

## HPC COMPANY DOCUMENT

# HINKLEY POINT C MATERIAL CHANGE APPLICATION - PRELIMINARY ENVIRONMENTAL INFORMATION REPORT - VOLUME 3: PROPOSED CHANGES OFF-SITE

Revision	01
Date of Issue	22.12.23
Document No.	101211878
Status	S2 - FIT FOR INFORMATION
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## DOCUMENT CONTROL

Revision	Purpose	Amendment	By	Date
01	S2 - FIT FOR INFORMATION	First issue	Isabelle Barnard	22/12/2023

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## 1. INTRODUCTION

### 1.1 Overview

1.1.1 This volume of the Preliminary Environmental Information Report ('PEIR') covers the proposed changes off-site to the Hinkley Point C Project. For an explanation of the difference between the proposed changes on-site and off-site to the Hinkley Point C Project, refer to **Section 1.3** in **Volume 1 Chapter 1**.

### 1.2 Proposed Changes Off-Site

1.2.1 NNB Generation Company (HPC) Limited ('NNB'), following extensive stakeholder engagement, has identified a package of compensatory measures that will ensure that the overall coherence of the National Sites Network ('NSN') is protected after the removal of the requirement to install the Acoustic Fish Deterrent ('AFD'). NNB is committed to the delivery of this package, referred to as "the proposed changes off-site", which comprise:

- Compensation for migratory fish species to improve successful migration, or easement of passage comprising works on three weir barriers. NNB has identified five potential locations where appropriate works to weirs would deliver

improvements to provide appropriate compensation. NNB is proposing to carry out works to three of the five weirs identified:

- Maisemore Weir on the River Severn;
- Trostrey Weir on the River Usk; and
- one further weir on the River Lugg (one of Mousenatch Weir, Eyton Weir or Coxall Weir), the River Towy (Manorafon Weir) or the River Severn (Upper Lode Weir).
  - Works at Maisemore on the River Severn and at Trostrey on the River Usk are presented as preferred proposals with one further location from the other three sites presented to be taken forward.
- Compensation for the marine species identified as the Severn Estuary Fish Assemblage, through improvements to, or creation of, habitats that will support the fish populations:
  - Creation or enhancement of approximately 340 ha of saltmarsh and associated habitats;
  - Creation / enhancement of 5 ha of seagrass bed;
  - Creation / enhancement of 15 ha of kelp forest;
  - Creation / enhancement of 1-2 ha of oyster bed, area dependent on location.
- An Adaptive Monitoring and Management Plan ('AMMP') - to provide reliable information on the

effectiveness and success of the implemented measures. Refer to **Section 3.1** in **Volume 1 Chapter 3** for further information about the AMMP.

- 1.2.2 Potential easement works at the weirs include full structural removal, bypass, or the provision of technical/natural fish passes. For the purposes of the assessments presented in this Volume, it has been assumed that the weirs would be fully removed, with associated bank works (where required), to significantly ease fish passage. Works associated with a bypass channel would be of a similar physical extent to the bank works associated with full removal. The works may be in different locations but would likely be of a similar footprint. Works to install a technical pass would likely be of a smaller nature and scale to full removal or the construction of a bypass channel. Work to refine the design and extent of work will be confirmed through further feasibility assessment and stakeholder engagement and the environmental impact of the proposed works will be assessed in the ES for the proposed material change application.

**Weir:** A weir is a flow control structure that is usually formed of a low level barrier across the width of a river. It is usually constructed from reinforced concrete or masonry and there are several typical forms they usually exhibit, but they will usually incorporate an apron, a weir crest and may also incorporate wingwalls/ headwall structures. Weirs are used to control river levels, and usually results in increased water levels upstream and a controlled discharge downstream. They are common throughout British waterways and have historically been used for flood prevention, flow measurement and navigation reasons.

**Weir removal:** In this context, weir removal refers to the full or partial removal of the main component of the weir structure (weir crest, apron and wingwalls if present) to return the watercourse to a more natural state. This process benefits environmental and ecological receptors (primarily fish and eel passage) but will likely result in reduced flow control and localised changes to geomorphology.

**Saltmarshes:** Saltmarshes are accumulations of mud and sand which support meadows of salt tolerant vegetation. Saltmarshes are found in sheltered estuaries and bays around the coast. They are inundated by tidal waters twice every day and are important habitats for plants and animals – birds, fish and invertebrates. Saltmarshes can also provide other benefits to mankind including recreation and wellbeing, flood and coastal defence, food provision and water quality improvement.

**Saltmarsh Restoration:** The most common way of creating new saltmarsh is to let water back into low lying agricultural areas that were historically saltmarsh. This can be done by creating breaches in the existing flood defences or by using structures to regulate the flow of water in and out. Where necessary new flood defences are then built further inland. The first scheme was completed in Essex in 1991 and since then around 90 schemes have been completed around the UK accreting approximately 2750 ha of habitat.

**Seagrass bed:** Seagrass ecosystems are well recognised as important nursery habitats, where juvenile and larval fish species can avoid predation and feed. In the UK and wider North Atlantic, the dominant seagrass species is the eelgrass *Zostera marina*. Within the Severn Estuary and Bristol Channel, *Z. marina* and the dwarf eelgrass *Z. noltei* are present in the subtidal and intertidal areas. As well as providing refuge for juvenile fish and invertebrates, seagrass can also provide spawning grounds for species including herring.

**Kelp forest:** Kelp forests create multi-dimensional habitats from the intertidal to subtidal zones, made up of several different layers: the holdfast, the stipe, and the frond. Each of these support organisms living directly on the kelp, as well as acting as habitat / refuge for species in the wider community. Kelp acts as a habitat engineer by modifying the local physical environment, with >1,800 species of plants and animals recorded within UK kelp forests, ranging from echinoderms, molluscs, crabs, lobsters and many fish species.

**Oyster bed:** Native oyster beds provide valuable ecosystem services, including enhanced fish production. Primarily found in shallow waters up to 10m, European oyster (*Ostrea edulis*) are habitat engineers, forming densely populated reefs (consisting of both live oysters and dead oyster shells), the structure of which supports a wide variety of flora and fauna. This can include high numbers of fish species, such as butterflyfish, five-bearded rockling, and blenny. Atlantic cod and European sea bass are also associated with oyster bed habitats.



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### Sites for delivery of the compensation package

- 1.2.3 As described in **Volume 1 Chapter 3**, NNB have identified sites for the delivery of parts of the compensation package.
- 1.2.4 The sites identified for the delivery of the saltmarsh and associated habitats are Pawlett Hams and The Island (both on the River Parrett).
- 3.1.1 The five potential options for the weirs are:
- Maisemore Weir on the River Severn;
  - Upper Lode Weir on the River Severn;
  - Weirs on the River Lugg (Mousenatch Weir, Eyton Weir and Coxall Weir);
  - Trostrey Weir on the River Usk; and
  - Manorafon Weir on the River Towy.
- 1.2.5 The sites for the delivery of the seagrass bed, kelp forest and oyster beds are yet to be identified. However, these would be delivered within the Severn Estuary/wider Bristol Channel, subject to detailed feasibility studies and site selection.

### 1.3 Order Limits

- 1.3.1 Some of the sites outlined in this chapter, if taken forward as part of the compensation package, would be within the Order Limits of the amended Development Consent Order ('DCO'). These sites are:
- Pawlett Hams;
  - The Island;
  - Maisemore Weir on the River Severn;
  - Upper Lode Weir on the River Severn; and
  - Weirs on the River Lugg (one of Mousenatch Weir, Eyton Weir or Coxall Weir).
- 1.3.2 The remaining sites for reasons including their location and subsequent available consenting regimes would be outwith the Order Limits of the DCO. These sites are:
- Trostrey Weir on the River Usk;
  - Manorafon Weir on the River Towy;
  - Seagrass bed;
  - Kelp forest; and
  - Oyster bed.

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## 1.4 Content of this Volume

- 1.4.1 The structure of this volume differs slightly from that of **Volume 2** as the proposed changes off-site were not originally anticipated and therefore not considered in the Scoping Report submitted to the Planning Inspectorate on 23 March 2022. It is also considered beneficial to split the volume by site, rather than by environmental Aspect. This is to allow consultees to easily review the preliminary environmental information on the site or sites most relevant to them.
- 1.4.2 The approach to scoping in relation to the proposed changes off-site that would form part of the Order Limits of the amended DCO is outlined in **Chapter 2**.
- 1.4.3 **Chapter 3** outlines the environmental Aspects considered in the original Environmental Statement ('ES') for the DCO application that have not been considered further in relation to the compensation package.
- 1.4.4 This volume then outlines the relevant legislation, policy and guidance in **Chapter 4** before providing an assessment of the likely significant effects of each of the proposed changes off-site for those remaining Aspects (see **Chapters 5 to 9** for the assessments of the sites within the Order Limits of the amended DCO). Note that the future baseline will remain largely

unchanged from the current baseline. On this basis, only the current baseline has been considered, unless stated otherwise.

- 1.4.5 The study areas for the assessments of Pawlett Hams and The Island in **Chapters 5 and 6** are based on the proposed Order Limits shown on **Volume 3 Figure 5** and **Volume 3 Figure 9**.
- 1.4.6 The study areas for the assessments of the removal of the English weirs in **Chapters 7 to 9** are based on the boundary of the Preferred Site Compound and Preferred Access Route shown on **Volume 3 Figure 12, Volume 3 Figure 15** and **Volume 3 Figure 18** in **PEIR Plans – Volume 3** (hereafter referred to as the 'Weir works boundary'). As it is not yet confirmed exactly what works will be undertaken at each of the weirs (this PEIR has assumed full removal), proposed Order Limits have not yet been developed. Potential Site Extents are shown on the figures referred to above, but the Preferred Site Compound and Preferred Access Route have been identified as the most feasible options to take forward.
- 1.4.7 The proposed scope of the updated Environmental Impact Assessment ('EIA') for the proposed changes off-site that would form part of the Order Limits of the amended DCO is then summarised (see **Chapter 10**).

- 1.4.8 The additional compensation measures (the remaining proposed changes off-site that would not form part of Order Limits of the amended DCO) are discussed in **Chapter 11**.
- 1.4.9 This volume is based on the information currently available about each of the sites. Further feasibility work is ongoing and will inform NNB, along with the responses received as part of this consultation, on the delivery of the compensation package.

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## 2. SCOPING

### 2.1 Overview

2.1.1 This Chapter outlines the approach to scoping in regard to the proposed changes to the Hinkley Point C Project off-site that would be within the Order Limits of the amended DCO:

- Pawlett Hams;
- The Island;
- Maisemore Weir on the River Severn;
- Upper Lode Weir on the River Severn; and
- Weirs on the River Lugg (one of Mousenatch Weir, Eyton Weir and Coxall Weir).

2.1.2 **Chapter 11** considers the other compensation measures that are proposed by NNB as part of its package of measures to compensate for the removal of the requirement to install an AFD:

- Trostrey Weir on the River Usk;
- Manorafon Weir on the River Towy;
- Seagrass habitat;
- Kelp habitat; and
- Oyster bed habitat.

### 2.2 Scoping

2.2.1 The proposed changes off-site required to compensate for the removal of the requirement to install an AFD were not established at the time of writing the Scoping Report for the proposed material change application. Therefore, the proposed changes off-site were not considered in the Scoping Report submitted to the Planning Inspectorate on 23 March 2022.

2.2.2 The Planning Inspectorate (on behalf of the Secretary of State) adopted the Scoping Opinion for the proposed changes on-site on 3 May 2022.

2.2.3 In accordance with Regulation 14(3) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (hereafter referred to as 'the 2017 EIA Regulations'), the ES must be based on the most recent scoping opinion adopted so far as the proposed development remains materially the same as the proposed development which was subject to that opinion.

2.2.4 The ES will be based on the most recent Scoping Opinion adopted. However, as the proposed changes off-site were not contemplated at the time of the scoping exercise in 2022, for the purpose of this PEIR a preliminary assessment of the likely significant effects of the proposed changes off-site against each

environmental Aspect has been undertaken. This has informed the scope of the EIA and which environmental Aspects should be included in the assessment.

- 2.2.5 The assessments outlined in this volume do not alter the assessments undertaken for the proposed changes on-site. The scope of the updated EIA in relation to the proposed changes on-site remains that outlined in **Volume 2**, in line with the Scoping Opinion.

## 3. ENVIRONMENTAL ASPECTS TO BE SCOPED OUT

### 3.1 Overview

- 3.1.1 Where it is considered that no pathway between environmental Aspects and the changes being proposed is possible, no assessment of likely significant effects has been undertaken for these Aspects. This approach might apply across all of the options for the delivery of the package of compensatory measures, while for some Aspects, this might only apply to particular sites.
- 3.1.2 A summary of where an assessment of likely significant effects has not been undertaken within this PEIR has been provided in **Table 3–1**, along with a justification as to why. It is proposed that these environmental Aspects either in their entirety, or in relation to the particular sites highlighted in **Table 3–1**, are scoped out of the updated EIA.

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**Table 3–1: Summary of environmental Aspects not assessed further**

Aspect	Justification	Compensation measure to not be assessed further				
		Pawlett Hams	The Island	Maisemore Weir on the River Severn	Upper Lode Weir on the River Severn	Weirs on the River Lugg
Spent fuel and radioactive waste management	See <b>Section 3.2</b>	X	X	X	X	X
Radiological	See <b>Section 3.3</b>	X	X	X	X	X
Coastal Hydrodynamics and Geomorphology	See <b>Section 3.4</b>	Being assessed, refer to <b>Chapter 5 and 6</b>	Being assessed, refer to <b>Chapter 5 and 6</b>	X	X	X
Marine Water and Sediment Quality	See <b>Section 3.5</b>	Being assessed, refer to <b>Chapter 5 and 6</b>	Being assessed, refer to <b>Chapter 5 and 6</b>	X	X	X
Marine Ecology	See <b>Section 3.6</b>	Being assessed, refer to <b>Chapter 5 and 6</b>	Being assessed, refer to <b>Chapter 5 and 6</b>	X	X	X
Shipping and Navigation	See <b>Section 3.7</b>	Being assessed, refer to <b>Chapter 5 and 6</b>	Being assessed, refer to <b>Chapter 5 and 6</b>	X	X	X
Offshore and intertidal archaeology	See <b>Section 3.8</b>	Being assessed, refer to <b>Chapter 5 and 6</b>	Being assessed, refer to <b>Chapter 5 and 6</b>	X	X	X
Major Accidents and Disasters	See <b>Section 3.9</b>	X	X	X	X	X

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## 3.2 Spent Fuel and Radioactive Waste Management

3.2.1 The proposed changes off-site included within the compensation package will not impact upon the storage or handling of spent fuel and radioactive waste, within the main Hinkley Point C development site. Modelling has been undertaken of the potential impacts associated within the storage of spent fuel and radioactive waste at the site and an Environmental Permit issued based upon the outcomes of the modelling. The addition of the elements of the compensation package to the DCO Order Limits for Hinkley Point C does not require additional modelling due to the source remaining unchanged. Therefore, Spent Fuel and Radioactive Waste Management has been scoped out from further consideration.

## 3.3 Radiological

3.3.1 The Environment Agency and Natural Resources Wales required an assessment of the likely impact of radioactive discharges on non-human species as part of the original permit application for radioactive substances activities under the Environmental Permitting Regulations 2016 (as amended). The methodology used to assess the impact was based on

a set of reference animals and plants onto which most species (including those local to the area) were assigned. The proposed changes included within the compensation package will have no impact on the basis for the original assessment, including the type of reference animals and plants used. Therefore, radiological impacts have been scoped out from further consideration.

## 3.4 Coastal Hydrodynamics and Geomorphology

3.4.1 Works at the Maisemore Weir, Upper Lode Weir and the River Lugg Weirs will be located above the Mean High Water Springs ('MHWS') tidal range level. Whilst changes to localised hydrodynamics and sediment transport regimes may arise through changes to the weirs, up to and including the full removal of the weir barriers, it is anticipated that these changes will be localised and restricted to the freshwater riverine environment. No pathway of effect is anticipated to affect the marine environment, therefore marine coastal hydrodynamics and geomorphology have been scoped out of impact assessments associated with the weir works.



### 3.5 Marine Water and Sediment Quality

3.5.1 Changes to weirs which are located within the freshwater riverine environments of the Severn and Usk have the potential to temporarily disturb sediments during the relevant works delivery, with the potential for sediment to enter the water column. However, whilst this sediment release has the potential to affect water quality, any changes are expected to occur within freshwater riverine environment in the vicinity of the relevant works. As these works will take place above MHWS, no pathway of effect to the marine environment is anticipated. Therefore, Marine Water and Sediment Quality have been scoped out of further impact assessment for the weir works with respect to impact on the marine environment.

### 3.6 Marine Ecology

3.6.1 There is the potential for works associated with the weirs on the Rivers Severn and Usk to affect populations of fish (including migratory fish) and other receptor groups such as macrophytes and invertebrates. Consideration of migratory fish which may pass through the marine environment to reach the weir sites is presented in **Volume 2 Chapter 5**.

3.6.2 Given that the weir works are located above MHWS, no pathway of effect is anticipated to the marine environment, therefore marine ecology has been scoped out of impact assessments associated with weir works.

### 3.7 Shipping and Navigation

3.7.1 Whilst any works in the aquatic environment have the potential to alter the navigability of a watercourse, it is not considered that there is significant shipping activity in the vicinity of the Maisemore Weir, Upper Lode Weir and the weirs on the River Lugg to be affected by the removal of the weirs.

3.7.2 On this basis, no pathway of effect is anticipated to shipping and navigation, and the Aspect has been scoped out of impact assessments associated with weir works.

### 3.8 Offshore and Intertidal Archaeology

3.8.1 Disturbance of the riverbed has the capacity to affect any archaeology / archaeological potential in the vicinity. However, it is expected that this will be restricted to the immediate works area. On that basis, no pathway of effect is anticipated to the marine /

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intertidal area, and so these have been scoped out of impact assessments associated with weir works.

### 3.9 Major Accidents and Disasters

3.9.1 The 2017 EIA Regulations state that significant adverse effects associated with risks of major accidents and disasters “*which are relevant to the project concerned*” should be described (Regulation 5(4)). As this is an application for a material change being submitted with an EIA prepared in accordance with the 2017 EIA Regulations, the nature and scale of the proposed changes off-site have been considered with regards to major accidents and disasters.

3.9.2 The approach to the assessment of Major accidents and disasters in EIA is still an emerging area of practice. The Institute of Environmental Management and Assessment (‘IEMA’) published Major Accidents and Disasters in EIA: A Primer<sup>1</sup> in 2020 in part to offer a possible assessment methodology. The definitions provided in the IEMA Primer have been considered:

- Major Accident: “*Events that threaten immediate or delayed serious environmental effects to human health, welfare and/or the environment and require*

*the use of resources beyond those of the client or its appointed representatives to manage. Whilst malicious intent is not accidental, the outcome (e.g. train derailment) may be the same and therefore many mitigation measures will apply to both deliberate and accidental events.”*

- Disaster: “*May be a natural hazard (e.g. earthquake) or a man-made/external hazard (e.g. act of terrorism) with the potential to cause an event or situation that meets the definition of a major accident.”*

3.9.3 In line with the definitions of major accidents and disasters set out above, foreseeable events are not within the scope of major accidents and disasters. Environmental effects of the proposed changes off-site in relation to foreseeable events have been considered in the Sections on Surface Water (flood risk) and Climate Change (vulnerability to climate change).

3.9.4 In regard to the proposed changes off-site, neither the creation or enhancement of saltmarsh and associated habitats nor the removal of weirs would increase the risk of major accidents and disasters, or be significantly affected by major accidents and disasters, so this

<sup>1</sup> IEMA (2020). Major Accidents and Disasters in EIA: A Primer.

Aspect has been scoped out from further consideration.

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## 4. LEGISLATION, POLICY AND GUIDANCE

4.1.1 In relation to the environmental Aspect assessments of the sites within the Order Limits of the amended DCO, this chapter presents the relevant legislation, policy and guidance. **Table 4–1** to **Table 4–3** summarise this legislation, policy and guidance.

**Table 4–1: Relevant Legislation**

<b>Legislation</b>
<b>Overarching</b>
Environment Act 2021 <sup>2</sup>
Environmental Protection Act 1990 (as amended) <sup>3</sup>
2017 EIA Regulations <sup>4</sup>
<b>Socio-economics</b>
N/A – no Aspect specific legislation not already covered under overarching legislation
<b>Transport</b>
N/A – no Aspect specific legislation not already covered under overarching legislation
<b>Conventional waste management</b>

<sup>2</sup> UK Government (2021). Environment Act 2021. [\[Online\]](#) Accessed 1 December 2023

<sup>3</sup> UK Government (1990). Environmental Protection Act 1990. [\[Online\]](#) Accessed 1 December 2023

<sup>4</sup> UK Government (2017). The Town and Country Planning (Environmental Impact Assessment) Regulations 2017. [\[Online\]](#) Accessed 1 December 2023

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<b>Legislation</b>
The Waste (England and Wales) Regulations 2011 (as amended) <sup>5</sup>
The Environmental Permitting (England and Wales) Regulations 2016 (as amended) <sup>6</sup>
The Waste Electrical and Electronic Equipment (England and Wales) Regulations 2013 (as amended) <sup>7</sup>
Hazardous Waste (England and Wales) Regulations 2005 (as amended) <sup>8</sup>
The Landfill (England and Wales) Regulations 2002 (as amended) <sup>9</sup>
<b>Noise and Vibration</b>
The Control of Pollution Act 1974 (as amended) <sup>10</sup>
<b>Air Quality</b>
Directive 2008/50/EC on ambient air quality and cleaner air for Europe <sup>11</sup> (hereafter ‘the Ambient Air Quality Directive’)
The Air Quality (Standards) Regulations 2010 (2016 as amended) <sup>12</sup>
The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 <sup>13</sup>
<b>Soils and Land Use</b>
N/A – no Aspect specific legislation not already covered under overarching legislation
<b>Geology and Land Contamination</b>

<sup>5</sup> UK Government (2020). The Waste (Circular Economy) (Amendment) Regulations 2020. [\[Online\]](#) Accessed 1 December 2023

<sup>6</sup> UK Government (2016). The Environmental Permitting (England and Wales) Regulations 2016. [\[Online\]](#) Accessed 1 December 2023

<sup>7</sup> UK Government (2013). The Waste Electrical and Electronic Equipment Regulations 2013. [\[Online\]](#) Accessed 1 December 2023

<sup>8</sup> UK Government (2005). The Hazardous Waste (England and Wales) Regulations 2005. [\[Online\]](#) Accessed 1 December 2023

<sup>9</sup> UK Government (2002). The Landfill (England and Wales) Regulations 2002. [\[Online\]](#) Accessed 1 December 2023

<sup>10</sup> UK Government (2023). The Control of Pollution Act 1974. [\[Online\]](#) Accessed 1 December 2023

<sup>11</sup> European Union (2008). Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe. [\[Online\]](#) Accessed 1 December 2023

<sup>12</sup> UK Government (2016). The Air Quality Standards (Amendment) Regulations 2016. [\[Online\]](#) Accessed 1 December 2023

<sup>13</sup> UK Government (2020). The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020. [\[Online\]](#) Accessed 1 December 2023

<b>Legislation</b>
The Contaminated Land (England) Regulations (Amendment) 2012 <sup>14</sup>
Water Framework Directive (Council Directive 2000/60/EC) <sup>15</sup>
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 <sup>16</sup>
<b>Groundwater</b>
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 <sup>16</sup>
Private Water Supplies (England) Regulations 2016 (as amended) <sup>17</sup>
Environmental Permitting (England and Wales) Regulations 2016 (as amended) <sup>6</sup>
Groundwater (Water Framework Directive) (England) Direction 2016 <sup>18</sup>
The Water Act 2014 <sup>19</sup>
Flood and Water Management Act 2010 <sup>20</sup>
The Flood Risk Regulations 2016 (as amended) <sup>21</sup>
Water Resources Act 1991 <sup>22</sup>
Climate Change Act 2008 <sup>23</sup>

<sup>14</sup> UK Government (2012). The Contaminated Land (England) Regulations (Amendment) 2012. [\[Online\]](#) Accessed 1 December 2023

<sup>15</sup> European Parliament and the council of European Union (2000). Directive 2000/60/EC of The European Parliament and of the council of 23 October 2000 establishing a framework for Community action in the field of water policy. *Official Journal of the European Communities*. [\[Online\]](#) Accessed 1 December 2023

<sup>16</sup> UK Government (2017). The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. [\[Online\]](#) Accessed 1 December 2023

<sup>17</sup> UK Government (2016). The Private Water Supplies (England) Regulations 2016. [\[Online\]](#) Accessed 1 December 2023

<sup>18</sup> UK Government (2016). The Groundwater (Water Framework Directive) (England) Direction 2016. [\[Online\]](#) Accessed 1 December 2023

<sup>19</sup> UK Government (2014). Water Act 2014. [\[Online\]](#) Accessed 1 December 2023

<sup>20</sup> UK Government (2010). Flood and Water Management Act 2010. [\[Online\]](#) Accessed 1 December 2023

<sup>21</sup> UK Government (2016). Part 1 Flood risk Activities. *The Environmental Permitting (England and Wales) Regulations 2016*. [\[Online\]](#) Accessed 1 December 2023

<sup>22</sup> UK Government (1991). Water Resources Act 1991. [\[Online\]](#) Accessed 1 December 2023

<sup>23</sup> UK Government (2008). Climate Change Act 2008 c.27. [\[Online\]](#) Accessed 1 December 2023

<b>Legislation</b>
<b>Surface Water</b>
The Water Environment (Water Framework Directive (WFD)) <sup>16</sup>
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 <sup>16</sup>
Environmental Permitting (England and Wales) Regulations 2016 (as amended). <sup>6</sup>
Land Drainage Act 1991 <sup>24</sup>
The Water Act 2014 <sup>19</sup>
Flood and Water Management Act 2010 <sup>20</sup>
The Flood Risk Regulations 2016 (as amended) <sup>21</sup>
Water Resources Act 1991 <sup>22</sup>
<b>Coastal Hydrodynamics and Geomorphology</b>
Flood and Water Management Act 2010 <sup>25</sup>
North Devon and Somerset Shoreline Management Plan Review (SMP2) Hartland Point to Anchor Head (2010) <sup>26</sup>
West Somerset Local Plan to 2032 – Adopted November 2016 <sup>27</sup>
<b>Marine Water and Sediment Quality</b>
Water Resources Act 1991
The EU Water Framework Directive ('WFD') (2000/60/EC) (WFD) <sup>28</sup>
Flood and Water Management Act 2010

<sup>24</sup> UK Government. (1991) Land Drainage Act 1991. [\[Online\]](#) Accessed 1 December 2023

<sup>25</sup> UK Government. (2010) Flood and Water Management Act 2010. [\[Online\]](#) Accessed 1 December 2023

<sup>26</sup> North Devon and Somerset Coastal Advisory Group (2010) Shoreline Management Plan SMP2, Hartland Point to Anchor Head, October 2010. [\[Online\]](#) Accessed 1 December 2023

<sup>27</sup> West Somerset District Council (2016) West Somerset Local Plan to 2032. [\[Online\]](#) Accessed 1 December 2023

<sup>28</sup> Water Framework Directive (WFD) 2000/60/EC. Available online at: <https://www.eea.europa.eu/policy-documents/water-framework-directive-wfd-2000> (Accessed October 2023)

<b>Legislation</b>
The Bathing Water Regulations 2013 <sup>29</sup>
<b>Marine Ecology</b>
Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora ('Habitats Directive') <sup>30</sup>
The Conservation of Habitats and Species Regulations 2017 <sup>31</sup>
The Wildlife and Countryside Act 1981 <sup>32</sup>
Marine and Coastal Access Act ('MCAA') 2009
<b>Ecology (terrestrial and freshwater) and Ornithology</b>
The Conservation of Habitats and Species Regulations 2017 (as amended) <sup>31</sup>
Wildlife and Countryside Act 1981 (as amended) <sup>32</sup>
Natural Environment and Rural Communities Act 2006 (NERC) <sup>33</sup>
Countryside and Rights of Way Act 2000 (as amended) (hereafter referred to as 'The CROW Act') <sup>34</sup>
Protection of Badgers Act 1992 <sup>35</sup>
Wild Mammals (Protection) Act 1996 <sup>36</sup>
The Hedgerows Regulations 1997 <sup>37</sup>
The Eels (England and Wales) Regulations 2009

<sup>29</sup> UK Government (2013). The Bathing Water Regulations 2013 [\[Online\]](#) Accessed 1 December 2023

<sup>30</sup> European Union (1992). Council Directive 92/43/EEC (1992) on the conservation of natural habitats and of wild fauna and flora. [\[Online\]](#) Accessed 1 December 2023

<sup>31</sup> UK Government (2017). The Conservation of Habitats and Species Regulations 2017. [\[Online\]](#) Accessed 1 December 2023

<sup>32</sup> UK Government (1981). Wildlife and Countryside Act 1981. [\[Online\]](#) Accessed 1 December 2023

<sup>33</sup> UK Government (2006). Natural Environment and Rural Communities Act 2006. [\[Online\]](#) Accessed 1 December 2023

<sup>34</sup> UK Government (2000). Countryside and Rights of Way Act 2000. [\[Online\]](#) Accessed 1 December 2023

<sup>35</sup> UK Government (1992). Protection of Badgers Act 1992. [\[Online\]](#) Accessed 1 December 2023

<sup>36</sup> UK Government (1996). Wild Mammals (Protection) Act 1996. [\[Online\]](#) Accessed 1 December 2023

<sup>37</sup> UK Government (1997). The Hedgerows Regulations 1997. [\[Online\]](#) Accessed 1 December 2023



NOT PROTECTIVELY MARKED

<b>Legislation</b>
Salmon and Freshwater Fisheries Act 1975 (as amended)
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. <sup>16</sup>
<b>Landscape and Visual</b>
National Parks and Access to the Countryside Act 1949 as amended by the Environment Act 1995 <sup>38</sup>
The Countryside and Rights of Way Act (2000) <sup>34</sup>
<b>Historic Environment</b>
The Town and Country Planning Act (1971) as amended by the Planning (Listed Buildings and Conservation Areas Act) 1990 <sup>39</sup>
<b>Offshore and Intertidal Archaeology</b>
Ancient Monuments and Archaeological Areas Act 1979 <sup>40</sup>
Protection of Wrecks Act 1973 <sup>41</sup>
Merchant Shipping Act 1995 <sup>42</sup>
Marine Policy Statement ('MPS') 2011 and Marine Plans drawn up under the Marine and Coastal Access Act 2009
<b>Amenity and recreation</b>
N/A – no Aspect specific legislation not already covered under overarching legislation
<b>Shipping and Navigation</b>
United Nations Convention on the Law of the Sea ('UNCLOS') (United Nations ('UN'), 1982) <sup>43</sup>

<sup>38</sup> UK Government (1949). National Parks and Access to the Countryside Act 1949. [\[Online\]](#) Accessed 1 December 2023

<sup>39</sup> UK Government (1971). Town and Country Planning Act 1971. [\[Online\]](#) Accessed 1 December 2023

<sup>40</sup> UK Government (1979). Ancient Monuments and Archaeological Areas Act 1979. [\[Online\]](#) Accessed 1 December 2023

<sup>41</sup> UK Government (1973). Protection of Wrecks Act 1973. [\[Online\]](#) Accessed 1 December 2023

<sup>42</sup> UK Government (1995). Merchant Shipping Act 1995. [\[Online\]](#) Accessed 1 December 2023

<sup>43</sup> United Nations (1982). United Nations Convention on the Law of the Sea. [\[Online\]](#) Accessed 1 December 2023

<b>Legislation</b>
Convention on the International Regulations for Preventing Collisions at Sea ('COLREGs') (International Maritime Organization ('IMO'), 1972/77) <sup>44</sup>
Safety of Life at Sea ('SOLAS') Chapter V (IMO, 1974) <sup>45</sup>
<b>Population and Human Health</b>
N/A – no Aspect specific legislation not already covered under overarching legislation
<b>Climate Change</b>
The Greenhouse Gas Emissions Regulations 2021 <sup>46</sup>
The Paris Agreement <sup>47</sup>
Climate Change Act 2008 <sup>23</sup>
Climate Change Act 2008 (2050 Target Amendment) Order 2019 <sup>48</sup>
Planning Act 2008. Part 9. Chapter 2. Climate Change <sup>49</sup>

<sup>44</sup> International Maritime Organization (1972/77). Convention on International Regulations for Preventing Collisions at Sea (COLREGs). London; IMO.

<sup>45</sup> International Maritime Organization (1974). International Convention for the Safety of Life at Sea Chapter V (SOLAS). [\[Online\]](#) Accessed 1 December 2023

<sup>46</sup> UK Government (2021). The Greenhouse Gas Emissions (Kyoto Protocol Registry) Regulations 2021. [\[Online\]](#) Accessed 1 December 2023

<sup>47</sup> UNFCCC (2015). Adoption of the Paris Agreement. [\[Online\]](#) Accessed 1 December 2023

<sup>48</sup> UK Government (2019). The Climate Change Act 2008 (2050 Target Amendment) Order 2019. [\[Online\]](#) Accessed 1 December 2023

<sup>49</sup> UK Government (2008) Part 9 Chapter 2 Climate Change. *Planning Act 2008*. [\[Online\]](#) Accessed 4 December 2023

Table 4–2: Relevant Policy

<b>Policy</b>
<b>All Aspects</b>
Sections of the National Policy Statements (NPSs), including The Overarching NPS for Energy (EN-1) <sup>50</sup> and Nuclear Power Generation (EN-6) <sup>51</sup>
National Planning Policy Framework 2023 <sup>52</sup>
West Somerset Local Plan to 2032 <sup>27</sup> (relevant to the assessments of Pawlett Hams and The Island)
The Sedgemoor Local Plan 2011 – 2032 <sup>53</sup> (relevant to the assessments of Pawlett Hams and The Island)
Sedgemoor District Local Plan; Sustainability Appraisal. Draft Post Examination Addendum Report 2017 <sup>54</sup> (relevant to the assessments of Pawlett Hams and The Island)
Gloucester, Cheltenham and Tewkesbury Joint Core Strategy to 2031 <sup>55</sup> A Strategic and Local Plan (SLP) is currently being produced. (relevant to the assessments of Maisemore Weir and Upper Lode Weir on the River Severn)
Gloucester City Council Local Plan to 2031 <sup>56</sup> (relevant to the assessments of Maisemore Weir and Upper Lode Weir on the River Severn)
Herefordshire Council, Core Strategy 2011-2031. Herefordshire Council is currently developing the updated Local Plan 2021-2041 <sup>57</sup> (relevant to the assessment of the Weirs on the River Lugg)
<b>Conventional waste management</b>

<sup>50</sup> Department for Energy Security and Net Zero (2023). Overarching National Policy Statement for Energy (EN-1). [\[Online\]](#) Accessed 4 December 2023

<sup>51</sup> Department for Energy and Climate Change (2011). National Policy Statement for Nuclear Power Generation (EN-6). [\[Online\]](#) Accessed 4 December 2023

<sup>52</sup> Ministry of Housing, Communities and Local Government (2023). National Planning Policy Framework. [\[Online\]](#) Accessed 4 December 2023

<sup>53</sup> Somerset Council (2019). The Sedgemoor Local plan 2011-2032. [\[Online\]](#) Accessed 4 December 2023

<sup>54</sup> Sedgemoor District Council (2017). Sustainability Appraisal. Draft Post Examination Addendum Report 2017. [\[Online\]](#) Accessed 4 December 2023

<sup>55</sup> Gloucester, Cheltenham and Tewkesbury (2017) Local Joint Core Strategy 2011-2023. [\[Online\]](#) Accessed 4 December 2023

<sup>56</sup> Gloucester City Council (2023) Local Plan 2011 – 2031. [\[Online\]](#) Accessed 4 December 2023

<sup>57</sup> Herefordshire Council (2015), Core Strategy 2011-2031. [\[Online\]](#) Accessed 4 December 2023

<b>Policy</b>
Waste Management Plan for England 2021 <sup>58</sup>
Government Review of Waste Policy in England 2011 <sup>59</sup>
National Planning Policy for Waste <sup>60</sup> (supersedes the Waste Strategy for England, 2007)
Department for Environment, Food & Rural Affairs (Defra) Resources and Waste Strategy for England (2018) <sup>61</sup>
Waste Core Strategy: Development Plan Document up to 2028 <sup>62</sup>
Gloucestershire Waste Core Strategy, adopted in November 2012 <sup>63</sup> (relevant to the assessments of Maisemore Weir and Upper Lode Weir on the River Severn)
Integrated Waste Management Strategy 2021-2035 <sup>64</sup> (relevant to the assessment of the Weirs on the River Lugg)
<b>Socio-economics</b>
N/A – no Aspect specific policies not already covered under overarching policy
<b>Transport</b>
Gloucestershire Local Transport Plan 2020- 2041 <sup>65</sup> (relevant to the assessments of Maisemore Weir and Upper Lode Weir on the River Severn)
Worcestershire Local Transport Plan 3 – Multi-model Freight Policy <sup>66</sup> (relevant to the assessments of the weirs on the River Lugg)

<sup>58</sup> Department for Environment, Food & Rural Affairs (DEFRA) (2021) Waste Management Plan for England 2021. [\[Online\]](#) Accessed 4 December 2023

<sup>59</sup> Department for Environment, Food & Rural Affairs (DEFRA) (2011) Government review of waste policy in England 2011. [\[Online\]](#) Accessed 4 December 2023

<sup>60</sup> Department for Communities and Local Government (2014) National planning policy for waste. [\[Online\]](#) Accessed 4 December 2023

<sup>61</sup> Department for Environment Food and Rural Affairs (DEFRA) and Environment Agency (EA) (2018). Resources and Waste Strategy for England. [\[Online\]](#) Accessed 4 December 2023

<sup>62</sup> Somerset County Council (2013) Somerset Waste Core Strategy 2028. [\[Online\]](#) Accessed 4 December 2023

<sup>63</sup> Gloucestershire City Council (2012) Gloucestershire Waste Core Strategy. [\[Online\]](#) Accessed 4 December 2023

<sup>64</sup> Herefordshire Council (2022) Integrated Waste Management Strategy 2021-2035. [\[Online\]](#) Accessed 4 December 2023

<sup>65</sup> Gloucestershire County Council (2021) Gloucestershire Local Transport Plan 2020 – 2041. [\[Online\]](#) Accessed 4 December 2023

<sup>66</sup> Worcestershire County Council (2011) Worcestershire Local Transport Plan 3 – Multimodel Freight Policy. [\[Online\]](#) Accessed 4 December 2023

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<b>Policy</b>
Somerset’s Future Transport Plan 2011 – 2026 <sup>67</sup> (relevant to the assessments of Pawlett Hams and The Island)
Bridgwater, Taunton and Wellington Future Transport Strategy 2011 - 2026 <sup>68</sup>
<b>Noise and Vibration</b>
The Noise Policy Statement for England <sup>69</sup>
Planning Practice Guidance: Noise <sup>70</sup>
<b>Air Quality</b>
The National Air Quality Strategy for England, Scotland, Wales and Northern Ireland <sup>71</sup>
The Clean Air Strategy (Department for Environment, Food & Rural Affairs (Defra)) <sup>72</sup>
<b>Soils and Land Use</b>
N/A – no Aspect specific policies not already covered under overarching policy
<b>Geology and Land Contamination</b>
N/A – no Aspect specific policies not already covered under overarching policy
<b>Groundwater</b>
N/A – no Aspect specific policies not already covered under overarching policy

<sup>67</sup> Somerset County Council (2011) Future Transport Plan 2011 – 2026. [\[Online\]](#) Accessed 4 December 2023

<sup>68</sup> Somerset County Council (2011) Bridgwater, Taunton and Wellington Future Transport Strategy 2011 – 2026. [\[Online\]](#) Accessed 4 December 2023

<sup>69</sup> Department for Environment, Food and Rural Affairs (DEFRA) (2010) Noise policy statement for England. [\[Online\]](#) Accessed 4 December 2023

<sup>70</sup> Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2019) Planning practice guidance: Noise. [\[Online\]](#) Accessed 4 December 2023

<sup>71</sup> Department for Environment, Food and Rural Affairs (DEFRA) Welsh Government, The Scottish Government, and Department of Agriculture, Environment and Rural Affairs (Northern Ireland) (2007). The air quality strategy for England, Scotland, Wales and Northern Ireland: Volume 1. [\[Online\]](#) Accessed 4 December 2023

<sup>72</sup> Department for Environment, Food and Rural Affairs (DEFRA) Welsh Government, The Scottish Government, and Department of Agriculture, Environment and Rural Affairs (Northern Ireland) (2019). Clean Air Strategy 2019. [\[Online\]](#) Accessed 4 December 2023

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<b>Policy</b>
<b>Surface Water</b>
N/A – no Aspect specific policies not already covered under overarching policy
<b>Coastal Hydrodynamics and Geomorphology</b>
N/A – no Aspect specific policies not already covered under overarching policy
<b>Marine Water and Sediment Quality</b>
N/A – no Aspect specific policies not already covered under overarching policy
<b>Marine Ecology</b>
North Devon and Somerset Shoreline Management Plan Review (SMP2) Hartland Point to Anchor Head (2010) <sup>73</sup>
<b>Ecology (terrestrial and freshwater) and Ornithology</b>
N/A – no Aspect specific policies not already covered under overarching policy
<b>Landscape and Visual</b>
N/A – no Aspect specific policies not already covered under overarching policy
<b>Historic Environment</b>
N/A – no Aspect specific policies not already covered under overarching policy
<b>Offshore and Intertidal Archaeology</b>
N/A – no Aspect specific policies not already covered under overarching policy
<b>Amenity and recreation</b>
Public Path Orders (PPOs) <sup>74</sup>

<sup>73</sup> North Devon and Somerset Coastal Authorities Group (2010) Shoreline Management Plan Review (SMP2) Hartland Point to Anchor Head. [\[Online\]](#) Accessed 6 December 2023.

<sup>74</sup> UK Government (1990) Public Path Orders (PPOs). [\[Online\]](#) Accessed 4 December 2023

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<b>Policy</b>
<b>Shipping and Navigation</b>
South West Inshore and South West Offshore Marine Plan <sup>75</sup>
<b>Population and Human Health</b>
Public Health England Strategy: Healthy Lives, Healthy People <sup>76</sup>
<b>Climate Change</b>
N/A – no Aspect specific policies not already covered under overarching policy

**Table 4–3: Relevant Guidance**

<b>Guidance</b>
<b>Conventional waste management</b>
Institute of Environmental Management and Assessment (IEMA) Guide to: Materials and Waste in Environmental Impact Assessment – Guidance for a Proportionate Approach <sup>77</sup>
Definition of Waste: Code of Practice <sup>78</sup>
<b>Socio-economics</b>
IEMA Guide to Socio-economic assessment and improving EIA <sup>79</sup>
The Planning Practice Guidance “Healthy and safe communities” <sup>80</sup>

<sup>75</sup> Defra (2018). South West Inshore and South West Offshore Marine Plan. [\[Online\]](#) Accessed 4 December 2023

<sup>76</sup> HM Government (2010) Public Health England Strategy: Healthy Lives, Healthy People. [\[Online\]](#) Accessed 4 December 2023

<sup>77</sup> Institute of Environmental Management and Assessment (IEMA) (2020) IEMA guide to: Materials and Waste in Environmental Impact Assessment. [\[Online\]](#) Accessed 4 December 2023

<sup>78</sup> CL:AIRE (2011) Definition of Waste: Code of Practice. [\[Online\]](#) Accessed 4 December 2023

<sup>79</sup> Institute of Environmental Management and Assessment (IEMA) (2014) Guide to Socio-economic assessment and improving EIA. [\[Online\]](#) Accessed 4 December 2023

<sup>80</sup> Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2019) Health and safe communities. [\[Online\]](#) Accessed 4 December 2023

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<b>Guidance</b>
<b>Transport</b>
N/A – no Aspect specific guidance. Assessment of impacts produced in accordance with the documents referred to in Table 4–2
<b>Noise and Vibration</b>
BS 5228-1:2009+A1:2014 Noise and vibration control on construction and open sites. Part 1 - Noise <sup>81</sup>
BS 5228-2:2009+A1:2014 Noise and vibration control on construction and open sites. Part 2 - Vibration <sup>82</sup>
'Calculation of Road Traffic Noise' <sup>83</sup>
DMRB, Sustainability and Environment, Appraisal, Noise and Vibration (LA 111 Version 2) <sup>84</sup>
Guidelines for Environmental Noise Impact Assessment <sup>85</sup>
<b>Air Quality</b>
Institute of Air Quality Management (IAQM) Guidance on the assessment of dust from demolition and construction <sup>86</sup>
Defra Local Air Quality Management Technical Guidance (TG22) <sup>87</sup>
Environmental Protection UK (EPUK) & IAQM & IAQM, Land-Use planning & Development Control: Planning for Air Quality <sup>88</sup>
IAQM A guidance to the assessment of air quality impacts on designated nature conservation sites 2020 <sup>89</sup>

<sup>81</sup> BSI (2014) Code of practice for noise and vibration control on construction and open sites – Noise. [\[Online\]](#) Accessed 4 December 2023

<sup>82</sup> BSI (2014) Code of practice for noise and vibration control on construction and open sites – Vibration. [\[Online\]](#) Accessed 4 December 2023

<sup>83</sup> Department for Transport and the Welsh Office (1988) Calculation of Road Traffic Noise' (CRTN). [\[Online\]](#) Accessed 4 December 2023

<sup>84</sup> Highways England (2020) DMRB, Sustainability and Environment, Appraisal, Noise and Vibration (LA111 Version 2). [\[Online\]](#) Accessed 4 December 2023

<sup>85</sup> Institute of Environmental Management and Assessment (IEMA) (2014) Guidelines for Environmental Noise Impact Assessment. [\[Online\]](#) Accessed 4 December 2023

<sup>86</sup> Institute of Air Quality Management (IAQM) (2023). Guidance on the assessment of dust from demolition and construction, v2.1. 2023. [\[Online\]](#) Accessed 4 December 2023

<sup>87</sup> Department for Environment, Food and Rural Affairs (DEFRA), Welsh Government, The Scottish Government, and Department of Agriculture, Environment and Rural Affairs (Northern Ireland) (2022). Local Air Quality Management Technical Guidance (TG22). [\[Online\]](#) Accessed 4 December 2023

<sup>88</sup> Environmental Protection UK (EPUK) & the Institute of Air Quality Management (IAQM) (2017). Land-Use Planning & Development Control: Planning for Air Quality, v1.1. January 2017. [\[Online\]](#) Accessed 4 December 2023

<sup>89</sup> Institute of Air Quality Management (IAQM) (2020). A guidance to the assessment of air quality impacts on designated nature conservation sites 2020. [\[Online\]](#) Accessed 4 December 2023



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<b>Guidance</b>
<b>Soils and Land Use</b>
Planning Inspectorate Advice Note 7 <sup>90</sup>
Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land <sup>91</sup>
Good Practice Guide for Handling Soils in Mineral Workings <sup>92</sup>
Construction Code of Practice for the Sustainable Use of Soils on Construction Sites <sup>93</sup>
BS 8601:2013 Specification for subsoil and requirements for use <sup>94</sup>
BS 3882:2015, Specification for Topsoil <sup>95</sup>
CL:AIRE The Definition of Waste: Development Industry Code of Practice (DoW:CoP) <sup>96</sup>
<b>Geology and Land Contamination</b>
Land Contamination Risk Management (LCRM) <sup>97</sup>
<b>Groundwater</b>
The UK Technical Advisory Group (UKTAG) guidance 2008 <sup>98</sup>
<b>Surface Water</b>
N/A – no Aspect specific guidance. Assessment of impacts produced in accordance with the technical guidance related to the NPPF.

<sup>90</sup> The Planning Inspectorate (2020) Advice Note 7. [\[Online\]](#) Accessed 4 December 2023

<sup>91</sup> Ministry of Agriculture, Fisheries and Food (MAFF) (1988) Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land. [\[Online\]](#) Accessed 4 December 2023

<sup>92</sup> Institute of Quarrying (2021) Good Practice Guide for Handling Soils in Mineral Workings. [\[Online\]](#) Accessed 4 December 2023

<sup>93</sup> Department for Environment, Food & Rural Affairs (DEFRA) (2011) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites. [\[Online\]](#) Accessed 4 December 2023

<sup>94</sup> BSI (2013) BS 8601:2013 Specification for subsoil and requirements for use. [\[Online\]](#) Accessed 4 December 2023

<sup>95</sup> BSI (2015) BS 3882:2015, Specification for Topsoil. [\[Online\]](#) Accessed 4 December 2023

<sup>96</sup> CL:AIRE (2011) CL:AIRE The Definition of Waste: Development Industry Code of Practice (DoW:CoP). [\[Online\]](#) Accessed 4 December 2023

<sup>97</sup> Environment Agency (2020). Land Contamination Risk Management (LCRM). [\[Online\]](#) Accessed 4 December 2023

<sup>98</sup> UK Technical Advisory Group (2008) UK Environmental Standards and Conditions. [\[Online\]](#) Accessed 4 December 2023

NOT PROTECTIVELY MARKED

<b>Guidance</b>
<b>Coastal Hydrodynamics and Geomorphology</b>
Joint Defra / Environment Agency Flood and Coastal Erosion Risk Management R&D Programme Saltmarsh Management Manual <sup>99</sup>
<b>Marine Water and Sediment Quality</b>
Cefas Guideline Action Levels for the Disposal of Dredged Material <sup>100</sup>
Canadian Sediment Quality Guidelines for the Protection of Aquatic Life <sup>101</sup>
Control of water pollution from construction sites. Guidance for consultants and contractors (C532) <sup>102</sup>
<b>Marine Ecology</b>
N/A – no Aspect specific guidance.
<b>Ecology (terrestrial and freshwater) and Ornithology</b>
Guidelines for Ecological Impact Assessment: Terrestrial, Freshwater, Coastal and Marine <sup>103</sup>
<b>Landscape and Visual</b>
Guidelines for Landscape and Visual Impact Assessment, Third Edition <sup>104</sup> (GLVIA3)
<b>Historic Environment</b>
Understanding Place, Historic Area Assessments <sup>105</sup>

<sup>99</sup> Environment Agency (2007) Joint Defra / Environment Agency Flood and Coastal Erosion Risk Management R&D Programme Saltmarsh management manual. [\[Online\]](#) Accessed 6 December 2023.

<sup>100</sup> Cefas (n.d.) Cefas Guideline Action Levels for the Disposal of Dredged Material. [\[Online\]](#) Accessed 6 December 2023.

<sup>101</sup> Canadian Council of Ministers of the Environment (2001) Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. [\[Online\]](#) Accessed 6 December.

<sup>102</sup> Construction Industry Research and Information Association (CIRIA) (2001) Control of water pollution from construction sites. Guidance for consultants and contractors (C532).

<sup>103</sup> Chartered Institute of Ecology and Environmental Management (2018). Guidelines for Ecological Impact Assessment: Terrestrial, Freshwater, Coastal and Marine. [\[Online\]](#) Accessed 4 December 2023

<sup>104</sup> The Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment Third Edition (GLVIA3). Abingdon, Routledge.

<sup>105</sup> Historic England (2017) Understanding Place, Historic Area Assessments. [\[Online\]](#) Accessed 4 December 2023

<b>Guidance</b>
The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning Note 3 (Second Edition) (2017) <sup>106</sup>
<b>Offshore and Intertidal Archaeology</b>
COWRIE: Historic Environment Guidance for the Offshore Renewable Energy Sector (2007) <sup>107</sup>
Chartered Institute for Archaeologists ('CIfA') (2020) Standard and Guidance for Historic Environment Desk-Based Assessment <sup>108</sup>
<b>Amenity and recreation</b>
The Planning Practice Guidance “Healthy and safe communities” <sup>80</sup>
<b>Shipping and Navigation</b>
IMO Guidelines for Formal Safety Assessment (FSA) <sup>109</sup>
MGN 654 Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response <sup>110</sup>
International Association of Marine Aids to Navigation and Lighthouse Authorities ('IALA') Recommendation O-139 The Marking of Man-Made Structures <sup>111</sup>
IALA Guideline G1162: The Marking of Offshore Man-Made Structures <sup>112</sup>
<b>Population and Human Health</b>

<sup>106</sup> Historic England (2017) The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning Note 3 (Second Edition) [\[Online\]](#) Accessed 4 December 2023

<sup>107</sup> Wessex Archaeology (2007). Historic Environment Guidance for the Offshore Renewable Energy Sector [\[Online\]](#) Accessed 4 December 2023

<sup>108</sup> Chartered Institute for Archaeologists (2020) Standard and guidance for historic environment desk-based assessment [\[Online\]](#) Accessed 4 December 2023

<sup>109</sup> International Maritime Organisation (2018) MSC-MEPC.2/Circ.12/Rev.2. Revised Guidelines for Formal Safety Assessment (FSA) For use in the IMO Rule-Making Process. [\[Online\]](#) Accessed 6 December 2023.

<sup>110</sup> Maritime and Coastguard Agency (2021) MGN 654 Safety of navigation: OREIs – Guidance on UK navigational practice, safety and emergency response. [\[Online\]](#) Accessed 6 December 2023.

<sup>111</sup> International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) (2021) IALA Recommendation R0139 (O-139) The Marking of Man-Made Structures. [\[Online\]](#) Accessed 6 December 2023.

<sup>112</sup> IALA (2021) IALA Guideline G1162 The Marking of Offshore Man-Made Structures. [\[Online\]](#) Accessed 6 December 2023.

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<b>Guidance</b>
IEMA Guide to Effective Scoping of Health in Environmental Impact Assessment <sup>113</sup>
IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment <sup>114</sup>
IEMA Environmental Assessment of Traffic and Movement <sup>115</sup>
The Planning Practice Guidance “Healthy and safe communities” <sup>80</sup>
<b>Climate Change</b>
UK Climate Projections 2018 (UKCP18) <sup>116</sup>
Environment Agency, Flood Risk Assessment: Climate Change Allowances <sup>117</sup>
PAS 2080:2023 Carbon Management in Infrastructure <sup>118</sup>
GHG Protocol <sup>119</sup>
IEMA – EIA Guidance on Assessing GHG Emissions <sup>120</sup>

<sup>113</sup> Institute of Environmental Management and Assessment (IEMA) (2022) Guide to Effective Scoping of Health in Environmental Impact Assessment [\[Online\]](#) Accessed 4 December 2023

<sup>114</sup> Institute of Environmental Management and Assessment (IEMA) (2022) Guide to Determining Significance For Human Health In Environmental Impact Assessment. [\[Online\]](#) Accessed 18 December 2023.

<sup>115</sup> Institute of Environmental Management and Assessment (2023) IEMA Environmental Assessment of Traffic and Movement. [\[Online\]](#) Accessed 4 December 2023

<sup>116</sup> Met Office (2018). UK Climate Projections (UKCP). [\[Online\]](#) Accessed 4 December 2023

<sup>117</sup> Environment Agency (EA) (2016). Flood risk assessments: climate change allowances. [\[Online\]](#) Accessed 4 December 2023

<sup>118</sup> British Standards Institute (2016). Carbon Management in Infrastructure. [\[Online\]](#) Accessed 4 December 2023

<sup>119</sup> World Business Council for Sustainable Development and World Resources Institute (2001) Greenhouse Gas Protocol. A Corporate Accounting and Reporting Standard. [\[Online\]](#) Accessed 4 December 2023

<sup>120</sup> Institute of Environmental Management and Assessment (IEMA). (2022). EIA Guidance on Assessing GHG Emissions. [\[Online\]](#) Accessed 4 December 2023

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## 5. PAWLETT HAMS

### 5.1 Conventional Waste Management

#### Introduction

5.1.1 This section considers the generation and management of conventional waste resulting from the proposals at Pawlett Hams. It does not include radioactive waste and materials management.

5.1.2 The aim of this section is to:

- Evaluate potential construction and operation activities associated with the proposed compensation measures at Pawlett Hams and identify the activities that could lead to significant environmental effects.
- Identify relevant receptors which could potentially be impacted by conventional waste management associated with the construction and operation of the proposed compensation measures.
- Outline a proposed scope and methodology for the assessment of potential conventional waste

management effects of the proposals at Pawlett Hams on the environment within the ES.

#### Study Area

5.1.3 As defined in *IEMA Guide to: Materials and Waste in Environmental Impact Assessment*<sup>121</sup>, two geographically different study areas should be determined. These have been defined as:

- Project Study Area, which comprises all land contained within a site boundary. Within these areas waste is generated and managed, including any areas identified for temporary uses such as temporary accesses, site compounds and other enabling works. In the context of this chapter, the Project Study Area covers the proposed Order Limits (refer to **paragraph 1.4.5 in Chapter 1**) and is located in Somerset, in the River Parrett estuary.
- Expansive Study Area provides the boundary for appreciation of the capacity of relevant waste management infrastructure, including remaining landfill voids. This is considered on a regional basis, within one or more regions as appropriate. The proposed compensation measures at Pawlett

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<sup>121</sup> Institute of Environmental Management and Assessment (2020) *IEMA Guide to: Materials and Waste in Environmental Impact Assessment*.[\[Online\]](#) Accessed 6 December 2023.

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Hams are located in the South West region, which in the context of this chapter comprises Bristol, Cornwall (including the Isles of Scilly), Dorset, Devon, Gloucestershire, Somerset and Wiltshire.

## Baseline

### Current Baseline

- 5.1.4 In the context of this chapter, the sensitive receptor is landfill capacity for waste, as detailed in *IEMA guide to: Materials and Waste in Environmental Impact Assessment*.
- 5.1.5 No conventional waste generation and management related to operation of the proposed compensation measures at Pawlett Hams have been identified. It is therefore proposed they are scoped out.
- 5.1.6 Information provided in *Waste Management in the South West: Data Tables 2022*<sup>122</sup> allows the assessment of the opportunities for waste arisings to be transferred, treated, recycled, recovered or disposed as appropriate within the region, if they

cannot be reused, recycled or otherwise recovered on-site.

- 5.1.7 Whilst annual capacity data are published by the Environment Agency for both landfill and incineration facilities at the national, regional, and sub-regional level, no annual capacity data are published by the Environment Agency for waste transfer, treatment, or recycling sites. Only annual throughput is published for these facilities. The total annual throughput or capacity reported is detailed in **Table 5–1**.

**Table 5–1: Annual permitted throughput or capacity of transfer, treatment, recycling and incineration in the South West, 2022**

Site type	South West (000s tonnes)
<b>Transfer (annual throughput)</b>	
Hazardous waste transfer stations	594
Household, industrial, commercial waste transfer stations	2,343
Non-biodegradable waste transfer stations	26
<b>Treatment and metal recycling (annual throughput)</b>	

<sup>122</sup> Environment Agency (2023) *Waste Management in the South West: Data Tables*. [\[Online\]](#)  
Accessed 6 December 2023.

Site type	South West (000s tonnes)
Material recovery	764
Physical treatment	3,313
Physico-chemical treatment	497
Chemical treatment	35
Composting	548
Biological treatment	2,987
Metal recycling	1,177
<b>Incineration (annual capacity)</b>	
Hazardous waste	9
Co-incineration of non-hazardous waste	0
Municipal and/or industrial & commercial incineration	1,505
Biomass/waste wood incineration	0

5.1.8 For wastes which cannot be reused, recycled or otherwise recovered, disposal to landfill will be required. The total remaining landfill capacity in 2022, as presented in **Table 5–2**, shows there are opportunities to dispose waste arisings from the proposed compensation measures at Pawlett Hams within the region.

**Table 5–2: Landfill capacity available in the South West, 2022**

Landfill type	South West (000s tonnes <sup>1</sup> )
Hazardous merchant landfill	1,770
Hazardous restricted landfill	0
Non-hazardous landfill with SNRHW cell <sup>2</sup>	2,615
Non-hazardous landfill	5,518
Non-hazardous restricted landfill	0
Inert landfill	15,404
<b>Total</b>	<b>27,328</b>
<p>1 Converted from cubic metres through the adoption of the following conversion factors: inert landfills 1.5 tonnes/m<sup>3</sup>, non-hazardous landfills 0.83 tonnes/m<sup>3</sup> and hazardous landfills 1.5 tonnes/m<sup>3</sup>.</p> <p>2 Some non-hazardous sites can accept some Stable Non-Reactive Hazardous Wastes ('SNRHW') into a dedicated cell, but this is usually a small part of the overall capacity of the site.</p>	

### Future Baseline

5.1.9 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site takes into account changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of

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the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline but the treatment and disposal tables will be updated with the latest available data.

### Assumptions and Limitations

5.1.10 At this PEIR stage, various details regarding the construction and operation of the proposed compensation measures at Pawlett Hams are not known. In particular, the expected waste types, waste generation estimates, and construction timeline have not been identified.

5.1.11 The vast majority of wastes assumed to be produced during the construction of the proposed compensation measures at Pawlett Hams will be excavated waste from earthworks and site preparation/clearance. The removal of Elizabeth Boat Room and demolition of two agricultural buildings at White House Farm will also be required. The design aims to reuse excavated material on site, achieving total earthwork cut/fill balance that avoids the need to import or export any material. Any excess excavations are proposed to be utilised on site, creating features like bird islands. As a result, construction, demolition, and excavation waste generation is expected to be very low.

5.1.12 Organic wastes are anticipated from the site clearance and a small amount of municipal-type solid waste associated with construction workers can be expected, such as food waste and packaging. A large proportion of this solid waste is likely to be suitable for reuse, recycling, composting or other recovery, although a proportion may also require disposal to landfill. The construction site at Hinkley Point C includes a waste consolidation centre to maximise reuse, recycling, and recovery of waste and to minimise use of landfill. The performance and output of the consolidation centre is monitored and discussed with relevant stakeholders including the Environment Agency and Somerset Council. A smaller scale version of the waste consolidation centre would be introduced and controlled by an approved Site Waste Management Plan (to be submitted and approved as a DCO requirement) at Pawlett Hams and similarly monitored by relevant stakeholders at the Quarterly Environmental Monitoring Meeting and the Socio-Economic Advisory Group. It has been assumed all excavations are to be reused on site, either in the construction or to create features like bird islands.

5.1.13 It has been assumed the area within the proposed Order Limits (refer to **paragraph 1.4.5 in Chapter 1**), and therefore the excavated material, is not contaminated and can be contained within the proposed Order Limits. However, if this is not the case



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any contaminated material would be removed for treatment and/ or disposal at an appropriate facility.

### Likely Significant Effects

- 5.1.14 Conventional waste generation is predicted to be minimal, as the expected earthworks excavations are to be reused on site. It is unlikely that the amount of waste required to be disposed of would alter the regional capacity in a significant way. Notwithstanding, this will be analysed, and the position will be confirmed in the ES, especially as the design information develops and if the approach to earthworks management changes over time.
- 5.1.15 At the time of writing this PEIR, no significant effects are expected, based on the current scope and design information.

### Proposed Scope

- 5.1.16 It is proposed that the ES includes an assessment of potential conventional waste management effects that could occur during the construction of the proposed compensation measures at Pawlett Hams and disposal of waste material. A summary of the proposed scope is outlined in **Table 5–3**.

**Table 5–3: Summary of conventional waste management elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Construction: Potential reduction in the remaining landfill void and impacts on the capacity of waste management facilities in the region	IN	Despite the fact that the expected waste generation would be minimal, waste types and estimated tonnages have not been detailed and may be subject to change as the design develops. If the excavation material is unsuitable for use on site, it would require recovery/disposal off site, increasing pressure on the regional waste management facilities. Significant effects are not expected, nonetheless a waste assessment should be conducted where potential effects of waste can be eventually scoped out, when there is more information available.
Operation: Potential reduction in the remaining landfill void and	OUT	No operational waste generation and management is expected/planned at this time. Therefore, it is proposed

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Potential Effect	Scoped IN or OUT	Justification
impacts on the capacity of waste management facilities in the region		for operational effects to be scoped out.

5.1.17 In general, the assessment of conventional waste management associated with construction activities shall follow the guidance set out in *IEMA guide to: Materials and Waste in Environmental Impact Assessment*.

5.1.18 Current and likely future baseline conditions for waste during the construction period will be considered, and the ES will include information on waste management capacity, including remaining landfill void space and annual throughputs of waste transfer, waste treatment, metal recycling and waste incineration facilities. Estimated landfill capacity alteration caused by waste generated by the construction of the proposed compensation measures at Pawlett Hams will also be included, as detailed in IEMA guidance.

5.1.19 Waste hierarchy, circular economy principles and sustainable approach to waste management would be applied. Where waste is reused on site, *Definition of Waste: Code of Practice*<sup>123</sup> would be considered.

## 5.2 Socio-economics

### Introduction

5.2.1 The section considers the likely impact of the proposed compensation measures at Pawlett Hams on socio-economic receptors within the study areas during both the construction and operational stages.

5.2.2 The socio-economic assessment considers employment effects and economic investment in the region as a result of construction of the proposed compensation measures at Pawlett Hams. The assessment also considers disruption to commercial receptors and impacts on land use for businesses and agricultural properties.

<sup>123</sup> CL:AIRE (2011) *Definition of Waste: Code of Practice*.[\[Online\]](#) Accessed 6 December 2023.

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## Study Area

5.2.3 Two study areas have been proposed for the assessment as follows:

- The study area for the assessment of disruption to commercial receptors and land use is 500 m from the proposed Order Limits. This has been selected as it is considered to represent the likely limit of direct effects of construction or operation on any commercial receptors.
- The study area for the assessment of effects on employment and economic investment is the former Sedgemoor District Council Area (now part of the area covered by Somerset Council). This wider study area is intended to encompass the area within which significant effects on employment and the local economy could occur.

## Baseline

### Current Baseline

5.2.4 The baseline data are based on desk-based research of publicly available sources and focuses on commercial receptors, land use, employment and economic investment within the study areas denoted above. Key receptors include commercial properties,

agricultural businesses, the local workforce population and the local economy.

### *Commercial properties and land use*

5.2.5 Pawlett Hams is surrounded by agricultural land. Two commercial properties have been identified within 500 m of the proposed Order Limits, Combwich Anchor Restaurant, although this is within the village of Combwich on the opposite bank of the River Parrett, as well as B&W Equine Vets Stretcholt just off Ham Lane.

5.2.6 It is understood that full planning permission was granted to a third party for the construction of two agricultural buildings on land that is sited within the proposed Order Limits to the north of White House Road in July 2023. This planning permission involves re-building the two agricultural buildings that were previously damaged by a storm.

### *Employment and economic investment*

5.2.7 In the former Sedgemoor District Council Area, the unemployment rate is 5.4 % with an employed

workforce of 57,400<sup>124</sup>. This is above the average for England which has an average unemployment rate 4.3 %<sup>125</sup>.

- 5.2.8 The local economy for the purposes of this assessment comprises the former Sedgemoor District Council Area. This area had an annual Gross Value Added ('GVA') of £2.1 billion in 2018<sup>126</sup>.

### Future Baseline

- 5.2.9 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site takes into account changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

## Assumptions and Limitations

- 5.2.10 At this PEIR stage, specific details regarding the construction and operational stages of the proposed compensation measures at Pawlett Hams are not fully known or decided, in particular, the likely flooding impacts associated with construction and operation of the proposed compensation measures.
- 5.2.11 The current assumptions in relation to socio-economic effects are:
- No new permanent jobs will be created when construction of the proposed compensation measures at Pawlett Hams are complete;
  - Construction is expected to last four years;
  - Access to Pawlett Hams is via Gaunts Road; and
  - The two agricultural buildings to the north of White House Road will have been re-built pursuant to the planning permission granted in July 2023 by the start of construction of the compensation measures at Pawlett Hams and these will therefore need to be demolished and removed from site to facilitate the construction of the compensation

<sup>124</sup> Somerset Council (2022) *Employment*. [\[Online\]](#) Accessed 6 December 2023.

<sup>125</sup> Office for National Statistics (2023) Unemployment rate (aged 16 and over, seasonally adjusted): %. [\[Online\]](#) Accessed 6 December 2023.

<sup>126</sup> Office for National Statistics (2018) Regional GVA(I) by local authority in the UK. [\[Online\]](#) Accessed 18 December 2023.

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measures at Pawlett Hams. Similarly, the Elizabeth Boat Room will need to be removed to facilitate construction of the compensation measures at Pawlett Hams. This assumption has been made on the basis that it is currently considered likely given the time periods involved. This will be kept under review and updated if required in the ES. NNB will look to engage with the owners of the agricultural barns and the Elizabeth Boat Room prior to the implementation of the compensation measures at Pawlett Hams.

### Likely Significant Effects

#### Disruption to commercial receptors

5.2.12 Disturbance effects to commercial receptors are considered to arise when a combination of two or more visual, traffic, air quality and noise effects coincide on a particular area or receptor with the potential to deter users from, or affect the functioning of, that commercial receptor. In general terms, it is considered most likely that a significant disturbance effect would occur if there are two or more significant effects (i.e. effects typically of moderate or major significance) identified by other environmental aspects. It is possible, however, that a significant disturbance effect could occur as a result of a combination of three or four of the aspects having a minor effect on a receptor.

5.2.13 Air quality has been scoped out of the assessment. Traffic and transport, noise and vibration, and landscape and visual have been scoped into the PEIR; therefore, there is risk of a combination of environmental effects that could create a disturbance effect for the local business receptors.

#### Employment and economic investment in the region

5.2.14 Employment effects from the construction of the proposed compensation measures at Pawlett Hams would arise through direct employment in construction-related roles, and indirectly through employment required to support the direct labour requirements. This is assessed within the context of the overall labour market. It is assumed that labour requirements for construction would be minimal and there would be no permanent employment during operation. Given the large size of the local workforce within the former Sedgemoor District Council Area, no socio-economic effects regarding workforce are anticipated.

5.2.15 Spending on the construction of the proposed compensation measures at Pawlett Hams includes land purchase, aggregate materials, machinery and other capital costs. Given the scale of the proposed compensation measures at Pawlett Hams in relation to the size of the regional economy, even if 100 % of

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direct capital expenditure on Pawlett Hams was captured in the local area, this would only represent around 1 % of the total GVA. NNB will seek to ensure that local suppliers are used (where possible) and that the tried and tested supply chain support for the wider Hinkley Point C Project is utilised to maximise the use of local suppliers. Even with this objective, the context means the benefit to the economy is likely to be of minor significance.

### Land Use

5.2.16 As mentioned above, it is understood that full planning permission was granted to a third party for the construction of two agricultural buildings to the north of White House Road in July 2023. The two agricultural buildings will be demolished prior to the construction of the proposed compensation measures at Pawlett Hams along with the removal of the Elizabeth Boat Room. Similarly, there is potential to compromise the agricultural productivity within the local area, through temporary and permanent uptake of agricultural land. This will be discussed with the relevant landowners.

### Proposed Scope

5.2.17 Socio-economic effects on commercial receptors and agricultural land use have been scoped into the EIA as summarised in **Table 5–4**.

**Table 5–4: Summary of Socio-economic elements scoped in or out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Disruption to commercial receptors	IN	It is possible that disturbance effects to commercial receptors may arise due to the combined effect of landscape and visual, traffic and transport and noise and vibration impacts.
Employment and economic investment in the region	OUT	Given the large size of the local workforce within the Sedgemoor Council Area, the strength of the regional economy and the low level of direct labour requirements to support the proposed compensation measures at Pawlett Hams, no employment or investment effects are anticipated.
Commercial and Agricultural Land Use	IN	Land use impacts on commercial and agricultural properties are scoped into the assessment due to the potential temporary and permanent uptake of agricultural land.

## 5.3 Transport

### Introduction

5.3.1 This section considers the potential transport impacts generated by the construction and operation of the proposed compensation measures at Pawlett Hams. The aim of this section is to:

- Identify the Study Area that could be impacted by the road traffic generated by the construction and operation of the proposed compensation measures.
- Identify the current transport baseline on the likely routes to be used by the construction and operational traffic.
- Identify the relevant receptors which could potentially be impacted by the road traffic generated during the construction and operation of the proposed compensation measures.
- Evaluate potential construction and operational activities associated with the proposed compensation measures at Pawlett Hams and identify the activities that could lead to significant transport effects.

- Outline a proposed scope and methodology for the assessment of potential transport effects on the local road network identified in the Study Area.

### Study Area

- 5.3.2 The scope of impacts to be considered concern highway routing between the access point for Pawlett Hams and the strategic road network ('SRN'). The SRN is designed to facilitate freight movements nationally, meaning that the relative impact will likely be smallest there.
- 5.3.3 The proposed Order Limits include one adopted road, White House Lane, going from Gaunts Road to the east and a bridleway (BW 27/12) to the west. White House Lane is used to access Elizabeth Boat Room, which is also located within the proposed Order Limits for Pawlett Hams.
- 5.3.4 The first access point option is from the east via White House Road, which is an on-site road providing an existing track for vehicle access from Gaunts Road and Ham Lane.
- 5.3.5 The second access point option is from an existing on-site unnamed road to the northeast which is parallel to Cobb's Leaze Rhyne. It is accessed directly from the T-junction with Ham Lane. This provides direct vehicular

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access to the proposed potential compound locations, making it more favourable.

5.3.6 This discussion of Transport Impacts will primarily be based on the second access point option, which is hereon referred to as the ‘preferred site access’.

5.3.7 The off-site affected road network associated with the first access point option is captured within that for the preferred site access, except for 20 m of Gaunts Road to the west. The characteristics of this excluded section (including affected Public Rights of Way (‘PRoW’)) and amenities where applicable) exist in the included sections of Gaunts Road, the findings of this discussion remain directly applicable for both site access options.

5.3.8 There are three access routes from the preferred site access to the A38 Pawlett Road / Bristol Road:

- Ham Lane / Chapel Road / Old Main Road;
- Ham Lane / Stretcholt Lane / Red Lane; and
- Ham Lane / Gaunts Road / Old Main Road.

5.3.9 From the preferred site access, vehicles must travel 600 m northwest along Ham Lane to meet the intersection with Stretcholt Lane and Chapel Road.

5.3.10 For Route A, vehicles would turn left for Stretcholt Lane and then right onto Red Lane to reach A38 Pawlett Road, being about 2.2 km from this site access point.

5.3.11 Alternatively, for Route B, vehicles would turn right onto Chapel Road through to Old Main Road to access A38 Bristol Road, also around 2.2 km from the site access point.

5.3.12 For Route C, construction vehicles would turn right onto Ham Lane from the preferred site access, then they would go south and turn right onto Gaunts Road and right onto Old Main Road for access to A38 Bristol Road (2.5 km from the preferred site access).

5.3.13 The A38 forms a County Freight Route and supports construction traffic travelling to both Pawlett Hams and The Island. Construction traffic from both sites would thereafter use the A39 spur to access the M5 at Junction 23. This section will only consider the highway impacts of the proposed compensation measures at Pawlett Hams, whilst the cumulative impact in combination with activity from The Island is assessed in **Volume 4**, which is particularly important to consider as the works are expected to take place concurrently.



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## Baseline

### Current Baseline

#### *On-site transport and access*

- 5.3.14 White House Lane provides public access to Bridleway BW 27/12 and Elizabeth Boat Room. White House Lane is made up of approximately 2 km of a narrow single-track lane.
- 5.3.15 King Charles III England Coast Path (which forms an on-site bridleway BW 27/12) sits adjacent to the River Parrett and borders the western side of the proposed Order Limits. BW 27/12 runs along the east coast of River Parrett, running from south of Pawlett to the south east and south of The Island to the north.
- 5.3.16 The private road that is parallel to Cobb's Leaze Rhyne is made up of a single track, with sufficient room for one direction of traffic to pass at a time.

#### *Ham Lane / Chapel Road / Old Main Road (Route A)*

- 5.3.17 Ham Lane is made up of a narrow single track lined with grass verges, with limited passing bays for traffic to pull into to give way to oncoming traffic. No walking, cycling and horse riding ('WCHR') routes run along Ham Lane, however BW 27/7 is accessed directly from

it, indicating that horse riding may occur on the highway for access to the other bridleways in Pawlett. A single carriageway is provided along Ham Lane in a similar format to that along the eastern section of Chapel Road, with a width that requires larger vehicles such as HGVs to stop and give way to oncoming traffic or be given way. Chapel Road has a speed limit of 30 mph for 750 m and occasional on-street parking. Its western section operates under the national speed limit (60 mph), providing a narrow single-track lane for its western section (450 m).

- 5.3.18 Pawlett Preschool, which is considered a sensitive receptor, is located on Chapel Road within Pawlett Methodist Church. It operates on Mondays, Tuesdays, Wednesdays, and Fridays, starting at 9.00 am and finishing at 3.00 pm.
- 5.3.19 No WCHR routes run along Chapel Road, however BW 27/10 is accessed directly from it, indicating that horse riding may occur on the highway along its most northern section.

#### *Ham Lane / Stretcholt Lane / Red Lane (Route B)*

- 5.3.20 The extent of Ham Lane is the same as that identified for Route A and can therefore be applied to this route.

5.3.21 Bridleway 27/6 merges with Red Lane for approximately 125 m, whereby horseriders are expected to share the highway with motorists. This could have implications on the accessibility of Stretcholt Equestrian Centre for horseriders. Due to the width of heavy goods vehicles ('HGVs'), it may not always be feasible or safe to overtake horseriders on the highway, meaning that there is a risk of an increased journey time to and from Pawlett Hams during construction.

*Ham Lane / Gaunts Road / Old Main Road (Route C)*

5.3.22 The characteristics of Ham Lane as identified for Route A can be applied to the concerned section covered in Route C. Further assessment is required to determine whether there is a sufficient clearance for HGVs to turn left from Ham Lane into Gaunts Road.

5.3.23 Single carriageway country lanes are provided along Gaunts Road up to its junction with River Road, with the presence of on-street parking. When vehicles are travelling simultaneously in the opposite direction, one direction of movement will be required to give way at natural stopping points. The western section of the road gets particularly narrow between River Road and the access point, where single track lanes are available.

5.3.24 Sensitive receptors are present along Gaunts Road, namely Pawlett Primary School Academy, which has been identified as the largest trip generator located on Gaunts Road, with a capacity for up to 79 pupils aged 4-11. No WCHR routes run along Gaunts Road, however BW 27/4 and 27/10 can be accessed from it, indicating that horse riding may occur on the highway along its section west of BW 27/10.

5.3.25 Old Main Road has a 30 mph speed limit and provides sufficient space for two vehicles travelling in opposite directions to pass each other without stopping, subject to the limited presence of on-street parking.

*A38 Corridor and A39 (all routes)*

5.3.26 HGVs currently use the A38 corridor for transporting freight regionally. The corridor connects to Dunball Roundabout for access to the SRN (M5) via the A39. The speed limit along the A38 corridor is 40 mph between Old Main Road and Puriton Road, and it is thereafter 50 mph down to Dunball Roundabout.

5.3.27 The A39 is part of the district's Major Road Network, providing a spur of approximately 0.5 km long between A38 Bristol Road and M5 Junction 23. The speed limit on the dual carriageway is 70 mph eastbound and for 300 m westbound. The speed limit on the remaining

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westbound section is 50 mph on the approach to Dunball Roundabout.

**Future Baseline**

5.3.28 Due to the low level of traffic anticipated to be generated by the construction and operation of the Pawlett Hams compensation measures and the low level of existing development and population in the study area, we will only consider the current baseline for any assessment of any impacts of the construction and operational traffic. No future baseline will be considered.

**Assumptions and Limitations**

5.3.29 At this PEIR stage, various details regarding the construction and operation of the proposed compensation measures at Pawlett Hams are not fully known. In particular, the expected construction and operational road traffic have not been finalised. Maximum movements of construction vehicles are therefore identified at a high level based on **paragraph 5.3.35**.

5.3.30 It has been assumed that excavated material will be reused on site for the construction of the proposed mitigation measures where suitable.

5.3.31 Excavations unsuitable for reuse as construction material are proposed to be utilised on site, creating features like bird islands.

5.3.32 The implementation of a Construction Environmental Management Plan ('CEMP') and a Construction Traffic Management Plan ('CTMP') will ensure that good practice is applied during the works.

5.3.33 The baseline and significant effects have been determined based on a desktop review of the latest available data. The feasibility of the route options will be reviewed again as part of the EIA to confirm the most suitable option for supporting the traffic required for the construction, operation, and maintenance of the proposed compensation measures at Pawlett Hams.

5.3.34 It is assumed that materials would be imported to Pawlett Hams primarily for constructing the haul routes from the access point to and through the site where necessary. The haul route alignment has not been defined, but it will be sensitive to the location of any utility assets that are within the site's vicinity to prevent any interference with utility supplies. Furthermore, the extent and nature of any temporary haul roads will depend on the ground conditions encountered at the time of construction and will be dependent of the prevailing weather conditions.

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5.3.35 The current concept design for Pawlett Hams requires the following:

- 5,000 m<sup>2</sup> site compound, with additional consideration for satellite compounds;
- 3 Portacabins/Containers e.g. a workshop;
- Welfare facilities;
- Fuel depot;
- 8 to 10 x Articulated Dump Trucks;
- 4 x Bulldozers; and
- 2 x Excavators.

5.3.36 Through a high-level review of the construction activities and available plant, it is assumed that a peak of no more than 24 HGV movements per day will be required to travel to Pawlett Hams during the construction phases only. It is assumed that this level of traffic would happen infrequently and for a short period of time. Although the design assumes the presence of existing on-site haul roads and that waste will be reused on site where possible, these figures consider a ‘worst case’ to account for a situation where these assumptions are found not to apply as the design develops. Moreover, it is assumed that the construction of the compensation measures will require a maximum of 15 daily light good vehicle (‘LGV’) movements for the

supply of small volume construction materials, small plant and maintenance of on-site construction plant.

5.3.37 These peak daily movements account for the movement of plant, materials, and equipment to and from Pawlett Hams where necessary.

5.3.38 Whilst these numbers have been provisionally identified, extensive stakeholder engagement and design developments will be needed to estimate the actual numbers of construction vehicles to and from Pawlett Hams. Moreover, it is expected that daily construction vehicle movements will be significantly lower for most of the construction programme. The programme will be designed to minimise the impacts of construction vehicles.

5.3.39 These construction vehicle movements are not included in the on-site HGV caps. However, the cumulative impacts of these vehicle movements and the on-site traffic are considered in **Volume 4**.

5.3.40 All construction vehicle movements will be scheduled outside of school hours. For the purpose of this scoping exercise, this would cover 8 hours across a 10-hour window, whereby an hour is excluded in the morning and another hour in the evening to account for the start and end of the school day. It is assumed that vehicle

movements to and from Pawlett Hams for its operation and maintenance will also comply to this restriction.

- 5.3.41 The day-to-day operation and maintenance of the proposed compensation measures at Pawlett Hams will generate a negligible volume of traffic, averaging at less than one movement per day annually, meaning that any transport impacts during operation can be scoped out of the assessment.
- 5.3.42 Traffic data are not currently available for the local roads examined, meaning that additional observations of traffic conditions on the affected roads identified in the Baseline will be considered as part of the preparation of the ES.
- 5.3.43 Department for Transport ('DfT') data shows that 92 % (excluding motorway-classified roads) and 98 % (including motorway-classified roads) of major roads had HGV concentrations of 15 % of all traffic flows or less in South-West England and West Midlands in 2022, the regions which the compensation measures are located in. Therefore, a 15 % threshold is being considered the maximum concentration of HGVs that should be on designated freight routes, trunk roads and slip roads providing access to motorways (SRN).

## Likely Significant Effects

### On-site transport impacts

- 5.3.44 The proposed compensation measures at Pawlett Hams would result in White House Road being lost. This would sever direct motorised access to BW 27/12. However, appropriate provision will be made to ensure access to the national grid power line is maintained. This power line runs diagonally from the north east of the site to the north west. Such access may be able to compensate the loss of White House Road, though its extent, alignment and access to the public is not confirmed at this stage of design development.
- 5.3.45 The Elizabeth Boat Room will be removed prior to the construction of the proposed compensation measures at Pawlett Hams as it falls within the proposed Order Limits.
- 5.3.46 The private road that will be used to access the construction compound falls within the proposed Order Limits and will need to be permanently acquired. As it is a private road, no significant transport impacts have been identified concerning local transport use.
- 5.3.47 The King Charles III England Coast Path sits adjacent to the River Parrett and runs along the outer edge of the proposed Order Limits. The current concept design

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proposes that the walking route will be permanently diverted, whereby a PRow will be established along the back embankment inland of the proposed Order Limits. The King Charles III England Coast Path will not be accessible to the public during this relocation. Diverting the route provides an opportunity to reduce the recreational disturbance to the site's overwintering birds. Moreover, other minor PRows off White House Road will be temporarily diverted to maintain access to Pawlett Hams. These will be reinstated post construction.

### Ham Lane

- 5.3.48 The narrow single track has limited opportunities for vehicles to pull over to give way to other oncoming vehicles, which could render it unsuitable for having simultaneous HGV movements travelling along the road in opposite directions. Through appropriate arrival and departure scheduling, this could be mitigated to generate a minor to moderate adverse effect.

### Gaunts Road

- 5.3.49 Pawlett Primary School Academy is a sensitive receptor with children being considered as a vulnerable group when considering the environmental impacts associated with construction and operational activities relating to the proposed compensation measures at

Pawlett Hams. The school has an outdoor playground and playing fields.

- 5.3.50 It is assumed that construction traffic will not be scheduled to travel along the route to or from Pawlett Hams during time periods where pupils are travelling to or from school. This is important as the extent of Pawlett Village falls within a 15-minute walking distance, making it plausible for most pupils to walk to school which would include the use of Gaunts Road which has multiple gaps in footway provision. With the occasional construction vehicle passing when school children use the playground, the effect is therefore expected to be minor or moderate at most.

### Chapel Road

- 5.3.51 Pawlett Preschool on Chapels Road has a capacity for up to 24 children. The grounds have on-site parking, meaning that long-stay parking would not compromise the suitability of the road for construction vehicles. If this route is taken forward further, the EIA will seek to identify whether on-street parking occurs, which would generate a potential conflict if HGVs are to use the road as a construction route. Accounting for this possibility, the effect is expected to be minor as no more than three HGV movements are expected during the average hour.

### Red Lane and Stretcholt Lane

5.3.52 Where the highway along Red Lane is shared with Bridleway 27/6, HGVs would be expected to give way to horseriders, or drive at slow speeds if the horseriders are given way due to the restricted width of the road. The intensity of the impact will depend on how frequently the route is used by horseriders. The EIA will need to clarify this if Route Option 3 is selected as the preferred construction route. Evidence may include traffic surveys of pedestrians and horseriders.

### A38 corridor and A39

5.3.53 The current total two-way traffic volumes along A38 Pawlett Road between B3139 (Highbridge) and A39 are reported as around 9,300 vehicles on an average day, whilst total traffic volumes along the A39 between A38 Bristol Road and M5 Junction 23 are reported as around 11,700 vehicles on an average day, as reported by DfT for 2022<sup>127</sup>.

5.3.54 On designated freight routes, HGV traffic typically makes up no more than 15 % of the total traffic volumes. When considering the total two-way traffic movements on the affected part of the A38 corridor, the

maximum number of additional HGVs generated by Pawlett Hams is not expected to cause HGV concentrations to exceed this level along A38 Pawlett Road (2.3 %). This therefore is not expected to generate a significant impact on the County Freight Route.

5.3.55 HGV concentrations on the A39 spur, which is a designated freight route, are broadly within the same order of magnitude. The construction traffic HGV concentrations at the count point increases the percentage of HGVs from the existing percentage of HGVs (10.8 %) to 11 % (less than 0.2 percentage points), which is a negligible additional impact.

5.3.56 A maximum of 24 additional HGV movements will cause slight increases in the total number of HGVs, increasing by up to 12.6 % along A38 Pawlett Road between the B3139 and the A39, whilst increasing by to 1.9 % along the A39 between A38 Bristol Road and M5 J23. Effects generated along both roads would therefore be considered minor.

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<sup>127</sup> Department for Transport (2022) Road traffic bulk downloads. [\[Online\]](#) Accessed 6 December 2023.

5.3.57 The changes in HGVs numbers are summarised in **Table 5–5**. The percentage figures are rounded to the nearest whole number.

**Table 5–5: HGV impacts at maximum daily numbers for Pawlett Hams**

Count point location	Current HGVs (DfT 2022)	Construction HGV movements	Total HGVs with construction peak	HGV % with construction peak	% Increase in HGVs
A38 Pawlett Rd, between B3139 (Highbridge) and A39	190	24	214	2 %	13 %
A39, between A38 Bristol Rd and M5 (J23)	1263	24	1287	11 %	2 %

5.3.58 The impacts of LGV movements were found to be negligible on the A38 (0.9 % increase) and A39 (0.8 % increase) corridors. These are summarised in **Table 5–6**. The percentage figures are rounded to the nearest whole number.

**Table 5–6: LGV impacts at maximum daily numbers for Pawlett Hams**

Count point location	Current LGVs (DfT 2022)	Construction LGVs	Total LGVs with construction LGVs	LGV % with construction peak	% Increase in LGVs
A38 Pawlett Rd, between B3139 (Highbridge) and A39	1757	19 %	15	1772	1 %
A39, between A38 Bristol Rd and M5 (J23)	1927	16 %	15	1942	1 %

5.3.59 It should be noted that the maximum construction vehicle movements for Pawlett Hams are separate from those outlined in the DCO for Hinkley Point C construction works. The impacts of Hinkley Point C construction traffic are considered in combination with this site and The Island in **Volume 4**.

### Proposed scope

5.3.60 Based on the above assessment, **Table 5–7** summarises the impacts that will be scoped in for further assessment.



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**Table 5–7: Summary of transport elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Traffic impacts during construction	IN	It needs to be understood whether the generated traffic from construction traffic (transporting plant, equipment, and construction materials) and the workforce personnel will impact the operation of the affected road network. This will only consider increases in link flows.  A CTMP will likely be required. It will include estimates of the total vehicle movements to Pawlett Hams relating to the staff, equipment, and materials. This will enable the impacts on the road network to be assessed at their peak levels. Moreover, relevant mitigation such as traffic management methods will be planned to mitigate any conflict points with construction traffic and other road users.
Traffic impacts during operation	OUT	The day-to-day operation of the proposed compensation measures at Pawlett Hams will generate a negligible volume of HGVs, averaging at less than one movement per day annually. This is

Potential Effect	Scoped IN or OUT	Justification
		therefore not considered significant to warrant a detailed assessment in the EIA.
Sensitive Receptors	IN	Depending on the selected route, the impacts on sensitive receptors including educational amenities will need to be identified and the ES will consider mitigation measures if required.  The CTMP will outline necessary limits and restrictions on construction vehicle movements, which are expected to include prohibitions during periods where conflicts with vulnerable travellers could occur.
Pedestrians, cyclists and horseriders	IN	King Charles III England Coast Path, (which forms an on-site bridleway BW 27/12) is expected to be directly affected due to on-site construction access. The constructed haul route may directly sever the route, warranting temporary or potentially permanent closures and diversions.  One of the route options shares a link with a bridleway, potentially creating accessibility implications for horseriders travelling to and from Stretcholt

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Potential Effect	Scoped IN or OUT	Justification
		Equestrian Centre, which is directly supported by the bridleway.

5.3.61 It is expected that the construction of the compensation measures at Pawlett Hams will last four years. Construction effects will be considered at the peak point of activity within this period, followed by the assessment of any operational effects. It is anticipated that operational effects will be negligible, though this will be clarified in the EIA.

5.3.62 In finalising the HGV routes, the observations identified in this section will form the basis of selecting and assessing a preferred routing option for the EIA.

## 5.4 Noise and Vibration

### Introduction

5.4.1 The aims of this section are to:

- Evaluate potential construction and operation activities associated with the proposed compensation measures at Pawlett Hams and identify those activities which could lead to significant effects.

- Identify the relevant human receptors which could potentially be impacted by noise and vibration associated with the construction and operation of the proposed compensation measures at Pawlett Hams.
- Outline a proposed scope and methodology for the assessment of potential noise and vibration effects within the ES.

5.4.2 The potential effects on human receptors (i.e. dwellings and other noise-sensitive locations used by humans) are considered within this section. Effects of noise and vibration are also considered in the following sections:

- **Section 5.2 Socio-economics;**
- **Section 5.17 Amenity and Recreation;** and
- **Section 5.19 Population and Human Health.**

### Study Area

5.4.3 Initial Study Areas have been defined for each aspect of the noise and vibration assessment. These areas are defined in terms of distances from the relevant part of the development. These distances have been selected, using professional judgement, based on:

- Initial estimates of noise/vibration levels likely to be generated during the construction and operation of

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the proposed compensation measures at Pawlett Hams;

- Noise/vibration levels thresholds below which effects are unlikely to occur; and
- Study Areas defined in relevant guidance documents.

5.4.4 The Study Area selected for construction noise is 500 m from any area where construction activities could take place, including construction compounds and laydown areas. At this PEIR stage, it is assumed that these activities could occur anywhere within the proposed Order Limits.

5.4.5 The Study Area for the construction vibration assessment is 100 m from the proposed Order Limits, as there is a negligible risk of effects occurring beyond this distance.

5.4.6 For the assessment of noise and vibration from road traffic during construction and operation, the initial Study Area is based on identifying where the proposed compensation measures at Pawlett Hams would lead to a change in traffic flows on the road network which would cause a change in the Basic Noise Level of 1 dB

LA<sub>10,18hr</sub> or greater, based on guidance set out in *Design Manual for Roads and Bridges* ('DMRB') LA 111 *Noise and Vibration*<sup>128</sup>.

5.4.7 Smaller roads surrounding the proposed Order Limits are likely to have baseline flows below the limit of validity for Calculation of Road Traffic Noise ('CRTN') (i.e. less than 50 vehicles per hour or 1000 vehicles per day). When considering receptors along these roads, guidance published by the Noise Advisory Council<sup>129</sup> has been used to identify potential effects.

## Baseline

### Current Baseline

5.4.8 Based on a desktop review of the local area, the baseline noise environment is likely to be influenced by local wildlife, agricultural activities, traffic on the M5 and nearby roads such Pawlett Road, and rail movements on the main Bristol - Exeter railway line. In general, the baseline noise climate at the nearest residential receptors is expected to be typical of a rural location, with low background levels.

<sup>128</sup> National Highways (2020) *Design Manual for Roads and Bridges. LA 111 - Noise and vibration*. [\[Online\]](#) Accessed 5 December 2023.

<sup>129</sup> Noise Advisory Council (1978) *A Guide to Measurement and Prediction of the Equivalent Continuous Sound Level Leq*. H.M. Stationery Office

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5.4.9 The key receptors and the approximate distance to the proposed Order Limits are summarised in **Table 5–8**.

**Table 5–8: Noise and vibration receptors**

Receptor Description	Receptor Type	Approximate distance to proposed Order Limits (m)
Pawlett Primary School Academy	Educational	730
Pawlett Methodist Church	Religious / Educational	730
Outlying residential properties along Gaunts Road to the west of Pawlett village	Residential	140
Outlying residential properties along Ham Lane to the west of Pawlett village	Residential	210
Residential properties in Pawlett village	Residential	780
Residential properties in Stretcholt village	Residential	1310
Residential properties in Combwich village	Residential	370

### Future Baseline

5.4.10 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site takes into account changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

5.4.11 At this PEIR stage, various details regarding the construction and operation of the proposed compensation measures at Pawlett Hams are not known. In particular, the likely construction plant and equipment have not been identified, and although construction is expected to last four years, the detailed programme of works is not defined.

5.4.12 The identification of receptors has been undertaken using aerial photography. The planning status of all potential sensitive receptors shall be confirmed within the ES.

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5.4.13 Professional experience has been used during the evaluation of potential noise and vibration effects.

### Likely Significant Effects

5.4.14 There are no activities that are expected to occur during the long-term operation of the proposed compensation measures at Pawlett Hams that could give rise to significant noise or vibration effects. Therefore, it is proposed to scope out the assessment of operational noise and vibration from the ES.

5.4.15 As no receptors are within the Study Area for construction vibration, no significant vibration effects are likely to occur. It is therefore proposed to scope out the assessment of construction vibration from the ES.

5.4.16 While mitigation measures will be considered to seek to minimise any significant effects on local receptors, the construction of the proposed compensation measures at Pawlett Hams is expected to involve the use of inherently noisy plant and equipment, with the potential to cause temporary noise disturbance at local receptors.

5.4.17 As residential receptors are located within the adopted Study Areas for construction, it is considered that the level of noise at receptors during the construction of the

proposed compensation measures at Pawlett Hams could give rise to significant noise effects.

5.4.18 BS 5228-1 refers to a period of 10 days as a temporal threshold above which significant effects due to construction noise might be experienced. The construction activities are likely to occur over a period greater than 10 days. Therefore, it is considered that the duration of noise at receptors during the construction of the proposed compensation measures at Pawlett Hams could give rise to significant noise effects.

5.4.19 The movement of construction related traffic on public highways has some potential to cause temporary noise and vibration effects.

5.4.20 Based on the indicative traffic flow information presented in **Section 5.3 Transport**, there is no potential for adverse effects for receptors near the major routes (i.e. the A38 corridor and A39), as high baseline flows mean that additional construction related traffic will not cause a change in the Basic Noise Level of 1dB LA10,18hr or greater.

5.4.21 However, for receptors along the smaller routes near Pawlett Hams, there is greater potential for adverse effects, due to lower baseline traffic flows. As the baseline traffic flows along these routes are not

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currently known, the potential for significant effects cannot be ruled out, and will be considered in the ES.

### Proposed Scope

5.4.22 Based on the above assessment, **Table 5–9** presents the potential noise and vibration effects that are proposed to be scoped in and out of requiring further assessment, along with the rationale.

**Table 5–9: Summary of noise and vibration elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Noise and vibration during operation	OUT	There are no activities expected to occur during the operation of the proposed compensation measures at Pawlett Hams that could give rise to significant noise or vibration effects.
Noise due to emissions from site plant and machinery	IN	The construction of the proposed compensation measures at Pawlett Hams is expected to involve the use of inherently noisy plant and equipment. Temporary noise disturbance could occur at local receptors located within

Potential Effect	Scoped IN or OUT	Justification
		the Study Area for construction noise.
Vibration due to emissions from site plant and machinery	OUT	The Study Area for this effect is 100 m from the proposed Order Limits. No receptors are located within this Study Area, and therefore no significant vibration effects are likely to occur.
Noise and vibration due to emissions from construction-related off-site traffic	IN	There is potential for adverse effects at receptors along the smaller routes near Pawlett Hams, due to low baseline traffic flows.

5.4.23 It is proposed that the ES includes a detailed assessment of potential noise and vibration effects that could occur during the construction of the proposed compensation measures at Pawlett Hams, including those associated with construction related traffic on public highways.

5.4.24 In general, the assessment of noise and vibration associated with construction activities shall follow the guidance set out in BS 5228-1 and BS 5228-2.

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5.4.25 The assessment of noise and vibration associated with construction related traffic on public highways shall follow the relevant guidance in DMRB LA 111.

5.4.26 The selected magnitude scale and assessment thresholds, including Significant Observed Adverse Effect Level ('SOAEL') and Lowest Observed Adverse Effect Level ('LOAEL') values, that will be adopted in the ES shall be discussed with the relevant stakeholders, including the Environmental Health department at Somerset Council.

5.4.27 BS 5228-1 sets out various suitable methodologies for the assessment of construction noise. These are based on either absolute thresholds (i.e. independent of existing noise levels) and relative thresholds (i.e. set in relation to the existing noise levels). If the thresholds agreed with the Environmental Health department at Somerset Council are based on relative thresholds then a survey of existing noise levels will be undertaken. Should other receptor types be identified, reference will be made in the ES to other absolute noise criteria such as those presented by BS8233<sup>130</sup> and the World Health Organisation ('WHO')<sup>131</sup>.

5.4.28 The ES shall set out suitable noise and vibration control measures such as a requirement for a CEMP, in accordance with best practicable means principles, to be adopted during construction.

## 5.5 Air Quality

### Introduction

5.5.1 The aim of this section is to evaluate the potential effects of the proposed compensation measures at Pawlett Hams on air quality at sensitive human and ecological receptors.

5.5.2 The assessment considers the following matters:

- potential impacts arising from dust and particulate matter emissions generated during the construction of the proposed compensation measures at Pawlett Hams;
- potential impacts on air quality due to emissions from associated on-site plant and machinery; and

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<sup>130</sup> British Standards Institution (2014) BS 8233:2014 Guidance on sound insulation and noise reduction for buildings.

<sup>131</sup> World Health Organisation (1999) Guidelines for community noise. [\[Online\]](#) Accessed 6 December 2023.

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- potential impacts on air quality due to emissions from construction and operational-related off-site traffic.

5.5.3 There are no potential impacts from dust and particulate matter emissions generated during the operation of the proposed compensation measures at Pawlett Hams.

### Study Area

5.5.4 For dust emissions during the construction of the proposed compensation measures at Pawlett Hams, the assessment of human receptors focuses on areas up to 250 m from the proposed Order Limits or up to 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site exit(s). For ecological receptors, the assessment focuses on areas up to 50 m from the proposed Order Limits or up to 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site exit(s). This distance is based on the Institute of Air Quality Management ('IAQM') construction dust guidance<sup>132</sup>.

5.5.5 Human receptors include locations where members of the public could be present for both short or long periods, for example residential properties, schools, hospitals, doctors' surgeries, places of worship, streets, shops, playing fields or parks and PRoW; including footpaths and bridleways.

5.5.6 An ecological receptor (also referred to in this section as 'protected conservation areas') refers to any designated habitat that might be sensitive to dust soiling. These can include European sites (i.e. Special Area of Conservation ('SAC'), Special Protection Area ('SPA') and Ramsar sites), a Site of Special Scientific Interest ('SSSI') and other nature sites (i.e. ancient woodlands, local wildlife sites ('LWS') and national nature reserves ('NNR') and local nature reserves ('LNR')).

### Baseline

#### Current Baseline

##### *Sensitive human receptors*

5.5.7 The closest residential properties to Pawlett Hams are outlying residential properties along Gaunts Road,

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<sup>132</sup> Institute of Air Quality Management (IAQM) (2023). Assessment of dust from demolition and construction 2023 v2.1. August 2023.



approximately 120 m from the proposed Order Limits. A National Trail and public footpath borders and dissects the site. Pawlett Primary School Academy is located on Gaunts Road, which is anticipated to be a construction route. It should be noted Pawlett Primary School Academy and Pawlett Methodist Church are over 250 m from the proposed Order Limits and over 250 m from the likely site exit(s) (based on the IAQM construction dust guidance<sup>132</sup>).

#### *Sensitive ecological receptors*

- 5.5.8 The Pawlett Hams site is located within the Severn Estuary Ramsar and SPA and Bridgwater Bay SSSI. Furthermore, the Severn Estuary SAC partially encompasses the proposed Order Limits for Pawlett Hams and the Pawlett Hams Wetland Site ('White House Hams'), which is an area of habitat restoration within the south and central portion of the site. The Somerset Wetlands NNR is 250 m west of the proposed Order Limits. Further description is provided in **Section 5.13 Ecology (Terrestrial and Freshwater) and Ornithology**.

#### **Air quality**

- 5.5.9 A review of baseline air quality was carried out prior to undertaking the preliminary air quality assessment. The following baseline sources were reviewed:
- UK Air Information Resource ('UK-AIR')<sup>133</sup>; and
  - Sedgemoor District Council air quality monitoring survey<sup>134</sup>.
- 5.5.10 As part of the Local Air Quality Management ('LAQM') process, Somerset Council carries out regular assessments and monitoring of air quality within its administrative boundary. The most recent Air Quality Annual Status Report,<sup>134</sup> conducted by the former Sedgemoor District Council, was reviewed to determine concentrations of particulate matter (the pollutant of main concern for the dust risk assessment) and nitrogen dioxide ('NO<sub>2</sub>') in the vicinity of Pawlett Hams. It should be noted Somerset Council has not declared an air quality management area ('AQMA') within its administrative boundary. During 2021, the former Sedgemoor District Council undertook monitoring at four automatic (i.e., continuous) monitoring locations for PM<sub>10</sub> (particles with an

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<sup>133</sup> Department for Environment, Food and Rural Affairs ('Defra') Welsh Government, The Scottish Government, and Department of Agriculture, Environment and Rural Affairs (Northern Ireland) (2023). UK-AIR Information Resource.

<sup>134</sup> Sedgemoor District Council (2022). 2022 Air Quality Annual Status Report (ASR) (Version 2). June, 2022

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aerodynamic diameter of 10 microns or less) and PM<sub>2.5</sub> (particles with an aerodynamic diameter of 2.5 microns or less) concentrations and non-automatic monitoring (i.e. diffusion tubes) at 32 monitoring locations for NO<sub>2</sub>.

5.5.11 **Table 5–10** presents information on the nearest monitoring locations to Pawlett Hams.

**Table 5–10: Nearest monitoring locations to Pawlett Hams**

Site ID /Description	Site type	Location	Distance and direction from the proposed Order Limits	2021 Annual mean concentration (µg/m <sup>3</sup> )
<b>Automatic monitoring</b>				
PM1 / Bristol Road	Roadside	E 330691 N 138490	3.9 km, SE	7.3 (PM <sub>10</sub> ) 5.8 (PM <sub>2.5</sub> )
<b>Non-automatic monitoring (diffusion tubes)</b>				
DT29 /Cannington (E)	Roadside	E 325523 N 139600	2.3 km, SW	9.5 (NO <sub>2</sub> )
DT30 Cannington (W)	Roadside	E 325331 N 139509	2.6 km, SW	7.4 (NO <sub>2</sub> )
DT33 / Bristol Road, Dunball	Roadside	E 331130 N 140751	3.2 km, ESE	29.0 (NO <sub>2</sub> )
The Environmental Quality Standard ('EQS') for annual mean NO <sub>2</sub> concentrations is 40 µg/m <sup>3</sup> . The EQS for annual mean PM <sub>10</sub> and PM <sub>2.5</sub> concentrations is 40 µg/m <sup>3</sup> and 20 µg/m <sup>3</sup> , respectively.				

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5.5.12 Although the annual mean concentrations recorded are well below the relevant Environmental Quality Standard ('EQS') (i.e. for the purposes of reporting, the relevant Air Quality Objectives ('AQOs') (i.e. an objective is the target date on which exceedances of a Standard must not exceed a specified number) have been collectively termed as EQS)) (see **Table 5–10**), the automatic and non-automatic monitoring locations presented in **Table 5–10** are not considered representative of conditions experienced at Pawlett Hams due to the distance from the proposed Order Limits and / or monitoring site type.

5.5.13 Information on background air quality in the vicinity of Pawlett Hams was obtained from Department for Environment, Food and Rural Affairs ('Defra') background map datasets<sup>133</sup>. The 2018-based background maps, which are the latest available by Defra, are estimates based upon the principal local and regional sources of emissions and ambient monitoring data. For sulphur dioxide ('SO<sub>2</sub>') and carbon monoxide ('CO') concentrations, the 2001-based background maps<sup>133</sup>, which are the latest available, were used. These background concentrations are presented in **Table 5–11**.

**Table 5–11: Background concentrations: adopted for use in assessment for human receptors and protected conservation areas**

Pollutant	Annual mean concentration (µg/m <sup>3</sup> )	Description
NO <sub>2</sub>	3.7 – 4.8	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration
NO <sub>x</sub>	4.6 – 6.0	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration
CO	76 – 90	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2001 based map concentration
PM <sub>10</sub>	9.6 – 10.4	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration
PM <sub>2.5</sub>	5.9 – 6.3	Defra 1 km x 1 km background map value for the assessed

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Pollutant	Annual mean concentration (µg/m <sup>3</sup> )	Description
		sensitive human receptor locations, 2023 map concentration
SO <sub>2</sub>	1.9 – 2.1	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2001 based map concentration
<p>The EQS for annual mean NO<sub>2</sub> concentrations is 40 µg/m<sup>3</sup>. The EQS for annual mean PM<sub>10</sub> and PM<sub>2.5</sub> concentrations is 40 µg/m<sup>3</sup> and 20 µg/m<sup>3</sup>, respectively. There is no EQS for annual mean CO and SO<sub>2</sub>.</p>		

5.5.14 The annual mean pollutant concentrations from the Defra background maps are well below the relevant EQS.

### Future Baseline

5.5.15 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the

purposes of this chapter will remain largely unchanged from the current baseline described.

### Assumptions and Limitations

5.5.16 The following assumptions and limitations apply to this assessment:

- The assessment provided is based on information available at the time of writing.
- The assessment takes account of best practice mitigation prior to the determination of effects.

### Likely Significant Effects

5.5.17 It should be noted the value of a receptor is incorporated into the specific methods prescribed in the IAQM construction dust guidance<sup>132</sup>. The approach described does not directly align with the overall approach to the categorisation of the value of receptors, magnitude of change and determination of the significance level set out in the EIA significance matrix. This is because the IAQM construction dust guidance<sup>132</sup> on this subject relates to defining whether an air quality effect is significant or not across the study area as a whole, rather than at individual properties, or at specific sensitive ecological sites. As set out in the IAQM construction dust guidance<sup>132</sup>, it is not appropriate to define a level of significance to air quality effects.

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### Emission from dust during the construction

- 5.5.18 For emissions from dust during the construction of the proposed compensation measures at Pawlett Hams, based on the IAQM construction dust guidance<sup>132</sup>, the anticipated demolition (including the removal of the Elizabeth Boat Room and demolition of two agricultural buildings at White House Farm), earthworks and trackout (i.e. the transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network) activities are considered to have the potential to generate a small dust emission magnitude. It should be noted the likely minimal construction activities anticipated means construction was scoped out of the assessment.
- 5.5.19 A further description of the methodology of the dust risk assessment is provided in the IAQM construction dust guidance<sup>132</sup>.
- 5.5.20 Based on the relationship between the sensitivity of the study area and the likely dust emission magnitude as set out in the IAQM construction dust guidance<sup>132</sup>, the proposed demolition, earthworks and trackout activities are predicted to have a negligible to low risk for potential dust soiling impacts (in the absence of mitigation).

- 5.5.21 There is the potential for infrequent, short-term episodes when baseline dust deposition rates could be increased by an amount that nearby human receptors could perceive. With regard to human health impacts, following the approach set out in the IAQM construction dust guidance<sup>132</sup>, there is predicted to be a negligible to low risk from demolition, earthworks and trackout activities (in the absence of mitigation) as there is limited potential for emissions of PM<sub>10</sub> and PM<sub>2.5</sub> to increase baseline conditions to a value that is above the AQO values for the protection of human health.
- 5.5.22 For ecological impacts (i.e. dust soiling on a sensitive habitat), following the approach set out in the IAQM construction dust guidance<sup>132</sup>, there is also likely to be a negligible to low risk (in the absence of mitigation).
- 5.5.23 Therefore, it would be necessary to adopt good practice mitigation measures to reduce the risk of causing a significant effect to nearby human and ecological receptors. Examples of good practice mitigation measures are presented in the IAQM construction dust guidance<sup>132</sup>. The mitigation measures taken forward would prevent or reduce potential nuisance dust or PM<sub>10</sub> (including PM<sub>2.5</sub>) emissions, which are associated with health impacts, such as exacerbating existing human health conditions including asthma and other lung conditions. Measures such as those specified in the IAQM construction dust guidance would normally be

sufficient to reduce construction dust nuisance and risks to human health and ecological receptors to a 'not significant' effect.

### **Emissions from plant and machinery**

5.5.24 Plant and items of machinery would likely be used for the construction of the proposed compensation measures at Pawlett Hams (for breaching of the soft landscape flood defences and the excavation of new creeks that will allow tidal waters to flood the low-lying areas of the Pawlett peninsula). As there would only be a relatively low number of these plant and machinery in use for only a limited duration and spread across the proposed Order Limits, it is not considered that there would be any likely significant effects on air quality due to emissions from on-site plant and machinery and it is therefore proposed that this is scoped out of the assessment.

### **Emissions from construction-related off-site traffic**

5.5.25 The number of construction-related traffic vehicles used for the construction of the proposed compensation measures at Pawlett Hams is likely to be below the

Environmental Protection UK ('EPUK') and IAQM screening criteria<sup>135</sup> for identifying roads where there is the potential for a significant effect on local air quality and the need for an air quality assessment. It is not considered likely that there would be any significant effects on air quality due to emissions from construction-related off-site traffic and it is therefore proposed that this is scoped out of the assessment.

### **Emissions from operational-related off-site traffic**

5.5.26 The number of operational-related traffic vehicles used for the operation of the proposed compensation measures at Pawlett Hams is also likely to be below the EPUK and IAQM screening criteria<sup>135</sup> for identifying roads where there is the potential for a significant effect on local air quality and the need for an air quality assessment. It is not considered likely that there would be any significant effects on air quality due to emissions from operational-related off-site traffic and it is therefore proposed that this is scoped out of the assessment.

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<sup>135</sup> Environmental Protection UK (EPUK) & the Institute of Air Quality Management (IAQM) (2017). Land-Use Planning & Development Control: Planning for Air Quality, v1.1. January 2017.

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## Proposed Scope

5.5.27 Based on the above assessment, **Table 5–12** presents the potential air quality impacts that are proposed to be scoped out of requiring further assessment, along with the rationale for the choice.

**Table 5–12: Summary of air quality elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Dust soiling, human health and ecological impacts arising from dust and particulate matter emissions generated during the construction of the proposed compensation measures at Pawlett Hams	OUT	Activities associated with the construction of the proposed compensation measures at Pawlett Hams have the potential to generate dust, which can cause annoyance and have health effects on local residents and cause harm to nearby ecological receptors. However, providing good practice mitigation measures (as recommended in the IAQM construction dust guidance <sup>132</sup> ) are implemented during the construction of the proposed compensation measures at Pawlett Hams, the likely effect on nearby human and ecological receptors is

Potential Effect	Scoped IN or OUT	Justification
		considered to be negligible (i.e., not significant).
Impacts on air quality due to emissions from site plant and machinery	OUT	Given that relatively low numbers of plant and items of machinery would likely be used for only a limited duration and spread across the proposed Order Limits, the likely effects on air quality are considered to be negligible (i.e. not significant).
Impacts on air quality due to emissions from construction-related off-site traffic	OUT	The predicted construction-related traffic flows associated with the construction of the proposed compensation measures at Pawlett Hams are likely to be less than the EPUK and IAQM screening criteria <sup>135</sup> . Therefore, the likely effects on air quality are considered to be negligible (i.e. not significant).
Impacts on air quality due to emissions from operational-related off-site traffic	OUT	The predicted operational-related traffic flows associated with the operation of the proposed compensation measures at Pawlett Hams are likely to be less than the EPUK and IAQM screening criteria <sup>135</sup> . Therefore, the likely effects on air quality are considered

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Potential Effect	Scoped IN or OUT	Justification
		to be negligible (i.e., not significant).

5.5.28 Therefore, it is proposed that air quality is scoped out of the ES.

## 5.6 Soils and Land Use

### Introduction

5.6.1 This section describes the current environmental baseline for soils and land-use at Pawlett Hams and the potential impacts associated with the proposed compensation measures.

### Study Area

5.6.2 The potential impacts on soils and land use are likely to be limited to direct disturbance during construction activities, and therefore impacts are expected to be very localised. However, there is the possibility of

contaminants being mobilised as a result of site disturbance which may impact soil quality, and so a study area encompassing the area within the proposed Order Limits with a 250 m buffer in all directions around the proposed Order Limits is considered appropriate. The 250 m influencing distance has been chosen based on National House Building Council ('NHBC') and Environment Agency guidance (2008)<sup>136</sup>. This distance is considered appropriate and proportionate in the context of the proposed compensation measures at Pawlett Hams, taking into account the distance over which contamination or ground gases can migrate.

### Baseline

#### Current Baseline

5.6.3 The following sources of information have been used to obtain the baseline information discussed in this chapter:

- Provisional Agricultural Land Classification<sup>137</sup>;
- Multi-agency Geographic Information for the Countryside ('MAGIC') Maps<sup>138</sup>;

<sup>136</sup> National House Building Council and Environment Agency guidance (2008). Guidance for the Safe Development of Housing on Land Affected by Contamination.

<sup>137</sup> Natural England (2022) Provisional Agricultural Land Classification. Retrieved from Provisional Agricultural Land Classification. [\[Online\]](#) Accessed 4 December 2023

<sup>138</sup> Defra (2023). MAGIC Maps. [\[Online\]](#) Accessed 4 December 2023



- Groundsure Enviro Data Viewer<sup>139</sup>; and
- Soilscales Online viewer<sup>140</sup>.

### *Soils and Land Use*

5.6.4 The resource value of soil is primarily measured by its ability to support agricultural uses. This is quantified by its Agricultural Land Classification ('ALC') which is determined through climatic, topographical and interactive soil limitations. This is defined with six grades as outlined in the *Agricultural Land Classification of England and Wales: Revised criteria for Grading the Quality of Agricultural Land*<sup>141</sup>, as follows:

- Grade 1 (excellent quality);
- Grade 2 (very good quality);
- Subgrade 3a (good quality);
- Subgrade 3b (moderate quality);
- Grade 4 (poor quality); and
- Grade 5 (very poor quality).

5.6.5 Grades 1 to Subgrade 3a are determined as Best and Most Versatile ('BMV') land. BMV agricultural land is the

most flexible land in terms of the range of crops that can be grown, the level and consistency of yield and the cost of obtaining the yield and offers the best prospect for both food and non-food crop production.

5.6.6 Pre-1988 ALC data are available for the study area which provides provisional data without site-specific detail. The provisional ALC data do not differentiate between ALC Subgrades 3a (which qualifies as BMV land) and Subgrade 3b (which does not qualify as BMV land). Therefore, at this stage it is conservatively assumed that all Grade 3 land is Subgrade 3a.

5.6.7 This provisional ALC data shows that Pawlett Hams is classified as Grade 3 agricultural land, used for grazing and in the absence of further data should be assumed to be Grade 3a.

5.6.8 Soils may also be of importance in supporting sites of ecological importance, therefore a high-level review of soil types has been undertaken using the Soilscales online viewer<sup>140</sup>. Soilscales conveys a summary of the broad regional differences in the soil landscapes of England and Wales.

<sup>139</sup> Groundsure (2023). Groundsure Enviro Data Viewer. [\[Online\]](#) Accessed 4 December 2023

<sup>140</sup> Soilscales (2023). Online viewer. [\[Online\]](#) Accessed 4 December 2023

<sup>141</sup> Ministry of Agriculture, Fisheries and Food (1988) Agricultural Land Classification of England and Wales: Revised criteria for Grading the Quality of Agricultural Land.

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- 5.6.9 Soils identifies the area within the proposed Order Limits as 21 'Loamy and clayey soils of coastal flats with naturally high groundwater' encroaching within the south-eastern proposed Order Limits.
- 5.6.10 The Steart Marshes coastal management scheme was carried out north of Pawlett Hams, north of the River Parrett. Bands/lenses of peat were identified in alluvium (to 15 mbgl). It is therefore possible that peat may be present at depth at Pawlett Hams.
- 5.6.11 Soils at Pawlett Hams may be of ecological importance given the ecological sensitivity of the site.

**Future Baseline**

- 5.6.12 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site takes into account changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

**Assumptions and Limitations**

- 5.6.13 The assessment is currently based on desk-top information, using publicly available datasets. No site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings presented.
- 5.6.14 Only provisional ALC data were available for review at the time of this preliminary assessment.
- 5.6.15 The preliminary assessment provided is based on the limited information available at the time of writing.

**Likely Significant Effects**

**Soils and Land Use**

- 5.6.16 Soils may be impacted in the following ways:
- Permanent loss of soils due to the proposed bulk excavation. The potential areas of loss are likely to be limited to those areas which will be directly disturbed (i.e. working areas);
  - Temporary or permanent loss of access to soils through sealing, during construction/excavation works or during future land use (paths, roads, buildings);

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- Degradation during stripping, handling and storage, through mechanisms such as erosion, compaction and smearing;
- The deposition of potentially contaminated fugitive dust from construction machinery may also impact soil quality;
- Soil quality may also be degraded by mobilising contaminants or from potentially contaminated surface water run-off; and
- Loss and disturbance of agricultural land, potentially Grade 3a BMV soils.

5.6.17 At this early stage and in the absence of further data or more detailed assessment there may be the potential for significant effects associated with either soils or land use.

### Proposed Scope

5.6.18 Based on the above assessment, **Table 5–13** presents the potential soils and land use impacts that are proposed to be scoped in, requiring further assessment, along with the rationale for the choice.

**Table 5–13: Summary of soils and land use elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Loss of soils and soil quality	IN	As there will be disturbance, excavations and potential loss of soils and soil quality in this area, soils have been scoped in for assessment of the construction and operation of the proposed compensation measures at Pawlett Hams.
Loss or disturbance to agricultural land	IN	There may be the potential loss of Grade 3 soils, which should be assumed to be Grade 3a (BMV). In the absence of further information, land use in terms of ALC has therefore been scoped in for assessment of the construction and operation of the proposed compensation measures at Pawlett Hams.

5.6.19 Therefore, it is proposed soils and land use is scoped in for the ES.

5.6.20 A desk study has not been completed at this stage and as such it has not been possible to fully establish the

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baseline conditions at Pawlett Hams. A full desk study will be undertaken and discussed/included within the ES.

## 5.7 Geology and Land Contamination

### Introduction

5.7.1 This section describes the current environmental baseline related to geology and potential land contamination at Pawlett Hams and the potential impacts associated with the proposed compensation measures at Pawlett Hams.

### Study Area

5.7.2 For the study area, a 250 m buffer in all directions around the proposed Order Limits, is considered appropriate. The 250 m distance has been chosen based on NHBC and Environment Agency guidance (2008)<sup>142</sup>. This distance is considered appropriate and proportionate in the context of the proposed compensation measures at Pawlett Hams, considering

the distance over which contamination or ground gases can migrate.

### Baseline

#### Current Baseline

5.7.3 The following sources of information have been used to obtain the baseline information discussed in this chapter:

- British Geological Survey ('BGS') (2023) Geo Index Map<sup>142</sup>;
- MAGIC Maps<sup>138</sup>;
- Groundsure Enviro Data Viewer<sup>139</sup>;
- Historical Landfill Sites<sup>143</sup>;
- National Library of Scotland Ordnance Survey ('OS') Maps<sup>144</sup>; and
- Somerset Minerals Plan Development Plan Document (2015)<sup>145</sup>.

<sup>142</sup> BGS. (2023). Geo Index Map. Retrieved from British Geological Survey: [\[Online\]](#) Accessed 4 December 2023

<sup>143</sup> Environment Agency (2023) Historical Landfill Sites. [\[Online\]](#) Accessed 4 December 2023

<sup>144</sup> National Library of Scotland (2023) Ordnance Survey Maps. [\[Online\]](#) Accessed 4 December 2023

<sup>145</sup> Somerset Council (2015) Somerset Minerals Plan. Development Plan Document up to 2030.

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*Geology*

- 5.7.4 Aquifer designations are not covered within this section as they are discussed in the baseline of **Section 5.8 Groundwater**.
- 5.7.5 BGS Geo Index shows the superficial deposits beneath Pawlett Hams to be Intertidal deposits (formerly named Estuarine Alluvium) consisting of tidal flat deposits of clay, silt and sand.
- 5.7.6 To the northeast and southwest of the proposed Order Limits small, isolated deposits of River Terrace Deposits and Burtle Formation (sand and gravels) are present.
- 5.7.7 The BGS Geo Index shows the bedrock geology to be the Blue Lias and Charmouth mudstone formation (undifferentiated) both of the Langport Member.
- 5.7.8 The BGS Geo Index does not show any areas of artificial ground on or around the proposed Order Limits.
- 5.7.9 There are no BGS borehole logs available which can be reviewed to infer ground conditions at Pawlett Hams. Four BGS records are recorded to be present, however these are labelled as confidential.
- 5.7.10 The Steart Marshes coastal management scheme was carried out north of Pawlett Ham, north of the River Parrett. The following ground conditions identified may

be used to infer possible ground conditions at Pawlett Hams:

- topsoil (ground level to 0.2 mbgl);
- alluvium – potentially very soft clay (with a desiccated crust) with bands/lenses of peat (0.2-15.0 mbgl);
- weathered bedrock (15- 16.5 mbgl); and
- bedrock.

- 5.7.11 There are no geological SSSIs recorded on or near the proposed Order Limits.
- 5.7.12 There is no information available at this stage relating to the presence of Geological Conservation Review sites or geological sites of local or regional importance.
- 5.7.13 The proposed Order Limits are not located in a Mineral Safeguarding Area ('MSA')<sup>145</sup> as identified in the Somerset Council Minerals Plan.

*Historical and Current Land Use*

- 5.7.14 Information relating to current and historical land use (which may indicate the potential for contamination) has been taken from publicly available OS maps of the area<sup>144</sup>.

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- 5.7.15 The area known as Pawlett is marked on the 1841 to 1952 OS maps of the area.
- 5.7.16 Pawlett Hams has largely remained undeveloped with flood embankments and numerous drainage ditches present. The White House Inn was located at the western end of what is today known as White House Road which crosses the proposed Order Limits from east to west. The White House Inn was still visible on the 1888 to 1913 OS map but not the 1955 to 1961 map. The Elizabeth Boat Room and two storm damaged agricultural buildings are still present at this location.
- 5.7.17 The area within the proposed Order Limits currently comprises permanent semi-improved, grassland; some of which is arable land, and is intersected by a range of rhynes (network of drainage ditches), which act as a drainage system in winter and as stock barriers and drinking water supplies in the summer.
- 5.7.18 Pawlett Hams is located on the eastern bank of the River Parrett, within a tight meander.

*Potential Sources of Contamination*

- 5.7.19 There may be the potential for contamination related to the following:
  - Any fertilisers or pesticides which may have been applied to the agricultural land.

- Potential for contamination within embankments, the origin and composition of embankment material is not currently known.
- Limited potential for Made Ground associated with the demolition of the two agricultural buildings and removal of Elizabeth Boat Room.

- 5.7.20 There are no historical landfills recorded within the study area.
- 5.7.21 There is borrow pit in the location of the Steart Marshes project. It is not known if this has been filled, and what the fill material might have been, however as this is west of the River it is thought unlikely to have the potential to impact Pawlett Hams.

**Future Baseline**

- 5.7.22 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

## Assumptions and Limitations

- 5.7.23 This study is based on a desk-based assessment only and no site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings presented.
- 5.7.24 The assessment is limited to publicly available information and based on the design information available at the time of writing.

## Likely Significant Effects

### Geology

- 5.7.25 Impacts may include temporary or permanent loss of a geological site (or part of it), for example by covering with stockpiles, or damaging key characteristics and features. Impacts may also include temporary or permanent loss of access to the site.
- 5.7.26 Impacts may also include enhancement through exposing a feature or increasing access to a rock exposure.
- 5.7.27 The proposed Order Limits are not within a MSA and is unlikely to be identified as an area for mineral extraction in the future given the ecological importance of the area (see **Section 5.13 Ecology (Terrestrial and**

**Freshwater) and Ornithology** section for more details). Therefore, sterilisation of mineral resources by as a result of the proposed compensation measures can be scoped out.

### Land Contamination

- 5.7.28 Disturbance of potentially contaminated soils may create new pathways for contaminants to impact receptors directly or indirectly as a result of mobilisation of contamination via creation of new pathways.
- 5.7.29 The disturbance of land contamination during construction works may result in unacceptable risks to construction workers resulting from exposure to contaminants in soils via ingestion, inhalation or dermal contact.
- 5.7.30 Additionally, ground gas from potential Made Ground and organic rich natural strata could accumulate within excavations and confined spaces resulting in explosive or asphyxiant hazards.
- 5.7.31 There may also be potentially unacceptable risks to nearby site users from the creation of fugitive dust and vapours from potentially contaminated soils disturbed during the works.

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5.7.32 There may be risks posed to surface water quality of the River Parrett, groundwater quality and ecological receptors from the disturbance and mobilisation of contamination.

5.7.33 At this early stage and in the absence of further data or more detailed assessment there may be the potential for significant effects associated with either geology or land contamination.

### Proposed Scope

5.7.34 Based on the above assessment, **Table 5–14** presents the potential geology and land contamination impacts that are proposed to be scoped in, requiring further assessment, along with the rationale for the choice.

**Table 5–14: Summary of geology and land contamination elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Impacts related to geology/geological features	IN	Scoped in for the construction and operational stages as there is not sufficient information relating to the presence of geological features to complete an assessment.

Potential Effect	Scoped IN or OUT	Justification
Impacts related to the disturbance of potentially contaminated land.	IN	There is currently limited information available relating to the history of Pawlett Hams and the potential for contamination to be present within soils, therefore land contamination is scoped in for assessment of the construction and operation of the proposed compensation measures at Pawlett Hams.
Sterilisation of Mineral Resources	OUT	The proposed Order Limits are not within a MSA and is unlikely to be identified as an area for mineral extraction in the future given the ecological importance of the area.

5.7.35 Therefore, it is proposed that Geology and Land Contamination is scoped into the ES.

5.7.36 A desk study has not been completed at this stage and as such it has not been possible to fully establish baseline conditions at Pawlett Hams. A full desk study will be undertaken and discussed/included within the ES. A ground investigation ('GI') may also be required



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at a later stage to confirm ground conditions and further assess the potential for contamination.

## 5.8 Groundwater

### Introduction

5.8.1 The assessment to determine the significance of effects on the groundwater environment in this PEIR is based on known groundwater receptors and construction/operational phase activities associated with the proposed compensation measures at Pawlett Hams.

5.8.2 A high-level, conceptual review of hydrogeological processes has been undertaken for the PEIR. This is based on available desk-based information only. This information has then been used to determine how the construction and operation of the proposed compensation measures at Pawlett Hams could impact on identified groundwater receptors.

### Study Area

5.8.3 For the groundwater study area, a 1 km buffer in all directions around the proposed Order Limits is considered appropriate. This is based on organisational experience regarding the maximum potential extent of

effects likely on groundwater receptors in the type of aquifers present, and the uncertainties associated with the degree of heterogeneity of these aquifers.

### Baseline

#### Current Baseline

##### *Geology and Aquifer Designation*

5.8.4 The geology baseline is described in **Section 5.7 Geology and Land Contamination**. However, a brief summary is provided below.

5.8.5 The study area is mainly underlain by superficial deposits of tidal flat deposits, comprised of clay, silt and sand. The area to the north of the proposed Order Limits is underlain by beach and tidal flat deposits (undifferentiated), comprised of clays, silts, sands and gravels. Both are classified as Secondary (undifferentiated) aquifers.

5.8.6 To the northeast and southwest of the proposed Order Limits are small, isolated deposits of river terrace deposits and Burtle Formation (sand and gravels) are present. These deposits are classified as Secondary A aquifers. Additionally, areas to the west and east of the proposed Order Limits, at the 1 km buffer boundary are absent of superficial deposits.

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5.8.7 Bedrock at Pawlett Hams is mainly Langport Member Blue Lias Formation and Charmouth Mudstone Formation (undifferentiated), which comprised interbedded limestones and mudstones. This is classified as a Secondary A aquifer.

5.8.8 In the south of the proposed Order Limits bedrock is comprised of the Mercia Mudstone Group, which is classified as a Secondary B aquifer. Additionally, in the wider study area to the west deposits of Blue Anchor Formation are present, which is also a Secondary B aquifer.

*Groundwater Levels*

5.8.9 There are no Environment Agency or BGS groundwater monitoring locations available in close proximity to the proposed Order Limits. There are also no available historical borehole records located within the proposed Order Limits to provide an indication of groundwater seeps, strikes, or rest water levels. Additionally, no GIs have been undertaken at Pawlett Hams.

5.8.10 Within the wider study area, there are five available historical BGS borehole records in the village of Combwich. Where encountered groundwater seepages were recorded between 2.95 m bgl and 1.2 m bgl. This suggests groundwater conditions around the River Parrett are relatively shallow.

5.8.11 Given, the tidal location of Pawlett Hams it is likely that groundwater levels are influenced by the tides, however the extent of this tidal influence is currently unknown.

*Connection to Hydrological Features*

5.8.12 The local groundwater may be connected (either directly or indirectly) to watercourses (as baseflow, sinks, sources, spreads, collects, issues etc.), and spring discharges. Changes to groundwater quality and levels beneath Pawlett Hams may therefore influence water quality and/or flows in these watercourses/hydrological features. On OS mapping there are no springs, sinks, sources, or collects, shown within the proposed Order Limits or the wider study area. Two spreads are located along the channel margins.

5.8.13 Pawlett Hams is located directly adjacent to the River Parrett which is likely to be receiving baseflow contributions from the groundwater within the proposed Order Limits, especially where more gravelly/ sandy horizons prevail. Additionally, within the proposed Order Limits there are multiple land drains/ditches which likely interact with shallow groundwater. The land drains/ditches likely help to manage local groundwater levels by draining any excess groundwater hence reducing the risk of groundwater emergence and protecting agriculture land use.

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5.8.14 As mentioned in **paragraph 5.8.11** groundwater is likely influenced by the tide therefore is likely to have interactions with the River Parrett.

*Groundwater as a resource*

5.8.15 There are no source protection zones ('SPZs') within the groundwater study area or its vicinity. This indicates that there are no licensed groundwater abstractions used for public water supply.

5.8.16 No information on licensed or private groundwater abstractions have been requested at this stage, therefore the presence or absence of groundwater abstractions cannot be determined. Information on groundwater abstractions will be requested and assessed at ES stage. It should be noted however, that for most Private Water Supplies ('PWSs') there is an onus on the abstraction owner to provide details to the Local Authority. As such, there may be other PWSs which the Local Authority is not aware of.

5.8.17 No wells are shown on OS mapping to be present within the proposed Order Limits or wider study area.

5.8.18 Discharges of liquids to ground or groundwater may be occurring within the groundwater study area. However, no information on licensed discharged to groundwater has been requested at this stage. Information on

groundwater discharge will be requested and assessed at ES stage.

*Groundwater Dependent Terrestrial Ecosystems*

5.8.19 The proposed Order Limits are located within the Severn Estuary Ramsar and Bridgwater Bay SSSI, which are statutory designated sites. Additionally, the site lies partially within the Severn Estuary SAC and SPA. To the north and west of the proposed Order Limits is the Somerset Wetlands Natural Nature Reserve. These designated sites have the potential to contain groundwater dependent terrestrial ecosystems ('GWDTE').

5.8.20 The area within the proposed Order Limits is designated as a coastal and floodplain grazing marsh Habitat of Principal Importance ('HPI'). This type of habitat has the potential to contain GWDTE.

*Groundwater Vulnerability*

5.8.21 Pawlett Hams and majority of the study area is classified as having a medium to high groundwater vulnerability. This relates to the ease at which contaminants can migrate into an aquifer from ground level.

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### *Water Framework Directive*

5.8.22 Pawlett Hams does not overlie a Water Framework Directive ('WFD') groundwater body. However, within the study area, to the south of the proposed Order Limits there is one WFD groundwater body, the Tone and North Somerset Streams Groundwater body (GB40802G806400). This WFD waterbody has a poor overall status with both poor chemical and quantitative status. The reasons for not achieving good status are diffuse source from agriculture and rural land management.

### **Future Baseline**

5.8.23 The groundwater baseline of the site is unlikely to change significantly up to and including 2027. However, given the location of the site there is the potential for increased frequency and magnitude of groundwater flooding events.

5.8.24 Groundwater flooding may be exacerbated where the events are linked to fluvial flooding and shallow, near-surface Secondary aquifers.

### **Assumptions and Limitations**

5.8.25 No GIs have been undertaken at Pawlett Hams to confirm groundwater conditions. Therefore,

groundwater has conservatively been assumed as being at ground level. Additionally, the extent of tidal influences on groundwater cannot be determined due to there being no continuous groundwater monitoring undertaken within or in close proximity to Pawlett Hams.

5.8.26 No information on licensed and private groundwater abstractions and licensed discharges to ground has been requested at this stage therefore their presence and any significant effects on them cannot be ruled out at this stage.

5.8.27 No site visits or walkover surveys or UK Habitat Classification ('UKHab') surveys have been undertaken at potential GWDTE sites. From the desk study there is potential for Pawlett Hams to contain GWDTE, however the presence and/ or groundwater dependency of any GWDTE cannot be determined at this stage and would require further assessment to be able to determine if any effects would be significant.

5.8.28 No excavation depths have been provided at this stage. Therefore, the following assumptions have been made to inform the assessment at this stage:

- For topsoil stripping and vegetation clearance a maximum depth of 1.0 m has been assumed.
- For excavations within the proposed Order Limits (new creek channel and shallow pools) it is

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assumed that groundwater will be intercepted due to the assumption that groundwater is at or near ground level. Therefore, groundwater control of nuisance seepage is likely to be required.

- It has been assumed that there will be no below ground structures and excavations associated with the construction of the embankments.

### Likely Significant Effects

#### Construction

5.8.29 During construction, it is considered likely that potential impacts resulting in significant effects to groundwater features (including superficial and bedrock aquifers, and associated groundwater receptors, such as licensed abstractions, PWS, GWDTE etc.) could arise from several activities including:

- Physical contamination of groundwater from ground disturbance such as soil stripping, construction of embankments, haul roads and compounds could lead to impacts with a slight significance of effect.
- The excavations for the network channels and lagoons could create vertical pathways for contaminated groundwater to migrate from the surface into ground and between different aquifer layers which could result in significant effects if

sensitive groundwater receptors such as GWDTE or PWS are present.

- The creation of the network channel could increase saline intrusion to groundwater through infiltration at the base of the channel and within the wider inundation area which could result in significant effects if sensitive groundwater receptors such as GWDTE or PWS are present.
- Disturbances could occur to groundwater flows and levels from temporary below ground structures, and/or shallow excavations that do not require groundwater control. The potential corresponding impact on groundwater levels and/or quality may lead to significant effects on any groundwater receptors such as GWDTE or PWS, if present within the proposed Order Limits.
- Disturbances to shallow groundwater flows and levels from compaction effects on shallow superficial aquifers from the construction of embankments. This could create a barrier to shallow groundwater flows and could lead to upswelling on the upgradient side of the embankments, hence increasing groundwater flood risk locally. However, the working area for construction is likely to be relatively small in comparison to the scale of the majority of aquifer(s)

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being crossed. Any effects, if they were to occur, would therefore likely be negligible.

- Local groundwater drawdown could occur as a result of temporary groundwater control. This may be required to construct any sub-surface structures, such as new channels and lagoons, that intercept the groundwater table. Drawdown impacts on groundwater levels, flows, and quality may be experienced in areas outside of the works area (which is of particular importance for groundwater abstractions and GWDTE). Discharges from dewatering may also impact on receiving surface water or groundwater bodies. At this stage significant effects on groundwater receptors such as abstractions and GWDTE cannot be ruled out.
- Local groundwater recharge rates could potentially be disrupted due to the increased interception of overland flows. This could be through the introduction of impervious structures, compaction of soils, and/or the movement and storage of earth materials within the groundwater study area. However, the working area for construction is likely to be relatively small in comparison to the scale of the majority of aquifer(s) being crossed. Any effects, if they were to occur, would therefore likely be negligible.

## Operation

5.8.30 During operation, it is considered likely that potential impacts to groundwater features could arise from the following:

- Groundwater levels, flows, and quality could be altered in the superficial deposits, both underneath the proposed embankments, and in their vicinity (which is of particular importance for groundwater abstractions and GWDTE). This could be due to embankment surcharge causing consolidation of the materials underneath the embankment, which may cause the ground beneath the structure to compress affecting groundwater storage, pore-water pressure distribution, and magnitude and direction of groundwater flow. This could lead to upswelling of groundwater on the upgradient side of the embankment which could locally increase the groundwater flood risk. However, the size of the embankments are relatively small in comparison to the scale of the majority of aquifer(s) being crossed. Any effects, if they were to occur, would therefore likely be negligible.
- Seepage loss under the embankments during periods of high tide impoundments could lead to groundwater flooding on the landward side of the embankments. The use of cut-off walls to deal with this could lead to groundwater mounding and

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changes to groundwater flow directions. The embankments will need to be designed with groundwater conditions taken into consideration to avoid an increase in groundwater flooding that could result in significant effects.

- Changes to groundwater levels, flows and quality, due to the presence of new channels, which could provide new pathways for groundwater migration and could alter groundwater flow directions. This could lead to subsequent changes to groundwater levels, flows and quality within the proposed Order Limits potentially causing impacts with significant effects to any GWDTE and groundwater abstractions which could be present.
- Increased risk of saline intrusion from the presence of new channels connected to the estuary. Saline water could infiltrate through the base of new channels and wider inundation area during times of high tide hence increasing saline concentrations in both the superficial and bedrock aquifers. This is of particular importance to any sensitive groundwater receptors such as groundwater abstractions and GWDTE, and could result in impacts with significant effects.
- Permanent reduction in recharge rates due to the increased surface area of impermeable ground at the new car park location. However, the increased

area of impervious surfaces is likely to be relatively small in comparison to the scale of the aquifer being crossed. Any effects, if they were to occur, would therefore be likely to be negligible.

### Proposed Scope

- 5.8.31 Based on the above assessment, all of the potential impacts have been scoped in for further assessment. **Table 5–15** presents a summary of potential impacts to groundwater that are proposed to be scoped in for further assessment, along with the rationale for the choice.

**Table 5–15: Summary of groundwater elements scoped into the assessment**

Potential Effect	Scoped IN or OUT	Justification
Impacts to groundwater levels and flows during construction and operation	IN	There is no information currently available on groundwater levels within the proposed Order Limits therefore significant effects on shallow groundwater levels and flows cannot be ruled out at this stage.
Impacts to groundwater	IN	Impacts can arise from construction activities such as

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Potential Effect	Scoped IN or OUT	Justification
quality during construction		excavations, topsoil stripping, accidental leaks and spills etc. Considering the depth of the water table across the proposed Order Limits is unknown significant effects on the underlying aquifers cannot be ruled out.
Impacts to secondary receptors such as groundwater abstractions and GWDTE, this includes both quality and qualitative status	IN	Information on groundwater abstractions have not been requested at this stage. Additionally, there have been no site visits to determine the presence of any potential GWDTE. Therefore, significant effects on these receptors, if present, cannot be ruled out at this stage.
Potential for saline intrusion during construction and operation which could impact groundwater quality	IN	Given the tidal nature of Pawlett Hams saline intrusion into the superficial aquifers could result in a deterioration of groundwater quality.

Potential Effect	Scoped IN or OUT	Justification
Increase in groundwater flood risk	IN	The presence of embankments can lead to upswelling of groundwater on the upgradient side of the embankment. Additionally, seepage loss under the embankments during periods of high tide impoundments could lead to groundwater flooding on the landward side of the embankments.

5.8.32 It is proposed that before the ES is written that GI be undertaken at Pawlett Hams to determine the ground and groundwater conditions. Given the likely presence of shallow groundwater across the proposed Order Limits as part of any GI the groundwater team will input into the scope in order to gather data that best characterises groundwater at Pawlett Hams. As part of the GI a groundwater monitoring strategy will be developed to allow continuous monitoring of groundwater levels to identify any tidal influences.

5.8.33 Additionally, no site walkovers or habitat surveys have been undertaken to determine the presence of any GWDTE. These will take place before commencing with the ES.



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5.8.34 Following on from this, any information from any GI, walkover and habitat surveys will then be included in a detailed Conceptual Site Model to refine the hydrogeological understanding of Pawlett Hams.

5.8.35 At the ES stage information on private and licensed groundwater abstractions will be requested from the local authority and Environment Agency. Information on licensed discharges to ground will also be requested.

## 5.9 Surface Water

### Introduction

5.9.1 The aims of this chapter are to:

- Identify the relevant surface water (water quality, geomorphology and flood risk) receptors which could be impacted by the proposed compensation measures at Pawlett Hams.
- Evaluate potential construction and operation impacts relevant to the proposed compensation measures at Pawlett Hams.

- Outline the proposed scope of work to assess the potential construction and operational impacts associated with the proposed compensation measures at Pawlett Hams to surface water.

### Study Area

5.9.2 The study area for surface water is defined by adding a 500 m buffer around the proposed Order Limits in all directions. This is based on the anticipated distance of impact pathways associated with surface water impacts.

### Baseline

#### Baseline Sources

5.9.3 The baseline conditions have been established based on the following sources:

- Aerial Imagery<sup>146</sup>;
- Environment Agency Catchment Data Explorer<sup>147</sup>;
- Environment Agency Flood Map for Planning<sup>148</sup>;

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<sup>146</sup> Google Earth (2023)

<sup>147</sup> Environment Agency (2023) Environment Agency Catchment Data Explorer. [\[Online\]](#)  
Accessed 6 December 2023.

<sup>148</sup> Environment Agency (2023) Environment Agency Flood Map for Planning. [\[Online\]](#)  
Accessed 6 December 2023

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- Environment Agency Historic Flood Map<sup>149</sup>;
  - Environment Agency Long-Term Flood Risk Information Mapping<sup>150</sup>;
  - Environment Agency Reservoir Flood Extents - Dry Day<sup>151</sup>;
  - Environment Agency Reservoir Flood Extents – Wet Day<sup>152</sup>;
  - MAGIC Maps<sup>138</sup>;
  - Somerset Council Parrett Estuary Flood Risk Management Strategy<sup>153</sup>; and
  - Somerset Council Preliminary Flood Risk Assessment<sup>154</sup>.
- Parrett WFD transitional water body (WFD ID: GB540805210900). This is a heavily modified water body ('HMWB') currently classified as achieving Moderate ecological potential and the chemical status is Fail<sup>147</sup>. The reasons for not achieving Good potential include chemicals and physical modification.
  - Stockland Bristol Stream River water body (WFD ID: GB108052021331). It is classed as a HMWB, classified as achieving Moderate ecological potential and chemical status is Fail. The reasons for not achieving Good potential status include poor nutrient management, septic tank pollution and physical modification.
  - Fiddington Brook river water body (WFD ID: GB108052021320). It is classed as not a HMWB, currently classified as achieving Poor ecological potential and the chemical status is Fail. The reasons for not achieving Good potential include poor nutrient management, sewage discharge and physical modification.

## Current Baseline

### *Surface Water Quality*

5.9.4 There are four WFD water bodies that are within or overlap the Pawlett Hams study area, also noted in **Table 5-13**:

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<sup>149</sup> Environment Agency (2023) Environment Agency Historic Flood Map. [\[Online\]](#) Accessed 6 December 2023.

<sup>150</sup> Environment Agency (2019) Environment Agency Long-Term Flood Risk Information Mapping. [\[Online\]](#) Accessed 6 December 2023.

<sup>151</sup> Environment Agency (2023) Environment Agency Reservoir Flood Extents - Dry Day. [\[Online\]](#) Accessed 6 December 2023.

<sup>152</sup> Environment Agency (2023) Environment Agency Reservoir Flood Extents - Wet Day. [\[Online\]](#) Accessed 6 December 2023.

<sup>153</sup> Environment Agency (2010) Somerset Council Parrett Estuary Flood Risk Management Strategy. [\[Online\]](#) Accessed 6 December 2023.

<sup>154</sup> Somerset Council (2011) Somerset Council Preliminary Flood Risk Assessment. [\[Online\]](#) Accessed 6 December 2023.

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- Cannington Brook Lower River water body (WFD ID: GB108052021310). It is classed as a HMWB, currently classified as achieving Moderate ecological potential and chemical status is Fail. The reasons for not achieving Good potential include poor nutrient management, sewage discharge and physical modification.

5.9.5 Bridgwater Bay SSSI, Severn Estuary Ramsar and Severn Estuary SAC, Severn Estuary SPA and Somerset Wetlands NNR are within or overlap the study area.

*Surface Water Supply*

5.9.6 Pawlett Hams is not located within a Surface Water Drinking Water Safeguard Zone.

5.9.7 No data were available at this stage regarding PWSs.

*Geomorphology*

5.9.8 **Table 5–16** presents the location and condition of all geomorphology receptors within the study area.

**Table 5–16: Geomorphology baseline condition of watercourses**

Watercourse	Description
River Parrett Parrett Water Body (GB540805210900)	A sinuous platform with some evidence of natural processes. Modifications include flood protection measures, such as embankments.
Stockland Bristol Stream Water Body (GB108052021331)	A gently sinuous watercourse with some evidence of natural processes. Modifications include agricultural land drainage.
Fiddington Brook Water Body (GB108052021320)	A gently sinuous watercourse with evidence of natural processes.
Cannington Brook Lower Water Body (GB108052021310)	A gently sinuous watercourse with some evidence of natural processes. Modifications include agricultural land drainage, flood protection measures and urbanisation.
Minor watercourses and drains	There are numerous minor watercourses, ditches and drains within the study area. These are likely to be artificially modified and will be assessed further in later stages of the environmental assessment.

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*Fluvial and Tidal Flood Risk*

- 5.9.9 The Environment Agency's Flood Map for Planning (rivers and sea)<sup>148</sup> indicate that the proposed Order Limits are within Flood Zone 3, meaning that there is a greater than 1 in 100 (1 % Annual Exceedance Probability ('AEP')) chance of flooding, so it is at high risk of fluvial or tidal flooding. The flood risk in the area is a combination of tidal flood risk and risk from tidally influenced rivers.

*Surface Water Flood Risk*

- 5.9.10 The Long-Term Flood Risk mapping<sup>150</sup> shows the proposed Order Limits are mostly at very low risk of surface water flooding, with a risk less than 0.1 % (1 in 1000) AEP. Areas of the buffer zone including Combwich and the east of the proposed Order Limits contain small areas at high risk (a risk greater than 3.3 % (1 in 30) AEP) to low risk (a risk between 0.1 % (1 in 1000) and 1 % (1 in 100) AEP) of surface water flooding.

*Groundwater Flood Risk*

- 5.9.11 As discussed in the baseline section of **Section 5.8 Groundwater** there are no Environment Agency, BGS or borehole records within the study area to provide an indication of groundwater levels. Given the tidal location

and proximity to watercourses, it is likely that groundwater levels are hydraulically linked to fluvial/tidal levels.

*Reservoir Flood Risk*

- 5.9.12 According to the Environment Agency Reservoir Flood Maps<sup>151&152</sup> there is a risk of flooding from reservoirs when river levels are normal and when there is also flooding from rivers. The potential extent of reservoir flooding is confined to the River Parrett channel or the floodplain to the south, near Cannington. Due to required maintenance standards and inspection levels of reservoirs under the Reservoir Act 1975, the risk of reservoir flooding is low.

*Other Flood Sources*

- 5.9.13 Water and sewage infrastructure is likely to exist in proximity to the proposed Order Limits, around built-up areas such as Combwich. The Somerset Council Preliminary Flood Risk Assessment<sup>154</sup> indicates the Director General 5 Incident register, from Wessex Water, who are the local sewerage providers, suggests most properties are at risk. This flooding is likely to be a higher risk during significant rainfall events or as a result of outfalls becoming overloaded due to fluvial or tidal flooding.

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### *Historical Records of Flooding*

- 5.9.14 Environment Agency historic flood maps<sup>149</sup> provide information in the form of recorded flood outlines. This is likely to capture the extent of significant fluvial and tidal flood events. The mapping shows a single event that covers much of the study area. No details or date of the events are provided.
- 5.9.15 The Parrett Estuary Flood Risk Management Strategy<sup>155</sup> lists 12 historical flood events in the Parrett Estuary since 1607, with events up until 1981, when flood risk management schemes were implemented. Mapping of the reported events is not available, but it appears from the descriptions that all events included tidal flooding within the study area.

### **Future Baseline**

- 5.9.16 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change

application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### **Assumptions and Limitations**

- 5.9.17 The following assumptions and limitations apply to the Surface Water assessment:
- The assessment of potential impacts on surface water is high-level, with no quantification.
  - The assessment of surface water quality has used site-specific data, where available, and otherwise used available online information.
  - The baseline geomorphological assessment of the relevant watercourses has been carried out virtually, using aerial imagery, as waterbodies are yet to be surveyed.
  - The assessment of baseline flood risk has been undertaken based on available online information only. No detailed hydraulic modelling of flood risk has been undertaken on the basis that the Environment Agency online flood mapping and local authority sources are reliable and provide a reasonable assessment of existing flood risk.

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<sup>155</sup> Environment Agency (2010) The Parrett Estuary Flood Risk Management Strategy

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- It has been assumed that the impact of climate change will not significantly alter the flood risk from that shown in online mapping.

## Likely Significant Effects

### Construction

#### *Surface Water Quality*

5.9.18 Potential impacts to surface water quality within the study area during the construction phase include:

- Mobilisation of sediments and potential release of fine sediment to suspension leading to sediment pollution. This may impact the chemical and biological quality of surface water.
- The accidental release of polluting substances, such as fuel leaks, which could have an impact upon the chemical and biological quality of surface water.

5.9.19 The study area is within close proximity to the surface water receptors and therefore the potential effects are anticipated to be significant.

#### *Surface Water Supply*

5.9.20 Potential impacts to surface water supply within the study area during the construction phase include:

- Pollution from construction upstream of water supplies.
- Severance due to disruption of pipelines or other buried assets.

5.9.21 Given that water infrastructure is unlikely to exist in the proximity of the proposed Order Limits, the effects on surface water supply, if any were to occur, are likely to be negligible.

#### *Geomorphology*

5.9.22 Potential impacts to the geomorphological receptors within the study area during the construction phase include:

- Loss of riparian vegetation during bankside working.
- Temporary change in local flow dynamics and bed and/or bank scour resulting from either in-channel or bankside working.
- Fine sediment inputs leading to smothering of morphological features or alteration of sediment dynamics which support key habitats.
- Accidental release of fine sediment that would have implications to downstream reaches following either bankside or in-channel working.

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5.9.23 The study area is within close proximity to the surface water receptors and therefore the potential effects are anticipated to be significant.

*Flood Risk*

5.9.24 Potential impacts on flood risk during the construction phase include:

- Loss of floodplain storage resulting in increased flood risk.
- Interception of overland flow due to construction compounds, storage areas or haul routes in the study area, potentially disrupting local flow routes and increasing surface water flood risk.
- The potential blocking of drainage systems and watercourses with construction debris, potentially resulting in blockage or reduced capacity and therefore increased flood risk.

5.9.25 The study area is within close proximity to the surface water receptors and therefore the potential effects are anticipated to be significant.

**Operation**

*Surface Water Quality*

5.9.26 Potential impacts to surface water quality during the operational phase include a change in chemical and biological quality of surface water as flood defences are breached and water is stored in the saltmarsh. The study area is within close proximity to the surface water receptors and therefore the potential effects are anticipated to be significant.

*Surface Water Supply*

5.9.27 Potential impacts to surface water supply during the operational phase include permanent loss due to disruption of pipelines and other buried assets. Given that water infrastructure is unlikely to exist in the proximity of the proposed Order Limits, the effects on surface water supply, if any were to occur, are likely to be negligible.

*Geomorphology*

5.9.28 Potential impacts to the geomorphological receptors within the study area during the operational phase include:

- Permanent loss of natural bed and bank material and riparian vegetation in the creation of new channels.
- Localised changes to flow dynamics and channel cross sections across the proposed Order Limits as flood defences are breached and new channels created.
- Localised bed and/or bank scour at new channels and channel realignments as the watercourse adjusts.
- Changes in flow regime potentially mobilising contaminants within bed and/or bank sediments causing pollution.

5.9.29 The study area is within close proximity to the surface water receptors and therefore the potential effects are anticipated to be significant.

#### *Flood Risk*

5.9.30 Potential impacts on flood risk during the operational phase include:

- Change in flood risk at Pawlett Hams and in the wider estuary due to the breaching of soft landscape defences and excavation of new channels.

- Long-term changes to groundwater levels could occur in the superficial deposits at the proposed Order Limits. This would be due to embankment surcharge causing consolidation of the materials underneath the embankment, which may cause the ground beneath the structure to compress affecting groundwater storage and pore-water pressure distribution. This may locally increase groundwater flood risk if emergence is possible.
- Groundwater flood risk may be enhanced during high tide impoundment with seepage loss across the embankments.

5.9.31 The study area is within close proximity to the surface water receptors and therefore the potential impacts/effects are anticipated to be significant.

#### **Proposed Scope**

5.9.32 **Table 5–17** summarises the surface water elements scoped in and out of the assessment.



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**Table 5–17: Summary of Surface Water elements scoped in or out of the assessment.**

Potential Effect	Scoped IN or OUT	Justification
Impacts on surface water quality	IN	Activities associated with the creation of the proposed compensation measures at Pawlett Hams have the potential to mobilise sediment or pollutants into the watercourse. The storage of water in the saltmarsh is also likely to change the biological and chemical quality of surface water. Therefore, there may be significant effects on surface water quality.
Impacts on surface water supply	OUT	Given that water infrastructure is unlikely to exist in the proximity of the proposed Order Limits, the effects on surface water supply are likely to be negligible.
Impacts on geomorphology due to the creation of new channels and	IN	Activities associated with the creation of the proposed compensation measures at Pawlett Hams have the potential to alter sediment and flow dynamics. Therefore, there

Potential Effect	Scoped IN or OUT	Justification
breaching of flood defences		may be significant effects on geomorphology.
Impacts on flood risk due to breaching of flood defences	IN	The breaching of flood defences is likely to increase flood risk at the proposed Order Limits. Therefore, there may be significant effects on flood risk.

5.9.33 The removal of the Elizabeth Boat Room and demolition of the two agricultural buildings is not expected to influence surface water. Therefore, this has not been considered further.

5.9.34 The identification of potentially significant effects will be derived from a qualitative assessment of baseline data to inform the receptor importance and professional judgement, combined with quantitative assessment where practical. It is proposed that the ES includes a detailed assessment of flood risk across the proposed Order Limits, produced in accordance with the technical guidance to the National Planning Policy Framework. In addition, a preliminary WFD assessment will be carried out, with a more detailed assessment if effects are identified and further mitigation is required.

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## 5.10 Coastal Hydrodynamics and Geomorphology

### Introduction

5.10.1 This chapter considers the potential for impacts on coastal hydrodynamics and geomorphology associated with the proposed compensation measures at the Pawlett Hams site.

5.10.2 Assessment of likely significant effects on coastal hydrodynamics and geomorphology focuses on direct changes to those aspects (for example increased turbidity or changes to the local hydrodynamic regime) but also considers how changes resulting from the compensation measures may affect the wider context of the receiving environment (i.e. whether predicted changes are within or beyond levels of natural variation for the specific environment under consideration). Therefore, this chapter should be read in conjunction with **Section 5.9 Surface Water**, **Section 5.12 Marine Ecology** and **Section 5.11 Marine Water and Sediment Quality**.

### Study Area

5.10.3 The proposed compensation measures at Pawlett Hams will cover the peninsula on the east bank of the

River Parrett, approximately three miles northwest of Bridgwater. The relevant area currently comprises permanent semi-improved grassland, some of which is arable land and intersected by drainage ditches. The works are anticipated to be very similar to the successful scheme developed at Steart on the opposite bank of the River Parrett. The works would require a construction compound of approximately 5,000 m<sup>2</sup>, with additional consideration for satellite compounds, three Portacabins/Containers (e.g. a workshop), welfare facilities and a fuel depot.

5.10.4 The Study Area (see **Figure 5–1**) therefore includes the spatial envelope of the Pawlett Hams site, the Parrett Estuary downstream of the site to the Bristol Channel and a 1 km buffer zone.

### Baseline

#### Current Baseline

5.10.5 The geology of the Parrett comprises estuarine and marine Holocene deposits, some of which have been reclaimed into coastal marshes and mudflats. The western bank forms the Steart Peninsula. At its confluence with the Severn, the Parrett forms extensive mudflats (the Steart Flats) deposited by tidal ebb

currents<sup>156</sup>. The Parrett is tidal for approximately 35 km from Bridgwater Bay to Oath. The maximum tidal range on the River Parrett varies from 6 m at Dunball to approximately 11 m at Burnham-on-Sea, with a Mean High Water Spring elevation of 5.46 m Ordnance Datum Newlyn ('ODN') and Mean Low Water Spring elevation of -5.10 m ODN.<sup>157</sup> Because the bed level is above that of the Severn, the Parrett empties at low tide.

- 5.10.6 The high energy of the system affects turbidity, causing levels to be extremely high within the river, influencing the ecology and water quality in the area (as described and assessed elsewhere within this PEIR).

#### *Shoreline management*

- 5.10.7 The North Devon and Somerset Shoreline Management Plan (SMP2) (2010)<sup>26</sup> was compiled for the North Devon and Somerset Coast Advisory Group. The area covered stretches from Hartland Point in the west to Anchor Head at Weston-Super-Mare in the east. As well as guiding land use and policy in the area, the plan recommends further studies to allow coastal protection measures to be put in place, as required in the future.

- 5.10.8 The long-term plan is 'to provide sustainable flood defence to people, property and infrastructure, while allowing the estuary to evolve as naturally as possible in response to climate change and rising sea levels'. To this end, there is consideration of potential realignment in one or more parts of the Parrett Estuary, outlined within Policy Scenario Area 8. Proposals contained within the ES for the Bridgwater Tidal Barrier envisage some areas downstream, including some farmland at Pawlett Hams, returning to saltmarsh over time.

#### *Baseline flood risk*

- 5.10.9 Initial studies completed for this compensation measure identified two flood defence features: a contemporary flood embankment separating the river from the low-lying ground of Pawlett Hams and the remnants of smaller, older flood embankments inland of the present-day embankment.<sup>5</sup>
- 5.10.10 The implementation of a tidal barrier in Bridgwater had been considered in the North and Devon SMP2, and the Environment Agency and Somerset Council have subsequently proposed the *Bridgwater Tidal Barrier*, which will start construction in 2024<sup>158</sup>.

<sup>156</sup> EDF (2011) Hinkley Point C Environmental Statement Volume 2.

<sup>157</sup> EDF (2010) ES Scoping report January 2010. [[Online](#)] Accessed 4 December 2023

<sup>158</sup> Somerset Council (2023) Bridgwater Tidal Barrier. [[Online](#)] Accessed 4 December 2023

5.10.11 The Environment Agency Flood Risk Management Maps<sup>159</sup> (**Figure 5–1**) show that Pawlett Hams is in Flood Zone 3, meaning it has a high probability of flooding. North and Devon SMP2 shows the site has two flood coastal defences at the entrance of the River Parrett near Burnham-on-Sea (**Figure 5–2**).

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<sup>159</sup> Environment Agency (2020). Flood Risk Management Maps [[Online](#)] Accessed 4 December 2023

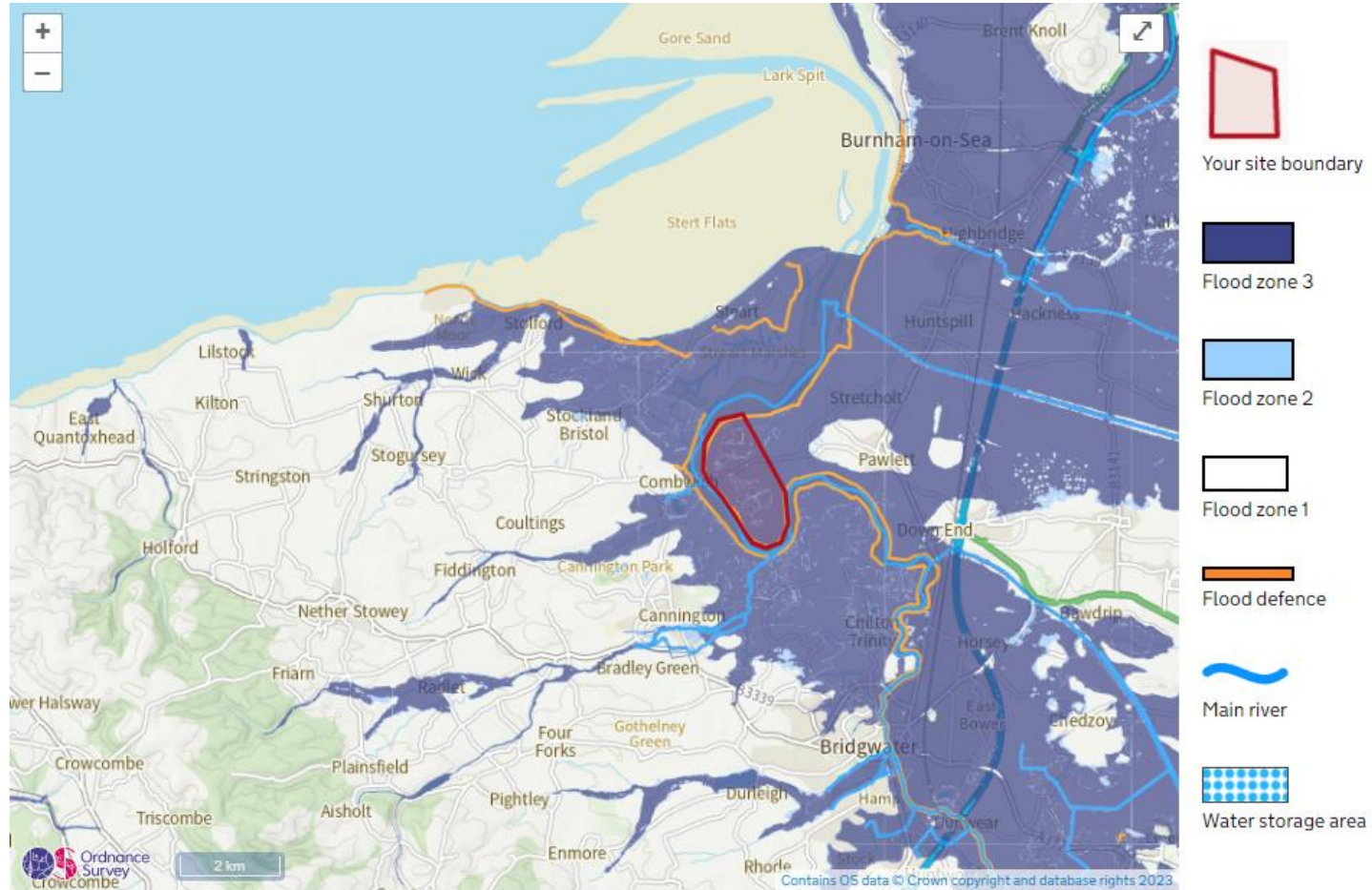


Figure 5–1: Environment Agency Flood Risk Management Map for the Study Area.



Figure 5–2: Existing Coastal defences along the Severn Estuary and Bristol Channel.

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5.10.12 According to the Parrett Catchment Flood Management Plan ('CFMP')<sup>160</sup>, the Pawlett Hams Study Area is covered under Policy 3 of this Plan, defined as '*areas of low to moderate flood risk where we are generally managing existing flood risk effectively*'. The area is protected by tidal embankments in poor condition and tidal outfalls which direct rainfall to the Bristol channel. Along this reach, several strategies are being considered for addressing long term fluvial flood risks.

5.10.13 Somerset Levels and Moors 20 Year Flood Action Plan describes actions to reduce the frequency and duration of floods across the Levels and Moors, stating that they will be '*changing how and where floodwater is stored*'. One of these measures has been to dredge the River Parrett below Burrowbridge. This could affect managed realignment downstream as it will alter river flows and the relative balance of freshwater and saline inundation, as well as possibly affecting sediment transport.

5.10.14 Sedgemoor Local Plan (2011-2032)<sup>161</sup> sets out some of the key issues facing the district, one of them being that the Study Area is at high risk of flooding.

*Coastal management and physical processes*

5.10.15 Hydrodynamics in the River Parrett are dominated by strong tidal flows, which combined with the scour of the riverbed creates high concentrations of suspended solids and mobile silt beds.

5.10.16 Hydrographic surveys were carried out for the Combwich Wharf development, on the opposite bank of Pawlett Hams, in 2010<sup>162</sup>. It was estimated that the mean high water springs ('MHWS') tidal level is 5.9 m AOD and mean high water neaps ('MHWN') is 3.0 m AOD.

*Statutory designations*

5.10.17 Pawlett Hams is within Bridgwater Bay SSSI, which has an unfavourable recovering neutral grassland; the site is also important for ditches, invertebrate assemblages, and ponds. The site is also within the Severn Estuary Ramsar, SPA, and SAC. The statutory designations in

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<sup>160</sup> Environment Agency (2009) Parrett Catchment Flood Management Plan. [\[Online\]](#)  
Accessed 4 December 2023

<sup>161</sup> Sedgemoor District Council (2019) Sedgemoor Local Plan 2011-2032. [\[Online\]](#) Accessed  
4 December 2023

<sup>162</sup> EDF (2011) Hinkley Point C ES. Volume 7 Combwich

the near vicinity of the site are described in greater detail in **Section 5.12 Marine Ecology**.

5.10.18 Pawlett Hams is covered by the Bridgwater and Pawlett Water Level Management Plan, which sets the requirement for the ditches in the SSSI to be at least 30cm of water to achieve favourable condition<sup>163</sup> meaning that it can maintain or rehabilitate the conservation interest of the site. Ditch levels are currently mostly less than 30cm.

#### Future Baseline

5.10.19 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

## Assumptions and Limitations

5.10.20 The primary limitation associated with this PEIR is in relation to the baseline, noting that the PEIR has been informed by previous assessments (such as the original DCO application and Hinkley Point C Marine Licence applications) supported by additional desk study. No targeted surveys have been carried out to date.

5.10.21 The majority of construction work (and associated infrastructure) is land based. Because such works are amenable to mitigation through standard construction site practice, and have very limited potential for significant residual effects on the marine environment, they are not considered in detail in this section of the PEIR.

## Likely Significant Effects

5.10.22 The proposed generic project-wide approach to the assessment methodology is set out in **Volume 1 Section 4.1**. However, whilst this has informed the approach that has been used in this section, it is necessary to set out how this methodology has been

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<sup>163</sup> Parrett Internal Drainage Board (2009) Bridgwater and Pawlett Water Level Management Plan. [\[Online\]](#) Accessed 4 December 2023



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applied, and adapted as appropriate, to address the specific needs of the assessment in this report.

5.10.23 The significance of an effect resulting from a development is determined in this assessment by reference to the sensitivity (or value) of a receptor and the magnitude of the impact (degree of change from the baseline) and applying the matrix described in **Volume 1 Table 2-1** and **Table 2-2** to establish the likely effect.

5.10.24 The creation of saltmarsh at Pawlett Hams will help regulate water levels, acting as a natural buffer to absorb and store water during high tides and storms, thereby reducing the risk of flooding in adjacent areas.

5.10.25 In order to create the saltmarsh at Pawlett Hams, interventions are required which necessitate an alteration to the hydrodynamic conditions and coastal geomorphology. This relates to the breach of existing flood defences and the excavation of ditches and pools for the creation of saltmarsh habitat.

5.10.26 The following key Coastal Hydrodynamics and Geomorphology receptors have been identified as relevant to this assessment:

- coastal processes (including sediment transport regime and water movements);

- channel morphology; and
- coastal/flood defences.

5.10.27 The proposals also have policy implications to the North Devon and Somerset Shoreline Management Plan (SMP2) and the Parrett Catchment Flood Management Plan. All these receptors are classed as of **low to medium value / sensitivity** (on the basis that the receptors possess key characteristics which contribute significantly to the distinctiveness and character of the site, but also have some tolerance to accommodate the proposed change).

5.10.28 Changes caused by the compensation measure considered in this section may result in effects on receptors assessed in other sections. For example, changes in hydrological or sediment transport regime may affect biodiversity receptors; such effects are assessed in **Section 5.12 Marine Ecology**.

5.10.29 Coastal processes will be affected by changes to coastal morphology (breaching coastal defences) and consequent changes to patterns of water movement and sediment transport. These alterations are necessary in order to manage the realignment at Pawlett Hams.

5.10.30 The likely magnitudes of change on the receptors are summarised below:

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- Hydrodynamics: Tidal waters may slow down as they pass through the saltmarsh. The change to coastal morphology (breach of defences) may also result in minor and localised changes to wave and current patterns. This change will be local but permanent over the majority of the area and thus of **medium magnitude**.
- Sediment transport: The reduced flow velocities will promote settlement of suspended material. The alteration to morphology may also change the local pattern of erosion and accretion. This change will be local but permanent over the majority of the area and thus of **medium magnitude**.
- Geomorphology: The breach of the coastal defences constitutes the biggest predicted change in geomorphology. Additional changes may occur over time due to the alteration of relative patterns of erosion and accretion. Saltmarshes serve as natural barriers against coastal erosion. The vegetation in saltmarshes helps bind soil and sediments, reducing the erosion of the shoreline. This change will be local but permanent thus of **medium magnitude**.
- Coastal defences: The breach of the coastal defences will result in an intentional change to the local environment, allowing low lying land to be inundated but thereby providing natural flood

defence. Saltmarshes serve as natural barriers against coastal erosion. The vegetation in saltmarshes helps bind soil and sediments, reducing the erosion of the shoreline. The permanent change over the majority of the area means this is of **medium magnitude**.

5.10.31 These changes may also affect several local coastal management policies and plans, namely the North Devon and Somerset Shoreline Management Plan (SMP2) and Parrett Catchment Flood Management Plan. The permanent nature of the change to key characteristics over the majority of the area means the magnitude of this change will be **medium**.

5.10.32 It is therefore predicted that these **medium magnitude** changes, acting on receptors of **medium to low value / sensitivity** have the potential to result in **minor to moderate effects**. As a result of this there is the potential that significant effects could arise due to the proposed development.

5.10.33 Taking future changes into account, climate change is likely to alter the status and distribution of many local habitats and coastal features. In the long-term, this may include large shifts in the baseline status of the intertidal and subtidal environment, with consequent implication for flood risk. The SMP2 recognises the need for regular review.

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5.10.34 The Flood Risk Management Strategy Report for the Parrett<sup>164</sup> concluded that sea level rise will have a minimal effect on the estuarine regime, but it will depend on future coastal realignment options.

5.10.35 Within this interim assessment, it is considered that climate change / sea level rise will not have a significant effect on the impact assessment presented.

### Proposed Scope

5.10.36 The proposed assessment scope for the coastal hydrodynamics and geomorphology assessment is outlined in **Table 5–18**.

**Table 5–18: Summary of Coastal hydrodynamics and geomorphology elements scoped in or out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Impact to coastal processes (including sediment transport)	IN	Due to the potential change to the hydrodynamic, sediment transport, geomorphology, and coastal defences there is

Potential Effect	Scoped IN or OUT	Justification
regime and water movements).		the potential for minor to moderate effects on coastal processes therefore this has been scoped in for requiring further assessment.
Impact to channel morphology.	IN	Due to the potential change to the hydrodynamic, sediment transport, geomorphology, and coastal defences there is the potential for minor to moderate effects on channel morphology therefore this has been scoped in for requiring further assessment.
Impact to coastal/flood defences.	IN	Due to the potential change to the hydrodynamic, sediment transport, geomorphology, and coastal defences there is the potential for minor to moderate effects on coastal/flood defences therefore this has been

<sup>164</sup> Environment Agency (2009) Preferred Parrett Estuary Flood Risk Management Strategy Report. Consultation Draft. [\[Online\]](#) Accessed 4 December 2023

Potential Effect	Scoped IN or OUT	Justification
		scoped in for requiring further assessment.

## 5.11 Marine Water and Sediment Quality

### Introduction

- 5.11.1 This chapter considers any potential impacts of the creation of saltmarsh and associated habitats at Pawlett Hams on the marine water and sediment quality on the surrounding area.
- 5.11.2 There is a possibility that there could be secondary impacts on the wider environment, so other Aspects should be considered. Therefore, this chapter should be read in conjunction with **Section 5.9 Surface Water**, **Section 5.10 Coastal Hydrodynamics and Geomorphology** and **Section 5.12 Marine Ecology**.

### Study Area

- 5.11.3 The proposed compensation measures at Pawlett Hams will cover the peninsula on the east bank of the River Parrett, approximately three miles northwest of Bridgwater and comprises permanent semi-improved

grassland, some of which is arable land, and intersected by drainage ditches.

- 5.11.4 The Study Area comprises the area of Pawlett Hams, the Parrett Estuary downstream of the site to the Bristol Channel and a 1 km buffer zone.

### Baseline

#### Current Baseline

- 5.11.5 Due to the large tidal range and strong currents in the Bristol Channel and Severn Estuary the sedimentary regime in tributary estuaries is very dynamic. Strong tidal currents lead to erosion of intertidal and shallow subtidal deposits and active re-suspension of muddy seabed sediments. Background suspended sediment concentrations within the Inner Bristol Channel are in the order of 1 g/l within 5 m water depth.
- 5.11.6 These highly dynamic conditions in the Bristol Channel combined with the scour of estuarine riverbeds result in high concentrations of suspended solids and mobile silt beds in the Parrett<sup>162</sup>.

#### *Waterborne Contaminant Inputs*

- 5.11.7 Several major rivers, including the Parrett, flow into the Severn and Bristol Channel. These contribute to the

contaminant loading and it is estimated that sewage and industrial inputs contribute approximately 3 % and 1 % of the freshwater flow, respectively. There has been an overall decline in industrial discharges over the past 30 years as a consequence of reduced industrial activity and the improvement of emissions controls<sup>165</sup>.

5.11.8 The bulk of the contaminant input to the Bristol Channel has historically been from discharges into the Severn Estuary.<sup>166</sup> In addition to point source inputs, diffuse chemical inputs arise from agricultural runoff into tributaries such as the Avon, Usk and Parrett, runoff from urban centres, and deposition from aerial emissions.

5.11.9 Surveys for water quality carried out for the Combwich development in 2010<sup>162</sup> showed concentrations of unionised ammonia below the WFD Environmental Quality Standards ('EQS') of a maximum annual average of 0.021 mg/l in transitional and coastal waters, indicating 'good' status. Survey results from the nearest Environmental Agency sampling point that sampled unionised ammonia at Fiddlington Brook at

Bolham House (sampling point SW-60010710, 0.8 km to Combwich Wharf) confirmed that that annual average was below 0.021 mg/l during the survey period February 2015 to April 2017.<sup>167</sup>

5.11.10 There are no surface water gauging stations in the tidal section of the River Parrett, but Environment Agency data indicates a moderate ecological status for the tidal River Parrett reaches.

#### *Sediment quality*

5.11.11 In the UK, for the assessment of dredged material, the guidance is to use to chemical action levels ('cALs') proposed by the Centre for Environment, Fisheries and Aquaculture Science ('Cefas'). Samples below cAL1 are generally considered acceptable for disposal at sea, and sediments above cAL2 are considered unacceptable for uncontrolled disposal at sea without special handling and containment.

5.11.12 A marine sediment quality survey was carried out in 2011 for the Combwich Wharf development<sup>162</sup>, with samples taken on the western margin of the Parrett

<sup>165</sup> The Severn Estuary Partnership (2011) State of the Severn Estuary Report. [\[Online\]](#)  
 Accessed 4 December 2023

<sup>166</sup> Langston W.J., Chesman, B.S., Burt, G.R., Hawkins, S.J., Readman, J. & Worsfold P. Characterisation of the South West European Marine Sites: The Severn Estuary pSAC, SPA. Marine Biological Association of the UK, 2003, Occasional Publication No.13, p. 206.

<sup>167</sup> Environment Agency (2023). EA Water sampling point Fiddlington Brook at Bolham House, available [\[Online\]](#) Accessed 4 December 2023

Estuary. Survey results showed that sediment concentrations of arsenic, chromium, copper, mercury and zinc were below cAL1, with marginal exceedances recorded for some metals, that were nonetheless below cAL2. Polycyclic Aromatic Hydrocarbons ('PAH') concentrations were an average of 5.7 mg/kg and below Canadian Guidelines PEL. No Polychlorinated Biphenyls ('PCB'), dichlorodiphenyltrichloroethane ('DDT') or dieldrin were detected.

#### *Designated water bodies*

5.11.13 The proposed compensation measures is contained within the Parrett WFD waterbody (ID: GB540805210900), which is classified as a Transitional water and has 'moderate ecological status'; and within the Huntspill WFD waterbody (ID: GB108052021210), which is classified as an artificial river and has 'moderate ecological status'.

5.11.14 There is one designated Bathing Water<sup>168</sup> within the Study Area at Burnham-on-Sea, called Burnham Jetty North, situated approximately 700 m from River Parrett's mouth, which is classified as being of poor

bathing quality under The Bathing Waters Regulation 2013<sup>169</sup>.

#### **Future Baseline**

5.11.15 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

5.11.16 In the longer term, climate change is likely to alter the status and distribution of many local habitats and coastal features. This may include large shifts in the baseline status of intertidal and subtidal habitats, and effects on flood risk.

5.11.17 The upcoming development of Bridgwater Tidal Barrier upstream of Dunball Cycle (to be completed by 2029)

<sup>168</sup> SEPA (2020). Bathing Waters. [\[Online\]](#) Accessed 4 December 2023

<sup>169</sup> UK Government (2013). The Bathing Waters Regulations 2013. [\[Online\]](#) Accessed 4 December 2023

will allow inundation of low-lying land downstream and saltmarsh development at Pawlett Hams.

### Assumptions and Limitations

5.11.18 Due to the extremely large tidal range and associated currents, marine sediments are kept in a state of almost constant flux within the estuary. As a result, the subtidal and intertidal sedimentary environment is highly dynamic. Published data (on which this PEIR is based) may become outdated.

5.11.19 The majority of construction work (and associated infrastructure) is land based. Such works are amenable to mitigation through standard construction site practice and have very limited potential for significant residual effects on the marine environment and are thus not considered in detail in this section of the PEIR.

### Likely Significant Effects

5.11.20 The proposed generic project-wide approach to the assessment methodology is set out in **Volume 1 Section 4.1**. However, whilst this has informed the approach that has been used in this section, it is

necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of the assessment in this report.

5.11.21 The significance of an effect resulting from a development is determined in this assessment by considering the sensitivity of a receptor (value) and the magnitude of the impact (degree of change from the baseline) and applying the matrix described in **Volume 1 Table 2-1** and **Table 2-2** to establish the likely effect. The definitions of receptor importance and sensitivity and magnitude of impacts have been retained from Section 7.6 of Volume 1 Introduction of the original ES<sup>170</sup> (Chapter 7 Environmental Impact Assessment Approach and Methodology), in order to ensure consistency across all the assessments relating to the project.

5.11.22 Managed realignment at Pawlett Hams is intended to create a saltmarsh which will ultimately improve water quality by encouraging sedimentation of suspended matter, filtering runoff and by removing dissolved nutrients from the water.

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<sup>170</sup> EDF Energy (2011). Environmental Statement - Volume 1 Introduction. [[Online](#)] Accessed 4 December 2023

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5.11.23 The following key marine water and sediment quality receptors have been identified as relevant to this assessment:

- marine water quality including contaminants, dissolved oxygen, salinity and turbidity;
- sediment quality including heavy metals (Cd, Cr, Co, Hg, Ni, Pb, Ag, Zn, As), organic micro-pollutants (PAHs, PCBs and TBT), ammonia and sulphide; and
- designated waterbodies: two WFD water bodies: Parrett (WFD waterbody ID: GB540805210900) and Huntspill (WFD waterbody ID: GB108052021210); and one designated Bathing Water, situated at Burnham-on-Sea (National Grid Reference ST3032148972).

4.1.1 General marine water and sediment quality are classed as receptors of **medium** value / sensitivity because they contribute significantly to the character of the area. However, it is noted that they have some ability to accommodate the anticipated changes.

4.1.2 The designated waterbodies are classed as of **high value** because they are designated at a national level, but again, it is noted that they have some capacity to accommodate limited change, provided this does not result in deterioration of their WFD status or affect their ability to achieve the target good status.

5.11.24 The managed realignment at Pawlett Hams will involve removal of earth from the coastal defence as well as minor excavations to create pools and channels for the establishment of saltmarsh habitat. This may cause temporary localised increases in turbidity as some material may enter the water. However, this should be viewed in the context of very high existing turbidity/suspended solids levels in the Parrett and the Bristol Channel. As previously noted, discharge or runoff from the construction site will be amenable to standard mitigation and is not expected to have a significant impact on the marine water quality and sediment quality receptors.

5.11.25 Resuspension of sediment may mobilise sediment associated contaminants, or disperse contaminated sediments, particularly if there has been historic use of fertilisers and/or pesticides on the farmland of Pawlett Hams. However, it is considered unlikely that the level of contamination of sediments with Pawlett Hams differs significantly from that in the Parrett sediment, due to runoff continuously introducing material to the river.

5.11.26 Available data suggest that existing contamination is not significant and below EQS levels. None of the proposed activities have the potential to introduce additional contamination into the system. The flux of material may increase as the ebb tide may transport



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material from land not previously subjected to flooding. Conversely, contamination within the river may be deposited on the saltmarsh as it matures, and flow velocity is reduced.

5.11.27 Such changes, while permanent, would be expected to be small and over a partial area therefore the magnitude of this change is considered **low**. This will be equally applicable for turbidity levels as the Severn Estuary is already a turbid water body and the mitigation for the removal of earth could be to deposit the sediment into the marsh and help with the creation of it.

5.11.28 Given the minor potential for contaminant remobilisation, it is not anticipated that contaminants will be remobilised in quantities sufficient to alter the status of designated water bodies. The magnitude of changes to designated waterbodies will therefore be barely discernible and thus **very low**.

5.11.29 In conclusion, the effects on general marine water and sediment quality are considered to be **minor (not significant)**. The effects on designated waterbodies are considered to be **minor (not significant)**.

5.11.30 Changes caused by the compensation measure considered in this section may result in effects on receptors assessed in other sections. For example,

changes in water quality that may have secondary impacts on biodiversity are assessed in **Section 5.12 Marine Ecology**.

### Proposed Scope

5.11.31 The proposed assessment scope for the Marine water and sediment quality assessment is outlined in **Table 5–19**.

**Table 5–19: Summary of Marine water and sediment quality elements scoped in or out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
General marine water and sediment quality	IN	Due to the potential change in contamination levels this has been scoped in for requiring further assessment to determine whether there is a material difference in levels that would result in the transport of contamination in one direction or another.
Designated waterbodies	IN	Due to the potential change in contamination levels this has been scoped in for requiring further assessment to determine whether there is a

Potential Effect	Scoped IN or OUT	Justification
		material difference in levels that would result in the transport of contamination in one direction or another.

## 5.12 Marine Ecology

### Introduction

5.12.1 This section presents the assessment of potential impacts on marine ecology associated with the development of saltmarsh and associated habitats at Pawlett Hams. It describes the key marine ecological receptors of potential relevance with respect to the Study Area, including their sensitivity. The section should be read in conjunction with the description of **Section 5.10 Coastal Hydrodynamics and Geomorphology**, and **Section 5.11 Marine Water and Sediment Quality**.

5.12.2 Within this section the marine environment has been defined as the area below MHWS, and associated ecological receptors, except for birds, which are considered in **Section 5.13 Ecology (Terrestrial and Freshwater) and Ornithology**. This includes shorebirds and waders which forage/feed in the marine environment.

### Study Area

5.12.3 Study Areas are determined based on good practice guidance (see the Guidance section above), the types of ecological features known to be present and the potential effects that could occur. The key aim is to ensure the Study Area covers, as a minimum, the Zol<sup>171</sup> relevant to all ecological features.

5.12.4 Typically, Study Areas for each species group are determined based on their mobility and likely extent of impacts resulting from the compensation measure. Given that the proposed measure has only the potential for very localised effects, and will not affect the wider Severn system beyond the Parrett, the large-scale

<sup>171</sup> The zone of Influence (Zol) is the area around the site that may be affected by the proposed changes within the site.

Study Areas often considered for mobile species (e.g. marine mammals) are not appropriate in this case.

- 5.12.5 The Study Area for this PEIR therefore comprises the area of the proposed Order Limits, the River Parrett Estuary downstream of the site to the Bristol Channel and a 1 km buffer zone.

## Baseline

### Current Baseline

#### *The Study Area and its surrounds*

- 5.12.6 The proposed compensation measures at Pawlett Hams will cover the peninsula the River Parrett forms on its east bank side. It is situated between 100 m and 800 m inland of the MHWS mark. The mouth of the River Parrett has a variety of mobile intertidal and subtidal banks. Another key habitat in the area is coastal saltmarsh. Both habitats are designated under the Bridgwater Bay SSSI and both are in favourable condition.
- 5.12.7 There are no surface water gauging stations in the tidal section of the River Parrett, but Environment Agency

data<sup>172</sup> indicates a moderate ecological status for the tidal reaches.

#### *Designated sites*

- 5.12.8 Pawlett Hams is part of the Bridgwater Bay SSSI which has marine and coastal features. It supports internationally and nationally important numbers of waders and waterfowl. The Severn Estuary SAC, Ramsar, and SPA are the designated sites within which the Pawlett Hams site is located (see **Section 5.13 Ecology (Terrestrial and Freshwater) and Ornithology**).

#### *Plankton*

- 5.12.9 Because of the highly turbid nature of the Bristol Channel and the estuaries that feed into it, most of the phytoplankton production is concentrated in the surface waters. Phytoplankton surveys were carried out in 2008 and 2009 in the near vicinity, and a total of 21 species were recorded, *Odontella regia* being the most frequently recorded species. It is considered that these historical data are likely to be representative of the estuary as the large-scale physicochemical

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<sup>172</sup> Environment Agency (2023). Catchment data explorer. [\[Online\]](#) Accessed 4 December 2023

conditions of the Bristol Channel are unlikely to have changed materially since 2008.

5.12.10 Zooplankton diversity is low in the Bristol Channel, Severn Estuary, and tributaries. The dominant species are the copepods *Eurytemora affinis* and *Acartia bifilosa*, both residents of the estuary and most abundant during Spring and July. In the 26 years up to 2018, a significant increase in the abundance of mysids has also been observed<sup>173</sup>, *Schistomysis spiritus*, *Mesopodopsis slabberi* and *Gastrosaccus spinifer* being the dominant species.

5.12.11 Ichthyoplankton surveys have been undertaken as a component of the British EDF Estuarine & Marine Studies project (BEEMS), as reported within the original Hinkley Point C DCO ES, during which the following species were recorded:

- Fish eggs from nine taxa were recorded, namely anchovy (*Engraulis encrasicolus*), pilchard (*Sardina pilchardus*), sea bass (*Dicentrarchus labrax*), Dover sole (*Solea solea*), solenette (*Buglossidium luteum*), mackerel (*Scomber*

*scombrus*), scaldish (*Arnoglossus laterna*), rocklings (*Lotidae*) and gurnards (*Triglidae*).

- Larvae recorded included herring (*Clupea harengus*), sprat (*Sprattus sprattus*), Dover sole (*Solea solea*), solenette, sea bass, sandeel (Ammodytidae), dragonet (*Callionymidae*), and gobies (*Gobiidae*).

5.12.12 The most abundant ichthyoplankton were anchovy eggs, goby larvae and sea bass eggs and larvae.

#### *Benthos*

5.12.13 The benthic macrofauna of the Parrett is a relatively impoverished assemblage typical of estuarine muds, dominated by taxa such as the polychaetes *Hediste diversicolor*, *Streblospio* sp., *Nephtys hombergii* and *Pygospio elegans*, oligochaetes, the clam *Macoma balthica*, the mud snail *Hydrobia ulvae* and the amphipod *Corophium volutator*<sup>156 162</sup>.

5.12.14 A survey was carried out for the original Hinkley Point C DCO application across the intertidal zone between Brean Down and Hinkley Point C<sup>156</sup> using seine and

<sup>173</sup> Plentry, et al, Long-term annual and monthly changes in mysids and caridean decapods in a macrotidal estuarine environment in relation to climate change and pollution, Journal of Sea Research, Volume 137, 2018. [Online] Accessed 4 December 2023

fyke nets. The most abundant mobile invertebrate species recorded were the brown shrimp *Crangon crangon*, prawns *Palaemon elegans*, *P. longirostris*, *Palaemonetes varians*, and the mysid shrimps *Mesopodopsis slabberi*, *Neomysis integer* and *Schistomysis spiritus*.

5.12.15 Benthic infaunal communities within the Inner Bristol Channel and Severn Estuary are generally noted as being impoverished assemblages, dominated by opportunistic species, mainly due to the high instability of the seabed habitats resulting from significant erosion and deposition of sediment through the tidal cycle<sup>174</sup>.

#### Fish

5.12.16 The fish community of the area offshore of Hinkley Point has been the subject of extensive surveys: Routine Impingement Monitoring Programme (RIMP) from 1981 to 2019, and the Comprehensive Impingement Monitoring Programme (CIMP) in 2009/10 and 2021/22. Full details of these surveys, and their findings, are presented in **Volume 2 Chapter 5**, with a summary of the datasets outlined here. However, it should be noted that the target of the RIMP

and CIMP surveys was the Bridgwater Bay area of the Severn Estuary, therefore there will be subtle differences when compared to the fish population of the Parrett Estuary / River Parrett. Specific data relating to the fish fauna of the Parrett are not available.

5.12.17 The RIMP detected 90 fish species at Hinkley Point B between 1981-2019, with about 38 species sampled in each year. The CIMP2 data from 2021/2022 recorded 62 species of fish at Hinkley Point B.

5.12.18 The most common species reported in the overall dataset are sprat (*Sprattus sprattus*), whiting (*Merlangius merlangus*) and sand goby (*Pomatoschistus minutus*)<sup>175</sup>.

5.12.19 Many species of fish living within the Severn Estuary undertake regular migrations and tend to move seasonally in waves up and down the estuary. In late summer and autumn, species richness and total abundance of fish are at their maximum with the timing of this peak varying between the upper and lower

<sup>174</sup> Hinkley Point C Development Site Environmental Statement – Volume 2 (October 2011)  
Chapter 19 – Marine Ecology

<sup>175</sup> Henderson, P.A., 1989. On the structure of the inshore fish community of England and Wales. *Journal of the Marine Biological Association of the United Kingdom*, 69(1), pp.145-163.

estuary<sup>176</sup>. Marine species also use the estuary as a nursery ground due to the extensive areas of shallow marginal mudflat that provide feeding opportunities to juveniles.

5.12.20 Seven diadromous fish species are known to migrate through the Severn Estuary, some of which may enter the Parrett Estuary; Atlantic salmon (*Salmo salar*), twaite shad (*Alosa fallax*), allis shad (*Alosa alosa*), river lamprey (*Lampetra fluviatilis*), sea lamprey (*Petromyzon marinus*), sea trout (*Salmo trutta*), and European eel (*Anguilla anguilla*). Salmon have been observed in the Parrett before entering the River Tone<sup>177</sup>. Of these species, also Annex II species of conservation importance for the Severn Estuary / Bristol Channel, there were no occurrences of river lamprey, sea lamprey, Atlantic salmon or Allis shad observed in the CIMP2 data.

5.12.21 European eel is categorised as critically endangered on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species. Even though the Parrett Estuary has historically supported an eel fishery, the population has declined significantly in

recent decades. In recent years, various recovery projects have been undertaken with the release of 20,000 elvers to boost local eel populations in the Huntspill in 2019.<sup>178</sup>

5.12.22 The structure of the estuarine fish community, and the relative abundance, is seasonally dynamic and subject to interannual variability, resulting from variation in recruitment and environmental factors. This inherent variation in species composition as well as the plasticity in feeding behaviour and prey selectivity should be considered when assessing the potential effects of Hinkley Point C on the fish species of the Severn Estuary.

#### *Marine mammals*

5.12.23 Studies have been undertaken into the marine mammal populations of the Severn Estuary and Inner Bristol Channel, including by the Somerset Sea Watch Surveys, which were completed between 2014 and 2018 at different locations along the Somerset coast<sup>179</sup>. These surveys recorded bottlenose dolphin; common

<sup>176</sup> Henderson, P.A. and Bird, D.J., 2010. Fish and macro-crustacean communities and their dynamics in the Severn Estuary. Marine pollution bulletin

<sup>177</sup> Environment Agency (2016). Signs of a salmon resurgence on Somerset river. [\[Online\]](#) Accessed 4 December 2023

<sup>178</sup> Sustainable Eel Group (2019). Fishermen and Conservation groups in Somerset get together to help elvers migrate up river [\[Online\]](#) Accessed 4 December 2023

<sup>179</sup> The Wildlife Trust Somerset (2020) Somerset Sea Watching. [\[Online\]](#) Accessed 4 December 2023

dolphin (*Tursiops truncatus*), harbour porpoise, and grey seal.

5.12.24 No mammals were recorded in the vicinity of the Parrett estuary. However, occasional vagrants have been observed in the Parrett basin over the years including common seal (the most recent record being from 2018)<sup>180</sup> and harbour porpoise (seen on the River Tone near the Parrett confluence in 2020)<sup>181</sup>.

5.12.25 Harbour porpoise is the most commonly recorded cetacean in the Bristol Channel, and within UK waters as a whole. As a qualifying feature of Bristol Channel Approaches SAC (circa 100 km west of Pawlett Hams), which is the closest European site to the development designated for harbour porpoise, marine monitoring programmes are carried out, with the last results from year 2016, with an estimated density ranging between 0-0,25 animals per km<sup>2</sup> for Bristol Channel area.

5.12.26 Of the two most common seal species in UK waters (grey seal *Halichoerus grypus* and common seal *Phoca vitulina*), the grey seal is the most frequently observed within the inner Bristol Channel. The closest European

site to the development designated for grey seal is Lundy SAC (102 km from the Project), which has a permanent grey seal population of 70 individuals. The species is most seen during Spring and Summer season. Common seal is less frequently seen in the wider area. Occasional sightings at Hurlstone Point (30 km away) were recorded in 2020<sup>182</sup>.

### Future Baseline

5.12.27 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site takes into account changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

5.12.28 At a more distant level baseline ecological conditions may change for several reasons over the lifetime of a project. This may be as a result of climate change, land

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<sup>180</sup> BristolLive (2018). Photographer stunned to find seal chilling 17 miles inland in Somerset after swimming up Bristol Channel [[Online](#)] Accessed 4 December 2023

<sup>181</sup> Fishing Buzz (2020). Porpoises spotted on Somerset's River Tone! [[Online](#)] Accessed 4 December 2023

<sup>182</sup> Sea Watch Foundation (2020) Somerset and Exmoor Sea Watch 2020 Report. [[Online](#)]. Accessed October 2023.

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use changes, natural variation, or conservation- / policy-based changes in legislation. Any of these has the capacity to alter the status and distribution of species (including positively, based on overall goals / objectives of numerous conservation legislative items), as well as the composition of habitats and communities in the long-term.

### Assumptions and Limitations

5.12.29 The primary limitation associated with this PEIR is in relation to the baseline, noting that the PEIR has been informed by previous assessments supported by additional desk study. No targeted surveys have been carried out to date.

5.12.30 The majority of construction work (and associated infrastructure) is land based. Such works are amenable to mitigation through standard construction site practice, and have very limited potential for significant residual effects on the marine environment and are thus not considered in detail here.

### Likely Significant Effects

5.12.31 The proposed generic project-wide approach to the assessment methodology is set out in **Volume 1 Section 4.1**. However, whilst this has informed the approach that has been used in this section, it is

necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of the assessment in this report.

5.12.32 The significance of an effect resulting from a development is determined in this assessment by reference to the sensitivity (or 'value') of a receptor and the magnitude of the impact (degree of change from the baseline) and applying the matrix described in **Volume 1 Table 2-1** and **Table 2-2** to establish a likely effect.

5.12.33 The following key marine ecology receptors have been identified as relevant to this assessment:

- Intertidal habitats and associated species are of **low sensitivity** because they are features of local importance and, given their adaptation to highly dynamic conditions, have the ability to accommodate a degree of change.
- Subtidal benthic habitats and associated species are similarly of **low sensitivity**.
- Migratory fish are of **high to medium sensitivity** as they are features of the UK Bap and have a limited ability to accommodate environmental change.



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- Non-migratory fish are of **low sensitivity** because they are of local importance and adapted to highly dynamic conditions.
- Marine mammals are of **medium sensitivity** as though they are features of the UK BAP, they occur in the Study Area so infrequently as not to contribute significantly to the distinctiveness and character of the Study Area. They are also of **low sensitivity** with the ability to tolerate a degree of change.

5.12.34 The marine ecological effects of establishing saltmarsh through managed realignment at Pawlett Hams are beneficial. Furthermore, because the interventions required are minimal, and any excavated soil will be re-used on site, there are no adverse effects arising to marine ecological receptors during construction.

5.12.35 The principal (and intended) effect will be increased provision of coastal saltmarsh habitat, with commensurate increased biodiversity. This in turn will provide a wide range of ecosystem benefit, including:

- increased foraging/prey resource for birds and fish;

- increased nursery habitat for estuarine fish species such as bass; and
- habitat for conservation dependent species (e.g. eels, which were once abundant in the Parrett).

5.12.36 Several fish species benefit indirectly from marshes by feeding on invertebrates which inhabit the adjacent mudflats and estuarine waters, which themselves feed on organic matter exported from the saltmarshes. Fish use saltmarshes both as nursery and, in some cases, breeding areas. A study in Mont Saint Michel Bay showed that sea bass fry colonise the marsh creeks during the flooding spring tides and return to coastal waters on the following ebb tide (Laffaille et al., 2001 in Stevenson, 2002)<sup>183</sup>. This observation is also supported by monitoring of managed realignment sites in Essex undertaken by the Environment Agency (Colclough et al, 2004)<sup>184</sup>.

5.12.37 Despite the occasional vagrant seal and porpoise being recorded in or near the Parrett, there is no scope for the proposed compensation measures at Pawlett Hams to impact marine mammals.

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<sup>183</sup> Stevenson, J. (2002). The benefits to fisheries of UK intertidal saltmarsh areas. Environment Agency. R&D Technical Report E2-061/TR.

<sup>184</sup> Colclough, S., Fonseca, L. & Astley, T. (2004). Fish utilisation of managed realignments. Environment Agency Report.

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5.12.38 The changes caused by the proposed managed realignment are predicted to be of **low or very low** magnitude (noticeable change over a partial area, and barely discernible changes over a wider area) to the channel of the Parrett and surrounding area, but **medium to high** magnitude for the inundated land (significant permanent change to most of the area and its features). However, the latter is a positive change. Therefore, the significance of resultant effects on marine ecological receptors is considered **minor adverse (not significant) to major beneficial (significant)**.

### Proposed Scope

5.12.39 The proposed assessment scope for the Marine ecology assessment is outlined in **Table 5–20**.

**Table 5–20: Summary of Marine ecology elements scoped in or out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Intertidal habitats and associated species	IN	Due to the potential effects of establishing saltmarsh through managed realignment (both positive and negative) this has been scoped in for

Potential Effect	Scoped IN or OUT	Justification
		requiring further assessment.
Subtidal benthic habitats and associated species	IN	Due to the potential effects of establishing saltmarsh through managed realignment (both positive and negative) this has been scoped in for requiring further assessment.
Migratory fish	IN	Due to the potential effects of establishing saltmarsh through managed realignment (both positive and negative) this has been scoped in for requiring further assessment.
Non-migratory fish	IN	Due to the potential effects of establishing saltmarsh through managed realignment (both positive and negative) this has been scoped in for requiring further assessment.

Potential Effect	Scoped IN or OUT	Justification
Marine mammals	OUT	This potential effect has scoped out due to the minimal (or no) recorded marine mammal activity in the River Parrett.

## 5.13 Ecology (Terrestrial and Freshwater) and Ornithology

### Introduction

- 5.13.1 This chapter presents the preliminary environmental information relating to terrestrial and freshwater ecology and ornithology for the proposed compensation measures at Pawlett Hams.
- 5.13.2 Terrestrial and freshwater ecology is concerned with the variety of living organisms and their relationships with each other and their environment. Ecology is the subject of a wide variety of legislation and policies; impacts to ecological receptors could constitute an offence under relevant legislation as well as comprising material considerations within the planning system.
- 5.13.3 The assessment comprises the following terrestrial and freshwater ecology elements:

- Designated sites – sites designated at all levels (both statutory and non-statutory) for nature conservation reasons, including SPAs, SACs, Ramsar sites, SSSIs, NNRs, LNRs and LWSs;
- Notable habitats – i.e. habitats of principal importance ('HPI'); and
- Protected and notable species – these include animal and plant species protected by legislation, species of principal importance (SPI), and species that are not legally protected but have a conservation designation.

5.13.4 A high-level review of the terrestrial and freshwater ecological baseline within the study area of the proposed Order Limits has been undertaken for this PEIR. This is based on available desk-based information only. This information has then been used to determine how the construction and operation of the proposed compensation measures at Pawlett Hams could impact on terrestrial and freshwater ecological receptors.

### Study Area

5.13.5 The study area for terrestrial and freshwater ecology relates to the area of construction activity, including construction compounds and access tracks. The study area comprises the proposed Order Limits plus other

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locations at distances which could allow potential pathways to effect on terrestrial and freshwater ecological receptors:

- Internationally important statutory designated sites: SPAs, SACs and Ramsar sites within 2 km of the proposed Order Limits, or where European sites are hydrologically connected to Pawlett Hams or within 30 km of a SAC where bats are noted as one of the qualifying interests. For with designated freshwater migratory aquatic species, all those that are proposed Order Limits are considered, as applicable;
- Nationally and county important statutory designated sites: SSSIs, NNR and LNR within 2 km of the proposed Order Limits;
- Non-statutory sites of local nature conservation importance: LWSs, ancient woodland and habitats of HPI within 1 km of the proposed Order Limits;
- Desk study records of protected or otherwise notable habitats and species, veteran or ancient trees within 1 km of proposed Order Limits; and
- For receptors potentially sensitive to air quality changes (including habitats within SPA, SAC, Ramsar, SSSI, NNR, LNR, LWS, ancient woodland or ancient and veteran trees), sites

located within 200 m of proposed construction routes where significant changes are anticipated.

## Baseline

### Baseline Sources

5.13.6 The following sources have been used to inform a preliminary understanding of the baseline conditions for the assessment of the terrestrial and freshwater ecology aspect:

- Somerset Environmental Records Centre ('SERC') provided data records in September 2023 for protected and designated species, invasive species and non-statutory LWS. Species records were limited to those within the last 10 years, i.e., 2013-present;
- MAGIC map application was used to identify international and national statutory and non-statutory designated sites, HPI, surveyed great crested newt ('GCN') ponds and granted European Protected Species Mitigation ('EPSM') licenses and GCN licence returns;
- Aerial photography;

- Bridgwater Tidal Barrier ES – Chapter 9 Biodiversity<sup>185</sup>;
- Pawlett Hams Water Supply Pipeline Project 2017 Environmental Report – Parrett Internal Drainage Board<sup>186</sup>;
- English Nature Research reports on Grazing marsh assemblages<sup>187</sup>;
- Buglife reports on Aquatic communities of grazing marsh ditch systems<sup>188</sup>;
- Environment Agency (2023) Fish catch data (2013) from Huntspill River<sup>189</sup>;
- Standard data forms for SPAs<sup>190</sup> and SACs<sup>191</sup> within the UK national site network of European sites;
- UK Ramsar Information Sheets<sup>192</sup>; and

- SSSI citations<sup>193</sup>.

## Current Baseline

### *Statutory Designated Sites*

- 5.13.7 The proposed Order Limits are located within three international statutory designated sites (Severn Estuary SPA, Severn Estuary SAC and Severn Estuary Ramsar).
- 5.13.8 There are four international statutory designated sites with bats as a qualifying feature within 30 km of the proposed Order Limits: Exmoor and Quantock Oakwoods SAC; Hestercombe House SAC; Mendip Limestone Grasslands SAC; and Northern Somerset & Mendip Bats SAC.

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<sup>185</sup> EA (2019). Bridgwater Tidal Barrier EA – Chapter 9 Biodiversity. [\[Online\]](#) Accessed 4 December 2023

<sup>186</sup> Parrett Internal Drainage Board (2017). Pawlett Hams Water Supply Pipeline Project 2017 – Environmental Report. [\[Online\]](#) Accessed 4 December 2023

<sup>187</sup> Drake, C. M (2004) Grazing marsh assemblages and site classification using invertebrates. English Nature Research Reports. Number 579

<sup>188</sup> Drake, C.M, Stewart, N.F., Palmer, M.A. & Kindemba, V. L. (2010a) The ecological status of ditch systems: an investigation into the current status of the aquatic invertebrate and plant communities of grazing marsh ditch systems in England and Wales. Technical Report. Buglife – The Invertebrate Conservation Trust, Peterborough.

Drake, M., Stewart, N., Palmer, M. & Kindemba, V. (2010b) The ecological status of ditch systems: an investigation into the current status of the aquatic invertebrate and plant

communities of grazing marsh ditch systems in England and Wales. Technical Report Volume 2. Buglife – The Invertebrate Conservation Trust, Peterborough. [\[Online\]](#) Accessed 4 December 2023

<sup>189</sup> Environment Agency (2023). Ecology and Fish Data Explorer [\[Online\]](#) Accessed 4 December 2023

<sup>190</sup> JNCC (2022). List of SPAs. [\[Online\]](#) Accessed 4 December 2023

<sup>191</sup> JNCC (2023). SACs in the United Kingdom. [\[Online\]](#) Accessed 4 December 2023

<sup>192</sup> Ramsar Sites Information Service (2023). Explore Sites. [\[Online\]](#) Accessed 4 December 2023

<sup>193</sup> Natural England (2023). Designated Sites View. [\[Online\]](#) Accessed 4 December 2023

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5.13.9 The proposed Order Limits are located within one national statutory designated site (Bridgwater Bay SSSI) and are 250 m west of another national statutory designated site (Somerset Wetlands NNR).

5.13.10 There are no LNRs within 2 km of the proposed Order Limits.

5.13.11 The proximity and reason for designation for statutory designated sites within 2 km (30 km for bats) of the proposed Order Limits or hydrologically linked for migratory aquatic species are summarised in **Table 5-21**.

**Table 5-21: International and National Statutory Designated Sites within 2 km (30 km for bats) of the proposed Order Limits, or hydrologically linked for freshwater aquatic species.**

Site	Location in relation to the proposed Order Limits	Reason for Designation
Severn Estuary SPA	Within the proposed Order Limits	This site has been designated for its wintering populations of Bewick's swan ( <i>Cygnus columbianus</i> ), white-fronted goose ( <i>Anser albifrons</i> ), shelduck ( <i>Tadorna tadorna</i> ), gadwall ( <i>Anas strepera</i> ), dunlin ( <i>Calidris alpina</i> ) and redshank ( <i>Tringa totanus</i> ) and its wintering waterfowl assemblage.
Severn Estuary Ramsar	Within the proposed Order Limits	This site has been designated for the following habitats and species: All SAC features (see below) <ul style="list-style-type: none"> <li>• Unusual estuarine communities associated with reduced productivity and diversity;</li> <li>• Migratory fish, including sea trout (<i>Salmo trutta</i>), salmon (<i>Salmo salar</i>), Allis shad (<i>Alosa alosa</i>) and eel (<i>Anguilla anguilla</i>) in addition to the cited SAC species;</li> </ul>

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Site	Location in relation to the proposed Order Limits	Reason for Designation
		<ul style="list-style-type: none"> <li>• Migratory birds in spring and autumn;</li> <li>• Wintering waterfowl assemblage; and</li> <li>• Internationally important wintering numbers of Bewick’s swan, white-fronted goose, gadwall, shelduck, dunlin and redshank.</li> </ul>
Severn Estuary SAC	Within the proposed Order Limits	<p>This site has been designated for the following habitats and species:</p> <ul style="list-style-type: none"> <li>• Estuaries;</li> <li>• Intertidal mudflats and sandflats;</li> <li>• Atlantic salt meadows;</li> <li>• sandbanks;</li> <li>• reefs; and</li> <li>• three species of migratory fish: sea lamprey (<i>Petromyzon marinus</i>); river lamprey (<i>Lampetra fluviatilis</i>); and twaite shad (<i>Alosa fallax</i>).</li> </ul>
Bridgwater Bay SSSI	Within the proposed Order Limits	<p>The site has been designated for the following habitats and species:</p> <ul style="list-style-type: none"> <li>• Mudflats;</li> <li>• Saltmarsh;</li> <li>• Shingle beach;</li> <li>• Grazing marsh;</li> <li>• Internationally and nationally important numbers of wintering and passage wildfowl including (in addition to species cited in other designations) black-tailed godwit (<i>Limosa limosa</i>), teal (<i>Anas crecca</i>) and grey plover (<i>Pluvialis squatarola</i>);</li> <li>• A diverse invertebrate fauna of ponds and ditches; and</li> </ul>

Site	Location in relation to the proposed Order Limits	Reason for Designation
		<ul style="list-style-type: none"> <li>The ecological link to the Somerset Levels and the position of the area in the context of the Severn Estuary.</li> </ul>
Somerset Wetlands NNR	250 m west	Largest remaining area of lowland wetland in England, with UK’s second largest area of lowland peat soils. Holds nationally and internationally important populations of wildlife and wading birds. Diverse habitats support a wide variety of insects, reptiles and plants rarely found elsewhere. <sup>194</sup>
Exmoor and Quantock Oakwoods SAC	9.3 km west	Primary reasons for site selection: Barbastelle ( <i>Barbastella barbastellus</i> ) Qualifying features but not a primary reason for site selection: Bechstein’s bat ( <i>Myotis bechsteini</i> )
Hestercombe House SAC	12.8 km south	Primary reason for site selection: Lesser horseshoe bat ( <i>Rhinolophus hipposideros</i> )
Mendip Limestone Grasslands SAC	15.8 km north-east	Qualifying features but not a primary reason for site selection: Greater horseshoe bat ( <i>Rhinolophus ferrumequinum</i> )
North Somerset & Mendip Bats SAC	21.1 km north-east	Primary reasons for site selection: Lesser horseshoe bat Greater horseshoe bat

<sup>194</sup> Natural England (2023). Corporate report: Somerset’s National Nature Reserves. [\[Online\]](#) Accessed 4 December 2023.



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### *Non-statutory designated sites*

5.13.12 There are three LWS within 1 km of the proposed Order Limits:

- Cannington Brook LWS (ST23/090), located 145 m south of the proposed Order Limits, on the opposite bank of the River Parrett. Described as a site with otter.
- Comwich Wharf LWS (ST24/049), located 215 m west of the proposed Order Limits, on the opposite bank of the River Parrett. Site of coastal salt marsh and water bodies supporting protected, the Natural Environment and Rural Communities ('NERC') Section 41 and Somerset notable species (particularly vascular plants, invertebrates, birds or riparian mammals).
- Comwich Brick Pit LWS (ST24/008), located 350 m west of the proposed Order Limits, on the opposite bank of the River Parrett. Described as open water and reed beds with notable breeding bird species.

5.13.13 The Pawlett Hams Wetland Site ('White House Hams') is an area of habitat restoration within the south and central portion of the proposed Order Limits that was secured via a Section 106 agreement between Wyvern Waste Services Ltd and Somerset County Council in

2003 as habitat mitigation for Walpole landfill, located to the east of the site. It is understood to be managed as a raised water level area to promote ecological diversity and includes an area managed for lapwing (*Vanellus vanellus*).

### *Habitats*

5.13.14 The proposed Order Limits within Pawlett Hams are located on the east bank of the River Parrett, approximately 3.5 km from the estuary mouth at Steart Point. The citation for Bridgwater Bay SSSI (of which the proposed Order Limits are a part) describes Pawlett Hams Pawlett Hams as permanent semi-improved, neutral grassland, some of which is arable land. The area is intersected by a range of rhynes (a network of agricultural drainage ditches), which act as a drainage system in winter and as stock barriers and drinking water supplies in the summer. The Hams are a hydrologically discrete area with freshwater provided by the Cannington Brook, to the south, which originates in the Quantock Hills (English Nature undated). A contemporary flood embankment and naturally developed shingle ridge separate the intertidal area of the adjacent River Parrett from the terrestrial, grazing marsh areas of the Pawlett Hams.

5.13.15 The condition of the SSSI units that comprise the proposed Order Limits (Units 82 to 88 – lowland neutral

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grassland and Unit 99 – littoral sediment) were last checked by Natural England in 2018 when all units were categorized as unfavourable-recovering.<sup>195</sup> The Parrett Internal Drainage Board (IDB) detail favourable conditions for wetland SSSIs in Somerset which include at least 30cm depth of water in ditches, winter surface water cover and pools for breeding season<sup>196</sup>. These conditions are unlikely to be currently met.

5.13.16 The desk study suggests the presence of the following HPI within 1 km of the proposed Order Limits: coastal saltmarsh, mudflats, coastal and floodplain grazing marsh, reedbeds, deciduous woodland and traditional orchards. The nearest blocks of reedbed, deciduous woodland and traditional orchard are approximately 370 m, 600 m and 450 m west, respectively, within the village of Comwich on the opposite side of the River Parrett.

5.13.17 Coastal and floodplain grazing marsh is distributed throughout the proposed Order Limits, with sporadic areas of coastal saltmarsh and mudflat bordering the perimeter of the proposed Order Limits. Given the marine nature of coastal saltmarsh and mudflats, these

HPI are not discussed further within this chapter (see **Section 5.12 Marine Ecology**).

5.13.18 As per **Section 5.8 Groundwater**, the coastal and floodplain grazing marsh HPI within the proposed Order Limits has the potential to contain GWDTE.

5.13.19 There is no ancient woodland located within 1 km of the proposed Order Limits.

5.13.20 There are no ancient/veteran trees located within 1 km of the proposed Order Limits.<sup>197</sup>

5.13.21 It should be noted that if the works within the proposed Order Limits were not to go ahead, the area is likely to remain as Coastal and Floodplain grazing marsh as described in **Sections 5.13.16 to 5.13.17** above.

*Notable Plants*

5.13.22 Eighty-one species of notable plants within 1 km of the proposed Order Limits were returned from the SERC data search.

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<sup>195</sup> Natural England (2018). Bridgwater Bay SSSI – Unit Detail. [\[Online\]](#) Accessed 4 December 2023

<sup>196</sup> Parrett Internal Drainage Board (2009) Bridgwater and Pawlett Water Level Management Plan.

<sup>197</sup> Woodland Trust (2023). Ancient tree inventory. [\[Online\]](#) Accessed 4 December 2023

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5.13.23 The following sixteen species are particularly notable: annual sea-blite (*Suaeda maritima*), Babington's orache (*Atriplex glabriuscula*), black mustard (*Brassica nigra*), Brackish water-crowfoot (*Ranunculus baudotii*), corn parsley (*Petroselinum segetum*), curled pondweed (*Potamogeton crispus*), English scurvygrass (*Cochlearia anglica*), frogbit (*Hydrocharis morsus-ranae*), green-winged orchid (*Anacamptis morio*), parsley water-dropwort (*Oenanthe lachenalia*), pennyroyal (*Mentha pulegium*), sea barley (*Hordeum marinum*), sea clover (*Trifolium squamosum*), sea wormwood (*Seriphidium maritimum*), slender hare's ear (*Bupleurum tenuissimum*) and tubular water-dropwort (*Oenanthe fistulosa*).

5.13.24 The whole of the Pawlett Hams, and hence the proposed Order Limits, is considered part of the Severn Estuary Shore Important Plant Area by Plantlife. Although this is not a form of site designation, it identifies the area as one of the most valuable for plant diversity in the UK.

5.13.25 Habitat survey for the Pawlet IDB pipeline identified the following rare plants on the southern coastal boundary of the proposed Order Limits with the River Parrett: sea

wormwood (*Artemisia maritima*); sea barley (*Hordeum marinum*); slender hare's-ear (*Bupleurum tenuissimum*) and rock-sea lavender (*Limonium binervosum*).<sup>198</sup> The first three species are noted in the Bridgwater Bay SSSI citation.

*Bats*

5.13.26 The following bat species have been identified in the SERC desk study within 1 km of the proposed Order Limits:

- Common pipistrelle (*Pipistrellus pipistrellus*);
- Soprano pipistrelle (*Pipistrellus pygmaeus*); and
- Serotine (*Eptesicus serotinus*).

5.13.27 All of the above records were located in Combwich, 300 m or more west from Pawlett Hams, across the River Parrett.

5.13.28 Field survey for the Bridgwater Tidal Barrier Order (Environment Agency, 2019) identified nine bat species and three species groups within the entire scheme as a result of static detector monitoring in 2017: barbastelle, serotine, Natterer's bat (*Myotis nattereri*), Leisler's bat

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<sup>198</sup> Parrett Internal Drainage Board (2017). Pawlett Hams Water Supply Pipeline Project 2017 – Environmental Report. [\[Online\]](#) Accessed 4 December 2023

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*Nyctalus leisleri*, noctule, common pipistrelle, soprano pipistrelle, greater horseshoe, lesser horseshoe, *Myotis* species (*Myotis* sp.), long-eared species (*Plecotus* sp.), and pipistrelle species (*Pipistrelle* sp.).

5.13.29 Of the four static monitoring locations in Combwich, directly across the River Parrett from the proposed Order Limits, recorded passes of barbastelle at a single static location suggested use by a single commuting barbastelle. Similarly, passes by lesser horseshoe bat and long-eared bat species at Combwich locations were considered commuting behaviour. No greater horseshoe bats were recorded at the Combwich static locations.

5.13.30 The terrestrial habitats at the proposed Order Limits likely provide suitable commuting and foraging habitat for a wide variety of bat species; in particular the ditch system, field boundaries and the River Parrett itself would all be considered important commuting corridors.

5.13.31 A single EPSM licence for roosting soprano pipistrelle bats in Combwich has been granted within 1 km of the proposed Order Limits. Given the low number of mature trees, buildings or structures within the proposed Order

Limits, there are likely few roosting opportunities for bats.

*Badger*

5.13.32 No recent badger records were returned within 1 km of the proposed Order Limits as a result of the SERC desk study. No badger setts were found as a result of field surveys for the Pawlett Hams Water Supply Pipeline Project in 2017. Field surveys for the Bridgwater Tidal Barrier Order recorded badger activity at Chilton Trinity, Combwich, Pawlett and Pims Clyse, indicating badger use of the wider study area.

*Hazel dormouse*

5.13.33 No dormouse records were returned within 1 km of the proposed Order Limits as a result of the SERC desk study. There are no granted EPSM licences for dormouse within 10 km of the proposed Order Limits. The nearest dormouse record is over 7 km to the south near Goathurst (record from 2022), as recorded by the National Dormouse Database.<sup>199</sup>

5.13.34 Based on aerial imagery, there is a lack of woodland blocks and/or substantial hedgerows within the

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<sup>199</sup> National Biodiversity Network (2023). National Dormouse Database. [\[Online\]](#) Accessed 4 December 2023

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proposed Order Limits, or to the east, indicating both a lack of suitable habitat and of connectivity within the wider landscape. There is a high degree of confidence dormice are not present within the proposed Order Limits.

#### *Otter*

5.13.35 Nine otter records were returned within 1 km of the proposed Order Limits as a result of the SERC desk study. The majority of records were along the west bank of the River Parrett, concentrated both north and south of Comwich.

5.13.36 Field survey for the Bridgwater Tidal Barrier Order<sup>200</sup> also recorded two potential otter lay-up sites within the vicinity of the proposed Order Limits: one 1.5 km east on the Pawlett side of the River Parrett and one just north of Comwich village, approximately 370 m west of the proposed Order Limits on the west bank of the River Parrett. As well as the River Parrett, the freshwater/brackish ditch system within the proposed Order Limits is considered suitable foraging/commuting habitat for otter.

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<sup>200</sup> Parrett Internal Drainage Board (2017) Pawlett Hams Water Supply Pipeline Project 2017 Environmental Report - including Environmental Impact, Habitats Regulations and Water Framework Directive Assessments. [\[Online\]](#) Accessed 6 December 2023.

#### *Water vole*

5.13.37 Two records of water vole within the proposed Order Limits (from the same location, approximately 200 m south of White House Road) from 2017 were returned by the SERC desk study, with one further additional record within 1 km of the proposed Order Limits. The Environmental Report for the Pawlett Hams Water Supply Pipeline Project also indicated that water vole are known to be present in the proposed Order Limits ditch system.<sup>198</sup>

#### *Ornithology*

5.13.38 The SERC desk study returned records of 60 species of birds within 1 km of the proposed Order Limits, many of which have overlapping conservation designations, such as Species of Principal Importance ('SPI') under Section 41 of the NERC Act 2006, red or amber listed as Birds of Conservation Concern ('BoCC')<sup>201</sup> or listed under Schedule 1 of the Wildlife and Countryside Act ('WCA') 1981.

<sup>201</sup> Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. 2021. The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. *British Birds* 114: 723-747.

5.13.39 Fifteen of these bird species are either qualifying species of the Severn Estuary SPA/Ramsar or specifically noted within the SPA, Ramsar or SSSI designations, including: black-tailed godwit (*Limosa limosa*), curlew (*Numenius arquata*), gadwall (*Anas strepera*), greenshank (*Tringa nebularia*), grey plover (*Pluvialis squatarola*), herring gull (*Larus argentatus*), mallard (*Anas platyrhynchos*), pintail (*Anas acuta*), shoveler (*Anas clypeata*), snipe (*Gallinago gallinago*), spotted redshank (*Tringa erythropus*), teal (*Anas crecca*), turnstone (*Arenaria interpres*), whimbrel (*Numenius phaeopus*) and wigeon (*Anas penelope*).

5.13.40 Two British Trust for Ornithology supplementary count wetland bird surveys ('WeBS'), conducted in 2020/21 (unknown month) and August 2021 recorded thirteen bird species within the proposed Order Limits which included two species specified within the Severn Estuary SPA and Ramsar site designations: shelduck and redshank; and three species specifically noted within the noteworthy fauna section of the Ramsar designation: herring gull, little egret (*Egretta garzetta*) and curlew.<sup>202</sup>

5.13.41 Other species recorded by the SERC desk study or the most recent WeBs surveys were: bittern (*Botaurus stellaris*), black-headed gull (*Chroicocephalus ridibundus*), common gull (*Larus canus*), crane (*Grus grus*), great black-backed gull (*Larus marinus*), green sandpiper (*Tringa ochropus*), grey heron (*Ardea cinerea*), greylag goose (*nswe nswer*), lapwing, mallard, Mediterranean gull (*Ichthyaetus melanocephalus*), moorhen (*Gallinula chloropus*), mute swan (*Cygnus olor*), oystercatcher (*Haematopus ostralegus*), sanderling (*Calidris alba*) and yellow-legged gull (*Larus michahellis*).

5.13.42 Beyond waterbirds, the species returned in the data search included a mix of species typical of the habitats present, a mosaic of arable farmland, grazing marsh, ditches and watercourses, including notable species such as: Cetti's warbler (*Cetti cetti*), cuckoo (*Cuculus canorus*), grey wagtail (*Motacilla cinerea*), house martin (*Delichon urbicum*), marsh tit (*Poecile palustris*), reed bunting (*Emberiza schoeniclus*), sedge warbler (*Acrocephalus schoenobaenus*), skylark (*Alauda arvensis*), starling (*Sturnus vulgaris*) wheatear (*Oenanthe Oenanthe*) and yellow wagtail (*Motacilla flava*).

<sup>202</sup> Austin, G.E., Calbrade, N.A., Birtles, G.A., Peck, K., Shaw, J.M., Wotton, S.R., Shaw, J.M., Balmer, D.E. and Frost, T.M. (2023). Waterbirds in the UK 2021/22: The Wetland Bird Survey

and Goose & Swan Monitoring Programme. British Trust for Ornithology, RSPB, JNCC and NatureScot. British Trust for Ornithology, Thetford.

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5.13.43 The Pawlett Hams Wetland Site has been managed to encourage breeding lapwing with recent success resulting in 15 breeding pairs (*pers.comm.* Colin Leopard, Natural England, autumn 2023).

*Great crested newt*

5.13.44 There were no records for GCN returned within 1 km of Pawlett Hams in the SERC data search. There are no granted EPSM licence applications for GCN, nor any GCN class survey licence returns, within 1 km of the proposed Order Limits.

5.13.45 Two ponds within the proposed Order Limits were surveyed in 2018 for GCN, with GCN reported as absent at both.

5.13.46 Field surveys for the Bridgwater Tidal Barrier Order confirmed the presence of GCN south of Pawlett village, approximately 1.5 km east of the proposed Order Limits and northwest of Chilton Trinity, approximately 1.5 km southwest of Pawlett Hams.<sup>203</sup>

5.13.47 Despite a lack of records for the species within the proposed Order Limits, it is considered that the grassland, freshwater ditches and ponds known to be

present within the proposed Order Limits could provide suitable terrestrial and/or breeding habitat for GCN. There are no obvious barriers for dispersal between known populations of GCN south of Pawlett village and Pawlett Hams itself.

*Reptiles*

5.13.48 There were no records for reptiles returned within 1 km of the proposed Order Limits from the SERC data search.

5.13.49 No reptile surveys in the vicinity of the proposed Order Limits were conducted for either the Bridgwater Tidal Barrier Order or the Pawlett Hams Water Supply Pipeline Project.

5.13.50 Suitable habitat, such as grassland, rough field margins, hedgerows and ponds/ditches within the proposed Order Limits have the potential to support three of the four common reptile species: common lizard (*Zootoca vivipara*), slow worm (*Anguis fragilis*) and grass snake (*Natrix natrix*).

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<sup>203</sup> Environment Agency (2019) 4.13.484.13.49 Field survey for the Bridgwater Tidal Barrier Order

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### Terrestrial Invertebrates

5.13.51 Five protected or notable terrestrial invertebrate species were returned from the SERC data search, as described in **Table 5-22**.

**Table 5-22: Notable and protected terrestrial invertebrate species within 1 km of the proposed Order Limits**

Species	Distance from proposed Order Limits	Conservation designation
A spider ( <i>Philodromus albidus</i> )	One record within the proposed Order Limits.	SERC-Notable
A weevil ( <i>Gymnetron villosulum</i> )	One record within the proposed Order Limits and one record approximately 1 km west.	Red Data Book- Notable B SERC-Notable
Wall ( <i>Lasiommata megera</i> )	Five records within 1 km. Closest record approximately 110 m north in Steart marshes.	Species of Principal Importance ('SPI'), International Union for Conservation of Nature ('IUCN') Red List – Near Threatened, Local Biodiversity Action Plan.

Species	Distance from proposed Order Limits	Conservation designation
Jersey Tiger ( <i>Euplagia quadripunctaria</i> )	One record approximately 895 m east.	Annex II, SERC-Notable
Essex skipper ( <i>Thymelicus lineola</i> )	380 m northwest	SERC-Notable

5.13.52 The invertebrate interest of the Bridgwater SSSI is largely associated with the freshwater and brackish habitats at Pawlett Hams (see Freshwater Habitats and Species below). However, it is likely the terrestrial habitat present, particularly the HPI coastal and floodplain grazing marsh, is suitable for a range of common and notable terrestrial invertebrates.<sup>204</sup>

### Other Notable Species

5.13.53 The SERC data search returned records of two additional notable species, brown hare (*Lepus europaeus*) and hedgehog (*Erinaceus europaeus*), within 1 km of the proposed Order Limits. The nearest brown hare record was within the proposed Order

<sup>204</sup> Buglife (2019). Notable invertebrates associated with coastal and floodplain grazing marsh. [\[Online\]](#) Accessed 4 December 2023



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Limits, with additional records over 800 m west, across the River Parrett. The nearest hedgehog record was 700 m east of the proposed Order Limits.

5.13.54 Common toad (*Bufo bufo*) records were recorded in the wider area (east and southeast of the proposed Order Limits) and the proposed Order Limits are considered to contain suitable habitat for these species.

5.13.55 Brown hare, hedgehog and common toad are all listed in accordance with Section 41 of the NERC Act 2006 as SPI.

*Invasive Non-Native Species (Plants and Animals)*

5.13.56 The desk study identified a number of records of terrestrial Invasive and Non-Native Species ('INNS'), including:

- Twenty records of Canada goose (*Branta canadensis*), the closest which is approximately 450 m west of the proposed Order Limits, and 12 records of Egyptian goose (*Alopochen aegyptiaca*), all of which are approximately 1.0 km north of the proposed Order Limits in Steart marshes; and
- One record of Himalayan balsam (*Impatiens glandulifera*), approximately 1.0 km southwest of the proposed Order Limits.

5.13.57 INNS do not have intrinsic value and will not be considered as a biodiversity receptor in the assessment but as a potential pathway to cause adverse effects on other receptors.

*Freshwater Habitats and Species*

5.13.58 Pawlett Hams is included in the Bridgwater Bay SSSI partly as it is of local importance for its network of ditches and ponds with notable aquatic flora. The Bridgwater Bay SSSI citation states a wide variety of aquatic and bankside plant species occur in the ditches.

5.13.59 Free floating species include:

- rootless duckweed (*Wolffia arrhiza*) (nationally restricted);
- frogbit (*Hydrocharis morsus-ranae*) (uncommon); and
- water fern (*Azolla filiculoides*).

5.13.60 Submerged waterweeds include:

- rigid hornwort (*Ceratophyllum demersum*); and
- spiked water-milfoil (*Myriophyllum spicatum*).

5.13.61 Emergent and bankside species include:

- flowering rush (*Butomus umbellatus*);

- common reed (*Phragmites australis*);
- water-plantain (*Alisma plantago-aquatica*);
- brookweed (*Samolus valerandi*); and
- local parsley water-dropwort (*Oenanthe lachenalii*).

5.13.62 The nearest Environment Agency macro-invertebrate sampling site is also within the River Huntspill between Sloway Lane and Pawlett Road, approximately 1.3 km upstream of the sluice gates to the River Parrett. The watercourse here is a much larger (discharge category 5<sup>205</sup>, i.e., 2.5 - 5.0 m<sup>3</sup> s<sup>-1</sup>) watercourse which is approximately 25 m wide and 1.6 m deep and therefore not representative of channels located within the proposed Order Limits, which form a network of small ditches.

5.13.63 Pawlett Hams is located within the Bridgwater Bay SSSI (units 82-88 and unit 99<sup>206</sup>). Although the SSSI citation includes freshwater and brackish invertebrates, no

condition status for the invertebrate components has been recorded.

5.13.64 In this area, many of the fields contain ponds with associated well developed communities of invertebrates very similar to those of the surrounding ditches.

5.13.65 Fifteen ditches across the Pawlett Hams area were surveyed in 2007<sup>207</sup>. The ditches surveyed on the coastal Pawlett Hams were only mildly brackish and are defined as freshwater ditches; species intolerant of brackish water were scarce. However, it is understood brackish ditches are present within the proposed Order Limits and are also of importance for their species composition<sup>208</sup>.

5.13.66 Overall 109 species of invertebrates were recorded from the Pawlett Hams Marshes, this includes a number of rare and scarce species (**Table 5-23**)<sup>209</sup>. Results were compared to previous surveys of the marshes undertaken at various times since 1983 and found no

<sup>205</sup> Joint Nature Conservation Committee (2016). Common Standards Monitoring Guidance for Rivers. [Online] Accessed 4 December 2023

<sup>206</sup> Natural England (2023). Designated Sites View [Online] Accessed 4 December 2023

<sup>207</sup> Drake, C.M, Stewart, N.F., Palmer, M.A. & Kindemba, V. L. (2010a) The ecological status of ditch systems: an investigation into the current status of the aquatic invertebrate and plant communities of grazing marsh ditch systems in England and Wales. Technical Report. Buglife – The Invertebrate Conservation Trust, Peterborough.

<sup>208</sup> Drake, C. M (2004) Grazing marsh assemblages and site classification using invertebrates. English Nature Research Reports. Number 579

<sup>209</sup> Drake, M., Stewart, N., Palmer, M. & Kindemba, V. (2010b) The ecological status of ditch systems: an investigation into the current status of the aquatic invertebrate and plant communities of grazing marsh ditch systems in England and Wales. Technical Report Volume 2. Buglife – The Invertebrate Conservation Trust, Peterborough. [Online] Accessed 4 December 2023

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indication of decline in overall quality, attributed to the input of conservation efforts on the SSSIs.

**Table 5-23: Rare and scarce species of invertebrates recorded from Pawlett Marshes, 2007 (Drake *et al.*, 2010b)**

Species	Abundance
The beetle <i>Hydaticus transversalis</i>	2
The beetle <i>Peltdodytes caesus</i>	3
Great silver water beetle ( <i>Hydrophilus piceus</i> )	2
The beetle <i>Limnoxenus niger</i>	13
The soldierfly <i>Odontomyia ornata</i>	8
The soldierfly <i>Odontomyia tigrinus</i>	3
The soldierfly <i>Stratiomys singularior</i>	5

5.13.67 In addition, the SSSI citation notes the additional Red Data Book species recorded from Pawlett Hams associated rhynes and ponds:

- the water beetle *Hydrovatus clypealis*; and
- the hover fly *Lejops vittata*.

5.13.68 The water mite *Diplodontus scapularis*, new to Britain, has also been recorded here.

5.13.69 Nationally scarce species include:

- the aquatic snail *Gyraulus laevis*; and

- the ladybird *Coccidula scutellata*.

5.13.70 SERC provides a list of species of national (**Table 5-24**) and local (**Table 5-25**) importance at Pawlett Hams, with many of the historical records dating back to 1983. No species of international importance were recorded.

5.13.71 As there are no recent records, with the latest in 2012, the presence or absence of species listed is not considered to be an up to date or comprehensive assessment of species supported at Pawlett Hams.

**Table 5-24: List of National aquatic and semi aquatic macro-invertebrate species for Pawlett Hams, recorded since 2007**

Scientific Name	Lists*	Latest record
The beetle <i>Agabus conspersus</i>	RDB-NS, SERC-Notable	1983
The beetle <i>Amara strenua</i>	LBAP, RDB-NR, RL-NT, SERC-Notable	1983
The beetle <i>Enochrus quadripunctatus</i>	RDB-NS	1983
Smooth ramshorn ( <i>Gyraulus (Torquis) laevis</i> )	RDB-NS, SERC-Notable	1983
The beetle <i>Helochares obscurus</i>	RL-VU	2012
The beetle <i>Hydaticus transversalis</i>	LBAP, RDB-NS, SERC-Notable	2012

Scientific Name	Lists*	Latest record
Great silver water beetle ( <i>Hydrophilus piceus</i> )	LBAP, RL-NT, SERC-Notable	2012
The diving beetle <i>Hydrovatus clypealis</i>	LBAP, RDB-NS, SERC-Notable	1983
The hoverfly <i>Lejops vittatus</i>	LBAP, RL-NT, SERC-Notable	1983
The beetle <i>Limnebius papposus</i>	RL-NT, SERC-Notable	1983
The beetle <i>Limnoxenus niger</i>	RL-NT, SERC-Notable	2012
Ornate brigadier ( <i>Odontomyia ornata</i> )	LBAP, RDB-NS, SERC-Notable	2012
The beetle <i>Paracymus scutellaris</i>	RDB-NS, SERC-Notable	1998
The beetle <i>Pedius longicollis</i>	RDB-NS, SERC-Notable	1983
The beetle <i>Peltodytes caesus</i>	RDB-NS, SERC-Notable	2012
The beetle <i>Plateumaris bradata</i>	RDB-NS, SERC-Notable	2007
Marsh pond snail ( <i>Stagnicola palustris/fuscus/corvus</i> )	RL-DD	2007
Long horned general ( <i>Stratiomys longicornis</i> )	RDB-NS, SERC-Notable	1998
<i>Sympetrum striolatum</i> (common darter)	RL-DD	2007

Source: SERC (search date 28/9/2023)

**Table 5-25: Summary of local aquatic and semi aquatic macro-invertebrate species for Pawlett Hams, recorded since 2007**

Scientific Name	Lists*	Latest record
Migrant hawkler ( <i>Aeshna mixta</i> )	SERC-Notable	1983
The beetle <i>Anacaena bipustulata</i>	SERC-Notable	2007
The beetle <i>Bagous subcarinatus</i>	RDB-NA, SERC-Notable	2012
The beetle <i>Bagous tempestivus</i>	RDB-NA, SERC-Notable	2012
The beetle <i>Berosus affinis</i>	SERC-Notable	2012
Hairy dragonfly ( <i>Brachytron pratense</i> )	SERC-Notable	2012
The beetle <i>Cercyon tristis</i>	SERC-Notable	1983
The beetle <i>Donacia clavipes</i>	SERC-Notable	2007
The diving beetle <i>Dytiscus circumflexus</i>	SERC-Notable	2007
The beetle <i>Enochrus melanocephalus</i>	SERC-Notable	2012
The whirligig beetle <i>Gyrinus urinator</i>	SERC-Notable	2006
The beetle <i>Helochares lividus</i>	SERC-Notable	2012
The beetle <i>Helophorus griseus</i>	SERC-Notable	1983
The beetle <i>Hydroglyphus geminus</i>	SERC-Notable	2006
The beetle <i>Hydronomus alismatis</i>	RDB-NB, SERC-Notable	2007

Scientific Name	Lists*	Latest record
The waterboatman <i>Micronecta (Micronecta) poweri</i>	LBAP, SERC-Notable	1983
The diving beetle <i>Nartus grapii</i>	SERC-Notable	2012
Marine moss beetle ( <i>Ochthebius marinus</i> )	SERC-Notable	1983
The soldier fly <i>Odontomyia tigrina</i>	SERC-Notable	2012
One spotted water slater ( <i>Proasellus meridianus</i> )	LBAP	2012
The diving beetle <i>Rhantus suturalis</i>	SERC-Notable	2012
The soldierfly <i>Stratiomys singularior</i>	SERC-Notable	2012

Source: SERC (search date 28/9/2023).

\*Abbreviations

- LBAP: Local Biodiversity Action Plan Species
- RDB-NA: Red Data Book listing (not based on IUCN guidelines) - Notable A
- RDB-NB: Red Data Book listing (not based on IUCN guidelines) - Notable B
- RDB-NR: Red Data Book listing (not based on IUCN guidelines) - Nationally Rare
- RDB-NS: Red Data Book listing (not based on IUCN guidelines) - Nationally Scarce

- RL-NT: IUCN Red List of Threatened Species - Near Threatened
- RL-VU: IUCN Red List of Threatened Species - Vulnerable
- SERC-Notable: Notable species in Somerset

5.13.72 In terms of freshwater fish, the nearest Environment Agency Sampling site is also on the Huntspill River. Species sampled during 2013 include perch (*Perca fluviatilis*), pike (*Esox lucius*), ruffe (*Gymnocephalus cernua*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), common bream (*Abramis brama*), silver bream (*Blicca bjoerkna*), 3-spined stickleback (*Gasterosteus aculeatus*) and European eel (*Anguilla anguilla*). This is based on Environment Agency Fish catch data and indicates a typical lowland fish community<sup>210</sup>. Fish data are not available for the proposed Order Limits, but it is expected that the network of ditches provides habitat for species such as European eel and other fish species noted in this section particularly 3-spined stickleback in the smallest watercourses.

<sup>210</sup> Environment Agency (2023). Ecology and Fish Data Explorer [[Online](#)] Accessed 4 December 2023

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### Future Baseline

5.13.73 The ecological baseline of the Pawlett Hams is unlikely to change significantly up to and including 2027 as land use would likely remain the same (i.e. the grazed and agricultural practices) with the recent enhanced freshwater supply at Pawlett Hams likely to continue.

5.13.74 Legal protection and planning policy reduces the likelihood that Pawlett Hams would undergo significant modification due to changes in land use and management or other activities, although there could be some local changes due to positive habitat management measures. As such, any corresponding significant change in biodiversity is not anticipated.

5.13.75 In the longer term it is anticipated that climate change will bring a possible 1.3 to 5.1°C increase in mean summer temperatures<sup>211</sup>, with milder winters, changes in rainfall distribution and seasonality, more extremes of weather and sea level rise. Whilst climate models project changes in temperature with reasonable confidence, the complexities of ecological responses mean that there is a range of possible future outcomes with Climate Change.

5.13.76 The future freshwater species baseline is likely to remain unchanged, if water levels within the ditches remain the same with respect to the degree of seawater inundation (i.e., it was managed to retain the same conditions). With future sea level rise if more seawater was able to enter the grazing marsh there could be an expansion of the population of brackish tolerant species and a possible disappearance of freshwater species intolerant of brackish conditions.

5.13.77 Colonisation of INNS both because of existing or known species colonising new areas or climate change resulting in improved conditions favouring invasive species could influence the future baseline including through competition with native species.

### Assumptions and Limitations

5.13.78 This study is based on a desk-based assessment only and no site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings presented. The assessment provided is based on information available at the time of writing.

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<sup>211</sup> Department for Energy and Net Zero (2023) Climate Change Explained. [\[Online\]](#) Accessed 6 December 2023.

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5.13.79 At this PEIR stage, specific details regarding construction and operational stages within the proposed Order Limits are not fully known or decided.

5.13.80 At the time of writing, mitigation design is in a preliminary phase. Mitigation will be fully developed for the ES in discussion with stakeholders. Effects that are normally mitigated by best practice/embedded design such as construction of access routes, the control of INNS and pollution from spills and faulty machinery are not considered in the potential effects.

5.13.81 It is acknowledged that the proposed Order Limits for Pawlett Hams lie within the Bridgwater Bay SSSI. The design of the proposed compensation measures at Pawlett Hams will aim to support the features of the SSSI as far as reasonably practicable.

### Likely Significant Effects

5.13.82 This assessment has been undertaken in accordance with the approach to EIA outlined in **Volume 1 Chapter 4**.

5.13.83 This chapter uses geographic frame of reference for importance (sensitivity) and follows the Chartered Institute of Ecology and Environmental Management ('CIEEM') *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*<sup>212</sup>.

5.13.84 To allow comparisons with other technical chapters in the ES, importance has also been described (in brackets) using the more familiar terms used for sensitivity as per **Volume 1 Chapter 4**:

- International and European (High) - SACs, SPAs, Marine Conservation Zones ('MCZs') and Ramsar sites and habitats or populations of species, outside of protected sites, considered to be important at an international/European level;
- National (Medium) - SSSIs and habitats or populations of species outside SSSIs considered to be important at the National level;
- Regional (Low) - Habitats or populations of species considered to be important within the South-West of England;

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<sup>212</sup> Chartered Institute of Ecology and Environmental Management (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine.

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- County (Low) - Non-statutory designated sites (CWS, OSWI or UWS), habitats or populations of species considered to be important in Somerset;
- Local (Low) - habitats or species populations considered to be important at the site level and its immediate surrounds, and
- Less than local (Negligible) - habitats or species populations which are common and widespread.

5.13.85 It should be noted that the individual sensitivities will be assigned in the ES.

5.13.86 For the purpose of this assessment, the level of impact is described as the ‘magnitude’ of impact to provide consistency across the technical chapters of this ES. The magnitude of impact is reported in accordance with the criteria provided in **Table 5-26**.

**Table 5-26: Description of magnitude**

Level of magnitude (change)		Typical description
High	Negative	Permanent/irreversible damage. The extent, duration and/or frequency/timing of the impact would negatively affect the integrity or key characteristics of the important ecological feature.

Level of magnitude (change)		Typical description
	Positive	Permanent addition of, improvement to, or restoration of an important ecological feature. The extent, duration and/or frequency/timing of the impact would positively affect the integrity or key characteristics of the important ecological feature.
Medium	Negative	Temporary/reversible damage. The extent, duration and/or frequency/timing of the impact would negatively affect the integrity or key characteristics of the important ecological feature.
	Positive	Temporary addition of, improvement to, or restoration of an important ecological feature. The extent, duration and/or frequency/timing of the impact would positively affect the integrity or key characteristics of the important ecological feature.
Low	Negative	Permanent/irreversible damage. The extent, duration and/or frequency/timing of the impact would not affect the integrity or key characteristics of the important ecological feature.
	Positive	Permanent addition of, improvement to, or restoration of an important ecological



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Level of magnitude (change)		Typical description
		feature. The extent, duration and/or frequency/timing of the impact would not affect the integrity or key characteristics of the important ecological feature.
Very Low	Negative	Temporary/reversible damage. The extent, duration and/or frequency/timing of the impact would not negatively affect the integrity or key characteristics of the important ecological feature.
	Positive	Temporary addition of, improvement to, or restoration of an important ecological feature. The extent, duration and/or frequency/timing of the impact would not affect the integrity or key characteristics of the important ecological feature.

## Terrestrial Ecology

### *Construction effects*

5.13.87 The main habitats at Pawlett Hams are designated within the SAC designation qualifying features, and are of international importance, the duration of the works are of medium term duration and the magnitude, although not known at present, is low / very low. This

results in a minor/moderate adverse effect due to the loss of some grazing marsh areas to accommodate the channel, creeks, and mudflat/pools. This is considered to be significant and is scoped in for further assessment.

5.13.88 It is not yet confirmed if hedgerows, trees and other linear features will be removed as part of the construction phase. If removed, this would result in the loss of breeding bird habitat, and feeding habitat for badgers, potential bat roosting habitat, reptile habitat, hare and hedgehog habitat. It is considered that these would be mitigated through best practice mitigation (e.g., protected species licensing, seasonal avoidance, construction methods, pollution, runoff and siting of access tracks) and not reach the significant threshold. Similarly, the removal of the Elizabeth Boat Room and demolition of two agricultural buildings at White House Farm could result in a loss of roosting bat and breeding bird features. However, this would also be mitigated through best practice and licencing, if required, and not reach the significant threshold.

5.13.89 Lapwing are of regional importance, with a medium term duration and medium magnitude. Lapwing are of regional importance, the construction phase is expected to be of with medium term duration and of medium magnitude. Moderate adverse effects of disturbance may occur for nesting Lapwing connected to the White House Hams Wetland Site, from excavations and the

movement of plant during construction. This is considered to be significant and is scoped in for further assessment.

5.13.90 The proposed Order Limits are within international designated sites, designated for their wintering waterfowl assemblage. These are high value receptors, with an expected medium-term duration and medium magnitude effects. Major adverse effects on wintering birds may occur during the construction phase due to noise disturbance from people and plant activities. This is considered to be significant and is scoped in for further assessment.

5.13.91 The construction phase may cause disturbance to otter, GCN and water vole during construction phase due to noise disturbance from people and plant activities. The desk based data suggest that these species are of national importance with an expected medium term duration and very low magnitude. However, there are insufficient recent data on these species to scope them out, so they are scoped in for further assessment.

#### *Operational effects*

5.13.92 Creation of creeks and pools will have a moderate beneficial effect on otters by providing new habitat for the species. Otters are of national importance and the habitats will be of a low positive magnitude. This is

considered to be minor beneficial significance and is scoped out of further assessment.

5.13.93 Permanent loss of internationally important habitat is considered to be major adverse effect, this is likely to be balanced by the creation of international important habitat. However, further data are required on the condition of the existing grazing marsh to assess fully its significance, so this is scoped in for further assessment.

5.13.94 There is likely to be a permanent loss of locally important habitats because of flooding by saline water. This would also result in the loss of habitat for breeding birds, foraging badgers, potential bat roosts, reptiles, hares and hedgehogs. The effects on these species will need to be mitigated, however it is considered to be minor adverse effects and considered to not be significant and scoped out of further assessment.

5.13.95 The creation of new saltmarsh and associated habitats will have a moderate beneficial effect on the ecological connectivity between Steart Wetlands and the Somerset Wetlands NNR further contributing to the overall coherence of the national network of protected sites.

5.13.96 Moderate adverse effect due to the changes in the salinity regime, particularly saline intrusion into

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previously freshwater habitats may occur once the proposed compensation measures at Pawlett Hams are in operation. This would change the floral and faunal communities in the affected stretches of the rhynes system and would change the bed sediment to muddy creeks. This is considered to be significant and is scoped in for further assessment.

5.13.97 Moderate beneficial effect due to an increase in available mudflats exposed due to the tidal nature of Pawlett Hams. This would change the bird species composition that use Pawlett Hams. This is considered significant and is scoped in for further assessment.

**Freshwater Ecology**

5.13.98 Potential effects on freshwater ecology of Pawlett Hams are outlined below. Note effects on the tidal Pawlett River are covered in **Section 5.12 Marine Ecology**.

*Sediment removal, landscaping and release during construction activities*

5.13.99 The creation of saltmarsh and associated habitats will cause soils, sediments and the associated habitats and species within them in areas to be excavated or engineered to be removed/disturbed and increase suspended sediments within the water column, smothering substrates within the watercourses. As

potentially large areas of sedimentary habitats will be removed or landscaped, so will associated species particularly macrophytes and invertebrates. Habitat modification, through excavation or infilling of freshwater ditches will result in direct, permanent loss of freshwater habitats used by a diverse range of aquatic flora and fauna. This is considered to be significant and is scoped in for further assessment. Sediment releases are likely to be temporary and reversible. Species relocation could be implemented as appropriate to mitigate for removal of individuals. Construction mitigation measures will reduce the sediment release effect particularly in the surrounding watercourses that are to remain which will not be subject to construction works. However, owing to the large-scale nature of the landscaping and excavation works large areas of freshwater habitat will be permanently removed comprising Pawlett Hams watercourses within the proposed Order Limits.

*Disturbance to fish communities (resident/migratory) during construction activities*

5.13.100 The creation of saltmarsh and associated habitats will disturb, displace, and/or possibly cause mortality to individuals within fish communities in the watercourses and if these occur during key migratory windows may affect migratory behaviour (e.g., of European eel). Given the importance of European eel this is considered

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to be significant at a regional scale and is scoped in for further assessment. Mitigation measures would include carrying out the construction activities outside of these migratory windows where possible and carrying out fish removal and relocation.

*Changes in sediment habitat and deposition during operation*

5.13.101 The creation of saltmarsh and associated habitats and tidal inundation will cause mobilisation of sediments and deposition within the watercourses over time, permanently altering the remaining freshwater habitats and supported species particularly of invertebrates and macrophytes within Pawlett Hams. The species affected may be of conservation designation and features of the SSSI. Freshwater habitats have the potential to support species of conservation interest, and therefore the loss of these habitats, resulting from changes in sediment regime during operation is considered significant at the regional level.

*Operational changes to salinity, hydrodynamics, water quality and temperature regime*

5.13.102 The creation of saltmarsh and associated habitats will cause changes to the water environment particularly within the proposed Order Limits increasing the salinity, altering the hydrodynamic regime and changing other

water quality parameters. These conditions will therefore no longer be suitable for wholly freshwater species (invertebrates, fish and macrophytes) and the freshwater communities in the areas affected will be permanently lost. The modification of freshwater communities, including species of conservation interest, from changing water quality and hydrodynamics is considered significant at the regional level. Brackish tolerant species may remain in the upper reaches of the watercourses, if these are not removed during landscaping and excavation. The species lost may be notable and/or features of the designated site. Mitigation would include carrying out species removal and relocation, where appropriate.

### Proposed Scope

5.13.103 It is proposed that the ES includes a detailed assessment of potential terrestrial and freshwater ecology and ornithology impacts that could occur during the construction and operation of the proposed compensation measures within the proposed Order Limits. **Table 5-27** summarises the elements scoped into the assessment.

5.13.104 Until further site-specific habitat and species surveys, and subsequent suitability assessments, are completed, a precautionary approach to assessment

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will be undertaken for the remaining ecological receptors.

5.13.105 Regardless of inclusion in the ES assessment, all relevant species will be reviewed in relation to legislation in a Biodiversity Legislation Compliance Report to be submitted as an appendix to the ES.

**Table 5-27: Summary of ecology (terrestrial and freshwater) and ornithology elements scoped into and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Terrestrial ecology and ornithology		
Disturbance and habitat loss for terrestrial species as a direct result of construction activities	IN	Construction vehicles and human activity will cause terrestrial species to temporarily leave, abandon, or be potentially killed by the activities. Surveys will need to be undertaken to understand which species are present at Pawlett Hams and mitigation will need to consider seasonal timings, type of vehicles and potentially trapping and translocation of species to

Potential Effect	Scoped IN or OUT	Justification
		reduce the disturbance and limit the habitat loss.
Temporary and permanent effects on GWDTE	IN	See <b>Section 5.8 Groundwater</b>
Changes in air quality effecting sensitive habitats	OUT	No significant change in air quality is anticipated during construction and no emissions to air would occur in operation. See <b>Section 5.5 Air Quality</b> .
Disturbance and habitat loss for wintering birds during construction	IN	Surveys will be undertaken to understand which species are present at Pawlett Hams and mitigation will need to consider seasonal timings and type of vehicles to reduce the disturbance and limit the habitat loss
Loss of grazing marsh habitats	IN	Surveys are required to understand the condition and abundance of this habitat at Pawlett Hams
Operational impacts of increase saline conditions on at Pawlett Hams from	IN	Further design work is required to understand the effects this change will have on the existing habitat and on the

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Potential Effect	Scoped IN or OUT	Justification
the removal of the flood defence barrier		potential for Pawlett Hams to support a saltmarsh and associated habitats
Operation impacts on the SPA, SSSI and SAC from increased saltmarsh and associated habitats and loss of grazing marsh habitat	IN	The designated sites contain a range of habitats, providing a range of suitable foraging and roosting sites. Changes to the habitat at Pawlett Hams needs to be assessed
Operational impact on protected species including otters from creation of new channel and new terrestrial habitats	IN	There is insufficient recent survey data to assess the significance of this change to protected species.
Freshwater ecology		
Sediment removal and emissions generated during creation of saltmarsh and associated habitats (excavation and engineering)	IN	Construction activities associated with the creation of saltmarsh and associated habitats will remove and suspend sediments and increase turbidity and smothering of substrate in the watercourses and cause significant loss of freshwater

Potential Effect	Scoped IN or OUT	Justification
		habitats (through grading and sediment removal). This will reduce water quality and cause a loss of freshwater macrophyte, fish and invertebrate communities or alteration to communities where freshwater watercourses remain. Construction mitigation would need to consider which remaining watercourses are vulnerable and put measures in place accordingly. Species relocation is another measure to be considered for those watercourses where habitat will be removed and protected species exist.
Disturbance to fish communities and migration during construction activities	IN	Disturbance to fish within the freshwater watercourses during construction will be likely through noise and excavation activities; however, mitigation measures including fish removal and relocation and construction window timing can reduce the effects if necessary.

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Potential Effect	Scoped IN or OUT	Justification
Changes in sediment habitat and deposition during operation	IN	The creation of saltmarsh and associated habitats and tidal inundation will cause changes over time to the sediment composition within the watercourses, permanently altering (i.e., removing) the freshwater habitats and supported species particularly of invertebrate and macrophyte within Pawlett Hams. Mitigation could consider relocation of selected individuals to undisturbed habitat prior to operation, as appropriate.
Operational changes to salinity, hydrodynamics, water quality and temperature regime	IN	The breaching and creation of saltmarsh and associated habitats will cause significant permanent changes to the water environment of the Pawlett and the freshwater habitat will become an intertidal zone, altering the hydrodynamic regime and changing other water quality parameters. These conditions will result in the permanent

Potential Effect	Scoped IN or OUT	Justification
		loss of freshwater habitats and species (invertebrates, fish and macrophytes) over time, several of which are notable, and a complete change in communities in the areas affected will occur. Mitigation measures would include species relocation where appropriate.

## 5.14 Landscape and Visual

### Introduction

5.14.1 This section considers the likely significant effects associated with landscape and visual impacts arising because of the proposed compensation measures at Pawlett Hams.

### Study Area

5.14.2 The proposed landscape and visual impact assessment ('LVIA') study area for the assessment of the proposed compensation measures extends to 2 km from the proposed Order Limits. This is considered to be the

[edfenergy.com](http://edfenergy.com)

likely maximum distance over which landscape and visual impacts may arise as a result of the relatively limited scale / elevation of the proposed compensation measures at Pawlett Hams.

## Baseline

### Baseline Sources

5.14.3 The following sources have been used to inform a preliminary understanding of the baseline conditions for the assessment of the landscape and visual aspect:

- Natural England's National Landscape Character Area Profiles<sup>213</sup>;
- West Somerset Landscape Character Assessment 1999 (adopted in 2016 as part of the West Somerset Local Plan 2016-2032)<sup>214</sup>;
- The Sedgemoor Landscape Assessment and Countryside Design Summary (Revised Edition, 2003) (adopted in 2011 as part of the Sedgemoor Local Plan 2011-2032, updated in Feb 2019)<sup>215</sup>;

- The definitive PRoW map for Somerset County Council<sup>216</sup>;
- MAGIC Maps<sup>138</sup>; and
- Aerial photography<sup>146</sup>.

### Current Baseline

#### *National Landscape Character*

5.14.4 The proposed compensation measures at Pawlett Hams have the potential to result in impacts on both landscape character and visual amenity. A number of landscape and visual receptors have been identified.

5.14.5 The proposed Order Limits fall within National Character Area ('NCA') 142: Somerset levels and moors. NCA 146: Vale of Taunton and Quantock Fringes comes close to the west of the proposed Order Limits at Combwich but due to the flat nature of the topography and intervening vegetation there is unlikely to be any impact on NCA 146.

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<sup>213</sup> Natural England (2014) An Approach to Landscape Character Assessment. [\[Online\]](#)  
Accessed 4 December 2023

<sup>214</sup> Somerset West and Taunton Council (1999), West Somerset Landscape Character Assessment.

<sup>215</sup> Sedgemoor District Council (2003), The Sedgemoor Landscape Assessment and Countryside Design Summary.

<sup>216</sup> Somerset County Council, Public Rights of Way and Definitive map and Statement. [\[Online\]](#)  
Accessed 4 December 2023



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5.14.6 Due to the large scale of the NCA's compared to the small scale of the proposed compensation measures at Pawlett Hams, the Local Landscape Character Areas ('LLCA') are more applicable to Pawlett Hams. Therefore, the National Landscape Character has been scoped out of the future assessment.

*Local Landscape Character*

5.14.7 The Sedgemoor Landscape Assessment and Countryside Design Summary<sup>217</sup> (adopted in February 2019 as part of the Sedgemoor Local Plan 2011-2032)<sup>218</sup> has defined the LLCAs within the former Sedgemoor District Council administrative area. The proposed Order Limits fall within the Levels and Moors – Levels LLCA. This describes the Somerset Levels and Moors as:

*'a vast area of drained wetland which lies at or below the level of high tide in the adjacent Bristol Channel. The Mendip Hills to the north and the Quantocks to the south-west define the outer limits of this flat landscape while the Polden Hills form a dividing feature. The "Levels" are slightly higher than the inland "Moors" and landscape is commonly characterised as an area of*

*summer pastures criss-crossed with a geometric pattern of rhynes (drainage ditches), long straight access droves and distinctive pollarded willows or hawthorn hedgerows. The extent of tree cover in the Levels and Moors is limited and it is often a very open landscape. Where hedgerows do exist they are often cut low but more fully-grown hedgerows are also found and can significantly reduce the openness of local views.*

*Most of the land within this area lies between 6 and 3 metres above ordnance datum (AOD) with the adjacent Bristol Channel tidal range reaching up to 6.7 metres AOD. Tidal incursions are prevented by coastal sand dunes and man-made sea defences including sea walls and raised banks on the Parrett estuary with arterial rivers generally characterised by raised floodbanks.'*

*Statutory Land -Based Designations*

5.14.8 Pawlett Hams forms part of the following international conservation designations:

- Severn Estuary Ramsar;
- Severn Estuary SPA; and

<sup>217</sup> Revised Edition (2003) The Sedgemoor Landscape Assessment and Countryside Design Summary

<sup>218</sup> Somerset Council (2019). The Sedgemoor Local plan 2011-2032. [\[Online\]](#) Accessed 4 December 2023

- Severn Estuary SAC.

5.14.9 Pawlett Hams forms part of the following national conservation designation; Bridgwater Bay Site of SSSI (Ref 1076402) which totals 43.28 ha. The Pawlett Hams site is deemed to be in Unfavourable – Recovering condition.

5.14.10 The Somerset Wetlands NNR is 250 m to the north and west of Pawlett Hams on the opposite side of the River Parrett and the Pawlett Hams Wetland Site is located within the proposed Order Limits.

5.14.11 The closest Scheduled Monument (Cynwit Castle ref: 1006225) to the proposed Order Limits is located approximately 2.55 km to the southwest at Canning Park with a second (Motte with two baileys) located approximately 2.8 km to the east at Dunball.

5.14.12 The closest Listed Buildings (Grade II) lie between 400 m and 700 m to the west on the opposite riverbank at Combwich.

#### *Vegetation*

5.14.13 The majority of the area within the proposed Order Limits is designated by Natural England as having Coastal and Floodplain Grazing Marsh HPI which also covers the majority of the surrounding low-lying land.

There is also Mudflat and Coastal Salt Marsh HPI along the edge of, and within, the River Parrett.

5.14.14 The majority of taller vegetation within the proposed Order Limits consists of a network of field hedges and hedgerow trees, with no areas of woodland or scrub.

#### *Access*

5.14.15 A number of PRoW are in close proximity to the proposed Order Limits providing public access towards or around Pawlett Hams:

- PRoW No. BW 27/12 follows the riverbank along the River Parrett following the top of a raised embankment.
- PRoW BW 27/7 connects to PRoW No. BW 27/12 at the northern end of the proposed Order Limits and runs north south towards Dodds Farm.
- PRoW BW 27/4 connects to PRoW No. BW 27/12 at the southern end of the proposed Order Limits and runs north towards Gaunt's Farm.

5.14.16 Further PRoWs provide views across the River Parrett including:

- PRoWs No. BW 34/41 and BW 5/4 follow the left bank of the River Parrett following the top of a raised embankment.

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- PRow 25/33 connects Riverside in Combwich with a bridleway BW 25/2 and footpath BW 25/3 which follow the left bank of the River Parrett to the north of Combwich.

5.14.17 Combwich Village Green is located between the village and the River Parrett on land known as Combwich common and includes areas of managed and un-managed grassland and a children’s play park.

*Infrastructure*

5.14.18 A National Grid overhead power line crosses Pawlett Hams in a northeast – southwest direction from River Parrett to south of Gaunt’s Farm. It is supported across Pawlett Hams on 8 pylons at between 300 – 400 m intervals.

*Visual receptors*

5.14.19 The visual receptors that are likely to be affected by the proposed compensation measures at Pawlett Hams are outlined in **Table 5–28**. The temporary construction compound will be located on the eastern side of the proposed Order Limits in the vicinity of Cobbs Leaze Rhyne.

**Table 5–28: Visual Receptors likely to be affected**

Receptor description	Receptor type	Approximate distance to proposed Order Limits (at its closest)
Levels and Moors - Levels LLCA	Landscape Character	0 m
PRow No. BW 27/12	Recreational	0 m
King Charles III England Coast Path	Recreational	0 m
The Parrett Trail	Recreational	0 m
Whitehouse Farm	Residential, Commercial, Recreational	0 m
The Warren	Residential, commercial	25 m
PRow BW 27/4	Recreational	80 m
Residential properties along Gaunts Road	Residential	60 - 120 m
PRow BW 27/7	Recreational	120 m
PRow BW 34/41	Recreational	150 m
PRow BW 5/4	Recreational	170 m

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Receptor description	Receptor type	Approximate distance to proposed Order Limits (at its closest)
Properties along eastern end of Ham Lane	Residential, commercial	170 m
Hill Farm	Residential	180 m
PRoW 25/33	Recreational	300 m
Combwich Village Green	Recreational	300 m
Combwich Boat Club	Recreational	300 m
PRoW 25/2 and 25/3	Recreational	320 m
Combwich village	Residential	340 m
Pawlett village	Residential	880 m
Pawlett Primary and Pre-School	Educational	900 m
Yearsley Farm House	Residential	1000 m
Stretcholt village	Residential	1400 m

### Future Baseline

5.14.20 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site takes into account changes that are expected to

have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

- 5.14.21 Identification of receptors is based on a desktop study.
- 5.14.22 At the time of this PEIR the proposed compensation measures at Pawlett Hams are not confirmed, or a mitigation strategy developed, to fully understand the potential for landscape and visual impacts at this stage. It is assumed that where it is not possible to avoid or reduce a significant adverse effect, mitigation measures will be used to reduce the effect.
- 5.14.23 It is assumed that construction access will be via existing highways from where a haul road will be created, which will be reinstated to the original land use / condition.
- 5.14.24 The King Charles III England Coast Path that runs along the outer edge of the proposed Order Limits will be permanently diverted. The loss of the King Charles III England Coast Path will be mitigated by establishing a

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PRoW along the back embankment inland of the proposed Order Limits. During this relocation, this section of the King Charles III England Coast Path will not be accessible to the public. Other minor PRoWs off White House Road will be temporarily diverted to maintain access to Pawlett Hams. These will be reinstated post construction. All components of the proposed compensation measures at Pawlett Hams will be included in the future assessment.

### Likely Significant Effects

5.14.25 The likely effects associated with the landscape and visual aspect as a result of the proposed compensation measures at Pawlett Hams are outlined below.

#### Local landscape Character

5.14.26 There would be some localised changes to landscape character due to the disruption from construction activity in the relatively settled landscape, resulting in short term and temporary landscape effects. It is acknowledged that once the proposed compensation measures at Pawlett Hams are complete and established, there will be a local change to characteristics due to the loss of agricultural field patterns, and the loss of hedgerows and trees. However, the proposed compensation measures at Pawlett Hams would be consistent with landscape characteristics in the wider area, including

those at Steart Marshes to the north. Therefore, it is anticipated that there are unlikely to be residual significant effects on landscape character.

#### Visual receptors

5.14.27 It is anticipated that some, or all, of the visual receptors have the potential to experience temporary visual effects from the proposed compensation measures at Pawlett Hams in construction due to temporary construction access, compounds, and movement of construction vehicles. There is also the potential for visual receptors to experience permanent visual effects due to a change in vegetation / ground levels.

#### Proposed Scope

5.14.28 Based on the above assessment, **Table 5–29** presents the potential Landscape and Visual effects that are proposed to be scoped in or out of requiring further assessment, along with the rationale for the choice.

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**Table 5–29: Summary of landscape and visual elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
National Landscape Character	OUT	Due to the large scale of the NCAs compared to the small-scale proposed compensation measures at Pawlett Hams, the LLCA are more applicable to Pawlett Hams. Therefore, the National Landscape Character has been scoped out of the future assessment.
Local Landscape Character	IN	There would be some localised changes to landscape character due to the disruption from construction activity in the relatively settled landscape, resulting in short term and temporary landscape effects. It is acknowledged that once the proposed compensation measures at Pawlett Hams are complete and established, there will be a local change to characteristics due to the loss of agricultural field patterns, and the loss of hedgerows and trees. However, the proposed compensation measures at Pawlett Hams would be consistent with landscape characteristics in the

Potential Effect	Scoped IN or OUT	Justification
		wider area, including those at Steart Marshes to the north.
Visual Receptors	IN	It is anticipated that some, or all, of the visual receptors have the potential to experience temporary visual effects from the proposed compensation measures at Pawlett Hams in construction due to temporary construction access, compounds and movement of construction vehicles. There is also the potential for visual receptors to experience permanent visual effects due to a change in vegetation / ground levels.

5.14.29 Therefore, it is proposed that Landscape and Visual is scoped into the ES.

## 5.15 Historic Environment

### Introduction

5.15.1 The aims of this section are to:

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- Identify any heritage assets and archaeological features associated with Pawlett Hams, both within the proposed Order Limits and within a 1 km buffer.
- Identify whether the assets could be potentially impacted by the proposed compensation measures at Pawlett Hams.
- Outline a proposed scope and methodology for the assessment of historic environment impacts within the ES.

### Study Area

5.15.2 For the purpose of the assessment, a 1 km study area was established around the proposed Order Limits to identify any nearby heritage assets that could be impacted by the development.

### Baseline

#### Current Baseline

5.15.3 There are no designated heritage assets (Scheduled Monuments, Listed Buildings, Registered Parks and Gardens or Registered Historic Battlefields) recorded within the proposed Order Limits by the National Heritage List for England ('NHLE'). The proposed Order Limits are also not located within a World Heritage Site or Conservation Area.

5.15.4 In the 1 km study area, there are four Grade II listed buildings present located within Combwich, a neighbouring village located to the west of the proposed Order Limits. This includes Fender House with outbuildings (NHLE 1059056), The Old Ship Inn (NHLE 1096078), Church of St Peter (NHLE 1237423) and Fives Wall at NGR ST 2599 4247 (NHLE 1264055). These designated assets lie between 400 m and 700 m to the west of the proposed Order Limits and are considered of high value (nationally important).

5.15.5 Additionally, the Somerset Historic Environment Record database (online) records the following non-designated heritage assets within the proposed Order Limits: wreck within the northern part of the proposed Order Limits (NRHE 27743), post medieval oyster beds (NRHE 27747, 27748, 27749), post medieval deserted farm earthworks (NRHE 10695), medieval/post medieval flood banks/defences (NRHE 11142), medieval/post medieval ridge and furrow (NRHE 11140), post medieval brushwood flood bank foundations (NRHE 32352), 20<sup>th</sup> century navigation beacon (NRHE 12869), Second World War pill box (N2) NW of Gaunts Farm (NRHE 11953) and Second World War pill box (N3) NW of Hill Farm (NRHE 11954). Furthermore, the Combwich Causeway, an important fort that is likely to have existed in the Roman period, crosses the river to the proposed Order Limits. These non-designated

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assets are considered of between medium and low value.

**Future Baseline**

5.15.6 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

**Assumptions and Limitations**

5.15.7 At this PEIR stage, specific detail regarding construction and operation stages of the proposed compensation measures at Pawlett Hams are not fully known or decided.

5.15.8 The study is based on a high-level desk-based assessment only and no site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings present. The data used in this PEIR have been derived from external sources and it is presumed that any third-party information used is

accurate. A full search of the Somerset Historic Environment Record has not been undertaken at this stage.

5.15.9 The study has outlined the potential of archaeology in the area as high due to the amount of heritage assets in the surrounding area. However, a full assessment of the impact of the proposed compensation measures at Pawlett Hams on each asset has not been researched in further detail. This will be further investigated to inform the ES assessment.

5.15.10 It is understood that full planning permission has been granted by Somerset Council to a third party for the construction of two agricultural buildings on land that is sited within the proposed Order Limits to the north of White House Road in July 2023 (application ref. 41/23/00001). This planning permission involves re-building the two agricultural buildings that were previously damaged by a storm. It is assumed that the two agricultural buildings will have been built by the time that the proposed compensation measures at Pawlett Hams are constructed. It is therefore further assumed for the purposes of this PEIR that these newly constructed agricultural buildings will need to be demolished and removed from the site to facilitate the construction of the compensation measures at Pawlett Hams.



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5.15.11 It is also understood that a planning application has been submitted to Somerset Council by a third party for the change of use of an existing sited wooden boat (referred to as the Elizabeth Boat Room) into a community interest centre on land that is sited within the proposed Order Limits to the west of White House Road (application ref. 41/23/00011). It is assumed that the re-purposed boat will be a community facility by the time that the proposed compensation measures at Pawlett Hams are constructed. It is therefore assumed for the purposes of the PEIR that the re-purposed boat and community facility will need to be demolished and removed from the site to facilitate the construction of the compensation measures at Pawlett Hams.

### Likely Significant Effects

5.15.12 The proposed compensation measures at the Pawlett Hams are expected to cause disturbance to and removal of a range of archaeological features (both known and unknown). Therefore, it is proposed to scope the assessment of historical environment into the ES.

5.15.13 For example, groundworks would likely result in the truncation or complete removal of known non-designated assets of medium to low value which could result in significant effects.

5.15.14 Similarly, the area within the proposed Order Limits is of considerable archaeological interest and groundworks could result in the truncation or removal of currently unknown archaeological remains, including deposits of geoarchaeological interest and well-preserved organic remains, which could result in significant effects.

### Proposed Scope

5.15.15 Based on the above assessment, **Table 5–30** presents the historic environment impacts that are proposed to be scoped in or out of further assessment along with the justification.

**Table 5–30: Summary of historic environment elements scoped in and out of assessment.**

Potential Effect	Scoped IN or OUT	Justification
Potential loss or damage of heritage assets and change in setting of assets	OUT	There are no designated heritage assets within the proposed Order Limits. There are four Grade II listed buildings within a 1 km study area which are of high value, but these are located on the opposite bank of the River Parrett.

Potential Effect	Scoped IN or OUT	Justification
		Therefore, an assessment of the potential loss or damage of heritage assets and change in setting of assets has been scoped out.
Potential loss or damage of non-designated assets and archaeological features	IN	The Somerset Historic Environment Record database recorded a variety of non-designated heritage assets dating to the medieval and post-medieval period which are of low/medium value. As such, an assessment of potential loss or damage of archaeological features has been scoped in for requiring further assessment.

supported by settings assessment, heritage impact assessment and archaeological fieldwork.

5.15.17 The ES will be informed by a detailed archaeological desk-based assessment, including geoarchaeological deposit modelling, conforming to the standards and guidance provided by the Chartered Institute for Archaeologists.

5.15.18 The assessment will consider the relevant policies stipulated in the National Policy Statement, Ancient Monuments and Archaeological Areas Act 1979, Sedgemoor District Council Local Plan 2017 and Core Strategy 2023.

5.15.19 Prior to any further assessment, it is proposed that there is engagement with statutory consultees and Somerset Council to better understand the level of assessment that they require should the heritage assets be removed or altered during the process.

5.15.16 It is proposed that the ES includes a detailed assessment of the historic environment that will be impacted by the construction of the proposed compensation measures at Pawlett Hams that will be

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5.15.20 The ES will follow the methodology described in *DMRB LA 104 Environmental Assessment and Monitoring*<sup>219</sup> and *DMRB LA 106 Cultural Heritage Assessment*<sup>220</sup>. All identified heritage assets will be attributed a value (significance) and then potential impacts on such assets will be rated. The resultant magnitude of impact and value of the assets will then be used to determine significant effects.

5.15.21 A suitable mitigation strategy will be discussed with the stakeholders and will be described within the ES.

## 5.16 Offshore and Intertidal Archaeology

### Introduction

5.16.1 This section presents the assessment of potential effects to offshore and intertidal archaeology associated with the compensation measure at Pawlett Hams. It describes the historic environment baseline from which the assessment will be conducted, focusing on historic environment receptors of potential relevance within the Study Area, and the potential for effects arising from the compensation measure.

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<sup>219</sup> National Highways (2020) *Design Manual for Roads and Bridges. LA 104 Environmental Assessment and Monitoring*. [\[Online\]](#) Accessed 5 December 2023

### Study Area

5.16.2 The intertidal Study Area is defined by the intertidal zone and the River Parrett which is situated immediately west of the proposed Order Limits, and extending 1 km from the proposed Order Limits. Topography at this location is dictated by the tidal River Parrett, which traverses very flat marsh and reclaimed marsh either side of the River.

5.16.3 The geological context is Beach and Tidal Flat Deposits, which comprise clays, silts and gravels. This overlies Langport Member, Blue Lias Formation and Charmouth Mudstone Formation - Mudstone.<sup>221</sup>

### Baseline

#### Current Baseline

5.16.4 Baseline studies undertaken as part of the ES for Combwich Wharf and the Hinkley Point C Development Site in 2011 and a review of updated data on designated assets found there to be no protected wrecks or other designated heritage assets within the intertidal zone adjacent to the proposed Order Limits. The baseline

<sup>220</sup> National Highways (2020) *Design Manual for Roads and Bridges. LA 106 Cultural heritage assessment*. [\[Online\]](#) Accessed 5 December 2023.

<sup>221</sup> British Geological Survey (no date) *Geology Viewer* [\[Online\]](#) Accessed 4 December 2023

focusing on non-designated heritage assets did not extend into the Pawlett Hams site.

#### *Designated Heritage Assets*

- 5.16.5 There are no protected wrecks within the intertidal Study Area. There are no scheduled monuments within the intertidal zone adjacent to the proposed Order Limits.

#### *Non-Designated Heritage Assets*

- 5.16.6 The Somerset HER online viewer<sup>222</sup> shows the remains of floodbanks extending into the intertidal Study Area (HER number 27754). Around 800 m north of this record there are HER entries relating to the sites of former buildings on slab patch, or Fenning Island within the River Parrett (HER numbers 12672 and 12673). The locations of these former buildings are now situated within the main channel of the River Parrett.

#### **Future Baseline**

- 5.16.7 There are no known changes that are likely to result in change in the future baseline.

## **Assumptions and Limitations**

- 5.16.8 The current baseline has been defined using the Somerset HER online map viewer. This is not representative of a comprehensive record of the Somerset HER, which would be attained through the request of a full HER search from the South-West Heritage Trust (Funded by Somerset County Council). The baseline is also informed by baseline studies which supported the ES chapters for Hinkley Point C Development site and Combrich which were undertaken in 2011. This data is likely to have been added to since this date. The ES will therefore be informed by an updated HER search.

## **Likely Significant Effects**

- 5.16.9 No significant effects to archaeological remains within the intertidal Study Area are deemed likely as a direct result of the proposed development. No heritage assets or archaeological remains are recorded within the intertidal Study Area, and while the scope of works may lead to a degree of sediment deposition from the land banks and adjacent ground, this would have the effect of further sealing any potential archaeological remains.

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<sup>222</sup> Somerset Historic Environment Record (no date) Map viewer [[Online](#)] Accessed 4 December 2023

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However, there is potential for disturbance to archaeological remains as a result of further measures which may be required, including additional maintenance dredging to maintain access to ports, marinas, and wharfs.

### Proposed Scope

5.16.10 Based on the above assessment, **Table 5–31** presents the offshore and intertidal archaeological impacts that are proposed to be scoped in or out of further assessment along with the justification.

**Table 5–31: Summary of offshore and intertidal archaeology elements scoped in and out of assessment.**

Potential Effect	Scoped IN or OUT	Justification
Potential loss or damage to protected wrecks or other designated heritage assets	OUT	There are no protected wrecks or other designated heritage assets within the intertidal zone adjacent to the proposed Order Limits.
Potential loss or damage of non-designated assets	IN	The Somerset Historic Environment Record database records a number of non-

Potential Effect	Scoped IN or OUT	Justification
and archaeological features		designated heritage assets extending into the intertidal Study Area within the within the main channel of the River Parrett. As such, an assessment of potential loss or damage of archaeological features has been scoped in for requiring further assessment.

5.16.11 It is proposed that the ES includes an assessment of offshore and intertidal archaeological interests which could be affected by measures including maintenance dredging which may be required because of the proposed development.

5.16.12 The ES will be informed by a detailed offshore and intertidal archaeological desk-based assessment, conforming to the standards and guidance provided by the Chartered Institute for Archaeologists. It will consider the relevant policies stipulated in the National Policy Statement, Marine Policy Statement 2011,

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Sedgemoor District Council Local Plan 2017 and Core Strategy 2023.

- 5.16.13 Prior to any further assessment, it is proposed that there is engagement with statutory consultees over the level of assessment required and the scope of required mitigation.
- 5.16.14 The ES methodology will involve all identified heritage assets being attributed a value (significance) and then potential impacts on such assets will be rated. The resultant magnitude of impact and value of the assets will then be used to determine significant effects.
- 5.16.15 A suitable mitigation strategy will be discussed with the stakeholders and will be described within the ES. This may include recommendations regarding protocols for monitoring and recording of potential archaeological remains.

## 5.17 Amenity and Recreation

### Introduction

- 5.17.1 This section considers the likely impact of the proposed compensation measures at Pawlett Hams on community, recreational and residential receptors within

the study area during both the construction and operational stages.

- 5.17.2 The assessment considers the likely impacts on access to recreational facilities as well as amenity impacts.
- 5.17.3 Amenity is the term used to describe the character or attractiveness of an area. Amenity can be affected when two or more environmental effects are experienced by the same receptor (e.g., a cycling route) with the potential to deter users of the receptor (e.g., cyclists). The following environmental effects are considered in the amenity assessment: landscape and visual effects, traffic and transport effects, noise and vibration effects and air quality effects. Amenity impacts are considered for residential, community and recreational receptors.

### Study Area

- 5.17.4 For the purposes of this assessment, the study area includes the proposed Order Limits, plus a 500 m buffer. This buffer has been selected as it is considered to represent the likely limit of direct effects of construction or operation on any recreational receptors.

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## Baseline

### Current Baseline

- 5.17.5 Environmental receptors considered in this assessment include residential properties, community facilities and recreational facilities including PRowS, promoted routes, cycle routes, long-distance walking routes ('LDWR'), bridleways, open access land and any recreational facilities.

#### *Residential receptors*

- 5.17.6 There are approximately 81 residential properties within 500 m of the proposed Order Limits located along Gaunts Road, Combwich Village, Ham Lane and Yearsley Farm House.

#### *Community receptors*

- 5.17.7 There are four community receptors located nearby, within or just outside, the 500 m buffer; Pawlett Primary School Academy, Pawlett Preschool which is located within Pawlett Methodist Church and Elizabeth Boat Room.

#### *Recreational receptors*

- 5.17.8 Recreational receptors include; eight PRowS including a bridleway mainly diverging off White House Road, the

King Charles III England Coast Path surrounding the outer edge of the proposed Order Limits, Parrett Trail, and Combwich Boat Club.

### Future Baseline

- 5.17.9 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site takes into account changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

## Assumptions and Limitations

- 5.17.10 At the PEIR stage, specific details regarding construction and operational stages of the proposed compensation measures at Pawlett Hams are not fully known or decided.
- 5.17.11 The current assumption in relation to Amenity and Recreation effects is that construction is expected to last four years.

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## Likely Significant Effects

### Access to recreational receptors

#### *PRoWs*

5.17.12 The King Charles III England Coast Path that runs along the outer edge of the proposed Order Limits will be permanently relocated. The permanent relocation of the King Charles III England Coast Path will be mitigated by establishing a PRoW along the back embankment inland of the proposed Order Limits. During this relocation, this section of the King Charles III England Coast Path will not be accessible to the public. Other minor PRoWs and bridleways off White House Road will be temporarily diverted to maintain access to Pawlett Hams. These will be reinstated post construction.

5.17.13 There will also be a potential loss of 7.2 km of walking paths around Pawlett Hams.

#### *Recreational Facilities*

5.17.14 Combwich Boat Club is located within 500 m of the proposed Order Limits to the west. During construction, access to the boat club and surrounding blue space and green space will not be inhibited. The proposed compensation measures at Pawlett Hams are, in the long term, expected to increase biodiversity which will

increase recreational opportunities such as birdwatching and fishing.

#### *Open Access Land and Public Spaces*

5.17.15 There are no areas of Open Access Land or Public Green Spaces within 500 m of the proposed Order Limits. Thus, no significant effects are anticipated and no requirement for replacement land.

### Access to community receptors

5.17.16 The education facilities located near to the proposed Order Limits are situated along the main access road to Pawlett Hams, Gaunts Road. No significant effects are anticipated regarding access to community receptors.

5.17.17 The Elizabeth Boat Room, a meeting room launched in May 2023 for residents in the local community, will be removed due to land take required for the proposed compensation measures at Pawlett Hams.

### Amenity Effects

5.17.18 Amenity effects can arise due to a combination of two or more effects from Air Quality, Noise and Vibration, Landscape and Visual and Traffic and Transport.

5.17.19 The community receptors at Pawlett Hams, Pawlett Primary School Academy, Pawlett Preschool and

[edfenergy.com](http://edfenergy.com)



Elizabeth Boat Room, may experience amenity effects due to the combined impact of noise and vibration, traffic and transport and landscape and visual effects.

### Proposed Scope

5.17.20 A summary of the amenity and recreation elements scoped in for further assessment is outlined in **Table 5–32**.

**Table 5–32: Summary of amenity and recreation elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Access to recreational receptors	IN	Access to recreational receptors is scoped in due to the potential loss of 7.2 km of walking paths and diversion of PRowWs, impeding active travel and recreation along these routes. No significant effects are expected during both construction and operation on Open Access Land and Public Green Space.
Access to community receptors	IN	Access to community receptors is scoped in due to the loss of the Elizabeth Boat Room.

Potential Effect	Scoped IN or OUT	Justification
Amenity effects	IN	Amenity effects could arise on recreational receptors as a result of the combined effects of landscape and visual, noise and vibration and traffic impacts.

## 5.18 Shipping and Navigation

### Introduction

- 5.18.1 This section considers the potential for impacts on shipping and navigation associated with the proposed Pawlett Hams managed realignment compensation measure.
- 5.18.2 The assessment focuses upon direct changes to those aspects during the construction and operational phases (for example interference with shipping lanes) but also considers how changes resulting from the compensation measures may affect the wider context of the receiving environment. It should be read in conjunction with the relevant parts of the PEIR, such as **Section 5.2 Socio-economics**.

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## Study Area

- 5.18.3 The proposed compensation measures at Pawlett Hams will cover the peninsula on the east bank of the River Parrett opposite Comwich Wharf, approximately three miles north-west of Bridgwater. A Study Area has been defined to cover the potential routes taken by vessels utilised for the habitat creation at Pawlett Hams should they be required, noting that at this stage no requirement for marine vessels has been stated.
- 5.18.4 The proposed compensation measures would involve the creation of saltmarsh and associated habitats through breaching of the soft landscape flood defences and the excavation of new creeks to allow tidal waters to flood the low-lying areas of the Pawlett peninsula. The works will be very similar to the scheme developed on the Steart peninsula on the opposite bank of the River Parrett 1 km north of Pawlett Hams.
- 5.18.5 The spatial scope of the shipping and navigation assessment is defined as a minimum 2nm buffer of the proposed Order Limits that has formed the basis of the Study Area described in this section. This Study Area lies within the Port of Bridgwater limits and comprises the River Parrett from Steart Point at the downstream extent (in the north) to Bridgwater Docks at the upstream extent (in the south). This Study Area is deemed appropriate based on professional judgement

and the likely areas/receptors with the potential to be impacted by the proposed compensation measures at Pawlett Hams. The Study Area covers the key maritime activities in relation to navigation, including commercial, military interests, fishing, and recreational activities.

## Baseline

### Current Baseline

- 5.18.6 The original ES provided an assessment of risks to navigation and shipping traffic related to the offshore works including the delivery of the cooling water infrastructure within the Severn Estuary.
- 5.18.7 The mitigation strategy for navigation provided in the DCO was informed by consultation undertaken with key stakeholders and considered the findings of a hazard identification ('HAZID') workshop which addressed ship collision risks associated with the Hinkley Point C offshore works and the refurbishment of Comwich Wharf.
- 5.18.8 Information on ship movements provided within the original DCO application was obtained from an Automatic Information System ('AIS') database, which included movements of both commercial and recreational vessels.

### *River Parrett*

5.18.9 A baseline study undertaken for the original DCO application found that between 1997 and 2008 the River Parrett was used by 37 to 80 freight ships per year to gain access to Dunball Wharf, upstream of Comwich. This traffic was supplemented by occasional visits by passenger vessels and one-off project operations to Comwich Wharf in 2005 and 2006.

5.18.10 Access to the River Parrett has typically taken place around high tide times. No dredging takes place, except for berth dredging at Dunball Wharf and occasional clearance of silt, if required, from the barge bed at Comwich Wharf. Hence, the size and loaded draught of vessel that can gain access to these wharfs is governed by the varying natural channel dimensions. Generally, access to Dunball Wharf is possible for ships of up to around 2,300 dwt.

5.18.11 Recreational navigation also takes place from the Comwich Wharf Motor Boat and Sailing Club ('CMBSC') which is based at Comwich Wharf.

### *Ports and harbours in the Severn Estuary*

5.18.12 The Severn Estuary is an important shipping route, with commercial vessels navigating through the deep water

approaches to several ports and harbours. Commercial ports in the Severn Estuary include the following:

- Royal Portbury and Avonmouth Docks (owned and operated by the Bristol Port Company);
- Cardiff, Newport, and Barry Docks (owned and operated by Associated British Ports);
- small ports and harbours including those located at Bridgwater, Watchet, Bibby, Minehead, Knightstone (Weston-Super-Mare), Sharpness, and Chepstow; and
- the Hinkley Point C Harbour Authority operate activities associated with the Hinkley Point C Project construction including deliveries to the jetty, marine construction activities, and abnormal indivisible loads ('AILs') delivered to Comwich Wharf.

5.18.13 The commercial ports operated by the Bristol Port Company and Associated British Ports generate a majority of the commercial shipping activity in the Severn Estuary and are situated a significant distance away from the Hinkley Point C offshore infrastructure and Pawlett Hams.

5.18.14 Marinas and other recreational boating facilities are located within the Study Area, this includes the Weston

Bay Yacht Club, CMBSC, Burnham-on-Sea Yacht Club,  
and Watchet Marina.

### *Port of Bridgwater*

Port facilities

5.18.15 The Port of Bridgwater was established by the Bridgwater Navigation and Quays Act 1845. The port limits cover approximately 25nm<sup>2</sup> (as shown on **Figure 5–3**), including the following areas:

- Bridgwater Bay from Brean Down to Hinkley Port;
- The River Parrett as far as Bridgwater;
- The River Brue as far as Highbridge; and
- A small part of the tidal River Axe.

5.18.16 The port limits include Combwich Wharf and Dunball Wharf on the River Parrett.

5.18.17 Bridgwater Harbour Authority is responsible for navigation and mooring, safety, rights of access, pilotage, maintenance of channels and navigation aids, oil spill contingency, and port waste management.

5.18.18 Recreational moorings within the port limits are located mainly in the river Brue Estuary and Combwich Pill, although recreational activity tends to be focused around Burnham-on-Sea.

Navigation

5.18.19 The River Parrett is approached through a channel between Steart Flats and Gore Sand and is entered at the Bridgwater bay around 5nm west of Burnham-on-Sea. All vessels of over 30 m overall length which navigate the tidal River Parrett beyond an imaginary line drawn from Steart Point to the north bank of the confluence of the River Brue with the River Parrett, are subject to compulsory pilotage for all vessels above 30 m length overall, with the following exceptions:

- Those vessels excluded by virtue of Section 7(3) of the Pilotage Act 1987; and
- Vessels under the pilotage of the holder of a “*Pilotage Exemption Certificate*” issued by the Competent Harbour Authority.



Figure 5–3: Plan of the Port of Bridgwater<sup>223</sup>

<sup>223</sup> Sedgemoor District Council (2019). Port of Bridgwater Port Operations Manual, Revision 7.

5.18.20 Safe navigational depths are only available over spring tides and the pilot often boards at the Brue Beacon, located within the Port of Bridgwater’s harbour limits in sheltered water.

5.18.21 Vessels navigating into the River Parrett and the Port of Bridgwater pass to the west and south of the Gore Bell Buoy. There is a designated anchorage available 0.6 nm south-west of Gore Buoy for vessels awaiting appropriate tidal conditions to enter the River Parrett and the Port of Bridgwater. Recreational vessels bound for the CMBSC may take more direct / alternative routes than those used by commercial vessels.

#### *Shipping activity*

5.18.22 The existing shipping activity in the vicinity of the Hinkley Point C proposed Order Limits which encompasses the Pawlett Hams compensation site includes commercial, military, fishing, and recreational vessels.

5.18.23 Commercial vessel movements at the Port of Bridgwater mostly consist of Hanson Aggregate Ltd discharging shipments of sea-dredged sand from sites in the Bristol Channel (most notably Area 472: Culvert

Sands) to their own vessels at their dedicated wharf at Dunball. In addition to this, movements associated with ALL deliveries to Comwich Wharf for the construction of Hinkley Point C occur in the River Parrett.

5.18.24 The Bridgwater Bay Danger Area (D119) and the Lilstock Range Firing Area are located within the vicinity of the Hinkley Point C site. D119 covers a circular area over land in West Somerset and sea in Bridgwater Bay. The Danger Area is delineation of the air space above the water and does not place any restrictions on navigation and vessels have the right to transit at any time. The Study Area for this shipping and navigation assessment as defined above is not considered to be in an area where military shipping levels are likely to be high and therefore impacts to military shipping from the proposed compensation measures at Pawlett Hams are unlikely.

5.18.25 According to the Port of Bridgwater's Port Operations Manual (2021), no commercial fishing vessels are registered at the port or on the River Parrett. Although, small charter angling boats often operate out of the River Brue.

5.18.26 The Severn Estuary is mostly covered by a designated sailing area for recreational craft. There are three sailing clubs within the Port of Bridgwater, CMBSC based at Comwich, the Burnham-on-Sea Motor Boat and

Sailing Club based on the river Brue, and the Weston Bay Yacht Club on Weston Bay. CMBSC and the Burnham-on-Sea Motor Boat Club and Sail Club are within the Study Area defined above.

#### *Other features*

5.18.27 There are several other physical features within the Study Area that influence navigation. These features include natural features (e.g., sand bars) and man-made features (e.g., Hinkley Point B intake and outfall head structures, and wave rider buoys). Where these features pose a navigational risk (i.e., risk of colliding with a vessel or grounding on a feature), then they are appropriately marked and identified on Admiralty Charts. For the purposes of this shipping and navigation assessment, these features are considered to be part of the baseline conditions in which navigation already takes place and are sufficiently integrated into existing navigation systems that they do not contribute to the potential hazards of habitat creation at Pawlett Hams.

#### **Future Baseline**

5.18.28 Given the uncertainty associated with long-term predictions of vessel traffic growth including the potential for any major new developments in the UK or transboundary ports and the long-term effects of Brexit, a conservative potential growth in commercial vessel

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movements is currently anticipated to be used to inform the shipping and navigation assessment.

5.18.29 During the remainder of the Hinkley Point C construction it is expected that there will be an increase in the number of AIL delivery movements to Comwich Wharf, however it is noted that deliveries are limited around one per month.

5.18.30 The Bridgwater Tidal Barrier project has the potential to increase the number of vessel movements in the River Parrett during its construction, however it is expected that use of marine vessels will be limited in the Bridgwater Tidal Barrier construction and consist of a spud leg barge and safety boats. Following construction of the Bridgwater Tidal Barrier vessel movements further upstream will be restricted whilst the barrier is in the closed position. When open, vessels will be able to navigate through the structure.

5.18.31 There are no known major developments which will increase the activity of recreational vessels in the Study Area, and it is not expected that commercial fishing vessels will undertake operations out of the Port of Bridgwater. Given the lack of reliable information on future activity levels or future trends, a conservative potential growth in recreational vessel movements is currently anticipated to be used for the shipping and navigation assessment.

5.18.32 Overall, there is not anticipated to be any significant change in the shipping and navigation activity relative to that presented in the current baseline section presented above.

### Assumptions and Limitations

5.18.33 At this stage, consultation with key navigational stakeholders has not been carried out to inform this preliminary assessment. Stakeholders, including Maritime and Coastguard Agency, Trinity House, MMO, and Bridgwater Port Authority will be formally consulted on the scheme though this PEIR. If required, further engagement on the potential for navigational risk because of the proposed compensation measures at Pawlett Hams will be carried out with the key stakeholders to ensure that any potential risks to shipping and navigation receptors are appropriately assessed and managed.

### Likely Significant Effects

5.18.34 The proposed generic project-wide approach to the assessment methodology is set out in **Volume 1 Section 4.1**. This approach has been applied, and adapted as appropriate, to address the specific needs of this preliminary shipping and navigation assessment and also to comply with sector best practice.

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5.18.35 The IMO FSA methodology (IMO, 2018) is the internationally recognised approach for assessing effects on shipping and navigation receptors, and is the approach required under the MCA methodology (MCA, 2013). This methodology is centred on risk control and assesses each effect in terms of its frequency and consequence in order that its significance can be determined as “Broadly Acceptable”, “Tolerable” or “Unacceptable”. Any effect assessed as “Unacceptable” requires additional environmental measures to be implemented beyond those embedded in the design of the project to allow the effect to be reduced to within tolerable or broadly acceptable parameters applying the As Low As Reasonably Practicable ('ALARP') principle.

5.18.36 The Formal Safety Assessment assigns each risk a “severity of consequence” and a “frequency of occurrence” to evaluate the significance of each risk.

5.18.37 The severity of consequences is assessed on a five-point scale. The defined consequence bands are presented in **Table 5–33**.

**Table 5–33: Assessment of severity of consequence for shipping and navigation**

Severity	People	Property	Environment	Business
Negligible	Zero injury	Minimal damage (<£10k)	Zero effect	Minimal impact (<£10k)
Minor	Minor injury	Minor damage (£10k-£100k)	Minor effect (local assistance required)	Minor impact (£10k-£100k)
Moderate	Major injury	Moderate damage (£100k-£1M)	Moderate effect (limited external assistance required)	Considerable impact (£100k-£1M) Local publicity
Serious	Single fatality	Major damage (£1M-£10M)	Major effect (regional assistance required)	Major national impact (£1M-£10M) National publicity
Major	Multiple fatalities	Extensive damage (>£10M)	Extensive effect (national assistance required)	Major international impact (>£10M) International publicity



5.18.38 The frequency of occurrence is also assessed on a five-point scale, as presented in **Table 5–34**.

**Table 5–34: Assessment of frequency of occurrence for Shipping and navigation.**

<b>Frequency</b>	Criteria
<b>Negligible</b>	< 1 occurrence per 10,000 years
<b>Extremely unlikely</b>	1 per 100 to 10,000 years
<b>Remote</b>	1 per 10 to 100 years
<b>Reasonably probable</b>	1 per 1 to 10 years
<b>Frequency</b>	Yearly

5.18.39 The severity of consequence and frequency of occurrence rankings are then used to determine the level of risk for each impact. Levels of risk are described as “Unacceptable”, “Tolerable” or “Broadly Acceptable” using the risk matrix shown in **Table 5–35**.

**Table 5–35: Risk matrix**

<b>Consequence</b>	<b>Major</b>	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable
	<b>Serious</b>	Broadly acceptable	Tolerable	Tolerable	Unacceptable	Unacceptable
	<b>Moderate</b>	Broadly acceptable	Broadly acceptable	Tolerable	Tolerable	Unacceptable
	<b>Minor</b>	Broadly acceptable	Broadly acceptable	Broadly acceptable	Tolerable	Tolerable
	<b>Negligible</b>	Broadly acceptable	Broadly acceptable	Broadly acceptable	Broadly acceptable	Tolerable
	<b>Negligible</b>	<b>Extremely Unlikely</b>	<b>Remote</b>	<b>Reasonably Probable</b>	<b>Frequent</b>	
	<b>Frequency</b>					

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5.18.40 The language used by the Formal Safety Assessment method (“Unacceptable”, “Tolerable” or “Broadly Acceptable”) differs from that used in the standard EIA methodology (“Negligible”, “Minor”, “Moderate” and “Major”) because the assessment is made against risk as opposed to impact. Definitions for risk categories are provided in **Table 5–36**.

**Table 5–36: Risk definitions**

Risk	Definition
Unacceptable	Generally regarded as unacceptable regardless of the level of benefit associated with the activity. Under EIA terms unacceptable is considered to be significant and would require risk mitigation or design modification to reduce to tolerable ALARP.
Tolerable	Under EIA terms tolerable is considered to be not significant, however there is an expectation that such risks are properly assessed, appropriate control measures are in place, residual risks are ALARP and that risks are periodically reviewed to monitor if further controls are appropriate.
Broadly Acceptable	Under EIA terms broadly acceptable is considered to be not significant and impacts are regarded as acceptable and adequately controlled.

5.18.41 The proposed compensation measures at Pawlett Hams are intended to create a new saltmarsh habitat and associated habitats. Interventions are required to create this habitat which necessitate an alteration to the existing site landward of MHWS in order for salt water to breach onto the land.

5.18.42 The Study Area for this shipping and navigation assessment is not considered to be in an area where military shipping levels are likely to be high and therefore impacts to military shipping from the proposed compensation measures at Pawlett Hams are unlikely.

5.18.43 The following shipping and navigation receptors have been identified as relevant to this preliminary assessment:

- Commercial vessels passing through the Study Area;
- Recreational vessels that may be disrupted; and
- Operational ports, marinas, and wharfs that may be impacted by the proposed compensation measures at Pawlett Hams.

5.18.44 During the construction of the proposed compensation measures at the Pawlett Hams site, vessel movements in the Study Area may be impacted. The potential impacts can be categorised into two groups:

*Impact to vessel movements*

5.18.45 The creation of new channels between Pawlett Hams and the River Parrett has the potential to impact the water turbidity that could affect vessel movements should they be in transit during or following a breaching event. The worst-case outcome of this potential impact is an enhanced grounding risk for vessels relative to baseline conditions. At this preliminary assessment stage, the physical size and number of the breaching event(s) and whether these will be undertaken using plant and equipment deployed within the terrestrial or marine environments is unknown.

5.18.46 The construction of the proposed compensation measures at Pawlett Hams has the potential to utilise marine vessels and plant or terrestrial equipment and plant on the foreshore. Due to the presence of these vessels, plant and equipment there is the potential that restricted access through the River Parrett could occur within short time periods. The deployment of vessels, plant and equipment within the navigable channel of the River Parrett may potentially increase the baseline risk of vessel collision if no vessel movement restrictions are in place during the relevant works.

5.18.47 During the construction phase there is the potential that there will be reduced access to ports, marinas, and

wharfs within the Study Area. This will be further refined and considered in the ES.

5.18.48 All impacts to vessel movements are expected to be to of **Minor** severity and **Remote** frequency, therefore the overall risk of the proposed development is **Broadly Acceptable** which is not significant in EIA terms.

*Impacts as a result of changes to sediment load*

5.18.49 The managed realignment at Pawlett Hams will involve removal of material from the existing coastal defence as well as minor excavations to create pools and channels for the enhancement of saltmarsh habitat. This may cause temporary localised increases in turbidity as some material may enter the River Parrett noting the very high existing turbidity/suspended solids levels in the Parrett and the Severn Estuary (see **Section 5.11 Marine water and sediment quality**).

5.18.50 Resuspension of sediment may be carried into the River Parrett and beyond to the Severn Estuary and the flux of material may increase as the ebb tide has the potential to transport material from the site (on land) not previously subjected to flooding.

5.18.51 This additional sediment load in the River Parrett has the potential to alter the depths of the navigable water channel and therefore the under-keel clearance of

vessels navigating the river. Due to the extreme tidal range, winding river, and constantly changing channels almost all vessels navigating the river require pilotage at high tide. These existing limitations on vessel movements could be further impacted by the potential increase in sediment load throughout the construction of the proposed compensation measures at Pawlett Hams. The worst-case outcome of this impact is grounding risk within the Study Area as defined above (e.g., the River Parrett, and the navigational approach to the channel between Steart Flats and Gore Sand).

5.18.52 The potential increase in sediment load has the potential to impact ports, marinas, and wharfs in the Study Area as defined above (i.e., Bridgwater Docks, Dunball Wharf, and Comwich Wharf) as increase to deposited material on marine infrastructure (i.e., berth beds) may require additional activities in order to maintain safe working conditions (i.e. additional maintenance dredging).

5.18.53 All impacts because of changes to sediment load are expected to be to of **Minor** severity and **Remote** frequency, therefore the overall risk of the proposed development is **Broadly Acceptable** which is not significant in EIA terms.

## Proposed Scope

5.18.54 The proposed assessment scope for the shipping and navigation assessment is outlined in **Table 5–37**.

**Table 5–37: Summary of Shipping and navigation elements scoped in or out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Impact to vessel activity associated with commercial and recreational movements.	IN	Commercial and recreation vessel activity impacts is scoped in due to the potential temporary impact during the construction activities and potential change to sediment loads and sedimentation dynamics within the Study Area
Impact to ports, marinas, and wharfs.	IN	Port, marina, and wharf impacts are scoped in due to the potential temporary impact during the potential temporary vessel restrictions during construction activities and potential change to sediment loads and sedimentation dynamics within the Study Area

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Potential Effect	Scoped IN or OUT	Justification
Impacts to fishing and military vessel movements	OUT	This potential effect has been scoped out due to the minimal (or no) recorded activity of the relevant vessels associated with these activities within the Study Area.
Impacts associated with other features interacting with navigation receptors.	OUT	These are considered to be part of the existing baseline conditions in which navigation already takes place and are sufficiently integrated into existing navigation systems.

## 5.19 Population and Human Health

### Introduction

5.19.1 This section considers the impact of the proposed compensation measures at Pawlett Hams on population and human health.

5.19.2 The WHO<sup>224</sup> defines human health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”.

5.19.3 Health effects can be direct (e.g., air pollution resulting in respiratory problems) or indirect (e.g. reduced community interaction due to increased traffic resulting in adverse effects on well-being). Similarly, prolonged environmental effects (direct effects) can result in changes to quality of life (indirect effects). The assessment follows a source-pathway-receptor model (as shown in **Table 5–38**), only reporting effects through which there is a clear pathway between the source and the receptor and using evidence to support the conclusions.

**Table 5–38: Source-Pathway-Receptor Model**

Source	Pathway	Receptor	Plausible Health Impact?	Explanation
x	✓	✓	No	There is not a clear source from where a potential health impact could originate

<sup>224</sup> The World Health Organisation (1948) *Constitution*. [\[Online\]](#). Accessed 6 December 2023.

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Source	Pathway	Receptor	Plausible Health Impact?	Explanation
✓	x	✓	No	The source of a potential health impact lacks a means of transition to a population
✓	✓	x	No	Receptors that would be sensitive or vulnerable to the health impact are not present
✓	✓	✓	Yes	Identifying a source, pathway and receptor does not mean a health impact is a likely significant effect. The health impact is assessed qualitatively based on the available evidence and through the application of professional judgement.

5.19.4 The assessment of impacts on human health relies on the effects reported by Aspect chapters to identify potential human health impacts. The relevant chapters have been referred to as the ‘constituent aspects’ and the effects they report are termed ‘health determinants’.

5.19.5 Health determinants can be defined as the range of personal, social, economic, and environmental factors that influence health status. Where effects are concluded as significant at a constituent aspect level within the PEIR, these have been considered within the assessment as having potential for human health effects. Where effects are concluded not to be significant at a constituent aspect level within the PEIR, these have not been considered in the health assessment. Constituent aspects considered in this assessment are:

- Conventional Waste Management;
- Socio-Economics;
- Transport;
- Noise and Vibration;
- Surface Water;
- Soils and Land use;
- Groundwater;
- Historic Environment;
- Geology and Land Contamination;
- Amenity and Recreation; and
- Landscape and Visual.

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## Study Area

5.19.6 For the assessment of impacts on population and human health, the study area is defined by the scope of the relevant constituent aspect study areas.

## Baseline

### Current Baseline

5.19.7 Baseline information relevant to population and human health is outlined in the relevant Aspects assessments as follows:

- The location and type of community and recreational facilities – Amenity and Recreation;
- The location and accessibility to green / open space – Amenity and Recreation;
- The spatial characteristics of the transport network and usage in the area, including the surrounding road network, PRow (including bridleways), cycleways, non-designated public routes and public transport routes – Transport;
- AQMAs and ambient air quality levels – Air Quality
- Flooding Risks – Groundwater, Surface Water, Landscape and Visual;

- Areas recognised as being sensitive to noise (e.g., noise important areas, noise management areas) and the ambient noise environment – Noise and Vibration;
- Sources and pathways of potential pollution (e.g., land/water contamination) – Soils and Land Use and Geology and Land Contamination; and
- Landscape amenity – Landscape and Visual.

### Future Baseline

5.19.8 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

## Assumptions and Limitations

5.19.9 At this PEIR stage, specific details regarding construction and operational stages of the proposed compensation measures at Pawlett Hams are not fully known or decided.

## Likely Significant Effects

5.19.10 The following constituent aspects have been scoped into the assessment and have the potential to give rise to significant effects. These likely significant effects are regarding impacts on physical and mental human health; these potential likely significant effects will be detailed in the ES whereby more information will be known:

- Landscape and Visual;
- Noise and Vibration;
- Amenity and Recreation;
- Soils and Land Use;
- Conventional Waste Management;
- Socio-Economics;
- Transport;
- Surface Water;
- Geology and Land Contamination;
- Groundwater; and
- Historic Environment.

## Proposed Scope

5.19.11 A summary of the population and human health scope for further assessment is outlined in **Table 5–39**.

**Table 5–39: Summary of population and human health elements scoped in and out of the assessment.**

Potential Effect	Scoped IN or OUT	Justification
Potential adverse or beneficial population and Human Health effects	IN	It is proposed that the ES includes a detailed assessment of potential population and human health effects that could occur during the construction and operation of the proposed compensation measures at Pawlett Hams.

## 5.20 Climate Change

### Introduction

5.20.1 The aim of this section is to consider the likely significant effects of the proposed compensation measures at Pawlett Hams on anthropogenic climate change (i.e., through greenhouse gas ('GHG') emissions) and the likely significant effects of climate



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change on the proposed compensation measures at Pawlett Hams.

5.20.2 The impacts on climate will be assessed through the estimation of the extent of GHG emissions from the lifecycle stages of the proposed compensation measures at Pawlett Hams. All GHGs are reported as a carbon dioxide equivalent ('CO<sub>2e</sub>').

5.20.3 The vulnerability of the proposed compensation measures at Pawlett Hams to the impacts of projected climate change will be assessed using projected changes in climate from the UK Climate Projections 2018 ('UKCP18')<sup>225</sup>.

### Study Area

5.20.4 Under Schedule 4 Paragraph 5(f) of the 2017 EIA Regulations, an ES must provide "a description of the likely significant effects of the development on the environment" resulting from "the impact of the project on climate (for example the nature and magnitude of GHG emissions) and the vulnerability of the project to climate change".

5.20.5 For the assessment of the impacts on climate (from GHG emissions), the proposed Order Limits are considered appropriate. The study area includes the GHG emissions associated with the proposed compensation measures to determine the impact on the climate. The main GHGs relevant to the proposed compensation measures at Pawlett Hams are carbon dioxide ('CO<sub>2</sub>'), methane ('CH<sub>4</sub>'), and nitrous oxide ('N<sub>2</sub>O'). GHG emissions are reported as CO<sub>2e</sub>, which accounts for the different Global Warming Potential ('GWP') of each GHG relative to CO<sub>2</sub>. Other GHGs which are normally considered include hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride, but these are not anticipated to be material in the nature of the activities.

5.20.6 Regarding the vulnerability of Pawlett Hams to climate change, Natural England<sup>226</sup> has reported that coastal saltmarshes have a high sensitivity to climate change. Based on information in the Natural England report and a report produced by the Marine Climate Change Impacts Partnership<sup>227</sup>, the following key climate

<sup>225</sup> Met Office Hadley Centre (2018), UKCP18 Probabilistic Climate Projections. Centre for Environmental Data Analysis, [\[Online\]](#) Accessed 4 December 2023

<sup>226</sup> Natural England (2020), Climate Change Adaptation Manual (NE751), 28. Coastal Saltmarsh, 22/04/2020 [\[Online\]](#) Accessed 4 December 2023

<sup>227</sup> Marine Climate Change Impacts Partnership, Climate change and marine conservation, Supporting management in a changing environment, Saltmarsh [\[Online\]](#) Accessed 4 December 2023

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change-related factors are likely to be most relevant to Pawlett Hams:

- Sea level rise and the frequency and extent of tidal inundation;
- Increased temperatures and reduced rainfall and drier conditions leading to drought; and
- Rainfall intensity and its effect on surface water and river flooding.

5.20.7 The study area for the consideration of the vulnerability to climate change is the area within the proposed Order Limits.

## Baseline

### Current Baseline

#### *Impacts on Climate Change*

5.20.8 Baseline emissions are defined as emissions that occur without the project. For the area of Pawlett Hams the emissions are considered as zero as the proposed Order Limits comprises permanent semi-improved grassland, some of which is arable land and is intersected by a network of drainage ditches where emissions from maintenance and land use are negligible. Therefore, no GHG emissions are

associated with the 'use' of this land prior to the proposed compensation measures at Pawlett Hams.

#### *The Vulnerability to the Impacts of Projected Climate Change*

5.20.9 The UKCP18 climate projections dataset uses a 30-year baseline period of 1981-2010, from which potential climatic changes in future years are projected. Some initial data to represent the current climate were therefore obtained from the UKCP18 baseline dataset, specifically 1981-2010. The baseline climate data for the South-West England region were compared to similar data for England as a whole, which indicate that:

- The climate in the South-West region is generally slightly warmer, with higher average daily minimum temperatures, daily mean temperatures and daily maximum temperatures for all seasons of the year. The exception is the average summer daily maximum temperature, which is the same as the England average (20.1 °C).
- The climate in the South-West region is wetter compared to the England average throughout the year, with the greatest difference in precipitation being in wintertime. Summer mean accumulated rainfall is 204 mm and winter mean accumulated rainfall is 307 mm. The England summer and

winter mean accumulated rainfall is 194 mm and 230 mm, respectively.

### Future Baseline

#### *Impacts on Climate Change*

5.20.10 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site accounts for changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

#### *The Vulnerability to the Impacts of Projected Climate Change*

5.20.11 In general, UKCP18 projects a greater chance of hotter, drier summers and warmer, wetter, winters with more extreme weather and rising sea levels.

5.20.12 UKCP18 indicates that by the end of the 21st century, all areas of the UK are projected to be warmer, more so in summer than in winter. This projected

temperature rise in the UK is consistent with future warming globally.

5.20.13 In the south west region, by the 2080s, in the high emission scenario (referred to as RCP8.5 – a potential worst-case scenario where substantial progress is not made in reducing global GHG emissions over the coming decades and global energy supply is increasingly fossil fuelled), the summer daily maximum temperature is projected to increase by 5.7 °C and the winter daily minimum temperature will increase by 3.1 °C (based on a 50 % probability of occurrence).

5.20.14 UKCP18 indicates that rainfall patterns across the UK are not uniform and vary on seasonal and regional scales and will continue to vary in the future. It is indicated that by the 2080s in the south-west region for RCP8.5, the summer mean accumulated rainfall will reduce by 40 % and the winter mean accumulated rainfall will increase by 25 %.

5.20.15 The UKCP18 climate projection data also indicate that more extreme precipitation events could occur slightly less frequently by the period 2061 - 2080. However, it should be noted that while more extreme precipitation events could occur less frequently, very extreme precipitation events could be of higher intensity when they do occur (e.g. the 99th percentile of projected daily

precipitation values could be at least 10 % higher than the current baseline period).

5.20.16 The UKCP18 projections of sea level rise indicates that in the south-west and south Wales coastal region, by the end of the century, sea levels could rise by between 0.51 m and 1.13 m (based on the 5th and 95th percentile values for the RCP8.5 scenario). The Marine Climate Change Impacts Partnership<sup>228</sup> reports that modelling studies indicate that changes in tidal range will be approximately plus or minus 10 % of any rises in sea level. Although small in comparison to the mean sea level changes, altered tidal ranges could enhance coastal flooding and also have implications for the future erosion and accretion of salt marshes and other coastal ecosystems.

### Assumptions and Limitations

5.20.17 Due to the uncertainties that exist around the subject of climate change, there are limitations associated with predicting and assessing the impacts of climate change on Pawlett Hams. In particular there is uncertainty around climate change projections and how these will specifically affect sea level, tidal inundation, rainfall and

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<sup>228</sup> Horsburgh, K., Rennie, A. and Palmer, M. (2020) Impacts of climate change on sea-level rise relevant to the coastal and marine environment around the UK. Marine Climate Change Impacts Partnership (MCCIP) Science Review 2020, 116–131.

temperatures (and associated periods of drought) at Pawlett Hams.

5.20.18 Other, more realistic, UKCP18 climate projection scenarios are available which predict lower changes in temperature, rainfall, and sea level rise than the RCP8.5 scenario. RCP8.5 has been used here as a worst-case approach and is consistent with relevant guidance for the assessment of vulnerability to climate change<sup>229</sup>.

5.20.19 Additionally, at this PEIR stage, specific details regarding the construction and operational stages of the proposed compensation measures at Pawlett Hams, and how the design would be adapted to mitigate against climate change, are not fully known.

### Likely Significant Effects

#### Impacts on Climate Change

5.20.20 There are GHG emissions that are associated with the construction of the proposed compensation measures in the form of earthworks, transport of workers and plant to and from Pawlett Hams, consumption of fuel

<sup>229</sup> Institute of Environmental Management and Assessment (2020) Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation, 2020

for construction activities, demolition of existing features and buildings and waste generated but they are considered to be negligible and a not significant adverse effect. In any case, good practice measures to reduce GHG emissions during construction could be implemented, for example:

- investigate and implement sustainable reuse of any materials won from excavation;
- use of locally sourced materials to reduce transportation emissions;
- reuse of materials and wastes where possible; and
- implement a plan to reduce energy and fuel use including monitoring of fuel and electricity use, training of operatives, use of stop-start technology, use of low-carbon and renewable energy sources to power plant and compounds.

5.20.21 In addition, it is also likely that this change of land type will increase the sequestration of carbon associated with increased sedimentation during the operational phase. Over the lifetime of the proposed compensation measures at Pawlett Hams this is likely to result in a net reduction in emissions which would be

representative of an overall beneficial effect (i.e. the GHG emissions during the construction phase could potentially be outweighed by the carbon sequestered during the operational phase).

5.20.22 Using data from an Environment Agency report<sup>230</sup> on potential carbon offsetting approaches it is estimated that Pawlett Hams may sequester between 626 tCO<sub>2</sub>e/yr and 2504 tCO<sub>2</sub>e/yr based on a rate between 2 and 8 tCO<sub>2</sub>e/ha/yr.

5.20.23 The GHG assessment indicates the proposed compensation measures at Pawlett Hams has the potential to accumulate carbon through deposition of sediment brought in by the tide and burial of vegetation within the proposed Order Limits, which suggests the proposed compensation measures at Pawlett Hams could result in a net reduction in emissions through its sequestration potential. Therefore, as the associated GHG emissions would be negligible in relation to the UK's carbon budget and have the potential to become a beneficial effect in future through sequestration, this is not proposed to be assessed within the ES. The potential beneficial effect is not anticipated to be significant.

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<sup>230</sup> Environment Agency (2021). Achieving net zero. A review of the evidence behind potential carbon offsetting approaches. [Online] Accessed 4 December 2023

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### The Vulnerability to the Impacts of Projected Climate Change

5.20.24 As noted above, coastal saltmarshes are sensitive to climate change. Changes to key climate parameters can impact on saltmarsh structure, composition and function<sup>226,227</sup>. The main climate change drivers which could affect the operation of the proposed compensation measures at Pawlett Hams are discussed below.

5.20.25 Given the relatively short timescale for the construction phase, changes in climate parameters are unlikely to be of a sufficient magnitude to directly impact on construction activities. Adoption of good practice construction methods, including appropriate weather forecasting and reporting for planning construction activities, would be sufficient to ensure any adverse effects are negligible and would be not significant.

#### *Relative sea level rise*

5.20.26 Sea level rise could lead to altered coastal dynamics and changes to the amount of sediment supplied. This could lead to areas of saltmarsh being lost if sediment loading is not sufficient to keep pace with sea level rise or where inland migration is restricted due to inland flood defences.

5.20.27 Sea level rise could also lead to increased frequency of inundation and waterlogging of the saltmarsh habitat. This could result in an increased area of exposed mud leading to greater susceptibility to invasive plants and erosion, and increased water logging at low tide.

5.20.28 Increased erosion at the seaward margin, with no sediment transfer higher into the marsh can cause plants to die back. The area of saltmarsh could be reduced where accretion is at a slower rate than sea level rise.

5.20.29 Rising sea levels could also lead to changes in the relative climate space available to saltmarsh species leading to changes in community/species composition and loss of key saltmarsh species.

#### *Increased temperatures / hotter and drier summers*

5.20.30 During hotter summers, increased evaporation of seawater could lead to increased salinity in the upper zones or ponds of the saltmarsh habitat, resulting in changes in community composition and vegetative dieback. Periods of drought during the hotter, drier summers could also lead to vegetative dieback in the upper areas of the marsh and changes in community composition due to competition from grassy species.

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5.20.31 Increased temperatures in other seasons, particularly spring season, may help promote the growth and accelerated spread of the invasive species which could out-compete native saltmarsh species producing a monoculture which has much less intrinsic value to wildlife than the natural species-diverse marsh.

*Increased precipitation*

5.20.32 Precipitation change, particularly increases in rainfall in winter months, could increase pluvial flooding, although the area within the proposed Order Limits has already been identified as being within a zone of high risk of fluvial flooding (i.e. flooding associated with the River Parrett) (see **Section 5.9 Surface Water**). The impact of increased flooding at Pawlett Hams is uncertain but increased freshwater input could lead to change in plant species.

*Summary*

5.20.33 It is likely that during construction, the impacts of climate change on the vulnerability of the construction activities and Pawlett Hams would be negligible, representing a not significant adverse effect. These would be managed by good practice construction methods and through the implementation of a CEMP.

5.20.34 At this stage it is not possible to determine the significance of the adverse effects of climate change on the proposed compensation measures at Pawlett Hams during operation. However, a number of potential climate change impacts have been identified which could lead to a significant adverse effect on the effective operation of the proposed compensation measures at Pawlett Hams. However, it is anticipated that these impacts could be taken into consideration and addressed through the design and any required ongoing management practices.

**Proposed Scope**

5.20.35 Based on the above assessment, **Table 5–40** presents the potential effects on climate change of the proposed compensation measures at Pawlett Hams and shows they are expected to be negligible and not significant and provides a rationale for being scoped out of further assessment. **Table 5–40** also presents the potential effect on Pawlett Hams from climate change and the rationale for scoping this Aspect out or in for the construction and operational phases, respectively.

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**Table 5–40: Summary of climate change elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Potential GHG emissions from the construction of the proposed compensation measures at Pawlett Hams	OUT	Emissions associated with the creation of the proposed compensation measures at Pawlett Hams would be minimal and likely balanced out or surpassed by the carbon removal resulting from increased sedimentation during the operation of the proposed compensation measures at Pawlett Hams. GHG emissions during construction would be negligible in comparison to the UK’s carbon budgets and would be a not significant adverse effect.
Potential GHG emissions from the operation of the proposed compensation measures at Pawlett Hams	OUT	Emissions associated with the operation of the proposed compensation measures at Pawlett Hams will be minimal and, because of the sequestration potential through sediment accumulation and habitat creation, could lead to a net reduction in GHG emissions.

Potential Effect	Scoped IN or OUT	Justification
		The potential net reduction in GHG emissions during operation would be considered a beneficial but not significant effect given the uncertainty in the magnitude of carbon sequestration.
Vulnerability to climate change during construction	OUT	Projected climate changes are lower over the short-term and these would be expected to be mitigated for by using best practice construction techniques and management plans. Overall, the effect would be expected to be negligible, and not significant.
Vulnerability to climate change during operation	IN	It is proposed that the ES includes a detailed assessment of the vulnerability of the proposed compensation measures at Pawlett Hams to climate change during the operational phase to determine the significance of effects. This would be based on further design work to determine the resilience of the saltmarsh habitat to likely future climate parameters and inform the design



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Potential Effect	Scoped IN or OUT	Justification
		and need for ongoing management.

5.20.36 Therefore, it is proposed that the impact of the proposed compensation measures at Pawlett Hams on climate change is scoped out of requiring further detailed assessment in the ES. The vulnerability of the proposed compensation measures at Pawlett Hams to climate change during operation is proposed to be scoped in for further assessment in the ES. Where appropriate, this would include consideration of a wider range of climate projection scenarios to determine suitable future baseline climate parameters to base the assessment on.

## 6. THE ISLAND

### 6.1 Conventional Waste Management

#### Introduction

6.1.1 This section considers the generation and management of conventional waste resulting from the proposals at The Island. It does not include radioactive waste or materials management.

6.1.2 The aim of this section is to:

- Evaluate potential construction and operation activities associated with the proposed compensation measures at The Island and identify the activities that could lead to significant environmental effects.
- Identify relevant receptors which could potentially be impacted by conventional waste management associated with the construction and operation of the proposed compensation measures.
- Outline a proposed scope and methodology for the assessment of potential conventional waste management effects of the proposals at The Island on the environment within the ES.

#### Study Area

6.1.3 As defined in *IEMA guide to: Materials and Waste in Environmental Impact Assessment*, two geographically different study areas should be determined. These have been defined as:

- Project Study Area, which comprises all land contained within a site boundary. Within these areas waste is generated and managed, including any areas identified for temporary uses such as temporary waste stockpiles, accesses, site compounds and other enabling works. In the context of this chapter, the Project Study Area covers the proposed Order Limits (refer to **paragraph 1.4.5 in Chapter 1**) and is located in Somerset, in the River Parrett estuary.
- Expansive Study Area provides the boundary for appreciation of the capacity of relevant waste management infrastructure, including remaining landfill voids. This is considered on a regional basis, within one or more regions as appropriate. The Island is located in the South-West region, which in the context of this chapter comprises Bristol, Cornwall (including the Isles of Scilly), Dorset, Devon, Gloucestershire, Somerset and Wiltshire.

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## Baseline

### Current Baseline

- 6.1.4 In the context of this chapter, the sensitive receptor is landfill capacity for waste, as detailed in *IEMA guide to: Materials and Waste in Environmental Impact Assessment*.
- 6.1.5 No conventional waste generation and management related to operation of the proposed compensation measures at The Island have been identified. It is therefore proposed they are scoped out.
- 6.1.6 Information provided in *Waste Management in the South-West: Data Tables 2022* allows the assessment of the opportunities for waste arisings to be transferred, treated, recycled, recovered or disposed as appropriate in the region, if they cannot be reused, recycled or otherwise recovered on-site.
- 6.1.7 Whilst annual capacity data are published by the Environment Agency for both landfill and incineration facilities at the national, regional and sub-regional level, no annual capacity data are published by the Environment Agency for waste transfer, treatment or recycling sites. Only annual throughput is published for these facilities. The total annual throughput or capacity reported is detailed in **Table 6–1**.

**Table 6–1: Annual permitted throughput or capacity of transfer, treatment, recycling and incineration in the South West, 2022**

Site type	South West (000s tonnes)
<b>Transfer (annual throughput)</b>	
Hazardous waste transfer stations	594
Household, industrial, commercial waste transfer stations	2,343
Non-biodegradable waste transfer stations	26
<b>Treatment and metal recycling (annual throughput)</b>	
Material recovery	764
Physical treatment	3,313
Physico-chemical treatment	497
Chemical treatment	35
Composting	548
Biological treatment	2,987
Metal recycling	1,177
<b>Incineration (annual capacity)</b>	
Hazardous waste	9
Co-incineration of non-hazardous waste	0

Site type	South West (000s tonnes)
Municipal and/or industrial & commercial incineration	1,505
Biomass/waste wood incineration	0

6.1.8 For wastes which cannot be reused, recycled or otherwise recovered, disposal to landfill will be required. The total remaining landfill capacity in 2022, as presented in **Table 6–2**, shows there are opportunities to dispose waste arisings from the proposed compensation measures at The Island within the region.

**Table 6–2: Landfill capacity available in the South West, 2022**

Landfill type	South West (000s tonnes <sup>1</sup> )
Hazardous merchant landfill	1,770
Hazardous restricted landfill	0
Non-hazardous landfill with SNRHW cell <sup>2</sup>	2,615
Non-hazardous landfill	5,518
Non-hazardous restricted landfill	0
Inert landfill	15,404
<b>Total</b>	<b>27,328</b>

Landfill type	South West (000s tonnes <sup>1</sup> )
<p>1 Converted from cubic metres through the adoption of the following conversion factors: inert landfills 1.5 tonnes/m<sup>3</sup>, non-hazardous landfills 0.83 tonnes/m<sup>3</sup> and hazardous landfills 1.5 tonnes/m<sup>3</sup>.</p> <p>2 Some non-hazardous sites can accept some Stable Non-Reactive Hazardous Wastes ('SNRHW') into a dedicated cell, but this is usually a small part of the overall capacity of the site.</p>	

### Future Baseline

6.1.9 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline but the treatment and disposal tables will be updated with the latest available data.

### Assumptions and Limitations

6.1.10 At this PEIR stage, various details regarding the construction and operation of the proposed compensation measures at The Island are not known.

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In particular, the expected waste types, waste generation estimates, and construction timeline have not been identified.

- 6.1.11 The vast majority of wastes assumed to be produced during construction of the proposed compensation measures at The Island will be excavated waste from earthworks and site preparation/clearance. The design is at concept stage and as a result there is no information on the quantities or quality of excavated material or how they will be managed. It can be expected, however, that the design aims to reuse all excavations within the site, similar to the proposed compensation measures at Pawlett Hams. If this is the case, construction, demolition, and excavation waste generation is then expected to be negligible.
- 6.1.12 Organic wastes are anticipated from the site clearance and a small amount of municipal-type solid waste associated with construction workers can be expected, such as food waste and packaging. A large proportion of this solid waste is likely to be suitable for reuse, recycling, composting or other recovery, although a proportion may also require disposal to landfill.
- 6.1.13 It has been assumed all excavations are to be reused on site, either for the construction or to create features such as bird islands.

- 6.1.14 It has been assumed that The Island, and therefore the excavated material is not contaminated and can be contained within the proposed Order Limits. The design aims to achieve a cut/ fill balance and reuse all excavation material within the site. However, if contamination within the proposed Order Limits is identified any contaminated material would be removed for treatment and/ or disposal at an appropriate facility. The potential for contamination at The Island will be explored further and addressed in the ES.

### Likely Significant Effects

- 6.1.15 Conventional waste generation is predicted to be minimal, as the expected earthworks excavations are to be reused on site. It is unlikely that the amount of waste required to be disposed of would alter the regional capacity in a significant way. Notwithstanding, this will be analysed and the position will be confirmed in the ES, especially as the design information develops and if the approach to earthworks management changes over time. The construction site at Hinkley Point C includes a waste consolidation centre to maximise reuse, recycling and recovery of waste and to minimise use of landfill. The performance and output of the consolidation centre is monitored and discussed with relevant stakeholders including the Environment Agency and Somerset Council. A smaller scale version of the waste consolidation centre would

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be introduced at The Island and similarly monitored by relevant stakeholders at the Quarterly Environmental Monitoring Meeting and the Socio-Economic Advisory Group.

6.1.16 At the time of writing this PEIR, no significant effects are expected, based on the current scope and design information.

### Proposed Scope

6.1.17 It is proposed that the ES includes an assessment of potential conventional waste management effects that could occur during the construction of the proposed compensation measures at The Island and disposal of waste material. A summary of the proposed scope is outlined in **Table 6–3**.

**Table 6–3: Summary of conventional waste management elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Construction: Potential reduction in the remaining landfill void and impacts on the capacity of waste management	IN	Despite the fact that the expected waste generation would be minimal, waste types and estimated tonnages have not been detailed and may be subject to change as the design develops. If the

Potential Effect	Scoped IN or OUT	Justification
facilities in the region		excavation material is unsuitable for use on site, it would require recovery/disposal off site, increasing pressure on the regional waste management facilities. Significant effects are not expected, nonetheless a waste assessment should be conducted where potential effects of waste can be eventually scoped out, when there is more information available.
Operation: Potential reduction in the remaining landfill void and impacts on the capacity of waste management facilities in the region	OUT	No operational generation and management is expected/planned at this time. Therefore, it is proposed for operational effects to be scoped out.

6.1.18 In general, the assessment of conventional waste management associated with construction activities shall follow the guidance set out in *IEMA guide to:*

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### *Materials and Waste in Environmental Impact Assessment.*

- 6.1.19 Current and likely future baseline conditions for waste during the construction period will be considered, and include information on waste management capacity, including remaining landfill void space and annual throughputs of waste transfer, waste treatment, metal recycling and waste incineration facilities. Estimated landfill capacity alteration caused by waste generated by the construction of the proposed compensation measures at The Island will also be included, as detailed in IEMA guidance.
- 6.1.20 Waste hierarchy, circular economy principles and sustainable approach to waste management would be applied. Where waste is reused on site, *Definition of Waste: Code of Practice* would be considered.

## 6.2 Socio-economics

### Introduction

- 6.2.1 The section considers the likely impact of the proposed compensation measures at The Island on socio-economic receptors within the study areas during both the construction and operational stages.

- 6.2.2 The socio-economic assessment considers employment effects and economic investment in the region because of construction of the proposed compensation measures at The Island. The assessment also considers disruption to commercial receptors including businesses and agricultural properties. The assessment also considers effects on commercial and agricultural land use.

### Study Area

- 6.2.3 Two study areas have been proposed for the assessment as follows:
- The study area for the assessment of disruption to commercial receptors and land use is 500 m from the proposed Order Limits. This has been selected as it is considered to represent the likely limit of direct effects of construction or operation on any commercial receptors and land use.
  - The study area for the assessment of effects on employment and economic investment is the former Sedgemoor District Council Area (now part of the area covered by Somerset Council). This wider study area is intended to encompass the area within which significant effects on employment and the local economy could occur.

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## Baseline

### Current Baseline

- 6.2.4 The baseline data is based on desk-based research of publicly available sources and focuses on commercial receptors, employment, economic investment, and land use within the study areas denoted above. Key receptors include commercial properties including agricultural businesses, land use, the local workforce population, and the local economy.

#### *Commercial properties and Land Use*

- 6.2.5 The study area contains fertile agricultural land classified as Grades 1, 2 and 3 using the standard ALC system. However, it is known that these areas are considered former agricultural land drains. There are two commercial receptors within 500 m of the proposed Order Limits, Laburnum House Hotel on Sloway Lane and Escape Rooms Middlemoor within the same location.

### *Employment and economic investment*

- 6.2.6 In the former Sedgemoor District Council area, the unemployment rate is 5.4 % with an employed workforce of 57,400<sup>124</sup>. This is above the average for England which has an average unemployment rate of 4.3 %<sup>125</sup>.
- 6.2.7 The local economy for the purposes of this assessment comprises the former Sedgemoor District Council Area. This area had an annual GVA of £2.1 billion in 2018<sup>231</sup>.

### Future Baseline

- 6.2.8 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

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<sup>231</sup> Office for National Statistics (2018) Regional GVA(I) by local authority in the UK. [\[Online\]](#)  
Accessed 18 December 2023.



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## Assumptions and Limitations

- 6.2.9 At this PEIR stage, specific details regarding the construction and operational stages of the proposed compensation measures at The Island are not fully known/ decided.
- 6.2.10 The current assumptions in relation to socio-economic effects are:
- No new permanent jobs would be created when the construction of the proposed compensation measures at The Island is complete;
  - Construction at The Island will last for 12 months, undertaken in tidal conditions, with working hours restricted to operational tidal windows; and
  - Access to The Island is via Sloway Lane along a private road.

## Likely Significant Effects

### Disruption to commercial receptors

- 6.2.11 Disturbance effects to commercial receptors are considered to arise when a combination of two or more visual, traffic, air quality and noise effects coincide on a particular area or receptor with the potential to deter users from, or affect the functioning of, that commercial receptor. In general terms, it is considered most likely

that a significant disturbance effect would occur on receptors if there are two or more significant effects (i.e. effects typically of moderate or major significance) identified by constituent aspects. It is possible, however, that a significant disturbance effect could occur as a result of a combination of three or four of the aspects having a minor effect on a receptor.

- 6.2.12 Air quality and noise effects have been scoped out of the assessment. Traffic and transport and landscape and visual have been scoped into the PEIR; therefore, there is risk of a combination of environmental effects that could create a disturbance effect for the local business receptors.

### Employment and economic investment in the region

- 6.2.13 Employment effects from the construction of the proposed compensation measures at The Island would arise through direct employment in construction-related roles, and indirectly through employment required to support the direct labour requirements. This would be assessed within the context of the overall labour market. It is assumed that labour requirements for the construction would be minimal. There would be no permanent employment during operation. Given the large size of the local workforce, no socio-economic effects regarding workforce are anticipated.

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6.2.14 Spending on the construction of proposed compensation measures at The Island includes land purchase, aggregate materials, machinery, and other capital costs. Given the scale of the proposed compensation measures at The Island in relation to the size of the regional economy, even if 100 % of direct capital expenditure on The Island was captured in the local area, this would represent less than 0.1 % of the total GVA. NNB will seek to ensure that local suppliers are used (where possible) and that the tried and tested supply chain support for the wider Hinkley Point C Project was utilised to maximise the use of local suppliers. Even with this objective, the context means the benefit to the economy is likely to be of negligible significance.

### Land Use

6.2.15 The land take required for the proposed compensation measures at The Island is inactive agricultural land, thus, the effect on agricultural productivity will be negligible.

### Proposed Scope

6.2.16 It is proposed that socio-economics is scoped out of the full assessment. No significant effects are anticipated in terms of land use, business receptors or the local economy, as summarised in **Table 6–4**.

**Table 6–4: Summary of socio-economic elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Disruption to commercial receptors	IN	It is possible that disturbance effects to the commercial receptors may arise due to the combined effect of landscape and visual and traffic and transport effects.
Employment and economic investment in the region	OUT	Given the large size of the local workforce within the former Sedgemoor Council Area, the strength of the regional economy and the low level of direct labour requirements to support the proposed compensation measures at The Island, no effects are anticipated.
Commercial and Agricultural Land Use	OUT	Land use impacts on commercial and agricultural properties are scoped out of the assessment due to no anticipated significant effects.

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## 6.3 Transport

### Introduction

6.3.1 This section considers the potential transport impacts generated by the construction and operation of the proposed compensation measures at The Island. The aim of this section is to:

- Identify the Study Area that could be impacted by the road traffic generated by the construction and operation of the proposed compensation measures.
- Identify the current transport baseline on the likely routes to be used by the construction and operational traffic.
- Identify the relevant receptors which could potentially be impacted by the road traffic generated during the construction and operation of the proposed compensation measures.
- Evaluate potential construction and operational activities associated with the proposed compensation measures at The Island and identify the activities that could lead to significant transport effects.

- Outline a proposed scope and methodology for the assessment of potential transport effects on the local road network identified in the Study Area.

### Study Area

- 6.3.2 The scope of impacts to be considered concern highway routing between the access point for The Island and the SRN. The SRN is designed to facilitate traffic movements (including freight) nationally.
- 6.3.3 The study area begins at the proposed access point on Sloway Lane, which is located on a private road approximately 300 m south of River Huntspill, which the road crosses via Sloway Bridge.
- 6.3.4 The A38 forms a County Freight Route and supports construction traffic travelling to both Pawlett Hams and The Island sites. Construction traffic from both sites would thereafter use the A39 spur to access the M5 at Junction 23. This section will only consider the highway impacts of the proposed compensation measures at The Island, whilst the cumulative impact in combination with activity from the Pawlett Hams site is assessed in **Volume 4**, which is particularly important to consider as the works are expected to take place concurrently.

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## Baseline

### Current Baseline

#### *On-site transport*

- 6.3.5 BW 35/12 forms part of the King Charles III England Coast Path, directly bordering the eastern (landside) side of the proposed Order Limits.

#### *Sloway Lane (S) and Red Lane*

- 6.3.6 Construction access to The Island from the south is obtained from Slow Way Drove, which is a private track within the proposed Order Limits. The track meets Sloway Lane at a point 300 m south of Sloway Bridge.
- 6.3.7 Thereafter, vehicles travel south along Sloway Lane to join Red Lane and meet A38 Pawlett Road, which is 2.1 km away from the site access. Sloway Lane a narrow single-track highway which is mostly surrounded by vegetation growth along its verges, which provides limited points for vehicles to pull over to give way to HGVs. 180 m of its northern section has a speed limit of 30 mph, whilst the national speed limit of 60 mph applies to the remaining sections. Collins Farm has been identified as a sensitive receptor, whereby farmers are expected to use the highway for the

transportation of equipment, goods and livestock when required. These may be slow moving vehicles.

- 6.3.8 Bridleway 27/6 merges with Red Lane for approximately 125 m, whereby horse riders are expected to share the highway with motorists. This could have implications on the accessibility of Stretcholt Equestrian Centre for horseriders. Due to the width of HGVs, it may not always be feasible or safe for HGVs to overtake horse riders on the highway, meaning that there is a risk of an increased journey time to and from the construction site.

#### *Sloway Lane (N) and Church Road*

- 6.3.9 The single carriageway section along Sloway Lane provides some passing places for vehicles to give way to other oncoming traffic. No pavement has been provided for pedestrians along the country lane. The bend located 140 m north of Sloway Bridge runs west of the 60-room Laburnum House accommodation site.
- 6.3.10 Church Road provides a relatively straight stretch of single carriageway A38 Pawlett Road and Sloway Lane, with one lane for each direction of travel. Sloway Lane provides 1 km of highway between Church Road to the east and the access point for The Island to the west.

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6.3.11 Church Road is wide enough for cars and LGVs to pass each other comfortably, whilst providing sufficient visibility for HGVs to view oncoming traffic and come to a stop to give way where necessary. A narrow pedestrian pavement is provided along the south side of the carriageway.

*A38 corridor and A39 (all routes)*

6.3.12 Existing HGV traffic uses the A38 corridor to navigate the regional freight network and to navigate regionally and have access to national highways via the M5, which forms part of the SRN. The north section between Old Main Road and Puriton Road has a 40 mph speed limit, whilst the south section down to Dunball Roundabout has a 50 mph speed limit.

6.3.13 The A39 is part of the Somerset Council's Major Road Network, providing a spur of approximately 0.5 km between A38 Bristol Road and M5 Junction 23. The speed limit along the dual carriageway is 70 mph eastbound and 300 m westbound, whilst the speed limit on the remaining westbound section is 50 mph on approach of Dunball Roundabout.

**Future Baseline**

6.3.14 Due to the low level of traffic anticipated to be generated by the construction and operation of The

Island compensation measures and the low level of existing development and population in the study area, we will only consider the current baseline for any assessment of any impacts of the construction and operational traffic. No future baseline will be considered.

**Assumptions and Limitations**

6.3.15 At this PEIR stage, various details regarding the construction and operation of the proposed compensation measures at The Island are not fully known. In particular, the expected construction and operational road traffic have not been finalised. Maximum movements of construction vehicles are therefore identified at a high level based in **paragraph 6.3.19**.

6.3.16 It has been assumed that excavated earthworks are to be reused on site for the construction of the proposed mitigation measures where suitable. The implementation of a CEMP and a CTMP will ensure that good practice is applied during the works.

6.3.17 The baseline and significant effects have been determined based on a desktop review of the latest available data. The physical conditions of the carriageway are subject to change over time and will undergo a more detailed review as part of the EIA to

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confirm their suitability and adaptability for supporting notable vehicle movements to and from The Island.

6.3.18 Materials are assumed to be imported to The Island primarily for constructing the haul routes from the access point to and through The Island where necessary. Furthermore, the extent and nature of any temporary haul roads will depend on the ground conditions encountered at the time of construction and will be dependent of the prevailing weather conditions. Existing materials available at The Island will be used for habitat restoration. It is assumed that no materials will be exported from The Island.

6.3.19 The concept design for The Island currently requires the following:

- 500 m<sup>2</sup> site compound, with additional consideration for satellite compounds;
- 1 Portacabin;
- Welfare facilities;
- Fuel depot;
- 2 x Articulated Dump Trucks;
- 1 x Bulldozer; and
- 1 x Tracked excavator.

6.3.20 Through a high-level review of the size of The Island, it is assumed that a peak of no more than eight HGVs per day will be required to travel to The Island during the construction phases only. Although the design assumes the presence of existing on-site haul roads and that waste will be reused on site where possible, these figures consider a reasonable 'worse case' to account for a situation where these assumptions are not found to apply as the design develops. Moreover, it is assumed that a maximum of 10 LGVs per day will be required for the construction of the proposed compensation measures at The Island.

6.3.21 These peak daily movements account for the movement of plant, materials, and equipment to and from The Island where necessary.

6.3.22 Nonetheless, the day-to-day operation and maintenance of The Island will generate a negligible volume of LGVs, averaging at less than one movement per day annually, meaning that significant impacts during the operation of the proposed compensation measures at The Island can be scoped out of the assessment.

6.3.23 Whilst these estimated maximum HGV movements have been provisionally identified, extensive stakeholder engagement and design developments will be needed to estimate the actual numbers of

construction vehicles to The Island. Moreover, it should be noted that as these maximum numbers of construction vehicle movements will only be reached for a limited period, it is expected that daily construction vehicle movements will be lower for most of the construction programme. The programme will be designed to minimise the impacts of construction vehicles.

6.3.24 These construction vehicle movements are not included in the on-site HGV caps. However, the cumulative impacts of these vehicle movements and the on-site traffic are considered in **Volume 4**.

6.3.25 All construction vehicle movements will be scheduled outside of school hours. For the purpose of this scoping exercise, this would cover 8 hours across a 10-hour window, whereby an hour is excluded in the morning and another hour in the evening to account for the school day starting and ending. It is assumed that vehicle movements to and from The Island for its operation will also comply with this restriction.

6.3.26 The day-to-day operation and maintenance of the proposed compensation measures at The Island will generate a negligible volume of traffic, averaging at less than one movement per day annually, meaning that any transport impacts during operation can be scoped out of the assessment.

6.3.27 Traffic data are not currently available for the local roads examined, meaning that further details on volumes using the links will be obtained and assessed as part of the preparation of the ES.

6.3.28 As outlined for the Pawlett Hams site, the maximum HGV concentration threshold of 15 % on affected freight routes is considered.

## Likely Significant Effects

### On-site transport

6.3.29 It is expected that the construction and operation of the compensation measures will directly impact the current operation of BW 35/12. Without mitigation, this impact could generate a moderate adverse impact. Rerouting options will be considered and discussed with Somerset Council. Diverting the route provides an opportunity to reduce the recreational disturbance to overwintering birds at The Island, which could reduce adverse impacts for wildlife as well as horse riders.

### Sloway Lane (S) and Red Lane

6.3.30 Where the highway along Red Lane is shared with Bridleway 27/6, construction vehicle drivers would be expected to give way to horse riders, or proceed to drive at slow speeds if they are given way due to the

restricted width of the road. The EIA will explore options to limit the number of HGVs using this particular route to access or leave The Island on an hourly basis.

- 6.3.31 The intensity of the impact will depend on how frequently the route is used by horse riders. If taken further, the EIA will need to explore this further. The EIA will also consider and clarify the applicability of mitigation measures to limit the impacts on activities linked to Collins Farm and horseriding, which may include liaising with stakeholders to agree on appropriate.

### Sloway Lane (N) and Church Road

- 6.3.32 BW 35/11 and BW 35/13 provide links directly to Sloway Lane, highlighting that horseriding is expected to occur on parts of Sloway Lane that are within the vicinity of these meeting points.
- 6.3.33 For Laburnum House on Sloway Lane, the movement of HGVs will need to be sensitive to the movement of the vehicles of customers and staff entering and exiting the accommodation site. Occasional pedestrian footfall is anticipated due to the proximity of the accommodation site to Huntspill River for recreational

fishing, potentially generating a minor adverse effect on the receptor. The feasibility of the route for HGVs will be considered along with mitigation measures such as speed limits for construction traffic around the vicinity of the accommodation site and restricting the timing of HGV movements to less disruptive times of the day.

### A38 corridor and A39

- 6.3.34 Total current two-way traffic volumes along A38 Pawlett Road between B3139 (Highbridge) and A39 are reported to be around 9,300 vehicles per day on average, whilst total volumes along the A39 between A38 Bristol Road and M5 Junction 23 are reported to be around 11,700 vehicles per day on average<sup>232</sup>.
- 6.3.35 The maximum levels of HGV traffic generated by The Island works would cause HGV concentrations at the A38 count point to make up 2.1 % of the total traffic volumes, which is below the 15 % that the road type is suited for as a County Freight Route.
- 6.3.36 HGV concentrations on the A39 spur would reach a maximum of 10.9 %, which is also below the 15 % that could be experienced on the road type. The construction traffic for The Island is predicted to

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<sup>232</sup> Department for Transport (2022) Road traffic bulk downloads. [\[Online\]](#) Accessed 6 December 2023.



increase HGV concentrations at the count point by less than 0.1 %, thus creating a negligible impact.

6.3.37 A maximum of eight HGV movements will cause slight increases in the relative HGV concentrations along the A38 corridor and the A39 spur. HGV movements on A38 Pawlett Road between B3139 and A39 are predicted to increase by up to 4.2 %, whilst HGV movements are predicted to increase by up to 0.6 % on the A39 between A38 Bristol Road and M5 J23.

6.3.38 The changes in HGVs with these traffic estimates are summarised in the **Table 6–5**. The percentage figures are rounded to the nearest whole number.

**Table 6–5: HGV impacts at maximum daily numbers for The Island**

Count point location	Current HGVs (DfT 2022)	Construction HGV movements	Total HGVs with construction peak	HGV % with construction peak	% Increase in HGVs
A38 Pawlett Road, between B3139 (Highbridge) and A39	190	8	198	2 %	4 %
A39, between A38 Bristol	1263	8	1271	11 %	1 %

Count point location	Current HGVs (DfT 2022)	Construction HGV movements	Total HGVs with construction peak	HGV % with construction peak	% Increase in HGVs
Road and M5 (J23)					

6.3.39 The impacts of LGV movements were found to be negligible on both the A38 (0.6 % increase) and the A39 (0.5 % increase) corridors. These are summarised in **Table 6–6**. The percentage figures are rounded to the nearest whole number.

**Table 6–6: LGV impacts at maximum daily numbers for The Island**

Count point location	Current LGVs (DfT 2022)	Construction LGVs	Total LGVs with construction LGVs	LGV % with construction peak	% Increase in LGVs
A38 Pawlett Road, between B3139 (Highbridge) and A39	1757	19 %	10	1767	1 %
A39, between A38 Bristol Road and M5 (J23)	1927	16 %	10	1937	1 %

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6.3.40 It should be noted that the vehicle movement numbers for The Island are separate from those outlined in the DCO for Hinkley Point C construction works. The impacts of Hinkley Point C construction traffic are considered in combination with this site and Pawlett Hams in **Volume 4**.

### Proposed Scope

6.3.41 Based on the above assessment, **Table 6–7** summarises the impacts that will be scoped in or out of further assessment.

**Table 6–7: Summary of transport elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Traffic impacts during construction	IN	It needs to be understood whether the generated traffic from construction traffic (transporting plant, equipment, and construction materials) and the workforce personnel will impact the operation of the affected road network. This will be limited to link flows only. A CTMP will likely be required. It will include estimates of the total vehicle movements to The Island relating to staff, equipment, and materials. This will

Potential Effect	Scoped IN or OUT	Justification
		enable the impacts on the road network to be assessed at their peak levels. Moreover, relevant mitigation such as traffic management methods will be planned to mitigate any conflict points with construction traffic and other road users.
Traffic impacts during operation	OUT	The day-to-day operation of the proposed compensation measures at The Island is predicted to generate a negligible volume of HGVs, averaging at less than one movement per day annually. This is therefore not considered significant to warrant a detailed assessment in the EIA.
Sensitive Receptors	IN	Depending on the selected route, the impacts on sensitive receptors including educational amenities will need to be identified and the ES will consider mitigation measures if required. The CTMP will outline necessary limits and restrictions on construction vehicle movements, which are expected to include prohibitions during periods where conflicts with vulnerable travellers could occur.

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Potential Effect	Scoped IN or OUT	Justification
Pedestrians, cyclists and horseriders	IN	One of the route options shares a link with a bridleway, potentially creating accessibility implications for horse riders travelling to and from Stretcholt Equestrian Centre, which is directly supported by the bridleway.

6.3.42 The construction methodology for The Island generally follows that of Pawlett Hams and is expected to occur concurrently with it. **Volume 4** will address the in-combination effects associated with the periods that the programmes coincide.

6.3.43 It is expected that the construction of the compensation measures at The Island will last 12 months due to the reduced productivity associated due to the tidal conditions. Construction effects will be considered at the peak point of activity within this period, followed by the assessment of any operational effects. It is anticipated that operational effects will be negligible, though this will be clarified in the EIA.

## 6.4 Noise and Vibration

### Introduction

6.4.1 The aims of this section are to:

- Evaluate potential construction and operation activities associated with the proposed compensation measures at The Island and identify those activities which could lead to significant effects.
- Identify the relevant human receptors which could potentially be impacted by noise and vibration associated with the construction and operation of the proposed compensation measures at The Island.
- Outline a proposed scope and methodology for the assessment of potential noise and vibration effects within the ES.

6.4.2 The potential effects on human receptors (i.e. dwellings and other noise-sensitive locations used by humans) are considered within this section. Effects of noise and vibration are also considered in the following sections:

- **Section 6.2 Socio-economics;**
- **Section 6.17 Amenity and Recreation;** and
- **Section 6.19 Population and Human Health.**

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## Study Area

6.4.3 Initial Study Areas have been defined for each aspect of the noise and vibration assessment. These areas are defined in terms of distances from the relevant part of the development. These distances have been selected, using professional judgement, based on:

- Initial estimates of noise/vibration levels likely to be generated during the construction and operation of the proposed compensation measures at The Island.
- Noise/vibration levels thresholds below which effects are unlikely to occur.
- Study Areas defined in relevant guidance documents.

6.4.4 The Study Area selected for construction noise is 500 m from any area where construction activities could take place, including construction compounds and laydown areas. At this PEIR stage, it is assumed that these activities could occur anywhere within the proposed Order Limits.

6.4.5 The Study Area for the construction vibration assessment is 100 m from the proposed Order Limits, as there is a negligible risk of effects occurring beyond this distance.

6.4.6 For the assessment of noise and vibration from road traffic during construction and operation, the initial Study Area is based on identifying where The Island would lead to a change in traffic flows on the road network which would cause a change in the Basic Noise Level of 1dB LA10,18hr or greater, based on guidance set out in DMRB LA 111.

## Baseline

### Current Baseline

6.4.7 Based on a desktop review of the local area, the baseline noise environment is likely to be influenced by local wildlife, agricultural activities, traffic on the M5 and rail movements on the main Bristol - Exeter railway line. In general, the baseline noise climate at the nearest residential receptors is expected to be typical of a rural location, with low background levels.

6.4.8 The key receptors and the approximate distance to the proposed Order Limits are summarised in **Table 6–8**.

**Table 6–8: Noise and vibration receptors**

Receptor description	Receptor type	Approximate distance to the proposed Order Limits (at its closest)
Yearsley Farm House	Residential	660 m

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Receptor description	Receptor type	Approximate distance to the proposed Order Limits (at its closest)
Laburnum House	Residential	160 m
Stretcholt Village	Residential	880 m
Collings Farm	Residential	480 m
Residential properties in West Huntspill	Residential	530 m
Residential properties to the northeast of Steart	Residential	1350 m

### Future Baseline

6.4.9 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

- 6.4.10 At this PEIR stage, various details regarding the construction and operation of proposed compensation measures at The Island are not known. In particular, the likely construction plant and equipment have not been identified, and, although construction is expected to last 12 months, the detailed programme of works is not defined.
- 6.4.11 The identification of receptors has been undertaken using aerial photography. The planning status of all potential sensitive receptors shall be confirmed within the ES.
- 6.4.12 Professional experience has been used during the evaluation of potential noise and vibration effects.

### Likely Significant Effects

- 6.4.13 There are no activities that are expected to occur during the long-term operation of proposed compensation measures at The Island that could give rise to significant noise or vibration effects. Therefore, it is proposed to scope out the assessment of operational noise and vibration from the ES.

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6.4.14 The construction of the proposed compensation measures at The Island is expected to involve the use of inherently noisy plant and equipment.

6.4.15 However, as no residential receptors are located within the adopted Study Areas for construction, it is considered that noise at receptors during the construction of the proposed compensation measures at The Island would not give rise to significant noise or vibration effects.

### Proposed Scope

6.4.16 Based on the above assessment, **Table 6–9** presents the potential noise and vibration effects that are proposed to be scoped out of requiring further assessment, along with the rationale.

**Table 6–9: Summary of noise and vibration elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Potential noise and vibration effects during operation of proposed compensation measures at The Island	OUT	There are no activities expected to occur during the operation of proposed compensation measures at The Island that could

Potential Effect	Scoped IN or OUT	Justification
		give rise to significant noise or vibration effects.
Potential noise effects due to emissions from site plant and machinery	OUT	No receptors are within the Study Area for construction noise and therefore no significant noise effects are anticipated.
Potential vibration effects due to emissions from site plant and machinery	OUT	No receptors are within the Study Area for construction vibration and therefore no significant noise effects are anticipated.
Potential noise and vibration effects due to emissions from construction-related off-site traffic.	OUT	The construction-related traffic flows are likely to be less than the DMRB screening criteria. Therefore, this is unlikely to result in

Potential Effect	Scoped IN or OUT	Justification
		any significant noise or vibration effects.

6.4.17 It is proposed that noise and vibration is scoped out of the ES.

## 6.5 Air Quality

### Introduction

6.5.1 The aim of this section is to evaluate the potential effects of the proposed compensation measures at The Island on air quality at sensitive human and ecological receptors.

6.5.2 The assessment considers the following matters:

- potential impacts arising from dust and particulate matter emissions generated during the construction of the proposed compensation measures at The Island;
- potential impacts on air quality due to emissions from associated on-site plant and machinery; and

- potential impacts on air quality due to emissions from construction and operational-related off-site traffic.

6.5.3 There are no potential impacts from dust and particulate matter emissions generated during the operation of the proposed compensation measures at The Island.

### Study Area

6.5.4 For dust emissions during the construction of the proposed compensation measures at The Island, the assessment of human receptors focuses on areas up to 250 m from the proposed Order Limits or up to 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site exit(s). For ecological receptors, the assessment focuses on areas up to 50 m from the proposed Order Limits or up to 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site exit(s). This distance is based on the IAQM construction dust guidance<sup>233</sup>.

<sup>233</sup> Institute of Air Quality Management (IAQM) (2023). Assessment of dust from demolition and construction 2023 v2.1. August 2023.

6.5.5 Human receptors include locations where members of the public could be present for both short or long periods, for example residential properties, schools, hospitals, doctors' surgeries, places of worship, streets, shops, playing fields or parks and PRow; including footpaths and bridleways.

6.5.6 An ecological receptor (also referred to in this section as 'protected conservation areas') refers to any designated habitat that might be sensitive to dust soiling. These can include European sites (i.e., SAC, SPA and Ramsar sites), a SSSI and other nature sites (i.e. ancient woodlands, LWS and NNR and LNR').

## Baseline

### Current Baseline

#### *Sensitive human receptors*

6.5.7 The closest residential property to The Island is Yearsley Farm House, Stretcholt approximately 640 m from the proposed Order Limits. A National Trail and public footpath borders the proposed Order Limits.

#### *Sensitive ecological receptors*

6.5.8 The Island is located within the Severn Estuary Ramsar, SPA and SAC and Bridgwater Bay SSSI. The Somerset Wetlands NNR is also adjacent to the northern and western proposed Order Limits. Further description is provided in **Section 6.13 Ecology (Terrestrial and Freshwater) and Ornithology**.

#### *Air quality*

6.5.9 A review of baseline air quality was carried out prior to undertaking the preliminary air quality assessment. The following baseline sources were reviewed:

- UK-AIR<sup>234</sup>; and
- Sedgemoor District Council air quality monitoring survey<sup>235</sup>.

6.5.10 As part of the LAQM process, Somerset Council carries out regular assessments and monitoring of air quality within its administrative boundary. The most recent Air Quality Annual Status Report, conducted by the former Sedgemoor District Council, was reviewed to determine concentrations of particulate matter (the

<sup>234</sup> Department for Environment, Food and Rural Affairs (Defra) Welsh Government, The Scottish Government, and Department of Agriculture, Environment and Rural Affairs (Northern Ireland)(2023). UK-AIR Information Resource.

<sup>235</sup> Sedgemoor District Council (2022). 2022 Air Quality Annual Status Report (ASR) (Version 2). June, 2022.



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pollutant of main concern for the dust risk assessment) and NO<sub>2</sub> in the vicinity of The Island. It should be noted Somerset Council has not declared an AQMA within its administrative boundary. During 2021, the former Sedgemoor District Council undertook monitoring at four automatic (i.e., continuous) monitoring locations for PM<sub>10</sub> (particles with an aerodynamic diameter of 10 microns or less) and PM<sub>2.5</sub> (particles with an aerodynamic diameter of 2.5 microns or less) concentrations and non-automatic monitoring (i.e. diffusion tubes) at 32 monitoring locations for NO<sub>2</sub>.

6.5.11 **Table 6–10** presents information on the nearest monitoring locations to The Island.

**Table 6–10: Nearest monitoring locations to The Island**

Site ID /Description	Site type	Location	Distance and direction from the proposed Order Limits	2021 Annual mean concentration (µg/m <sup>3</sup> )
<b>Automatic monitoring</b>				
PM1 / Bristol Road	Roadside	E 330691 N 138490	7.3 km, SSE	7.3 (PM <sub>10</sub> ) 5.8 (PM <sub>2.5</sub> )
<b>Non-automatic monitoring (diffusion tubes)</b>				
DT11 / Clover Way	Suburban	E 332173 N 147968	3.7 km, NE	10.8 (NO <sub>2</sub> )
DT12 / Church Street	Roadside	E 331972 N 147301	3.2 km, NE	19.4 (NO <sub>2</sub> )

The Environmental Quality Standard (EQS) for annual mean NO<sub>2</sub> concentrations is 40 µg/m<sup>3</sup>. The EQS for annual mean PM<sub>10</sub> and PM<sub>2.5</sub> concentrations is 40 µg/m<sup>3</sup> and 20 µg/m<sup>3</sup>, respectively.

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6.5.12 Although the annual mean concentrations recorded are well below the relevant EQS (i.e. for the purposes of reporting, the relevant AQOs (i.e. an objective is the target date on which exceedances of a Standard must not exceed a specified number) have been collectively termed as EQS)) (see **Table 6–10**), the automatic and non-automatic monitoring locations presented in **Table 6–10** are not considered representative of conditions experienced at The Island due to the distance from the proposed Order Limits and / or monitoring site type.

6.5.13 Information on background air quality in the vicinity of The Island was obtained from Defra background map datasets<sup>234</sup>. The 2018-based background maps, which are the latest available by Defra, are estimates based upon the principal local and regional sources of emissions and ambient monitoring data. For SO<sub>2</sub> and CO concentrations, the 2001-based background maps<sup>234</sup>, which are the latest available, were used. These background concentrations are presented in Table 6–11.

**Table 6–11: Background concentrations: adopted for use in assessment for human receptors and protected conservation areas**

Pollutant	Annual mean concentration (µg/m <sup>3</sup> )	Description
NO <sub>2</sub>	3.9 – 6.4	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration
NO <sub>x</sub>	4.8 – 8.1	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration
CO	74 - 92	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2001 based map concentration
PM <sub>10</sub>	9.6 – 11.2	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration
PM <sub>2.5</sub>	6.0 – 7.4	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration
SO <sub>2</sub>	2.0 – 4.2	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2001 based map concentration

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Pollutant	Annual mean concentration ( $\mu\text{g}/\text{m}^3$ )	Description
The EQS for annual mean $\text{NO}_2$ concentrations is $40 \mu\text{g}/\text{m}^3$ . The EQS for annual mean $\text{PM}_{10}$ and $\text{PM}_{2.5}$ concentrations is $40 \mu\text{g}/\text{m}^3$ and $20 \mu\text{g}/\text{m}^3$ , respectively. There is no EQS for annual mean CO and $\text{SO}_2$ .		

6.5.14 The annual mean pollutant concentrations from the Defra background maps are well below the relevant EQS.

#### Future Baseline

6.5.15 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline described.

#### Assumptions and Limitations

6.5.16 The following assumptions and limitations apply to this assessment:

- The assessment provided is based on information available at the time of writing.
- The assessment takes account of best practice mitigation prior to the determination of effects.

#### Likely Significant Effects

6.5.17 It should be noted the value of a receptor is incorporated into the specific methods prescribed in the IAQM construction dust guidance<sup>233</sup>. The approach described does not directly align with the overall approach to the categorisation of the value of receptors, magnitude of change and determination of the significance level set out in the EIA significance matrix. This is because the IAQM construction dust guidance<sup>4</sup> on this subject relates to defining whether an air quality effect is significant or not across the study area as a whole, rather than at individual properties, or at specific sensitive ecological sites. As set out in the IAQM construction dust guidance<sup>233</sup>, it is not appropriate to define a level of significance to air quality effects.

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### Emission from dust during the construction of the proposed compensation measures at The Island

- 6.5.18 For emissions from dust during the construction of the proposed compensation measures at The Island, based on the IAQM construction dust guidance<sup>233</sup>, the anticipated earthworks and trackout (i.e. the transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network) activities are considered to have the potential to generate a small dust emission magnitude. It should be noted the likely minimal demolition and construction activities anticipated means demolition and construction were scoped out of the assessment.
- 6.5.19 A further description of the methodology of the dust risk assessment is provided in the IAQM construction dust guidance<sup>233</sup>.
- 6.5.20 Based on the relationship between the sensitivity of the study area and the likely dust emission magnitude as set out in the IAQM construction dust guidance<sup>233</sup>, the proposed earthworks and trackout activities are predicted to have a negligible to low risk for potential dust soiling impacts (in the absence of mitigation).
- 6.5.21 There is the potential for infrequent, short-term episodes when baseline dust deposition rates could be

increased by an amount that nearby human receptors could perceive. With regard to human health impacts, following the approach set out in the IAQM construction dust guidance<sup>233</sup>, there is predicted to be a negligible to low risk from earthworks and trackout activities (in the absence of mitigation) as there is limited potential for emissions of PM<sub>10</sub> and PM<sub>2.5</sub> to increase baseline conditions to a value that is above the AQO values for the protection of human health.

- 6.5.22 For ecological impacts (i.e. dust soiling on a sensitive habitat), following the approach set out in the IAQM construction dust guidance<sup>233</sup>, there is also likely to be a negligible to low risk (in the absence of mitigation).
- 6.5.23 Therefore, it would be necessary to adopt good practice mitigation measures to reduce the risk of causing a significant effect to nearby human and ecological receptors. Examples of good practice mitigation measures are presented in the IAQM construction dust guidance<sup>233</sup>. The mitigation measures taken forward would prevent or reduce potential nuisance dust or PM<sub>10</sub> (including PM<sub>2.5</sub>) emissions, which are associated with health impacts, such as exacerbating existing human health conditions including asthma and other lung conditions. Measures such as those specified in the guidance would normally be sufficient to reduce construction dust nuisance and

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risks to human health and ecological receptors to a ‘not significant’ effect.

### Emissions from plant and machinery

6.5.24 Plant and items of machinery would likely be used for the construction of the proposed compensation measures at The Island (for breaching of the soft landscape flood defences and the excavation of new creeks that will allow tidal waters to naturally flood the land). As there would only be a relatively low number of these plant and machinery in operation for only a limited duration and spread across the proposed Order Limits, it is not considered that there would be any likely significant effects on air quality due to emissions from on-site plant and machinery and it is therefore proposed that this is scoped out of the assessment.

### Emissions from construction-related off-site traffic

6.5.25 The number of construction-related traffic vehicles used for the construction of the proposed compensation measures at The Island is likely to be below the EPUK and IAQM screening criteria<sup>236</sup> for

identifying roads where there is the potential for a significant effect on local air quality and the need for an air quality assessment. It is not considered likely that there would be any significant effects on air quality due to emissions from construction-related off-site traffic and it is therefore proposed that this is scoped out of the assessment.

### Emissions from operational-related off-site traffic

6.5.26 The number of operational-related traffic vehicles used for the operation of the proposed compensation measures at The Island is also likely to be below the EPUK and IAQM screening criteria<sup>236</sup> for identifying roads where there is the potential for a significant effect on local air quality and the need for an air quality assessment. It is not considered likely that there would be any significant effects on air quality due to emissions from operational-related off-site traffic and it is therefore proposed that this is scoped out of the assessment.

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<sup>236</sup> Environmental Protection UK (EPUK) & the Institute of Air Quality Management (IAQM) (2017). Land-Use Planning & Development Control: Planning for Air Quality, v1.1. January 2017.

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## Proposed Scope

6.5.27 Based on the above assessment, **Table 6–12** presents the potential air quality impacts that are proposed to be scoped out of requiring further assessment, along with the rationale for the choice.

**Table 6–12: Summary of air quality elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Dust soiling, human health and ecological impacts arising from dust and particulate matter emissions generated during the construction of the proposed compensation measures at The Island	OUT	Activities associated with the construction of the proposed compensation measures at The Island have the potential to generate dust, which can cause annoyance and have health effects on local residents and cause harm to nearby ecological receptors. However, providing good practice mitigation measures (as recommended in the IAQM construction dust guidance <sup>233</sup> ) are implemented during the construction of the proposed compensation measures at The Island, the likely effect on nearby human and ecological receptors is

Potential Effect	Scoped IN or OUT	Justification
		considered to be negligible (i.e. not significant).
Impacts on air quality due to emissions from site plant and machinery.	OUT	Given that relatively low numbers of plant and items of machinery would likely be used for only a limited duration and spread across the proposed Order Limits, the associated potential effects on air quality are considered to be negligible (i.e., not significant).
Impacts on air quality due to emissions from construction-related off-site traffic.	OUT	The predicted construction-related traffic flows associated with the construction of the proposed compensation measures at The Island are likely to be less than the EPUK and IAQM screening criteria <sup>236</sup> . Therefore, the likely effects on air quality are considered to be negligible (i.e. not significant).
Impacts on air quality due to emissions from operational-related off-site traffic	OUT	The predicted operational-related traffic flows associated with the operation of the proposed compensation measures at The Island are likely to be less than the EPUK and IAQM screening

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Potential Effect	Scoped IN or OUT	Justification
		criteria <sup>236</sup> . Therefore, the likely effects on air quality are considered to be negligible (i.e. not significant).

6.5.28 Therefore, it is proposed that air quality is scoped out of the ES.

## 6.6 Soils and Land Use

### Introduction

6.6.1 This section describes the current environmental baseline for soils and land-use at The Island and the potential impacts associated with the proposed compensation measures at The Island.

### Study Area

6.6.2 The potential impacts on soils and land use are likely to be limited to direct disturbance during construction activities, and therefore impacts are expected to be

very localised. However, there is the possibility of contaminants being mobilised because of site disturbance which may impact soil quality, and so a study area of the area within the proposed Order Limits with a 250 m buffer in all directions around the proposed Order Limits is considered appropriate. The 250 m influencing distance has been chosen based on NHBC and Environment Agency guidance (2008)<sup>237</sup>. This distance is considered appropriate and proportionate in the context of the proposed compensation measures at The Island, considering the distance over which contamination or ground gases can migrate.

### Baseline

#### Current Baseline

6.6.3 The following sources of information have been used to obtain the baseline information discussed in this chapter:

- Provisional Agricultural Land Classification<sup>137</sup>;
- MAGIC Maps<sup>138</sup>;
- Groundsure Enviro Data Viewer<sup>139</sup>; and

<sup>237</sup> National House Building Council and Environment Agency guidance (2008). Guidance for the Safe Development of Housing on Land Affected by Contamination.

- Soilscales Online viewer<sup>140</sup>.

#### *Soils and Land Use*

6.6.4 The resource value of soil is primarily measured by its ability to support agricultural uses. This is quantified by its ALC which is determined through climatic, topographical, and interactive soil limitations. This is defined with six grades as outlined in the *Agricultural Land Classification of England and Wales: Revised criteria for Grading the Quality of Agricultural Land*, as follows:

- Grade 1 (excellent quality);
- Grade 2 (very good quality);
- Subgrade 3a (good quality);
- Subgrade 3b (moderate quality);
- Grade 4 (poor quality); and
- Grade 5 (very poor quality).

6.6.5 Grades 1 to Subgrade 3a are determined as BMV land. BMV agricultural land is the most flexible land in terms of the range of crops that can be grown, the level and consistency of yield and the cost of obtaining the yield and offers the best prospect for both food and non-food crop production.

6.6.6 Pre-1988 ALC data is available for the study area which provides provisional data without site-specific detail. The provisional ALC data do not differentiate between ALC Subgrades 3a (which qualifies as BMV land) and Subgrade 3b. Therefore, at this stage it is conservatively assumed that all Grade 3 land is Subgrade 3a.

6.6.7 This provisional ALC data shows The Island to be classified as Grade 3 agricultural land. Therefore, at this stage it is conservatively assumed that all Grade 3 land is Subgrade 3a.

6.6.8 Soils may also be of importance in supporting sites of ecological importance, therefore a high-level review of soil types has been undertaken using the Soilscales online viewer. Soilscales conveys a summary of the broad regional differences in the soil landscapes of England and Wales.

6.6.9 Soilscales identifies the majority of the area within the proposed Order Limits as 1 ‘saltmarsh soils’, with a small area of 21 ‘Loamy and clayey soils of coastal flats with naturally high groundwater’ encroaching within the south-eastern proposed Order Limits.

6.6.10 The Steart Marshes coastal management scheme was carried out north-west of the River Parrett. Bands/lenses of peat are noted within alluvium (to



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15 mbgl). It is therefore possible that peat may be present at depth at The Island.

6.6.11 Soils at The Island may be of ecological importance given the ecological sensitivity of the site.

### Future Baseline

6.6.12 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

6.6.13 This study is currently based on a desk-top information using publicly available datasets. No site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings presented.

6.6.14 Only provisional ALC data were available for review at the time of this preliminary assessment.

6.6.15 The preliminary assessment provided is based on the limited information available at the time of writing.

### Likely Significant Effects

#### Soils and Land Use

6.6.16 Soils may be impacted in the following ways:

- Permanent loss of soils due to the proposed bulk excavation and removal. The potential areas of loss are likely to be limited to those areas which will be directly disturbed (i.e., working areas);
- Temporary or permanent loss of access to soils through sealing, during construction/excavation works or during future land use (paths, roads, buildings);
- Degradation during stripping, handling and storage, through mechanisms such as erosion, compaction and smearing;
- The deposition of potentially contaminated fugitive dust from construction machinery may also impact soil quality in adjacent areas;
- Soil quality may also be degraded by mobilising contaminants or from potentially contaminated surface water run-off; and

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- Loss of disturbance of agricultural land, potentially Grade 3a BMV soils could lead to alterations of grazing regimes (presence, duration and intensity) with associated impacts on flora and fauna.

6.6.17 At this early stage and in the absence of further data or more detailed assessment there may be the potential for significant effects associated with either soils or land use.

### Proposed Scope

6.6.18 Based on the above assessment, **Table 6–13** presents the potential soils and land use impacts that are proposed to be scoped in, requiring further assessment, along with the rationale for the choice.

**Table 6–13: Summary of soils and land use elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Loss of soils and soil quality	IN	As there will be disturbance, excavations and potential loss of soils and soil quality in this area soils have been scoped in for assessment of the construction and operation of the proposed

Potential Effect	Scoped IN or OUT	Justification
		compensation measures at The Island.
Loss or and disturbance to agricultural land	IN	There may be the potential loss of Grade 3 soils, which should be assumed to be Grade 3a (BMV). In the absence of further information, land use in terms of ALC has therefore been scoped in for assessment of the construction and operation of the proposed compensation measures at The Island.

6.6.19 Therefore, it is proposed soils and land use is scoped in for the ES.

6.6.20 A desk study has not been completed at this stage and as such it has not been possible to fully establish baseline conditions at The Island. A full desk study will be undertaken and discussed/included within the ES.

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## 6.7 Geology and Land Contamination

### Introduction

6.7.1 This section describes the current environmental baseline for related to geology and potential land contamination at The Island and the potential impacts associated with the proposed compensation measures at The Island.

### Study Area

6.7.2 For the study area, a 250 m buffer in all directions around the proposed Order Limits is considered appropriate. The 250 m buffer has been chosen based on NHBC and Environment Agency guidance (2008)<sup>238</sup>. This distance is considered appropriate and proportionate in the context of the proposed compensation measures at The Island, taking into account the distance over which contamination or ground gases can migrate.

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<sup>238</sup> National House Building Council and Environment Agency guidance (2008). Guidance for the Safe Development of Housing on Land Affected by Contamination.

## Baseline

### Current Baseline

6.7.3 The following sources of information have been used to obtain the baseline information discussed in this chapter:

- Geo Index Map<sup>142</sup>;
- MAGIC Maps<sup>138</sup>;
- Groundsure Enviro Data Viewer<sup>139</sup>;
- Soilscales Online viewer<sup>140</sup>;
- Historical Landfill Sites<sup>143</sup>; and
- Somerset Minerals Plan Development Plan Document (2015)<sup>145</sup>.

### Geology

6.7.4 Aquifer designations are not covered within this section as they are discussed in the baseline of **Section 6.8 Groundwater**.

6.7.5 In the absence of specific ground information, it could be assumed according to the BGS Geo Index shows

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the superficial deposits beneath The Island to be Intertidal deposits (formerly named Estuarine Alluvium) consisting of tidal flat deposits of clay, silt, sand.

- 6.7.6 The BGS Geo Index shows the bedrock geology to be the Blue Lias and Charmouth mudstone formation (undifferentiated) both of the Langport Member.
- 6.7.7 The BGS Geo Index does not show any areas of artificial ground within or around the proposed Order Limits.
- 6.7.8 There are no BGS borehole logs available which can be reviewed to infer ground conditions at The Island.
- 6.7.9 The Steart Marshes coastal management scheme was carried out north-west of The Island, north of the River Parrett. The ground conditions related to this study area may be used to infer possible ground conditions at The Island;
- topsoil (0.2 mbgl);
  - alluvium – potentially very soft clay (with a desiccated crust) with bands/lenses of peat (0.2-15.0 mbgl);
  - weathered bedrock (16.5 mbgl); and
  - bedrock.

6.7.10 There are no geological SSSIs recorded within or near the proposed Order Limits.

6.7.11 There is no information available at this stage relating to the presence of Geological Conservation Review sites or geological sites of local or regional importance.

6.7.12 The proposed Order Limits are not located in a MSA as identified in the Somerset Council Minerals Plan.

*Historical and Current Land Use*

6.7.13 Information relating to current and historical land use (which may indicate the potential for contamination) has been taken from publicly available OS maps of the area<sup>144</sup>.

6.7.14 The study area is in a rural setting consisting of agricultural land use.

6.7.15 The Island is marked on the 1841 to 1952 OS map of the area.

6.7.16 At that time the embankments extended further to the west and the enclosed land appears to have been part of Island Farm with a small collection of buildings located in a corner of one of the fields.

6.7.17 The 1842 to 1952 OS map shows an additional flood embankment built to the east (i.e., inland) of the

western most embankments separating Island Farm from the River Parrett.

6.7.18 The Huntspill River is shown on OS National Grid mapping dated 1944 -1972. A sluice is noted and two small ponds.

*Potential sources of contamination*

6.7.19 There may be the potential for contamination related to the following:

- Any fertilisers or pesticides which may have been applied to the agricultural land.
- Potential for contamination within embankments, the origin of and composition of embankment material is not currently known.

6.7.20 There are no historical landfills recorded within the study area.

6.7.21 There is borrow pit in the location of the Steart Marshes project. It is not known if this has been filled, and what the fill material might have been, however as this is north of the River Parrett it is thought unlikely to have the potential to impact The Island.

## Future Baseline

6.7.22 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site takes into account changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

## Assumptions and Limitations

6.7.23 This study is based on a desk-based assessment only and no site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings presented.

6.7.24 The assessment is limited to publicly available information and based on the design information available at the time of writing.

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## Likely Significant Effects

### Geology

- 6.7.25 Impacts may include temporary or permanent loss of a geological site (or part of it), for example by covering with stockpiles, or damaging key characteristics and features. Impacts may also include temporary or permanent loss of access to The Island.
- 6.7.26 Impacts may also include enhancement through exposing a feature or increasing access to a rock exposure.
- 6.7.27 The proposed Order Limits are not within a MSA and are unlikely to be identified as an area for mineral extraction in the future given the ecological importance of the area (see **Section 6.13 Ecology (Terrestrial and Freshwater) and Ornithology** for more details). Therefore, sterilisation of mineral resources because of the proposed compensation measures can be scoped out.

### Land Contamination

- 6.7.28 Disturbance of potentially contaminated soils may allow receptors to be impacted directly or indirectly because of mobilisation of contamination via creation of new pathways.

- 6.7.29 The disturbance of land contamination during construction works may result in unacceptable risks to construction workers resulting from exposure to contaminants in soils via ingestion, inhalation or dermal contact.
- 6.7.30 Additionally, ground gas from potential Made Ground and organic rich natural strata could accumulate within excavations and confined spaces resulting in explosive or asphyxiant hazards.
- 6.7.31 There may also be potentially unacceptable risks to nearby site users from the creation of fugitive dust and vapours from potentially contaminated soils during the works.
- 6.7.32 There may be risks posed to surface water quality of the River Parrett, and risks to groundwater quality and ecological receptors from the disturbance and mobilisation of contamination.
- 6.7.33 At this early stage and in the absence of further data or more detailed assessment there may be the potential for significant effects associated with either geology or land contamination.

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## Proposed Scope

6.7.34 Based on the above assessment, **Table 6–14** presents the potential geology and land contamination impacts that are proposed to be scoped in, requiring further assessment, along with the rationale for the choice.

**Table 6–14: Summary of geology and land contamination elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Impacts related to geology/geological features	IN	Scoped in for the construction and operational stages as there is not sufficient information relating to the presence of geological features to complete an assessment.
Impacts related to the disturbance of potentially contaminated land.	IN	There is currently limited information available relating to the history of The Island and the potential for contamination to be present within soils, therefore land contamination is scoped

Potential Effect	Scoped IN or OUT	Justification
		in for assessment of the construction and operation of the proposed compensation measures at The Island.
Sterilisation of Mineral Resources	OUT	The proposed Order Limits are not within a MSA and is unlikely to be identified as an area for mineral extraction in the future given the ecological importance of the area.

6.7.35 Therefore, it is proposed geology and land contamination is scoped in for the ES.

6.7.36 A desk study has not been completed at this stage and as such it has not been possible to fully establish baseline conditions at The Island. A full desk study will be undertaken and discussed/included within the ES. GI may also be required at a later stage to confirm ground conditions and further assess the potential for contamination.

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## 6.8 Groundwater

### Introduction

- 6.8.1 The assessment to determine the significance of effects on the groundwater environment in this PEIR is based on known groundwater receptors and construction/operational phase activities associated with the proposed compensation measures at The Island.
- 6.8.2 A high-level, conceptual review of hydrogeological processes has been undertaken for the PEIR. This is based on available desk-based information only. This information has then been used to determine how the construction and operation of proposed compensation measures at The Island could impact on identified groundwater receptors.

### Study Area

- 6.8.3 For the groundwater study area, a 1 km buffer in all directions around the proposed Order Limits is considered appropriate. This is based on organisational experience regarding the maximum potential extent of effects likely on groundwater receptors in the type of aquifers present, and the uncertainties associated with the degree of heterogeneity of these aquifers.

## Baseline

### Current Baseline

#### *Geology and Aquifer Designation*

- 6.8.4 The geology baseline is described in **Section 6.7 Geology and Land Contamination**. However, a brief summary is provided below.
- 6.8.5 The study area is mainly underlain by superficial deposits of tidal flat deposits, comprised of clay, silt and sand. To the north the proposed Order Limits the area is underlain by beach and tidal flat deposits (undifferentiated), comprised of clays, silts, sands and gravels. These deposits are also present to the west. Both are classified as Secondary (undifferentiated) aquifers.
- 6.8.6 Within the study area to the east and south of the proposed Order Limits small, isolated deposits of Burtle Formation (sand and gravels) are present. These deposits are classified as Secondary A aquifers. Additionally, areas along the River Parrett, are absent of superficial deposits.
- 6.8.7 Bedrock at The Island is mainly Langport Member Blue Lias Formation and Charmouth Mudstone Formation (undifferentiated), which comprised interbedded



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limestones and mudstones. This is classified as a Secondary A aquifer.

- 6.8.8 To the north of the proposed Order Limits and along the course of the River Parrett to the west bedrock is also comprised of the Charmouth Mudstone Formation. This is classified as a Secondary (undifferentiated) aquifer.

*Groundwater levels*

- 6.8.9 There are no Environment Agency or BGS groundwater monitoring locations available in close proximity to the proposed Order Limits. There are also no available historical borehole records located within the proposed Order Limits to provide an indication of groundwater seeps, strikes, or rest water levels. Additionally, no GIs have been undertaken at The Island.
- 6.8.10 Within the wider study area, there is one available historical BGS borehole record, located approximately 940 m to the east. However, within this record there is no mention of groundwater. Given, the location of The Island next to the River Parrett it is likely that groundwater levels are close to ground level.
- 6.8.11 Additionally, the tidal location of The Island means that it is likely that groundwater levels are influenced by the

tides, however the extent of this tidal influence is currently unknown.

*Connection to hydrological features*

- 6.8.12 The local groundwater may be connected (either directly or indirectly) to watercourses (as baseflow, sinks, sources, spreads, collects, issues etc.), and spring discharges. Changes to groundwater quality and levels beneath The Island may therefore influence water quality and / or flows in these watercourses/hydrological features. On OS mapping there are no springs, sinks or sources shown within the proposed Order Limits or the wider study area.
- 6.8.13 However, a tributary to Gadwell's Rhyne issues from The Island from a collect and a spread (in addition to drains) suggesting that groundwater across The Island could be close to ground level. A separate tributary to Gadwell's Rhyne originated from the Huntspill River to the northeast corner of the proposed Order Limits. This river is heavily modified and canalised with the flow out into the estuary controlled by a sluice. Both tributaries meet to the north of the proposed Order Limits and feed into the River Parrett.
- 6.8.14 Within the proposed Order Limits are multiple relict drains which likely interact with shallow groundwater. The relict drains likely help to manage local

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groundwater levels by draining any excess groundwater hence reducing the groundwater flood risk.

- 6.8.15 As mentioned in **paragraph 5.8.11** groundwater is likely influenced by the tide therefore is likely to have interactions with the River Parrett.

*Groundwater as a resource*

- 6.8.16 There are no SPZs within the groundwater study area or its vicinity. This indicates that there are no licensed groundwater abstractions used for public water supply.
- 6.8.17 No information on licensed or private groundwater abstractions have been requested at this stage, therefore the presence or absence of groundwater abstractions cannot be determined. Information on groundwater abstractions will be requested and assessed at ES stage. It should be noted however, that for most PWSs there is an onus on the abstraction owner to provide details to the Local Authority. As such, there may be other PWSs which the Local Authority is not aware of.
- 6.8.18 No wells are shown on OS mapping to be present within the proposed Order Limits or wider study area.

- 6.8.19 Discharges of liquids to ground or groundwater may be occurring within the groundwater study area. However, no information on licensed discharged to groundwater has been requested at this stage. Information on groundwater discharge will be requested and assessed at ES stage.

*Groundwater Dependent Terrestrial Ecosystems*

- 6.8.20 The Island is located within the Severn Estuary Ramsar, Bridgwater Bay SSSI, and Severn Estuary SAC and SPA which are statutory designated sites. These designated sites have the potential to contain GWDTE. Within the north of the proposed Order Limits the tributary to Gadwell's Rhyne is designated as part of the Somerset Wetland NNR, which also have the potential to contain GWDTE.
- 6.8.21 To the east of the proposed Order Limits there is a large area designated as coastal saltmarsh HPI. This type of habitat has the potential to contain GWDTE.

*Groundwater Vulnerability*

- 6.8.22 The Island and 1 km study area is classified to have a medium to high groundwater vulnerability. This relates to the ease at which contaminants can migrate into an aquifer from ground level.

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*Water Framework Directive*

6.8.23 The Island does not overlie a WFD groundwater body. However, within the study area, to the north of the proposed Order Limits there is one WFD groundwater body, the Wells Groundwater body (GB40902G804700). This WFD waterbody has a good overall status with both good chemical and quantitative status.

**Future Baseline**

6.8.24 The groundwater baseline of the site is unlikely to change significantly up to and including 2027. However, given the location of the site there is the potential for increased frequency and magnitude of groundwater flooding events.

6.8.25 Groundwater flooding may be exacerbated where the events are linked to fluvial flooding and shallow, near-surface Secondary aquifers.

**Assumptions and Limitations**

6.8.26 No GIs have been undertaken at The Island to confirm groundwater conditions. Therefore, groundwater has conservatively been assumed as being at or near ground level. Additionally, the extent of tidal influences on groundwater cannot be determined due to there

being no continuous groundwater monitoring undertaken within or in close proximity to the proposed Order Limits.

6.8.27 No information on licenced and private groundwater abstractions and licensed discharges to ground has been requested at this stage therefore their presence cannot be ruled out. As a result, any significant effects cannot be ruled out at this stage.

6.8.28 No site visits or walkover surveys or UKHab surveys have been undertaken at potential GWDTE sites. From the desk study there is potential for the proposed Order Limits to contain GWDTE however the presence and/or groundwater dependency of any GWDTE cannot be determined at this stage and would require further assessment to be able to determine if any effects would be significant.

6.8.29 No excavation depths have been provided at this stage. Therefore, the following assumptions have been made to inform the assessment at this stage:

- For topsoil stripping and vegetation clearance a maximum depth of 1.0 m has been assumed.
- For excavations within the proposed Order Limits (new creek system and shallow pools) it is assumed that groundwater will be intercepted due to the assumption that groundwater is at or near

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ground level. Therefore, groundwater control of nuisance seepage is likely to be required.

## Likely Significant Effects

### Construction

6.8.30 During construction, it is considered likely that potential impacts resulting in significant effects to groundwater features (including superficial and bedrock aquifers, and associated groundwater receptors, such as licensed abstractions, PWS, GWDTE etc.) could arise from several activities including:

- Physical contamination of groundwater from ground disturbance such as soil stripping, construction of embankments, haul roads and compounds could lead to impacts with a slight significance of effect.
- The excavations for the network channels and pools could create vertical pathways for contaminated groundwater to migrate from the surface into ground and between different aquifer layers which could lead to significant effects on any groundwater receptors such as GWDTE or PWS, if present within the proposed Order Limits.
- The creation of the network channel could increase saline intrusion to groundwater through infiltration at the base of the channel and within the

wider inundation area which could result in significant effects if sensitive groundwater receptors such as GWDTE or PWS are present.

- Disturbances could occur to groundwater flows and levels from shallow excavations that do not require dewatering (e.g., topsoil stripping). The potential corresponding effects on groundwater levels and/or quality may lead to significant effects on any groundwater receptors such as GWDTE or PWS, if present within the proposed Order Limits.
- Local groundwater drawdown could occur because of temporary groundwater control. This may be required to construct any sub-surface structures, such as new channels and lagoons, that intercept the groundwater table. Drawdown impacts on groundwater levels, flows, and quality may be experienced in areas outside of the works area (which is of particular importance for groundwater abstractions and GWDTE). Discharges from dewatering may also impact on receiving surface water or groundwater bodies. At this stage impacts resulting in significant effects on groundwater receptors such as abstractions and GWDTE cannot be ruled out.

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## Operation

6.8.31 During operation, it is considered likely that potential impacts resulting in significant effects to groundwater features could arise from the following:

- Changes to groundwater levels, flows and quality, due to the presence of new channels, which could provide new pathways for groundwater migration and could alter groundwater flow directions. This could lead to subsequent changes to groundwater levels, flows and quality within the proposed Order Limits potentially causing impacts with significant effects to any GWDTE and groundwater abstractions which could be present.
- Increased risk of saline intrusion from the presence of new channels connected to the estuary. Saline water could infiltrate through the base of new channels during times of high tide hence increasing saline concentrations in both the superficial and bedrock aquifers. This is of particular importance to any sensitive groundwater receptors such as groundwater abstractions and GWDTE and could result in significant effects.

## Proposed Scope

6.8.32 Based on the above assessment, all of the potential impacts have been scoped in for further assessment.

**Table 6–15** presents a summary of potential impacts to groundwater that are proposed to be scoped in for further assessment, along with the rationale for the choice.

**Table 6–15: Summary of groundwater elements scoped into the assessment**

Potential Effect	Scoped IN or OUT	Justification
Impacts to groundwater levels and flows during construction and operation	IN	There is no information currently available on groundwater levels within the proposed Order Limits therefore significant effects on shallow groundwater levels and flows cannot be ruled out at this stage.
Impacts to groundwater quality during construction	IN	Impacts can arise from construction activities such as excavations, topsoil stripping, accidental leaks and spills etc. Considering the depth of the water table across the proposed Order Limits is unknown significant effects on the underlying aquifers cannot be ruled out.
Impacts to secondary receptors such	IN	Information on groundwater abstractions have not been requested at this stage.

Potential Effect	Scoped IN or OUT	Justification
as groundwater abstractions and GWDTE, this includes both quality and qualitative status		Additionally, there have been no site visits to determine the presence of any potential GWDTE. Therefore, significant effects on these receptors, if present, cannot be ruled out at this stage.
Potential for saline intrusion during construction and operation which could impact groundwater quality	IN	Given the tidal nature of The Island saline intrusion into the superficial aquifers could result in a deterioration of groundwater quality.
Increase in groundwater flood risk	OUT	There are no sub-surface structures or embankments proposed for this site, therefore the groundwater flood risk is not expected to change from baseline conditions.

6.8.33 It is proposed that before the ES is written that GI be undertaken at The Island to determine the ground and groundwater conditions. Given the likely presence of shallow groundwater across the proposed Order Limits as part of any GI the groundwater team will input into

the scope in order to gather data that best characterises groundwater at The Island. As part of the GI a groundwater monitoring strategy will be developed to allow continuous monitoring of groundwater levels to identify any tidal influences.

6.8.34 Additionally, no site walkovers or habitat surveys have been undertaken to determine the presence of any GWDTE. These will take place before commencing with the ES.

6.8.35 Following on from this, any information from any GI, walkover and habitat surveys will then be included in a detailed Conceptual Site Model to refine the hydrogeological understanding of The Island.

6.8.36 At the ES stage information on private and licensed groundwater abstractions will be requested from the local authority and Environment Agency. Information on licensed discharges to ground will also be requested.

## 6.9 Surface Water

### Introduction

6.9.1 The aims of this chapter are to:

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- Identify the relevant surface water (water quality, geomorphology, and flood risk) receptors which could be impacted by the proposed compensation measures at The Island.
- Evaluate potential construction and operation impacts relevant to The Island.
- Outline the proposed scope of work to assess the potential construction and operational impacts associated with the proposed compensation measures at The Island to surface water.

### Study Area

6.9.2 The study area for surface water is defined by adding a 500 m buffer around the proposed Order Limits in all directions. This is based on the anticipated distance of impact pathways associated with surface water impacts.

### Baseline

#### Baseline Sources

- 6.9.3 The baseline conditions have been established based on the following sources:
- Aerial Imagery<sup>146</sup>;
  - Environment Agency, Catchment Data Explorer<sup>147</sup>;

- Environment Agency Flood Map for Planning (rivers and sea)<sup>148</sup>;
- Environment Agency Historic Flood Map<sup>149</sup>;
- Environment Agency Long-Term Flood Risk Information Mapping<sup>150</sup>;
- Environment Agency Reservoir Flood Extents - Dry Day<sup>151</sup>;
- Environment Agency Reservoir Flood Extents - Wet Day<sup>152,151</sup>;
- MAGIC Maps;
- Somerset Council Parrett Estuary Flood Risk Management Strategy<sup>153</sup>; and
- Somerset Council Preliminary Flood Risk Assessment<sup>154</sup>.

#### Current Baseline

##### *Surface Water Quality*

- 6.9.4 There are two WFD water bodies that are within or overlap the Island study area, also noted in **Table 6–16**:
- Parrett WFD transitional water body (WFD ID: GB540805210900). This is a HMWB currently classified as achieving Moderate ecological potential and the chemical status is Fail<sup>147</sup>. The

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reasons for not achieving Good potential include chemicals and physical modification.

- River Brue from the conference with North Drain to Tidal Limit water body (WFD ID: GB108052021260). It is classed as a HMWB, currently classified as achieving Moderate ecological potential and chemical status is Fail. The reasons for not achieving Good potential include poor nutrient management, sewage discharge and physical modification.

6.9.5 Bridgwater Bay SSSI, Severn Estuary Ramsar and Severn Estuary SAC, Severn Estuary SPA and Somerset Wetlands NNR are within or overlap the study area<sup>138</sup>.

#### *Surface Water Supply*

6.9.6 The Island is not located within a Surface Water Drinking Water Safeguard Zone<sup>138</sup>

6.9.7 No data was available at this stage regarding PWSs.

#### *Geomorphology*

6.9.8 **Table 6–16** presents the location and condition of all geomorphological receptors within the study area of The Island.

**Table 6–16: Geomorphology baseline condition of watercourses**

<b>Watercourse</b>	<b>Description</b>
River Parrett Parrett Water Body (GB540805210900)	A sinuous platform with some evidence of natural processes. Modifications include flood protection measures, including embankments.
River Huntspill River Brue – from the conference with North Drain to Tidal Limit Water Body (GB108052021260)	An artificially straightened channel with modifications including agricultural land drainage.

#### *Fluvial and Tidal Flood Risk*

6.9.9 The Environment Agency’s Flood Map for Planning (rivers and sea)<sup>148</sup> indicate that the study area is within Flood Zone 3, meaning that there is a greater than 1 in 100 (1 % AEP) chance of flooding, so it is at high risk of fluvial or tidal flooding. The flood risk in the area is a combination of tidal flood risk and risk from tidally influenced rivers.



### *Surface Water Flood Risk*

6.9.10 The Long-Term Flood Risk mapping<sup>150</sup> shows The Island is at very low risk of surface water flooding, with a risk less than 0.1 % (1 in 1000) AEP.

### *Groundwater Flood Risk*

6.9.11 As discussed in the baseline section of **Section 6.8 Groundwater** there are no Environment Agency, BGS or borehole records within the study area to provide an indication of groundwater levels. Given the tidal location and proximity to watercourses, it is likely that groundwater levels are hydraulically linked to fluvial/tidal levels.

### *Reservoir Flooding*

6.9.12 According to the Environment Agency Reservoir Flood Maps<sup>151152</sup> there is a risk of flooding from reservoirs when river levels are normal and when there is also flooding from rivers. The potential extent of reservoir flooding is confined to the River Parrett and Huntspill River channel. Due to required maintenance standards and inspection levels of reservoirs under the Reservoir Act 1975, the risk of reservoir flooding is low.

### *Other Flood Sources*

6.9.13 Water and sewage infrastructure is unlikely to exist in the study area due to its rural nature, therefore the risk of flooding from these sources is very low.

### *Historical Records of Flooding*

6.9.14 Environment Agency historic flood maps<sup>149</sup> provide information in the form of recorded flood outline. This is likely to capture the extent of significant fluvial and tidal flood events. The mapping shows a single event that covers much of the study area. No details or date of the event are provided.

6.9.15 The Parrett Estuary Flood Risk Management Strategy<sup>153</sup> lists 12 historical flood events in the Parrett Estuary since 1607, with events up until 1981, when flood risk management schemes were implemented. Mapping of the reported events is not available, but it appears from the descriptions that all events included tidal flooding within the study area.

### **Future Baseline**

6.9.16 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational,

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including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

6.9.17 The following assumptions and limitations apply to the Surface Water assessment:

- The assessment of potential impacts on surface water is high-level, with no quantification.
- The assessment of surface water quality has used site-specific data, where available, and otherwise used available online information.
- The baseline geomorphological assessment of the relevant watercourses has been carried out virtually, using aerial imagery, as waterbodies are yet to be surveyed.
- The assessment of baseline flood risk has been undertaken based on available online information only. No detailed hydraulic modelling of flood risk has been undertaken on the basis that the Environment Agency online flood mapping and local authority sources are reliable and provides a reasonable assessment of existing flood risk.

- It has been assumed that the impact of climate change will not significantly alter the flood risk from that shown in online mapping.

### Likely Significant Effects

#### Construction

##### *Surface Water Quality*

6.9.18 Potential impacts to surface water quality within the study area during the construction phase include:

- Mobilisation of sediments and potential release of fine sediment to suspension leading to sediment pollution. This may impact the chemical and biological quality of surface water.
- The accidental release of polluting substances, such as fuel leaks, or contaminants from the site, which could have an impact upon the chemical and biological quality of surface water.

6.9.19 The study area is within close proximity to the surface water receptors and therefore the potential effects are anticipated to be significant.

##### *Surface Water Supply*

6.9.20 Potential impacts to surface water supply within the study area during the construction phase include:

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- Pollution from construction upstream of water supplies.
- Severance due to disruption of pipelines or other buried assets.

6.9.21 Given that water infrastructure is unlikely to exist in the proximity of the proposed Order Limits, the effects on surface water supply are likely to be negligible.

#### *Geomorphology*

6.9.22 Potential impacts to the geomorphological receptors within the study area during the construction phase include:

- Loss of riparian vegetation during bankside working.
- Temporary change in local flow dynamics and bed and/or bank scour resulting from either in-channel or bankside working.
- Fine sediment inputs leading to smothering of morphological features of alteration of sediment dynamics which support key habitats.
- Accidental release of fine sediment that would have implications to downstream areas following either bankside or in-channel working.

6.9.23 The study area is within close proximity to the surface water receptors and therefore the potential effects are anticipated to be significant.

#### *Flood Risk*

6.9.24 Potential impacts on flood risk during the construction phase of the proposed compensation measures at The Island include:

- Loss of floodplain storage resulting in increased flood risk.
- Interception of overland flow due to construction compounds, storage areas or haul routes in the study area, potentially disrupting local flow routes and increasing surface water flood risk.
- The potential blocking of drainage systems and watercourses with construction debris, potentially resulting in blockage or reduced capacity and therefore increased flood risk.

6.9.25 The study area is within close proximity to the surface water receptors and therefore the potential effects are anticipated to be significant.

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## Operation

### *Surface Water Quality*

6.9.26 Potential impacts to surface water quality during the operational phase include a change in chemical and biological quality of surface water as flood defences are breached and water is stored in the saltmarsh at The Island.

6.9.27 The study area is within close proximity to the surface water receptors and therefore the potential effects are anticipated to be significant.

### *Surface Water Supply*

6.9.28 Potential impacts to surface water supply during the operational phase include permanent loss due to disruption of pipelines and other buried assets.

6.9.29 Given that water infrastructure is unlikely to exist in the proximity of the proposed Order Limits, the effects on surface water supply are likely to be negligible.

### *Geomorphology*

6.9.30 Potential impacts to the geomorphological receptors within the study area during the operation phase include:

- Permanent loss of natural bed and bank material and riparian vegetation in the creation of new channels.
- Localised changes to flow dynamics and channel cross sections across the proposed Order Limits as flood defences are breached and new channels created.
- Localised bed and/or bank scour at new channels and channel realignments as the watercourse adjusts.
- Changes in flow regime potentially mobilising contaminants within bed and/or bank sediments causing pollution.

6.9.31 The study area is within close proximity to the surface water receptors and therefore the potential effects are anticipated to be significant.

### *Flood Risk*

6.9.32 Potential impacts on flood risk during the operational phase of the proposed compensation measures at The Island include:

- Change in flood risk at The Island and in the wider estuary due to the breaching of soft landscape defences and excavation of new channels.

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- Long-term changes to groundwater levels could occur in the superficial deposits at The Island. This would be due to embankment surcharge causing consolidation of the materials underneath the embankment, which may cause the ground beneath the structure to compress affecting groundwater storage and pore-water pressure distribution. This may locally increase groundwater flood risk if emergence is possible.

6.9.33 The study area is within close proximity to the surface water receptors and therefore the potential effects are anticipated to be significant.

### Proposed Scope

6.9.34 **Table 6–17** summarises the surface water elements scoped in and out of the assessment.

**Table 6–17: Summary of Surface Water scope**

Potential Effect	Scoped IN or OUT	Justification
Impacts on surface water quality	IN	Activities associated with the creation of the proposed compensation measures at The Island have the potential to mobilise sediment or pollutants into the watercourse. The storage of water in the

Potential Effect	Scoped IN or OUT	Justification
		saltmarsh is also likely to change the biological and chemical quality of surface water. Therefore, there may be significant effects on surface water quality.
Impacts on surface water supply	OUT	Given that water infrastructure is unlikely to exist in the proximity of the proposed Order Limits, the effects on surface water supply are likely to be negligible.
Impacts on geomorphology due to the creation of new channels and breaching of flood defences	IN	Activities associated with the creation of the proposed compensation measures at The Island have the potential to alter sediment and flow dynamics. Therefore, there may be significant effects on geomorphology.
Impacts on flood risk due to breaching of flood defences	IN	The breaching of flood defences is likely to increase flood risk at The Island. Therefore, there may be significant effects on flood risk.

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6.9.35 The identification of potentially significant effects will be derived from a qualitative assessment of baseline data to inform the receptor importance, professional judgement, combined with quantitative assessment where practical. It is proposed that the ES includes a detailed assessment of flood risk across the proposed Order Limits, produced in accordance with the technical guidance to the National Planning Policy Framework. In addition, a preliminary WFD assessment will be carried out, with a more detailed assessment if effects are identified and further mitigation is required.

## 6.10 Coastal Hydrodynamics and Geomorphology

### Introduction

- 6.10.1 This chapter considers the potential for impacts on coastal hydrodynamics and geomorphology associated with the proposed saltmarsh enhancement at The Island.
- 6.10.2 Assessment of likely significant effects on coastal hydrodynamics and geomorphology focuses on direct changes to those aspects (for example increased levels of turbidity or changes to the local hydrodynamic regime) but also considers how changes resulting from

the saltmarsh enhancement measures may affect the wider context of the receiving environment (i.e. whether predicted changes are within or beyond levels of natural variation for the environment under consideration). Therefore, this chapter should be read in conjunction with **Section 6.9 Surface Water**, **Section 6.12 Marine Ecology** and **Section 6.11 Marine Water and Sediment Quality**.

### Study Area

- 6.10.3 The proposed compensation measures at The Island will cover an area of farmland at the confluence of the River Parrett and River Hunstpill, on the east side of River Parrett and west side of the River Hunstpill, approximately 1.2 km from the estuary mouth at Steart. The works will require a construction compound significantly smaller than the one required at Pawlett Hams, approximately 500 m<sup>2</sup>. Additional facilities may include a portacabin, welfare facilities and a fuel depot.
- 6.10.4 The Study Area will cover the extent of the island, the Parrett Estuary downstream of the site to the Bristol Channel, the Hunstpill River and a 1 km buffer.

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## Baseline

### Current Baseline

- 6.10.5 The geology of the Parrett comprises estuarine and marine Holocene deposits, some of which have been reclaimed into coastal marshes and mudflats. The western bank forms the Steart Peninsula. At its confluence with the Severn, the Parrett forms extensive mudflats (the Steart Flats) deposited by tidal ebb currents<sup>156</sup>.
- 6.10.6 The Parrett is tidal for approximately 35 km from Bridgwater Bay to Oath. The maximum tidal range on the River Parrett varies from 6 m at Dunball to approximately 11 m at Burnham-on-Sea, with a Mean High Water Spring elevation of 5.46 m Ordnance Datum Newlyn ('ODN') and Mean Low Water Spring elevation of -5.10 m ODN<sup>157</sup>. Because the bed level is above that of the Severn, the Parrett empties at low tide.
- 6.10.7 The high energy of the system affects turbidity, causing levels to be extremely high within the river, influencing the ecology and water quality in the area (as described and assessed elsewhere within this PEIR).

### Shoreline management

- 6.10.8 The North Devon and Somerset Shoreline Management Plan (SMP2) (2010)<sup>26</sup> was compiled for the North Devon and Somerset Coast Advisory Group. The area covered stretches from Hartland Point in the west to Anchor Head at Weston-Super-Mare in the east. As well as guiding land use and policy in the area, the plan recommends further studies to allow coastal protection measures to be put in place, as required in the future.
- 6.10.9 The long-term plan is currently 'to provide sustainable flood defence to people, property and infrastructure, while allowing the estuary to evolve as naturally as possible in response to climate change and rising sea levels'. To this end, there is consideration of potential realignments in one or more parts of the Parrett Estuary, outlined within Policy Scenario Area 8. Proposals contained within the ES for the Bridgwater Tidal Barrier envisage some areas downstream.

### Baseline flood risk

- 6.10.10 Initial studies completed for this compensation measure identified a contemporary flood embankment separating the intertidal area of The Island from the terrestrial areas to the east and the remnants of a smaller older flood embankment further west<sup>27</sup>.

6.10.11 The implementation of a tidal barrier at Bridgwater had been considered in the North and Devon SMP2, and the Environment Agency and Somerset Council have subsequently proposed the Bridgwater Tidal Barrier, which will start construction in 2024<sup>158</sup>.

6.10.12 The Environment Agency Flood Risk Management Maps<sup>159</sup> show that The Island is in Flood Zone 3, meaning it has a high probability of flooding. North and Devon SMP2 shows the site has two flood coastal defences at the entrance of the River Parrett near Burnham-on-Sea.

6.10.13 According to the Parrett Catchment Flood Management Plan (CFMP)<sup>160</sup>, the Island Study Area is covered under Policy 3 of this Plan, defined as ‘*areas of low to moderate flood risk where we are generally managing existing flood risk effectively*’. The wider area is protected by tidal embankments in poor condition and tidal outfalls which direct rainfall to the Bristol channel. Along this reach, several strategies are being considered for addressing long term fluvial flood risks.

6.10.14 Somerset Levels and Moors 20 Year Flood Action Plan describes actions to reduce the frequency and duration of floods across the Levels and Moors, stating that they will be ‘*changing how and where floodwater is stored*’. One of these measures has been to dredge the River Parrett below Burrowbridge.

6.10.15 Sedgemoor Local Plan (2011-2032)<sup>161</sup> sets out some of the key issues facing the district, one of them being that the Study Area is at high risk of flooding.

#### *Coastal management and physical processes*

6.10.16 Hydrodynamics in the River Parrett are dominated by strong tidal flows, which combined with the scour of the riverbed creates high concentrations of suspended solids and mobile silt beds.

6.10.17 Hydrographic surveys were carried out for the Combwich wharf development in 2010<sup>162</sup>. It was estimated that the MHWs tidal level is 5.9 m AOD and MHWN is 3.0 m AOD. The tidal range near The Island is likely to be slightly greater, as it generally increases towards the estuary mouth (being approximately 11 m at Burnham-on-Sea).

#### *Statutory designations*

6.10.18 The Island is within Bridgwater Bay SSSI, which has an unfavourable recovering neutral grassland; the site is also important for ditches, invertebrate assemblages and ponds. The site is also within the Severn Estuary Ramsar, SPA, and SAC. This statutory designations in the near vicinity of the site are described in greater detail in **Section 6.12 Marine Ecology**.



6.10.19 The Island is covered by the Bridgwater and Pawlett Water Level Management Plan, which sets the requirement for the ditches in the SSSI to be at least 30cm of water to achieve favourable condition<sup>163</sup> meaning that it can maintain or rehabilitate the conservation interest of the site. Ditch levels are currently mostly less than 30cm.

### Future Baseline

6.10.20 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

6.10.21 The primary limitation associated with this PEIR is in relation to the baseline, noting that the PEIR has been informed by previous assessments (such as the original DCO application and Hinkley Point C Marine Licence applications) supported by additional desk

study. No targeted surveys have been carried out to date.

6.10.22 The majority of construction work (and associated infrastructure) is land based. Such works can be mitigated through standard construction site practice and have very limited potential for significant residual effects on the marine environment and are thus not considered in detail in this PEIR.

### Likely Significant Effects

6.10.23 The proposed generic project-wide approach to the assessment methodology is set out in **Volume 1 Section 4.1**. However, whilst this has informed the approach that has been used in this section, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of the assessment in this report.

6.10.24 The significance of an effect resulting from a development is determined in this assessment by reference to the sensitivity (or 'value') of a receptor and the magnitude of the impact (degree of change from the baseline) and applying the matrix described in **Volume 1 Table 2-1** and **Table 2-2** to establish the likely effect.

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6.10.25 Saltmarsh enhancement at The Island will promote the development of the existing saltmarsh, which will help regulate water levels, acting as a natural buffer to absorb and store water during high tides and storms, thereby reducing the risk of flooding in adjacent areas.

6.10.26 In order to enhance the saltmarsh at The Island, interventions are required which necessitate minor alteration to the hydrodynamic conditions and coastal geomorphology. These comprise minor earthworks (digging ditches and ponds to promote habitat diversity) and possibly the intentional breach of existing flood defence structures to promote water ingress.

6.10.27 The following key Coastal Hydrodynamics and Geomorphology receptors have been identified as relevant to this assessment:

- coastal processes (including sediment transport regime and water movements);
- channel morphology; and
- coastal/flood defences.

6.10.28 The proposals also have policy implications to the North Devon and Somerset Shoreline Management Plan (SMP2) and the Parrett Catchment Flood Management Plan. All these receptors are classed as of **low to medium value / sensitivity** (on the basis that the receptors possess key characteristics which

contribute significantly to the distinctiveness and character of the site, but also have some tolerance to accommodate the proposed change).

6.10.29 The approach to identifying receptors has considered the fact that environmental changes may be considered in one Aspect section, but the consequent effects may be assessed in other sections. Changes caused by the compensation measure considered in this section may result in effects on receptors assessed in other sections. For example, changes in hydrological or sediment transport regime may affect biodiversity receptors; such effects are assessed in **Section 6.12 Marine Ecology**.

6.10.30 Coastal processes will be affected by changes to coastal morphology (breaching coastal defences) and consequent changes to patterns of water movement and sediment transport. These alterations are necessary in order to enhance the saltmarsh at the Island.

6.10.31 The likely magnitudes of change on the receptors are summarised below:

- Hydrodynamics: Tidal waters may slow down as they pass through the saltmarsh, The change to coastal morphology (breach of defences) may also result in minor and localised changes to wave and current patterns. This change will be local but

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permanent over the majority of the area and thus of **medium magnitude**.

- Sediment transport: The reduced flow velocities will promote settlement of suspended material. The alteration to morphology may also change the local pattern of erosion and accretion. This change will be local but permanent over the majority of the area and thus of **medium magnitude**.
- Geomorphology: The excavation of ditches and channels comprise the main potential change in geomorphology. Additional changes may occur over time due to the alteration of relative patterns of erosion and accretion. Saltmarshes serve as natural barriers against coastal erosion. The vegetation in saltmarshes helps bind soil and sediments, reducing the erosion of the shoreline. This change will be local but permanent thus of **medium magnitude**.
- Coastal defences: The possible breach of the coastal defences will result in an intentional change to the local environment, allowing low lying land to be inundated but thereby providing natural flood defence. Saltmarshes serve as natural barriers against coastal erosion. The vegetation in saltmarshes helps bind soil and sediments, reducing the erosion of the shoreline. The

permanent change over the majority of the area means this is of **medium magnitude**.

6.10.32 These changes may also affect local coastal management policies and plans, namely the North Devon and Somerset Shoreline Management Plan (SMP2) and Parrett Catchment Flood Management Plan. The permanent nature of the change to key characteristics over the majority of the area means the magnitude of this change will be **medium**.

6.10.33 It is therefore predicted that these **medium magnitude** changes, acting on receptors of **low to medium value / sensitivity** have the potential to result in **minor to moderate effects**. As a result of this there is the potential that significant effects could arise due to the proposed development.

6.10.34 Taking future changes into account, climate change is likely to alter the status and distribution of many local habitats and coastal features. In the long-term, this may include large shifts in the baseline status of the intertidal and subtidal environment, with consequent implication for flood risk. The SMP2 recognises the need for regular review.

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6.10.35 The Flood Risk Management Strategy Report for the Parrett<sup>239</sup> concluded that sea level rise will have a minimal effect on the estuarine regime, but it will depend on future coastal realignment options.

6.10.36 Within this interim assessment, it is considered that climate change / sea level rise will not have a significant effect on the impact assessment presented.

### Proposed Scope

6.10.37 The proposed assessment scope for the coastal hydrodynamics and geomorphology assessment is outlined in **Table 6–18**.

**Table 6–18: Summary of Coastal hydrodynamics and geomorphology elements scoped in or out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Impact to coastal processes (including sediment transport)	IN	Due to the potential change to the hydrodynamic, sediment transport, geomorphology, and coastal defences there is

Potential Effect	Scoped IN or OUT	Justification
regime and water movements).		the potential for minor to moderate effects on coastal processes therefore this has been scoped in for requiring further assessment.
Impact to channel morphology.	IN	Due to the potential change to the hydrodynamic, sediment transport, geomorphology, and coastal defences there is the potential for minor to moderate effects on channel morphology therefore this has been scoped in for requiring further assessment.
Impact to coastal/flood defences.	IN	Due to the potential change to the hydrodynamic, sediment transport, geomorphology, and coastal defences there is the potential for minor to moderate effects on coastal/flood defences therefore this has been

<sup>239</sup> Environment Agency (2009) Preferred Parrett Estuary Flood Risk Management Strategy Report. Consultation Draft. [\[Online\]](#) Accessed 4 December 2023

Potential Effect	Scoped IN or OUT	Justification
		scoped in for requiring further assessment.

## 6.11 Marine Water and Sediment Quality

### Introduction

- 6.11.1 This chapter considers impacts on marine water and sediment quality associated with the saltmarsh enhancement at The Island.
- 6.11.2 There is a possibility that there could be secondary impacts on the wider environment from changes in water and sediment quality. Therefore, this chapter should be read in conjunction with **Section 6.9 Surface Water**, **Section 6.10 Coastal Hydrodynamics and Geomorphology** and **Section 6.12 Marine Ecology**.

### Study Area

- 6.11.3 The proposed compensation measures at The Island will cover an area of farmland at the confluence of the River Parrett and River Hunstpill, on the east side of River Parrett and west side of the River Hunstpill, approximately 1.2 km from the estuary mouth at Stert.

- 6.11.4 The Study Area will cover the extent of The Island, the Parrett Estuary downstream of the site to the Bristol Channel, the Hunstpill River and a 1 km buffer.

### Baseline

#### Current Baseline

- 6.11.5 Due to the large tidal range and strong currents operating in the Bristol Channel and Severn Estuary the sedimentary regime is very dynamic. Strong tidal currents lead to erosion of intertidal and shallow subtidal deposits and active re-suspension of muddy seabed sediments. Background suspended sediment concentrations within the Inner Bristol Channel are considered to be in the order of 1 g/l within 5 m water depth.
- 6.11.6 These highly dynamic conditions in the Bristol Channel combined with the scour of estuarine riverbeds, result in high concentrations of suspended solids and mobile silt beds in the Parrett<sup>162</sup>.

#### *Waterborne Contaminant Inputs*

- 6.11.7 Several major rivers, including the Parrett, flow into the Severn and Bristol Channel. These contribute to the contaminant loading, and it is estimated that sewage and industrial inputs contribute approximately 3 % and

1 % of the freshwater flow, respectively. There has been an overall decline in industrial discharges over the past 30 years as a consequence of reduced industrial activity and the improvement of emissions controls<sup>165</sup>.

6.11.8 The bulk of the contaminant input to the Bristol Channel is reported from the early scientific literature<sup>166</sup> to be from discharges into the Severn Estuary. In addition to point source contaminant inputs, diffuse chemical inputs to the Severn and Bristol Channel arise from runoff from agricultural land to tributaries such as the Avon, Usk and Parrett, runoff from urban centres, and deposition from aerial emissions. Surveys for water quality carried out for the Combwich development in 2010<sup>162</sup> showed concentrations of unionised ammonia below WFD environmental quality standard of a maximum annual average of 0.021 mg/l for 'good' status. Survey results from the nearest Environmental Agency sampling point that sampled unionised ammonia at Fiddlington Brook at Bolham House (sampling point SW-60010710, 0.8 km to Combwich Wharf) confirmed that that annual average was below 0.021 mg/l during the survey period February 2015 to April 2017.<sup>240</sup>

6.11.9 In the tidal section of the River Parrett there are no surface water gauging stations, but Environment Agency data indicates a moderate ecological status for the tidal reaches.

#### *Sediment quality*

6.11.10 In the UK, for the assessment of dredged material, the guidance is to use to chemical action levels ('cALs') proposed by the Centre for Environment, Fisheries and Aquaculture Science ('Cefas'). Samples below cAL1 are generally considered acceptable for disposal at sea, and sediments above cAL2 are considered unacceptable for uncontrolled disposal at sea without special handling and containment.

6.11.11 A marine sediment quality survey was carried out in 2011 for the Combwich Wharf development<sup>162</sup>, with samples taken on the western margin of the Parrett Estuary. Survey results showed that sediment concentrations of arsenic, chromium, copper, mercury and zinc were below cAL 1, with marginal exceedances recorded for some metals, that were nonetheless below cAL 2. Polycyclic Aromatic Hydrocarbons ('PAH') concentrations were an average of 5.7 mg/kg

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<sup>240</sup> Environment Agency (2023). Water sampling point Fiddlington Brook at Bolham House. [\[Online\]](#) Accessed 4 December 2023

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and below Canadian Guidelines PEL. No Polychlorinated Biphenyls ('PCB'), dichlorodiphenyltrichloroethane ('DDT') or dieldrin were detected.

*Designated water bodies*

6.11.12 The proposed compensation measures are contained within the Parrett WFD waterbody (ID: GB540805210900), which is classified as a Transitional water and has 'moderate ecological status'; and within the Huntspill WFD waterbody (ID: GB108052021210), which is classified as an artificial river and has 'moderate ecological status'.

6.11.13 There is one designated Bathing Water<sup>168</sup> within the Study Area at Burnham-on-Sea, Burnham Jetty North, situated approximately 700 m from River Parrett's mouth, which is classified as being of poor bathing quality under The Bathing Waters Regulation 2013<sup>169</sup>.

**Future Baseline**

6.11.14 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed

changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

6.11.15 In the long-term, climate change is likely to alter the status and distribution of many local habitats and coastal features. This may include large shifts in the baseline status of intertidal and subtidal habitats, and effects on flood risk.

6.11.16 The upcoming development of Bridgwater Tidal Barrier upstream of Dunball Cycle (to be completed by 2029) and with the tide levels continuing to rise, will allow saltmarsh enhancement at The Island.

**Assumptions and Limitations**

6.11.17 Due to the extremely large tidal range and currents, marine sediments are kept in a state of almost constant flux within the estuary. As a result, the subtidal and intertidal sedimentary environment is highly dynamic. As a result, published data (on which this PEIR is based) provide only general information and may become quickly outdated.

6.11.18 The majority of construction work (and associated infrastructure) is land based. Such works are amenable to mitigation through standard construction site

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practice and have very limited potential for significant residual effects on the marine environment and are thus not considered in detail in this PEIR.

### Likely Significant Effects

6.11.19 The proposed generic project-wide approach to the assessment methodology is set out in **Volume 1 Section 4.1**. However, whilst this has informed the approach that has been used in this section, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of the assessment in this report.

6.11.20 The significance of an effect resulting from a development is determined in this assessment by considering the sensitivity (or 'value') of a receptor and the magnitude of the impact (degree of change from the baseline) and applying the matrix described in **Volume 1 Table 2-1** and **Table 2-2** to establish the likely effect. The definitions of receptor importance and sensitivity and magnitude of impacts have been retained from Section 7.6 of Volume 1 Introduction of the original ES<sup>170</sup> (Chapter 7 Environmental Impact Assessment Approach and Methodology), in order to ensure consistency across all the assessments relating to the project

6.11.21 Saltmarsh enhancement at The Island is intended to result in a saltmarsh which will ultimately improve water quality by encouraging sedimentation of suspended matter, filtering runoff and by removing dissolved nutrients from the water.

6.11.22 The following key marine water and sediment quality receptors have been identified as relevant to this assessment:

- marine water quality: contaminants, dissolve oxygen, salinity and turbidity;
- sediment quality including heavy metals (Cd, Cr, Co, Hg, Ni, Pb, Ag, Zn, As), organic micro-pollutants (PAHs, PCBs and TBT), ammonia and sulphide; and
- designated waterbodies: two WFD water bodies: Parrett (WFD waterbody ID: GB540805210900) and Huntspill (WFD waterbody ID: GB108052021210); and one designated Bathing Water, situated at Burnham-on-Sea (National Grid Reference ST3032148972).

6.11.23 General marine water and sediment quality are classed as receptors of **medium value** because they contribute significantly to the character of the area. However, it is noted that they have ability to accommodate the anticipated changes.



6.11.24 The designated waterbodies are classed as of **high value** because they are designated at a national level, but again, it is noted that they have some capacity to accommodate limited change, provided this does not result in deterioration of their WFD status or affect their ability to achieve the target good status.

6.11.25 The saltmarsh enhancement at The Island will involve removal of earth from the coastal defence as well as minor excavations to create pools and channels for the establishment of saltmarsh habitat. This may cause temporary localised increases in turbidity as some material may enter the water. However, this should be viewed in the context of very high existing turbidity/suspended solids levels in the Parrett and the Bristol Channel. As previously noted discharge or runoff from the construction site will be amenable to standard mitigation and is not expected to have a significant impact on the marine water quality and sediment quality receptors.

6.11.26 Resuspension of sediment may mobilise sediment associated contaminants. However, it is considered unlikely that the level of contamination of sediments with The Island differs significantly from that in the Parrett sediment, due to runoff continuously introducing material to the river.

6.11.27 Available data suggest that existing contamination is not significant and below EQS levels. None of the proposed activities have the potential to introduce additional contamination into the system. The flux of material may increase as the ebb tide may transport material from land not previously subjected to flooding. Conversely, contamination within the river may be deposited on the saltmarsh as it matures, and flow velocity is reduced.

6.11.28 Such changes, while permanent, would be expected to be small and over a partial area therefore the magnitude of this change is considered **low**. This will be equally applicable for turbidity levels as the Severn Estuary is already a turbid water body and the mitigation for the removal of earth could be to deposit the sediment into the marsh and help with the creation of it.

6.11.29 Given the minor potential for contaminant remobilisation, it is not anticipated that contaminants will be remobilised in quantities sufficient to alter the status of designated water bodies. The magnitude of changes to designated waterbodies will therefore be barely discernible and thus **very low**.

6.11.30 In conclusion, the effects on general marine water and sediment quality are considered to be **minor (not**

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**significant**). The effects on designated waterbodies are considered to be **minor (not significant)**.

6.11.31 Changes caused by the compensation measure considered in this section may result in effects on receptors assessed in other sections. For example, changes in water quality that may have secondary impacts on biodiversity are assessed in **Section 6.12 Marine Ecology**.

### Proposed Scope

6.11.32 The proposed assessment scope for the Marine water and sediment quality assessment is outlined in **Table 6–19**.

**Table 6–19: Summary of Marine water and sediment quality elements scoped in or out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
General marine water and sediment quality	IN	Due to the potential change in contamination levels this has been scoped in for requiring further assessment to determine whether there is a material difference in levels that would result in the

Potential Effect	Scoped IN or OUT	Justification
		transport of contamination in one direction or another.
Designated waterbodies	IN	Due to the potential change in contamination levels this has been scoped in for requiring further assessment to determine whether there is a material difference in levels that would result in the transport of contamination in one direction or another.

## 6.12 Marine Ecology

### Introduction

6.12.1 This section scopes the assessment of potential impacts on marine ecology associated with the enhancement of the saltmarsh and associated habitats at The Island. It describes the key marine ecological receptors of potential relevance with respect to the Study Area, including their sensitivity. The section should be read in conjunction with the description of **Section 6.10 Coastal Hydrodynamics and**

### **Geomorphology, and Section 6.11 Marine Water and Sediment Quality.**

6.12.2 Within this section the marine environment has been defined as the area below mean high water springs ('MHWS'), and associated ecological receptors, with the exception of birds, which are considered in **Section 6.13 Ecology (Terrestrial and Freshwater) and Ornithology**. This includes shorebirds/waders which use the marine environment, for example for feeding.

### **Study Area**

6.12.3 Study Areas are determined based on good practice guidance (see the Guidance section above), the types of ecological features known to be present and the potential effects that could occur. The key aim is to ensure the Study Area covers, as a minimum, the Zol<sup>171</sup> relevant to all ecological features

6.12.4 Typically, Study Areas for each species group are determined based on their mobility and likely extent of impacts resulting from the compensation measure. Given that the proposed measure has only the potential for very localised effects, and will not affect the wider

Severn system beyond the Parrett, the large-scale Study Areas often considered for mobile species (e.g., marine mammals) are not appropriate in this case.

6.12.5 The Study Area for this PEIR therefore comprises The Island, the Parrett Estuary downstream of the site to the Bristol Channel, River Huntspill and a 1 km buffer zone.

### **Baseline**

#### **Current Baseline**

##### *The Study Area and its surrounds*

6.12.6 The proposed enhancement of saltmarsh and associated habitats measures at The Island will be on land at the confluence between the River Parrett and River Huntspill. The Island is situated between 100 m and 400 m inland of the MHWS mark.

6.12.7 There are no surface water gauging stations in the tidal section of the River Parrett, but Environment Agency data<sup>241</sup> indicates a moderate ecological status for the tidal reaches.

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<sup>241</sup> Environment Agency (2023). Catchment data explorer. [\[Online\]](#) Accessed 4 December 2023

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*Designated sites*

6.12.8 The mouth of the River Parrett has a variety of mobile intertidal and subtidal banks and coastal saltmarsh, both of which are protected within Bridgwater Bay SSSI. The SSSI also supports internationally and nationally important numbers of waders and waterfowl. The Island site is located within the Severn Estuary SAC, Ramsar and SPA (see **Section 6.13 Ecology (Terrestrial and Freshwater) and Ornithology**).

*Plankton*

6.12.9 Because of the highly turbid nature of the Bristol Channel and the estuaries that feed into it most of the phytoplankton production is concentrated in the surface waters. Phytoplankton surveys were carried out in 2008 and 2009 around the area, and a total of 21 species were recorded, *Odontella regia* being the most frequently recorded species. It is considered that these historical data are likely to be representative of the estuary as the large-scale physicochemical conditions of the Bristol Channel are unlikely to have changed materially since 2008.

6.12.10 Zooplankton diversity is low in the Bristol Channel, Severn Estuary and tributaries. The dominant species are the copepods *Eurytemora affinis* and *Acartia bifilosa*, both residents of the estuary and most abundant during spring and July. In the 26 years up to 2018, a significant increase in the abundance of mysids has also been observed<sup>242</sup>, *Schistomysis spiritus*, *Mesopodopsis slabberi* and *Gastrosaccus spinifer* being the dominant species.

6.12.11 Ichthyoplankton surveys have been undertaken as a component of the British EDF Estuarine & Marine Studies project (BEEMS), as reported within the original Hinkley Point C DCO ES, during which the following species were recorded:

- Fish eggs from nine taxa were recorded, namely anchovy (*Engraulis encrasicolus*), pilchard (*Sardina pilchardus*), sea bass (*Dicentrarchus labrax*), Dover sole (*Solea solea*), solenette (*Buglossidium luteum*), mackerel (*Scomber scombrus*), scaldish (*Arnoglossus laterna*), rocklings (*Lotidae*) and gurnards (*Triglidae*).
- Larvae recorded included herring (*Clupea harengus*), sprat (*Sprattus sprattus*), Dover sole

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<sup>242</sup> Plentry, et al, Long-term annual and monthly changes in mysids and caridean decapods in a macrotidal estuarine environment in relation to climate change and pollution, Journal of Sea Research, Volume 137, 2018. [Online] Accessed 4 December 2023

(*Solea solea*), solenette, sea bass, sandeel (*Ammodytidae*), dragonet (*Callionymidae*), and gobies (*Gobiidae*).

- The most abundant ichthyoplankton were anchovy eggs, goby larvae and sea bass eggs and larvae.

#### *Benthos*

6.12.12 The benthic macrofauna of the Parrett is a relatively impoverished assemblage typical of estuarine muds, dominated by taxa such as the polychaetes *Hediste diversicolor*, *Streblospio sp.*, *Nephtys hombergii* and *Pygospio elegans*, oligochaetes, the clam *Macoma balthica*, the mud snail *Hydrobia ulvae* and the amphipod *Corophium volutator*<sup>156 162</sup>.

6.12.13 A survey was carried out for the original DCO application across the intertidal zone between Brean Down and Hinkley Point C<sup>156</sup> using seine and fyke nets. The most abundant mobile invertebrate species recorded were the brown shrimp *Crangon crangon*, prawns *Palaemon elegans*, *P. longirostris*, *Palaemonetes varians*, and the mysid shrimps *Mesopodopsis slabberi*, *Neomysis integer* and *Schistomysis spiritus*.

6.12.14 Benthic infaunal communities within the Inner Bristol Channel and Severn Estuary are generally noted as being impoverished assemblages, dominated by

opportunistic species, mainly due to the high instability of the seabed habitats resulting from significant erosion and deposition of sediment through the tidal cycle<sup>174</sup>.

#### *Fish*

6.12.15 The fish community of the area offshore of Hinkley Point has been the subject of extensive surveys: Routine Impingement Monitoring Programme (RIMP) from 1981 to 2019, and the Comprehensive Impingement Monitoring Programme (CIMP) in 2009/10 and 2021/22. Full details of these surveys, and their findings, are presented in **Volume 2 Chapter 5**, with a summary of the datasets outlined here. However, it should be noted that the target of the RIMP and CIMP surveys was the Bridgwater Bay area of the Severn Estuary, therefore there will be subtle differences when compared to the fish population of the Parrett Estuary / River Parrett. Specific data relating to the fish fauna of the Parrett are not available.

6.12.16 The RIMP detected 90 fish species at Hinkley Point B between 1981-2019, with about 38 species sampled in each year. The CIMP2 data from 2021/2022 recorded 62 species of fish at Hinkley Point B.

6.12.17 The most common species reported in the overall dataset are sprat (*Sprattus sprattus*), whiting

(*Merlangius merlangus*) and sand goby (*Pomatoschistus minutus*)<sup>175</sup>.

6.12.18 Many species of fish living within the Severn Estuary undertake regular migrations and tend to move seasonally in waves up and down the estuary. In late summer and autumn, species richness and total abundance of fish are at their maximum with the timing of this peak varying between the upper and lower estuary<sup>176</sup>. Marine species also use the estuary as a nursery ground due to the extensive areas of shallow marginal mudflat that provide feeding opportunities to juveniles.

6.12.19 Seven diadromous fish species are known to migrate through the Severn Estuary some of which may enter the Parrett Estuary; Atlantic salmon (*Salmo salar*), twaite shad (*Alosa fallax*), allis shad (*Alosa alosa*), river lamprey (*Lampetra fluviatilis*), sea lamprey (*Petromyzon marinus*), sea trout (*Salmo trutta*), and European eel (*Anguilla anguilla*). Salmon have been observed in the Parrett before entering the River Tone<sup>177</sup>. Of these species, also Annex II species of conservation importance for the Severn Estuary / Bristol Channel, there were no occurrences of river lamprey, sea lamprey, Atlantic salmon or Allis shad observed in the CIMP2 data.

6.12.20 European eel is categorised as critically endangered on the IUCN Red List of Threatened Species. Even though the Parrett Estuary has historically supported an eel fishery, the population has declined significantly in recent decades. In recent years, various recovery projects have been undertaken with the release of 20,000 elvers to boost local eel populations in the Huntspill in 2019<sup>178</sup>.

6.12.21 The structure of the estuarine fish community, and the relative abundance, is seasonally dynamic and subject to interannual variability, resulting from variation in recruitment and environmental factors. This inherent variation in species composition as well as the plasticity in feeding behaviour and prey selectivity should be considered when assessing the potential effects of Hinkley Point C on the fish species of the Severn Estuary.

#### *Marine mammals*

6.12.22 Studies have been undertaken into the marine mammal populations of the Severn Estuary and Inner Bristol Channel, including by the Somerset Sea Watch Surveys, which were completed between 2014 and 2018 at different locations along the Somerset coast<sup>179</sup>. These surveys recorded bottlenose dolphin; common dolphin (*Tursiops truncatus*), harbour porpoise, and grey seal.

6.12.23 No mammals were recorded in the vicinity of the Parrett estuary during the sea watch surveys. However, historically, occasional vagrants have been observed in the Parrett basin including common seal (the most recent record being from 2018) and harbour porpoise (seen on the River Tone near the Parrett confluence in 2020)<sup>181</sup>.

6.12.24 Harbour porpoise is the most commonly recorded cetacean in the Bristol Channel, and within UK waters as a whole. As a qualifying feature of Bristol Channel Approaches SAC (circa 100 km west of The Island), which is the closest European site to the development designated for harbour porpoise, marine monitoring programmes are carried out, with the last results from year 2016, with an estimated density ranging between 0-0,25 animals per km<sup>2</sup> for Bristol Channel area.

6.12.25 Of the two most common seal species in UK waters (grey seal *Halichoerus grypus* and common seal *Phoca vitulina*), the grey seal is the most frequently observed within the inner Bristol Channel. The closest European site to the development designated for grey seal is Lundy SAC (102 km from the Project), which has a permanent grey seal population of 70 individuals. The species is most seen during Spring and Summer season<sup>169</sup>. Common seal is less frequently seen in the wider area. Occasional sightings at Hurlstone Point (30 km away) were recorded in 2020<sup>182</sup>.

## Future Baseline

6.12.26 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

6.12.27 At a more distant level, baseline ecological conditions may change for several reasons over the lifetime of a project, this may be as a result of climate change, land use changes, natural variation, or conservation- / policy-based changes in legislation. Any of these has the capacity to alter the status and distribution of species (including positively, based on overall goals / objectives of numerous conservation legislative items), as well as the composition of habitats and communities in the long-term.

## Assumptions and Limitations

6.12.28 The primary limitation associated with this PEIR is in relation to the baseline, noting that the PEIR has been informed by previous assessments supported by

additional desk study. No targeted surveys have been carried out to date.

6.12.29 The majority of construction work (and associated infrastructure) is land based. Such works are amenable to mitigation through standard construction site practice and have very limited potential for significant residual effects on the marine environment and are thus not considered in detail in this PEIR.

### Likely Significant Effects

6.12.30 The proposed generic project-wide approach to the assessment methodology is set out in **Volume 1 Section 4.1**. However, whilst this has informed the approach that has been used in this section, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of the assessment in this report.

6.12.31 The significance of an effect resulting from a development is determined in this assessment by reference to the sensitivity (or 'value') of a receptor and the magnitude of the impact (degree of change from the baseline) and applying the matrix described in **Volume 1 Table 2-1** and **Table 2-2** to establish a likely effect.

6.12.32 The following key marine ecology receptors have been identified as relevant to this assessment:

- Intertidal habitats and associated species are of **low sensitivity** because they are features of local importance and, given their adaptation to highly dynamic conditions, have the ability to accommodate a degree of change.
- Subtidal benthic habitats and associated species are similarly of **low sensitivity**.
- Migratory fish are of **high to medium sensitivity** as they are features of the UK Bap and have a limited ability to accommodate environmental change.
- Non-migratory fish are of **low sensitivity** because they are of local importance and adapted to highly dynamic conditions.
- Marine mammals are of **medium sensitivity** as though they are features of the UK BAP, they occur in the Study Area so infrequently as not to contribute significantly to the distinctiveness and character of the Study Area. They are also of **low sensitivity** with the ability to tolerate a degree of change.

6.12.33 The marine ecological effects of enhancing the saltmarsh at The Island are beneficial. Furthermore, because the interventions required are minimal, and



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any excavated soil will be re-used on site, there are no adverse effects arising to marine ecological receptors during construction.

6.12.34 The principal (and intended) effect will be increased provision of coastal saltmarsh habitat, with commensurate increased biodiversity. This in turn will provide a wide range of ecosystem benefit, including:

- increased foraging/prey resource for birds and fish;
- increased nursery habitat for estuarine fish species such as bass; and
- habitat for conservation dependent species (e.g. eels, which were once abundant in the Parrett).

6.12.35 Several fish species benefit indirectly from marshes by feeding on invertebrates which inhabit the adjacent mudflats and estuarine waters, which themselves feed on organic matter exported from the saltmarshes. Fish use saltmarshes both as nursery and, in some cases, breeding areas. A study in Mont Saint Michel Bay showed that sea bass fry colonise the marsh creeks during the flooding spring tides and return to coastal waters on the following ebb tide (Laffaille et al., 2001 in Stevenson, 2002)<sup>183</sup>. This observation is also supported by monitoring of managed realignment sites in Essex undertaken by the Environment Agency (Colclough et al, 2004)<sup>184</sup>.

6.12.36 Despite the occasional vagrant seal and porpoise being recorded in or near the Parrett, there is no scope for the proposed compensation measures at The Island to impact marine mammals.

6.12.37 The changes caused by the proposed saltmarsh enhancement are predicted to be of **low or very low magnitude** (noticeable change over a partial area, and barely discernible changes over a wider area), to the channel of the Parrett and surrounding area, but **medium to high magnitude** for the inundated land (significant permanent change to most of the area and its features). However, the latter is a positive change. Therefore, the significance of resultant effects on marine ecological receptors is considered **negligible (not significant) to major beneficial (significant)**.

### Proposed Scope

6.12.38 The proposed assessment scope for the Marine ecology assessment is outlined in **Table 6–20**.

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**Table 6–20: Summary of Marine ecology elements scoped in or out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Intertidal habitats and associated species	IN	Due to the potential effects of establishing saltmarsh through managed realignment (both positive and negative) this has been scoped in for requiring further assessment.
Subtidal benthic habitats and associated species	IN	Due to the potential effects of establishing saltmarsh through managed realignment (both positive and negative) this has been scoped in for requiring further assessment.
Migratory fish	IN	Due to the potential effects of establishing saltmarsh through managed realignment (both positive and negative) this has been scoped in for requiring further assessment.

Potential Effect	Scoped IN or OUT	Justification
Non-migratory fish	IN	Due to the potential effects of establishing saltmarsh through managed realignment (both positive and negative) this has been scoped in for requiring further assessment.
Marine mammals	OUT	This potential effect has scoped out due to the minimal (or no) recorded marine mammal activity in the River Parrett.

## 6.13 Ecology (Terrestrial and Freshwater) and Ornithology

### Introduction

- 6.13.1 This chapter presents the preliminary environmental information relating to terrestrial and freshwater ecology and ornithology for the enhancement of saltmarsh and associated habitats within the proposed Order Limits and wider study area.

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6.13.2 Terrestrial and freshwater ecology is concerned with the variety of living organisms and their relationships with each other and their environment. Ecology is the subject of a wide variety of legislation and policies; impacts to ecological receptors could constitute an offence under relevant legislation as well as comprising material considerations within the planning system.

6.13.3 The assessment comprises the following terrestrial and freshwater ecology elements:

- Designated sites – sites designated at all levels (both statutory and non-statutory) for nature conservation reasons, including SPAs, SACs, Ramsar sites, SSSIs, NNRs, LNRs and LWSs;
- Notable habitats – i.e. HPis; and
- Protected and notable species – these include animal and plant species protected by legislation, species of conservation importance (SPI), and species that are not legally protected but have a conservation designation.

6.13.4 A high-level review of the terrestrial and freshwater ecological baseline of the proposed Order Limits and wider study area has been undertaken for this PEIR. This is based on available desk-based information only. This information has then been used to determine how the construction and operation of the enhancement of saltmarsh and associated habitats

within the proposed Order Limits could impact on terrestrial and freshwater ecological receptors.

### Study Area

6.13.5 The study area for terrestrial and freshwater ecology relates to the area of construction activity, including construction compounds and access tracks. The study area comprises the relative areas by which potential pathways to effect on terrestrial and freshwater ecological receptors could occur.

- Internationally important statutory designated sites: SPAs, SACs and Ramsar sites within 2 km of the proposed Order Limits, or where European sites are hydrologically connected to The Island; or within 30 km of a SAC where bats are noted as one of the qualifying interests;
- Nationally and county important statutory designated sites: SSSIs, NNR and LNR within 2 km of the proposed Order Limits;
- Non-statutory sites of local nature conservation importance: LWSs, ancient woodland and 'HPI within 1 km of the proposed Order Limits;
- Desk study records of protected or otherwise notable habitats and species, veteran or ancient trees within 1 km of the proposed Order Limits; and

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- For receptors potentially sensitive to air quality changes (including habitats within SPA, SAC, Ramsar, SSSI, NNR, LNR, LWS, ancient woodland or ancient and veteran trees), sites located within 200 m of proposed construction routes where significant changes are anticipated.

## Baseline

### Baseline Sources

6.13.6 The following sources have been used to inform a preliminary understanding of the baseline conditions for the assessment of the terrestrial and freshwater ecology aspect:

- SERC provided data records in September 2023 for protected and designated species, invasive species and non-statutory LWS. Species records were limited to those within the last 10 years, i.e. 2013-present;
- MAGIC Maps<sup>138</sup> was used to identify international and national statutory and non-statutory designated sites, HPI, surveyed GCN ponds and granted EPSM licenses and GCN licence returns;

- Aerial photography;
- Standard data forms for SPAs<sup>243</sup> and SACs<sup>244</sup> within the UK national site network of European sites;
- UK Ramsar Information Sheets<sup>245</sup>; and
- SSSI citations<sup>206</sup>.

### Current Baseline

#### *Statutory Designated Sites*

6.13.7 The proposed Order Limits are located within three international statutory designated sites (Severn Estuary SPA, Severn Estuary Ramsar and Severn Estuary SAC).

6.13.8 There are four international statutory designated sites with bats as qualifying feature within 30 km of the proposed Order Limits: Exmoor and Quantock Oakwoods SAC; Hestercombe House SAC; Mendip Limestone Grasslands SAC; and Northern Somerset & Mendip Bats SAC.

<sup>243</sup> JNCC (2022). List of SPAs. [\[Online\]](#) Accessed 4 December 2023

<sup>244</sup> JNCC (2023). SACs in the United Kingdom. [\[Online\]](#) Accessed 4 December 2023

<sup>245</sup> Ramsar Sites Information Service (2023). Explore Sites. [\[Online\]](#) Accessed 4 December 2023

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6.13.9 The proposed Order Limits are located within one national statutory designated site (Bridgwater Bay SSSI) and are immediately adjacent (to the west and north) to another national statutory designated site (Somerset Wetlands NNR).

6.13.10 There are no LNRs within 2 km of The Island.

6.13.11 The proximity and reason for designation for statutory designated sites within 2 km (30 km for bats) of the proposed Order Limits is described further in **Table 6-21**.

**Table 6-21: International and National Statutory Designated Sites within 2 km (30 km for bats) of the proposed Order Limits**

Site	Location in relation to the proposed Order limits	Reason for Designation
Severn Estuary SPA	Within the proposed Order Limits	This site has been designated for its wintering populations of Bewick’s swan ( <i>Cygnus columbianus</i> ), white-fronted goose ( <i>Anser albifrons</i> ), shelduck ( <i>Tadorna tadorna</i> ), gadwall ( <i>Anas strepera</i> ), dunlin ( <i>Calidris alpina</i> ) and redshank ( <i>Tringa tetanus</i> ) and its wintering waterfowl assemblage.
Severn Estuary Ramsar	Within the proposed Order Limits	This site has been designated for the following habitats and species: <ul style="list-style-type: none"> <li>• All SAC features (see below);</li> <li>• Unusual estuarine communities associated with reduced productivity and diversity;</li> <li>• Migratory fish, including sea trout (<i>Salmo trutta</i>), salmon (<i>Salmo salar</i>), Allis shad (<i>Alosa alosa</i>) and eel (<i>Anguilla anguilla</i>) in addition to the cited SAC species;</li> <li>• Migratory birds in spring and autumn;</li> <li>• Wintering waterfowl assemblage; and</li> <li>• Internationally important wintering numbers of Bewick’s swan, white-fronted goose, gadwall, shelduck, dunlin and redshank.</li> </ul>
Severn Estuary SAC	Within the proposed Order Limits	This site has been designated for the following habitats and species: <ul style="list-style-type: none"> <li>• Estuaries;</li> </ul>

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Site	Location in relation to the proposed Order limits	Reason for Designation
		<ul style="list-style-type: none"> <li>• Intertidal mudflats and sandflats;</li> <li>• Atlantic salt meadows;</li> <li>• sandbanks;</li> <li>• reefs; and</li> <li>• three species of migratory fish: sea lamprey (<i>Petromyzon marinus</i>); river lamprey (<i>Lampetra fluviatilis</i>); and twaite shad (<i>Alosa fallax</i>).</li> </ul>
Bridgwater Bay SSSI	Within the proposed Order Limits	<p>The site has been designated for the following habitats and species:</p> <ul style="list-style-type: none"> <li>• Mudflats;</li> <li>• Saltmarsh;</li> <li>• Shingle beach;</li> <li>• Grazing marsh;</li> <li>• Internationally and nationally important numbers of wintering and passage wildfowl including (in addition to species cited in other designations) black-tailed godwit (<i>Limosa limosa</i>), teal (<i>Anas crecca</i>) and grey plover (<i>Pluvialis squatarola</i>);</li> <li>• A diverse invertebrate fauna of ponds and ditches; and</li> <li>• The ecological link to the Somerset Levels and the position of the area in the context of the Severn Estuary.</li> </ul>
Somerset Wetlands NNR	Immediately adjacent to north and west	<p>Largest remaining area of lowland wetland in England, with the UK's second largest area of lowland peat soils. Holds nationally and internationally important populations of wildlife and wading birds. Diverse habitats support a wide variety of insects, reptiles and plants rarely found elsewhere.<sup>246</sup></p>

<sup>246</sup> Natural England (2023). Corporate report: Somerset's National Nature Reserves. [\[Online\]](#) Accessed 4 December 2023

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Site	Location in relation to the proposed Order limits	Reason for Designation
Exmoor and Quantock Oakwoods SAC	12.5 km southwest	Primary reasons for site selection: Barbastelle ( <i>Barbastella barbastellus</i> ) Qualifying features but not a primary reason for site selection: Bechstein's bat ( <i>Myotis bechsteini</i> )
Hestercombe House SAC	15.9 km south	Primary reason for site selection: Lesser horseshoe bat ( <i>Rhinolophus hipposideros</i> )
Mendip Limestone Grasslands SAC	13.4 km north-east	Qualifying features but not a primary reason for site selection: Greater horseshoe bat ( <i>Rhinolophus ferrumequinum</i> )
North Somerset & Mendip Bats SAC	18.8 km north-east	Primary reasons for site selection: Lesser horseshoe bat Greater horseshoe bat

### Non-statutory Designated Sites

6.13.12 There is one LWS within 1 km of the proposed Order Limits:

- Bridgwater Bay NNR (ST24/041), located immediately to the east of The Island. Described as part of NNR outside of SSSI supporting legally protected species. Considered to be a section of river/stream with greater than or equal to 2 confirmed recent records of the following

species/taxa: kingfisher (*Alcedo atthis*), water shrew (*Neomys fodiens*), stoneflies (except Nemouridae), otter and water vole.

### Habitats

6.13.13 The proposed Order Limits are located on the right (east) bank of the River Parrett opposite the opening to the Steart Marshes managed realignment, approximately 1.2 km from the estuary mouth at Steart Point. The proposed Order Limits comprise saltmarsh

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habitat intersected by drains. A large tidal creek extends from north to south through the proposed Order Limits and there is a contemporary flood embankment, which separates the intertidal area of the proposed Order Limits from the terrestrial areas to the east. The proposed Order Limits are crossed by a number of former agricultural land drains, oriented east-west.

6.13.14 The SSSI unit that makes up the proposed Order Limits, unit 93, comprises littoral sediment and when last assessed in 2010 was in favourable condition.

6.13.15 Coastal saltmarsh HPI is distributed throughout the proposed Order Limits, with coastal and floodplain grazing marsh HPI bordering the eastern side of the proposed Order Limits (as well as distributed widely to the northeast, east and southeast) and mudflat HPI bordering the northern and western boundaries of the proposed Order Limits.

6.13.16 Given the marine nature of coastal saltmarsh and mudflats, these HPI are not discussed further within this chapter (see **Section 6.12 Marine Ecology**).

6.13.17 Additional HPI within 1 km of the proposed Order Limits include small areas of reedbeds (closest feature being 860 m west within Steart Marshes) and traditional orchards (closest feature being 980 m southeast in Stretcholt).<sup>138</sup>

6.13.18 As per **Section 6.8 Groundwater**, the coastal saltmarsh HPI within the proposed Order Limits has the potential to contain GWDTE.

6.13.19 There is no ancient woodland located within 1 km of the proposed Order Limits.

6.13.20 There are no ancient/veteran trees located within 1 km of the proposed Order Limits.<sup>197</sup>

6.13.21 It should be noted that if the works at the proposed Order Limits were not to go ahead, it is likely that saltmarsh would still remain, however the condition and extent would likely not improve or increase.

*Notable Plants*

6.13.22 The proposed Order Limits comprise saltmarsh habitat and therefore is tidally influenced. Wholly terrestrial plant species would therefore find the existing habitat unfavourable. Notable marine plant species is covered in **Section 6.12 Marine Ecology**.

*Bats*

6.13.23 No bat records were returned in the SERC desk study and no EPSM licences for bats have been granted within 1 km of the proposed Order Limits.



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6.13.24 Use of coastal habitats by bats is greatest at rocky shores, with coastal cliff vegetation being used for navigation and foraging. However, The Island is comprised primarily of saltmarsh and mudflats. It is anticipated that common and widespread bat species, similar to the species discussed for Pawlett Hams (approximately 3 km southwest) may use the area within the proposed Order Limits for commuting or foraging purposes, particularly along the watercourses both within and adjacent to the area (River Parrett and Huntspill River).

6.13.25 Given the regular tidal inundation of the habitats and subsequent lack of trees, buildings or structures on within the proposed Order Limits, there are likely few roosting opportunities for bats here.

*Badger*

6.13.26 No recent badger records were returned within 1 km of the proposed Order Limits because of the SERC desk study. Given The Island's regular inundation by seawater, it would not be considered suitable badger sett building habitat, but badger may occasionally use the saltmarsh for foraging at low tides.

*Hazel dormouse*

6.13.27 Saltmarsh does not provide suitable habitat for dormouse and there is a high degree of confidence dormice are not present within the proposed Order Limits.

*Otter*

6.13.28 Two otter records were returned within 1 km of the proposed Order Limits because of the SERC desk study. The closest of these includes four records from between 2017 and 2018, approximately 25 m north of the proposed Order Limits, adjacent to the Huntspill Sluice.

6.13.29 Given the regular inundation by seawater within the proposed Order Limits, it would not be considered suitable holt/couch building habitat, but it is considered likely that otter use the saltmarsh within this area for foraging and commuting.

*Water vole*

6.13.30 Two water vole records were returned within 1 km of the proposed Order Limits as a result of the SERC desk study. Both records are located approximately 950 m west in the Steart marshes, across the River Parrett from The Island. Water voles have been reported

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feeding in salt marshes and persisting in brackish habitats, as evidenced by the Steart marsh records. Given regular inundation within the proposed Order Limits, it is anticipated the habitat would not be suitable for burrow building but would retain its function as a foraging resource. There is potentially suitable terrestrial/freshwater habitat for water voles to the east of the contemporary flood embankment of the proposed Order Limits, which separates the intertidal area from adjacent terrestrial habitats.

*Ornithology*

6.13.31 The SERC desk study returned records of 87 species of birds within 1 km of the proposed Order Limits, many of which have overlapping conservation designations, such as SPI under Section 41 of the NERC Act 2006, red or amber listed as BoCC or listed under Schedule 1 of the WCA 1981.

6.13.32 Nineteen of these are either qualifying species of the Severn Estuary SPA/Ramsar or specifically noted within the SPA, Ramsar or SSSI designations, including: black-tailed godwit (*Limosa limosa*), curlew (*Numenius arquata*), gadwall (*Anas strepera*), greenshank (*Tringa nebularia*), grey plover (*Pluvialis squatarola*), herring gull (*Larus argentatus*), knot (*Calidris canutus*), mallard (*Anas platyrhynchos*), pintail (*Anas acuta*), ruff (*Philomachus pugnax*), shoveler (*Anas clypeata*), snipe

(*Gallinago gallinago*), spotted redshank (*Tringa erythropus*) teal (*Anas crecca*), tufted duck (*Aythya fuligula*), turnstone (*Arenaria interpres*), water rail (*Rallus aquaticus*), whimbrel (*Numenius phaeopus*) and wigeon (*Anas penelope*).

6.13.33 The British Trust for Ornithology WeBS conducted in 2021/2022 (the last year for which data is available) recorded a total of 98 species in the Bridgwater Bay (Severn Estuary) site over the course of the survey year. This covers an area of the River Parrett starting north of Pawlett Hams as it flows into Bridgwater Bay (alongside the Island), and the estuary from approximately Burnham-on-Sea in the east to Hinkley Point B in the west. As would be expected, the surveys recorded all six of the qualifying features of the Severn Estuary SPA with the following annual peak counts:

- Bewick's swan (92);
- Shelduck (7324);
- Dunlin (28,493);
- Gadwall (181+);
- Greater white-fronted goose (207); and
- Redshank (5755).

6.13.34 The existing saltmarsh and adjacent mudflats within the proposed Order Limits likely support a wide diversity of

wildfowl and wader species who utilise the habitat for foraging, loafing, roosting and breeding.

6.13.35 Other species recorded by the SERC desk study were: bar-tailed godwit (*Limosa lapponica*), bittern (*Botaurus stellaris*), black-headed gull (*Chroicocephalus ridibundus*), Brent goose (*Branta bernicla*), common gull (*Larus canus*), common sandpiper (*Actitis hypoleucos*), curlew sandpiper (*Calidris ferruginea*), golden plover (*Pluvialis apricaria*), great black-backed gull (*Larus marinus*), green sandpiper (*Tringa ochropus*), grey heron (*Ardea cinerea*), jack snipe (*Lymnocyptes minimus*), lapwing, little gull (*Hydrocoloeus minutus*), Mediterranean gull (*Ichthyaetus melanocephalus*), moorhen (*Gallinula chloropus*), mute swan (*Cygnus olor*), oystercatcher (*Haematopus ostralegus*) and sanderling (*Calidris alba*).

6.13.36 Beyond waterbirds, the species returned in the data search included a mix of species typical of the habitats present on The Island, a mosaic of saltmarsh, mudflats, grazing marsh, ditches and watercourses, including notable species such as: Cetti's warbler (*Cetti cetti*), grey wagtail (*Motacilla cinerea*), reed bunting (*Emberiza schoeniclus*), sedge warbler (*Acrocephalus schoenobaenus*), skylark (*Alauda arvensis*), starling (*Sturnus vulgaris*), wheatear (*Oenanthe oenanthe*) and yellow wagtail (*Motacilla flava*).

#### *Great crested newt*

6.13.37 There were no records for GCN returned within 1 km of the proposed Order Limits as a result of the SERC data search. There are no granted EPSM licence applications for GCN, nor any GCN class survey licence returns, within 1 km of the proposed Order Limits. Given the marine nature of the existing Island habitats, GCN is considered absent from this area.

#### *Reptiles*

6.13.38 There were no records for reptiles returned within 1 km of the proposed Order Limits because of the SERC data search.

6.13.39 Given the marine nature of the existing habitats, reptiles are considered absent from the proposed Order Limits.

6.13.40 There is potentially suitable terrestrial/freshwater habitat for reptiles just east of the contemporary flood embankment, which separates the intertidal area of the proposed Order Limits from adjacent terrestrial habitats.

#### Terrestrial Invertebrates

6.13.41 Six protected or notable terrestrial invertebrate species were returned from the SERC data search, as described in **Table 6-22**.

**Table 6-22: Notable and protected terrestrial invertebrate species within 1 km of the proposed Order Limits**

Species	Distance from the Island	Conservation designation
A spider ( <i>Philodromus albidus</i> )	One record, approximately 105 m northeast.	SERC-Notable
Brown argus ( <i>Aricia agestis</i> )	Two records within 1 km. Closest record approximately 115 m north at the Huntspill sluice.	SERC-Notable
Small heath ( <i>Coenonympha pamphilus</i> )	One record, 115 m north at the Huntspill sluice.	Species of Principal Importance ('SPI'), IUCN Red List – Near Threatened.
Wall ( <i>Lasiommata megera</i> )	Two records within 1 km. Closest record approximately 650 m east.	SPI, IUCN Red List – Near Threatened.
Essex skipper ( <i>Thymelicus lineola</i> )	Two records within 1 km, closest record approximately 115 m north.	SERC-Notable
A spider ( <i>Nigma puella</i> )	One record, approximately 105 m northeast.	RDB – Nationally Scarce SERC- Notable

6.13.42 The existing saltmarsh within the proposed Order Limits would not provide suitable habitat for many protected or

notable terrestrial invertebrate species. More mobile species, such as butterflies and moths, may use the saltmarsh for foraging, though this would be highly dependent on the food-plants available.

#### *Other Notable Species*

6.13.43 No additional notable species records were returned as part of the SERC data search.

#### *Invasive Non-native Species (Plants and Animals)*

6.13.44 The desk study identified several records of terrestrial INNS, including:

6.13.45 One record of Canada goose (*Branta canadensis*), approximately 105 m north of the proposed Order Limits, and 1 record of Egyptian goose (*Alopochen aegyptiaca*), approximately 620 m north of this area.

6.13.46 INNS do not have intrinsic value and will not be considered as a biodiversity receptor in the assessment but as a potential pathway to cause effects on other receptors.

#### *Freshwater Habitats and Species*

6.13.47 The proposed Order Limits comprise saltmarsh habitat and therefore are tidally influenced. Wholly freshwater

species (invertebrates and flora) would therefore find the habitat subject to saline influence unfavourable.

6.13.48 The land surrounding the proposed Order Limits comprises watercourses likely supporting freshwater communities of fish, invertebrates and macrophytes.

6.13.49 Although the tidal limit of the Huntspill River (and hence freshwater habitat) is close by to the proposed Order Limits this is owing to the sluices (Huntspill Sluice) in place which create a seaward limit much closer to the sea. Fish communities upstream of this, which would have limited two-way connectivity to The Island, include species such as perch (*Perca fluviatilis*), pike (*Esox lucius*), ruffe (*Gymnocephalus cernua*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), common bream (*Abramis brama*), silver bream (*Blicca bjoerkna*) and European eel (*Anguilla anguilla*). This is based on Environment Agency Fish catch data (2013) and indicates a typical lowland freshwater fish community.

### Future Baseline

6.13.50 The ecological baseline of The Island is unlikely to change significantly up to and including 2027 as land

use would likely remain the same (i.e., the existing saltmarsh).

6.13.51 Legal protection and planning policy reduce the likelihood that The Island would undergo significant modification due to changes in land use and management. As such, any corresponding significant change in biodiversity is not anticipated.

6.13.52 In the longer term it is anticipated that climate change will bring a possible 1.3 to 5.1 °C increase in mean summer temperatures<sup>247</sup>, with milder winters, changes in rainfall distribution and seasonality, more extremes of weather and sea level rise. Whilst climate models project changes in temperature with reasonable confidence, the complexities of ecological responses mean that there is a range of possible future outcomes with Climate Change. An increase in sea levels could see The Island undergo natural saline inundation with associated modification of sediment and mudflat habitats.

6.13.53 In terms of freshwater species outside of the proposed Order limits the future baseline is likely to remain unchanged but this is dependent on management of

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<sup>247</sup> Department for Energy Security and Net Zero (2023). Climate Change Explained [\[Online\]](#). Accessed 18 December 2023.

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any tidal inundation events which would become more frequent with sea level rise.

6.13.54 Colonisation of INNS both as a result of existing or known species colonising new areas or climate change resulting in improved conditions favouring invasive species could influence the future baseline including through competition with native species.

### Assumptions and Limitations

6.13.55 This study is based on a desk-based assessment only and no site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings presented.

6.13.56 At this PEIR stage, specific details regarding construction and operation of the proposed compensation measures at The Island are not fully known/ decided.

6.13.57 At the time of writing, mitigation design is in a preliminary phase. Mitigation will be fully developed for the ES in discussion with stakeholders.

### Likely Significant Effects

6.13.58 This assessment has been undertaken in accordance with the approach to EIA outlined in **Volume 1**

**Chapter 4.** This chapter uses geographic frame of reference for importance (sensitivity) and follows the CIEEM *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*.

6.13.59 To allow comparisons with other technical chapters in the ES, importance has also been described (in brackets) using the more familiar terms used for sensitivity as per **Volume 1 Chapter 4:**

- International and European (High) - SACs, SPAs, MCZs and Ramsar sites and habitats or populations of species, outside of protected sites, considered to be important at an international/European level;
- National (Medium) - SSSIs and habitats or populations of species, outside of SSSIs, considered to be important at the National level;
- Regional (Low) - Habitats or populations of species considered to be important within the South West of England;
- County (Low) Non-statutory designated sites (CWS, OSWI or UWS), habitats or populations of species considered to be important in Somerset;
- Local (Low) habitats or species populations considered to be important at the site level and its immediate surrounds; and

- Less than local (Very Low) e.g., habitats or species populations which are common and widespread.

6.13.60 It should be noted that the individual sensitivities will be assigned at the next stage in the ES.

6.13.61 For the purpose of this assessment, the level of impact is described as the ‘magnitude’ of impact. The magnitude of impact is reported in accordance with the criteria provided in **Table 6-23**.

**Table 6-23: Description of magnitude**

Level of magnitude (change)		Typical description
High	Negative	Permanent/irreversible damage. The extent, duration and/or frequency/timing of the impact would negatively affect the integrity or key characteristics of the important ecological feature.
	Positive	Permanent addition of, improvement to, or restoration of an important ecological feature. The extent, duration and/or frequency/timing of the impact would positively affect the integrity or key characteristics of the important ecological feature.
Medium	Negative	Temporary/reversible damage. The extent, duration and/or frequency/timing of the impact would negatively affect the

Level of magnitude (change)		Typical description
		integrity or key characteristics of the important ecological feature.
	Positive	Temporary addition of, improvement to, or restoration of an important ecological feature. The extent, duration and/or frequency/timing of the impact would positively affect the integrity or key characteristics of the important ecological feature.
Low	Negative	Permanent/irreversible damage. The extent, duration and/or frequency/timing of the impact would not affect the integrity or key characteristics of the important ecological feature.
	Positive	Permanent addition of, improvement to, or restoration of an important ecological feature. The extent, duration and/or frequency/timing of the impact would not affect the integrity or key characteristics of the important ecological feature.
Very Low	Negative	Temporary/reversible damage. The extent, duration and/or frequency/timing of the impact would not negatively affect the integrity or key characteristics of the important ecological feature.
	Positive	Temporary addition of, improvement to, or restoration of an important ecological

Level of magnitude (change)	Typical description
	feature. The extent, duration and/or frequency/timing of the impact would not affect the integrity or key characteristics of the important ecological feature.

### Terrestrial Ecology

- 6.13.62 As this area within the proposed Order Limits is already tidally influenced, any effects on the terrestrial ecology are likely to be associated with the construction phase.
- 6.13.63 The Island is within international designated sites, designated for its wintering waterfowl assemblage. That is a high value receptor, with an expected short-term duration and low magnitude. This may result in a moderate adverse effect on wintering birds during the construction phase due to noise disturbance from people and plant activities. This is considered to be significant and is scoped in for further assessment.
- 6.13.64 The construction phase may cause disturbance to otter during construction phase due to noise disturbance from people and plant activities. The desk-based data suggest that these species are of national importance with an expected short-term duration and very low magnitude. The effects are considered not significant and are scoped out of further assessment. It is

considered that these would be mitigated through best practice mitigation (e.g., protected species licensing, seasonal avoidance, construction methods, pollution, runoff, and siting of access tracks).

### Freshwater Ecology

6.13.65 Potential effects on freshwater ecology are outlined below.

#### *Construction activities (access) associated with enhancement*

6.13.66 As The Island is already tidally influenced, any operational effects on freshwater ecology from the enhancement of saltmarsh and associated habitats can be discounted (freshwater habitat would be absent). The only potential effects on freshwater ecology could occur within the land surrounding the proposed Order Limits during site access. It is considered that these would be mitigated through best practice mitigation (e.g., pollution, runoff and siting of access tracks).

### Proposed Scope

6.13.67 It is proposed that the ES includes a detailed assessment of potential terrestrial and freshwater ecology impacts that could occur during the



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construction of the proposed compensation measures at The Island.

6.13.68 Dormouse, GCN and reptiles are scoped out of the assessment. Until further site-specific habitat and species surveys, and subsequent suitability assessments, are completed, a precautionary approach to assessment will be undertaken for the remaining ecological receptors.

6.13.69 **Table 6-24** summarises the elements scoped into and out of the assessment.

6.13.70 Regardless of inclusion in the ES assessment, all relevant species will be reviewed in relation to legislation in a Biodiversity Legislation Compliance Report to be submitted as an appendix to the ES.

**Table 6-24: Summary of ecology (terrestrial and freshwater) and ornithology elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Terrestrial ecology and ornithology		
Disturbance and habitat loss for terrestrial species as	IN	Construction vehicles and human activity will cause terrestrial species to

Potential Effect	Scoped IN or OUT	Justification
a direct result of construction activities		temporarily leave, abandon, or potentially be killed by the activities. Surveys will need to be undertaken to understand which species are present on The Island and mitigation will need to consider seasonal timings, type of vehicles and potentially trapping and translocation of species to reduce the disturbance and limit the habitat loss
Disturbance and habitat loss for wintering birds during construction	IN	Surveys will need to be undertaken to understand which species are present on The Island and mitigation will need to consider seasonal timings and type of vehicles to reduce the disturbance and limit the habitat loss
Operational impacts of increase saline conditions on at The Island	IN	Further design of the enhancement of saltmarsh and associated habitats is required to understand the effect this change will have on the existing habitat

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Potential Effect	Scoped IN or OUT	Justification
Operation impacts on the SPA, SSSI and SAC from enhancement of saltmarsh and associated habitats and loss of grazing marsh habitat	IN	The designated sites contain a range of habitats, providing a range of suitable foraging and roosting sites. Changes to the habitat at The Island will need to be assessed
Operational impact on protected species from creation of new channel and new terrestrial habitats	IN	There is insufficient recent survey data to assess the significance of this change to protected species.
Loss of grazing marsh habitats	IN	Surveys are required to understand the condition and abundance of this habitat at The Island
Temporary and permanent effects on GWDTE	IN	See <b>Section 4.8 Groundwater</b>
Changes in air quality effecting sensitive habitats	OUT	No significant change in air quality is anticipated during construction and no emissions to air would occur in operation. See <b>Section 4.5 Air Quality</b> .

Potential Effect	Scoped IN or OUT	Justification
Freshwater ecology		
Construction activity associated with enhancement of saltmarsh and associated habitats: Access	OUT	Effects on watercourses associated with accessing The Island and construction of access tracks are expected to be mitigated by best practice measures
Operation of enhancement of saltmarsh and associated habitats	OUT	The area of the proposed Order Limits is already tidally influenced therefore there will be no operational effects as it does not comprise freshwater habitat.

## 6.14 Landscape and Visual

### Introduction

6.14.1 This section considers the likely significant effects associated with landscape and visual impacts arising because of the proposed compensation measures at The Island.

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## Study Area

6.14.2 The proposed LVIA study area for the assessment of the proposed compensation measures extends to 2 km from the proposed Order Limits. This is considered to be the likely maximum distance at which any landscape and visual impacts are likely to arise as a result of the relatively limited scale of the compensation measures at The Island. Beyond 2 km there is unlikely to be any perceptible change.

## Baseline

### Baseline Sources

- 6.14.3 The following sources have been used to inform a preliminary understanding of the baseline conditions for the assessment of the landscape and visual aspect:
- Natural England's National Landscape Character Area Profiles<sup>213</sup>;
  - *West Somerset Landscape Character Assessment 1999* (adopted in 2016 as part of the West Somerset Local Plan 2016-2032)<sup>214</sup>;
  - *The Sedgemoor Landscape Assessment and Countryside Design Summary* (Revised Edition, 2003) (adopted in 2011 as part of the Sedgemoor Local Plan 2011-2032, updated in Feb 2019)<sup>215</sup>;

- The definitive PRoW map for Somerset County Council<sup>216</sup>;
- MAGIC Maps application<sup>138</sup>; and
- Aerial photography<sup>146</sup>.

### Current Baseline

6.14.4 The proposed compensation measures at The Island have the potential to result in impacts on both landscape character and visual amenity. A number of landscape and visual receptors have been identified.

#### *National Landscape Character*

- 6.14.5 The Island falls within NCA 142: Somerset levels and moors. NCA146: Vale of Taunton and Quantock Fringes comes close to the west of The Island at Combwich but due to the flat nature of the topography and intervening vegetation there is unlikely to be any impact on NCA 146.
- 6.14.6 Due to the large scale of the NCAs compared to the small-scale changes at The Island, the LLCA are more applicable to The Island. Therefore, the National Landscape character have been scoped out of the future assessment.

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### *Local Landscape Character*

6.14.7 The Sedgemoor Landscape Assessment and Countryside Design Summary (Revised Edition, 2003) (adopted in Feb 2019 as part of the Sedgemoor Local Plan 2011-2032) has defined the LLCAs within the former Sedgemoor District Council administrative area. The Island falls within the Levels and Moors - Levels LLCA. This describes the Somerset Levels and Moors as:

*‘a vast area of drained wetland which lies at or below the level of high tide in the adjacent Bristol Channel. The Mendip Hills to the north and the Quantocks to the south-west define the outer limits of this flat landscape while the Polden Hills form a dividing feature. The “Levels” are slightly higher than the inland “Moors” and landscape is commonly characterised as an area of summer pastures criss-crossed with a geometric pattern of rhynes (drainage ditches), long straight access droves and distinctive pollarded willows or hawthorn hedgerows. The extent of tree cover in the Levels and Moors is limited and it is often a very open landscape. Where hedgerows do exist, they are often cut low but more fully-grown hedgerows are also found and can significantly reduce the openness of local views.*

*Most of the land within this area lies between 6 and 3 metres above ordnance datum (AOD) with the adjacent Bristol Channel tidal range reaching up to 6.7 metres AOD. Tidal incursions are prevented by coastal sand dunes and man-made sea defences including sea walls and raised banks on the Parrett estuary with arterial rivers generally characterised by raised floodbanks.’*

### *Statutory Land-Based Designations*

6.14.8 The Island forms part of the following international conservation designations:

- Severn Estuary Ramsar;
- Severn Estuary SPA; and
- Severn Estuary SAC.

6.14.9 The Island forms part of the following national conservation designations:

- Bridgwater Bay SSSI (Ref 1076402) which totals 43.28 ha. The Island is deemed to be in favorable condition.
- The Somerset Wetlands NNR follows the western and northern boundaries of The Island and extends into the proposed Order Limits along the lower drainage channel that flows north into the Huntspill River.

6.14.10 The closest Scheduled Monument (Alston lake settlement site ref: 1012311) to The Island is located approximately 2.35 km to the northeast at Alstone.

6.14.11 The closest Listed Buildings (Grade II with one Grade I) are located approximately 1.25 km to the east on the western fringe of Huntspill.

#### *Vegetation*

6.14.12 The Island is designated by Natural England as having Coastal Salt Marsh HPI with Mudflat HPI along the western side of the proposed Order Limits with the River Parrett. Coastal and Floodplain Grazing Marsh HPI is located immediately to the east of the proposed Order Limits.

6.14.13 The area within the proposed Order Limits has no tall vegetation however there is riparian scrub along the drainage ditch to the east of the raised embankment along the eastern side of the proposed Order Limits.

6.14.14 Surrounding the proposed Order Limits, hedgerows and hedgerow trees are associated with field boundaries to the east and to the north on the opposite side of Huntspill River, while the River has groups of tall trees along its length. One large area of scrub is located to the north of the river.

#### *Access*

6.14.15 A number of PRoW are in close proximity to the proposed Order Limits providing public access towards or around The Island:

- PRoW No. BW 35/12 follows the eastern side of the proposed Order Limits following the top of a raised embankment.
- PRoW BW 27/12 connects to PRoW No. BW 35/12 at the southern end of The Island and runs north south along the riverbank.
- PRoW BW 35/10 connects to PRoW No. BW 35/12 at the northern end of The Island on the northern side of River Huntspill connecting along Cadwell's Lane to the village of Huntspill.

6.14.16 The King Charles III England Coast Path, a long-distance footpath, passes along the banks of the River Parrett utilising the PRoWs. The Parrett Trail also follows the left bank of the river approximately 1.3 km to the west.

#### *Visual receptors*

6.14.17 The visual receptors that are likely to be affected by The Island are outlined in **Table 6–25**. The temporary construction compound will be located immediately to the east of The Island and the temporary construction

access will extend along the route of Slow Way Drove to Sloway Lane.

**Table 6–25: Receptors likely to be affected**

Receptor description	Receptor type	Approximate distance to the proposed Order Limits (at its closest)
Levels and Moors - Levels LLCA	Landscape Character	0 m
The Island PRow No. BW 35/12, England Coast Path	Recreational	0 m
Pawlett Level PRow BW 27/12, England Coast Path	Recreational	0 m
Sloway Lane	Highway user	0 m
Cadwell’s Lane PRow BW 35/10	Recreational	230 m
Laburnum House	Residential, recreational	370 m
Collings Farm	Residential	430 m
West Huntspill	Residential	530 m
Yearsley Farm House	Residential	640 m

Receptor description	Receptor type	Approximate distance to the proposed Order Limits (at its closest)
Stretcholt Village	Residential, recreational	730 m
England Coast Path, ECP14	Recreational	900 m
Stretcholt Lane	Highway user	900 m
Balliol Hall	Cultural heritage, Recreational	1200 m
The Parrett Trail, Steart Marshes	Recreational	1300 m
Steart Marsh Bird Hide	Recreational	1300 m
Steart Point Bird Hide	Recreational	1320 m
Residential properties to the northeast of Steart	Residential	1400 m

**Future Baseline**

6.14.18 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational,

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including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

- 6.14.19 Identification of receptors is based on a desktop study.
- 6.14.20 At the time of this PEIR the proposed compensation measures at The Island are not confirmed, or a mitigation strategy developed, to fully understand the potential for landscape and visual impacts at this stage. It is assumed that where it is not possible to avoid or reduce a significant adverse effect, remediation measures will be used to offset the effect.
- 6.14.21 It is assumed that temporary construction access will be via existing highways and / or tracks or where this is not possible a haul road will be created and then reinstated to the original land use / condition.
- 6.14.22 The English Coast Path, that runs along the eastern edge of The Island, will require closure during construction and possible permanent diversion of some sections. During this relocation, this section of the King

Charles III England Coast Path will not be accessible to the public.

- 6.14.23 All components of the proposed compensation measures at The Island will be included in the future assessment.

### Likely Significant Effects

- 6.14.24 The likely effects associated with the landscape and visual aspect because of the proposed compensation measures at The Island are outlined below:

#### Local landscape Character

- 6.14.25 Due to the scale and nature of The Island, effects on landscape character are unlikely to result in significant change, however this would be considered in detail once a final design is developed.

#### Visual receptors

- 6.14.26 It is anticipated that some, or all, of the visual receptors have the potential to experience temporary visual effects from the proposed compensation measures at The Island in construction due to temporary construction access, compounds, and movement of construction vehicles. There is also the potential for

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visual receptors to experience permanent visual effects due to a change in vegetation / ground levels.

### Proposed Scope

6.14.27 Based on the above assessment, **Table 6–26** presents the potential Landscape and Visual effects that are proposed to be scoped in or out of requiring further assessment, along with the rationale for the choice.

**Table 6–26: Summary of landscape and visual elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
National Landscape Character	OUT	Due to the large scale of the NCAs compared to the small-scale proposed compensation measures at The Island, the LLCA are more applicable to The Island. Therefore, the National Landscape Character has been scoped out of the future assessment.
Local Landscape Character	IN	Due to the scale and nature of the proposed compensation measures at the Island, effects on landscape character are unlikely to result in significant change, however this

Potential Effect	Scoped IN or OUT	Justification
		would be considered in detail once a final design is developed.
Visual Receptors	IN	It is anticipated that some, or all, of the visual receptors have the potential to experience temporary visual effects from the proposed compensation measures at The Island in construction due to temporary construction access, compounds, and movement of construction vehicles. There is also the potential for visual receptors to experience permanent visual effects due to a change in vegetation / ground levels.

6.14.28 Therefore, it is proposed that Landscape and Visual is scoped into the ES.

## 6.15 Historic Environment

### Introduction

6.15.1 The aims of this section are to:



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- Identify any heritage assets and archaeological features associated with The Island, both within the proposed Order Limits and a 1 km buffer.
- Identify whether the assets could be potentially impacted by the proposed compensation measures at The Island.
- Outline a proposed scope and methodology for the assessment of historic environment impacts within the ES.

### Study Area

6.15.2 For the purpose of the assessment, a 1 km Study Area was established around the proposed Order Limits to identify any nearby heritage assets that could be impacted by the development.

### Baseline

#### Current Baseline

6.15.3 There are no designated heritage assets (Scheduled Monuments, Listed Buildings, Registered Parks and Gardens or Registered Historic Battlefields) recorded within the proposed Order Limits or 1 km study area by the NHLE. The Island is also not located within a World Heritage Site or Conservation Area.

6.15.4 The Somerset Historic Environment Record database (online) records the following non-designated assets within the proposed Order Limits: medieval or post medieval deserted farm earthworks (NRHE 10695), medieval field system earthworks and drainage (NRHE 11142), medieval/post-medieval flood defences (NRHE 27755), second world war bombing range marker (NHRE 18121), second world war concrete base (NRHE 36877), earthworks and brick walls of the Old White House Inn within a walled and ditched enclosure that included a shard of 15<sup>th</sup> and 16<sup>th</sup> century pottery (NRHE 10696), medieval ridge and furrow cultivation, Dunball and Pawlett (NRHE 27796), medieval ridge and furrow cultivation, west of West Huntspill (NRHE 27894) and floodbanks north side of Pawlett Hams (NRHE 27754) . As such, The Island is of high archaeological potential. Such assets are considered of medium to low value.

#### Future Baseline

6.15.5 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the

purposes of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

- 6.15.6 At this PEIR stage, specific details regarding the construction and operational stages of the proposed compensation measures at The Island are not fully known/decided.
- 6.15.7 The study is based on a desk-based assessment only and no site investigation, surveys or walkover visits are yet to be undertaken to inform this study or confirm the findings present. The data used in this PEIR has been derived from external sources, and it is presumed that any third-party information used is accurate. A full search of the Somerset Historic Environment Record has not been undertaken at this stage.
- 6.15.8 The study has outlined the potential of archaeology in the area as high due to the amount of heritage assets in the surrounding area. However, a full assessment of the impact of the proposed compensation measures at The Island on each asset has not been researched in further detail so far. This will need to be further investigated to inform the ES assessment.

### Likely Significant Effects

- 6.15.9 The proposed compensation measures at The Island are expected to cause disturbance and removal to a range of non-designated heritage assets and archaeological features. Therefore, it is proposed to scope in the assessment of historical environment into the ES.
- 6.15.10 For example, groundworks for The Island would likely result in the truncation or complete removal of known non-designated assets of medium to low value which could result in significant effects.
- 6.15.11 Similarly, The Island is of considerable archaeological interest and groundworks could result in the truncation or removal of currently unknown archaeological remains, including deposits of geoarchaeological interest and well-preserved organic remains, which could result in significant effects.

### Proposed Scope

- 6.15.12 Based on the above assessment, **Table 6–27** presents the historic environment impacts that are proposed to be scoped in for requiring further assessment along with the rationale of choice.

**Table 6–27: Summary of historic environment elements scoped in and out of assessment.**

Potential Effect	Scoped IN or OUT	Justification
Potential loss or damage of heritage assets and change in setting of assets	OUT	There are no designated heritage assets within the proposed Order Limits or wider study area.
Potential loss or damage of non-designated assets and archaeological features	IN	The Somerset Historic Environment Record database recorded a variety of non-designated heritage assets dating to the medieval and post-medieval period which are of low/medium value. As such, an assessment of potential loss or damage of archaeological features has been scoped in for requiring further assessment.

6.15.13 It is proposed that the ES includes a detailed assessment of the historic environment that will be impacted by the construction of the proposed compensation measures at The Island, including scoping assessment, settings assessment, heritage impact assessment and archaeological fieldwork.

6.15.14 The ES will be informed by a detailed archaeological desk-based assessment, including geoarchaeological deposit modelling, conforming to the standards and guidance provided by the Chartered Institute for Archaeologists.

6.15.15 The assessment will consider the relevant policies stipulated in the National Policy Statement, Ancient Monuments and Archaeological Areas Act 1979, Sedgemoor District Council Local Plan 2017 and Core Strategy 2023.

6.15.16 Prior to any work and assessments, it is proposed that there is engagement with statutory consultees and Somerset Council to discuss the level of assessment that they require should the heritage assets be removed or altered during the process.

6.15.17 The ES will follow the methodology described in DMRB LA 104 and DMRB LA 106. All identified heritage assets will be attributed a value (significance) and then potential impacts on such assets will be rated. The resultant magnitude of impact and value of the assets will then be used to determine significant effects.

6.15.18 A suitable mitigation strategy will be discussed with the stakeholders and will be described within the ES.

## 6.16 Offshore and Intertidal Archaeology

### Introduction

6.16.1 This section presents the assessment of potential effects to offshore and intertidal archaeology associated with the compensation measure at The Island. It describes the historic environment baseline from which the assessment will be conducted, focusing on historic environment receptors of potential relevance within the Study Area, and the potential for effects arising from the compensation measure.

### Study Area

6.16.2 The Study Area is defined by the intertidal zone and the River Parrett which is situated immediately west of the proposed Order Limits, and extending 1 km from the proposed Order Limits. Topography at this location is dictated by the tidal River Parrett, which traverses very flat reclaimed marshland on the northern and eastern bank of the River, with the settlement of Comwich occupying part of the western side of the River.

6.16.3 The geological context is Beach and Tidal Flat Deposits, which comprise clays, silts and gravels. This overlies Langport Member, Blue Lias Formation and Charmouth Mudstone Formation - Mudstone.<sup>221</sup>

## Baseline

### Current Baseline

6.16.4 Baseline studies undertaken as part of the original ES for Comwich Wharf and Hinkley Point C Development Site in 2011 found there to be no protected wrecks or other designated heritage assets within the intertidal Study Area. The baseline identified numerous Historic Environment Record ('HER') entries located wholly or partially within the intertidal Study Area. Most of these relate to post medieval flood defence earthworks (HER numbers 27753, 27754, 27755). Other records relate to the location of a former causeway across the River Parrett thought to have been built in the early medieval period (HER number 10310), and the site of a former ferry crossing which is partly located within the intertidal Study Area (HER number 10697). On the western bank of the River Parrett, HER entries relating to a Romano-British settlement and port (HER number 10658) and medieval harbour (HER number 10130) within the currently occupied settlement of Comwich are recorded partially within the intertidal Study Area.

### *Designated Heritage Assets*

6.16.5 There are no protected wrecks within the intertidal Study Area. There are no scheduled monuments within

the intertidal Study Area adjacent to the proposed Order Limits.

#### *Non-Designated Heritage Assets*

- 6.16.6 As the 2011 baseline did not encompass the entirety of the current intertidal Study Area, additional HER entries have been identified including the site of a possible post-medieval Oyster Beds (HER number 227748).

#### **Future Baseline**

- 6.16.7 There are no known changes that are likely to result in change in the future baseline.

#### **Assumptions and Limitations**

- 6.16.8 The current baseline has been defined using the Somerset HER online map viewer. This is not representative of a comprehensive record of the Somerset HER, which would be attained through the request of a full HER search from the South-West Heritage Trust (Funded by Somerset County Council). This baseline is also informed by baseline studies which supported the ES chapters for Hinkley Point C Development Site and Combrich which were undertaken in 2011. Further data is likely to have been added since this date. The ES will therefore be informed by an updated HER search.

#### **Likely Significant Effects**

- 6.16.9 No significant effects to archaeological remains within the intertidal Study Area are deemed likely as a direct result of the proposed development. Although archaeological remains are recorded within the intertidal Study Area, and while the scope of works may lead to a degree of sediment deposition from the land banks and adjacent ground, this would have the effect of further sealing any potential archaeological remains. However, there is potential for disturbance to archaeological remains as a result of further measures which may be required, including additional maintenance dredging to maintain access to ports, marinas, and wharfs.

#### **Proposed Scope**

- 6.16.10 Based on the above assessment, **Table 6–28** presents the offshore and intertidal archaeological impacts that are proposed to be scoped in or out of further assessment along with the justification.

**Table 6–28: Summary of offshore and intertidal archaeology elements scoped in and out of assessment.**

Potential Effect	Scoped IN or OUT	Justification
Potential loss or damage to protected	OUT	There are no protected wrecks or other

Potential Effect	Scoped IN or OUT	Justification
wrecks or other designated heritage assets		designated heritage assets within the intertidal zone adjacent to the proposed Order Limits.
Potential loss or damage of non-designated assets and archaeological features	IN	The Somerset Historic Environment Record database records a number of non-designated heritage assets extending into the intertidal Study Area within the within the main channel of the River Parrett. As such, an assessment of potential loss or damage of archaeological features has been scoped in for requiring further assessment.

6.16.11 It is proposed that the ES includes an assessment of offshore and intertidal archaeological interests which could be affected by measures including maintenance dredging which may be required as a result of the proposed development.

6.16.12 The ES will be informed by a detailed offshore and intertidal archaeological desk-based assessment, conforming to the standards and guidance provided by the Chartered Institute for Archaeologists. It will consider the relevant policies stipulated in the National Policy Statement, Marine Policy Statement 2011, Sedgemoor District Council Local Plan 2017 and Core Strategy 2023.

6.16.13 Prior to any further assessment, it is proposed that there is engagement with statutory consultees over the level of assessment required and the scope of required mitigation.

6.16.14 The ES methodology will involve all identified heritage assets being attributed a value (significance) and then potential impacts on such assets will be rated. The resultant magnitude of impact and value of the assets will then be used to determine significant effects.

6.16.15 A suitable mitigation strategy will be discussed with the stakeholders and will be described within the ES. This may include recommendations regarding protocols for monitoring and recording of potential archaeological remains.

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## 6.17 Amenity and Recreation

### Introduction

- 6.17.1 The section considers the likely impact of the proposed compensation measures at The Island on community, recreational and residential receptors within the study area during both the construction and operational stages.
- 6.17.2 The assessment considers likely impacts on access to recreational facilities as well as amenity impacts.
- 6.17.3 Amenity is the term used to describe the character or attractiveness of an area. Amenity can be affected when two or more environmental effects are experienced by the same receptor (e.g., a cycling route) with the potential to deter users of the receptor (e.g. cyclists). The following environmental effects are considered in the amenity assessment: landscape and visual effects, transport effects, noise and vibration effects and air quality effects. Amenity impacts are considered for residential, community and recreational receptors.

### Study Area

- 6.17.4 For the purposes of this assessment, the study area includes the proposed Order Limits, plus a 500 m buffer. This buffer has been selected as it is considered to

represent the likely limit of direct effects of construction or operation on any recreational receptors.

### Baseline

#### Current Baseline

- 6.17.5 Environmental receptors considered in this assessment include residential properties, community facilities and recreational facilities including PRowS and bridleways, promoted routes, cycle routes, LDWR, open access land and any recreational facilities.

#### *Residential and Community receptors*

- 6.17.6 There are 14 residential receptors within 500 m of The Island. There are no community receptors within 500 m of the proposed Order Limits.

#### *Recreational receptors*

- 6.17.7 Recreational receptors include the BW 35/12, BW 27/12 and BW 35/10 PRowS that run along the edge of the proposed Order Limits, as well as the 27/6 bridleway.
- 6.17.8 The King Charles III England Coast Path, a long-distance footpath, passes along the banks of the River Parrett utilising the PRowS.

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## Future Baseline

6.17.9 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site takes into account changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

## Assumptions and Limitations

6.17.10 At this PEIR stage, specific details regarding construction and operational stages of the proposed compensation measures at The Island are not fully known/ decided.

6.17.11 The current assumptions in relation to Amenity and Recreation effects are:

- Construction will last 12 months; and
- Access to the site is via Sloway Lane, along a private track.

## Likely Significant Effects

### Access to recreational receptors

#### *PRoWs*

6.17.12 The English Coast Path, that runs along the eastern edge of the proposed Order Limits, will require closure during construction and possible permanent diversion of some sections. During this relocation, this section of the King Charles III England Coast Path will not be accessible to the public.

#### *Open Access Land and Public Spaces*

6.17.13 There are no areas of Open Access Land or Public Green Spaces within 500 m of the proposed Order Limits. Thus, no significant effects are anticipated.

#### *Recreational Activities*

6.17.14 There could be potential impacts on recreational activities such as fishing, swimming, boating and water-based activities along the river Huntspill and River Parrett.

#### *Access to community receptors*

6.17.15 There are 14 nearby residential receptors and no community receptors. No significant effects on these

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residential properties regarding accessibility are anticipated during the construction and operation phases of the compensation measures at The Island site.

### Amenity Effects

6.17.16 Amenity effects can arise due to a combination of two or more effects from air quality, noise and vibration, landscape and visual and transport. No significant effects on air quality, noise and vibration are expected because of the proposed compensation measures at The Island. However, there may be landscape and visual and traffic effects which could result in amenity effects for residential receptors.

### Proposed Scope

6.17.17 A summary of the amenity and recreation elements scoped into and out of further assessment is outlined in **Table 6–29**.

**Table 6–29: Summary of amenity and recreation elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Access to recreational receptors	IN	Access to recreational receptors is scoped in to the assessment due to the relocation and temporary closure of the National Trail on the eastern edge of the proposed Order Limits.
Access to community and residential receptors	OUT	There are no community receptors within the study area. Thus, no significant effects anticipated. There are 14 residential receptors located within 500 m of the proposed Order Limits. No significant effects regarding access to these residential properties is anticipated.
Amenity effects	IN	Amenity effects could arise to residential and community receptors as a result of a combination of traffic and transport and landscape and visual effects.

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## 6.18 Shipping and Navigation

### Introduction

6.18.1 This section considers the potential for impacts on shipping and navigation associated with the proposed The Island saltmarsh enhancement compensation measure.

6.18.2 The assessment focuses upon direct changes to those aspects during the construction and operational phases (for example interference with shipping lanes) but also considers how changes resulting from the compensation measures may affect the wider context of the receiving environment. It should be read in conjunction with the relevant parts of the PEIR, such as **Section 6.2 Socio-economics**.

### Study Area

6.18.3 The proposed compensation measures at The Island will be located approximately three miles northwest of Bridgwater on the east bank of the River Parrett adjacent to the Pawlett Hams site, at the confluence between the River Parrett and river Huntspill, approximately three miles north west of Bridgwater. A Study Area has been defined to cover the potential routes taken by vessels utilised for the habitat enhancement at The Island should they be required,

noting that at this stage no requirement for marine vessels has been stated.

6.18.4 The proposed compensation measures would involve the enhancement of existing saltmarsh and associated habitats through the lowering of the existing high-level marsh to create a range of habitats more amenable to fish usage including tidal creek, mudflat and lower saltmarsh.

6.18.5 The spatial scope of the shipping and navigation assessment is defined as a minimum 2nm buffer of the proposed Order Limits that has formed the basis of the Study Area described in this section. This Study Area lies within the Port of Bridgwater limits and comprises the River Parrett from Steart Point at the downstream extent (in the north) to Bridgwater Docks at the upstream extent (in the south). This Study Area is deemed appropriate based on professional judgement and the likely areas/receptors with the potential to be impacted by the proposed compensation measures at The Island. The Study Area covers the key maritime activities in relation to navigation, including commercial, military interests, fishing, and recreational activities.

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## Baseline

### Current Baseline

- 6.18.6 The Severn Estuary is an important shipping route, with commercial vessels navigating through the deep-water approaches to several ports and harbours and its tributaries to smaller ports/wharfs. The original ES provided an assessment of risks to navigation and shipping traffic related to the offshore works including the delivery of the cooling water infrastructure within the Severn Estuary.
- 6.18.7 The mitigation strategy for navigation provided in the DCO was informed by consultation undertaken with key stakeholders and considered the findings of a hazard identification ('HAZID') workshop which addressed ship collision risks associated with the Hinkley Point C Project offshore works and the refurbishment of Combwich Wharf.
- 6.18.8 Information on ship movements provided within the original DCO application was obtained from an Automatic Information System ('AIS') database, which included movements of both commercial and recreational vessels.

### *River Parrett*

- 6.18.9 A baseline study undertaken for the original DCO application found that between 1997 and 2008 the River Parrett was used by 37 to 80 freight ships per year to gain access to Dunball Wharf, upstream of Combwich. This traffic was supplemented by occasional visits by passenger vessels and one-off project operations to Combwich Wharf in 2005 and 2006.
- 6.18.10 Access to the River Parrett has typically taken place around high tide times. No dredging takes place, expect for berth dredging at Dunball Wharf and occasional clearance of silt, if required, from the barge bed at Combwich Wharf. Hence, the size and loaded draught of vessel that can gain access to these wharfs is governed by the varying natural channel dimensions. Generally, access to Dunball Wharf is possible for ships of up to around 2,300dwt.
- 6.18.11 Recreational navigation also takes place from the Combwich Wharf Motor Boat and Sailing Club ('CMBSC') which is based at Combwich Wharf.

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## Current Baseline

### *Ports and harbours in the Severn Estuary*

6.18.12 The Severn Estuary is an important shipping route, with commercial vessels navigating through the deep-water approaches to several ports and harbours. Commercial ports in the Severn Estuary include the following:

- Royal Portbury and Avonmouth Docks (owned and operated by the Bristol Port Company);
- Cardiff, Newport, and Barry Docks (owned and operated by Associated British Ports);
- small ports and harbours including those located at Bridgwater, Watchet, Bibby, Minehead, Knightstone (Weston-Super-Mare), Sharpness, and Chepstow; and
- the Hinkley Point C Harbour Authority operate activities associated with the Hinkley Point C Project construction including deliveries to the jetty, marine construction activities, and abnormal indivisible loads ('AILs') delivered to Combwich Wharf.

6.18.13 The commercial ports operated by the Bristol Port Company and Associated British Ports generate a majority of the commercial shipping activity in the Severn Estuary and are situated a significant distance

away from the Hinkley Point C offshore infrastructure and The Island.

6.18.14 Marinas and other recreational boating facilities are located within the Study Area, this includes the Weston Bay Yacht Club, CMBSC, Burnham-on-Sea Yacht Club, and Watchet Marina.

### *Port of Bridgwater*

#### Port facilities

6.18.15 The Port of Bridgwater was established by the Bridgwater Navigation and Quays Act 1845. The port limits cover approximately 25nm<sup>2</sup> (as shown on **Figure 6–1**), including the following areas:

- Bridgwater Bay from Brean Down to Hinkley Port;
- The River Parrett as far as Bridgwater;
- The River Brue as far as Highbridge; and
- A small part of the tidal River Axe.

6.18.16 The port limits include Combwich Wharf and Dunball Wharf on the River Parrett.

6.18.17 Bridgwater Harbour Authority is responsible for navigation and mooring, safety, rights of access, pilotage, maintenance of channels and navigation aids, oil spill contingency, and port waste management.

6.18.18 Recreational moorings within the port limits are located mainly in the river Brue Estuary and Combwich Pill, although recreational activity tends to be focused around Burnham-on-Sea.

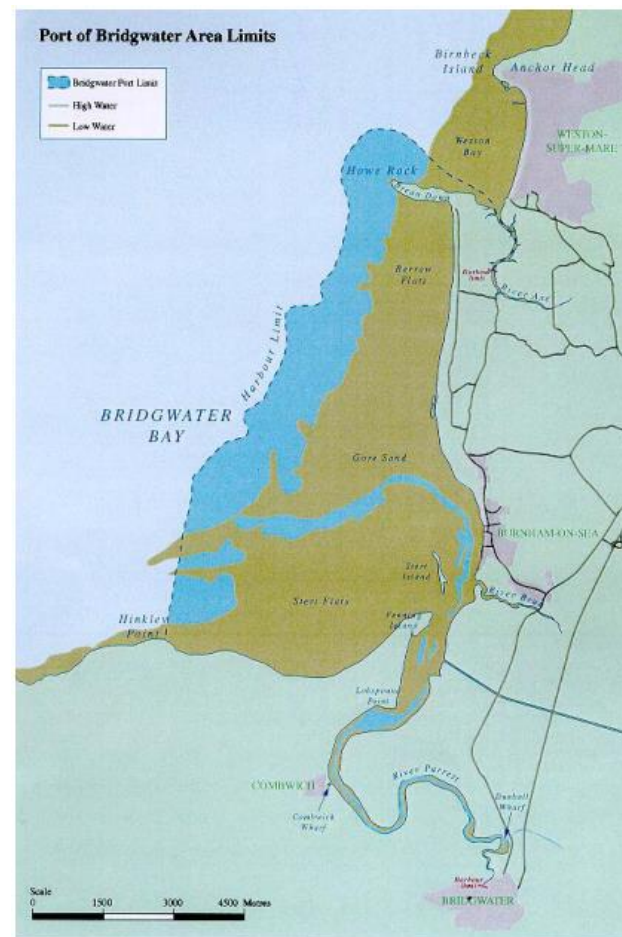


Figure 6–1: Plan of the Port of Bridgewater<sup>223</sup>

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## Navigation

6.18.19 The River Parrett is approached through a channel between Steart Flats and Gore Sand and is entered at the Bridgwater bar around 5nm west of Burnham-on-Sea. All vessels of over 30 m overall length which navigate the tidal River Parrett beyond an imaginary line drawn from Steart Point to the north bank of the confluence of the River Brue with the River Parrett, are subject to compulsory pilotage for all vessels above 30 m length overall, with the following exceptions:

- Those vessels excluded by virtue of Section 7(3) of the Pilotage Act 1987; and
- Vessels under the pilotage of the holder of a “*Pilotage Exemption Certificate*” issued by the Competent Harbour Authority.

6.18.20 Safe navigational depths are only available over spring tides and the pilot often boards at the Brue Beacon, located within the Port of Bridgwater’s harbour limits in sheltered water.

6.18.21 Vessels navigating into the River Parrett and the Port of Bridgwater pass to the west and south of the Gore Bell Buoy. There is a designated anchorage available 0.6nm south-west of Gore Buoy for vessels awaiting appropriate tidal conditions to enter the River Parrett and the Port of Bridgwater. Recreational vessels bound

for the CMBSC may take more direct / alternative routes than those used by commercial vessels.

## *Shipping activity*

6.18.22 The existing shipping activity in the vicinity of the Hinkley Point C proposed Order Limits which encompasses The Island compensation site includes commercial, military, fishing, and recreational vessels.

6.18.23 Commercial vessel movements at the Port of Bridgwater mostly consist of Hanson Aggregate Ltd discharging shipments of sea-dredged sand from sites in the Bristol Channel (most notably Area 472: Culvert Sands) to their own vessels at their dedicated wharf at Dunball. In addition to this, movements associated with AIL deliveries to Comwich Wharf for the construction of Hinkley Point C occur in the River Parrett.

6.18.24 The Bridgwater Bay Danger Area (D119) and the Lilstock Range Firing Area are located within the vicinity of the Hinkley Point C site. D119 covers a circular area over land in West Somerset and sea in Bridgwater Bay. The Danger Area is delineation of the air space above the water and does not place any restrictions on navigation and vessels have the right to transit at any time.

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6.18.25 According to the Port of Bridgwater's Port Operations Manual (2021), no commercial fishing vessels are registered at the port or on the River Parrett. Although, small charter angling boats often operate out of the River Brue.

6.18.26 The Severn Estuary is mostly covered by a designated sailing area for recreational craft. There are three sailing clubs within the Port of Bridgwater, CMBSC based at Combwich, the Burnham-on-Sea Motor Boat and Sailing Club based on the river Brue, and the Weston Bay Yacht Club on Weston Bay. CMBSC and the Burnham-on-Sea Motor Boat Club and Sail Club are within the Study Area defined above.

*Other features*

6.18.27 There are a number of other physical features within the Study Area that influence navigation. These features include natural features (e.g., sand bars) and man-made features (e.g. Hinkley Point B intake and outfall head structures, and wave rider buoys). Where these features pose a navigational risk (i.e., risk of colliding with a vessel or grounding on a feature), then they are appropriately marked and identified on Admiralty Charts. For the purposes of this shipping and navigation assessment, these features are considered to be part of the baseline conditions in which navigation already takes place and are sufficiently integrated into existing

navigation systems that they do not contribute to the potential hazards of habitat enhancement at The Island.

**Future Baseline**

6.18.28 Given the uncertainty associated with long-term predictions of vessel traffic growth including the potential for any major new developments in the UK or transboundary ports and the long-term effects of Brexit, a conservative potential growth in commercial vessel movements is currently anticipated to be used to inform the shipping and navigation assessment.

6.18.29 During the remainder of the Hinkley Point C construction it is expected that there will be an increase in the number of AIL delivery movements to Combwich Wharf, however it is noted that deliveries are limited around one per month.

6.18.30 The Bridgwater Tidal Barrier project has the potential to increase the number of vessel movements in the River Parrett during its construction, however it is expected that use of marine vessels will be limited in the Bridgwater Tidal Barrier construction and consist of a spud leg barge and safety boats. Following construction of the Bridgwater Tidal Barrier vessel movements further upstream will be restricted whilst the barrier is in the closed position. When open, vessels will be able to navigate through the structure.

6.18.31 There are no known major developments which will increase the activity of recreational vessels in the Study Area, and it is not expected that commercial fishing vessels will undertake operations out of the Port of Bridgwater. Given the lack of reliable information on future activity levels or future trends, a conservative potential growth in recreational vessel movements is currently anticipated to be used for the shipping and navigation assessment.

6.18.32 Overall, there is not anticipated to be any significant change in the shipping and navigation activity relative to that presented in the current baseline section presented above.

### Assumptions and Limitations

6.18.33 At this stage, consultation with key navigational stakeholders has not been carried out to inform this preliminary assessment. Stakeholders, including Maritime and Coastguard Agency, Trinity House, MMO, and Bridgwater Port Authority, will be formally consulted on the scheme through this PEIR. If required, further engagement on the potential for navigational risk because of the proposed compensation measures at The Island will be carried out with the key stakeholders to ensure that any potential risks to shipping and navigation receptors are appropriately assessed and managed.

### Likely Significant Effects

6.18.34 The proposed generic project-wide approach to the assessment methodology is set out in **Volume 1 Section 4.1**. This approach has been applied, and adapted as appropriate, to address the specific needs of this preliminary shipping and navigation assessment and to comply with sector best practice.

6.18.35 The IMO FSA methodology (IMO, 2018) is the internationally recognised approach for assessing effects on shipping and navigation receptors, and is the approach required under the MCA methodology (MCA, 2013). This methodology is centred on risk control and assesses each effect in terms of its frequency and consequence in order that its significance can be determined as “Broadly Acceptable”, “Tolerable” or “Unacceptable”. Any effect assessed as “Unacceptable” requires additional environmental measures to be implemented beyond those embedded in the design of the project to allow the effect to be reduced to within tolerable or broadly acceptable parameters applying the ALARP principle.

6.18.36 The Formal Safety Assessment assigns each risk a “severity of consequence” and a “frequency of occurrence” to evaluate the significance of each risk.



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6.18.37 The severity of consequences is assessed on a five-point scale. The defined consequence bands are presented in **Table 6–30**.

**Table 6–30: Assessment of severity of consequence for shipping and navigation**

Severity	People	Property	Environment	Business
Negligible	Zero injury	Minimal damage (<£10k)	Zero effect	Minimal impact (<£10k)
Minor	Minor injury	Minor damage (£10k-£100k)	Minor effect (local assistance required)	Minor impact (£10k-£100k)
Moderate	Major injury	Moderate damage (£100k-£1M)	Moderate effect (limited external assistance required)	Considerable impact (£100k-£1M) Local publicity
Serious	Single fatality	Major damage (£1M-£10M)	Major effect (regional assistance required)	Major national impact (£1M-£10M) National publicity
Major	Multiple fatalities	Extensive damage (>£10M)	Extensive effect (national assistance required)	Major international impact (>£10M) International publicity

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6.18.38 The frequency of occurrence is also assessed on a five-point scale, as presented in **Table 6–31**.

**Table 6–31: Assessment of frequency of occurrence for Shipping and navigation.**

Frequency	Criteria
Negligible	< 1 occurrence per 10,000 years
Extremely unlikely	1 per 100 to 10,000 years
Remote	1 per 10 to 100 years
Reasonably probable	1 per 1 to 10 years
Frequency	Yearly

6.18.39 The severity of consequence and frequency of occurrence rankings are then used to determine the level of risk for each impact. Levels of risk are described as “Unacceptable”, “Tolerable” or “Broadly Acceptable” using the risk matrix shown in **Table 6–32**.

**Table 6–32: Risk matrix**

<b>Consequence</b>	<b>Major</b>	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable
	<b>Serious</b>	Broadly acceptable	Tolerable	Tolerable	Unacceptable	Unacceptable
	<b>Moderate</b>	Broadly acceptable	Broadly acceptable	Tolerable	Tolerable	Unacceptable
	<b>Minor</b>	Broadly acceptable	Broadly acceptable	Broadly acceptable	Tolerable	Tolerable
	<b>Negligible</b>	Broadly acceptable	Broadly acceptable	Broadly acceptable	Broadly acceptable	Tolerable
	<b>Negligible</b>	<b>Extremely Unlikely</b>	<b>Remote</b>	<b>Reasonably Probable</b>	<b>Frequent</b>	
	<b>Frequency</b>					

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6.18.40 The language used by the Formal Safety Assessment method (“Unacceptable”, “Tolerable” or “Broadly Acceptable”) differs from that used in the standard EIA methodology (“Negligible”, “Minor”, “Moderate” and “Major”) because the assessment is made against risk as opposed to impact. Definitions for risk categories are provided in **Table 6–33**.

**Table 6–33: Risk definitions**

Risk	Definition
Unacceptable	Generally regarded as unacceptable regardless of the level of benefit associated with the activity. Under EIA terms unacceptable is considered to be significant and would require risk mitigation or design modification to reduce to tolerable ALARP.
Tolerable	Under EIA terms tolerable is considered to be not significant, however there is an expectation that such risks are properly assessed, appropriate control measures are in place, residual risks are ALARP and that risks are periodically reviewed to monitor if further controls are appropriate.
Broadly Acceptable	Under EIA terms broadly acceptable is considered to be not significant and impacts are regarded as acceptable and adequately controlled.

6.18.41 The proposed compensation measures at The Island are intended to enhance saltmarsh and associated habitats. Interventions are required to enhance this habitat which necessitate an alteration to the existing site landward of MHWS in order for salt water to breach onto the land.

6.18.42 The Study Area for this shipping and navigation assessment is not considered to be in an area where military shipping levels are likely to be high and therefore impacts to military shipping from the proposed compensation measures at The Island are unlikely.

6.18.43 The following shipping and navigation receptors have been identified as relevant to this preliminary assessment:

- Commercial vessels passing through the Study Area;
- Recreational vessels that may be disrupted; and
- Operational ports, marinas, and wharfs that may be impacted by the proposed habitat enhancement scheme.

6.18.44 During the construction of the proposed compensation measures at The Island, vessel movements in the Study Area may be impacted. The potential impacts can be categorised into two groups:

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*Impact to vessel movements*

- 6.18.45 The creation of new channels between The Island and the River Parrett has the potential to impact the water turbidity that could affect vessel movements should they be in transit during or following a breaching event. The worst-case outcome of this potential impact is an enhanced grounding risk for vessels relative to baseline conditions. At this preliminary assessment stage, the physical size and number of the breaching event(s) and whether these will be undertaken using plant and equipment deployed within the terrestrial or marine environments is unknown.
- 6.18.46 The construction of the habitat enhancement scheme has the potential to utilise marine vessels and plant or terrestrial equipment and plant on the foreshore. Due to the presence of these vessels, plant and equipment there is the potential that restricted access through the River Parrett could occur within short time periods. The deployment of vessels, plant and equipment within the navigable channel of the River Parrett may potentially increase the baseline risk of vessel collision if no vessel movement restrictions are in place during the relevant works.
- 6.18.47 During the construction phase there is the potential that there will be reduced access to ports, marinas, and

wharfs within the Study Area. This will be further refined and considered in the ES.

- 6.18.48 All impacts to vessel movements are expected to be to be **Broadly Acceptable** in terms of overall risk.

*Impacts as a result of changes to sediment load*

- 6.18.49 The saltmarsh enhancement at The Island will involve removal of material from the existing coastal defence as well as minor excavations to create pools and channels for the enhancement of saltmarsh habitat. This may cause temporary localised increases in turbidity as some material may enter the River Parrett noting the very high existing turbidity/suspended solids levels in the Parrett and the Severn Estuary (see **Section 6.11 Marine water and sediment quality**).
- 6.18.50 Resuspension of sediment may be carried into the River Parrett and beyond to the Severn Estuary and the flux of material may increase as the ebb tide has the potential to transport material from the site (on land) not previously subjected to flooding.
- 6.18.51 This additional sediment load in the River Parrett has the potential to alter the depths of the navigable water channel and therefore the under-keel clearance of vessels navigating the river. Due to the extreme tidal range, winding river, and constantly changing channels

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almost all vessels navigating the river require pilotage at high tide. These existing limitations on vessel movements could be further impacted by the potential increase in sediment load throughout the construction of the habitat enhancement scheme. The worst-case outcome of this impact is grounding risk within the Study Area as defined above (e.g. the River Parrett, and the navigational approach to the channel between Steart Flats and Gore Sand).

6.18.52 The potential increase in sediment load has the potential to impact ports, marinas, and wharfs in the Study Area as defined above (i.e., Bridgwater Docks, Dunball Wharf, and Comwich Wharf) as increase to deposited material on marine infrastructure (i.e. berth beds) may require additional activities in order to maintain safe working conditions (i.e. additional maintenance dredging).

6.18.53 All impacts as a result of changes to sediment load are expected to be to be **Broadly Acceptable** in terms of overall risk.

### Proposed Scope

6.18.54 The proposed assessment scope for the coastal shipping and navigation assessment is outlined in **Table 6–34**.

**Table 6–34: Summary of Shipping and navigation elements scoped in or out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Impact to vessel activity associated with commercial and recreational movements.	IN	Commercial and recreation vessel activity impacts is scoped in due to the potential temporary impact during the construction activities and potential change to sediment loads and sedimentation dynamics within the Study Area.
Impact to ports, marinas, and wharfs.	IN	Port, marina, and wharf impacts are scoped in due to the potential temporary impact during the potential temporary vessel restrictions during construction activities and potential change to sediment loads and sedimentation dynamics within the Study Area.
Impacts to fishing and military vessel movements	OUT	This potential effect has been scoped out due to the minimal (or no) recorded activity of the relevant vessels associated

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Potential Effect	Scoped IN or OUT	Justification
		with these activities within the Study Area.
Impacts associated with other features interacting with navigation receptors.	OUT	These are considered to be part of the existing baseline conditions in which navigation already takes place and are sufficiently integrated into existing navigation systems.

environmental effects (direct effects) can result in changes to quality of life (indirect effects). The assessment follows a source-pathway-receptor model (as shown in **Table 6–35**), only reporting effects through which there is a clear pathway between the source and the receptor and using evidence to support the conclusions.

**Table 6–35: Source-Pathway-Receptor Model**

Source	Pathway	Receptor	Plausible Health Impact?	Explanation
x	✓	✓	No	There is not a clear source from where a potential health impact could originate
✓	x	✓	No	The source of a potential health impact lacks a means of transition to a population
✓	✓	x	No	Receptors that would be sensitive or vulnerable to the health impact are not present

## 6.19 Population and Human Health

### Introduction

- 6.19.1 This section considers the impact of the proposed compensation measures at The Island on population and human health.
- 6.19.2 The WHO defines human health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”.
- 6.19.3 Health effects can be direct (e.g., air pollution resulting in respiratory problems) or indirect (e.g. reduced community interaction due to increased traffic resulting in adverse effects on well-being). Similarly, prolonged

Source	Pathway	Receptor	Plausible Health Impact?	Explanation
✓	✓	✓	Yes	Identifying a source, pathway and receptor does not mean a health impact is a likely significant effect. The health impact is assessed qualitatively based on the available evidence and through the application of professional judgement.

6.19.4 The assessment of impacts on human health relies on the effects reported by each environmental aspect to identify potential human health impacts. The relevant chapters have been referred to as the ‘constituent aspects’ and the effects they report are termed ‘health determinants’.

6.19.5 Health determinants can be defined as the range of personal, social, economic, and environmental factors that influence health status. Where effects are concluded as significant at a constituent aspect level within the PEIR, these have been considered within the

assessment as having potential for human health effects. Where effects are concluded not to be significant at a constituent aspect level within the PEIR, these have not been considered in the health assessment. Constituent aspects considered in this assessment include:

- Conventional Waste Management;
- Socio-Economics;
- Transport
- Noise and Vibration; Soils and Land use;
- Geology and Land Contamination;
- Groundwater;
- Surface Water;
- Historic Environment;
- Amenity and Recreation; and
- Landscape and Visual.

### Study Area

6.19.6 For the assessment of impacts on population and human health, the study area will be defined by the scope of the relevant constituent aspects study areas.

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## Baseline

### Current Baseline

6.19.7 Baseline information relevant to population and human health is outlined in the relevant Aspects assessments as follows:

- The location and type of community and recreational facilities – Amenity and Recreation;
- The location and accessibility to open access land and public spaces – Amenity and Recreation;
- The spatial characteristics of the transport network and usage in the area, including the surrounding road network, PRow (including bridleways), cycleways, non-designated public routes and public transport routes – Transport;
- AQMAs and ambient air quality levels – Air Quality;
- Flooding Risks – Groundwater, Surface Water, Landscape and Visual;
- Areas recognised as being sensitive to noise (e.g., noise important areas, noise management areas) and the ambient noise environment – Noise and Vibration;

- Sources and pathways of potential pollution (e.g., land/water contamination) – Soils and Land Use and Geology and Land Contamination; and
- Landscape amenity – Landscape and Visual.

### Future Baseline

6.19.8 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site takes into account changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

6.19.9 At this PEIR stage, specific details regarding construction and operational stages of the proposed compensation measures at The Island are not fully known/ decided.

### Likely Significant Effects

6.19.10 The following constituent aspects have been scoped into the assessment and have the potential to give rise

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to significant effects on physical and mental human health, these potential likely significant effects will be detailed in the ES:

- Landscape and Visual;
- Conventional Waste Management;
- Socio-Economics;
- Transport;
- Geology and Land Contamination;
- Groundwater;
- Surface Water;
- Historic Environment;
- Amenity and Recreation; and
- Soil and Land Use.

### Proposed Scope

6.19.11 A summary of the population and human health scope for further assessment is outlined in **Table 6–36**.

**Table 6–36: Summary of Population and Human Health elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Potential adverse or beneficial population and Human Health effects	IN	It is proposed that the ES includes a detailed assessment of potential population and human health effects that could occur during the construction and operation of the proposed compensation measures at The Island.

## 6.20 Climate Change

### Introduction

6.20.1 The aim of this section is to consider the likely significant effects of the proposed compensation measures at The Island on anthropogenic climate change (i.e. through GHG emissions) and the likely significant effects of climate change on the proposed compensation measures at The Island.

6.20.2 The impacts on climate will be assessed through the estimation of the extent of GHG emissions from the lifecycle stages of the proposed compensation

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measures at The Island. All GHGs are reported as a CO<sub>2</sub>e.

6.20.3 The vulnerability of the proposed compensation measures at The Island to the impacts of projected climate change will be assessed using projected changes in climate from the UKCP18<sup>248</sup>.

### Study Area

6.20.4 Under Schedule 4 Paragraph 5(f) of the 2017 EIA Regulations, an ES must provide “a description of the likely significant effects of the development on the environment” resulting from “the impact of the project on climate (for example the nature and magnitude of GHG emissions) and the vulnerability of the project to climate change”.

6.20.5 For the assessment of the impacts on climate (from GHG emissions), the proposed Order Limits are considered appropriate. The study area includes the GHG emissions associated with the proposed compensation measures at The Island to determine the impact on the climate. The main GHGs relevant to the

proposed compensation measures at The Island are CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O. GHG emissions are reported as CO<sub>2</sub>e, which accounts for the GWP of each GHG, relative to CO<sub>2</sub>. Other GHGs which are normally considered include hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride, but these are not anticipated to be material in the nature of the activities.

6.20.6 Regarding the vulnerability of The Island to climate change, Natural England<sup>249</sup> has reported that coastal saltmarshes have a high sensitivity to climate change. Based on information in the Natural England report and a report produced by the Marine Climate Change Impacts Partnership<sup>250</sup>, the following key climate change-related factors are likely to be most relevant to The Island:

- Sea level rise and the frequency and extent of tidal inundation;
- Increased temperatures and reduced rainfall and drier conditions leading to drought; and

<sup>248</sup> Met Office Hadley Centre (2018), UKCP18 Probabilistic Climate Projections. Centre for Environmental Data Analysis, [\[Online\]](#) Accessed 4 December 2023

<sup>249</sup> Natural England (2020), Climate Change Adaptation Manual (NE751), 28. Coastal Saltmarsh, 22/04/2020 [\[Online\]](#) Accessed 4 December 2023

<sup>250</sup> Marine Climate Change Impacts Partnership, Climate change and marine conservation, Supporting management in a changing environment, Saltmarsh [\[Online\]](#) Accessed 4 December 2023

- Rainfall intensity and its effect on surface water and river flooding.

6.20.7 The study area for the consideration of the vulnerability to climate change is the proposed Order Limits.

## Baseline

### Current Baseline

#### *Impacts on Climate Change*

6.20.8 Baseline emissions are defined as emissions that occur without the project. For The Island the emissions are considered as zero as the proposed Order Limits currently comprises permanent semi-improved, grassland some of which is arable land and is intersected by a network of drainage ditches where emissions from maintenance and land use are negligible. Therefore, no emissions are associated with the 'use' of this land prior to the proposed compensation measures at The Island.

#### *The Vulnerability to the Impacts of Projected Climate Change*

6.20.9 The UKCP18 climate projections dataset uses a 30-year baseline period of 1981-2010, from which potential climatic changes in future years are projected.

Some initial data to represent the current climate were therefore obtained from the UKCP18 baseline dataset, specifically 1981-2010. The baseline climate data for the South-West England region were compared to similar data for England as a whole, which indicate that:

- The climate in the South-West region is generally slightly warmer, with higher average daily minimum temperatures, daily mean temperatures and daily maximum temperatures for all seasons of the year. The exception is the average summer daily maximum temperature, which is the same as the England average (20.1 °C)

6.20.10 The climate in the South-West region is wetter compared to the England average throughout the year, with the greatest difference in precipitation being in wintertime. Summer mean accumulated rainfall is 204 mm and winter mean accumulated rainfall is 307 mm. The England summer and winter mean accumulated rainfall is 194 mm and 230 mm, respectively.

### Future Baseline

#### *Impacts on Climate Change*

6.20.11 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site accounts for changes that are expected to have

been made by the time Hinkley Point C is operational, including because of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

#### *The Vulnerability to the Impacts of Projected Climate Change*

6.20.12 In general, UKCP18 projects a greater chance of hotter, drier summers and warmer, wetter winters with more extreme weather and rising sea levels.

6.20.13 UKCP18 indicates that by the end of the 21<sup>st</sup> century, all areas of the UK are projected to be warmer, more so in summer than in winter. This projected temperature rise in the UK is consistent with future warming globally.

6.20.14 In the south west region, by the 2080s, in the high emission scenario (referred to as RCP8.5 – a scenario where substantial progress is not made in reducing global GHG emissions over the coming decades and global energy supply is increasingly fossil fuelled), the summer daily maximum temperature is projected to increase by 5.7 °C and the winter daily minimum

temperature will increase by 3.1 °C (based on a 50 % probability of occurrence).

6.20.15 UKCP18 indicates that rainfall patterns across the UK are not uniform and vary on seasonal and regional scales and will continue to vary in the future. It is indicated that by the 2080s in the south-west region, the summer mean accumulated rainfall will reduce by 40 % and the winter mean accumulated rainfall will increase by 25 %.

6.20.16 The UKCP18 climate projection data also indicate that more extreme precipitation events could occur slightly less frequently by the period 2061 - 2080. However, it should be noted that while more extreme precipitation events could occur less frequently, very extreme precipitation events could be of higher intensity when they do occur (e.g., the 99<sup>th</sup> percentile of projected daily precipitation values could be at least 10 % higher than the current baseline period).

6.20.17 The UKCP18 projections of sea level rise indicates that in the south-west and south Wales coastal region, by the end of the century, sea levels could rise by between 0.51 m and 1.13 m (based on the 5<sup>th</sup> and 95<sup>th</sup> percentile values for the RCP8.5 scenario). The Marine Climate Change Impacts Partnership reports that modelling studies indicate that changes in tidal range will be approximately plus or minus 10 % of any rises in sea

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level<sup>251</sup>. Although small in comparison to the mean sea level changes, altered tidal ranges could enhance coastal flooding and also have implications for the future erosion and accretion of salt marshes and other coastal ecosystems.

### Assumptions and Limitations

6.20.18 Due to the uncertainties that exist around the subject of climate change, there are limitations associated with predicting and assessing the impacts of climate change on The Island. In particular, there is uncertainty around climate change projections and how these will specifically affect sea level, tidal inundation, rainfall, and temperatures (and associated periods of drought) at The Island.

6.20.19 Other, more realistic, UKCP18 climate projection scenarios are available which predict lower changes in temperature, rainfall and sea level rise than the RCP8.5 scenario. RCP8.5 has been used here as a worst-case approach and is consistent with relevant guidance for the assessment of vulnerability to climate change<sup>252</sup>.

6.20.20 Additionally, at this PEIR stage, specific details regarding the construction and operational stages of the proposed compensation measures at The Island, and how the design would be adapted to mitigate against climate change, are not fully known.

### Likely Significant Effects

#### Impacts on Climate Change

6.20.21 There are GHG emissions that are associated with the construction of the proposed compensation measures at The Island in the form of earthworks, and transport of workers and plant to and from The Island, but they are considered to be negligible and a not significant adverse effect. In any case, good practice measures to reduce GHG emissions during construction could be implemented, for example:

- investigate and implement sustainable reuse of any materials won from excavation;
- use of locally sourced materials to reduce transportation emissions;
- reuse of materials and wastes where possible; and

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<sup>251</sup> Horsburgh, K., Rennie, A. and Palmer, M. (2020) Impacts of climate change on sea-level rise relevant to the coastal and marine environment around the UK. Marine Climate Change Impacts Partnership (MCCIP) Science Review 2020, 116–131.

<sup>252</sup> Institute of Environmental Management and Assessment (IEMA) (2020) Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation, 2020

- implement a plan to reduce energy and fuel use including monitoring of fuel and electricity use, training of operatives, use of stop-start technology, use of low-carbon and renewable energy sources to power plant and compounds.

6.20.22 In addition, it is also likely that this change of land type will increase the sequestration of carbon associated with increased sedimentation during the operational phase. Over the lifetime of the proposed compensation measures at The Island this is likely to result in a net reduction in emissions which would be representative of an overall beneficial effect (i.e. the GHG emissions during the construction phase could potentially be outweighed by the carbon sequestered during the operational phase).

6.20.23 Using data from an Environment Agency report<sup>253</sup> on potential carbon offsetting approaches it is estimated that The Island may sequester between 55 tCO<sub>2</sub>e/yr and 220 tCO<sub>2</sub>e/yr based on a rate between 2 and 8 tCO<sub>2</sub>e/ha/yr.

6.20.24 The GHG assessment indicates the proposed compensation measures at The Island have the

potential to accumulate carbon through deposition of sediment brought in by the tide and burial of vegetation within the proposed Order Limits, which suggests the proposed compensation measures at The Island could result in a net reduction in emissions through its sequestration potential. Therefore, as the associated GHG emissions would be negligible in relation to the UK's carbon budget and have the potential to be a beneficial effect through sequestration, this is not proposed to be assessed within the ES.

### The Vulnerability to the Impacts of Projected Climate Change

6.20.25 As noted above, coastal saltmarshes are sensitive to climate change. Changes to key climate parameters can impact on saltmarsh structure, composition and function<sup>249,250</sup>. The main climate change drivers which could affect the operation of the proposed compensation measures at The Island are discussed below.

6.20.26 Given the relatively short timescale for the construction phase, changes in climate parameters are unlikely to be of a sufficient magnitude to directly impact on

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<sup>253</sup> Environment Agency (2021). Achieving net zero. A review of the evidence behind potential carbon offsetting approaches. [Online] Accessed 4 December 2023

construction activities. Adoption of good practice construction methods, including appropriate weather forecasting and reporting for planning construction activities, would be sufficient to ensure any adverse effects are negligible and would be not significant.

*Relative sea level rise*

6.20.27 Sea level rise could lead to altered coastal dynamics and changes to the amount of sediment supplied. This could lead to areas of saltmarsh being lost if sediment loading is not sufficient to keep pace with sea level rise or where inland migration is restricted due to inland flood defences.

6.20.28 Sea level rise could also lead to increased frequency of inundation and waterlogging of the saltmarsh habitat. This could result in an increased area of exposed mud leading to greater susceptibility to invasive plants and erosion, and increased water logging at low tide.

6.20.29 Increased erosion at the seaward margin, with no sediment transfer higher into the marsh can cause plants to die back. The area of saltmarsh could be reduced where accretion is at a slower rate than sea level rise.

6.20.30 Rising sea levels could also lead to changes in the relative climate space available to saltmarsh species

leading to changes in community/species composition and loss of key saltmarsh species.

*Increased temperatures / hotter and drier summers*

6.20.31 During hotter summers, increased evaporation of seawater could lead to increased salinity in the upper zones or ponds of the saltmarsh habitat, resulting in changes in community composition and vegetative dieback. Periods of drought during the hotter, drier summers could also lead to vegetative dieback in the upper areas of the marsh and changes in community composition due to competition from grassy species.

6.20.32 Increased temperatures in other seasons, particularly spring season, may help promote the growth and accelerated spread of the invasive species which could out-compete native saltmarsh species producing a monoculture which has much less intrinsic value to wildlife than the natural species-diverse marsh.

*Increased precipitation*

6.20.33 Precipitation change, particularly increases in rainfall in winter months, could increase pluvial flooding, although The Island has already been identified within a zone of high risk of fluvial flooding (i.e., flooding associated with the River Parrett) (see **Section 6.9 Surface Water**). The impact of increased flooding on

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The Island is uncertain but increased freshwater input could lead to change in plant species.

*Summary*

6.20.34 It is likely that during construction, the impacts of climate change on the vulnerability of the construction activities and The Island would be negligible, representing a not significant adverse effect. These would be managed by good practice construction methods and through the implementation of a CEMP.

6.20.35 At this stage it is not possible to determine the significance of the adverse effects of climate change on the proposed compensation measures at The Island during operation. However, a number of potential climate change impacts have been identified which could lead to a significant adverse effect on the effective operation of the proposed compensation measures at The Island. However, it is anticipated that these impacts could be taken into consideration and addressed through the design and any required ongoing management practices.

**Proposed Scope**

6.20.36 Based on the above assessment, **Table 6–37** presents the potential effects on climate change of the proposed compensation measures at The Island and shows they

are expected to be negligible and not significant and provides a rationale for being scoped out of further assessment. **Table 6–37** also presents the potential effect on The Island from climate change and the rationale for scoping this Aspect out or in for the construction and operational phases, respectively.

**Table 6–37: Summary of climate change elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Potential impact on climate change from the construction of the proposed compensation measures at The Island	OUT	GHG emissions associated with the creation of the proposed compensation measures at The Island would be minimal and likely balanced out or surpassed by the carbon removal resulting from the increased sedimentation through the proposed compensation measures at The Island during operation. GHG emissions during construction would be negligible in comparison to the UK’s carbon budgets and would be a not significant adverse effect.
Potential impact on climate	OUT	GHG emissions associated with the operation of the proposed



Potential Effect	Scoped IN or OUT	Justification
change from the operation of the proposed compensation measures at The Island		compensation measures at The Island will be minimal and, because of the sequestration potential due sediment accumulation and habitat creation, could lead to a net reduction in GHG emissions.  The potential net reduction in GHG emissions during operation would be considered a beneficial but not significant effect given the uncertainty in the magnitude of carbon sequestration.
Vulnerability to climate change during construction	OUT	Projected climate changes are lower over the short-term and these would be expected to be mitigated for by using best practice construction techniques and management plans. Overall, the effect would be expected to be negligible, and not significant.
Vulnerability to climate change during operation	IN	It is proposed that the ES includes a detailed assessment of the vulnerability of the proposed compensation measures at The Island to climate change during the operational phase to determine

Potential Effect	Scoped IN or OUT	Justification
		the significance of effects. This would be based on further design work to determine the resilience of the enhanced saltmarsh and associated habitats to likely future climate parameters and inform the design and need for ongoing management.

6.20.37 Therefore, it is proposed that the impact of the proposed compensation measures at The Island on climate change is scoped out of requiring further detailed assessment in the ES. The vulnerability of the proposed compensation measures at The Island to climate change during operation is proposed to be scoped in for further assessment in the ES. Where appropriate, this would include consideration of a wider range of climate projection scenarios to determine suitable future baseline climate parameters to base the assessment on.

## 7. MAISEMORE WEIR ON THE RIVER SEVERN

### 7.1 Conventional Waste Management

#### Introduction

7.1.1 This section considers the generation and management of conventional waste resulting from the proposed compensation measures at Maisemore Weir. It does not include radioactive waste and materials management.

7.1.2 The aim of this section is to:

- Evaluate potential activities associated with the removal of the weir and operation of the proposed compensation measures at Maisemore Weir and identify the activities that could lead to significant environmental effects.
- Identify relevant receptors which could potentially be impacted by conventional waste management associated with the removal of the weir and operation of the proposed compensation measures.
- Outline a proposed scope and methodology for the assessment of potential conventional waste

management impacts of the proposed compensation measures at Maisemore Weir on the environment within the ES.

#### Study Area

7.1.3 As defined in *IEMA guide to: Materials and Waste in Environmental Impact Assessment*, two geographically different study areas should be determined. These have been defined as:

- Project Study Area, which comprises all land contained within a site boundary. Within these areas waste is generated and managed, including any areas identified for temporary uses such as temporary waste stockpiles, accesses, site compounds and other enabling works. In the context of this chapter, the Project Study Area covers the Maisemore Weir works boundary (refer to **paragraph 1.4.6 in Chapter 1**) and is located in Gloucestershire, on the River Severn.
- Expansive Study Area provides the boundary for appreciation of the capacity of relevant waste management infrastructure, including remaining landfill void. This is considered on a regional basis, within one or more regions as appropriate. Maisemore Weir is located in the South-West region, which in the context of this chapter comprises Bristol, Cornwall (including the Isles of

Scilly), Dorset, Devon, Gloucestershire, Somerset and Wiltshire.

## Baseline

### Current Baseline

- 7.1.4 In the context of this chapter, the sensitive receptor is landfill capacity for waste, as detailed in *IEMA guide to: Materials and Waste in Environmental Impact Assessment*.
- 7.1.5 Information provided in *Waste Management in the South-West: Data Tables 2022* allows the assessment of the opportunities for waste arisings to be transferred, treated, recycled, recovered or disposed as appropriate in the region, if they cannot be reused, recycled or otherwise recovered on-site.
- 7.1.6 Whilst annual capacity data are published by the Environment Agency for both landfill and incineration facilities at the national, regional and sub-regional level, no annual capacity data are published by the Environment Agency for waste transfer, treatment or recycling sites. Only annual throughput is published for these facilities. The total annual throughput or capacity reported is detailed in **Table 7–1**.

**Table 7–1: Annual permitted throughput or capacity of transfer, treatment, recycling and incineration in the South West, 2022**

Site type	South West (000s tonnes)
<b>Transfer (annual throughput)</b>	
Hazardous waste transfer stations	594
Household, industrial, commercial waste transfer stations	2,343
Non-biodegradable waste transfer stations	26
<b>Treatment and metal recycling (annual throughput)</b>	
Material recovery	764
Physical treatment	3,313
Physico-chemical treatment	497
Chemical treatment	35
Composting	548
Biological treatment	2,987
Metal recycling	1,177
<b>Incineration (annual capacity)</b>	
Hazardous waste	9
Co-incineration of non-hazardous waste	0

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Site type	South West (000s tonnes)
Municipal and/or industrial & commercial incineration	1,505
Biomass/waste wood incineration	0

7.1.7 For wastes which cannot be reused, recycled or otherwise recovered, disposal to landfill will be required. The total remaining landfill capacity in 2022, as presented in **Table 7–2**, shows there are opportunities to dispose waste arisings from the Proposed compensation measures at within the region.

**Table 7–2: Landfill capacity available in the South West, 2022**

Landfill type	South West (000s tonnes <sup>1</sup> )
Hazardous merchant landfill	1,770
Hazardous restricted landfill	0
Non-hazardous landfill with SNRHW cell <sup>2</sup>	2,615
Non-hazardous landfill	5,518
Non-hazardous restricted landfill	0
Inert landfill	15,328

Landfill type	South West (000s tonnes <sup>1</sup> )
<b>Total</b>	<b>27,3288</b>
<p>1 Converted from cubic metres through the adoption of the following conversion factors: inert landfills 1.5 tonnes/m<sup>3</sup>, non-hazardous landfills 0.83 tonnes/m<sup>3</sup> and hazardous landfills 1.5 tonnes/m<sup>3</sup>.</p> <p>2 Some non-hazardous sites can accept some Stable Non-Reactive Hazardous Wastes (SNRHW) into a dedicated cell, but this is usually a small part of the overall capacity of the site.</p>	

7.1.8 No conventional waste generation and management has been identified post-removal of the weir. It is therefore proposed they are scoped out.

### Future Baseline

7.1.9 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline but the treatment and disposal tables will be updated with the latest available data.

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## Assumptions and Limitations

- 7.1.10 At the PEIR stage, various details regarding the proposed compensation measures at Maisemore Weir are not known. In particular, the expected waste types, waste generation estimates, and removal timeline have not been identified.
- 7.1.11 The vast majority of wastes assumed to be produced during the proposed compensation measures at Maisemore Weir will be excavated waste from earthworks, site preparation/clearance and the removed weir itself. The design is at concept stage and as a result there is no information on quantities of waste generated or the proposed management. It can be expected, however, that the Proposed compensation measures at Maisemore Weir will aim to reuse all excavations within the site, and that the removed weir will be classified as demolition waste and recycled wherever possible.
- 7.1.12 Organic wastes may be produced from the site clearance and small amount of municipal-type solid waste associated with removal workers can be expected, such as food waste, packing and such like. A large proportion of this solid waste is likely to be suitable for reuse, recycling, composting or other recovery, although a proportion may also require disposal to landfill.

- 7.1.13 It has been assumed that the Maisemore Weir works boundary, and therefore the excavated and demolition material is not contaminated. However, if this is not the case any contaminated material would be removed for treatment and/ or disposal at an appropriate facility.

## Likely Significant Effects

- 7.1.14 Conventional waste generation is predicted to be minimal, as the expected earthworks excavations can possibly be reused on site and the amount of demolition waste would only be the quantity associated with the weir removal. The removal works themselves are a relatively small development and would require a relatively small workforce on site – so the municipal waste generation is expected to be negligible. It is unlikely that the amount of waste required to be disposed of would alter the regional capacity in a significant way. Notwithstanding, this should be analysed and confirmed in the ES, especially if excavation material cannot be reused on site. Best practice methods would be used to minimise the generation of municipal waste.
- 7.1.15 At the time of writing this report, no significant effects are expected, based on the current scope and design information.

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## Proposed Scope

7.1.16 It is proposed that the ES includes an assessment of potential conventional waste management effects that could occur during the removal of Maisemore Weir and disposal of waste material. A summary of the proposed scope is outlined in **Table 7–3**.

**Table 7–3: Summary of conventional waste management elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Removal of the weir: Potential reduction in the remaining landfill void and impacts on the capacity of waste management facilities in the region	IN	The vast majority of the expected waste tonnage would be from the demolition of the weir itself, assumed to be built from rock and concrete. Opportunities to recycle/recover this type of waste (CDE) exists in the region, however, waste types and estimated tonnages have not been detailed and may be subject to change as the design develops. Significant effects are not expected, nonetheless a waste assessment should be conducted where potential

Potential Effect	Scoped IN or OUT	Justification
		effects of waste can be eventually scoped out, when there is more information available.
Operation: Potential reduction in the remaining landfill void and impacts on the capacity of waste management facilities in the region	OUT	No waste generation and management is expected/planned at the moment during the operational phase. Therefore, it is proposed for operational effects to be scoped out.

7.1.17 In general, the assessment of conventional waste management associated with the removal of Maisemore Weir shall follow the guidance set out in *IEMA guide to: Materials and Waste in Environmental Impact Assessment*.

7.1.18 Current and likely future baseline conditions for waste during the removal of the weir will be considered, and include information on waste management capacity, including remaining landfill void space and annual throughputs of waste transfer, waste treatment, metal recycling and waste incineration facilities. Estimated landfill capacity alteration caused by waste generated

by the removal of the weir will also be included, as detailed in IEMA guidance.

7.1.19 Waste hierarchy, circular economy principles and sustainable approach to waste management would be applied. Where waste is reused on site, *Definition of Waste: Code of Practice* would be considered.

## 7.2 Socio-economics

### Introduction

7.2.1 The section considers the likely impact of the proposed compensation measures at Maisemore Weir on socioeconomic receptors within the study area during both the removal and operational stages.

7.2.2 The socioeconomic assessment considers employment effects and economic investment in the region because of the proposed compensation measures at Maisemore Weir. The assessment also considers disruption to commercial receptors including businesses and agricultural properties and impacts on land use.

### Study Area

7.2.3 Two study areas have been proposed for the assessment as follows.

- The study area for the assessment of disruption to commercial receptors is 500 m from the Maisemore Weir works boundary. This has been selected as it is considered to represent the likely limit of direct effects on commercial receptors.
- The study area for the assessment of effects on employment and economic investment is Tewkesbury District Council Area. This wider study area is intended to encompass the area within which significant effects on employment and the local economy could occur.

### Baseline

#### Current Baseline

7.2.4 The baseline data are based on desk-based research of publicly available sources and focuses on commercial receptors, employment and economic investment within the study area denoted above. Key receptors are commercial properties including agricultural businesses, the local workforce population and the local economy.

### *Commercial properties and Land Use*

7.2.5 The Maisemore Weir works boundary is surrounded by agricultural land. Six commercial receptors have been identified within 500 m of the Maisemore Weir works boundary; The White Hart Inn, Ghurka Pub, J Young Fuels, LJ Bridal Collection, Steadings Business Centre and Ewatt Technology.

### *Employment and economic investment*

7.2.6 In Tewkesbury District Council area, the unemployment rate is 2.3 % with an employed workforce of around 45,600<sup>254</sup>. This percentage is slightly below the average for England which has an average unemployment rate 4.3 %<sup>255</sup>.

7.2.7 Tewkesbury District Council Area had an annual GVA of £2.23 billion in 2014<sup>256</sup>.

### **Future Baseline**

7.2.8 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have

been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### **Assumptions and Limitations**

7.2.9 At present, specific details regarding the proposed compensation measures at Maisemore Weir are not fully known/ decided.

7.2.10 The current assumptions in relation to socioeconomic effects are:

- The removal of Maisemore Weir will be short term and temporary.
- Agricultural land will not be acquired permanently as removal of the weir will, for the most part, occur in the river body itself and river banks. Temporary uptake of land will occur during removal to establish a site compound, this is to the North of

<sup>254</sup> Office for National Statistics (2023). Employment, unemployment and economic inactivity in Tewkesbury. [\[Online\]](#) Accessed 6 December 2023

<sup>255</sup> Office for National Statistics (2023) Unemployment rate (aged 16 and over, seasonally adjusted): %. [\[Online\]](#) Accessed 6 December 2023.

<sup>256</sup> Tewkesbury Council. (2017). Economic Development and Tourism Strategy. [\[Online\]](#) Accessed 6 December 2023.



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the weir off the private farm track. Temporary uptake of land will also occur along the river bank at either end of the weir for the length of the bank protection.

- Temporary rights may be required to access the works from the North Bank via the private farm track. The Environment Agency may then need ongoing rights to monitor the site.

### Likely Significant Effects

#### Disruption to commercial receptors

- 7.2.11 Disturbance effects to commercial receptors are considered to arise when a combination of two or more visual, traffic, air quality and noise effects coincide on a particular area or receptor with the potential to deter users from, or affect the functioning of, that receptor. In general terms, it is considered most likely that a significant disturbance effect would occur if there are two or more significant effects (i.e. effects typically of moderate or greater significance) identified by constituent aspects. It is possible, however, during the demolition phase, that a significant disturbance effect could occur as a result of a combination of three or four of the environmental effects having a minor effect on a receptor.

- 7.2.12 Transport, noise and vibration and landscape and visual effects have been scoped into the PEIR; therefore, there is risk of a combination of environmental effects that could create a disturbance effect for the local business receptor.

#### Employment and economic investment in the region

- 7.2.13 Employment effects from the proposed compensation measures at Maisemore Weir would arise through direct employment in removal-related roles, and indirectly through employment required to support the direct labour requirements. This is assessed within the context of the overall labour market. It is assumed that labour requirements for the removal works would be minimal and there would be no permanent employment during operation. Given the large size of the local workforce within the Tewkesbury Council Area, no socio-economic effects regarding workforce are anticipated.
- 7.2.14 Spending on the proposed compensation measures at Maisemore Weir include land purchase, machinery, and other capital costs. Given the scale of the proposed compensation measures at Maisemore Weir in relation to the size of the regional economy, even if 100 % of direct capital expenditure on the proposed compensation measures at Maisemore Weir was

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captured in the local area, this would represent less than 0.01 % of the total GVA. Therefore, the benefit to the economy is likely to be of minor significance.

### Land Use

7.2.15 During removal, temporary uptake of land will occur to establish a site compound. Temporary uptake of land will also occur along the river bank at either end of the weir for the length of the bank protection. The Maisemore Weir works boundary is surrounded by agricultural land. There is potential to temporarily compromise the agricultural productivity within the local area, through temporary uptake of agricultural land however, given that removal is likely to last 4 months and the land required makes up a small proportion of the overall land holding, this is not expected to be significant.

7.2.16 Given that no permanent uptake of land is anticipated during operation, no significant effects will be realised during this phase.

### Proposed Scope

7.2.17 It is proposed impacts related to disruption to commercial receptors are scoped into the full assessment and that the remaining socioeconomics

elements are scoped out of the full assessment, as summarised in **Table 7-4**.

**Table 7-4: Summary of socio-economic elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Disruption to commercial receptors	IN	It is possible that disturbance effects to commercial receptors may arise due to the combined effect of Landscape and Visual and Noise and Vibration.
Employment and economic investment in the region	OUT	Given the large size of the local workforce within the Tewkesbury Council Area, the strength of the regional economy and the low level of direct labour requirements to support the proposed compensation measures at Maisemore Weir, no socio-economic effects are anticipated.
Commercial and Agricultural Land Use	OUT	While there is potential to compromise the agricultural productivity within the local area, through temporary uptake of agricultural land however this is temporary, small scale and

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Potential Effect	Scoped IN or OUT	Justification
		unlikely to result in significant effects.

## 7.3 Transport

### Introduction

7.3.1 This section describes the current baseline relating to transport provisions to access Maisemore Weir and the potential transport impacts associated with the proposed compensation measures at Maisemore Weir. This section will conclude by outlining the proposed scope of works that will inform the final EIA. Good practice in managing transportation impacts is considered throughout the discussions in this section.

### Study Area

7.3.2 Maisemore Weir would be accessed from the northern bank through private land, accessed via a private road out of Maisemore village. This is accessed from Old Road and The Rudge, which connects to Maisemore Weir from A417.

7.3.3 To the south, the A417 links to the A40 which forms the SRN approximately 2 miles from the Maisemore Weir, which thereafter connects to the M5 at J11. To the north, the A417 provides a link to the M50 J2, approximately 10 miles away.

### Baseline

#### Current Baseline

7.3.4 Footpath EMA12 runs parallel to the River Severn, where the weir is located. Footpaths EMA14 and EMA24 currently terminate at Old Road, whereby pedestrians can access them.

7.3.5 Narrow single-tracks are present along Old Road and The Rudge, being wide enough to accommodate a HGV travelling in one direction at a time.

7.3.6 The A417 not part of Gloucestershire's Major Road Network, however Gloucestershire County Council classify the corridor as a Primary Route Corridor for HGVs.

#### Future Baseline

7.3.7 Due to the low level of traffic anticipated to be generated by the removal of the weir and operation of the proposed compensation measures at Maisemore

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Weir and the low level of existing development and population in the study area, we will only consider the current baseline for any assessment of any impacts of the removal of the weir and operational traffic. No future baseline will be considered.

### Assumptions and Limitations

- 7.3.8 The access route via Old Road and the northeast section of The Rudge has been assumed as this prevents contact and disruption associated with the south of the southern part of The Rudge.
- 7.3.9 Through a high-level review of the size of the Maisemore Weir works boundary, no more than a peak of 20 HGV movements per day (10 HGVs) will be required to travel to and from Maisemore Weir. Moreover, it is assumed that a maximum of 20 LGV movements per day would be required for the proposed compensation measures at Maisemore Weir. These peak daily movements account for the movement of plant, materials, and equipment to and from Maisemore Weir where necessary.
- 7.3.10 Whilst these caps have been provisionally identified, extensive stakeholder engagement and design developments will be needed to estimate the actual numbers of construction vehicles to Maisemore Weir. Moreover, it should be noted that as these construction

vehicle limits will only be reached for a limited period, it is expected that daily construction vehicle movements will be lower for the majority of the programme for the removal of the weir.

- 7.3.11 The programme will be designed to minimise the impacts of construction vehicles. The implementation of a Construction Environmental Management Plan ('CEMP') and a Construction Traffic Management Plan ('CTMP') will ensure that good practice is applied during the works.
- 7.3.12 The day-to-day operation and maintenance of the proposed compensation measures at Maisemore Weir will generate a negligible volume of LGVs, averaging as less than one movement per day annually, meaning that significant impacts during operation can be scoped out of the assessment.
- 7.3.13 Traffic counter point data is not available along Old Road and The Rudge, meaning that the quantitative effect has not been compared in this section. Nonetheless, traffic counter point data is available along the A417 corridor.
- 7.3.14 For the A417 corridor, a 10 % threshold for HGV concentrations can be considered appropriate as Department for Transport ('DfT') report that 88 % of major roads in South-West England and West

Midlands (excluding motorway-classified roads) have HGV concentrations within this threshold.

7.3.15 The impacts of the removal activity will not be considered in combination with other works associated with the Hinkley Point C development site and compensation measures. This is because Maisemore Weir falls outside of the geography of the local road networks affected by other works, meaning that there will be no substantial interaction with them to generate a cumulative effect. This is also covered in **Volume 4** of this PEIR.

### Likely Significant Effects

7.3.16 As Footpath EMA12 is immediately adjacent to the north side of the weir, it may need to be closed or diverted for working areas or access. This may require a Public Path Order. Depending on the outcome of closures and / or diversions, this could generate a minor to moderate adverse impact for non-motorised users.

7.3.17 Pedestrian footfall along Old Road that is linked to Footpaths EMA14 and EMA24 may coincide with the

movement of HGVs. Speed restrictions below the authorised limit to construction vehicles are expected as a safety precaution, which could generate a minor to moderate adverse impact on non-motorised users.

7.3.18 Total daily two-way traffic volumes on the A417 between Hawcross Lane and Down House Lane are reported as around 4,400 vehicles, whilst total volumes between Old Road and Ham's Lane are reported as around 7,400 vehicles, as reported by DfT<sup>257</sup>.

7.3.19 The A417 corridor to the north for M50 J11 passes two schools; Hartmore School and Staunton & Corse C of E Academy. It is likely that these impacts will be negligible relative to the existing presence of HGVs using the route.

7.3.20 A maximum of 20 HGV movements will cause a Slight increase in the relative HGV concentrations at the counter points along the A417. The total concentration of HGVs would not exceed 10 %, as would typically be expected on similar major roads. The changes in HGVs are summarised in **Table 7-5**. The percentage figures are rounded to the nearest whole number.

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<sup>257</sup> Department for Transport (2022) Road traffic bulk downloads. [\[Online\]](#) Accessed 6 December 2023.

**Table 7-5: Impacts of construction HGVs for Maisemore Weir (maximum daily movements)**

Count point location	Current HGVs (DfT 2022)	Construction HGVs*	Total HGVs with construction peak	HGV % with construction peak	% Increase in HGVs
A417 between Hawcross Lane and Down House Lane	315	20	335	8 %	6 %
A417 between Old Road and Ham's Lane	280	20	300	4 %	7 %

7.3.21 The impacts of LGV movements were found to be negligible (less than 3 % increase). These are summarised in **Table 7-6**. The percentage figures are rounded to the nearest whole number.

**Table 7-6: Impacts of construction LGVs for Maisemore Weir (maximum daily movements)**

Count point location	Current LGVs (DfT 2022)	Construction LGVs	Total LGVs with construction LGVs	LGV % with construction peak	% Increase in LGVs
A417 between Hawcross	832	19 %	20	852 %	2 %

Count point location	Current LGVs (DfT 2022)	Construction LGVs	Total LGVs with construction LGVs	LGV % with construction peak	% Increase in LGVs
Lane and Down House Lane					
A417 between Old Road and Ham's Lane	1322	18 %	20	1342 %	2 %

7.3.22 It is anticipated that these maximum levels of construction movements would occur sporadically over a short duration.

### Proposed Scope

7.3.23 Based on the above assessment, **Table 7-7** presents the potential transport impacts that are proposed to be scoped in and out of requiring further assessment, along with justifications.

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**Table 7-7: Summary of transport impacts scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Traffic impacts during removal	IN	It needs to be understood whether the generated traffic from construction traffic (transporting plant, equipment, and materials) and the workforce personnel will impact the operation of the affected road network.  The CTMP will likely be required as a planning obligation. It will include estimates of the total vehicle movements to Maisemore Weir relating to the staff, equipment, and materials. This will enable the impacts on the road network to be assessed at their peak levels.
Traffic impacts during operations	OUT	The day-to-day operation of the proposed compensation measures at Maisemore Weir will generate a negligible volume of construction vehicles, averaging as less than one movement per day annually on the affected road network. This is therefore not considered significant

Potential Effect	Scoped IN or OUT	Justification
		to warrant a detailed assessment in the EIA.
Sensitive Receptors	IN	Depending on the selected route, the impacts on sensitive receptors including educational amenities will need to be acknowledged and identify the mitigation measures if required.  The CTMP will outline necessary limits and restrictions on construction vehicle movements and speeds, which are expected to include prohibitions during periods where conflicts with vulnerable travellers could occur.
Pedestrians, cyclists and horseriders	IN	One on-site bridleway is expected to be directly affected due to on-site access during removal. Access to Maisemore Weir is expected to sever the route, warranting temporary or potentially permanent closures and diversions.

## 7.4 Noise and Vibration

### Introduction

7.4.1 The aims of this section are to:

- Evaluate the potential impact of the activities associated with the removal of the weir and operation of the proposed compensation measures at Maisemore Weir and identify those activities which could lead to significant effects.
- Identify the relevant human receptors which could potentially be impacted by noise and vibration associated with the removal of the weir and operation of the proposed compensation measures at Maisemore Weir.
- Outline a proposed scope and methodology for the assessment of potential noise and vibration impacts within the ES.

7.4.2 The potential effects on human receptors (i.e., dwellings and other noise-sensitive locations used by humans) are considered within this section. Effects of noise and vibration on other receptor types are considered in the following sections:

- **Section 7.2 Socio-economics;**
- **Section 7.13 Amenity and Recreation;** and

- **Section 7.14 Population and Human Health.**

### Study Area

7.4.3 Initial Study Areas have been defined for each aspect of the noise and vibration assessment. These areas are defined in terms of distances from the relevant part of the development. These distances have been selected, using professional judgement, based on:

- Initial estimates of noise/vibration levels likely to be generated during the removal of the weir and operation of the proposed compensation measures at Maisemore Weir.
- Noise/vibration levels thresholds below which effects are unlikely to occur.
- Study Areas defined in relevant guidance documents.

7.4.4 The Study Area selected for noise associated with the removal of the weir is 500 m from any area where removal activities could take place, including site compounds and laydown areas. At the PEIR stage, it assumed that these activities could occur anywhere within the Maisemore Weir works boundary.

7.4.5 The Study Area for the assessment of vibration associated with the removal of the weir is 100 m from



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the Maisemore Weir works boundary, as there is a negligible risk of effects occurring beyond this distance.

7.4.6 For the assessment of noise and vibration from road traffic during the removal of the weir and operation, the initial Study Area is based on identifying where the proposed compensation measures at Maisemore Weir would lead to a change in traffic flows on the road network which would cause a change in the Basic Noise Level of 1dB LA10,18hr or greater, based on guidance set out in DMRB LA 111.

## Baseline

### Current Baseline

7.4.7 Based on a desktop review of the local area, the baseline noise environment is likely to be influenced by local wildlife, agricultural activities, traffic on the A417 and A40. In general, the baseline noise climate at the nearest residential receptors is expected to be typical of a rural location, with low background levels.

7.4.8 The key receptors and the approximate distance to the Maisemore Weir works boundary are summarised in **Table 7-8**.

**Table 7-8: Noise and vibration receptors**

Receptor Description	Approximate distance to Maisemore Weir works boundary (m)
Residential properties in Maisemore village	250
Residential properties along Church Road	460

### Future Baseline

7.4.9 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

7.4.10 At the PEIR stage, various details regarding the removal of the weir and operation of the proposed compensation measures at Maisemore Weir are not

known. In particular, the likely plant for the works and equipment have not been identified, and the programme of works is not defined.

- 7.4.11 The identification of receptors has been undertaken using aerial photography, and the planning status of potential sensitive receptors has not been confirmed.
- 7.4.12 Professional experience has been used during the evaluation of potential noise and vibration effects.

### Likely Significant Effects

- 7.4.13 There are no activities that are expected to occur during the operation of the proposed compensation measures at Maisemore Weir that could give rise to significant noise or vibration effects. Therefore, it is proposed to scope out the assessment of operational noise and vibration from the ES.
- 7.4.14 As no receptors are within the Study Area for vibration associated with the removal of the weir, no significant vibration effects are likely to occur. It is therefore proposed to scope out the assessment of vibration associated with the removal of the weir from the ES.
- 7.4.15 The removal of Maisemore Weir is expected to involve the use of inherently noisy plant and equipment, with

the potential to cause temporary noise disturbance at local receptors.

- 7.4.16 As residential receptors are located within the adopted Study Areas for the removal of the weir, it is considered that the level of noise at receptors during the removal could give rise to significant noise effects.
- 7.4.17 BS 5228-1 refers to a period of 10 days as a temporal threshold above which significant effects due to noise associated with the removal of the weir might be experienced. The removal activities could occur over a period greater than 10 days. Therefore, it is considered that the duration of noise at receptors during the removal could give rise to significant noise effects.
- 7.4.18 Based on the indicative traffic flow information presented in **Section 7.3 Transport**, there is no potential for adverse effects for receptors near the major routes (i.e., the A417, A40, M50 and M5), as high baseline flows mean that additional construction related traffic will not cause a change in the Basic Noise Level of 1dB  $L_{A10,18hr}$  or greater.
- 7.4.19 Smaller roads surrounding Maisemore Weir are likely to have baseline flows below the limit of validity for BNL calculations in CRTN (i.e., less than 50 vehicles per hour or 1000 vehicles per day). When considering potential effects at receptors along these roads,

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guidance published by the Noise Advisory Council has been used to identify potential significant effects.

7.4.20 Calculations undertaken using the Noise Advisory Council guidance demonstrate that the indicative traffic flows during removal presented in **Section 7.3 Transport** would not be sufficient to give rise to levels at receptors along these routes above 55 dB LA10,18hr, which is the Lowest Observed Adverse Effect Level (LOAEL) set out in DMRB LA111.

7.4.21 It is therefore considered that there is no potential for significant noise and vibration effects due to off-site road traffic during removal. It is proposed to scope out the assessment of off-site road traffic during the removal of the weir from the ES.

### Proposed Scope

7.4.22 Based on the above assessment, **Table 7-9** presents the potential noise and vibration effects that are proposed to be scoped out of requiring further assessment, along with the rationale.

**Table 7-9: Summary of noise and vibration elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Potential noise and vibration effects during operation the proposed compensation measures at Maisemore Weir.	OUT	There are no activities expected to occur during the operation of the proposed compensation measures at Maisemore Weir that could give rise to significant noise or vibration effects.
Potential noise effects due to emissions from site plant and machinery.	IN	The removal of Maisemore Weir is expected to involve the use of inherently noisy plant and equipment. Temporary noise disturbance could occur at local receptors located within the Study Area for noise associated with removal of the weir.
Potential vibration effects due to emissions from site plant and machinery.	OUT	No receptors are within the Study Area for vibration associated with the removal of the weir, and no significant vibration effects are likely to occur.
Potential noise and vibration effects due to	OUT	Based on the indicative traffic flow information there is no potential for

[edfenergy.com](http://edfenergy.com)

Potential Effect	Scoped IN or OUT	Justification
emissions from construction traffic off-site		significant noise or vibration effects to occur.

7.4.23 In general, the assessment of noise and vibration associated with the removal activities shall follow the guidance set out in BS 5228-1 and BS 5228-2.

7.4.24 The selected magnitude scale and assessment thresholds, including SOAEL and LOAEL values, that will be adopted in the ES shall be discussed with the relevant stakeholders.

7.4.25 BS 5228-1 sets out various suitable methodologies for the assessment of noise associated with the removal of the weir. These are based on either absolute thresholds (i.e. independent of existing noise levels) and relative thresholds (i.e. set in relation to the existing noise levels). If the thresholds agreed with the relevant stakeholders are based on relative thresholds, then a survey of existing noise levels will be undertaken.

7.4.26 Should other receptor types be identified, reference will be made in the ES to other absolute noise criteria such as those presented in BS8233 and by the WHO.

7.4.27 The ES shall set out suitable noise and vibration control measures, in accordance with best practicable means (BPM) principles, that would be adopted during the removal of the weir.

## 7.5 Air Quality

### Introduction

7.5.1 The aims of this section are to evaluate the potential effects of the proposed compensation measures at Maisemore Weir on air quality at sensitive human and ecological receptors.

7.5.2 The assessment considers the following matters:

- potential impacts arising from dust and particulate matter emissions generated during the removal of Maisemore Weir;
- potential impacts on air quality due to emissions from associated on-site plant and machinery; and
- potential impacts on air quality due to emissions from the removal of the weir and operational-related off-site traffic.

7.5.3 There are no potential impacts from dust and particulate matter emissions generated during operation following the removal of Maisemore Weir.

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## Study Area

- 7.5.4 For dust emissions during the removal of the Maisemore Weir, the assessment of human receptors focuses on areas up to 250 m from the Maisemore Weir works boundary or up to 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site exit(s). For ecological receptors, the assessment focuses on areas up to 50 m from the Maisemore Weir works boundary or up to 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site exit(s). This distance is based on the IAQM proposed works dust guidance<sup>258</sup>.
- 7.5.5 Human receptors include locations where members of the public could be present for both short or long periods, for example residential properties, schools, hospitals, doctors' surgeries, places of worship, streets, shops, playing fields or parks and PRoW; including footpaths and bridleways.
- 7.5.6 An ecological receptor (also referred to in this section as 'protected conservation areas') refers to any designated habitat that might be sensitive to dust

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<sup>258</sup> Institute of Air Quality Management (IAQM) (2023). Assessment of dust from demolition and construction 2023 v2.1. August 2023.

soiling. These can include European sites (i.e. SAC, SPA and Ramsar sites), a SSSI and other nature sites (i.e. ancient woodlands, NNR, LWS and LNR).

## Baseline

### Current Baseline

#### *Sensitive human receptors*

- 7.5.7 The closest residential property to Maisemore Weir is Maisemore Lock House, which is adjacent to the Maisemore Weir works boundary. A public footpath is adjacent to the northern edge of the Maisemore Weir works boundary.

#### *Sensitive ecological receptors*

- 7.5.8 There are no relevant ecological receptors within the study area. The closest ecological receptor to the Maisemore Weir works boundary is The Reddings ancient and semi-natural woodland, which is approximately 1.3 km west-southwest at its closest point.

*Air quality*

7.5.9 A review of baseline air quality was carried out prior to undertaking the air quality assessment. The following baseline sources were reviewed:

- UK-AIR<sup>259</sup>; and
- Gloucester City Council air quality monitoring survey<sup>260</sup>.

7.5.10 As part of the LAQM process, Gloucester City Council carries out regular assessments and monitoring of air quality within its administrative boundary. The most recent Air Quality Annual Status Report<sup>260</sup> was reviewed to determine concentrations of NO<sub>2</sub> in the vicinity of Maisemore Weir. It should be noted Gloucester City Council has declared three AQMAs within its administrative boundary. The closest AQMA to the Maisemore Weir works boundary is termed 'Priory Road AQMA', which was declared by Gloucester City Council of elevated annual mean NO<sub>2</sub> concentrations in 2005. The AQMA is approximately 2.8 km south-southeast of Maisemore Weir. During 2021, Gloucester City Council undertook monitoring at

non-automatic monitoring (i.e., diffusion tubes) at 22 monitoring locations for NO<sub>2</sub>. None of the remaining assessed pollutants are monitored by Gloucester City Council.

7.5.11 **Table 7-10** presents information on the nearest monitoring locations to the Maisemore Weir works boundary.

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<sup>259</sup> Department for Environment, Food and Rural Affairs (Defra) Welsh Government, The Scottish Government, and Department of Agriculture, Environment and Rural Affairs (Northern Ireland) (2023). UK Air Information Resource.

<sup>260</sup> Gloucester City Council (2022). Annual Progress Report 2022. Bureau Veritas, August 2022.

**Table 7-10: Nearest monitoring locations to the Maisemore Weir works boundary**

Site ID / Description	Site type	Location	Distance and direction from Maisemore Weir works boundary	2021 Annual mean concentration ( $\mu\text{g}/\text{m}^3$ )
23 / 46 Priory Road	Roadside	E 382898 N 219029	2.9 km, SE	34.1 (NO <sub>2</sub> )
24 / 56 Priory Road	Roadside	E 382921 N 219034	2.9 km, SE	37.6 (NO <sub>2</sub> )
25 / 66 Priory Road	Roadside	E 382950 N 219040	2.9 km, SE	35.1 (NO <sub>2</sub> )
27 / 38 Priory Road	Roadside	E 382818 N 218993	2.8 km, SE	25.1 (NO <sub>2</sub> )

The Environmental Quality Standard (EQS) for annual mean NO<sub>2</sub> concentrations is 40  $\mu\text{g}/\text{m}^3$ .

7.5.12 Although the annual mean concentrations recorded are well below the relevant EQS (i.e. for the purposes of reporting, the relevant AQOs (i.e. an objective is the target date on which exceedances of a Standard must not exceed a specified number) have been collectively termed as EQSs)) (see **Table 7-10**), the non-automatic monitoring locations presented in **Table 7-10** are not considered representative of conditions experienced at Maisemore Weir due to the distance from the Maisemore Weir works boundary and / or monitoring site type.

7.5.13 Information on background air quality in the vicinity of the Maisemore Weir works boundary was obtained

from Defra background map datasets<sup>259</sup>. The 2018-based background maps, which are the latest available by Defra, are estimates based upon the principal local and regional sources of emissions and ambient monitoring data. For SO<sub>2</sub> and CO concentrations, the 2001-based background maps<sup>259</sup>, which are the latest available, were used. These background concentrations are presented in **Table 7-11**.

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**Table 7-11: Background concentrations: adopted for use in assessment for human receptors and protected conservation areas**

Pollutant	Annual mean concentration ( $\mu\text{g}/\text{m}^3$ )	Description
NO <sub>2</sub>	7.2 – 7.4	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration
NO <sub>x</sub>	9.3 – 9.5	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration
CO	115 - 119	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2001 based map concentration
PM <sub>10</sub>	12.4 – 12.9	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration
PM <sub>2.5</sub>	7.8 – 8.0	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration
SO <sub>2</sub>	2.1 – 2.2	Defra 1 km x 1 km background map value for the assessed sensitive

Pollutant	Annual mean concentration ( $\mu\text{g}/\text{m}^3$ )	Description
		human receptor locations, 2001 based map concentration
<p>PM<sub>10</sub>, particles with an aerodynamic diameter of 10 microns or less and PM<sub>2.5</sub>, particles with an aerodynamic diameter of 2.5 microns or less</p> <p>The EQS for annual mean NO<sub>2</sub> concentrations is 40 <math>\mu\text{g}/\text{m}^3</math>. The EQS for annual mean PM<sub>10</sub> and PM<sub>2.5</sub> concentrations is 40 <math>\mu\text{g}/\text{m}^3</math> and 20 <math>\mu\text{g}/\text{m}^3</math>, respectively. There is no EQS for annual mean CO and SO<sub>2</sub>.</p>		

7.5.14 The annual mean pollutant concentrations from the Defra background maps are well below the relevant EQS.

#### Future Baseline

7.5.15 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline described.



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## Assumptions and Limitations

7.5.16 The following assumptions and limitations apply to this assessment:

- The assessment provided is based on information available at the time of writing.
- The assessment takes account of best practice mitigation prior to the determination of effects.

## Likely Significant Effects

7.5.17 It should be noted the value of a receptor is incorporated into the specific methods prescribed in the IAQM construction dust guidance<sup>258</sup>. The approach described does not directly align with the overall approach to the categorisation of the value of receptors, magnitude of change and determination of the significance level set out in the EIA significance matrix. This is because the IAQM construction dust guidance<sup>258</sup> on this subject relates to defining whether an air quality effect is significant or not across the study area as a whole, rather than at individual properties, or at specific sensitive ecological sites. As set out in the IAQM construction dust guidance<sup>258</sup>, it is not appropriate to define a level of significance to air quality effects.

## Emission from dust during the removal of Maisemore Weir

7.5.18 For emissions from dust during the removal of the Maisemore Weir, based on the IAQM construction dust guidance<sup>258</sup>, the anticipated demolition, earthworks and trackout (i.e. the transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network) activities are considered to have the potential to generate a small dust emission magnitude. It should be noted the likely minimal removal activities anticipated means removal was scoped out of the assessment.

7.5.19 A further description of the methodology of the dust risk assessment is provided in the IAQM construction dust guidance<sup>258</sup>.

7.5.20 Based on the relationship between the sensitivity of the study area and the likely dust emission magnitude as set out in the IAQM construction dust guidance<sup>258</sup>, the proposed demolition, earthworks and trackout activities are predicted to have a negligible to low risk for potential dust soiling impacts (in the absence of mitigation).

7.5.21 There is the potential for infrequent, short-term episodes when baseline dust deposition rates could be

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increased by an amount that nearby human receptors could perceive. With regard to human health impacts, following the approach set out in the IAQM construction dust guidance<sup>258</sup>, there is predicted to be a negligible to low risk from demolition, earthworks and trackout activities (in the absence of mitigation) as there is limited potential for emissions of PM<sub>10</sub> and PM<sub>2.5</sub> to increase baseline conditions to a value that is above the AQO values for the protection of human health.

7.5.22 Therefore, it would be necessary to adopt good practice mitigation measures to reduce the risk of causing a significant effect to nearby human and ecological receptors. Examples of good practice mitigation measures are presented in the IAQM construction dust guidance. The mitigation measures taken forward would prevent or reduce potential nuisance dust or PM<sub>10</sub> (including PM<sub>2.5</sub>) emissions, which are associated with health impacts, such as exacerbating existing human health conditions including asthma and other lung conditions. Measures such as those specified in the guidance would normally be sufficient to reduce construction dust nuisance and

risks to human health and ecological receptors to a 'not significant' effect.

### **Emissions from plant and machinery**

7.5.23 Plant and items of machinery would likely be used for the removal of the Maisemore Weir. As there would only be a relatively low number of these plant and machinery in operation for only a limited duration and spread across the Maisemore Weir works boundary, it is not considered that there would be any likely significant effects on air quality due to emissions from on-site plant and machinery and it is therefore proposed that this is scoped out of the assessment.

### **Emissions from construction traffic off-site**

7.5.24 The number of construction traffic vehicles used for the removal of the Maisemore Weir is likely to be below the EPUK and IAQM screening criteria<sup>261</sup> for identifying roads where there is the potential for a significant effect on local air quality and the need for an air quality assessment. It is not considered likely that there would be any significant effects on air quality due to emissions

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<sup>261</sup> Environmental Protection UK (EPUK) & the Institute of Air Quality Management (IAQM) (2017). Land-Use Planning & Development Control: Planning for Air Quality, v1.1. January 2017.

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from construction traffic off-site and it is therefore proposed that this is scoped out of the assessment.

### Emissions from operational-related off-site traffic

7.5.25 The number of operational-related traffic vehicles used following the removal of the Maisemore Weir is also likely to be below the EPUK and IAQM screening criteria<sup>261</sup> for identifying roads where there is the potential for a significant effect on local air quality and the need for an air quality assessment. It is not considered likely that there would be any significant effects on air quality due to emissions from operational-related off-site traffic and it is therefore proposed that this is scoped out of the assessment.

### Proposed Scope

7.5.26 Based on the above assessment, **Table 7-12** presents the potential air quality impacts that are proposed to be scoped out of requiring further assessment, along with the rationale for the choice.

**Table 7-12: Summary of air quality elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Potential dust soiling, human health and ecological impacts arising from dust and particulate matter emissions generated during the removal of Maisemore Weir	OUT	Activities associated with the removal of Maisemore Weir have the potential to generate dust, which can cause annoyance and have health effects on local residents and cause harm to nearby ecological receptors. However, providing good practice mitigation measures (as recommended in the IAQM construction dust guidance <sup>258</sup> ) are implemented during the removal of Maisemore Weir, the impact at nearby human receptors is considered to be negligible (i.e. not significant).
Impacts on air quality due to emissions from site plant and machinery	OUT	Given that relatively low numbers of plant and items of machinery would likely be used for only a limited duration and spread across the Maisemore Weir works boundary, the associated potential effects on air quality are

Potential Effect	Scoped IN or OUT	Justification
		considered to be negligible (i.e. not significant).
Impacts on air quality due to emissions from construction traffic off-site	OUT	The predicted construction traffic flows associated with the removal of Maisemore Weir are likely to be less than the EPUK and IAQM screening criteria <sup>261</sup> . Therefore, the likely effects on air quality are considered to be negligible (i.e. not significant).
Impacts on air quality due to emissions from operational-related off-site traffic	OUT	The predicted operational-related traffic flows associated with the proposed compensation measures at Maisemore Weir are likely to be less than the EPUK and IAQM screening criteria <sup>261</sup> . Therefore, the likely effects on air quality are considered to be negligible (i.e. not significant).

7.5.27 Therefore, it is proposed air quality is scoped out of the ES.

<sup>262</sup> National House Building Council and Environment Agency guidance (2008). Guidance for the Safe Development of Housing on Land Affected by Contamination

## 7.6 Soils and Land Use

### Introduction

7.6.1 This section describes the current environmental baseline for soils and land-use at Maisemore Weir and the potential impacts which may be associated with the proposed compensation measures at Maisemore Weir.

### Study Area

7.6.2 The potential impacts on soils and land use are likely to be limited to direct disturbance during removal activities, and therefore impacts are expected to be very localised. However, there is the possibility of contaminants being mobilised as a result of site disturbance which may impact soil quality, and so a study area of the Maisemore Weir works boundary with a 250 m buffer in all directions around the Maisemore Weir work boundary is considered appropriate. The 250 m influencing distance has been chosen based on NHBC and Environment Agency guidance (2008)<sup>262</sup>. This distance is considered appropriate and proportionate in the context of the proposed compensation measures at Maisemore Weir,

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considering the distance over which contamination or ground gases can migrate.

## Baseline

### Current Baseline

7.6.3 The following sources of information have been used to obtain the baseline information discussed in this chapter:

- Provisional Agricultural Land Classification<sup>263</sup>;
- Multi-agency Geographic Information for the Countryside ('MAGIC') Maps<sup>264</sup>;
- Groundsure Enviro Data Viewer<sup>265</sup>; and
- Soilscales Online viewer<sup>266</sup>.

### Soils and Land Use

7.6.4 The resource value of soil is primarily measured by its ability to support agricultural uses. This is quantified by its ALC grade which is determined through climatic, topographical, and interactive soil limitations. This is defined with six grades outlined within the *ALC for*

*England and Wales: Revised criteria for Grading the Quality of Agricultural Land*, as follows:

- Grade 1 (excellent quality);
- Grade 2 (very good quality);
- Subgrade 3a (good quality);
- Subgrade 3b (moderate quality);
- Grade 4 (poor quality); and
- Grade 5 (very poor quality).

7.6.5 Grades 1 to Subgrade 3a are determined as BMV land. BMV agricultural land is the most flexible land in terms of the range of crops that can be grown, the level and consistency of yield and the cost of obtaining the yield and offers the best prospect for both food and non-food crop production.

7.6.6 Pre-1988 ALC data are available for the study area which provides provisional data without site-specific detail. The provisional ALC data do not differentiate between ALC Subgrades 3a (which qualifies as BMV land) and Subgrade 3b. Therefore, at this stage it is

<sup>263</sup> Natural England. (2022). Provisional Agricultural Land Classification ('ALC'). [\[Online\]](#) Accessed 4 December 2023

<sup>264</sup> DEFRA (2023). MAGIC Maps. [\[Online\]](#) Accessed 4 December 2023

<sup>265</sup> Groundsure (2023). Groundsure Enviro Data Viewer. [\[Online\]](#) Accessed 4 December 2023

<sup>266</sup> Soilscales (2023). Online viewer. [\[Online\]](#) Accessed 4 December 2023

conservatively assumed that all Grade 3 land is Subgrade 3a.

7.6.7 These provisional data show the Maisemore Weir works boundary is classified as Grade 3 agricultural land, and in the absence of further data should be assumed to be Grade 3a.

7.6.8 Soils may also be of importance in supporting sites of ecological importance, therefore a high-level review of soil types has been undertaken using the Soilscales web viewer<sup>266</sup>. Soilscales conveys a summary of the broad regional differences in the soil landscapes of England and Wales.

7.6.9 Soilscales identifies the study area to be 20- Loamy and Clayey Floodplain Soils with naturally high groundwater.

### Future Baseline

7.6.10 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site takes into account changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future

baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

7.6.11 The assessment is currently based on desk-top information, using publicly available datasets. No site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings presented.

7.6.12 Only provisional ALC data were available for review at the time of this assessment.

7.6.13 The assessment provided is based on information available at the time of writing and a high level of uncertainty remains at this stage.

### Likely Significant Effects

#### Soils and Land Use

- 7.6.14 Soils may be impacted in the following ways:
- Permanent or temporary loss of soils due to the works.
  - Degradation of soils during stripping, handling and storage, through mechanisms such as erosion, compaction and smearing.

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- The deposition of potentially contaminated fugitive dust from machinery used during the removal of the weir may also impact soil quality.
- Soil quality may also be degraded by mobilising contaminants or from potentially contaminated surface water run-off.
- Loss or disturbance of agricultural land, potentially Grade 3a BMV soils.
- The potential areas of loss are likely to be limited to those areas which will be directly disturbed (i.e., working areas on the river banks either side of the weir).

At this early stage and in the absence of further data or more detailed assessment there may be the potential for significant effects associated with either soils or land use.

### Proposed Scope

7.6.15 Based on the above assessment, **Table 7-13** presents the potential soils and land use impacts that are proposed to be scoped in, requiring further assessment, along with the rationale for the choice.

**Table 7-13: Summary of soils and land use elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Loss of soils and soil quality as a result of the works.	IN	As there will be disturbance, excavations and potential loss of soils and soil quality in this area soils have been scoped in for assessment of the proposed compensation measures at Maisemore Weir.
Loss or and disturbance to agricultural land	IN	There may be the potential loss of Grade 3 soils, which should be assumed to be Grade 3a (BMV) in the absence of further information, land use in terms of ALC has therefore been scoped in for assessment of the proposed compensation measures at Maisemore Weir.

7.6.16 Therefore, it is proposed soils and land use is scoped in for the ES.

7.6.17 A desk study has not been completed at this stage and as such it has not been possible to fully establish baseline conditions at Maisemore Weir, a full desk

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study will be undertaken and discussed/included within the ES.

## 7.7 Geology and Land Contamination

### Introduction

7.7.1 This section describes the current environmental baseline related to geology and potential land contamination at Maisemore Weir and the potential impacts associated with the proposed compensation measures at Maisemore Weir.

### Study Area

7.7.2 For the study area, a 250 m buffer in all directions around the Maisemore Weir works boundary is considered appropriate. The 250 m influencing distance has been chosen based on NHBC and Environment Agency guidance (2008)<sup>262</sup>. This distance is considered appropriate and proportionate in the context of the removal of the weir, considering the

distance over which contamination or ground gases can migrate.

### Baseline

#### Current Baseline

7.7.3 The following sources of information have been used to obtain the baseline information discussed in this chapter:

- Geo Index Map<sup>267</sup>;
- MAGIC Maps<sup>264</sup>;
- Groundsure Enviro Data Viewer<sup>265</sup>;
- Historic Landfill Sites<sup>268</sup>;
- National Library of Scotland Historical mapping<sup>269</sup>; and
- Minerals Local Plan for Gloucestershire 2018-2032<sup>270</sup>.

<sup>267</sup> BGS. (2023). Geo Index Map. [\[Online\]](#) Accessed 4 December 2023

<sup>268</sup> Environment Agency (2023) Historical Landfill Sites. [\[Online\]](#) Accessed 4 December 2023

<sup>269</sup> National Library of Scotland. (2023). Historical mapping [\[Online\]](#) Accessed 4 December 2023

<sup>270</sup> Gloucestershire County Council (2020). Minerals Local Plan for Gloucestershire 2018-2032.



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*Geology*

- 7.7.4 Aquifer designations are not covered within this section as they are discussed in the baseline of **Section 7.8 Groundwater**.
- 7.7.5 The BGS Geo Index shows the majority of the weir and study area to be underlain by Alluvium of clay, silt, sand and gravel. The land directly adjacent to the North of the weir has no superficial deposits according to the BGS Geo Index.
- 7.7.6 A small outcrop of Holt Heath Sand and Gravel Member lies further north of Maisemore Weir. Head Deposits are noted to the west of Maisemore Weir.
- 7.7.7 The BGS Geo Index shows the bedrock geology to be Rugby Limestone Member consisting of mudstone and limestone, interbedded.
- 7.7.8 The BGS Geo Index does not show any areas of artificial ground within the study area.
- 7.7.9 There are no BGS borehole records recorded within the study area.
- 7.7.10 There are no geological SSSIs recorded within the study area.

- 7.7.11 There is no information available at this stage relating to the presence of Geological Conservation Review sites or geological sites of local or regional importance.
- 7.7.12 The Maisemore Weir works boundary is located in a MSA for Sand and Gravel as identified in the Minerals Local Plan for Gloucestershire<sup>270</sup>.

*Historical and Current Land Use*

- 7.7.13 Limited information is available relating to current and historical land use. A review of the publicly available National Library of Scotland mapping<sup>269</sup> has been completed in order to assess the potential for land contamination at Maisemore Weir.
- 7.7.14 The study area is located in a rural setting consisting of agricultural land use, with Maisemore Weir located on the River Severn.
- 7.7.15 The weir is surrounded by farmland, with a residential building, immediately south on the southern bank.
- 7.7.16 The weir was constructed in the 1870s, and is a large, shallow, broad crested weir.

**Potential sources of contamination**

- 7.7.17 There may be the potential for contamination related to the following;

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- Any fertilisers or pesticides which may have been applied to the agricultural land.
- Potential for contamination within any Made Ground which may be present around the weir.

7.7.18 There are no historical landfills recorded within the study area.

**Future Baseline**

7.7.19 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

**Assumptions and Limitations**

7.7.20 This study is based on a desk-based assessment only and no site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings presented.

7.7.21 Limited historical mapping was available for review at the time of writing this report. A full set of historical maps will be required in further stages of the assessment.

7.7.22 The assessment is limited to publicly available information at the time of writing this PEIR and a high level of uncertainty remains at this stage.

**Likely Significant Effects**

7.7.23 There may be the following impacts associated with the works:

**Geology**

7.7.24 Impacts may include temporary or permanent loss of a geological site (or part of it), for example by covering with stockpiles, or damaging key characteristics and features. Impacts may also include temporary or permanent loss of access to Maisemore Weir.

7.7.25 Impacts may also include enhancement through exposing a feature or increasing access to a rock exposure.

7.7.26 The Maisemore Weir works boundary is within an MSA for sand and gravel and so there is the potential for

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sterilisation of mineral resources because of the proposed compensation measures.

### Land Contamination

- 7.7.27 Disturbance of potentially contaminated soils may create new pathways for contaminants to impact receptors directly or indirectly because of mobilisation of contamination via creation of new pathways.
- 7.7.28 The disturbance of land contamination during the removal of the weir may result in unacceptable risks to workers or maintenance workers resulting from exposure to contaminants in soils via ingestion, inhalation, or dermal contact.
- 7.7.29 Additionally, ground gas from potential Made Ground and natural strata containing high amounts of organics (such as Alluvium) could accumulate within excavations and confined spaces resulting in explosive or asphyxiant hazards.
- 7.7.30 There may also be potentially unacceptable risks to nearby site users from the creation of fugitive dust and vapours from potentially contaminated soils disturbed during the works.
- 7.7.31 There may be risks posed to surface water quality of the River Severn, groundwater quality and ecological

receptors from the disturbance and mobilisation of contamination.

- 7.7.32 At this early stage and in the absence of further data or more detailed assessment there may be the potential for significant effects associated with either geology or land contamination.

### Proposed Scope

- 7.7.33 Based on the above assessment, **Table 7-14** presents the potential geology and land contamination impacts that are proposed to be scoped in, requiring further assessment, along with the rationale for the choice.

**Table 7-14: Summary of geology and land contamination elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Impacts related to geology/geological features	IN	Scoped in, at this stage for the removal of the weir and operational stages as there is not sufficient information relating to the presence of geological features to complete an assessment.

Potential Effect	Scoped IN or OUT	Justification
Impacts related to the disturbance of potentially contaminated land.	IN	There is currently limited information available relating to the history of Maisemore Weir and the potential for contamination to be present within soils, therefore land contamination is scoped in for assessment of the proposed compensation measures at Maisemore Weir.
Sterilisation of Mineral Resources	IN	The works boundary works boundary is within a MSA.

7.7.34 Therefore, it is proposed geology and land contamination is scoped in for the ES.

7.7.35 A desk study has not been completed at this stage and as such it has not been possible to fully establish baseline conditions at Maisemore Weir, a full desk study will be undertaken and discussed/included within the ES. GI may also be required at a later stage to confirm ground conditions and further assess the potential for contamination.

## 7.8 Groundwater

### Introduction

7.8.1 The assessment to determine the significance of effects for the groundwater environment in this PEIR is based on known groundwater receptors and the proposed compensation measures at Maisemore Weir.

7.8.2 A high-level, conceptual review of hydrogeological processes has been undertaken for the PEIR. This is based on available desk-based information only. This information has then been used to determine how the proposed compensation measures at Maisemore Weir could impact on identified groundwater receptors.

### Study Area

7.8.3 For the groundwater study area, a 1 km buffer in all directions around the Maisemore Weir works boundary is considered appropriate. This is based on professional experience regarding the maximum potential extent of effects likely on groundwater receptors in the type of aquifers present, and the uncertainties associated with the degree of heterogeneity of these aquifers.

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## Baseline

### Current Baseline

#### *Geology and Aquifer Designation*

- 7.8.4 The geology baseline is described in **Section 7.7 Geology and Land Contamination**. However, a brief summary is provided here.
- 7.8.5 The Maisemore Weir works boundary and wider study area is mainly underlain by superficial deposits of alluvium (comprised of clay, silt, sands and gravels), which follow the course of the River Severn and its floodplain. Part of the Maisemore Weir works boundary to the northwest is shown on BGS mapping to be absent of underlying superficial deposits. Within the wider study area to the east there are isolated deposits of Cheltenham sand and gravel. To the west of the Maisemore Weir works boundary are isolated areas of Kidderminster Station Member (sands and gravels), Holt Heath Sand and Gravel Member, Worcester Member (sands and gravels) and head deposits. All superficial aquifer, excluding head deposits, are classified as Secondary A aquifers, with the head deposits classified as Secondary (undifferentiated) aquifers.

- 7.8.6 Within the wider 1 km study area there are large areas to the west which are absent of superficial deposits.
- 7.8.7 Bedrock at Maisemore Weir is mainly the Rugby Limestone Member, comprised of interbedded mudstone and limestone. This is classified as a Secondary A aquifer.
- 7.8.8 To the west of the 1 km study area bedrock is comprised of the Saltford Shale Member, which is classified as a secondary B aquifer. Additionally, in the wider study area to the south deposits of Charmouth Mudstone Formation are present, which classify as a secondary (undifferentiated) aquifer.

#### *Groundwater levels*

- 7.8.9 There are no Environment Agency or BGS groundwater monitoring locations available in close proximity to Maisemore Weir. There are also no available historical borehole records located within the Maisemore Weir works boundary to provide an indication of groundwater seeps, strikes, or rest water levels. Additionally, no GIs have been undertaken at Maisemore Weir.
- 7.8.10 Within the wider study area, there are multiple historical BGS borehole records to the south of the study area. Where encountered, groundwater strikes/

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seepages are recorded between 0.9-13.65 mbgl, with the majority of strikes and seepages encountered around 2-3 mbgl. However, given the distance of these historical boreholes from the Maisemore Weir works boundary they are unlikely to accurately represent groundwater levels within the immediate environs of the weir.

- 7.8.11 Given, the location of Maisemore Weir and the tidal influences on the river there is potential that the groundwater levels are also influenced by the tides. However, the extent of this tidal influence and the lag time in tidal response is unclear at this stage.

*Connection to hydrological features*

- 7.8.12 The local groundwater may be connected (either directly or indirectly) to watercourses (as baseflow, sinks, sources, spreads, collects, issues etc.), and spring discharges. Changes to groundwater quality and levels beneath Maisemore Weir may therefore influence water quality and / or flows in these watercourses/hydrological features or vice versa. On OS mapping there are no springs, sinks, sources, or collects, shown within the Maisemore Weir works boundary or the wider study area. One issue is located in Maisemore to the west of the weir, which could be sourced from groundwater.

- 7.8.13 The Maisemore Weir works boundary is located across the River Severn which could be receiving baseflow contributions from both the alluvium and underlying bedrock, which are both classified as secondary A aquifers. Additionally, within the study area there are multiple drains which could be interacting with shallow groundwater, if present.

*Groundwater as a resource*

- 7.8.14 There are no SPZs within the groundwater study area or its vicinity. This indicates that there are no licensed groundwater abstractions used for public water supply.
- 7.8.15 No information on licensed or private groundwater abstractions have been requested at this stage, therefore the presence or absence of groundwater abstractions cannot be determined. Information on groundwater abstractions will be requested and assessed at ES stage. It should be noted however, that for most PWSs there is an onus on the abstraction owner to provide details to the Local Authority. As such, there may be other PWSs which the Local Authority is not aware of.
- 7.8.16 No wells are shown on OS mapping to be present within the Maisemore Weir works boundary or wider study area.

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7.8.17 Discharges of liquids to ground or groundwater may be occurring within the groundwater study area. However, no information on licensed discharges to groundwater has been requested at this stage. Information on groundwater discharge will be requested and assessed at ES stage.

*Groundwater Dependent Terrestrial Ecosystems*

7.8.18 There are no statutory designated sites within the study area. However, within the study area there are large areas to the north, east and south of Maisemore Weir designated as a coastal and floodplain grazing marsh Habitat of Priority Importance (HPI). This type of habitat has the potential to contain GWDTE.

*Groundwater Vulnerability*

7.8.19 The Maisemore Weir works boundary and majority of the study area is classified as having a medium to high groundwater vulnerability. Where superficial deposits are absent the groundwater vulnerability increases to high. This relates to the ease at which contaminants can migrate into an aquifer from ground level. The entire study area also has a soluble rock risk.

*Water Framework Directive*

7.8.20 The Maisemore Weir works boundary overlies a WFD groundwater body the Severn Vale-Secondary Combined waterbody Groundwater body (GB40902G204900). This WFD waterbody has a good overall status with both good chemical and quantitative status.

**Future Baseline**

7.8.21 The groundwater baseline of the site is unlikely to change significantly. However, conditions relating to climate change for groundwater include the potential for increased frequency and magnitude of groundwater flooding events.

7.8.22 Groundwater flooding may be exacerbated where the events are linked to fluvial flooding and shallow, near-surface Secondary aquifers.

**Assumptions and Limitations**

7.8.23 No GIs have been undertaken at Maisemore Weir to confirm groundwater conditions. Therefore groundwater has conservatively been assumed as being at or near ground level. Additionally tidal influences on groundwater cannot be determined due

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to there being no continuous groundwater monitoring within or in close proximity to Maisemore Weir.

7.8.24 No information on licensed and private groundwater abstractions and licensed discharges to ground have been requested at this stage. As a result, any significant impacts cannot be ruled out at this stage.

7.8.25 No site visits or walkover surveys or UKHab surveys have been undertaken at potential GWDTE sites. From the desk study there is potential for the Maisemore Weir works boundary to contain GWDTE however the presence and/ or groundwater dependency of any GWDTE cannot be determined at this stage and would require further assessment to be able to determine if any impacts would be significant.

7.8.26 The assessment takes account of best practice mitigation prior to the determination of effects.

7.8.27 At PEIR stage it is assumed that a full weir removal is to take place. Therefore, the following assumptions have been made:

- For topsoil stripping and vegetation clearance a maximum depth of 0.5 m has been assumed.
- The channel will temporarily be pumped dry during weir removal with a bypass flow in place.

- Minor excavation may be required to remove any foundations which could cause nuisance seepage to be controlled.

### Likely Significant Effects

#### Removal of the weir

7.8.28 During the removal, it is considered likely that potential impacts to groundwater features (including superficial and bedrock aquifers, and associated groundwater receptors, such as licensed abstractions, PWS, GWDTE etc.) could arise from several activities including;

- Physical contamination of groundwater from ground disturbance such as soil stripping, haul roads and compounds.
- Mobilisation of suspended solids and accidental leaks and spills during the removal of the weir, especially within the channel could impact groundwater quality in the underlying aquifer and any secondary receptors.
- Changes to groundwater levels and flows from the removal of any below ground structures (e.g. foundations). Removal of any sub surface structures could require minor excavations which may require groundwater control to manage nuisance seepage. At an aquifer scale such

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impacts should be negligible, however significant impacts to potential groundwater receptors such as abstractions and GWDTE cannot be ruled out at this stage.

- Temporary Bypass flow of the channel during the weir removal could cause a reduction in local groundwater levels and flows if the river is in hydraulic continuity with the underlying aquifer. Any changes would be short-lived and negligible on a groundwater body scale. However, any temporary bypass flow could have a significant impact on flows to nearby groundwater receptors such as GWDTE and abstractions, if present.

### Operation

7.8.29 Changes to groundwater levels, flows and quality, due to the removal the weir could occur due to changes to baseflow conditions locally. By removing the weir and re-establishing the natural channel bed there is the potential to create more connectivity between the aquifer and channel, hence improving baseflow conditions.

7.8.30 Additionally, by removing the weir and re-establishing the natural channel bed more groundwater flow could reach any GWDTE which may be present and help to sustain the habitats. More connectivity between the aquifer and channel could be established therefore

having a positive impact to GWDTE. However, it should be noted that any existing established habitats could be reliant on the equilibrium between artificial water levels in the river and surrounding aquifers. Therefore, by returning the area to natural conditions there could be a period of unstable groundwater and surface water levels while a new equilibrium is established which could negatively impact any groundwater receptors in the short term, until a new baseline/ equilibrium is established. This could lead to significant short-term impacts on any adjacent/nearby GWDTE.

### Proposed Scope

7.8.31 Based on the above assessment, all of the potential impacts have been scoped in for further assessment. **Table 7-15** presents a summary of potential impacts to groundwater that are proposed to be scoped in for further assessment, along with the rationale for the choice.

**Table 7-15: Summary of groundwater elements scoped into the assessment**

Potential Effect	Scoped IN or OUT	Justification
Impacts to groundwater	IN	There is no information currently available on groundwater levels

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Potential Effect	Scoped IN or OUT	Justification
levels and flows during the removal		within the Maisemore Weir works boundary therefore significant impacts to shallow groundwater levels and flows cannot be ruled out at this stage.
Impacts to groundwater quality during the removal	IN	Impacts can arise from the removal activities such as excavations, topsoil stripping, accidental leaks and spills etc. Considering the depth of the water table across the Maisemore Weir works boundary is unknown significant impacts to the underlying aquifers cannot be ruled out.
Impacts to secondary receptors such as groundwater abstractions and GWDTE, this includes both quality and qualitative status	IN	Information on groundwater abstractions have not been requested at this stage. Additionally, there have been no site visits to determine the presence of any potential GWDTE. Therefore significant impacts to these receptors, if present, cannot be ruled out at this stage.
Changes to baseflow	IN	Considering the depth of the water table across the Maisemore Weir

Potential Effect	Scoped IN or OUT	Justification
conditions from removal of the weir		works boundary is unknown significant changes to baseflow contributions cannot be ruled out.

- 7.8.32 It is proposed that before the ES is written that GI be undertaken at Maisemore Weir to determine the ground and groundwater conditions. Given the potential of shallow groundwater, especially in close proximity to the river, as part of any GI the groundwater team should have input into the scope in order to gather data that best characterises groundwater at Maisemore Weir. As part of the GI a groundwater monitoring strategy should be developed to allow continuous monitoring of groundwater levels to identify any tidal influences.
- 7.8.33 Additionally, no site walkovers or habitat surveys have been undertaken to determine the presence of any GWDTE. These should take place before commencing with the ES.
- 7.8.34 Following on from this, any information from any GI, walkover and habitat surveys would then be included in a detailed Conceptual Site Model to refine our hydrogeological understanding of Maisemore Weir.

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7.8.35 At ES stage information on private and licensed groundwater abstractions should be requested from the local authority and Environment Agency. Information on licensed discharges to ground should also be requested.

## 7.9 Surface Water

### Introduction

7.9.1 The aims of this chapter are to:

- Identify the relevant surface water (water quality, hydromorphology and flood risk) receptors which could be impacted by the proposed compensation measures at Maisemore Weir.
- Evaluate potential impacts during the proposed compensation measures at Maisemore Weir.
- Outline the proposed scope of work to assess the potential impacts of the proposed compensation measures at Maisemore Weir to surface water.

### Study Area

7.9.2 The study area for surface water is defined by adding a 500 m buffer around the Maisemore Weir works boundary in all directions. This is based on the anticipated distance of impact pathways associated with surface water impacts.

### Baseline

#### Baseline Sources

7.9.3 The baseline conditions have been established based on the following sources:

- Aerial Imagery<sup>271</sup>;
- Canal and River Trust Online Information, including:
  - Gloucester Lock to Upper Lode Lock Information<sup>272</sup>;
  - River Severn Navigation Guide<sup>273</sup> Environment Agency Catchment Data Explorer<sup>274</sup>;
- Environment Agency Flood Map for Planning<sup>275</sup>;

<sup>271</sup> Google Earth

<sup>272</sup> Canal and River Trust (2014) Gloucester Lock to Upper Lode Lock Information

<sup>273</sup> Canal and River Trust (2016) River Severn Navigation Guide

<sup>274</sup> Environment Agency (2023) Environment Agency Catchment Data Explorer [[Online](#)] Accessed 4 December 2023

<sup>275</sup> Environment Agency (2023) Environment Agency Flood Map for Planning [[Online](#)] Accessed 4 December 2023

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- Environment Agency Historic Flood Map<sup>276</sup>;
- Environment Agency Long-Term Flood Risk Information Mapping<sup>277</sup>;
- Environment Agency Reservoir Flood Extents – Dry Day<sup>278</sup>;
- Environment Agency Reservoir Flood Extents – Wet Day<sup>279</sup>;
- MAGIC Maps<sup>280</sup>; and
- Tewkesbury Borough Council Level 1 Strategic Flood Risk Assessment<sup>281</sup>.

### Current Baseline

#### Surface Water Quality

- 7.9.4 There are two WFD water bodies that are within or overlap the study area, also noted in **Table 7-16**:
- The Severn Upper WFD water body (WFD ID: GB530905415403). This is a HMWB currently classified as achieving Moderate ecological potential and the chemical status is Fail<sup>274</sup>. The

reasons for not achieving Good potential include phytoplankton and physical modification.

- The River Severn from the confluence with the River Avon to the confluence with the Upper Parting WFD water body (WFD ID: GB109054044404). It is classed as a HMWB and currently at Moderate potential. Ecological classification is Moderate and chemical status is Fail. The reasons for not achieving Good potential include sewage discharge and physical modification.

#### Surface Water Supply

- 7.9.5 Maisemore Weir is located within a Surface Water Drinking Water Safeguard Zone.
- 7.9.6 No data was available at this stage regarding PWSs.

#### Geomorphology

- 7.9.7 **Table 7-16** presents the location and condition of all geomorphology receptors within the study area of Maisemore Weir.

<sup>276</sup> Environment Agency (2023) Environment Agency Historic Flood Map  
<sup>277</sup> Environment Agency (2019) Environment Agency Long-Term Flood Risk Information Mapping  
<sup>278</sup> Environment Agency (2023) Environment Agency Reservoir Flood Extents – Dry Day

<sup>279</sup> Environment Agency (2023) Environment Agency Reservoir Flood Extents – Wet Day

<sup>281</sup> Halcrow Group Limited (2008) Tewkesbury Borough Council Level 1 Strategic Flood Risk Assessment

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**Table 7-16: Geomorphology baseline condition of watercourses**

Watercourse	Description
Severn Upper Water Body (GB530905415403)	A sinuous platform with some evidence of natural processes. Modifications include flood protection measures, and urbanisation.
River Severn from the confluence with the River Avon to the confluence with the Upper Parting Water Body (GB109054044404)	A sinuous platform with some evidence of natural processes. Modifications include flood protection measures, urbanisation and inland waterway navigation, such as ports.
Minor watercourses and ditches	There are numerous minor watercourses and ditches within the study area. These are likely to be artificially modified and will be assessed further in later stages of the environmental assessment.

*Fluvial and Tidal Flood Risk*

7.9.8 The Environment Agency’s Flood Map for Planning (rivers and sea)<sup>275</sup> indicates that the study area is within Flood Zone 3, meaning that there is a greater than 1 in 100 (1 % AEP chance of flooding, so it is at high risk of

fluvial or tidal flooding. Although Maisemore Weir is the tidal limit for the River Severn during normal tides, at spring high tides, the tidal limit extends further upstream to Upper Lode Weir, Tewkesbury<sup>272,273</sup>. Therefore, flood risk in the area is a combination of tidal flood risk and risk from tidally influenced rivers.

*Surface Water Flood Risk*

7.9.9 The Long-Term Flood Risk mapping<sup>277</sup> shows Maisemore Weir is at high risk of surface water flooding, with a risk greater than 3.3 % (1 in 30) AEP, immediately downstream of Maisemore Weir, in the tributary to the north of the weir and in areas of Maisemore, particularly roads. In fields north of Maisemore Weir and in the River Severn upstream of Maisemore Weir, the risk of surface flooding is low, with risk between 0.1 % (1 in 1000) and 1 % (1 in 100) AEP. Generally, the surface water flood risk within the Study Area corresponds to the routes of watercourses and as such is likely to be representative of risk associated with existing watercourses and better described as fluvial flood risk.

*Groundwater Flood Risk*

7.9.10 As discussed in the baseline section of **Section 7.8 Groundwater** there are no Environment Agency, BGS or borehole records within the study area to provide an

indication of groundwater levels. Given the tidal location and proximity to watercourses, it is likely that groundwater levels are hydraulically linked to fluvial/tidal levels.

#### *Reservoir Flooding*

- 7.9.11 According to the Environment Agency Reservoir Flood Maps<sup>278,279</sup> there is a risk of flooding from reservoirs when there is also flooding from rivers across the Maisemore Weir works boundary. Due to required maintenance standards and inspection levels of reservoirs under the Reservoir Act 1975, the risk of reservoir flooding is low.

#### *Other Flood Sources*

- 7.9.12 Water and sewage infrastructure is unlikely to exist in the study area due to its rural nature, therefore the flood risk from these sources is very low.

#### *Historic Records of Flooding*

- 7.9.13 Environment Agency historic flood maps provide information in the form of recorded flood outline. This is likely to capture the extent of significant fluvial and tidal flood events. The mapping shows a single event that covers much of the Study Area. No details or date of the event are provided, although from the extents it

would appear to be a combination of tidal and fluvial flooding.

- 7.9.14 The Tewkesbury Borough Council Level 1 Strategic Flood Risk Assessment<sup>281</sup> lists one historical flooding event on floodplains at Maisemore in March 1946. Mapping of the reported event is not available, but it appears from the descriptions that the event was a combination of tidal and fluvial flooding within the vicinity of the study area.

#### **Future Baseline**

- 7.9.15 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

#### **Assumptions and Limitations**

- 7.9.16 The following assumptions and limitations apply to the Surface Water assessment:

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- The assessment of potential impacts on surface water is high-level, with no quantification.
- The assessment of surface water quality has used site-specific data, where available, and otherwise used available online information.
- The baseline geomorphological assessment of the relevant watercourses has been carried out virtually, using aerial imagery, as waterbodies are yet to be surveyed.
- The assessment of baseline flood risk has been undertaken based on available online information only. No detailed of hydraulic modelling of flood risk has been undertaken on the basis that the Environment Agency online flood mapping and local authority sources are reliable and provides a reasonable assessment of existing flood risk.
- It has been assumed that the impact of climate change will not significantly alter the flood risk from that shown in online mapping.

## Likely Significant Effects

### Removal of the weir

#### *Surface Water Quality*

7.9.17 Potential impacts to surface water quality within the study area during the removal of the weir would include:

- Mobilisation of sediments and potential release of fine sediment to suspension leading to sediment pollution. This may impact the chemical and biological quality of surface water.
- The accidental release of polluting substances, such as fuel leaks, which could have an impact upon the chemical and biological quality of surface water.

#### *Surface Water Supply*

7.9.18 Potential impacts to surface water supply within the study area during the removal of the weir would include:

- Pollution from the removal works upstream of water supplies.
- Severance due to disruption of pipelines or other buried assets.

### *Geomorphology*

7.9.19 Potential impacts to the geomorphological receptors within the study area during the removal of the weir would include:

- Loss of riparian vegetation during bankside working.
- Temporary change in local flow dynamics and bed and/or bank scour resulting from either in-channel or bankside working.
- Fine sediment inputs leading to smothering of morphological features of alteration of sediment dynamics which support key habitats.
- Accidental release of fine sediment that would have implications to downstream areas following either bankside or in-channel working.

### *Flood Risk*

7.9.20 Potential impacts on flood risk during the removal of the weir of the proposed compensation measures at Maisemore Weir include:

- Loss of floodplain storage resulting in increased flood risk.
- Interception of overland flow due to works compounds, storage areas or haul routes in the

Study Area, potentially disrupting local flow routes and increasing surface water flood risk.

- The potential blocking of drainage systems and watercourses with debris arising from the works, potentially resulting in blockage or reduced capacity and therefore increased flood risk.

### **Operation**

#### *Surface Water Quality*

7.9.21 No significant effects during operation would be anticipated.

#### *Surface Water Supply*

7.9.22 Potential impacts to surface water supply during the operational phase would include the diversion of utilities and field drains ameliorated.

#### *Geomorphology*

7.9.23 A potential impact to the geomorphological receptors within the study area during the operation phase would include the return to a more natural state, increasing the natural bed material at the footprint of the weir and restoring natural flow dynamics.



*lood Risk*

7.9.24 Potential impacts on flood risk during the operation of the proposed compensation measures at Maisemore Weir include:

- Change in flood risk at Maisemore Weir and downstream due to the removal of Maisemore Weir.
- By removing the weir and re-establishing the natural channel bed there is the potential to create more connectivity between the aquifer and channel. This may locally increase groundwater flood risk if emergence is possible.

**Proposed Scope**

7.9.25 **Table 7-17** summarises the proposed scope for Surface Water.

**Table 7-17: Summary of Surface Water scope.**

Potential Effect	Scoped IN or OUT	Justification
Potential impacts on surface water quality.	IN	Activities associated with the removal of Maisemore Weir have the potential to mobilise sediment or pollutants into the watercourse.

Potential Effect	Scoped IN or OUT	Justification
Potential impacts on surface water supply.	IN	The diversion of utilities and amelioration of field drains is likely to impact surface water supply at the Maisemore Weir works boundary. Therefore, the potential impacts are considered significant.
Potential impacts on geomorphology	IN	Activities associated with the removal of Maisemore Weir have the potential to alter sediment dynamics during removal.
Potential impacts on flood risk	IN	Weir removal may increase flood risk downstream and re-establishing the natural bed may increase connectivity with the aquifer.

7.9.26 The identification of potentially significant effects will be derived from a qualitative assessment of baseline data to inform the receptor importance, professional judgement, combined with quantitative assessment where practical. It is proposed that the ES includes a detailed assessment of flood risk across the Maisemore Weir works boundary, produced in accordance with the technical guidance to the National Planning Policy Framework. In addition, a Preliminary WFD assessment will be carried out, with a more

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detailed assessment if impacts are identified and further mitigation is required.

## 7.10 Ecology (Terrestrial and Freshwater) and Ornithology

### Introduction

7.10.1 This chapter presents the preliminary environmental information relating to terrestrial and freshwater ecology and ornithology for the proposed compensation measures at Maisemore Weir.

7.10.2 Terrestrial and freshwater ecology is concerned with the variety of living organisms and their relationships with each other and their environment. Ecology is the subject of a wide variety of legislation and policies; impacts to ecological receptors could constitute an offence under relevant legislation as well as comprising material considerations within the planning system.

7.10.3 The assessment comprises the following terrestrial and freshwater ecology elements:

- Designated sites – sites designated at all levels (both statutory and non-statutory) for nature conservation reasons, including SPAs, SACs, Ramsar sites, SSSIs, NNRs, LNRs and LWSs;

- Notable habitats – i.e. HPI;
- Protected and notable species – these include animal and plant species protected by legislation, species of principal importance (SPI), and species that are not legally protected but have a conservation designation.

7.10.4 A high-level review of the terrestrial and freshwater ecological baseline within the Maisemore Weir works boundary and surrounding study area has been undertaken for the PEIR. This is based on available desk-based information only. This information has then been used to determine how the removal of the weir and operation of the proposed compensation measures at Maisemore Weir could impact on terrestrial and freshwater ecological receptors.

### Study Area

7.10.5 The study area for terrestrial and freshwater ecology relates to the Maisemore Weir works boundary. The study area comprises the relative areas by which potential pathways to effect on terrestrial and freshwater ecological receptors could occur.

- Internationally important statutory designated sites: SPAs, SACs and Ramsar sites within 2 km of the Maisemore Weir works boundary, or within 30 km of a SAC where bats are noted as one of the

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qualifying interests or where European sites are hydrologically connected to the Maisemore Weir works boundary;

- Nationally and county important statutory designated sites: SSSIs, NNR and LNR within 2 km of the Maisemore Weir works boundary;
- Non-statutory sites of local nature conservation importance: LWS, ancient woodland and habitats of principal importance (HPI) within 1 km of the Maisemore Weir works boundary;
- Desk study records of protected or otherwise notable habitats and species, veteran or ancient trees within 1 km of the Maisemore Weir works boundary; and
- For receptors potentially sensitive to air quality changes (including habitats within SPA, SAC, Ramsar, SSSI, NNR, LNR, LWS, ancient woodland or ancient and veteran trees), sites located within 200 m of proposed construction routes where significant changes are anticipated.

## Baseline

### Baseline sources

7.10.6 The following sources have been used to inform a preliminary understanding of the baseline conditions

for the assessment of the terrestrial and freshwater ecology aspect:

- Gloucestershire Centre for Environmental Records ('GCER') provided data records in September 2023 for protected and designated species, invasive species and non-statutory LWS. Species records were limited to those within the last 10 years, i.e., 2013-present;
- MAGIC map application was used to identify international and national statutory and non-statutory designated sites, HPI, surveyed GCN ponds and granted EPSM licenses and GCN licence returns;
- Aerial photography;
- Standard data forms for SPAs and SACs within the UK national site network of European sites;
- UK Ramsar Information Sheets; and
- SSSI citations.

### Current Baseline

#### *Statutory Designated Sites*

7.10.7 There are no international or national statutory designated sites within 2 km of the Maisemore Weir works boundary.

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7.10.8 There are two international statutory designated sites with bats as qualifying feature within 30 km of the Maisemore Weir works boundary: Wye Valley and forest of Dean Bat sites SAC and Wye Valley Woodlands SAC.

7.10.9 There are no LNRs within 2 km of the Maisemore Weir.

7.10.10 The proximity and reason for designation for statutory designated sites within 2 km (30 km for bats) of the Maisemore Weir works boundary is further in **Table 7-18**.

**Table 7-18: International and National Statutory Designated Sites within 2 km (30 km for bats) of the Maisemore Weir works boundary**

Site	Location in relation to the Maisemore Weir works boundary	Reason for Designation
Wye Valley and Forest of Dean Bat Sites SAC	18.9 km south-west	Primary reason for site selection: Lesser horseshoe bat ( <i>Rhinolophus hipposideros</i> ) And Greater horseshoe bat ( <i>Rhinolophus ferrumequinum</i> )

Site	Location in relation to the Maisemore Weir works boundary	Reason for Designation
Wye Valley Woodlands SAC	27.1 km south	Qualifying features but not a primary reason for site selection: Lesser horseshoe bat ( <i>Rhinolophus hipposideros</i> )

*Non-statutory designated sites*

7.10.11 There are two LWS within 1 km of the Maisemore Weir works boundary:

- Sandhurst Brickpits South LWS (non RIGS part) (SO82/006) located 977 m north of the Maisemore Weir works boundary, the site is described as a wet woodland surrounding waterfilled brick pits; and
- Maisemore Cliff LWS (SO81/21), located within the Maisemore Weir works boundary, the site is designated as a RIGS site.

*Habitats*

7.10.12 The weir is located entirely within the Severn main river the weir lies north south across the River Severn, aerial

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photography indicates that the river is treelined and where the river bows the treeline is thicker. The potential site access and site compounds are a farm track and arable field to the west of Maisemore Weir.

7.10.13 The desk study suggests the presence of the following HPI within 1 km of the Maisemore Weir works boundary: coastal and floodplain grazing marsh, and traditional orchards.

7.10.14 There is no ancient woodland located within 1 km of the Maisemore Weir works boundary.

7.10.15 There are no ancient/veteran trees located within 1 km of the Maisemore Weir works boundary.<sup>282</sup>

*Notable Plants*

7.10.16 One species of notable plants within 1 km of the Maisemore Weir works boundary were returned from the GCER data search: frogbit (*Hydrocharis morsus-ranae*).

*Bats*

7.10.17 The following bat species have been identified in the SERC desk study within 1 km of the Maisemore Weir works boundary:

- Common pipistrelle (*Pipistrellus pipistrellus*);
- Soprano pipistrelle (*Pipistrellus pygmaeus*);
- Greater Horseshoe (*Rhinolophus ferrumequinum*); and
- Lesser Horseshoe (*Rhinolophus hipposideros*).

7.10.18 Of the 10 records, seven are from Maisemore village, 500 m south of Maisemore Weir, three are from further south and one is east of Maisemore Weir.

7.10.19 The linear features such as the River Severn and the trees and riparian habitat associated with the river are considered to be suitable for commuting/foraging and roosting habitat for bats.

*Badger*

7.10.20 A badger sett record was identified in the GCER desk study within 1 km of the Maisemore Weir works boundary. The arable fields and connecting linear

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<sup>282</sup> Woodland Trust (2023). Ancient tree inventory. [\[Online\]](#) Accessed 4 December 2023

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features in the vicinity of Maisemore Weir and site compound are considered suitable foraging/commuting and sett habitat for badgers.

*Otter*

7.10.21 Seven otter records were identified in the GCER desk study within 2 km of the Maisemore Weir works boundary. The River Severn and the riparian habitat in the vicinity of the weir are considered suitable foraging/commuting and potentially holt habitat for otters.

*Dormouse*

7.10.22 No dormouse records were returned within 1 km of the Maisemore Weir works boundary because of the GCER data search.

7.10.23 Based on aerial imagery, there is a lack of woodland blocks and/or substantial hedgerows within the surrounding environment to Maisemore Weir indicating both a lack of suitable habitat and of connectivity within the wider landscape.

*Great crested newt*

7.10.24 There were no records for GCN returned within 1 km of the Maisemore Weir works boundary because of the GCER data search.

7.10.25 Despite a lack of records for the species within Maisemore Weir works boundary, it is considered that the grassland and ponds in the wider environment could provide suitable terrestrial and/or breeding habitat for GCN.

*Reptiles*

7.10.26 There were no records for reptiles returned within 1 km of Maisemore Weir because of the GCER data search.

7.10.27 Suitable habitat, such as grassland, rough field margins, hedgerows, and ponds/ditches within Maisemore Weir surrounds have the potential to support three of the four common reptile species: common lizard (*Zootoca vivipara*), slow worm (*Anguis fragilis*) and grass snake (*Natrix natrix*).

*Terrestrial Invertebrates*

7.10.28 One species of moth (Cinnabar *Tyria jacobaeae*) was identified within 1 km of the weir from the GCER data search. It is likely that the terrestrial habitat such as arable field margins and rough grassland is suitable for a range of common and notable terrestrial invertebrates.

### Ornithology

7.10.29 The GCER desk study returned records of 71 species of birds within 2 km of Maisemore Weir, many of which have overlapping conservation designations, such as SPI under Section 41 of the NERC Act 2006, red or amber listed as BoCC<sup>283</sup> or listed under Schedule 1 of the WCA 1981.

7.10.30 The species returned in the data search included a mix of species typical of the habitats present, a mosaic of arable farmland, grazing marsh, ditches and watercourses, including notable species such as: Whooper Swan ((*Cygnus cygnus*), shoveler (*Anas clypeata*), snipe (*Gallinago gallinago*), curlew (*Numenius arquata*) Cetti's warbler (*Cetti cetti*), cuckoo (*Cuculus canorus*), grey wagtail (*Motacilla cinerea*), house martin (*Delichon urbicum*), marsh tit (*Poecile palustris*), reed bunting (*Emberiza schoeniclus*), sedge warbler (*Acrocephalus schoenobaenus*), skylark (*Alauda arvensis*), starling (*Sturnus vulgaris*) wheatear (*Oenanthe oenanthe*) and yellow wagtail (*Motacilla flava*).

### Other Notable Species

7.10.31 The SERC data search returned records of two additional notable species, hare (*Lepus europaeus*) and hedgehog (*Erinaceus europaeus*), within 1 km of Maisemore Weir. The nearest hare record was over 900 m west, and the nearest hedgehog record was 500 m south-west of the Weir.

7.10.32 A Common toad (*Bufo bufo*) record was recorded in the wider area and contains suitable habitat for these species.

7.10.33 Hare, hedgehog and common toad are all listed in accordance with Section 41 of the NERC Act 2006 as SPI.

### Freshwater habitats and species

7.10.34 The macrophyte element of this waterbody (ID GB109054044404) is classed as High in 2022 (an improvement from Moderate in 2019). Macrophytes sampled by the Environment Agency upstream of Maisemore Weir, northwest of Norton indicates freshwater habitat comprising reeds (*Phalaris*), brooklime (*Veronica beccabunga*), water pepper

<sup>283</sup> Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. 2021. The status of our bird populations: the fifth Birds of

Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114: 723-747.

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(*Persicaria hydropiper*), horsetails, mosses and liverworts.

7.10.35 Overall, the macrophyte communities are not indicative of permanent saline/brackish conditions north of Maisemore Weir.

7.10.36 Rare or scarce macrophytes recorded within 2 km of Maisemore Weir include frogbit (*Hydrocharis morsus-ranae*), at Alney Island (SO82562047) in 2015 (GCER request, 2023).

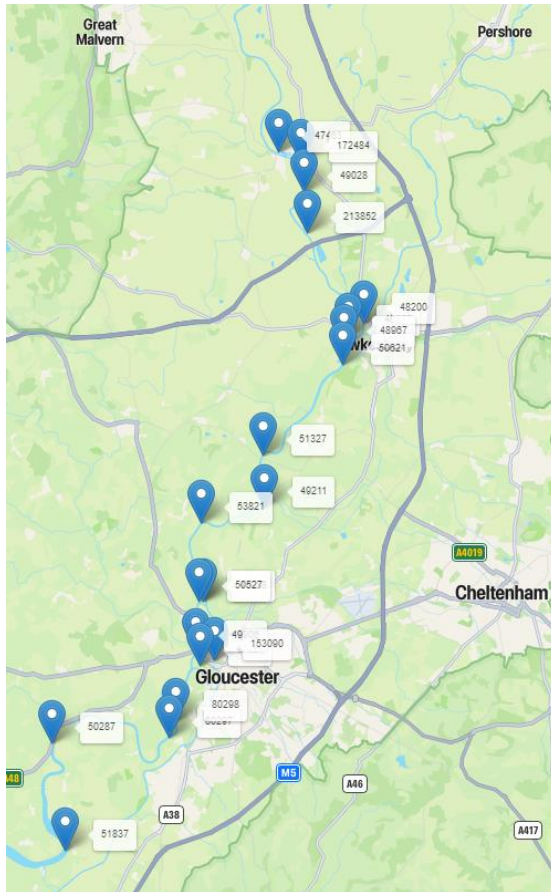
7.10.37 In terms of macrophyte INNS, Nuttall's waterweed (*Elodea nuttallii*) has historically (2005) been recorded within 2 km of Maisemore Weir (Ditch Wickridge, SO82162178) (GCER request, 2023).

7.10.38 The invertebrate element of this waterbody has been classed as Bad since 2019. The Environment Agency macroinvertebrate monitoring programme (primarily 3-minute kick sweep but also dredge and airlift) has provided records since 1993 on sites on the River Severn. The sites range from between Enney and Upton upon Severn (**Figure 7-1**).

7.10.39 Macro-invertebrate data from these sites (**Table 7-19**;) indicates brackish invertebrate communities both upstream and downstream of Maisemore Weir. Sites downstream are representative of transitional waters

and do not contain freshwater taxa. Upstream taxa are a mixture of those tolerant of brackish conditions and/or brackish taxa tolerant of freshwater conditions.





**Figure 7-1: Environment Agency macroinvertebrate monitoring sites on the River Severn**

**Table 7-19: EA monitoring sites (presented downstream to upstream) on the River Severn between Epney and Upton upon Severn.**

SITE_ID	NGR	Comments
51837	SO7605011100	Taxa of transitional water
46877	SO8820032950	Taxa of transitional water
50287	SO7550015700	Taxa of transitional water
80297	SO8050015900	Taxa of transitional water
80298	SO8080016600	Taxa of transitional water
49906	SO8165019550	Approximately 2 km DS Maisemore Weir Taxa of transitional water
	SO 81800 21648	Maisemore Weir
50527	SO8180021700	Immediately upstream of Maisemore Weir. Taxa tolerant of brackish conditions and/or characteristic of brackish taxa tolerant of FW conditions. Gammarus zaddachi and Corophium curvispinum
48988	SO8200021700	~200 m US Maisemore Weir. Family level data only, Corixidae and Gammaridae present
53821	SO8189925042	Taxa tolerant of brackish conditions and/or characteristic of brackish taxa tolerant of FW conditions.

SITE_ID	NGR	Comments
49211	SO8460025700	Taxa tolerant of brackish conditions and/or characteristic of brackish taxa tolerant of FW conditions.
51327	SO8456827891	Long term monitoring site. Taxa tolerant of brackish conditions and/or characteristic of brackish taxa tolerant of FW conditions.
50621	SO8795031750	~1 km DS Upper Lode Weir. Long term monitoring site. Taxa tolerant of brackish conditions and/or characteristic of brackish taxa tolerant of FW conditions.
48967	SO8800032500	~200 m DS Upper Lode Weir. Taxa includes brackish tolerant and freshwater species.
	SO 88098 32761	Upper Lode Weir
46877	SO8820032950	Immediately upstream of Upper Lode Weir, Taxa includes brackish tolerant and freshwater species.
48200	SO8887033460	~1 km US Upper Lode Weir. Taxa includes brackish tolerant and freshwater species.

SITE_ID	NGR	Comments
213852	SO8644837357	Taxa includes some brackish tolerant and freshwater species.
49028	SO8632039060	Taxa includes some brackish tolerant and freshwater species.
<b>172484</b>	<b>SO8617740354</b>	Freshwater taxa list. Some brackish tolerant species.
47463	SO8523640760	Freshwater taxa list. Some brackish tolerant species.

7.10.40 Environment Agency invertebrate records show a number of taxa of conservation interest are present (**Table 7-20:**), this includes swan mussel (*Anodonta cygnea*) and swollen river mussels (*Unio tumidus*), a number of species of the mayfly family Caenidae, the common clubtail dragonfly (*Gomphus vulgatissimus*) and two notable Elmidae beetles (*Macronychus quadrituberculatus* and *Stenelmis canaliculata*). All such taxa recorded are present upstream of the Maisemore Weir and are either freshwater taxa or freshwater taxa which are tolerant of mild brackish conditions.

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**Table 7-20: Environment Agency Macroinvertebrate sampling species of conservation interest.**

Species name	Salinity tolerance <sup>1</sup>	Sites (see Figure 7-1)
<i>Anodonta cygnea</i>	Freshwater taxa tolerant of mild brackish conditions	48200, 47463, 51327, 48200, 51327, 172484
<i>Atrichops crassipes</i>		172484
<i>Brachycercus harrisella</i>		172484 51327
<i>Caenis pusilla</i>	Freshwater taxa (notable)	172484, 51327
<i>Gomphus vulgatissimus</i>	Freshwater taxa (notable)	48200, 51327, 172484
<i>Leptocerus interruptus</i>	RDB3 (rare)	172484
<i>Macronychus quadrituberculatus</i>	RDB3 (rare)	51327
<i>Oecetis notata</i>	RDB3 (rare)	172484
<i>Potamanthus luteus</i>	RDB2 (vulnerable)	48200, 51327, 172484
<i>Pseudanodonta complanata</i>	Freshwater taxa (notable)	47463, 48200, 172484, 51327, 213852
<i>Stagnicola palustris/fuscus/corvus</i>		51327
<i>Stenelmis canaliculata</i>	RDB2 (vulnerable)	172484
<i>Unio tumidus</i>		51327

<sup>1</sup> Where reported (SAG index)

7.10.41 A number of INNS have been recorded along the River Severn including zebra mussels (*Dreissena polymorpha*) and the Asian clam (*Corbicula fluminea*) (Table 7-21:). There are records of both species upstream of Maisemore Weir, the latter is also downstream of the weir. Other INNS species recorded are more widespread and well established, such as the gastropods *Potamopyrgus antipodarum* and *Physella acuta*, which are considered naturalised.

**Table 7-21: INNS recorded on the River Severn during Environment Agency Macroinvertebrate Surveys**

Species name	Common name/type	Location
<i>Chelicorophium curvispinum</i>	Caspian mud shrimp	Upstream and downstream of Maisemore Weir
<i>Corbicula fluminea</i>	Asian Clam	Upstream and downstream of Maisemore Weir
<i>Dikerogammarus haemobaphes</i>	Demon Shrimp	Upstream of Maisemore Weir
<i>Dreissenidae/Dreissena polymorpha</i>	Zebra or Quagga mussel	Upstream of Maisemore Weir
<i>Gammarus tigrinus</i>	Shrimp species	Upstream and downstream of Maisemore Weir

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Species name	Common name/type	Location
<i>Hypania invalida</i>	Polychaete worm species	Upstream of Maisemore Weir
<i>Musculium transversum</i>	bivalve species	Upstream of Maisemore Weir

7.10.42 The Environment Agency has freshwater fish catch data over the past ten years for the River Severn upstream of Maisemore Weir. Downstream of the River Chelt tributary (i.e., closest site upstream of Maisemore Weir) fish communities sampled by the Environment Agency comprised freshwater and migratory/estuarine species. Ten species were found in 2014 and 2016 surveys, dominated by common goby and minnow, respectively. Other species included bleak, roach, gudgeon dace, perch, chub, 3-spined stickleback, flounder, European eel, ruffe and rudd.

7.10.43 On the River Chelt close to its tributary with the Severn, roach, dace and chub dominated, with stone loach, Atlantic salmon, European eel, flounder, minnow perch and bleak among the other species were present.

7.10.44 On the River Swilgate south of Tewkesbury 12 species were recorded, dominated by dace but also including chub, roach, perch, tench, flounder, ruff, European eel, barbel, gudgeon, Atlantic salmon and bullhead.

7.10.45 Other notable species expected to be present are lampreys and shads; the majority of shad migrating up the Severn do so via the Maisemore Weir. However, it is only passable at certain tide states or when river flows are very high. Overall, the fish communities show that estuarine species can penetrate Maisemore Weir towards Tewkesbury. This also includes migratory species such as European eel and Atlantic salmon.

#### Future Baseline

7.10.46 Water quality of the main rivers will, in the immediate future, continue to reflect existing land and water management practices and is influenced by run off from the surrounding agricultural run-off and purposeful/accidental discharges.

7.10.47 In the longer term, water quality will remain an important factor determining habitat quality. Climate change is predicted to result in increases in freshwater temperatures and increase variability in precipitation resulting in changes to river levels resulting in flooding and droughts. The effects of climate change may progressively worsen the impacts of existing obstacles for fish migration. In terms of freshwater species, the future baseline may alter owing to sea level rise in terms of changes in the tidal limit (i.e., extent of brackish vs. exclusively freshwater species). Improvements in management and water quality in the

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future are likely to result in an improvement in the status of freshwater communities.

7.10.48 Colonisation of INNS both because of existing or known species colonising new areas or climate change resulting in improved conditions favouring invasive species could influence the future baseline for example through competition with native species.

### Assumptions and Limitations

7.10.49 This study is based on a desk-based assessment only and no site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings presented. The assessment provided is based on information available at the time of writing.

7.10.50 At this PEIR stage, specific details regarding removal of the weir and operation of the proposed compensation measures at Maisemore Weir are not fully known or decided.

7.10.51 At the time of writing, mitigation design is in a preliminary phase. Mitigation will be fully developed for the ES in discussion with stakeholders. Effects that are normally mitigated by best practice/embedded design such as access routes, the control of INNS and pollution from spills and faulty machinery are not considered in the potential effects.

### Likely Significant Effects

7.10.52 This assessment has been undertaken in accordance with the common Framework set out in **Volume 1 Chapter 4**. This chapter uses geographic frame of reference for importance (sensitivity) and follows the CIEEM *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*.

7.10.53 To allow comparisons with other technical chapters in the ES, importance has also been described (in brackets) using the more familiar terms used for sensitivity as per **Volume 1 Chapter 4**:

- International and European (High) - SACs, SPAs, MCZs and Ramsar sites and habitats or populations of species, outside of protected sites, considered to be important at an international/European level;
- National (Medium) - SSSIs and habitats or populations of species outside SSSIs considered to be important at the National level;
- Regional (Low) - Habitats or populations of species considered to be important within the West of England;
- County (Low) - Non-statutory designated sites (CWS, OSWI or UWS), habitats or populations of

species considered to be important in Gloucestershire;

- Local (Low) - habitats or species populations considered to be important at the site level and its immediate surrounds, and
- Less than local (Negligible) - habitats or species populations which are common and widespread.

7.10.54 It should be noted that the individual sensitivities will be assigned at the next stage in the ES.

7.10.55 For the purpose of this assessment, the level of impact is described as the ‘magnitude’ of impact to provide consistency across the technical chapters of this ES. The magnitude of impact is reported in accordance with the criteria provided in **Table 7-22**.

**Table 7-22: Description of magnitude**

Level of magnitude (change)		Typical description
High	Negative	Permanent/irreversible damage. The extent, duration and/or frequency/timing of the impact would negatively affect the integrity or key characteristics of the important ecological feature.
	Positive	Permanent addition of, improvement to, or restoration of an important

Level of magnitude (change)		Typical description
		ecological feature. The extent, duration and/or frequency/timing of the impact would positively affect the integrity or key characteristics of the important ecological feature.
Medium	Negative	Temporary/reversible damage. The extent, duration and/or frequency/timing of the impact would negatively affect the integrity or key characteristics of the important ecological feature.
	Positive	Temporary addition of, improvement to, or restoration of an important ecological feature. The extent, duration and/or frequency/timing of the impact would positively affect the integrity or key characteristics of the important ecological feature.
Low	Negative	Permanent/irreversible damage. The extent, duration and/or frequency/timing of the impact would not affect the integrity or key characteristics of the important ecological feature.
	Positive	Permanent addition of, improvement to, or restoration of an important ecological feature. The extent,

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Level of magnitude (change)		Typical description
		duration and/or frequency/timing of the impact would not affect the integrity or key characteristics of the important ecological feature.
Very Low	Negative	Temporary/reversible damage. The extent, duration and/or frequency/timing of the impact would not negatively affect the integrity or key characteristics of the important ecological feature.
	Positive	Temporary addition of, improvement to, or restoration of an important ecological feature. The extent, duration and/or frequency/timing of the impact would not affect the integrity or key characteristics of the important ecological feature.

### Terrestrial Ecology

7.10.56 The habitats surrounding the weir are not listed as HPI and are common in the wider landscape. The terrestrial species inhabiting the riparian habitats and surrounding fields and field margins have not been surveyed. Although detailed design is not known at this stage, the removal phase will be temporary, of medium-term duration and will be of very low magnitude.

However, until a preliminary ecological assessment (PEA) of Maisemore Weir and its necessary working areas is undertaken, all species will be scoped in for further assessment as a precautionary approach.

7.10.57 Until further design information is available an assessment of riparian habitats and the effects of the river on these habitats during operation is scoped in for further assessment.

### Freshwater Ecology

7.10.58 Potential effects on freshwater ecology are outlined below.

#### *Sediment removal and release during removal activities*

7.10.59 The weir removal activities will cause sediments and the associated habitats built up around the existing structure and upstream to be removed/disturbed. This will increase suspended sediments within the water column and smother substrate downstream (causing a deterioration in habitats such as gravels). As sedimentary habitats will be removed, so will associated species particularly macrophytes and invertebrates. Mitigation measures and best practices will reduce this effect, but it is likely that there will be effects observable in the vicinity of the weir and

downstream. The removal phase effects will likely be temporary, of short-term duration and will be of moderate magnitude.

*Disturbance to fish communities (resident/migratory) during removal activities*

7.10.60 The weir removal activities will disturb and displace fish communities in the river and if they occur during key migratory windows they may act as barrier to migration. Mitigation measures would include carrying out the removal activities outside of these migratory windows where possible. The removal phase effects will likely be temporary, of short-term duration and of moderate magnitude.

*Spread of INNS during operation*

7.10.61 The removal of the weir may create conditions for the increase in extent of the INNS present in the River Severn. However, as INNS are already present up and downstream of the weir, its removal may not cause a detectable effect. The removal phase effects will likely be temporary, although of potentially long term duration it would constitute a very low magnitude.

*Changes in sediment habitat and deposition during operation*

7.10.62 The removal of the weir will cause changes over time to the hydrodynamics, riverbed, and gradient, altering the aquatic habitats both up and downstream of the weir. This may represent a betterment as the channel re-naturalises. The operational phase effects will likely be of long-term duration and of moderate magnitude.

*Operational changes to hydrodynamics, water quality and temperature regime*

7.10.63 The removal of the weir will cause changes to the water environment; namely the hydrodynamics which influence the temperature and other water quality parameters in the river which over time will stabilise with the new gradient and loss of impoundment effect. These conditions may increase/decrease the suitability for some aquatic species (invertebrates, fish and macrophytes), e.g., through changes in dissolved oxygen, and a change in communities in the areas affected are likely to occur. The operational phase effects will likely be of long-term duration and moderate magnitude.



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*Changes to water quality and habitats from alteration in salinity regime during operation*

7.10.64 The removal of the weir will alter the relative volumes of freshwater and saltwater in affected sections of the River Severn around Maisemore owing to the removal of the restriction of the freshwater flow and tidal limit here. The community composition will likely change up and downstream dependent on flow regime in terms of distribution and proportion of salinity tolerant vs. wholly freshwater species. The operational phase effects will likely be of long-term duration and moderate magnitude.

*Changes to species distribution during operation*

7.10.65 The removal of the weir will improve access to the upstream habitat particularly for migratory fish species. Species such as Atlantic salmon, shads, river and sea lamprey and European eel will be more able to access the habitat, and this will benefit the populations of these species with associated spawning success and/or escapement from the catchment. The operational phase effects will likely be of long term duration and moderate-major magnitude.

**Proposed Scope**

7.10.66 It is proposed that the ES includes a detailed assessment of potential terrestrial and freshwater ecology impacts that could occur during the removal of the weir and operation within and around the Maisemore Weir works boundary. **Table 7-23** summarises the elements scoped into the assessment.

7.10.67 Until further site-specific habitat and species surveys, and subsequent suitability assessments, are completed, a precautionary approach to assessment will be undertaken for the ecological receptors.

7.10.68 Regardless of inclusion in the ES assessment, all relevant species will be reviewed in relation to legislation in a Biodiversity Legislation Compliance Report to be submitted as an appendix to the ES.

**Table 7-23: Summary of ecology (terrestrial and freshwater) and ornithology elements scoped into the assessment**

Potential Effect	Scoped IN or OUT	Justification
Terrestrial ecology and ornithology		
Disturbance and habitat loss for	IN	Construction vehicles and human activity will cause temporary

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Potential Effect	Scoped IN or OUT	Justification
terrestrial species as a direct result of removal activities		disturbance to foraging/commuting terrestrial species. Surveys will need to be undertaken to understand which species are present at Maisemore Weir and mitigation will need to consider seasonal timings, type of vehicles and potentially trapping and translocation of species to reduce the disturbance and limit the habitat loss.
Changes to riparian habitat once the weir is removed	IN	Maisemore Weir will need to be assessed to ensure once the weir is removed the riparian habitat is not lost due to the new flow regimen.
Freshwater ecology		
Sediment removal and emissions generated during the removal of Maisemore Weir.	IN	Removal activities associated with the removal of Maisemore Weir have the potential to remove and suspend sediments and increase turbidity and smothering of substrate downstream, causing deterioration in habitats (e.g. gravels), removal of habitats (through sediment removal),

Potential Effect	Scoped IN or OUT	Justification
		reduction in water quality and effects on macrophyte, fish and invertebrate communities.
Disturbance to fish communities and migration during removal activities.	IN	Disturbance to fish communities around the weir during removal in and around the river will be unavoidable owing to noise and excavations; however, mitigation measures including removal window timing can reduce the effects.
Spread of INNS (operation).	IN	The operational regime may allow INNS to move to other areas of the River Severn, but as such species are already present up and downstream of Maisemore Weir this effect may not be detectable.
Operational changes to sedimentary habitats	IN	The removal of the weir will permanently change the aquatic habitats owing to changes in sediment distribution and hydrodynamics. Some aquatic species will be displaced as a result of this, but there will be beneficial effects to other species

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Potential Effect	Scoped IN or OUT	Justification
		(e.g., fish through improved spawning habitat)
Operational changes to hydrodynamics, temperature, and other water quality parameters	IN	The removal of the weir will cause changes to hydrodynamics, temperature regime and other water quality parameters in the river which over time will stabilise with the new gradient and loss of impoundment effect. These conditions may increase/decrease the suitability for some aquatic species (invertebrates, fish and macrophytes) and changes in communities in these areas are likely to occur.
Operational changes to water quality and habitats from alteration to salinity regime	IN	The removal of the weir will alter the relative volumes of freshwater and saltwater in affected sections of the River Severn around Maisemore owing to the removal of the restriction of the freshwater flow and tidal limit here. The community composition will likely change dependent on flow regime in terms of distribution of salinity tolerant vs. wholly freshwater species

Potential Effect	Scoped IN or OUT	Justification
Operational changes to distribution in species from removal of weir barrier	IN	The removal of the weir will improve access to the upstream habitat particularly for migratory fish species

## 7.11 Landscape and Visual

### Introduction

7.11.1 This section considers the likely significant effects associated with landscape and visual impacts arising because of the proposed compensation measures at Maisemore Weir.

### Study Area

7.11.2 The proposed LVIA study area for the assessment of the proposed compensation measures at Maisemore Weir extends to 1 km from the Maisemore Weir works boundary. This is considered to be the likely maximum distance at which landscape and visual impacts are likely to arise as a result of the relatively limited scale of the proposed compensation measures at Maisemore

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Weir, riparian vegetation, topography and low profile of the weir structure. Beyond 1 km there is unlikely to be any perceptible change.

## Baseline

### Baseline Sources

7.11.3 The following sources have been used to inform a preliminary understanding of the baseline conditions for the assessment of the landscape and visual aspect:

- Natural England’s National Landscape Character Area Profiles<sup>284</sup>;
- Gloucestershire Landscape Character Assessment, LDA 2006<sup>285</sup>;
- The Gloucester-Cheltenham-Tewkesbury Joint Core Strategy Landscape Characterisation Assessment & Sensitivity Analysis (2013)<sup>286</sup>;
- Rights of Way Online map for Gloucestershire County Council<sup>287</sup>;
- MAGIC Maps <sup>264</sup>; and

- Aerial photography – (Google Satellite Imagery, map data 2022).

### Current Baseline

7.11.4 The proposed compensation measures at Maisemore Weir have the potential to result in impacts on both landscape character and visual amenity. Several landscape and visual receptors have been identified.

#### *National Landscape Character*

7.11.5 The Maisemore Weir works boundary falls within NCA 106: Severn and Avon Vales.

7.11.6 Due to the large scale of the NCAs compared to the small scale of the proposed compensation measures at Maisemore Weir, the Local Landscape Character Type (‘LCT’) are more applicable to Maisemore Weir. Therefore, the National Landscape character have been scoped out of the future assessment.

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284 Natural England (2014) An Approach to Landscape Character Assessment. [\[Online\]](#) Accessed 4 December 2023

285 Gloucestershire Landscape Character Assessment, LDA 2006 [\[Online\]](#) Accessed 4 December 2023

286 The Gloucester-Cheltenham-Tewkesbury Joint Core Strategy Landscape Characterisation Assessment & Sensitivity Analysis (2013) [\[Online\]](#) Accessed 4 December 2023

287 Gloucestershire County Council (2023). Rights of Way Online May. [\[Online\]](#) Accessed 4 December 2023

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### *Local Landscape Character*

- 7.11.7 Gloucestershire *Landscape Character Assessment*, LDA 2006 has defined the areas as within the LCT: 12 – *Floodplain Farmland*, sub area SV 3B *The Rea, Maisemore Ham and Longford* and is described as follows;

*‘The broad, flat floodplain landscape generally lies below the 15m AOD contour, with the exception of a localised high point between Middle Rea and Lower Rea where a height of 20m AOD is reached. Typical of the landscape type, woodland cover is extremely limited with isolated blocks, deciduous in composition around the landfill sites and south of the A417. Elsewhere, tree cover is evident along boundary lines. Although settlement within the Floodplain Farmland is limited, the close proximity of Gloucester exerts a strong influence on the area. A pattern of isolated farms and dwellings is apparent across the landscape, but unlike other areas of the Floodplain Farmland, urban features and land uses have a strong influence on character ranging from sewage works, sub stations and industrial units on the edge of the area, as well as a network of principal roads and the main line railway.’*

- 7.11.8 The Gloucester-Cheltenham-Tewkesbury Joint Core Strategy Landscape Characterisation Assessment & Sensitivity Analysis (2013) has defined areas of

landscape sensitivity. While the Maisemore Weir works boundary sits just outside the boundary of the defined areas it sits immediately adjacent to G3 - Maisemore Village and G5 - Maisemore Ham to Twigworth which are described as:

*‘G3 Maisemore village: Medium Sensitivity Although interspersed with large, intensively farmed fields and modern properties the Maisemore village has a stronger sense of time-depth and a more intimate rural character than the adjoining landscape to the north-west. Landscape features that have endured include the meandering and treed stream, some small fields, narrow winding village lanes, and some high and well established hedge boundaries. Maisemore Court and Church are of historic interest and are associated with duck pond, mature trees and orchard. The landscape becomes progressively more rural in the north. Within the area linear poplar belts occasionally demarcate field boundaries and occasional ornamental species and conifers are associated with private properties. The A417 reduces tranquility in the south.’*

*‘G5 Maisemore Ham to Twigworth: Medium – low sensitivity Although the treed River Severn, scattered traditional rural properties, and some lush pasture occupy this compartment the majority of the landscape has suffered agricultural intensification, where large fields of mixed use are bound by gappy or scrubby*

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*hedgerows and post and rail. Pollarded willows often demarcate the linear ditches, Horn's Ditch, Queen's Dyke, Broadboard Brook, and Cox's Brook; and the East Channel of the River Severn provides a vegetated corridor, likely to be important to wildlife. The landscape becomes less sensitive towards the city and A417 as tranquillity reduces and pylons create urban landmarks. To the north rural associations become stronger, and scattered farms/houses can be associated with smaller fields and the occasional remnant orchard. The northern section of Alney Island demonstrates a particularly regimented field pattern, which is visually enclosed by the well treed river corridors, access within this area is not readily sign posted.'*

*Statutory Landscape Designation*

7.11.9 The Alney Island LNR is located approximately 2 km to the south of Maisemore Weir.

7.11.10 The closest Scheduled Monument (Churchyard Cross) is located approximately 390 m to the west at St Giles Churchyard. Two further Scheduled monuments are located between approximately 1.8 km and 2 km to the south (Over earthwork and Over Bridge).

7.11.11 The closest Listed Buildings (Grade II and Grade II\*) are located approximately 330 m to the west at St Giles Church with others located in Maisemore.

*Vegetation*

7.11.12 The Maisemore Weir works boundary is located adjacent to Natural England designated Coastal and Floodplain Grazing Marsh HPI to north with other areas further to the east and south.

7.11.13 Vegetation in the surrounding landscape is predominantly associated with riparian woodland/scrub. This is supplemented with field hedgerows and trees and domestic garden planting.

*Access*

7.11.14 A number of PRoW are in close proximity to Maisemore Weir providing public access towards and along the River Severn;

- PRoW EMA12 follows the right bank of the River Severn Western Channel passing the western end of Maisemore Weir.
- PRoW EMA23, connects to PRoW EMA12 providing a link between the river and The Rudge, and continues to the north of Maisemore on EMA15 and 14.

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- PRoW ESA1A follows the left bank of the River Severn and then continues along the East Channel.
- Bridleway EMA18 crosses Maisemore Hams connecting to the A417 at Maisemore Bridge.

7.11.15 The Severn Way footpath follows the PRoWs EMA12 and EMA23 along the River Severn Western channel. The Three Choirs Way follows The Rudge. Both cross the River Severn at Maisemore Bridge.

*Visual receptors*

7.11.16 The visual receptors that are likely to be affected by the proposed compensation measures at Maisemore Weir are outlined in **Table 7-24**.

**Table 7-24: Visual Receptors likely to be affected**

Receptor description	Receptor type	Approximate distance to the Maisemore Weir works boundary (at its closest)
LCT: 12 – Floodplain Farmland, sub area SV 3B The Rea, Maisemore	Landscape Character	0 m

Receptor description	Receptor type	Approximate distance to the Maisemore Weir works boundary (at its closest)
Ham and Longford		
Maisemore Lock House	Residential	0 m
PRoW EMA12	Recreational	0 m
The Severn Way	Recreational	0 m
PRoW EMA23	Recreational	160 m
The Rudge	Highway User	160 m
The Three Choirs Way	Recreational	160 m
Maisemore village	Residential	250 m
Steadings Business Centre	Business	330 m
PRoW ESA1A	Recreational	340 m
Residential properties along Church Road	Residential	460 m
Maisemore Bridge	Recreational, Highway User	520 m

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### Future Baseline

7.11.17 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

7.11.18 Identification of receptors is based on a desktop study.

7.11.19 At the time of this PEIR the proposed compensation measures at Maisemore Weir are not confirmed, or a mitigation strategy developed. It is assumed that where it is not possible to avoid or reduce a significant adverse effect, remediation measures will be used to offset the effect.

7.11.20 It is assumed that access during the removal works will be via existing highways and / or tracks or where this is not possible a haul road will be created and reinstated to the original land use / condition.

7.11.21 It is assumed that PRow access along the riverbank will be retained, however temporary diversions will be required while the removal works are carried out.

7.11.22 All components of the proposed compensation measures at Maisemore Weir will be included in the future assessment.

### Potential Effects

7.11.23 The likely effects associated with the landscape and visual Aspect as a result of the proposed compensation measures at Maisemore Weir are outlined below.

#### Local landscape Character

7.11.24 Due to the small scale, localised change, and nature of the proposed compensation measures at Maisemore Weir effects on landscape character are unlikely to result in significant change, however this would be considered in detail once a final design is developed.

#### Visual receptors

7.11.25 It is anticipated that some, or all, of the visual receptors have the potential to experience temporary visual effects from the proposed compensation measures at Maisemore Weir while the removal works are carried out due to temporary access, compound, and



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movement of vehicles. There is also the potential for them to experience permanent visual effects, due to a change in vegetation / water levels.

### Proposed Scope

7.11.26 Based on the above assessment, **Table 7-25** presents the potential Landscape and Visual effects that are proposed to be scoped in or out of requiring further assessment, along with the rationale for the choice.

**Table 7-25: Summary of landscape and visual elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
National Landscape Character	OUT	Due to the large scale of the NCAs compared to the small scale of the proposed compensation measures at Maisemore Weir, the LCT are more applicable to Maisemore Weir. Therefore, the NCA has been scoped out of the future assessment.
Local Landscape Character	IN	Due to the small scale, localised change and nature of the proposed compensation measures at Maisemore Weir effects on landscape character are unlikely to

Potential Effect	Scoped IN or OUT	Justification
		result in significant change, however this would be considered in detail once a final design is developed.
Visual Receptors	IN	It is anticipated that some, or all, of the visual receptors have the potential to experience temporary visual effects from the proposed compensation measures at Maisemore Weir during the removal works due to temporary access, compound, and movement of vehicles. There is also the potential for them to experience permanent visual effects, due to a change in vegetation / water levels.

7.11.27 Therefore, it is proposed that Landscape and Visual is scoped into the ES.

## 7.12 Historic Environment

### Introduction

7.12.1 The aims of this section are to:

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- Identify any heritage assets and archaeological features associated with the proposed compensation measures at Maisemore Weir, both within the Maisemore Weir works boundary and a 250 m study area.
- Identify whether the assets could be potentially impacted by the proposed compensation measures at Maisemore Weir.
- Outline a proposed scope and methodology for the assessment of historic environment impacts within the ES.

### Study Area

7.12.2 For the purpose of the assessment, a 250 m study area was established around the Maisemore Weir works boundary, to identify any nearby heritage assets that could be impacted by the development.

### Baseline

#### Current Baseline

7.12.3 There are no designated heritage assets (Scheduled Monuments, Listed Buildings, Registered Parks and Gardens or Registered Historic Battlefields) recorded within the Maisemore Weir works boundary or 250 m study area by the NHLE. Maisemore Weir is also not

located within a World Heritage Site or Conservation Area.

7.12.4 Additionally, the Gloucestershire Historic Environment Record database was consulted to determine any archaeological features located within the area. It discovered the following within a 250 m Study Area; 20<sup>th</sup> century Maisemore Lock and Lockhouse (NHRE 15600). The lock and lock house first featured on the 1920 OS and allows access to the River Severn from the West Channel past Maisemore Weir. The lock is now disused and filled in. As such this asset is considered of negligible interest.

7.12.5 Based on the above, the area is considered of low archaeological significance.

#### Future Baseline

7.12.6 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

## Assumptions and Limitations

- 7.12.7 At the PEIR stage, various details regarding the scale of the proposed compensation measures at Maisemore Weir are not known. In particular the size of the work has not been fully identified which would impact on the archaeological finds and heritage assets to be included within the assessment. However, as discussed, the area is of low archaeological importance so the work would be expected to cause a negligible impact on the assets.
- 7.12.8 The study is based on a desk-based assessment only and no site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings present. The data used in this report have been derived from external sources, and it is presumed that any third-party information used is accurate.
- 7.12.9 The study has outlined the potential of archaeology in the area as low due to the lack of heritage assets in the surrounding area.

## Likely Significant Effects

- 7.12.10 Based on the available information, the removal of Maisemore Weir is not expected to result in any significant effects in relation to the historic environment.

## Proposed Scope

- 7.12.11 Based on the above assessment, **Table 7-26** provides the historic environment impacts that are proposed to be scoped out of requiring further assessment, along with the rationale of choice.

**Table 7-26: Summary of historic environment elements scoped in and out of the assessment.**

Potential Effect	Scoped IN or OUT	Justification
Potential for impact on assets and archaeological features by the proposed compensation measures at Maisemore Weir.	OUT	The lock was installed in the 20 <sup>th</sup> century and removed any archaeological significance in the process. There are no designated and non-designated heritage assets within the Maisemore Weir works boundary and study area. As such, the area is of low archaeological significance.

- 7.12.12 Therefore, it is proposed that historic environment is scoped out of the ES.

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## 7.13 Amenity and Recreation

### Introduction

- 7.13.1 The section considers the likely impact of the proposed compensation measures at Maisemore Weir on the River Severn on community, recreational and residential receptors within the study area.
- 7.13.2 Recreational receptors include PRoWs, promoted routes, cycle routes, LDWRs, open access land, bridleways, and any recreational facilities. The assessment considers likely impacts on access to recreational facilities as well as amenity impacts.
- 7.13.3 Amenity is the term used to describe the character or attractiveness of an area. Amenity can be affected when two or more environmental effects are experienced by the same receptor (e.g., a cycling route) with the potential to deter users of the receptor (e.g. cyclists). The following environmental effects are considered in the amenity assessment: landscape and visual effects, traffic and transport effects, noise and vibration effects and air quality effects. Amenity impacts are considered for residential, community and recreational receptors.

### Study Area

- 7.13.4 For the purposes of this assessment, the study area includes the Maisemore Weir works boundary, plus a 500 m buffer.

### Baseline

#### Current Baseline

- 7.13.5 Environmental receptors considered in this assessment are residential properties, community facilities and recreational facilities including PRoWs, promoted routes, cycle routes, LDWR, open access land and any recreational facilities. Residential receptors
- 7.13.6 There are approximately 37 residential properties within 500 m of the Maisemore Weir works boundary, at Maisemore Village and Maisemore Lock House.

#### *Community receptors*

- 7.13.7 There are no community receptors within the study area. Outside of the 500 m buffer, the A417 corridor to the north for M50 J11 passes two schools; Hartmore School and Staunton & Corse C of E Academy.

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### *Recreational receptors*

7.13.8 Recreational receptors include The Severn Way, The Three Choirs Way, one Bridleway and PRoWs – EMA 12, EMA14, EMA 23, EMA24 and ESA1A.

### **Future Baseline**

7.13.9 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### **Assumptions and Limitations**

7.13.10 At the PEIR stage, specific details regarding the proposed compensation measures at Maisemore Weir are not fully known or decided.

7.13.11 The current assumptions in relation to Amenity and Recreation effects are:

- The duration of the removal works will be short term and temporary (4 months); and

- All Open Access Land and Public Green Spaces will remain accessible; entry may require temporary diversion.

### **Likely Significant Effects**

#### **Access to recreational receptors**

##### *PRoWs*

7.13.12 There are three PRoWs within 200 m of the Maisemore Weir works boundary. These PRoWs may require a temporary diversion during the removal of the weir. As Footpath EMA12 is immediately adjacent to the north side of the weir, it may need to be temporarily closed or diverted for working areas or access. The footpath would be reinstated and there will be no permanent diversion once the removal of the weir is complete.

7.13.13 Pedestrian footfall along Old Road that is linked to Footpaths EMA14 and EMA24 may be affected during removal impeding access temporarily.

7.13.14 One on-site bridleway is expected to be directly affected due to on-site access during removal. This may temporarily divert the route for horse riders.

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### *Recreational Facilities*

7.13.15 There are no recreational facilities near to the Maisemore Weir works boundary. Weir removal is anticipated to increase biodiversity which will increase recreational opportunities including birdwatching and fishing.

### *Open Access Land and Public Spaces*

7.13.16 There are no areas of Open Access Land or Public Green Spaces within 500 m of the Maisemore Weir works boundary. Thus, no significant effects are anticipated.

### **Access to community receptors**

7.13.17 There are no community receptors within the study area. Outside of the 500 m buffer is two schools; Hartmore School and Staunton & Corse C of E Academy., No significant effects are anticipated.

### **Amenity Effects**

7.13.18 Amenity effects can arise due to a combination of two or more effects from Air Quality, Noise and Vibration, Landscape and Visual and Transport.

7.13.19 Amenity effects could arise on recreational receptors (because of the combined effects of landscape and

visual, noise and vibration and traffic effects on PRowS. It should also be noted that amenity effects could arise during recreational activities occurring within the removal stage, such as angling. This disturbance would be minor and short term. During operation, non-significant benefits of recreational activities will occur.

### **Proposed Scope**

7.13.20 A summary of the amenity and recreation elements scoped into and out of further assessment is outlined in **Table 7-27**.

**Table 7-27: Summary of amenity and recreation elements scoped in and out of the assessment.**

Potential Effect	Scoped IN or OUT	Justification
Access to recreational receptors	OUT	Temporary diversions to PRowS will be reinstated once the removal works are complete. This will not be a long-term change and access for the local community will still be maintained. The on-site bridleway may be temporarily closed or diverted, but no significant effects are anticipated to arise from this. During operation, there could be

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Potential Effect	Scoped IN or OUT	Justification
		benefits for those using the river for recreational activities due to increased biodiversity through habitat creation.
Access to community receptors	OUT	There are no community receptors within the study area. Thus, no significant effects anticipated.
Amenity effects	IN	Amenity effects could arise on recreational receptors as a result of the combined effects of landscape and visual, traffic and noise and vibration.

## 7.14 Population and Human Health

### Introduction

7.14.1 This section considers the impact of the proposed compensation measures at Maisemore Weir on population and human health.

7.14.2 The WHO defines human health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”.

7.14.3 Health effects can be direct (e.g. air pollution resulting in respiratory problems) or indirect (e.g. reduced community interaction due to increased traffic resulting in adverse effects on well-being). Similarly, prolonged environmental effects (direct effect) can result in changes to quality of life (indirect effects). The assessment follows a source-pathway-receptor model (as shown in **Table 7-28**), only reporting effects through which there is a clear pathway between the source and the receptor and using evidence to support the conclusions.

**Table 7-28: Source-Pathway-Receptor Model**

Source	Pathway	Receptor	Plausible Health	Explanation
x	✓	✓	No	There is not a clear source from where a potential health impact could originate
✓	x	✓	No	The source of a potential health impact lacks a means of transition to a population
✓	✓	x	No	Receptors that would be sensitive or

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Source	Pathway	Receptor	Plausible Health	Explanation
				vulnerable to the health impact are not present
✓	✓	✓	Yes	Identifying a source, pathway and receptor does not mean a health impact is a likely significant effect. The health impact is assessed qualitatively based on the available evidence and through the application of professional judgement.

within the PEIR, these have been considered within the assessment as having potential for human health effects. Where effects are concluded not to be significant at a constituent aspect level within the PEIR, these have not been considered in the health assessment. Constituent aspects considered in this assessment include:

- Noise and Vibration;
- Transport;
- Soils and Land use;
- Geology and Land Contamination;
- Amenity and Recreation; and
- Landscape and Visual.

### Study Area

7.14.4 The assessment of impacts on human health relies on the effects reported by Aspect chapters to identify potential human health impacts. The relevant chapters have been referred to as the ‘constituent aspects’ and the effects they report are termed ‘health determinants’.

7.14.5 Health determinants can be defined as the range of personal, social, economic, and environmental factors that influence health status. Where effects are concluded as significant at a constituent aspect level

7.14.6 For the assessment of impacts on population and human health, the study area is defined by the scope of the relevant constituent aspect study areas.



## Baseline

### Current Baseline

7.14.7 Baseline information relevant to population and human health is outlined in the relevant constituent aspects as follows:

- The location and type of community and recreational facilities – Recreation and Amenity;
- The location of green / open space – Soils and Land Use and Recreation and Amenity;
- The spatial characteristics of the transport network and usage in the area, including the surrounding road network, PRow (including bridleways), cycle ways, non-designated public routes and public transport routes –Transport;
- AQMAs and ambient air quality levels – Air Quality;
- Areas recognised as being sensitive to noise (e.g., noise important areas, noise management areas) and the ambient noise environment – Noise and Vibration;
- Sources and pathways of potential pollution (e.g., land/water contamination) – Soils and Land Use and Geology and Land Contamination; and
- Landscape amenity – Landscape and Visual.

- Future Baseline

7.14.8 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

7.14.9 At the PEIR stage, specific details regarding the proposed compensation measures at Maisemore Weir are not fully known or decided.

### Likely Significant Effects

7.14.10 The following constituent aspects have been scoped into the assessment due to likelihood of giving rise to significant effects and therefore have the potential to give rise to impacts on human health:

- Landscape and Visual;
- Transport;
- Noise and Vibration;

- Soil and Land Use;
- Geology and Land Contamination; and
- Amenity and Recreation.

### Proposed Scope

7.14.11 A summary of the population and human health scope for further assessment is outlined in **Table 7-29**.

**Table 7-29: Summary of population and human health elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Potential adverse or beneficial population and Human Health effects	IN	It is proposed that the ES includes a detailed assessment of potential population and human health effects that could occur during the removal of Maisemore Weir. At this stage, it is unclear whether potential significant population and human health effects will be realised, thus, with the likelihood of the scoped in constituent aspects giving rise to potential impacts on human health, the full assessment is required.

## 7.15 Climate Change

### Introduction

7.15.1 The aim of this section is to consider the likely significant effects of the proposed compensation measures at Maisemore Weir on anthropogenic climate change (i.e., through GHG emissions).

7.15.2 Under Schedule 4 Paragraph 5(f) of the 2017 EIA Regulations, an ES must provide “a description of the likely significant effects of the development on the environment” resulting from “the impact of the project on climate (for example the nature and magnitude of GHG emissions) and the vulnerability of the project to climate change.” Although the Regulations require consideration of the vulnerability to climate change, as the proposals include removal of infrastructure, there is no physical asset remaining, other than reinstating the riverbank, which could be vulnerable to climate change. Therefore, no further consideration of this aspect is included within this section and is scoped out from the ES.

### Study Area

7.15.3 For the assessment of the impacts of GHG emissions on climate, the Maisemore Weir works boundary is considered appropriate. The study area includes the

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GHG emissions associated with the project to determine the impact on the climate. The main GHGs relevant to the removal of Maisemore Weir are CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O. GHG emissions are reported as CO<sub>2</sub>e, which accounts for the different GWP of each GHG, relative to CO<sub>2</sub>. Other GHGs which are normally considered include hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride, but these are not anticipated to be material in the nature of the activities.

## Baseline

### Current Baseline

7.15.4 Baseline emissions are defined as emissions that occur without the project. For the area of the Maisemore Weir works boundary there are zero emissions associated with the current operation of the river. Therefore, no emissions are associated with the 'use' of this land prior to the removal of Maisemore Weir.

### Future Baseline

7.15.5 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site accounts for changes that are expected to have been made by the time Hinkley Point C is operational,

including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

## Assumptions and Limitations

7.15.6 At the PEIR stage, specific details regarding the removal of the Maisemore Weir are not fully known.

## Likely Significant Effects

7.15.7 GHG emissions associated with the removal of the weir in the form of vehicle emissions from the transport of workers and plant to and from Maisemore Weir, consumption of fuel for the removal activities and wastes generated are expected to be minimal due the relatively small size of the weir (2340 m<sup>3</sup>). The GHG emissions would be negligible in comparison to the UK's carbon budgets and represent a not significant adverse effect on climate.

7.15.8 It is anticipated that there would be no GHG emissions on completion of the works to remove the weir.

## Proposed Scope

7.15.9 Based on the above assessment, **Table 7-30** presents the potential impacts on climate change of the proposed compensation measures at Maisemore Weir and shows they are expected to be negligible and not significant and provides a rationale for being scoped out of further assessment.

**Table 7-30: Summary of climate change elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Potential GHG emissions from the removal of Maisemore Weir	OUT	GHG emissions during the weir removal would be negligible in comparison to the UK's carbon budgets and would be a not significant adverse effect.
Potential GHG emissions from the operation of the proposed compensation measures at Maisemore Weir	OUT	It is unlikely that there would be any GHG emissions following the removal of the Maisemore Weir.

Potential Effect	Scoped IN or OUT	Justification
Vulnerability to climate change	OUT	There is no physical asset remaining which would be vulnerable to climate change.

7.15.10 Therefore, it is proposed climate change is scoped out of requiring further detailed assessment in the ES.

## 8. UPPER LODGE WEIR ON THE RIVER SEVERN

### 8.1 Conventional Waste Management

#### Introduction

8.1.1 This section considers the generation and management of conventional waste resulting from the proposed compensation measures at Upper Lode Weir. It does not include radioactive waste and materials management.

8.1.2 The aim of this section is to:

- Evaluate potential activities associated with the removal of the weir and operation of the proposed compensation measures at Upper Lode Weir and identify the activities that could lead to significant environmental effects.
- Identify relevant receptors which could potentially be impacted by conventional waste management associated with the removal of the weir and operation of the proposed compensation measures.
- Outline a proposed scope and methodology for the assessment of potential conventional waste

management impacts of the proposed compensation measures at Upper Lode Weir on the environment within the ES.

#### Study Area

8.1.3 As defined in *IEMA guide to: Materials and Waste in Environmental Impact Assessment*, two geographically different study areas should be determined. These have been defined as:

- Project Study Area, which comprises all land contained within a site boundary. Within these areas waste is generated and managed, including any areas identified for temporary uses such as temporary waste stockpiles, accesses, site compounds and other enabling works. In the context of this chapter, the Project Study Area covers the Upper Lode works boundary (refer to **paragraph 1.4.6 in Chapter 1**) and is located in Gloucestershire, on the River Severn.
- Expansive Study Area provides the boundary for appreciation of the capacity of relevant waste management infrastructure, including remaining landfill void. This is considered on a regional basis, within one or more regions as appropriate. Upper Lode Weir is located in the South-West region, which in the context of this chapter comprises Bristol, Cornwall (including the Isles of Scilly),

Dorset, Devon, Gloucestershire, Somerset and Wiltshire.

## Baseline

### Current Baseline

- 8.1.4 In the context of this chapter, the sensitive receptor is landfill capacity for waste, as detailed in *IEMA guide to: Materials and Waste in Environmental Impact Assessment*.
- 8.1.5 Information provided in *Waste Management in the South-West: Data Tables 2022* allows the assessment of the opportunities for waste arisings to be transferred, treated, recycled, recovered, or disposed as appropriate in the region, if they cannot be reused, recycled or otherwise recovered on-site.
- 8.1.6 Whilst annual capacity data are published by the Environment Agency for both landfill and incineration facilities at the national, regional, and sub-regional level, no annual capacity data are published by the Environment Agency for waste transfer, treatment or recycling sites. Only annual throughput is published for these facilities. The total annual throughput or capacity reported is detailed in **Table 8–1**.

**Table 8–1: Annual permitted throughput or capacity of transfer, treatment, recycling and incineration in the South West, 2022**

Site type	South West (000s tonnes)
<b>Transfer (annual throughput)</b>	
Hazardous waste transfer stations	594
Household, industrial, commercial waste transfer stations	2,343
Non-biodegradable waste transfer stations	26
<b>Treatment and metal recycling (annual throughput)</b>	
Material recovery	764
Physical treatment	3,313
Physico-chemical treatment	497
Chemical treatment	35
Composting	548
Biological treatment	2,987
Metal recycling	1,177
<b>Incineration (annual capacity)</b>	
Hazardous waste	9
Co-incineration of non-hazardous waste	0

Site type	South West (000s tonnes)
Municipal and/or industrial & commercial incineration	1,505
Biomass/waste wood incineration	0

8.1.7 For wastes which cannot be reused, recycled, or otherwise recovered, disposal to landfill will be required. The total remaining landfill capacity in 2022, as presented in **Table 8–2**, shows there are opportunities to dispose waste arisings from the Proposed compensation measures at within the region.

**Table 8–2: Landfill capacity available in the South West, 2021**

Landfill type	South-West (000s tonnes <sup>1</sup> )
Hazardous merchant landfill	1,770
Hazardous restricted landfill	0
Non-hazardous landfill with SNRHW cell <sup>2</sup>	2,615
Non-hazardous landfill	5,518
Non-hazardous restricted landfill	0
Inert landfill	15,404
<b>Total</b>	<b>27,328</b>

Landfill type	South-West (000s tonnes <sup>1</sup> )
<p>1 Converted from cubic metres through the adoption of the following conversion factors: inert landfills 1.5 tonnes/m<sup>3</sup>, non-hazardous landfills 0.83 tonnes/m<sup>3</sup> and hazardous landfills 1.5 tonnes/m<sup>3</sup>.</p> <p>2 Some non-hazardous sites can accept some Stable Non-Reactive Hazardous Wastes (SNRHW) into a dedicated cell, but this is usually a small part of the overall capacity of the site.</p>	

8.1.8 No conventional waste generation and management has been identified post-removal of the weir. It is therefore proposed they are scoped out.

### Future Baseline

8.1.9 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline but the treatment and disposal tables will be updated with the latest available data.

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## Assumptions and Limitations

- 8.1.10 At the PEIR stage, various details regarding the proposed compensation measures at Upper Lode Weir are not known. In particular, the expected waste types, waste generation estimates, and removal timeline have not been identified.
- 8.1.11 The vast majority of wastes assumed to be produced during removal of the weir will be excavated waste from earthworks, site preparation/clearance and the removed weir itself. The design is at concept stage and as a result there is no information on quantities of waste generated or the proposed management. It can be expected, however, that the Proposed compensation measures at Upper Lode Weir will aim to reuse all excavations within the site, and that the removed weir will be classified as demolition waste and recycled wherever possible.
- 8.1.12 Organic wastes may be produced from the site clearance and small amount of municipal-type solid waste associated with removal workers can be expected, such as food waste and packaging. A large proportion of this solid waste is likely to be suitable for reuse, recycling, composting or other recovery, although a proportion may also require disposal to landfill.

- 8.1.13 It has been assumed that the Upper Lode Weir works boundary, and therefore the excavated and demolition material is not contaminated. However, if this is not the case any contaminated material would be removed for treatment and/ or disposal at an appropriate facility.

## Likely Significant Effects

- 8.1.14 Conventional waste generation is predicted to be minimal, as the expected earthworks excavations can possibly be reused on site and the amount of demolition waste would only be the quantity associated with the weir removal. The removal itself is a relatively small development and would require a relatively small workforce on site – so the municipal waste generation is expected to be negligible. It is unlikely that the amount of waste required to be disposed of would alter the regional capacity in a significant way. Notwithstanding, this should be analysed and confirmed in the ES, especially if excavation material cannot be reused on site.
- 8.1.15 At the moment of writing this report, no significant effects are expected, based on the current scope and design information.



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## Proposed Scope

8.1.16 It is proposed that the ES includes an assessment of potential conventional waste management effects that could occur during the removal of the Upper Lode Weir and disposal of waste material. A summary of the proposed scope is outlined in **Table 8–3**.

**Table 8–3: Summary of conventional waste management elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Removal: Potential reduction in the remaining landfill void and impacts on the capacity of waste management facilities in the region	IN	The vast majority of the expected waste tonnage would be from the demolition of the weir itself, assumed to be built from rock and concrete. Opportunities to recycle/recover this type of waste (CDE) exists in the region, however, waste types and estimated tonnages have not been detailed and may be subject to change as the design develops. Significant effects are not expected, nonetheless a waste assessment should be conducted where potential

Potential Effect	Scoped IN or OUT	Justification
		effects of waste can be eventually scoped out, when there is more information available.
Operation: Potential reduction in the remaining landfill void and impacts on the capacity of waste management facilities in the region	OUT	No waste generation and management is expected/planned at the moment during the operational phase. Therefore, it is proposed for operational effects to be scoped out.

8.1.17 In general, the assessment of conventional waste management associated with the removal of Upper Lode Weir shall follow the guidance set out in *IEMA guide to: Materials and Waste in Environmental Impact Assessment*.

8.1.18 Current and likely future baseline conditions for waste during the removal period will be considered, and include information on waste management capacity, including remaining landfill void space and annual throughputs of waste transfer, waste treatment, metal recycling and waste incineration facilities. Estimated landfill capacity alteration caused by waste generated

by the removal of the weir, as detailed in IEMA guidance.

- 8.1.19 Waste hierarchy, circular economy principles and sustainable approach to waste management would be applied. Where waste is reused on site, *Definition of Waste: Code of Practice* would be considered.

## 8.2 Socio-economics

### Introduction

- 8.2.1 The section considers the likely impact of the proposed compensation measures at Upper Lode Weir on the River Severn on socioeconomic receptors within the study area.
- 8.2.2 The socioeconomic assessment considers employment effects and economic investment in the region as a result of the proposed compensation measures at Upper Lode Weir. The assessment also considers disruption to commercial receptors including businesses and agricultural properties as well as land use impacts.

### Study Area

- 8.2.3 Two study areas have been proposed for the assessment as follows:
- The study area for the assessment of disruption to commercial receptors is 500 m from the Upper Lode Weir works boundary. This has been selected as it is considered to represent the likely limit of direct effects of removal or operation on any commercial receptors.
  - The study area for the assessment of effects on employment and economic investment is Tewkesbury Council Area. This wider study area is intended to encompass the area within which significant effects on employment and the local economy could occur.

### Baseline

#### Current Baseline

- 8.2.4 The baseline data is based on desk-based research of publicly available sources and focuses on commercial receptors, employment and economic investment within the study area denoted above. Key receptors include commercial properties including agricultural businesses, the local workforce population and the local economy.

### *Commercial properties and Land Use*

8.2.5 The Upper Lode Weir works boundary is surrounded by Grade 3 agricultural land. There are no commercial receptors within 500 m of the Upper Lode Weir works boundary.

### *Employment and economic investment*

8.2.6 In Tewkesbury District Council area, the unemployment rate is 2.3 % with an employed workforce of 45,648<sup>288</sup>. This is below the average for England which has an average unemployment rate of 4.3 %<sup>289</sup>.

8.2.7 The local economy for the purposes of this assessment comprises the Tewkesbury District Council Area. This area had an annual GVA of £2.23 billion in 2014<sup>290</sup>.

### **Future Baseline**

8.2.8 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site takes into account changes that are expected to have been made by the time Hinkley Point C is

operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### **Assumptions and Limitations**

8.2.9 At the PEIR stage, specific details regarding the proposed compensation measures at Upper Lode Weir are not fully known/ decided.

8.2.10 The current assumptions in relation to socioeconomic effects are;

- Removal is expected to be temporary and short term (4 months).
- No agricultural land will be permanently acquired during removal. A proposed site compound may require temporary uptake of land to the east of the weir. Temporary uptake of land will also occur along the river bank where the bank protection measures will occur.

<sup>288</sup> Office for National Statistics (2023). Employment, unemployment and economic inactivity in Tewkesbury. [\[Online\]](#) Accessed 6 December 2023

<sup>289</sup> Office for National Statistics (2023) Unemployment rate (aged 16 and over, seasonally adjusted): %. [\[Online\]](#) Accessed 6 December 2023.

<sup>290</sup> Tewkesbury Council. (2017). Economic Development and Tourism Strategy. [\[Online\]](#) Accessed 6 December 2023.

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- Access to Upper Lode Weir is via the A438 and Mythe Bridge, where temporary road diversion may be required.

## Likely Significant Effects

### Disruption to commercial receptors

- 8.2.11 There are no commercial receptors within the study area. Therefore, there is no potential for disruption effects.

### Employment and economic investment in the region

- 8.2.12 Employment effects from the proposed compensation measures at Upper Lode Weir would arise through direct employment in removal-related roles, and indirectly through employment required to support the direct labour requirements. This is assessed within the context of the overall labour market. It is assumed that labour requirements for the removal works would be minimal and there would be no permanent employment during operation. Given the large size of the local workforce within the Tewkesbury District Council Area, no socio-economic effects regarding workforce are anticipated.

- 8.2.13 Spending on the proposed compensation measures at Upper Lode Weir would include land purchase, aggregate materials, machinery, and other capital costs. Given the scale of the proposed compensation measures at Upper Lode Weir in relation to the size of the regional economy, even if 100 % of direct capital expenditure on the proposed compensation measures at Upper Lode Weir was captured in the local area, this would represent less than 0.01 % of the total GVA. Therefore, the benefit to the economy is likely to be of minor significance.

### Land Use

- 8.2.14 No permanent uptake of agricultural land is anticipated. A proposed site compound may require temporary uptake of agricultural land to the East of the weir.
- 8.2.15 There is potential to temporarily compromise the agricultural productivity within the local area, through temporary uptake of agricultural land however, given that removal is likely to last 4 months and the land required makes up a small proportion of the overall land holding, this is not expected to be significant.
- 8.2.16 Temporary uptake of land will also occur along the riverbank for the length of the bank protection measures. Similarly, this will be short term and not expected to result in significant impacts.

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## Proposed Scope

8.2.17 It is proposed that socioeconomics are scoped out of the full assessment. No significant effects are anticipated in terms of land use, business receptors or the local economy, as summarised in **Table 8-4**.

**Table 8-4: Summary of socio-economic elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Disruption to commercial receptors	OUT	There are no commercial receptors within the study area. Therefore, there is no potential for disruption effects.
Employment and economic investment in the region	OUT	Given the large size of the local workforce within the Tewkesbury Council Area, the strength of the regional economy and the low level of direct labour requirements to support the proposed compensation measures at Upper Lode Weir, no socio-economic effects are anticipated.
Commercial and Agricultural Land Use	OUT	Give that no permanent uptake of agricultural or commercial land is anticipated, and the proposed site

Potential Effect	Scoped IN or OUT	Justification
		compound and bank protection will only require temporary uptake of land, land use effects will be negligible.

## 8.3 Transport

### Introduction

8.3.1 This section describes the current baseline relating to transport provisions to access Upper Lode Weir and the potential transport impacts associated with the proposed compensation measures at Upper Lode Weir. This section will conclude by outlining the proposed scope of works that will inform the final EIA. Good practice in managing transportation impacts is considered throughout the discussions in this section.

### Study Area

8.3.2 There is a private access road to the lock, which links to a single-lane carriageway to connects to the A438 approximately half a mile away, linking to the A38 for access to the M50 on the SRN approximately 4 miles away.

## Baseline

### Current Baseline

- 8.3.3 The weir would be accessed from the south of the River Severn via Severn Ham. The only existing access point to the ham for motorised vehicles is through Healings Flour Mill and Warehouses via Quay Street.
- 8.3.4 PRoW routes on Severn Ham are present nearby this access point and the weir. Footpath ZTE11 parallel to the south of Healings Flour Mill and Warehouses, and thereafter parallel to the southern bank of River Severn and the Weir. Footpath ZTE10 branches off Footpath ZTE11, which is within 10 m of the existing weir, to meet with Footpath ZTE13 to the west of Severn Ham (within 100 m of the weir).
- 8.3.5 Footpath ZTE12 connects from Footpath ZTE11 to the northwest of the ham to meet Footpath ZTE13 to the east of the ham. Footpath ZTE14 runs parallel to Mill Avon, linking to Footpaths ZTE12 and ZTE13 to its south and Footpath ZTE11 to its north.
- 8.3.6 The first point of access on the public road network is Quay Street, connecting to A38 High Street / Barton Street / Barton Road for access to the county's primary route corridors for HGVs. This includes A438 Ashchurch Road, which provides a 1.4 km corridor

connecting to M5 J9 for the SRN, and the A38 corridor which connects to the A4019 to the south for access to M5 J10 approximately 8.5 km away. Both options are considered in this section for significant effects.

- 8.3.7 A38 High Street has a mixture of residential and commercial uses including normal retail activities. It forms a part of the A38 corridor, thus supporting a regular daily flow of traffic.
- 8.3.8 Tewkesbury Community Hospital is located on A38 Barton Road, which is expected to attract vulnerable groups.

### Future Baseline

- 8.3.9 Due to the low level of traffic anticipated to be generated by the removal of the weir and operation of the proposed compensation measures at Upper Lode Weir and the low level of existing development and population in the study area, we will only consider the current baseline for any assessment of any impacts of the removal and operational traffic. No future baseline will be considered.

## Assumptions and Limitations

- 8.3.10 This assessment assumes the use of the current existing access point to the ham via Quay Street,

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leading immediately into Healings Flour Mill and Warehouses. Access is subject to negotiation with the existing landowners. This assumption will be reviewed during the design's development. Through a high-level review of the size of the Upper Lode Weir works boundary, no more than a peak of 20 HGV movements per day (10 HGVs) will be required to travel to Upper Lode Weir. Moreover, it is assumed that a maximum of 20 LGV movements per day would be required for the proposed compensation measures at Upper Lode Weir. These peak daily movements account for the movement of plant, materials, and equipment to and from Upper Lode Weir where necessary.

- 8.3.11 Whilst these caps have been provisionally identified, extensive stakeholder engagement and design developments will be needed to estimate the actual numbers of construction vehicles to Upper Lode Weir. Moreover, it should be noted that as these construction vehicle limits will only be reached for a limited period, it is expected that daily construction vehicle movements will be lower for the majority of the removal programme.
- 8.3.12 The programme will be designed to minimise the impacts of construction vehicles. The implementation of a CEMP and a CTMP will ensure that good practice is applied during the works.

- 8.3.13 The day-to-day operation and maintenance of the proposed compensation measures at Upper Lode Weir will generate a negligible volume of LGVs, averaging as less than one movement per day annually, meaning that significant impacts during operation can be scoped out of the assessment.
- 8.3.14 Excluding motorway-classified roads, DfT data shows that 92 % of major roads had HGV concentrations of 15 % of all traffic flows or less in South West England and West Midlands in 2022, the regions which the compensation measures are located in. This 15 % threshold can therefore be considered the maximum concentration of HGVs that should be on designated freight routes, trunk roads and slip roads which provide access to motorways (SRN). For all other major roads, a 10 % threshold for HGV concentrations can be considered as 88 % of major roads in these regions (excluding motorway-classified roads) have HGV concentrations within this threshold.
- 8.3.15 The impacts of the removal activity will not be considered in combination with other works associated with Hinkley Point C development site and compensation measures. This is because Upper Lode Weir falls outside of the geography of the local road networks affected by other works, meaning that there will be no substantial interaction with them to generate

a cumulative effect. This is also covered in **Volume 4** of this PEIR.

### Likely Significant Effects

- 8.3.16 The footpaths and byways identified above may require closures and diversions during the works periods. This may require a Public Path Order. Depending on the outcome of closures and / or diversions, this could generate a minor to moderate adverse impact for non-motorised users.
- 8.3.17 The normal retail activities along A38 High Street will continue to be facilitated by existing pedestrian infrastructure such as signalised crossing points, which the construction vehicles must adhere to by law. Any impact on this receptor is expected to be negligible.
- 8.3.18 Access to Tewkesbury Community Hospital will be maintained, with no changes to the provision of bus stops or through-access for staff and patients wishing to use the car park. With a maximum of two HGV movements and two LGV movements in a given hour, the impact is expected to be minor.
- 8.3.19 It should be noted that the daily two-way traffic volumes at the identified points range from approximately 11,300 to 15,700 vehicles in total, as reported by DfT<sup>291</sup>.
- 8.3.20 HGV concentrations do not exceed 5 %, which is well below the HGV concentrations that can be experienced for the observed types of roads (10-15 %). The largest expected increase in HGVs at the observed locations is expected on A38 High Street (21.7 %), however this is still considered Slight. Impacts are therefore expected to be minor at these observed points, however it should be noted that no count point data was available on Quay Street.
- 8.3.21 The changes in HGV daily movements are summarised in **Table 8-5**. The percentage figures are rounded to the nearest whole number.

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<sup>291</sup> Department for Transport (2022) Road traffic bulk downloads. [\[Online\]](#) Accessed 6 December 2023.



**Table 8-5: Impacts of construction HGVs for Upper Lode Weir (maximum daily movements)**

Countpoint location	Current HGVs (DfT 2022)	Construction HGVs	Total HGVs with construction HGVs	HGV % with construction peak	% Increase in HGVs
A38 High Street, between A38 Mythe Road and A38 Barton Street	92	20	112	1 %	22 %
A38 Barton Road, between A38 Barton Street and A438 Ashchurch Road	129	20	149	1 %	16 %
A438 Ashchurch Road, between A38 Barton Road and M5 J9.	724	20	744	5 %	3 %
A38 Tewkesbury Road, between B4213 and A4019 Cheltenham Road	202	20	222	2 %	10 %

Countpoint location	Current HGVs (DfT 2022)	Construction HGVs	Total HGVs with construction HGVs	HGV % with construction peak	% Increase in HGVs
A4019 Cheltenham Road, between A38 Tewkesbury Road and M5 J10	187	20	207	2 %	11 %
A38 Gloucester Road, between A38 Jubilee Way and B4213	161	20	181	1 %	12 %

8.3.22 The impacts of LGV movements were found to be negligible (less than 3 % increase). These are summarised in **Table 8-6**. The percentage figures are rounded to the nearest whole number.

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**Table 8-6: Impacts of construction LGVs for Upper Lode Weir (maximum daily movements)**

Countpoint location	Current LGVs (DfT 2022)	Construction LGVs	Total LGVs with construction LGVs	LGV % with construction peak	% Increase in LGVs
A38 High Street, between A38 Mythe Road and A38 Barton Street	1276	20	1296	11 %	2 %
A38 Barton Road, between A38 Barton Street and A438 Ashchurch Road	1562	20	1582	12 %	1 %
A438 Ashchurch Road, between A38 Barton Road and M5 J9.	2551	20	2571	16 %	1 %
A38 Tewkesbury Road, between B4213 and A4019 Cheltenham Road	1781	20	1801	15 %	1 %

Countpoint location	Current LGVs (DfT 2022)	Construction LGVs	Total LGVs with construction LGVs	LGV % with construction peak	% Increase in LGVs
A4019 Cheltenham Road, between A38 Tewkesbury Road and M5 J10	1521	20	1541	13 %	1 %
A38 Gloucester Road, between A38 Jubilee Way and B4213	2060	20	2080	14 %	1 %

8.3.23 It is anticipated that these maximum levels of construction movements would occur sporadically over a short duration.

### Proposed Scope

8.3.24 Based on the above assessment, **Table 8-7** presents the potential transport impacts that are proposed to be scoped in and out of requiring further assessment, along with justifications.

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**Table 8-7: Summary of transport impacts scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Traffic impacts during removal	IN	<p>It needs to be understood whether the generated traffic from construction traffic (transporting plant, equipment, and materials) and the workforce personnel will impact the operation of the affected road network.</p> <p>The CTMP will likely be required as a planning obligation to mitigate any transport impacts. It will include estimates of the total vehicle movements to Upper Lode Weir relating to the staff, equipment, and materials. This will enable the impacts on the road network to be assessed at their peak levels.</p> <p>Congestion issues have been flagged during peak times along sections of the access route. The CTMP will outline necessary limits and restrictions on construction vehicle movements and speeds, which are expected to include prohibitions during periods where</p>

Potential Effect	Scoped IN or OUT	Justification
		conflicts with vulnerable travellers could occur.
Traffic impacts during operations	OUT	The day-to-day operation of the proposed compensation measures at Upper Lode Weir will generate a negligible volume of LGVs, averaging as less than one movement per day annually. This is therefore not considered significant to warrant a detailed assessment in the EIA.
Sensitive Receptors	IN	<p>The identified receptors are expected to experience minor impacts at most in light of the existing concentrations of HGV traffic.</p> <p>The implementation of a CTMP will likely mitigate these impacts.</p> <p>For residential settlements, it is expected that the CTMP will limit or prohibit night time working in line with standard practices and regulations.</p>
Pedestrians, cyclists and horseriders	IN	On-site PRoWs are expected to be directly affected due to on-site access during removal. Access is expected to sever the route.

Potential Effect	Scoped IN or OUT	Justification
		warranting temporary or potentially permanent closures and diversions.

## 8.4 Noise and Vibration

### Introduction

8.4.1 The aims of this section are to:

- Evaluate potential effects associated with the proposed compensation measures at Upper Lode Weir and identify those activities which could lead to significant effects.
- Identify the relevant human receptors which could potentially be impacted by noise and vibration associated with the proposed compensation measures at Upper Lode Weir.
- Outline a proposed scope and methodology for the assessment of potential noise and vibration impacts within the ES.

8.4.2 The potential effects on human receptors (i.e., dwellings and other noise-sensitive locations used by humans) are considered within this section. Effects of noise and vibration on other receptor types are considered in the following sections:

- **Section 8.2 Socio-economics;**
- **Section 8.13 Amenity and Recreation;** and
- **Section 8.14 Population and Human Health.**

### Study Area

8.4.3 Initial Study Areas have been defined for each aspect of the noise and vibration assessment. These areas are defined in terms of distances from the relevant part of the development. These distances have been selected, using professional judgement, based on:

- Initial estimates of noise/vibration levels likely to be generated during the removal of the weir and operation of the proposed compensation measures at Upper Lode Weir.
- Noise/vibration levels thresholds below which effects are unlikely to occur.
- Study Areas defined in relevant guidance documents.

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- 8.4.4 The Study Area selected for noise associated with the removal of the weir is 500 m from any area where removal activities could take place, including site compounds and laydown areas. At the PEIR stage, it is assumed that these activities could occur anywhere within the Upper Lode Weir works boundary.
- 8.4.5 The Study Area for the vibration assessment is 100 m from the Upper Lode Weir works boundary, as there is a negligible risk of effects occurring beyond this distance.
- 8.4.6 For the assessment of noise and vibration from road traffic during removal of the weir and operation, the initial Study Area is based on identifying where the proposed compensation measures at Upper Lode Weir would lead to a change in traffic flows on the road network which would cause a change in the Basic Noise Level of 1dB LA10,18hr or greater, based on guidance set out in DMRB LA 111.

## Baseline

### Current Baseline

- 8.4.7 Based on a desktop review of the local area, the baseline noise environment is likely to be influenced by local wildlife, agricultural activities, and traffic on the A438. In general, the baseline noise climate at the

nearest residential receptors is expected to be typical of a rural location, with low background levels.

- 8.4.8 The key receptors and the approximate distance to the Upper Lode Weir works boundary are summarised in **Table 8-8**.

**Table 8-8: Noise and vibration receptors**

Receptor Description	Approximate distance to Upper Lode Weir works boundary (m)
Outlying residential properties to north of Upper Lode Weir	250
Town of Tewkesbury	720

### Future Baseline

- 8.4.9 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

## Assumptions and Limitations

- 8.4.10 At the PEIR stage, various details regarding the proposed compensation measures at Upper Lode Weir are not known. In particular, the likely plant and equipment required for removal have not been identified, and the programme of works is not defined.
- 8.4.11 The identification of receptors has been undertaken using aerial photography, and the status of all potential sensitive receptors has not been verified.
- 8.4.12 Professional experience has been used during the evaluation of potential noise and vibration effects.

## Likely Significant Effects

- 8.4.13 There are no activities that are expected to occur during the long-term operation of the proposed compensation measures at Upper Lode Weir that could give rise to significant noise or vibration effects. Therefore, it is proposed to scope out the assessment of operational noise and vibration from the ES.
- 8.4.14 As no receptors are within the Study Area for vibration associated with removal, no significant vibration effects are likely to occur. It is therefore proposed to scope out the assessment of vibration associated with removal from the ES.

- 8.4.15 The removal of the Upper Lode Weir is expected to involve the use of inherently noisy plant and equipment, with the potential to cause temporary noise disturbance at local receptors.
- 8.4.16 As residential receptors are located within the adopted Study Areas for removal, it is considered that the level of noise at receptors during the removal could give rise to significant noise effects.
- 8.4.17 BS 5228-1 refers to a period of 10 days as a temporal threshold above which significant effects due to noise associated with removal of the weir might be experienced. The removal activities could occur over a period greater than 10 days. Therefore, it is considered that the duration of noise at receptors during the removal works could give rise to significant noise effects.
- 8.4.18 The indicative daily flows of construction traffic vehicles described in **Section 8.3 Transport** would be below the DMRB screening criteria for noise effects. It is not considered that the expected volume of construction related traffic on public highways has the potential to cause temporary noise or vibration effects.

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## Proposed Scope

8.4.19 Based on the above assessment, **Table 8-9** presents the potential noise and vibration effects that are proposed to be scoped out of requiring further assessment, along with the rationale.

**Table 8-9: Summary of noise and vibration elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Potential noise and vibration effects during operation of the potential compensation measures at Upper Lode Weir.	OUT	There are no activities expected to occur during the operation of the proposed compensation measures at Upper Lode Weir that could give rise to significant noise or vibration effects.
Potential noise effects due to emissions from site plant and machinery.	IN	The removal of Upper Lode Weir is expected to involve the use of inherently noisy plant and equipment. Temporary noise disturbance could occur at local receptors located within the Study Area for noise associated with removal of the weir.

Potential Effect	Scoped IN or OUT	Justification
Potential vibration effects due to emissions from site plant and machinery.	OUT	No receptors are within the Study Area for vibration associated with the removal of the weir.
Potential noise and vibration effects due to emissions from construction traffic off-site.	OUT	The construction traffic flows are likely to be less than the DMRB screening criteria. Therefore, the associated potential effects would not be likely to cause significant effects.

8.4.20 It is proposed that the ES includes a detailed assessment of potential noise and vibration effects that could occur during the removal of Upper Lode Weir.

8.4.21 In general, the assessment of noise and vibration associated with the removal activities shall follow the guidance set out in BS 5228-1 and BS 5228-2.

8.4.22 The selected magnitude scale and assessment thresholds, including SOAEL and LOAEL values, that will be adopted in the ES shall be discussed with the relevant stakeholders.

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- 8.4.23 BS 5228-1 sets out various suitable methodologies for the assessment of noise associated with removal. These are based on either absolute thresholds (i.e. independent of existing noise levels) and relative thresholds (i.e set in relation to the existing noise levels). If the thresholds agreed with the relevant stakeholders are based on relative thresholds, then a survey of existing noise levels will be undertaken. Should other receptor types be identified, reference will be made in the ES to other absolute noise criteria such as those presented in BS8233 and by the WHO.
- 8.4.24 The ES shall set out suitable noise and vibration control measures, in accordance with best practicable means (BPM) principles, that would be adopted during the removal of the weir.

## 8.5 Air Quality

### Introduction

- 8.5.1 The aims of this section are to evaluate the potential effects of the proposed compensation measures at Upper Lode Weir on air quality at sensitive human and ecological receptors.
- 8.5.2 The assessment considers the following matters:

- potential impacts arising from dust and particulate matter emissions generated during the removal of Upper Lode Weir;
- potential impacts on air quality due to emissions from associated on-site plant and machinery; and
- potential impacts on air quality due to emissions from removal and operational-related off-site traffic.

- 8.5.3 There are no potential impacts from dust and particulate matter emissions generated during the operation of the proposed compensation measures at Upper Lode Weir.

### Study Area

- 8.5.4 For dust emissions during the removal of the Upper Lode Weir, the assessment of human receptors focuses on areas up to 250 m from the Upper Lode Weir works boundary or up to 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site exit(s). For ecological receptors, the assessment focuses on areas up to 50 m from the Upper Lode Weir works boundary or up to 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site exit(s). This distance is based on the IAQM construction dust guidance<sup>258</sup>.



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8.5.5 Human receptors include locations where members of the public could be present for both short or long periods, for example residential properties, schools, hospitals, doctors' surgeries, places of worship, streets, shops, playing fields or parks and PRoW; including footpaths and bridleways.

8.5.6 An ecological receptor (also referred to in this section as 'protected conservation areas') refers to any designated habitat that might be sensitive to dust soiling. These can include European sites (i.e., SAC, SPA and Ramsar sites), a SSSI and other nature sites (i.e. ancient woodlands, NNR, LWS and LNR).

## Baseline

### Current Baseline

#### *Sensitive human receptors*

8.5.7 The closest residential property to Upper Lode Weir is Upper Lode Lock House, which is adjacent to the Upper Lode Weir works boundary. Furthermore, a public footpath is also adjacent to the Upper Lode Weir works boundary.

#### *Sensitive ecological receptors*

8.5.8 The Upper Lode Weir works boundary is located between (and adjacent to) the Severn Ham Tewkesbury SSSI and Old River Severn Upper Lode SSSI. Further description is provided in the **Section 8.10 Ecology (Terrestrial and Freshwater) and Ornithology**.

#### *Air quality*

8.5.9 A review of baseline air quality was carried out prior to undertaking the air quality assessment. The following baseline sources were reviewed:

- UK-AIR<sup>259</sup>; and
- Tewkesbury Borough Council air quality monitoring survey<sup>292</sup>.

8.5.10 As part of the LAQM process, Tewkesbury Borough Council carries out regular assessments and monitoring of air quality within its administrative boundary. The most recent Air Quality Annual Status Report<sup>292</sup> was reviewed to determine concentrations of NO<sub>2</sub> in the vicinity of the Upper Lode Weir works boundary. It should be noted Tewkesbury Borough

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<sup>292</sup> Tewkesbury Borough Council (2021). 2019 – 2021 Air Quality Status Report (ASR). Tewkesbury Borough Council, June 2021.

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Council has not designated an AQMA within its administrative boundary. During 2020, Tewkesbury Borough Council undertook monitoring at non-automatic monitoring (i.e., diffusion tubes) at 18 monitoring locations for NO<sub>2</sub>. None of the remaining assessed pollutants are monitored by Tewkesbury Borough Council.

8.5.11 **Table 8-10** presents information on the nearest monitoring locations to the Upper Lode Weir works boundary.

**Table 8-10: Nearest monitoring locations to the Upper Lode Weir works boundary**

Site ID /Description	Site type	Location	Distance and direction from Upper Lode Weir works boundary	2020 Annual mean concentration (µg/m <sup>3</sup> )
1N / 131 High Street	Roadside	E 389314 N 232807	1.1 km, E	16.7 (NO <sub>2</sub> )
2N / 43 Oldbury Road	Roadside	E 389399 N 232788	1.2 km, E	12.5 (NO <sub>2</sub> )
5N / 13-14 Barton Street	Roadside	E 389356 N 232705	1.2 km, E	15.8 (NO <sub>2</sub> )
37N / 101 Church Street	Roadside	E 389254 N 232670	1 km, ESE	15.5 (NO <sub>2</sub> )
38N / 38 High Street	Roadside	E 389331 N 323950	1.1 km, ENE	16.9 (NO <sub>2</sub> )
41N / 31 Barton Street	Roadside	E 389462 N 232721	1.3 km, ESE	20.2 (NO <sub>2</sub> )
47N / 65 Barton Street	Roadside	E 389400 N 232600	1.2 km, ESE	19.1 (NO <sub>2</sub> )

The Environmental Quality Standard (EQS) for annual mean NO<sub>2</sub> concentrations is 40 µg/m<sup>3</sup>.

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8.5.12 Although the annual mean concentrations recorded are well below the relevant EQS (i.e. for the purposes of reporting, the relevant AQOs (i.e. an objective is the target date on which exceedances of a Standard must not exceed a specified number), have been collectively termed as EQSs)) (see **Table 8-10**), the non-automatic monitoring locations presented in **Table 8-10** are not considered representative of conditions experienced at Upper Lode Weir due to the distance from the Upper Lode Weir works boundary and / or monitoring site type.

8.5.13 Information on background air quality in the vicinity of the Upper Lode Weir works boundary was obtained from Defra background map datasets. The 2018-based background maps, which are the latest available by Defra, are estimates based upon the principal local and regional sources of emissions and ambient monitoring data. For SO<sub>2</sub> and CO concentrations, the 2001-based background maps, which are the latest available, were used. These background concentrations are presented in **Table 8-11**.

**Table 8-11: Background concentrations: adopted for use in assessment for human receptors and protected conservation areas**

Pollutant	Annual mean concentration (µg/m <sup>3</sup> )	Description
NO <sub>2</sub>	5.8 – 7.1	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration
NO <sub>x</sub>	7.4 – 9.0	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration
CO	111 - 114	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2001 based map concentration
PM <sub>10</sub>	11.6 – 12.4	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration
PM <sub>2.5</sub>	7.4 – 7.7	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration
SO <sub>2</sub>	1.7 – 1.9	Defra 1 km x 1 km background map value for the assessed sensitive

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Pollutant	Annual mean concentration ( $\mu\text{g}/\text{m}^3$ )	Description
		human receptor locations, 2001 based map concentration
<p>PM<sub>10</sub>, particles with an aerodynamic diameter of 10 microns or less and PM<sub>2.5</sub>, particles with an aerodynamic diameter of 2.5 microns or less</p> <p>The EQS for annual mean NO<sub>2</sub> concentrations is 40 <math>\mu\text{g}/\text{m}^3</math>. The EQS for annual mean PM<sub>10</sub> and PM<sub>2.5</sub> concentrations is 40 <math>\mu\text{g}/\text{m}^3</math> and 20 <math>\mu\text{g}/\text{m}^3</math>, respectively. There is no EQS for annual mean CO and SO<sub>2</sub>.</p>		

8.5.14 The annual mean pollutant concentrations from the Defra background maps are well below the relevant EQS.

### Future Baseline

8.5.15 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline described.

## Assumptions and Limitations

- 8.5.16 The following assumptions and limitations apply to this assessment:
- The assessment provided is based on information available at the time of writing.
  - The assessment takes account of best practice mitigation prior to the determination of effects.

## Likely Significant Effects

- 8.5.17 It should be noted the value of a receptor is incorporated into the specific methods prescribed in the IAQM construction dust guidance<sup>86</sup>. The approach described does not directly align with the overall approach to the categorisation of the value of receptors, magnitude of change and determination of the significance level set out in the EIA significance matrix. This is because the IAQM construction dust guidance on this subject relates to defining whether an air quality effect is significant or not across the study area as a whole, rather than at individual properties, or at specific sensitive ecological sites. As set out in the IAQM construction dust guidance, it is not appropriate to define a level of significance to air quality effects.

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### Emission from dust during the removal of the Upper Lode Weir

- 8.5.18 For emissions from dust during the removal of the Upper Lode Weir, based on the IAQM construction dust guidance, the anticipated demolition, earthworks and trackout (i.e., the transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network) activities are considered to have the potential to generate a small dust emission magnitude. It should be noted the likely minimal activities associated with removal anticipated means removal was scoped out of the assessment.
- 8.5.19 A further description of the methodology of the dust risk assessment is provided in the IAQM construction dust guidance.
- 8.5.20 Based on the relationship between the sensitivity of the study area and the likely dust emission magnitude, as set out in the IAQM construction dust guidance, the proposed demolition, earthworks and trackout activities are predicted to have a negligible to low risk for potential dust soiling impacts (in the absence of mitigation).
- 8.5.21 There is the potential for infrequent, short-term episodes when baseline dust deposition rates could be

increased by an amount that nearby human receptors could perceive. With regard to human health impacts, following the approach set out in the IAQM construction dust guidance, there is predicted to be a negligible to low risk for demolition, earthworks and trackout activities (in the absence of mitigation) as there is limited potential for emissions of PM<sub>10</sub> and PM<sub>2.5</sub> to increase baseline conditions to a value that is above the AQO values for the protection of human health.

- 8.5.22 For ecological impacts (i.e., dust soiling on a sensitive habitat), following the approach set out in the IAQM construction dust guidance, there is also likely to be a negligible to low risk (in the absence of mitigation).
- 8.5.23 Therefore, it would be necessary to adopt good practice mitigation measures to reduce the risk of causing a significant effect to nearby human and ecological receptors. Examples of good practice mitigation measures are presented in the IAQM construction dust guidance. The mitigation measures taken forward would prevent or reduce potential nuisance dust or PM<sub>10</sub> (including PM<sub>2.5</sub>) emissions, which are associated with health impacts, such as exacerbating existing human health conditions including asthma and other lung conditions. Measures such as those specified in the guidance would normally be sufficient to reduce construction dust nuisance and

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risks to human health and ecological receptors to a ‘not significant’ effect.

### Emissions from plant and machinery

8.5.24 Plant and items of machinery would likely be used for the removal of the Upper Lode Weir. As there would only be a relatively low number of these plant and machinery in operation for only a limited duration and spread across the Upper Lode Weir works boundary, it is not considered that there would be any likely significant effects on air quality due to emissions from on-site plant and machinery and it is therefore proposed that this is scoped out of the assessment.

### Emissions from construction traffic off-site

8.5.25 The number of construction traffic vehicles used for the removal of the Upper Lode Weir is likely to be below the EPUK and IAQM screening criteria<sup>293</sup> for identifying roads where there is the potential for a significant effect on local air quality and the need for an air quality assessment. It is not considered likely that there would be any significant effects on air quality due to emissions

from construction traffic off-site and it is therefore proposed that this is scoped out of the assessment.

### Emissions from operational-related off-site traffic

8.5.26 The number of operational-related traffic vehicles used following the removal of the Upper Lode Weir is also likely to be below the EPUK and IAQM screening criteria<sup>293</sup> for identifying roads where there is the potential for a significant effect on local air quality and the need for an air quality assessment. It is not considered likely that there would be any significant effects on air quality due to emissions from operational-related off-site traffic and it is therefore proposed that this is scoped out of the assessment.

### Proposed Scope

8.5.27 Based on the above assessment, **Table 8-12** presents the potential air quality impacts that are proposed to be scoped out of requiring further assessment, along with the rationale for the choice.

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<sup>293</sup> Environmental Protection UK (EPUK) & the Institute of Air Quality Management (IAQM) (2017). Land-Use Planning & Development Control: Planning for Air Quality, v1.1. January 2017.

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**Table 8-12: Summary of air quality elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Potential dust soiling, human health and ecological impacts arising from dust and particulate matter emissions generated during the removal of Upper Lode Weir.	OUT	Activities associated with the removal of Upper Lode Weir have the potential to generate dust, which can cause annoyance and have health effects on local residents and cause harm to nearby ecological receptors. However, providing good practice mitigation measures (as recommended in the IAQM construction dust guidance <sup>86</sup> ) are implemented during the removal of the Upper Lode Weir, the impact at nearby human and ecological receptors is considered to be negligible (i.e. not significant).
Impacts on air quality due to emissions from site plant and machinery.	OUT	Given that relatively low numbers of plant and items of machinery would likely be used for only a limited duration and spread across the Upper Lode Weir works boundary, the associated potential effects on air quality are

Potential Effect	Scoped IN or OUT	Justification
		considered to be negligible (i.e. not significant).
Impacts on air quality due to emissions from construction traffic off-site	OUT	The predicted construction traffic flows associated with the removal of the Upper Lode Weir are likely to be less than the EPUK and IAQM screening criteria <sup>293</sup> . Therefore, the likely effects on air quality are considered to be negligible (i.e., not significant).
Impacts on air quality due to emissions from operational-related off-site traffic	OUT	The predicted operational-related traffic flows associated with the proposed compensation measures at Upper Lode Weir are likely to be less than the EPUK and IAQM screening criteria <sup>293</sup> . Therefore, the likely effects on air quality are considered to be negligible (i.e., not significant).

8.5.28 Therefore, it is proposed air quality is scoped out of the ES.

## 8.6 Soils and Land Use

### Introduction

8.6.1 This section describes the current environmental baseline for soils and land-use at Upper Lode Weir and the potential impacts which may be associated with the proposed compensation measures at Upper Lode Weir.

### Study Area

8.6.2 The potential impacts on soils and land use are likely to be limited to direct disturbance during removal activities, and therefore impacts are expected to be very localised. However, there is the possibility of contaminants being mobilised because of site disturbance which may impact soil quality, and so a study area of the Upper Lode Weir works boundary with a 250 m buffer in all directions around the Upper Lode Weir works boundary is considered appropriate. The 250 m influencing distance has been chosen based on NHBC and Environment Agency guidance (2008)<sup>262</sup>. This distance is considered appropriate and proportionate in the context of the proposed compensation measures at Upper Lode Weir, considering the distance over which contamination or ground gases can migrate.

## Baseline

### Current Baseline

8.6.3 The following sources of information have been used to obtain the baseline information discussed in this chapter:

- Provisional Agricultural Land Classification<sup>263</sup>;
- MAGIC Maps<sup>264</sup>;
- Groundsure Enviro Data Viewer<sup>265</sup>; and
- Soilscales Online viewer<sup>266</sup>.

### Soils and Land Use

8.6.4 The economic resource value of soil is primarily measured by its ability to support agricultural uses. This is quantified by its ALC grade, with six grades defined within the *ALC for England and Wales: Revised criteria for Grading the Quality of Agricultural Land*, as follows:

- Grade 1 (excellent quality);
- Grade 2 (very good quality);
- Subgrade 3a (good quality);
- Subgrade 3b (moderate quality);
- Grade 4 (poor quality); and
- Grade 5 (very poor quality).



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- 8.6.5 Grades 1 to Subgrade 3a are determined as BMV land. BMV agricultural land is the most flexible land in terms of the range of crops that can be grown, the level and consistency of yield and the cost of obtaining the yield and offers the best prospect for both food and non-food crop production.
- 8.6.6 Pre-1988 ALC data is available for the study area which provides provisional data without site-specific detail. The provisional ALC data do not differentiate between ALC Subgrades 3a (which qualifies as BMV land) and Subgrade 3b. Therefore, at this stage it is conservatively assumed that all Grade 3 land is Subgrade 3a.
- 8.6.7 This provisional data shows the Upper Lode Weir works boundary is classified as Grade 3 agricultural land, and in the absence of further data should be assumed to be Grade 3a.
- 8.6.8 Soils may also be of importance in supporting sites of ecological importance, therefore a high-level review of soil types has been undertaken using the Soilscales web viewer<sup>266</sup>. Soilscales conveys a summary of the broad regional differences in the soil landscapes of England and Wales.

- 8.6.9 Soilscales identifies the Upper Lode Weir works boundary and study area to consist of 12 Freely Draining Floodplain Soils.

**Future Baseline**

- 8.6.10 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

**Assumptions and Limitations**

- 8.6.11 The assessment is currently based on desk-top information, using publicly available datasets. No site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings presented.
- 8.6.12 Only provisional ALC data were available for review at the time of this assessment.

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8.6.13 The assessment provided is based on information available at the time of writing and a high level of uncertainty remains at this stage.

### Likely Significant Effects

#### Soils and Land Use

8.6.14 Soils may be impacted in the following ways:

- Permanent or temporary loss of soils due to the works.
- Degradation of soils during stripping, handling and storage, through mechanisms such as erosion, compaction and smearing.
- The deposition of potentially contaminated fugitive dust from machinery required for the removal of the weir may also impact soil quality.
- Soil quality may also be degraded by mobilising contaminants or from potentially contaminated surface water run-off.
- Loss or disturbance of agricultural land, potentially Grade 3a BMV soils.
- However, the potential areas of loss are likely to be limited to those areas which will be directly disturbed (i.e., working areas on the river banks either side of the weir).

8.6.15 At this early stage and in the absence of further data or more detailed assessment there may be the potential for significant effects associated with either soils or land use.

### Proposed Scope

8.6.16 Based on the above assessment, **Table 8-13** presents the potential soils and land use impacts that are proposed to be scoped in, requiring further assessment, along with the rationale for the choice.

**Table 8-13: Summary of soils and land use elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Loss of soils and soil quality because of the works.	IN	As there will be disturbance, excavations and potential loss of soils and soil quality in this area soils have been scoped in for assessment of the proposed compensation measures at Upper Lode Weir.
Loss or and disturbance to agricultural land	IN	There may be the potential loss of Grade 3 soils, which should be assumed to be Grade 3a (BMV) in the absence of further information, land use in terms of ALC has

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Potential Effect	Scoped IN or OUT	Justification
		therefore been scoped in for assessment of the proposed compensation measures at Upper Lode Weir.

8.6.17 Therefore, it is proposed soils and land use is scoped in for the ES.

8.6.18 A desk study has not been completed at this stage and as such it has not been possible to fully establish baseline conditions at Upper Lode Weir, a full desk study will be undertaken and discussed/included within the ES.

## 8.7 Geology and Land Contamination

### Introduction

8.7.1 This section describes the current environmental baseline related to geology and potential land contamination at Upper Lode Weir and the potential impacts associated with the proposed compensation measures at Upper Lode Weir.

### Study Area

8.7.2 For the study area, a 250 m buffer in all directions around the Upper Lode Weir works boundary is considered appropriate. The 250 m influencing distance has been chosen based on NHBC and Environment Agency guidance (2008)<sup>262</sup>. This distance is considered appropriate and proportionate in the context of the proposed compensation measures at Upper Lode Weir, considering the distance over which contamination or ground gases can migrate.

### Baseline

#### Current Baseline

8.7.3 The following sources of information have been used to obtain the baseline information discussed in this chapter:

- Geo Index Map<sup>267</sup>;
- MAGIC Maps<sup>264</sup>;
- Groundsure Enviro Data Viewer<sup>265</sup>;
- Historic Landfill Sites<sup>268</sup>;
- National Library of Scotland mapping<sup>269</sup>; and
- Gloucestershire Minerals Local Plan 2018-2032<sup>270</sup>.

### *Geology*

- 8.7.4 Aquifer designations are not covered within this section as they are discussed in the baseline of **Section 8.8 Groundwater**.
- 8.7.5 The BGS Geo Index shows the weir location to be underlain by superficial deposits of Alluvium comprising clay, silt, sand, and gravel. Head deposits are located to the west and north of Upper Lode Weir at the edges of the alluvium.
- 8.7.6 Bedrock underlying Upper Lode Weir comprises multiple bedrock units including; Wilmcote Limestone Member (interbedded limestone and mudstone) of the Blue Lias Formation, underlain by the Penarth Group (mudstone), underlain by the Branscombe Mudstone Formation of the Blue Anchor Formation.
- 8.7.7 The BGS Geo Index does not show any areas of artificial ground within the study area.
- 8.7.8 There are no BGS borehole logs recorded within the study area.
- 8.7.9 There are no geological SSSIs recorded on within the study area.
- 8.7.10 There is no information available at this stage relating to the presence of Geological Conservation Review sites or geological sites of local or regional importance.
- 8.7.11 The Upper Lode works boundary is located in a MSA for Sand and Gravel as identified in the Minerals Local Plan for Gloucestershire<sup>270</sup>.

### *Historical and Current Land Use*

- 8.7.12 Limited information is available relating to current and historical land use. A review of the publicly available National Library of Scotland mapping<sup>269</sup> has been completed in order to assess the potential for land contamination at Upper Lode Weir.
- 8.7.13 The study area is located in a rural setting consisting of agricultural land use, with Upper Lode Weir located on the River Severn approximately 1 km west of Tewkesbury in Gloucestershire.
- 8.7.14 Upper Lode Weir was constructed in the 1850s and is a large broad crested weir. It is adjacent to the Upper Lode Lock and the confluence of the River Avon.
- 8.7.15 A lock keepers' cottage is located adjacent to the weir.

### *Potential sources of contamination*

- 8.7.16 There may be the potential for contamination related to the following;
- Any fertilisers or pesticides which may have been applied to the agricultural land.
  - Potential for contamination within any Made Ground which may be present around the weir.
- 8.7.17 There are no historical landfills recorded within the study area.

### **Future Baseline**

- 8.7.18 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### **Assumptions and Limitations**

- 8.7.19 This study is based on a desk-based assessment only and no site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings presented.
- 8.7.20 Limited historical mapping was available for review at the time of writing this report. A full set of historical maps will be required in further stages of the assessment.
- 8.7.21 The assessment is limited to publicly available information at the time of writing this report and a high level of uncertainty remains at this stage.

### **Likely Significant Effects**

- 8.7.22 There may be the following impacts associated with the works:

### **Geology**

- 8.7.23 Impacts may include temporary or permanent loss of a geological site (or part of it), for example by covering with stockpiles, or damaging key characteristics and features. Impacts may also include temporary or permanent loss of access to Upper Lode Weir.

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8.7.24 Impacts may also include enhancement through exposing a feature or increasing access to a rock exposure.

8.7.25 The Upper Lode works boundary is within a MSA and there may be the potential for sterilisation of mineral resources because of the proposed compensation measures.

**Land Contamination**

8.7.26 Disturbance of potentially contaminated soils may create new pathways for contaminants to impact receptors directly or indirectly because of mobilisation of contamination via creation of new pathways.

8.7.27 The disturbance of land contamination during removal of the weir may result in unacceptable risks to workers or maintenance workers resulting from exposure to contaminants in soils via ingestion, inhalation, or dermal contact.

8.7.28 Additionally, ground gas from potential Made Ground and natural strata containing high amounts of organics (such as Alluvium) could accumulate within excavations and confined spaces resulting in explosive or asphyxiant hazards.

8.7.29 There may also be potentially unacceptable risks to nearby site users from the creation of fugitive dust and vapours from potentially contaminated soils disturbed during the works.

8.7.30 There may be risks posed to surface water quality of the River Severn, groundwater quality and ecological receptors from the disturbance and mobilisation of contamination.

8.7.31 At this early stage and in the absence of further data or more detailed assessment there may be the potential for significant effects associated with either geology or land contamination.

**Proposed Scope**

8.7.32 Based on the above assessment, **Table 8-14** presents the potential geology and land contamination impacts that are proposed to be scoped in, requiring further assessment, along with the rationale for the choice.

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**Table 8-14: Summary of geology and land contamination elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Impacts related to geology/geological features	IN	Scoped in, at this stage for the removal of the weir and operational stages as there is not sufficient information relating to the presence of geological features to complete an assessment.
Impacts related to the disturbance of potentially contaminated land.	IN	There is currently limited information available relating to the history of Upper Lode Weir and the potential for contamination to be present within soils, therefore land contamination is scoped in for assessment of the proposed compensation measures at Upper Lode Weir.
Sterilisation of Mineral Resources	IN	The weir is located in a MSA.

8.7.33 Therefore, it is proposed geology and land contamination is scoped in for the ES.

8.7.34 A desk study has not been completed at this stage and as such it has not been possible to fully establish baseline conditions at Upper Lode Weir, a full desk study will be undertaken and discussed/included within the ES. GI may also be required at a later stage to confirm ground conditions and further assess the potential for contamination.

## 8.8 Groundwater

### Introduction

8.8.1 The assessment to determine the significance of effects for the groundwater environment in this PEIR is based on known groundwater receptors and the proposed compensation measures at Upper Lode Weir.

8.8.2 A high-level, conceptual review of hydrogeological processes has been undertaken for the PEIR. This is based on available desk-based information only. This information has then been used to determine how the proposed compensation measures at Upper Lode Weir could impact on identified groundwater receptors.

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## Study Area

8.8.3 For the groundwater study area, a 1 km buffer in all directions around the Upper Lode Weir works is considered appropriate. This is based on organisational experience regarding the maximum potential extent of effects likely on groundwater receptors in the type of aquifers present, and the uncertainties associated with the degree of heterogeneity of these aquifers.

## Baseline

### Current Baseline

#### *Geology and Aquifer Designation*

8.8.4 The geology baseline is described in **Section 8.7 Geology and Land Contamination**. However, a brief summary is provided below.

8.8.5 The Upper Lode Weir works boundary, and the majority of the wider study area is underlain by alluvium, comprised of clays, silts, sands and gravels. The alluvial deposits follow the course of the River Severn. The alluvium is classified as a secondary A aquifer.

8.8.6 Surrounding the alluvium in isolated patches is the Holt Heath Sand and Gravel Member, also classified as a

Secondary A aquifer. Head deposits, classified as Secondary (undifferentiated) aquifers, are located to the west and north of the Upper Lode Weir works boundary at the edges of the alluvium.

8.8.7 Bedrock underlying the Upper Lode Weir works boundary comprises multiple bedrock units including; Blue Anchor Formation, Wilmcote Limestone Member (interbedded limestone and mudstone) and Penarth Group (mudstone). The blue Anchor Formation and Penarth Group are classified as Secondary B aquifers, whereas the Wilmcote Limestone Member is classified as a secondary (undifferentiated) aquifer.

8.8.8 Surrounding this upstream of Upper Lode Weir is the Branscombe Mudstone Formation, and downstream is the Saltford Shale Member. Both are classified as Secondary B aquifers.

#### *Groundwater levels*

8.8.9 There are no Environment Agency or BGS groundwater monitoring locations available in close proximity to the Upper Lode Weir. There are also no available historical borehole records located within the Upper Lode Weir works boundary to provide an indication of groundwater seeps, strikes, or rest water levels. Additionally, no GIs have been undertaken at Upper Lode Weir.



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8.8.10 Within the wider study area, there are multiple historical BGS borehole records to the south and east of the study area. Where encountered, groundwater strikes/seepages are recorded between 1.5-6.1 mbgl. However, given the distance of these historical boreholes from the Upper Lode Weir works boundary they are unlikely to accurately represent groundwater levels at the weir location.

*Connection to hydrological features*

8.8.11 The local groundwater may be connected (either directly or indirectly) to watercourses (as baseflow, sinks, sources, spreads, collects, issues etc.), and spring discharges. Changes to groundwater quality and levels beneath the Upper Lode Weir may therefore influence water quality and / or flows in these watercourses/hydrological features or vice versa. On OS mapping there are no springs, sinks, sources or collects, shown within the Upper Lode Weir works boundary or the wider study area. However, three issues are located to the north of Upper Lode Weir, and feed into the Old Severn. These issues could be sourced from groundwater.

8.8.12 The Upper Lode Weir is located across the River Severn which could be receiving baseflow contributions from the alluvium. Interactions could be occurring with the bedrock, however this is likely to be

limited given the low permeability of the bedrock units. Additionally, within the Upper Lode Weir works boundary to the north of the River Severn there are multiple drains which, if present, could be interacting with shallow groundwater across the floodplain.

*Groundwater as a resource*

8.8.13 There are no SPZs within the groundwater study area or its vicinity. This indicates that there are no licensed groundwater abstractions used for public water supply.

8.8.14 No information on licensed or private groundwater abstractions has been requested at this stage, therefore the presence or absence of groundwater abstractions cannot be determined. Information on groundwater abstractions will be requested and assessed at ES stage. It should be noted however, that for most PWSs there is an onus on the abstraction owner to provide details to the Local Authority. As such, there may be other PWSs which the Local Authority is not aware of.

8.8.15 No wells are shown on OS mapping to be present within the Upper Lode Weir works boundary or wider study area.

8.8.16 Discharges of liquids to ground or groundwater may be occurring within the groundwater study area. However,

no information on licensed discharged to groundwater has been requested at this stage. Information on groundwater discharge will be requested and assessed at ES stage.

#### *Groundwater Dependent Terrestrial Ecosystems*

8.8.17 There are two statutory designated sites within the study area. Severn Ham, Tewkesbury SSSI is located along the eastern bank of the river adjacent to Upper Lode Weir. The second Old River Severn, Upper Lode SSSI is located to the west of the weir on the western bank of the river. Both sites describe wet ground conditions which are habitats that could be potential GWDTE.

8.8.18 Within the study area there are large areas of land around the Upper Lode Weir works boundary, including the Severn Ham, Tewkesbury SSSI, which is designated as a coastal and floodplain grazing marsh HPI. This type of habitat has the potential to contain GWDTE.

#### *Groundwater Vulnerability*

8.8.19 The Upper Lode Weir works boundary and majority of the study area is classified as having a medium to high groundwater vulnerability. Where superficial deposits are absent the groundwater vulnerability increases to

high. This relates to the ease at which contaminants can migrate into an aquifer from ground level. Large areas of the study area to the east and west also have a soluble rock risk.

#### *Water Framework Directive*

8.8.20 The Upper Lode Weir overlies a WFD groundwater body the Severn Vale-Secondary Combined waterbody Groundwater body (GB40902G204900). This WFD waterbody has a good overall status with both good chemical and quantitative status. Within the eastern part of the study area is the Warwickshire Avon-Secondary Mudrocks Groundwater body (GB40902G990900). This WFD waterbody has a good overall status with both good chemical and quantitative status.

#### **Future Baseline**

8.8.21 The groundwater baseline of the site is unlikely to change significantly. However, conditions relating to climate change for groundwater include the potential for increased frequency and magnitude of groundwater flooding events.

8.8.22 Groundwater flooding may be exacerbated where the events are linked to fluvial flooding and shallow, near-surface Secondary aquifers.

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## Assumptions and Limitations

- 8.8.23 No GIs have been undertaken at Upper Lode Weir to confirm groundwater conditions. Therefore, groundwater has conservatively been assumed as being at or near ground level.
- 8.8.24 No information on licensed and private groundwater abstractions and licensed discharges to ground have been requested at this stage therefore their presence and cannot be ruled out. As a result, any significant impacts cannot be ruled out at this stage.
- 8.8.25 No site visits or walkover surveys or UKHab surveys have been undertaken at potential GWDTE sites. From the desk study there is potential for the Upper Lode Weir works boundary to contain GWDTE. However, the presence and/ or groundwater dependency of any GWDTE cannot be determined at this stage and would require further assessment to be able to determine if any impacts would be significant.
- 8.8.26 At PEIR stage it is assumed that a full weir removal is to take place. Therefore, the following assumptions have been made:
- For topsoil stripping and vegetation clearance a maximum depth of 0.5 m has been assumed.

- The channel will temporarily be pumped dry during weir removal with a bypass flow in place.
- Minor excavation may be required to remove any foundations which could cause nuisance seepage to be controlled.

## Likely Significant Effects

### Removal of the weir

- 8.8.27 During removal, it is considered likely that potential impacts to groundwater features (including superficial and bedrock aquifers, and associated groundwater receptors, such as licensed abstractions, PWS, GWDTE etc.) could arise from several activities including:
- Physical contamination of groundwater from ground disturbance such as soil stripping, haul roads and compounds.
  - Mobilisation of suspended solids and accidental leaks and spills during removal, especially within the channel could impact groundwater quality in the underlying aquifer and any secondary receptors.
  - Changes to groundwater levels and flows from the removal of any below ground structures (e.g. Foundations). Removal of any sub surface

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structures could require minor excavations which would likely need dewatering. At an aquifer scale, impacts would be negligible, however significant impacts to potential groundwater receptors such as abstractions and GWDTE cannot be ruled out at this stage.

- Temporary Bypass flow of the channel during the weir removal could cause a reduction in local groundwater levels and flows if the river is in hydraulic continuity with the underlying aquifer. Any changes would be short-lived and negligible on a groundwater body scale. However, any temporary bypass flow could have a significant impact on flows to nearby groundwater receptors such as GWDTE and abstractions, if present.

### Operation

8.8.28 During operation no significant effects are predicted to groundwater. Changes to groundwater levels, flows and quality, due to the removal the weir could occur due to changes to baseflow conditions locally. However, by removing the weir and re-establishing the natural channel bed there is the potential to create more connectivity between the aquifer and channel, hence improving baseflow conditions.

8.8.29 Additionally, by removing the weir and re-establishing the natural channel bed more groundwater flow could

reach any GWDTE which may be present and help to sustain the habitats. More connectivity between the aquifer and channel could be established therefore having a positive impact to GWDTE. However, it should be noted that any existing established habitats could be reliant on the equilibrium between artificial water levels in the river and surrounding aquifers. Therefore, by returning the area to natural conditions there could be a period of unstable groundwater and surface water levels while a new equilibrium is established which could negatively impact any groundwater receptors in the short term, until a new baseline/ equilibrium is established. This could lead to significant short-term impacts on any GWDTE.

### Proposed Scope

8.8.30 Based on the above assessment, all of the potential impacts have been scoped in for further assessment. **Table 8-15** presents a summary of potential impacts to groundwater that are proposed to be scoped in for further assessment, along with the rationale for the choice.

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**Table 8-15: Summary of groundwater elements scoped into the assessment**

Potential Effect	Scoped IN or OUT	Justification
Impacts to groundwater levels and flows during removal	IN	There is no information currently available on groundwater levels within the Upper Lode Weir works boundary therefore significant impacts to shallow groundwater levels and flows cannot be ruled out at this stage.
Impacts to groundwater quality during removal	IN	Impacts can arise from removal activities such as excavations, topsoil stripping, accidental leaks and spills etc. Considering the depth of the water table across the Upper Lode Weir works boundary is unknown significant impacts to the underlying aquifers cannot be ruled out.
Impacts to secondary receptors such as groundwater abstractions and GWDTE, this includes both	IN	Information on groundwater abstractions have not been requested at this stage. Additionally, there have been no site visits to determine the presence of any potential GWDTE. Therefore, significant impacts to

Potential Effect	Scoped IN or OUT	Justification
quality and qualitative status		these receptors, if present, cannot be ruled out at this stage.
Changes to baseflow conditions from removal of the weir	IN	Considering the depth of the water table across the Upper Lode Weir works boundary is unknown significant changes to baseflow contributions cannot be ruled out.

- 8.8.31 It is proposed that before the ES is written that GI be undertaken at Upper Lode Weir to determine the ground and groundwater conditions, especially near sensitive receptors such as GWDTE. Given the potential of shallow groundwater, especially in close proximity to the river, as part of any GI the groundwater team should have input into the scope in order to gather data that best characterises groundwater at Upper Lode Weir.
- 8.8.32 Additionally, no site walkovers or habitat surveys have been undertaken to determine the presence of any GWDTE. These should take place before commencing with the ES.
- 8.8.33 Following on from this, information from any GI, walkover and habitat surveys would then be included

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in a detailed Conceptual Site Model to refine our hydrogeological understanding of Upper Lode Weir.

8.8.34 At ES stage information on private and licensed groundwater abstractions would be requested from the local authority and Environment Agency. Information on licensed discharges to ground should also be requested.

## 8.9 Surface Water

### Introduction

- 8.9.1 The aims of this chapter are to:
- Identify the relevant surface water (water quality, hydromorphology and flood risk) receptors which could be impacted by the proposed compensation measures at Upper Lode Weir.
  - Evaluate potential impacts relevant to the proposed compensation measures at Upper Lode Weir.
  - Outline the proposed scope of work to assess the potential impacts associated with the removal of the weir and operational of the proposed compensation measures at Upper Lode Weir to surface water.

### Study Area

8.9.2 The study area for surface water is defined by adding a 500 m buffer around the Upper Lode Weir works boundary in all directions. This is based on the anticipated distance of impact pathways associated with surface water impacts.

### Baseline

#### Baseline Sources

- 8.9.3 The baseline conditions have been established based on the following sources:
- Aerial imagery<sup>280</sup>;
  - Canal and River Trust Online Information, including:
    - Gloucester Lock to Upper Lode Lock Information<sup>272</sup>;
    - River Severn Navigation Guide<sup>273</sup>;
  - Environment Agency, Catchment Data Explorer<sup>274</sup>;
  - Environment Agency Flood Map for Planning<sup>275</sup>;
  - Environment Agency Historic Flood Map<sup>276</sup>;
  - Environment Agency Long-Term Flood Risk Information Mapping<sup>277</sup>;

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- Environment Agency Reservoir Flood Extents - Dry Day<sup>278</sup>;
- Environment Agency Reservoir Flood Extents - Wet Day <sup>279</sup>; and
- MAGIC Maps <sup>280</sup>.

### Current Baseline

#### *Surface Water Quality*

8.9.4 The only WFD water body that is within or overlaps the study area is the River Severn from the confluence with the River Avon to the confluence with the Upper Parting water body (WFD ID: GB109054044404). This is a HMWB currently classified as achieving moderate ecological potential and the chemical status is Fail<sup>274</sup>. The reasons for not achieving Good potential include sewage discharge and physical modification.

#### *Severn Ham SSSI overlaps the study area<sup>280</sup> Surface Water Supply*

8.9.5 Upper Lode Weir is located within a Surface Water Drinking Water Safeguard Zone<sup>280</sup>.

8.9.6 No data was available at this stage regarding PWSs.

#### *Geomorphology*

8.9.7 **Table 8-16** presents the location and condition of all geomorphology receptors within the study area of Upper Lode Weir.

**Table 8-16: Geomorphology baseline condition of watercourses**

Watercourse	Description
River Severn from the confluence with the River Avon to the confluence with the Upper Parting Water Body (GB109054044404)	A sinuous platform with some evidence of natural processes. Modifications include flood protection measures, urbanisation, and inland waterway navigation, such as ports.
Minor watercourses and ditches	There are numerous minor watercourses and ditches within the study area. These are likely to be artificially modified and will be assessed further in later stages of the environmental assessment.

#### *Fluvial and Tidal Flood Risk*

8.9.8 The Environment Agency’s Flood Map for Planning (rivers and sea)<sup>275</sup> indicate that the study area is within Flood Zone 3, meaning that there is a greater than 1 in

100 (1 % AEP) chance of flooding, so it is at high risk of fluvial or tidal flooding. Upper Lode Weir is the tidal limit for the River Severn during spring high tides<sup>272, 273</sup>. Therefore, flood risk in the area is a combination of tidal flood risk and risk from tidally influenced rivers.

#### *Surface Water Flood Risk*

- 8.9.9 The Long-Term Flood Risk mapping <sup>277</sup> shows the study area is at variable risk of surface water flooding. Areas at high risk of surface water flooding, a risk greater than 3.3 % AEP (1 in 30), include to the north of Upper Lode Weir in the Old Severn meander and in fields to the north and west of Upper Lode Weir. Downstream of the Upper Lode Weir in the River Severn, there is a medium to low risk of surface water flooding, a risk between 3.3 % (1 in 30) and 0.1 % (1 in 1000) AEP. Generally, the surface water flood risk within the Study Area corresponds to the routes of watercourses and as such is likely to be representative of risk associated with existing watercourses and better described as fluvial flood risk.

#### *Groundwater Flood Risk*

- 8.9.10 As discussed in the baseline section of **Section 8.8 Groundwater** there are no Environment Agency, BGS or borehole records within the study area to provide an indication of groundwater levels. Given the tidal

location and proximity to watercourses, it is likely that groundwater levels are hydraulically linked to fluvial/tidal levels.

#### *Reservoir Flooding*

- 8.9.11 According to the Environment Agency Reservoir Flood Maps<sup>278, 279</sup> there is a risk of flooding from reservoirs when river levels are normal and when there is also flooding from rivers. The potential extent of reservoir flooding covers most of the Upper Lode Weir works boundary, particularly to the west. Due to required maintenance standards and inspection levels of reservoirs under the Reservoir Act 1975, the risk of reservoir flooding is low.

#### *Other Flood Sources*

- 8.9.12 Water and sewage infrastructure is unlikely to exist in the study area due to its rural nature, therefore the risk of flooding from these sources is very low.

#### *Historic Records of Flooding*

- 8.9.13 Environment Agency historic flood maps <sup>276</sup> provide information in the form of recorded flood outline. This is likely to capture the extent of significant fluvial and tidal flood events. The mapping shows a single event that covers much of the Study Area. No details or date of



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the event are provided, although from the extents it would appear to be a combination of tidal and fluvial flooding.

### Future Baseline

8.9.14 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

- 8.9.15 The following assumptions and limitations apply to the Surface Water assessment:
- The assessment of potential impacts on surface water is high-level, with no quantification.
  - The assessment of surface water quality has used site-specific data, where available, and otherwise used available online information.
  - The baseline geomorphological assessment of the relevant watercourses has been carried out

virtually, using aerial imagery, as waterbodies are yet to be surveyed.

- The assessment of baseline flood risk has been undertaken based on available online information only. No detailed hydraulic modelling of flood risk has been undertaken on the basis that the Environment Agency online flood mapping and local authority sources are reliable and provides a reasonable assessment of existing flood risk.
- It has been assumed that the impact of climate change will not significantly alter the flood risk from that shown in online mapping.

### Likely Significant Effects

#### Removal of the weir

##### *Surface Water Quality*

- 8.9.16 Potential impacts to surface water quality within the study area during the removal works would include:
- Mobilisation of sediments and potential release of fine sediment to suspension leading to sediment pollution. This may impact the chemical and biological quality of surface water.
  - The accidental release of polluting substances, such as fuel leaks, which could have an impact

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upon the chemical and biological quality of surface water.

*Surface Water Supply*

8.9.17 Potential impacts to surface water supply within the study area during the removal works would include:

- Pollution from removal of the weir upstream of water supplies.
- Severance due to disruption of pipelines or other buried assets.

*Geomorphology*

8.9.18 Potential impacts to the geomorphological receptors within the study area during the removal works would include:

- Loss of riparian vegetation during bankside working.
- Temporary change in local flow dynamics and bed and/or bank scour resulting from either in-channel or bankside working.
- Fine sediment inputs leading to smothering of morphological features of alteration of sediment dynamics which support key habitats.

- Accidental release of fine sediment that would have implications to downstream areas following either bankside or in-channel working.

*Flood Risk*

8.9.19 Potential impacts on flood risk during the removal works include:

- Loss of floodplain storage resulting in increased flood risk.
- Interception of overland flow due to site compounds, storage areas or haul routes in the Study Area, potentially disrupting local flow routes and increasing surface water flood risk.
- The potential blocking of drainage systems and watercourses with debris from the removal of the weir, potentially resulting in blockage or reduced capacity and therefore increased flood risk.

**Operation**

*Surface Water Quality*

8.9.20 No significant effects during operation would be anticipated.

*Surface Water Supply*

8.9.21 Potential impacts to surface water supply during the operational phase would include the diversion of utilities and field drains ameliorated.

*Geomorphology*

8.9.22 A potential impact to the geomorphological receptors within the study area during the operation phase would include the return to a more natural state, increasing the natural bed material at the footprint of the weir and restoring natural flow dynamics.

*Flood Risk*

8.9.23 Potential impacts on flood risk during the operational phase of the proposed compensation measures at include:

- Change in flood risk at Upper Lode Weir and downstream due to the removal of Upper Lode Weir.
- By removing the weir and re-establishing the natural channel bed there is the potential to create more connectivity between the aquifer and channel. This may locally increase groundwater flood risk if emergence is possible.

**Proposed Scope**

8.9.24 **Table 8-17** summarises the proposed scope for Surface Water.

**Table 8-17: Summary of Surface Water scope.**

Potential Effect	Scoped IN or OUT	Justification
Potential impacts on surface water quality.	IN	Activities associated with the removal of Upper Lode Weir have the potential to mobilise sediment or pollutants into the watercourse.
Potential impacts on surface water supply.	IN	The diversion of utilities and amelioration of field drains is likely to impact surface water supply within the Upper Lode Weir works boundary. Therefore, the potential impacts are considered significant.
Potential impacts on geomorphology	IN	Activities associated with the removal of Upper Lode Weir have the potential to alter sediment dynamics during removal.
Potential impacts on flood risk	IN	Weir removal may increase flood risk downstream and re-establishing the natural bed may

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Potential Effect	Scoped IN or OUT	Justification
		increase connectivity with the aquifer.

8.9.25 The identification of potentially significant effects will be derived from a qualitative assessment of baseline data to inform the receptor importance, professional judgement, combined with quantitative assessment where practical. It is proposed that the ES includes a detailed assessment of flood risk across the Upper Lode Weir works boundary, produced in accordance with the technical guidance to the National Planning Policy Framework. In addition, a Preliminary WFD assessment will be carried out, with a more detailed assessment if impacts are identified and further mitigation is required.

## 8.10 Ecology (Terrestrial and Freshwater) and Ornithology

### Introduction

8.10.1 This chapter presents the preliminary environmental information relating to terrestrial and freshwater

ecology and ornithology for the proposed compensation measures at Upper Lode Weir.

8.10.2 Terrestrial and freshwater ecology is concerned with the variety of living organisms and their relationships with each other and their environment. Ecology is the subject of a wide variety of legislation and policies; impacts to ecological receptors could constitute an offence under relevant legislation as well as comprising material considerations within the planning system.

8.10.3 The assessment comprises the following terrestrial and freshwater ecology elements:

- Designated sites – sites designated at all levels (both statutory and non-statutory) for nature conservation reasons, including SPAs, SACs, Ramsar sites, SSSIs, NNRs, LNRs and LWSs;
- Notable habitats – i.e. HPI; and
- Protected and notable species – these include animal and plant species protected by legislation, SPI, and species that are not legally protected but have a conservation designation.

8.10.4 A high-level review of the terrestrial and freshwater ecological baseline within the Upper Lode Weir works boundary and study area has been undertaken for the PEIR. This is based on available desk-based information only. This information has then been used

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to determine how the removal of the weir and associated infrastructure and the resultant operation of the river could impact on terrestrial and freshwater ecological receptors.

### Study Area

8.10.5 The study area for terrestrial and freshwater ecology relates to the Upper Lode Weir works boundary. The study area comprises the relative areas by which potential pathways to effect on terrestrial and freshwater ecological receptors could occur:

- Internationally important statutory designated sites: SPAs, SACs and Ramsar sites within 2 km of the Upper Lode Weir works boundary, or within 30 km of a SAC where bats are noted as one of the qualifying interests or where European sites are hydrologically connected to the area within the Upper Lode Weir works boundary;
- Nationally and county important statutory designated sites: SSSIs, NNR and LNR within 2 km of the Upper Lode Weir works boundary;
- Non-statutory sites of local nature conservation importance: LWS, ancient woodland and HPI within 1 km of the Upper Lode Weir works boundary;

- Desk study records of protected or otherwise notable habitats and species, veteran, or ancient trees within 1 km of the Upper Lode Weir works boundary; and
- For receptors potentially sensitive to air quality changes (including habitats within SPA, SAC, Ramsar, SSSI, NNR, LNR, LWS, ancient woodland or ancient and veteran trees), sites located within 200 m of proposed construction routes where significant changes are anticipated.

### Baseline

#### Baseline sources

- 8.10.6 The following sources have been used to inform a preliminary understanding of the baseline conditions for the assessment of the terrestrial and freshwater ecology aspect:
- Worcestershire Biological Records Centre (WBRC) and Gloucestershire Centre for Environmental Records provided data records in October 2023 for protected and designated species, invasive species and non-statutory LWS. Species records were limited to those within the last 10 years, i.e., 2013-present;
  - MAGIC map application was used to identify international and national statutory and non-

[edfenergy.com](https://www.edfenergy.com)

statutory designated sites, HPI, surveyed GCN ponds and granted EPSM licenses and GCN licence returns;

- Aerial photography;
- Standard data forms for SPAs and SACs within the UK national site network of European sites;
- UK Ramsar Information Sheets;
- SSSI citations; and
- Environment Agency macrophyte, macro invertebrate and fish survey data<sup>294</sup>.

### Current Baseline

#### *Statutory Designated Sites*

8.10.7 There are no international statutory designated sites within 2 km (or within 30 km for bats) of the Upper Lode Weir works boundary.

8.10.8 There is one international statutory designated site with bats as a qualifying feature within 30 km of the Upper Lode Weir works boundary: Wye Valley and forest of Dean Bat sites SAC.

8.10.9 There are two national statutory designated sites within 2 km of the Upper Lode Weir works boundary. The parcel of land adjacent to the eastern end of the weir is almost entirely designated as Severn Ham, Tewkesbury SSSI. North of the river is the Old Severn and designated as And Old River Severn, Upper Lode SSSI.

8.10.10 There are no LNRs within 2 km of the Upper Lode Weir works boundary.

8.10.11 The proximity and reason for designation for statutory designated sites within 2 km (30 km for bats) of the Upper Lode Weir works boundary is further in **Table 8-18**.

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<sup>294</sup> Environment Agency (2023). Ecology and Fish Data Explorer [[Online](#)] Accessed 4 December 2023

**Table 8-18: International and National Statutory Designated Sites within 2 km (30 km for bats) of the Upper Lode Weir works boundary**

Site	Location in relation to the Upper Lode Weir works boundary	Reason for Designation
Wye Valley and Forest of Dean Bat Sites SAC	18.9 km south-west	Primary reason for site selection: Lesser horseshoe bat ( <i>Rhinolophus hipposideros</i> ) And Greater horseshoe bat ( <i>Rhinolophus ferrumequinum</i> )
Severn Ham SSSI	59.7 m east	One of the last remaining traditionally managed ham meadows overlying the alluvium of the Severn Vale and subject to annual winter flooding
Old River Severn SSSI	147.6 m north	The main reason for its status is the presence of six nationally rare plant species

*Non-statutory designated sites*

8.10.12 There are three LWS within 1 km of Upper Lode Weir:

- Forthampton Oaks LWS (SO83/00611) located 187.8 m north of Upper Lode Weir, the site is

described as Pasture Woodland and Mature Timber habitat: site with 10 or more over mature trees or site with an Alexander Index of saproxylic beetles of 10 or more;

- Lower Lode Lane (Tewkesbury) Conservation road verge (CRV036), located 869.7 m from the site; and
- Aggberrow, Sarn Hill and Voulters Woods LWS.

*Habitats*

8.10.13 Upper Lode Weir is located entirely within the Severn River. The western end of Upper Lode Weir is densely wooded and is surrounded by pastoral and arable fields.

8.10.14 There are several Ancient and Veteran trees to the western side of the River Severn.

8.10.15 Aerial photography indicates that the river is treelined and surrounded by arable and pastoral fields.

8.10.16 The desk study suggests the presence of the following HPI within 1 km of the Upper Lode Weir: coastal and floodplain grazing marsh, deciduous woodland, traditional orchards and Woodpasture and Parkland.

8.10.17 There is no ancient woodland located within 1 km of the Upper Lode Weir.

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8.10.18 There are ancient/veteran trees located within 1.5 km of the weir.<sup>282</sup>

*Notable Plants*

8.10.19 There are no notable plants within 1 km of the Upper Lode Weir from the GCER data search.

*Bats*

8.10.20 The following bat species have been identified in the SERC desk study within 1 km of the Upper Lode Weir works boundary:

- Common pipistrelle (*Pipistrellus pipistrellus*);
- Soprano pipistrelle (*Pipistrellus pygmaeus*);
- Serotine (*Eptesicus serotinus*);
- Brown Long-eared (*Plecotus auritus*);
- Daubentons (*Myotis daubentonii*); and
- Noctule (*Nyctalus noctula*).

8.10.21 The linear features such as the River Severn and the trees and riparian habitat are considered to be suitable for commuting/foraging and roosting habitat for bats.

*Badger*

8.10.22 A badger record was identified in the GCER desk study within 1 km of the Upper Lode Weir. The arable fields and connecting linear features in the vicinity of the weir are considered suitable foraging/commuting and sett habitat for badgers.

*Otter*

8.10.23 Nine otter records were identified in the GCER desk study within 2 km of the Upper Lode Weir. The River Severn and the riparian habitat in the vicinity of the weir are considered suitable foraging/commuting and potentially holt habitat for otter.

*Dormouse*

8.10.24 No dormouse records were returned within 1 km of the Upper Lode Weir because of the GCER data search.

8.10.25 Based on aerial imagery, there is a lack of woodland blocks and/or substantial hedgerows within the surrounding environment to Upper Lode Weir indicating both a lack of suitable habitat and of connectivity within the wider landscape.



### *Water vole*

8.10.26 No water vole, records were returned within 1 km of the Upper Lode Weir because of the GCER data search.

### *Great crested newt*

8.10.27 There were five records for GCN returned within 1 km of Upper Lode Weir because of the GCER data search. It is considered that the grassland and ponds in the wider environment could provide suitable terrestrial and/or breeding habitat for GCN.

### *Reptiles*

8.10.28 There were no records for reptiles returned within 1 km of Upper Lode Weir because of the GCER data search.

8.10.29 Suitable habitat, such as grassland, rough field margins, hedgerows and ponds/ditches within Upper Lode Weir have the potential to support three of the four common reptile species: common lizard (*Zootoca vivipara*), slow worm (*Anguis fragilis*) and grass snake (*Natrix natrix*).

### *Terrestrial Invertebrates*

8.10.30 Dragonflies, moths, and beetles have been recorded within 1 km of the weir from the GCER data search. It is likely that the terrestrial habitat such as arable field margins and rough grassland, deciduous and ancient woodland and riparian habitat is suitable for a range of common and notable terrestrial invertebrates.

### *Ornithology*

8.10.31 The GCER desk study returned records of 81 species of birds within 2 km of Upper Lode Weir, many of which have overlapping conservation designations, such as SPI under Section 41 of the NERC Act 2006, red or amber listed as BoCC<sup>295</sup> or listed under Schedule 1 of the WCA 1981.

8.10.32 The species returned in the data search included a mix of species typical of the habitats present, a mosaic of arable farmland, grazing marsh, ditches and watercourses, including notable species such as: curlew (*Numenius arquata*) Cetti's warbler (*Cetti cetti*), cuckoo (*Cuculus canorus*), grey wagtail (*Motacilla cinerea*), house martin (*Delichon urbicum*), marsh tit (*Poecile palustris*), reed bunting (*Emberiza*

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<sup>295</sup> Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. 2021. The status of our bird populations: the fifth Birds of

Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114: 723-747.

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*schoeniclus*), sedge warbler (*Acrocephalus schoenobaenus*), skylark (*Alauda arvensis*), starling (*Sturnus vulgaris*) wheatear (*Oenanthe Oenanthe*) and yellow wagtail (*Motacilla flava*).

*Other Notable Species*

8.10.33 The SERC data search returned records of hedgehog (*Erinaceus europaeus*), within 1 km of Upper Lode Weir.

8.10.34 A Common toad (*Bufo bufo*) record was recorded in the wider area and contains suitable habitat for these species.

8.10.35 Hedgehog and common toad are all listed in accordance with Section 41 of the NERC Act 2006 as SPI.

*Freshwater habitats and species*

8.10.36 The Old River Severn, Upper Lode SSSI is linked to the River Severn at its southern end. The citation states that a tidal influence is present this far upstream; aquatic plants include pondweed (*Potamogeton* sp.) with flowering rush (*Butomus umbellatus*), water forget-me-not (*Myosotis scorpioides*), water-cress (*Nasturtium officinale*) and water dock (*Rumex hydrolapathum*) in the muddy margins. Also within this

marginal habitat is tasteless water-pepper (*Polygonum mite*), small water pepper (*P. minus*), mudwort (*Limosella aquatica*) and needle spike rush (*Eleocharis acicularis*); this site is the only location in Gloucestershire for these three species. Other locally rare plants include narrow-leaved water plantain (*Alisma lanceolatum*), glaucous bulrush (*Schoenoplectus tabernaemontani*) and sea club rush (*Scirpus maritimus*) which is rarely found inland.

8.10.37 The macrophyte element of this waterbody (ID GB109054044404) is classed as High in 2022 (an improvement from Moderate in 2019).

8.10.38 Macrophytes sampled by the Environment Agency upstream of Tewkesbury (Uckinghall-Queenhill) on the River Severn comprised the following freshwater species:

- River feather moss (*Brachythecium rivulare*);
- Smaller lattice moss (*Cinclidotus fontinaloides*);
- Willowherb (*Epilobium*);
- A moss (*Fissidens*);
- Himalayan balsam (INNS) (*Impatiens glandulifera*);
- Purple loostrife (*Lythrum salicaria*);
- Reed canary grass (*Phalaris arundinacea*);

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- Bittersweet (*Solanum dulcamara*);
- Blue-green algal scum / pelts;
- Green algae (*Cladophora glomerata/Rhizoclonium hieroglyphicum*); and
- Kneiff's feather moss (*Leptodictyum riparium*).

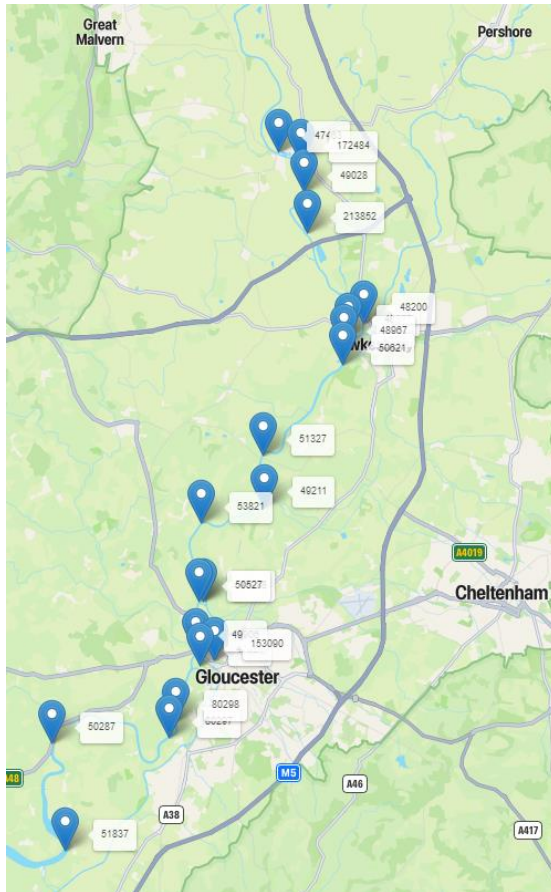
composition shifts towards an increasing proportion of freshwater species.

8.10.39 Macrophytes to the west of Tewkesbury on the River Severn include freshwater species such as the yellow water lily (*Nuphar lutea*), arrowhead (*Sagittaria sagittifolia*) and water milfoil (*Myriophyllum spicatum*).

8.10.40 In terms of INNS, the GERC has recorded the water fern (*Azolla filiculoides*) at Tewkesbury in 2015 (Grid reference SO889325). Fringed water lily (*Nymphoides 459uture459*) has also been recorded at Severn Hams (Grid reference SO88933256)

8.10.41 The Environment Agency macroinvertebrate monitoring programme (primarily 3-minute kick sweep but also dredge and airlift) has provided records since 1993 on sites on the River Severn. The sites range from between Enney and Upton upon Severn (**Figure 8-1**).

8.10.42 Macro-invertebrate data from these sites (**Table 8-19**), downstream of the weir, includes a mixture of brackish tolerant and freshwater species. Further upstream of the weir, the macro-invertebrate community



**Figure 8-1: Environment Agency macroinvertebrate monitoring sites on the River Severn**

**Table 8-19: EA monitoring sites (presented downstream to upstream) on the River Severn between Epney and Upton upon Severn.**

SITE_ID	NGR	Comments
51837	SO7605011100	Taxa of transitional water
46877	SO8820032950	Taxa of transitional water
50287	SO7550015700	Taxa of transitional water
80297	SO8050015900	Taxa of transitional water
80298	SO8080016600	Taxa of transitional water
49906	SO8165019550	Approximately 2 km DS Maisemore Weir Taxa of transitional water
	SO 81800 21648	Maisemore Weir
50527	SO8180021700	Immediately upstream of Maisemore Weir. Taxa tolerant of brackish conditions and/or characteristic of brackish taxa tolerant of FW conditions. <i>Gammarus zaddachi</i> and <i>Corophium curvispinum</i>
48988	SO8200021700	~200 m US Maisemore Weir. Family level data only, Corixidae and Gammaridae present
53821	SO8189925042	Taxa tolerant of brackish conditions and/or characteristic of brackish taxa tolerant of FW conditions.

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SITE_ID	NGR	Comments
49211	SO8460025700	Taxa tolerant of brackish conditions and/or characteristic of brackish taxa tolerant of FW conditions.
51327	SO8456827891	Long term monitoring site. Taxa tolerant of brackish conditions and/or characteristic of brackish taxa tolerant of FW conditions.
50621	SO8795031750	~1 km DS Upper Lode Weir. Long term monitoring site. Taxa tolerant of brackish conditions and/or characteristic of brackish taxa tolerant of FW conditions.
48967	SO8800032500	~200 m DS Upper Lode Weir. Taxa includes brackish tolerant and freshwater species.
	SO 88098 32761	Upper Lode Weir
46877	SO8820032950	Immediately upstream of Upper Lode Weir, Taxa includes brackish tolerant and freshwater species.
48200	SO8887033460	~1 km US Upper Lode Weir. Taxa includes brackish tolerant and freshwater species.

SITE_ID	NGR	Comments
213852	SO8644837357	Taxa includes some brackish tolerant and freshwater species.
49028	SO8632039060	Taxa includes some brackish tolerant and freshwater species.
172484	SO8617740354	Freshwater taxa list. Some brackish tolerant species.
47463	SO8523640760	Freshwater taxa list. Some brackish tolerant species.

8.10.43 Environment Agency invertebrate records show several species of conservation interest are present (**Table 8-20**:). These include swan mussel (*Anodonta cygnea*) and swollen river mussel (*Unio tumidus*), several species of the mayfly family Caenidae, the common clubtail dragonfly (*Gomphus vulgatissimus*) (also recorded by The Worcester Biological Records Center at Upper Lode) and two notable elmidae beetles (*Macronychus quadrituberculatus* and *Stenelmis 461analiculate*). All species of conservation interest recorded are either freshwater taxa or freshwater taxa which are tolerant of mild brackish conditions. The majority of the species are present downstream of Upper Lode Weir.

8.10.44 GERC has also 144 records of scarce chaser (*Libellula fulva*; GB Red Data Book Near Threatened) over the

last ten years. This species has been primarily recorded in The Mythe, over a kilometre away from the Upper Lode Weir.

**Table 8-20: Environment Agency Macroinvertebrate sampling: protected taxa**

Species name	Salinity tolerance <sup>1</sup>	Sites (see Figure 8-1)
<i>Anodonta cygnea</i>	Freshwater taxa tolerant of mild brackish conditions	48200, 47463, 51327, 48200, 51327, 172484
<i>Atrichops crassipes</i>	No data	172484
<i>Brachycercus harrisella</i>	Freshwater species	172484, 51327
<i>Caenis pusilla</i>	Freshwater taxa (notable)	172484, 51327
<i>Gomphus vulgatissimus</i>	Freshwater taxa (notable)	48200, 51327, 172484
<i>Leptocerus interruptus</i>	RDB3 (rare)	172484
<i>Macronychus quadrituberculatus</i>	RDB3 (rare)	51327
<i>Oecetis notata</i>	RDB3 (rare)	172484
<i>Potamanthus luteus</i>	RDB2 (vulnerable)	48200, 51327, 172484
<i>Pseudanodonta complanata</i>	Freshwater taxa (notable)	47463, 48200, 172484, 51327, 213852

Species name	Salinity tolerance <sup>1</sup>	Sites (see Figure 8-1)
<i>Stagnicola palustris/fuscus/corvus</i>	Freshwater taxa tolerant of mild brackish conditions	51327
<i>Stenelmis canaliculata</i>	RDB2 (vulnerable)	172484
<i>Unio tumidus</i>	Freshwater species	51327

8.10.45 Several INNS were recorded (**Table 8-21:**), with all species including zebra mussel (*Dreissena polymorpha*) and the Asian clam (*Corbicula fluminea*). Present both upstream and downstream of the Upper Lode Weir.

**Table 8-21: INNS recorded on the River Severn during Environment Agency Macroinvertebrate surveys**

Species name	Common name/type	Location
<i>Chelicorophium curvispinum</i>	Caspian mud shrimp	Upstream and downstream of Upper Lode Weir
<i>Corbicula fluminea</i>	Asian Clam	Upstream and downstream of Upper Lode Weir

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Species name	Common name/type	Location
<i>Dikerogammarus haemobaphes</i>	Demon Shrimp	Upstream and downstream of Upper Lode Weir
<i>Dreissenidae/Dreissena polymorpha</i>	Zebra or Quagga mussel	Upstream and downstream of Upper Lode Weir
<i>Gammarus tigrinus</i>	Shrimp species	Upstream and downstream of Upper Lode Weir
<i>Hypania invalida</i>	Polychaete worm species	Upstream and downstream of Upper Lode Weir
<i>Musculium transversum</i>	bivalve species	Upstream and downstream of Upper Lode Weir

8.10.46 Downstream of the River Chelt tributary on the River Severn fish communities sampled by the Environment Agency comprised freshwater and migratory/estuarine species. Ten species were found in 2014 and 2016 surveys, dominated by common goby and minnow, respectively. Other species included bleak, roach, gudgeon, dace, perch, chub, 3-s stickleback, flounder, European eel, ruffe and rudd.

8.10.47 On the river Chelt close to its tributary with the Severn, roach, dace and chub dominated, with stone loach,

Atlantic salmon, European eel, flounder, minnow perch and bleak among the other species were present.

8.10.48 On the River Swilgate south of Tewkesbury and downstream of the weir 12 species were recorded, dominated by dace but also including chub, roach, perch, tench, flounder, ruffe , European eel, barbel, gudgeon, Atlantic salmon, and bullhead.

8.10.49 Fish communities north of Tewkesbury on the River Severn, sampled on the tributary Bushley Brook, south of Queenhill were dominated by roach. Species such as gudgeon, dace, Flounder and European eel were also present. Flounder was not recorded on the sites further upstream to Upton upon Severn. In the River Severn east of Upton upon Severn fish communities were dominated by chub, with gudgeon and bleak also commonly sampled. There were records of zander (*Sander lucioperca*) from this stretch of the river also.

8.10.50 Overall, the fish communities show that estuarine species can penetrate the weir north of Tewkesbury, to around Upton upon Severn. Migratory species such as European eel and Atlantic salmon also reach above the weir at Tewkesbury; Shad are also able to navigate the weir here.

## Future Baseline

- 8.10.51 Water quality of the main rivers will, in the immediate future, continue to reflect existing land and water management practices and is influenced by run off from the surrounding agricultural run-off and purposeful/accidental discharges.
- 8.10.52 In the longer term, water quality will remain an important factor determining habitat quality. Climate change is predicted to result in increases in freshwater temperatures and increase variability in precipitation resulting in changes to river levels resulting in flooding and droughts. The effects of climate change may progressively worsen the impacts of existing obstacles for fish migration. In terms of freshwater species, the future baseline may alter owing to sea level rise in terms of changes in the tidal limit (i.e., extent of brackish vs. exclusively freshwater species). Improvements in management and water quality in the future are likely to result in an improvement in the status of freshwater communities.
- 8.10.53 Colonisation of INNS both because of existing or known species colonising new areas or climate change resulting in improved conditions favouring invasive species could influence the future baseline for example through competition with native species.

## Assumptions and Limitations

- 8.10.54 This study is based on a desk-based assessment only and no site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings presented. The assessment provided is based on information available at the time of writing.
- 8.10.55 At this PEIR stage, specific details regarding removal of the weir and operational stages within the Upper Lode Weir works boundary are not fully known or decided.
- 8.10.56 At the time of writing, mitigation design is in a preliminary phase. Mitigation will be fully developed for the ES in discussion with stakeholders. Effects that are normally mitigated by best practice/embedded design such as construction of access routes, the control of INNS and pollution from spills and faulty machinery are not considered in the potential effects.

## Likely Significant Effects

- 8.10.57 This assessment has been undertaken in accordance with the common Framework set out in **Volume 1 Chapter 4**. This chapter uses geographic frame of reference for importance (sensitivity) and follows the CIEEM *Guidelines for Ecological Impact Assessment*



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*in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine.*

8.10.58 To allow comparisons with other technical chapters in the ES, importance has also been described (in brackets) using the more familiar terms used for sensitivity as per **Volume 1 Chapter 4**:

- International and European (High) – SACs, SPAs, MCZs and Ramsar sites and habitats or populations of species, outside of protected sites, considered to be important at an international/European level;
- National (Medium) – SSSIs and habitats or populations of species outside SSSIs considered to be important at the National level;
- Regional (Low) – Habitats or populations of species considered to be important within the West of England;
- County (Low) – Non-statutory designated sites (CWS, OSWI or UWS), habitats or populations of species considered to be important in Worcestershire and Gloucestershire;
- Local (Low) – habitats or species populations considered to be important at the site level and its immediate surrounds, and

- Less than local (Negligible) – habitats or species populations which are common and widespread.

8.10.59 It should be noted that the individual sensitivities will be assigned at the next stage in the ES.

8.10.60 For the purpose of this assessment, the level of impact is described as the ‘magnitude’ of impact to provide consistency across the technical chapters of this ES. The magnitude of impact is reported in accordance with the criteria provided in **Table 8-22**:

**Table 8-22: Description of magnitude**

Level of magnitude (change)		Typical description
High	Negative	Permanent/irreversible damage. The extent, duration and/or frequency/timing of the impact would negatively affect the integrity or key characteristics of the important ecological feature.
	Positive	Permanent addition of, improvement to or restoration of an important ecological feature. The extent, duration and/or frequency/timing of the impact would positively affect the integrity or key characteristics of the important ecological feature.

Level of magnitude (change)		Typical description
Medium	Negative	Temporary/reversible damage. The extent, duration and/or frequency/timing of the impact would negatively affect the integrity or key characteristics of the important ecological feature.
	Positive	Temporary addition of, improvement to, or restoration of an important ecological feature. The extent, duration and/or frequency/timing of the impact would positively affect the integrity or key characteristics of the important ecological feature.
Low	Negative	Permanent/irreversible damage. The extent, duration and/or frequency/timing of the impact would not affect the integrity or key characteristics of the important ecological feature.
	Positive	Permanent addition of, improvement to, or restoration of an important ecological feature. The extent, duration and/or frequency/timing of the impact would not affect the integrity or key characteristics of the important ecological feature.

Level of magnitude (change)		Typical description
Very Low	Negative	Temporary/reversible damage. The extent, duration and/or frequency/timing of the impact would not negatively affect the integrity or key characteristics of the important ecological feature.
	Positive	Temporary addition of, improvement to, or restoration of an important ecological feature. The extent, duration and/or frequency/timing of the impact would not affect the integrity or key characteristics of the important ecological feature.

### Terrestrial Ecology

8.10.61 The habitats surrounding the weir are listed as HPI and are common in the wider landscape. The terrestrial species inhabiting the riparian habitats and surrounding fields and field margins have not been surveyed. Although detailed design is not known at this stage, the removal phase will be temporary, of medium-term duration and will be of very low magnitude. However, until a PEA of Upper Lode Weir and necessary working areas is undertaken, all species and HPI will be scoped in as a precautionary approach.

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8.10.62 Until further design information is available, the impacts on the SSSIs are scoped in for further assessment.

8.10.63 Until further design information is available an assessment of riparian habitats and the effects of the river on these habitats during operation is scoped in for further assessment.

**Freshwater Ecology**

8.10.64 Potential effects on freshwater ecology are outlined below.

*Sediment removal and release during removal activities*

8.10.65 The weir removal activities will cause sediments and the associated habitats built up around the existing structure and upstream to be removed/disturbed. Increased suspended sediments within the water column can smother substrate downstream (causing a deterioration in habitats such as gravels). As sedimentary habitats will be removed, so will associated species particularly macrophytes and invertebrates. Mitigation measures and best practices will reduce this effect, but it is likely that there will be effects observable in the vicinity of the weir and downstream. The removal phase effects will likely be

temporary, of short-term duration and moderate magnitude.

*Disturbance to fish communities (resident/migratory) during removal activities*

8.10.66 The weir removal activities will disturb and displace fish communities in the river and if these occur during key migratory windows they may act as a barrier to migration. Mitigation measures would include carrying out the removal activities outside of these migratory windows where possible. The removal phase effects will likely be temporary, of short-term duration and moderate magnitude.

*Spread of INNS during operation*

8.10.67 The removal of the weir may create conditions for the increase in extent of the INNS present in the River Severn. However, as INNS are already present up and downstream of the weir, its removal may not cause a detectable effect. The removal phase effects will likely be temporary, although of potentially long-term duration it would constitute a very low magnitude.

*Changes in sediment habitat and deposition during operation*

8.10.68 The removal of the weir will cause changes over time to the hydrodynamics, riverbed, and gradient, altering the aquatic habitats both up and downstream of the weir. The operational phase effects will likely be of long-term duration and moderate magnitude.

*Operational changes to hydrodynamics, water quality and temperature regime*

8.10.69 The removal of the weir will cause changes to the water environment namely the hydrodynamics which influence the temperature and other water quality parameters in the river which over time will stabilise with the new gradient and loss of impoundment effect. These conditions may increase/decrease the suitability for some aquatic species (invertebrates, fish and macrophytes), e.g., through changes in dissolved oxygen, and a change in communities in the areas affected are likely to occur. The operational phase effects will likely be of long-term duration and moderate magnitude.

*Changes to water quality and habitats from alteration in salinity regime during operation*

8.10.70 The removal of the weir will alter the relative volumes of freshwater and saltwater in affected sections of the River Severn downstream to Gloucester owing to the removal of the restriction of the freshwater flow here. The community composition will likely change up and downstream (including connected watercourses such as the Old River Severn, Upper Lode SSSI), dependent on flow regime in terms of distribution and proportion of salinity tolerant vs. wholly freshwater species. The operational phase effects will likely be of long-term duration and moderate magnitude.

*Changes to species distribution during operation*

8.10.71 The removal of the weir will improve access to the upstream habitat particularly for migratory fish species. Species such as Atlantic salmon, shads, river and sea lamprey and European eel will be more able to access the habitat, and this will benefit the populations of these species with associated spawning success and/or escapement from the catchment. The operational phase effects will likely be of long-term duration and moderate-major magnitude.

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## Proposed Scope

8.10.72 It is proposed that the ES includes a detailed assessment of potential terrestrial and freshwater ecology impacts that could occur during the removal of the weir and operation within and around the Upper Lode Weir works boundary. **Table 8-23** summarises the elements scoped into the assessment.

8.10.73 Until further site-specific habitat and species surveys, and subsequent suitability assessments, are completed, a precautionary approach to assessment will be undertaken for the ecological receptors.

8.10.74 Regardless of inclusion in the ES assessment, all relevant species will be reviewed in relation to legislation in a Biodiversity Legislation Compliance Report to be submitted as an appendix to the ES.

**Table 8-23: Summary of ecology (terrestrial and freshwater) and ornithology elements scoped into the assessment**

Potential Effect	Scoped IN or OUT	Justification
Terrestrial ecology and ornithology		
Disturbance and habitat	IN	Construction vehicles and human activity will cause temporary

Potential Effect	Scoped IN or OUT	Justification
loss for terrestrial species as a direct result of removal activities		disturbance to foraging/commuting terrestrial species. Surveys will need to be undertaken to understand which species are present at Upper Lode Weir and mitigation will need to consider seasonal timings, type of vehicles and potentially trapping and translocation of species to reduce the disturbance and limit the habitat loss.
Changes to riparian habitat once the weir is removed	IN	Upper Lode Weir will need to be assessed to ensure once the weir is removed the riparian habitat is not lost due to the new flow regimen.
Freshwater ecology		
Sediment removal and emissions generated during the removal within and around the Upper Lode Weir works boundary.	IN	Removal activities associated with the barrier removal / easement at the Upper Lode Weir works boundary have the potential to remove and suspend sediments and increase turbidity and smothering of substrate downstream, causing deterioration in habitats (e.g., gravels), removal of habitats (through sediment removal), reduction in water quality and

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Potential Effect	Scoped IN or OUT	Justification
		effects on macrophyte, fish and invertebrate communities.
Disturbance to fish communities and migration during removal activities.	IN	Disturbance to fish communities around the weir during removal in and around the river will be unavoidable through noise and excavations; however, mitigation measures including removal window timing can reduce the effects.
Spread of INNS (operation).	IN	The operational regime may allow INNS to move to other areas of the River Severn, but as such species are already present up and downstream of the weir this effect may not be detectable.
Operational changes to sedimentary habitats	IN	The removal of the weir will permanently change the aquatic habitats owing to changes in sediment distribution and hydrodynamics. Some aquatic species will be displaced as a result of this, but there will be beneficial effects to other species (e.g., fish through improved spawning habitat).
Operational changes to	IN	The removal of the weir will cause changes to hydrodynamics,

Potential Effect	Scoped IN or OUT	Justification
hydrodynamics, temperature and other water quality parameters		temperature regime and other water quality parameters in the river which over time will stabilise with the new gradient and loss of impoundment effect. These conditions may increase/decrease the suitability for some aquatic species (invertebrates, fish and macrophytes) and changes in communities in these areas are likely to occur.
Operational changes to water quality and habitats from alteration to salinity regime	IN	The removal of the weir will alter the relative volumes of freshwater and saltwater in affected sections upstream and downstream towards Gloucester owing to the removal of the restriction of the freshwater flow. The community composition will likely change dependent on flow regime in terms of distribution of salinity tolerant vs. wholly freshwater species. This includes having the potential to affect the communities within connected watercourses such as the Old River Severn, Upper Lode SSSI.

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Potential Effect	Scoped IN or OUT	Justification
Operational changes to distribution in species from removal of weir barrier	IN	The removal of the weir will improve access to the upstream habitat particularly for migratory fish species.

## 8.11 Landscape and Visual

### Introduction

8.11.1 This section considers the likely significant effects associated with landscape and visual impacts arising because of the proposed compensation measures at Upper Lode Weir.

### Study Area

8.11.2 The proposed LVIA study area for the assessment of the proposed changes extends to 1.5 km from the Upper Lode Weir works boundary. This is considered to be the likely maximum distance at which any landscape and visual impacts are likely to arise as a result of the relatively limited scale of the the proposed compensation measures at Upper Lode Weir, riparian

vegetation, topography and low profile of the weir structures. Beyond 1.5 km there is unlikely to be any perceptible change.

### Baseline

#### Baseline Sources

8.11.3 The following sources have been used to inform a preliminary understanding of the baseline conditions for the assessment of the landscape and visual aspect:

- Natural England’s National Landscape Character Area Profiles;
- Gloucestershire Landscape Character Assessment, LDA 2006;
- The Gloucester-Cheltenham-Tewkesbury Joint Core Strategy Landscape Characterisation Assessment & Sensitivity Analysis (2013);
- The definitive PRoW map for Gloucestershire County Council;
- MAGIC Maps; and
- Aerial photography.

#### Current Baseline

8.11.4 The proposed compensation measures at Upper Lode Weir have the potential to result in impacts on both

[edfenergy.com](http://edfenergy.com)

landscape character and visual amenity. Several landscape and visual receptors have been identified.

#### *National Landscape Character*

8.11.5 Upper Lode Weir falls within NCA 106: Severn and Avon Vales.

8.11.6 Due to the large scale of the NCAs compared to the small scale of the proposed compensation measures at Upper Lode Weir, the LCT are more applicable to Upper Lode Weir. Therefore, the National Landscape character have been scoped out of the future assessment.

#### *Local Landscape Character*

8.11.7 The Gloucestershire Landscape Character Assessment 2006 has defined the areas as within the LCT: 16 – *Riverside Meadows*, sub area SV 4A *Severn Ham, Tewkesbury*.

8.11.8 The Gloucester-Cheltenham-Tewkesbury Joint Core Strategy Landscape Characterisation Assessment & Sensitivity Analysis (2013); has defined areas of landscape sensitivity. The Upper Lode Weir works boundary sits within *T19 – Severn Ham* and immediately adjacent *T20- The Lock at Cork's Hill*.

8.11.9 *T19 – Severn Ham* is described as high-medium sensitivity. It is further described as;

*'a very good representation of a Riverside Meadow landscape character type. This compartment is inherently flat, open, uninhabited, and lacking structural vegetation and field boundaries. Occasional mature Oaks are present but sparse, while Willows (some traditionally pollarded) and scrub sporadically demarcate small watercourses (brooks and ditches)'. ....'The large red brick Mythe Water Treatment Works are an obvious detractor in the north, while occasional river signage creates more localised features. However, infrastructure has limited impact within the compartment. Enclosed by landform in the west and built form in the east this landscape compartment provides an important buffer zone of high amenity value between the rural west and urban east.'*

#### *Statutory Landscape Designations*

8.11.10 The Severn Ham, Tewkesbury Site of Scientific Interest (SSSI) (ref 1077413) is located immediately to the east of Upper Lode Weir and is designated in favourable condition.

8.11.11 The Old River Severn, Upper Lode SSSIs (ref 1077422 and 1077423) are located immediate to the west of



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Upper Lode Weir and are designated in favourable condition.

8.11.12 The closest Scheduled Monument (Site of St Mary's Abbey) is located approximately 850 m to the east. Two further Scheduled monuments are located between approximately 1.2 km and 1.8 km to the south (Holm Castle, Site of Null and Margaret's Camp).

8.11.13 The closest Listed Building (Grade II\*) is located at Abbey Mill approximately 770 m to the east. Numerous listed buildings (Grade I, II and Grade II\*) are located in Tewkesbury.

8.11.14 A registered Battlefield (Battle of Tewkesbury 1471) is located approximately 800 m to the south.

8.11.15 Tewkesbury Cemetery is a Grade II listed park and garden and is located approximately 1.2 km to the southeast.

*Vegetation*

8.11.16 The Upper Lode Weir works boundary is located adjacent to Natural England designated Coastal and Floodplain Grazing Marsh HPI. Deciduous Woodland which is indicative of lowland mixed deciduous woodland HPI is located to the west on the island

between Upper Lode Weir and Upper Lode Lock, Cork's Hill and Upper Lode.

8.11.17 Woodpasture and Parkland HPI is also designated at Cork's Hill and further west towards Home Farm. Traditional Orchard HPI is located approximately 630 m to the south-west with Ancient and Semi-natural Woodland designated approximately 1730 m to the north west.

8.11.18 Vegetation in the surrounding landscape is predominantly associated with riparian woodland/scrub. This is supplemented with field hedgerows and trees and domestic garden planting.

*Access*

8.11.19 A number of ProW are in close proximity to the Upper Lode Weir works boundary providing public access towards and along the River Severn;

- PRow ZTE37 follows the right bank of the River Severn on the north side of Upper Lode Lock.
- PRow ZTE11 follows the left bank of the River Severn immediately to the east of Upper Lode Weir.
- ProWs ZTE10, 12 and 13 cross the Severn Hams to the east.

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- PRoW EFO11 follows the right bank of the Old Severn and continues along the right bank of the Severn to the south of Upper Lode Weir.

8.11.20 The Severn Way footpath follows ProWs, bridleways and public highways to the east of Severn Ham.

8.11.21 The Severn Ham is registered as Common Land.

8.11.22 The River Severn is navigable both upstream and downstream of Upper Lode Weir, with the weir by-passed via the adjacent lock. The river is therefore accessible to pleasure craft.

*Visual receptors*

8.11.23 The visual receptors that are likely to be affected by the proposed compensation measures at Upper Lode Weir are outlined in **Table 8-24**.

**Table 8-24: Visual Receptors likely to be affected**

Receptor description	Receptor type	Approximate distance to the Upper Lode Weir works boundary (at its closest)
LCT: 16 – Riverside Meadows, sub area SV 4A Severn Ham, Tewkesbury.	Landscape Character	0 m

Receptor description	Receptor type	Approximate distance to the Upper Lode Weir works boundary (at its closest)
The River Severn	Recreational, commercial	0 m
PRoW ZTE11	Recreational	0 m
PRoW ZTE10	Recreational	0 m
Upper Lode Lock Cottages	Residential, Commercial, Recreational	65 m
PRoW ZTE12	Recreational	65 m
PRoW ZTE13	Recreational	100 m
PRoW ZTE37	Recreational	110 m
PRoW EFO11	Recreational	110 m
Outlying residential properties to north of Upper Lode Weir	Residential	250 m
Outlying residential properties to north of Upper Lode Weir	Residential	250 m
Town of Tewkesbury	Residential, Commercial, Recreational	720 m
The Severn Way	Recreational	780 m

Receptor description	Receptor type	Approximate distance to the Upper Lode Weir works boundary (at its closest)
Lower Lode Inn	Residential, Commercial, Recreational	975 m
Cheltenham College Boat House	Recreational	1125 m

### Future Baseline

8.11.24 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

8.11.25 Identification of receptors is based on a desktop study.

8.11.26 At the time of this report the proposed compensation measures at Upper Lode Weir are not confirmed, or a

mitigation strategy developed, such that the impacts and those effects cannot be fully understood, including the impact of any potential lowering of water levels up stream of Upper Lode Weir. It is assumed that where it is not possible to avoid or reduce a significant adverse effect, remediation measures will be used to offset the effect.

8.11.27 It is assumed that temporary access during removal will be via existing highways and / or tracks or where this is not possible a haul road will be created and reinstated to the original land use / condition.

8.11.28 It is assumed that ProW access will not be permanently affected however temporary diversions may be required during the removal works.

8.11.29 All components of the proposed compensation measures at Upper Lode Weir will be included in the future assessment.

### Potential Effects

8.11.30 The likely effects associated with the landscape and visual aspect as a result of the proposed compensation measures at Upper Lode Weir are outlined below.

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### Local landscape Character

8.11.31 Due to the scale and nature of the proposed compensation measures at Upper Lode Weir, effects on Landscape character are unlikely to result in significant change, however this would be considered in detail once a final design is developed.

### Visual receptors

8.11.32 It is anticipated that some, or all, of the visual receptors have the potential to experience temporary visual effects from the removal works due to temporary works access, site compounds and movement of construction vehicles. There is also the potential for them to experience permanent visual effects due to a change in vegetation / water levels.

### Proposed Scope

8.11.33 Based on the above assessment, **Table 8-25** presents the potential Landscape and Visual effects that are proposed to be scoped in or out of requiring further assessment, along with the rationale for the choice.

**Table 8-25: Summary of landscape and visual elements scoped in and out of the assessment**

Potential Effect	Scope d IN or OUT	Justification
National Landscape Character	OUT	Due to the large scale of the NCAs compared to the small scale of the proposed compensation measures at Upper Lode Weir the LCT are more applicable to Upper Lode Weir. Therefore, the National Landscape character has been scoped out of further assessment.
Local Landscape Character	IN	Due to the scale and nature of the proposed compensation measures at Upper Lode Weir, effects on Landscape character are unlikely to result in significant change, however this would be considered in detail once a final design is developed.
Visual Receptors	IN	It is anticipated that some, or all, of the visual receptors have the potential to experience temporary visual effects from the removal of the weir due to temporary works access, site compounds and movement of construction vehicles. There is also the potential for them

[edfenergy.com](http://edfenergy.com)

Potential Effect	Scope d IN or OUT	Justification
		to experience permanent visual effects due to a change in vegetation / water levels.

8.11.34 Therefore, it is proposed that Landscape and Visual is scoped into the ES.

## 8.12 Historic Environment

### Introduction

8.12.1 The aims of this section are to:

- Identify any heritage assets and archaeological features associated with the Upper Lode Weir works boundary, both within the works boundary and a 250 m buffer.
- Identify whether the assets could be potentially impacted by the proposed compensation measures at Upper Lode Weir.
- Outline a proposed scope and methodology for the assessment of historic environment impacts within the ES.

### Study Area

8.12.2 For the purpose of the assessment, a 250 m study area was established around the Upper Lode Weir works boundary to identify any nearby heritage assets that could be impacted by the development.

### Baseline

#### Current Baseline

8.12.3 There are no designated heritage assets (Scheduled Monuments, Listed Buildings, Registered Parks and Gardens or Registered Historic Battlefields) recorded within the Upper Lode Weir works boundary or 250 m study area by the NHLE. Upper Lode Weir is also not located within a World Heritage Site or Conservation Area.

8.12.4 Additionally, the Gloucestershire Historic Environment Record database was consulted to determine any archaeological features located within the area. It discovered the following within a 250 m study area; Romano-British Pottery (NRHE 5522), Bushley Lock Keepers House, west of Tewkesbury (NRHE 5536), Tewkesbury Lock (NRHE 11366), Second World War earthworks (NRHE 40604), and Upper Lode Weir (NRHE 48987). The weir was completed in August 1858 by Severn Commissioners. An archaeological

watching brief was undertaken by Cotswold Archaeological Trust in May 1995 in connection with the proposed works of a new fish pass at Upper Lode Weir. The investigation noticed no archaeological stratigraphy due to the wholesale removal of any archaeological potential during the proposed works of the weir. As such this asset is considered of negligible interest.

8.12.5 Based on the above, the area is considered of low archaeological significance.

#### Future Baseline

8.12.6 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site takes into account changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

#### Assumptions and Limitations

8.12.7 At the PEIR stage, various details regarding the proposed compensation measures at Upper Lode Weir

are not known. In particular the size of the work has not been fully identified which would impact on the archaeological finds and heritage assets to be included within the assessment, however, as discussed, the area is of low archaeological importance so the work would cause a negligible impact on the assets.

8.12.8 The study is based on a desk-based assessment only and no site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings present. The data used in this report have been derived from external sources, and it is presumed that any third-party information used is accurate.

8.12.9 The study has outlined the potential of archaeology in the area as low due to the lack of heritage assets in the surrounding area.

#### Likely Significant Effects

8.12.10 Based on the available information, the removal of Upper Lode Weir is not expected to result in any significant effects in relation to the historic environment.

#### Proposed Scope

8.12.11 Based on the above assessment, **Table 8-26** presents the historic environment impacts that are proposed to

be scoped out of requiring further assessment along with the rationale of further choice.

**Table 8-26: Summary of historic environment elements scoped in and out of assessment**

Potential Effect	Scoped IN or OUT	Justification
Potential impacts on assets and archaeological features from the proposed compensation measures at Upper Lode Weir.	OUT	The weir was completed in August 1858 by Severn Commissioners. In May 1995, an archaeological watching brief was undertaken by Cotswold Archaeological Trust for the proposed works of a new fish pass at the weir. The investigation noticed no archaeological stratigraphy due to the wholesale removal of any archaeological potential during the proposed works of the weir. As such, it is of low/negligible significance.

8.12.12 Therefore, it is proposed that the historic environment is scoped out of the ES.

## 8.13 Amenity and Recreation

### Introduction

- 8.13.1 This section considers the likely impact of the proposed compensation measures at Upper Lode Weir on community, recreational and residential receptors within the study area.
- 8.13.2 Recreational receptors include ProWs, promoted routes, cycle routes, LDWRs, open access land, bridleways, and any recreational facilities. The assessment considers likely impacts on access to recreational facilities as well as amenity impacts.
- 8.13.3 Amenity is the term used to describe the character or attractiveness of an area. Amenity can be affected when two or more environmental effects are experienced by the same receptor (e.g., a cycling route) with the potential to deter users of the receptor (e.g. cyclists). The following environmental effects are considered in the amenity assessment: landscape and visual effects, Traffic and transport effects, noise and vibration effects and air quality effects. Amenity

impacts are considered for residential, community and recreational receptors.

### Study Area

- 8.13.4 For the purposes of this assessment, the study area includes the Upper Lode Weir works boundary, plus a 500 m buffer.

### Baseline

#### Current Baseline

- 8.13.5 Environmental receptors considered in this assessment include residential properties, community facilities and recreational facilities including ProWs, Open Access Land, Public Open Spaces and Recreational sites.

#### *Residential receptors*

- 8.13.6 There are approximately five residential properties (Upper Lode Lock Cottages) within 500 m of the Upper Lode Weir works boundary.

#### *Community receptors*

- 8.13.7 There are no community receptors within 500 m of the Upper Lode Weir works boundary. Outside of the 500

boundary is Tewkesbury Community Hospital on A38 Barton Road, which is expected to attract vulnerable groups.

#### *Recreational receptors*

- 8.13.8 Recreational receptors include; four main ProWs of which one is immediately adjacent – ZTE10,11,12,13. Footpath ZTE11 runs parallel to the south of Healings Flour Mill and Warehouses, and thereafter parallel to the southern bank of River Severn and the Weir. Footpath ZTE10 branches off Footpath ZTE11, which is within 10 m of the existing weir, to meet with Footpath ZTE13 to the west of Severn Ham (within 100 m of the weir). Another recreational receptor within the 500 m buffer is Severn Ham SSSI and Upper Lode Angling Club.

#### Future Baseline

- 8.13.9 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the



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purposes of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

8.13.10 At the PEIR stage, specific details regarding the proposed compensation measures at Upper Lode Weir are not fully known or decided.

8.13.11 The current assumptions in relation to Amenity and Recreation effects are;

- The duration of the removal works will be short term and temporary (4 months); and
- All Open Access Land and Public Green Spaces will remain accessible; entry may require temporary diversion.

### Likely Significant Effects

#### Access to recreational receptors

##### *ProWs*

8.13.12 The onsite ProWs may be temporarily diverted or closed during the removal works, thus, access will be directly impacted. These will be reinstated once removal of the weir is complete.

#### *Recreational Facilities*

8.13.13 Upper Lode Angling Club is within 500 m of the Upper Lode Weir works boundary. During the removal of Upper Lode Weir, access to the angling club and surrounding blue space and green space will not be inhibited. There is the potential of environmental Aspects such as noise and visual impacts affecting species targeted by anglers during the removal works, however this is a temporary effect. The removal of the Upper Lode Weir will have an overall benefit for aquatic communities, increasing biodiversity which will increase recreational opportunities including birdwatching and fishing. The removal of Upper Lode Weir will have an overall benefit for aquatic communities, increasing biodiversity which will increase recreational opportunities including birdwatching and fishing.

#### *Open Access Land and Public Spaces*

8.13.14 There is an SSSI, Severn Ham (Tewkesbury), which is the parcel of land adjacent to eastern end of Upper Lode Weir. The intervention may improve freshwater biodiversity within and around this SSSI, benefitting aquatic communities and in turn creating recreational benefits for bird watchers and other recreational activities. Access to this SSSI will not be impeded during the removal of the weir or operation.

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### Access to community receptors

8.13.15 There are no community receptors located within 500 m of the Upper Lode Weir works boundary.

### Amenity Effects

8.13.16 Amenity effects can arise due to a combination of two or more significant effects from air quality, noise and vibration, landscape and visual and transport.

8.13.17 Air quality and transport have been scoped out of the assessment. However, amenity effects could arise on recreational receptors because of the combined effects of landscape and visual and noise and vibration.

### Proposed Scope

8.13.18 A summary of the amenity and recreation elements scoped into and out of further assessment is outlined in **Table 8-27**.

**Table 8-27: Summary of amenity and recreation elements scoped in and out of the assessment.**

Potential Effect	Scoped IN or OUT	Justification
Access to recreational receptors	OUT	Temporary diversions or closures to ProWs will be reinstated once removal of the weir is complete. This will not be a long-term change and access for the local community will still be maintained. Upper Lode Angling Club may experience a minor impact from noise affecting species targeted by anglers during the removal of the weir, however this is deemed not significant. During operation, there could be benefits for those using the river for recreational activities due to increased freshwater biodiversity through benefits to aquatic communities.
Access to community receptors	OUT	There are no community receptors within the study area. Thus, no significant effects anticipated.
Amenity effects	IN	Amenity effects could arise on recreational receptors because of the combined effects of landscape and visual and noise and vibration.

## 8.14 Population and Human Health

### Introduction

- 8.14.1 This section considers the impact of the proposed compensation measures at Upper Lode Weir on population and human health.
- 8.14.2 The WHO defines human health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”.
- 8.14.3 Health effects can be direct (e.g., air pollution resulting in respiratory problems) or indirect (e.g. reduced community interaction due to increased traffic resulting in adverse effects on well-being). Similarly, prolonged environmental effects (direct effect) can result in changes to quality of life (indirect effects). The assessment follows a source-pathway-receptor model (as shown in **Table 8-28**), only reporting effects through which there is a clear pathway between the source and the receptor and using evidence to support the conclusions.

**Table 8-28: Source-Pathway-Receptor Model**

Source	Pathway	Receptor	Plausible Health	Explanation
x	✓	✓	No	There is not a clear source from where a potential health impact could originate
✓	x	✓	No	The source of a potential health impact lacks a means of transition to a population
✓	✓	x	No	Receptors that would be sensitive or vulnerable to the health impact are not present
✓	✓	✓	Yes	Identifying a source, pathway and receptor does not mean a health impact is a likely significant effect. The health impact is assessed qualitatively based on the available evidence and through the application of

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Source	Pathway	Receptor	Plausible Health	Explanation
				professional judgement.

8.14.4 The assessment of impacts on human health relies on the effects reported by Aspect chapters to identify potential human health impacts. The relevant chapters have been referred to as the ‘constituent aspects’ and the effects they report are termed ‘health determinants’.

8.14.5 Health determinants can be defined as the range of personal, social, economic, and environmental factors that influence health status. Where effects are concluded as significant at a constituent aspect level within the PEIR, these have been considered within the assessment as having potential for human health effects. Where effects are concluded not to be significant at a constituent aspect level within the PEIR, these have not been considered in the health assessment. Constituent aspects considered in this assessment include:

- Noise and Vibration;
- Soils and Land use;
- Geology and Land Contamination;

- Amenity and Recreation; and
- Landscape and Visual.

### Study Area

8.14.6 For the assessment of impacts on population and human health, the study area will be defined by the scope of the relevant constituent aspect study areas.

### Baseline

#### Current Baseline

8.14.7 Baseline information relevant to population and human health is outlined in the relevant constituent Aspects as follows:

- The location and type of community and recreational facilities – Recreation and Amenity;
- The location of green / open space – Soils and Land Use and Recreation and Amenity;
- The spatial characteristics of the transport network and usage in the area, including the surrounding road network, PRow (including bridleways), cycle ways, non-designated public routes and public transport routes –Transport;
- AQMAs and ambient air quality levels – Air Quality;

- Areas recognised as being sensitive to noise (e.g., noise important areas, noise management areas) and the ambient noise environment – Noise and Vibration;
- Sources and pathways of potential pollution (e.g., land/water contamination) – Soils and Land Use and Geology and Land Contamination; and
- Landscape amenity – Landscape and Visual.

### Future Baseline

8.14.8 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

8.14.9 At the PEIR stage, specific details regarding the proposed compensation measures at Upper Lode Weir are not fully known or decided.

### Likely Significant Effects

8.14.10 The following constituent Aspects have been scoped into the assessment and therefore have the potential to give rise to impacts on human health:

- Landscape and Visual;
- Noise and Vibration;
- Soil and Land Use;
- Amenity and Recreation; and
- Geology and Land Contamination.

### Proposed Scope

8.14.11 A summary of the population and human health scope for further assessment is outlined in **Table 8-29**.

**Table 8-29: Summary of Population and Human Health elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Potential adverse or beneficial Population and	IN	It is proposed that the ES includes a detailed assessment of potential population and human health effects that could occur during the removal of Upper Lode Weir. At

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Potential Effect	Scoped IN or OUT	Justification
Human Health effects		this stage, it is unclear whether potential significant population and human health effects will be realised, thus, with the likelihood of the scoped in constituent aspects giving rise to potential impacts on human health, the full assessment is required.

## 8.15 Climate Change

### Introduction

- 8.15.1 The aim of this section is to consider the likely significant effects of the proposed compensation measures at Upper Lode Weir on anthropogenic climate change (i.e., through GHG emissions).
- 8.15.2 Under Schedule 4 Paragraph 5(f) of the 2017 EIA Regulations, an ES must provide “a description of the likely significant effects of the development on the environment” resulting from “the impact of the project on climate (for example the nature and magnitude of GHG emissions) and the vulnerability of the project to climate change”. Although the Regulations require consideration of the vulnerability to climate change, as

the proposals include removal of infrastructure, there is no physical asset remaining, other than reinstating the riverbank, which could be vulnerable to climate change. Therefore, no further consideration of this aspect is included within this section and is scoped out from the ES.

### Study Area

- 8.15.3 For the assessment of the impacts of GHG emissions on climate, the Upper Lode Weir works boundary is considered appropriate. The study area includes the GHG emissions associated with the proposed compensation measures at Upper Lode Weir to determine the impact on the climate. The main GHGs relevant to the removal of Upper Lode Weir are CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O. GHG emissions are reported as CO<sub>2</sub> equivalents (CO<sub>2</sub>e), which accounts for the different GWP of each GHG, relative to CO<sub>2</sub>. Other GHGs which are normally considered include hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride, but these not anticipated to be material in the nature of the activities.

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## Baseline

### Current Baseline

8.15.4 Baseline emissions are defined as emissions that occur without the project. For the area of the Upper Lode Weir works boundary there are zero emissions associated with the current operation of the river. Therefore, no emissions are associated with the 'use' of this land prior to the removal of the Upper Lode Weir.

### Future Baseline

8.15.5 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site accounts for changes that are expected to have been made by the time Hinkley Point C is operational, including because of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

## Assumptions and Limitations

8.15.6 At the PEIR stage, specific details regarding the proposed compensation measures at Upper Lode Weir are not fully known.

## Likely Significant Effects

8.15.7 GHG emissions associated with the removal of the weirs in the form of vehicle emissions from the transport of workers and plant to and from Upper Lode Weir, consumption of fuel for the removal activities and wastes generated are expected to be minimal due the relatively small size of the weir (5460 m<sup>3</sup>). The GHG emissions would be negligible in comparison to the UK's carbon budgets and represent a not significant adverse effect on climate.

8.15.8 It is anticipated that there would be no GHG emissions on completion of the works to remove the weir.

## Proposed Scope

8.15.9 Based on the above assessment, **Table 8-30** presents the potential impacts on climate change of the proposed compensation measures at Upper Lode Weir and shows they are expected to be negligible and not significant and provides a rationale for being scoped out of further assessment.

**Table 8-30: Summary of climate change elements scoped in and out of the assessment**

Potential Impact	Scoped IN or OUT	Justification
Potential GHG emissions from the removal of Upper Lode Weir	OUT	GHG emissions during the weir removal would be negligible in comparison to the UK's carbon budgets and would be a not significant adverse effect.
Potential GHG emissions from the operation of the proposed compensation measures at Upper Lode Weir	OUT	It is unlikely that there would be any GHG emissions following the removal of Upper Lode Weir.
Vulnerability to climate change	OUT	There is no physical asset remaining which would be vulnerable to climate change.

8.15.10 Therefore, it is proposed climate change is scoped out of requiring further detailed assessment in the ES.



## 9. Weirs on the River Lugg

### 9.1 Conventional Waste Management

#### Introduction

9.1.1 This section considers the generation and management of conventional waste resulting from the proposed compensation measures at the weirs on the River Lugg. It does not include radioactive waste and materials management.

9.1.2 The aim of this section is to:

- Evaluate potential activities associated with the removal of the weir and operation of the proposed compensation measures at the weirs on the River Lugg and identify the activities that could lead to significant environmental effects.
- Identify relevant receptors which could potentially be impacted by conventional waste management associated with the proposed compensation measures at the weirs on the River Lugg.
- Outline a proposed scope and methodology for the assessment of potential conventional waste management impacts of the proposed compensation measures at the weirs on the River Lugg on the environment within the ES.

#### Study Area

9.1.3 As defined in *IEMA guide to: Materials and Waste in Environmental Impact Assessment*, two geographically different study areas should be determined. These have been defined as:

- Project Study Area, which comprises all land contained within a site boundary. Within these areas waste is generated and managed, including any areas identified for temporary uses such as temporary waste stockpiles, accesses, site compounds and other enabling works. In the context of this chapter, the Project Study Area covers the River Lugg weirs works boundary (refer to **paragraph 1.4.6 in Chapter 1**) and is located in Herefordshire, on the River Lugg.
- Expansive Study Area provides the boundary for appreciation of the capacity of relevant waste management infrastructure, including remaining landfill void. This is considered on a regional basis, within one or more regions as appropriate. The weirs on the River Lugg are located in the West Midlands region, which in the context of this chapter comprises Herefordshire, Shropshire, Staffordshire, Warwickshire, West Midlands (metropolitan county) and Worcestershire.

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## Baseline

### Current Baseline

- 9.1.4 In the context of this chapter, sensitive receptor is landfill capacity for waste, as detailed in *IEMA guide to: Materials and Waste in Environmental Impact Assessment*.
- 9.1.5 Information provided in *Waste Management 2022 in West Midlands: Data Tables* allows the assessment of the opportunities for waste arisings to be transferred, treated, recycled, recovered, or disposed as appropriate in the region, if they cannot be reused, recycled or otherwise recovered on-site.
- 9.1.6 Whilst annual capacity data are published by the Environment Agency for both landfill and incineration facilities at the national, regional, and sub-regional level, no annual capacity data are published by the Environment Agency for waste transfer, treatment or recycling sites. Only annual throughput is published for these facilities. The total annual throughput or capacity reported is detailed in **Table 9–1**.

**Table 9–1: Annual permitted throughput or capacity of transfer, treatment, recycling and incineration in West Midlands, 2022**

Site type	West Midlands (000s tonnes)
<b>Transfer (annual throughput)</b>	
Hazardous waste transfer stations	1,041
Household, industrial, commercial waste transfer stations	2,652
Non-biodegradable waste transfer stations	100
<b>Treatment and metal recycling (annual throughput)</b>	
Material recovery	737
Physical treatment	3,153
Physico-chemical treatment	5,895
Composting	468
Biological treatment	1,894
Metal recycling	1,632
<b>Incineration (annual capacity)</b>	
Co-incineration of non-hazardous waste	409
Hazardous waste	7
Municipal and/or industrial & commercial incineration	1,920

Site type	West Midlands (000s tonnes)
Biomass/waste wood incineration	116

9.1.7 For wastes which cannot be reused, recycled or otherwise recovered, disposal to landfill will be required. The total remaining landfill capacity in 2022, as presented in **Table 9–2**, shows there are opportunities to dispose waste arisings from the Proposed compensation measures within the region.

**Table 9–2: Landfill capacity available in West Midlands, 2022**

Landfill type	South-West (000s tonnes <sup>1</sup> )
Hazardous merchant landfill	-
Hazardous restricted landfill	803
Non-hazardous landfill with SNRHW cell <sup>2</sup>	3,384
Non-hazardous landfill	20,221
Non-hazardous restricted landfill	-
Inert landfill	12,905
<b>Total</b>	<b>37,312</b>

1 Converted from cubic metres through the adoption of the following conversion factors: inert landfills 1.5 tonnes/m<sup>3</sup>, non-hazardous landfills 0.83 tonnes/m<sup>3</sup> and hazardous landfills 1.5 tonnes/m<sup>3</sup>.

Landfill type	South-West (000s tonnes <sup>1</sup> )
2 Some non-hazardous sites can accept some Stable Non-Reactive Hazardous Wastes (SNRHW) into a dedicated cell, but this is usually a small part of the overall capacity of the site.	

9.1.8 No conventional waste generation and management has been identified post-removal of the weir. It is therefore proposed they are scoped out.

### Future Baseline

9.1.9 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline but the treatment and disposal tables will be updated with the latest available data.

### Assumptions and Limitations

9.1.10 At the PEIR stage, various details regarding the proposed compensation measures at the weirs on the

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River Lugg are not known. In particular, the expected waste types, waste generation estimates, and removal timeline have not been identified.

- 9.1.11 The vast majority of wastes assumed to be produced during removal of the weirs on the River Lugg will be excavated waste from earthworks, site preparation/clearance and the removed weir itself. The design is at concept stage and as a result there is no information on quantities of waste generated or the proposed management. It can be expected, however, that the Proposed compensation measures at the weirs on the River Lugg will aim to reuse all excavations within the site, and that the removed weirs will be classified as demolition waste and recycled wherever possible.
- 9.1.12 Organic wastes may be produced from the site clearance and small amount of municipal-type solid waste associated with removal workers can be expected, such as food waste and packaging. A large proportion of this solid waste is likely to be suitable for reuse, recycling, or other recovery, although a proportion may also require disposal to landfill.
- 9.1.13 It has been assumed that the River Lugg weirs works boundary, and therefore the excavated and demolition material is not contaminated. However, if this is not the

case any contaminated material would be removed for treatment and/ or disposal at an appropriate facility.

### Likely Significant Effects

- 9.1.14 Conventional waste generation is predicted to be minimal, as the expected earthworks excavations can possibly be reused on site and the amount of demolition waste would only be the quantity associated with the weir removal. The removal itself is a relatively small development and would require a relatively small workforce on site – so the municipal waste generation is expected to be negligible. It is unlikely that the amount of waste required to be disposed of would alter the regional capacity in a significant way. Notwithstanding, this should be analysed and confirmed in the ES, especially if excavation material cannot be reused on site.
- 9.1.15 At the time of writing this report, no significant effects are expected, based on the current scope and design information.

### Proposed Scope

- 9.1.16 It is proposed that the ES includes an assessment of potential conventional waste management effects that could occur during the removal of the weirs on the River

Lugg and disposal of waste material. A summary of the proposed scope is outlined in **Table 9–3**.

**Table 9–3: Summary of conventional waste management elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Removal: Potential reduction in the remaining landfill void and impacts on the capacity of waste management facilities in the region	IN	The vast majority of the expected waste tonnage would be from the demolition of the weir itself, assumed to be built from rock and concrete. Opportunities to recycle/recover this type of waste (CDE) exists in the region, however, waste types and estimated tonnages have not been detailed and may be subject to change as the design develops. Significant effects are not expected, nonetheless a waste assessment should be conducted where potential effects of waste can be eventually scoped out, when there is more information available.

Potential Effect	Scoped IN or OUT	Justification
Operation: Potential reduction in the remaining landfill void and impacts on the capacity of waste management facilities in the region	OUT	No waste generation and management is expected/planned at the moment during the operational phase. Therefore, it is proposed for operational effects to be scoped out.

- 9.1.17 In general, the assessment of conventional waste management associated with the removal of the weirs on the River Lugg shall follow the guidance set out in *IEMA guide to: Materials and Waste in Environmental Impact Assessment*.
- 9.1.18 Current and likely future baseline conditions for waste during the removal period will be considered, and include information on waste management capacity, including remaining landfill void space and annual throughputs of waste transfer, waste treatment, metal recycling and waste incineration facilities. Estimated landfill capacity alteration caused by waste generated by the removal of the weirs will also be included, as detailed in IEMA guidance.

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9.1.19 Waste hierarchy, circular economy principles and sustainable approach to waste management would be applied. Where waste is reused on site, *Definition of Waste: Code of Practice* would be considered.

## 9.2 Socio-economics

9.2.1 The section considers the likely impact of the proposed compensation measures at the weirs on the River Lugg on socioeconomic receptors within the study area during both the removal of the weirs and operational stages.

9.2.2 The socioeconomic assessment considers employment effects and economic investment in the region as a result of the proposed compensation measures at the weirs on the River Lugg. The assessment also considers disruption to commercial receptors including businesses, agricultural land, and properties.

### Study Area

9.2.3 Two study areas have been proposed for the assessment as follows:

- The study area for the assessment of disruption to commercial receptors is 500 m from the River Lugg weirs works boundary. This has been

selected as it is considered to represent the likely limit of direct effects of removal of the weirs or operation on any commercial receptors.

- The study area for the assessment of effects on employment and economic investment is Herefordshire District Council Area. This wider study area is intended to encompass the area within which significant effects on employment and the local economy could occur.

### Baseline

#### Current Baseline

9.2.4 The baseline data is based on desk-based research of publicly available sources and focuses on commercial receptors, employment and economic investment within the study area denoted above. Key receptors include commercial properties including agricultural businesses, the local workforce population and the local economy.

#### *Commercial properties and Land Use*

9.2.5 The River Lugg weirs are surrounded by agricultural land, comprised largely of Grade 3 and Grade 4 soils, with some Grade 2 soils recorded on/near Coxall Weir.

9.2.6 There are no commercial properties located within 500 m of all the weirs along the River Lugg.

#### *Employment and economic investment*

9.2.7 In Herefordshire District Council area, the unemployment rate is 2.6 % with an employed workforce of 26,000<sup>296</sup>. This is below the average for England which has an average unemployment rate of 4.3 %<sup>297</sup>.

9.2.8 The local economy for the purposes of this assessment comprises the Herefordshire District Council Area. This area had an annual GVA of £3,337 million in 2014<sup>298</sup>.

#### **Future Baseline**

9.2.9 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change

application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

#### **Assumptions and Limitations**

9.2.10 At the PEIR stage, specific details regarding the proposed compensation measures at the weirs on the River Lugg are not fully known/ decided.

9.2.11 The current assumptions in relation to socioeconomic effects are:

- Removal of the weirs is expected to be temporary and short term (4 months); and
- No agricultural land will be permanently acquired during removal.

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<sup>296</sup> Herefordshire Council. (2022). Employment and economic activity. [\[Online\]](#) Accessed 6 December 2023.

<sup>297</sup> Office for National Statistics (2023) Unemployment rate (aged 16 and over, seasonally adjusted): %. [\[Online\]](#) Accessed 6 December 2023.

<sup>298</sup> Office for National Statistics (2014) GVA UKG11 Herefordshire Raw total £m. [\[Online\]](#) Accessed 6 December 2023.

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## Likely Significant Effects

### Disruption to commercial receptors

- 9.2.12 There are no commercial receptors within the study area. Therefore, there is no potential for disruption effects.

### Employment and economic investment in the region

- 9.2.13 Employment effects from the proposed compensation measures at the weirs on the River Lugg would arise through direct employment in removal-related roles, and indirectly through employment required to support the direct labour requirements. This is assessed within the context of the overall labour market. It is assumed that labour requirements for the removal of the weirs would be minimal and there would be no permanent employment during operation. Given the large size of the local workforce within the Herefordshire District Council Area, no socio-economic effects regarding workforce are anticipated.
- 9.2.14 Spending on the proposed compensation measures at the weirs on the River Lugg include land purchase, aggregate materials, machinery and other capital costs. Given the scale of the proposed compensation measures at the weirs on the River Lugg in relation to

the size of the regional economy, even if 100 % of direct capital expenditure on the proposed compensation measures at the weirs on the River Lugg was captured in the local area, this would represent less than 0.01 % of the total GVA. Therefore, the benefit to the economy is likely to be of minor significance.

### Land Use

- 9.2.15 During removal, temporary access to the weirs on the River Lugg is required via the B4361, the road north of the River Lugg and the unnamed road that runs parallel to Oakfields Farm which connects to the B4360. A temporary route may be required to directly access the weirs on the River Lugg through agricultural land. Similarly, ongoing rights to access the weirs may also be required through agricultural land for monitoring purposes. Temporary uptake of land will occur during removal to establish a site compound.
- 9.2.16 There is potential to temporarily compromise the agricultural productivity within the local area, through temporary uptake of agricultural land however, given that removal is likely to last 4 months and the land required makes up a small proportion of the overall land holding, this is not expected to be significant.



## Proposed Scope

9.2.17 It is proposed that socioeconomics are scoped out of the full assessment as summarised in **Table 9-4**.

**Table 9-4: Summary of Socioeconomic elements scoped in or out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Disruption to commercial receptors	OUT	There are no nearby commercial receptors for any of the weirs on the River Lugg, thus, disruption effects are anticipated to be negligible.
Employment and economic investment in the region	OUT	Given the large size of the local workforce within the Herefordshire Council Area, the strength of the regional economy and the low level of direct labour requirements to support the proposed compensation measures at the weirs on the River Lugg, no socio-economic effects are anticipated.
Commercial and Agricultural Land Use	OUT	Give that no permanent uptake of agricultural or commercial land is anticipated, and the proposed site compound and bank protection will

Potential Effect	Scoped IN or OUT	Justification
		only require temporary uptake of land, land use effects will be negligible.

## 9.3 Transport

### Introduction

9.3.1 This section describes the current baseline relating to transport provisions to access the weirs on the River Lugg and the potential transport impacts associated with the proposed compensation measures at the weirs on the River Lugg. This section will conclude by outlining the proposed scope of works that will inform the final EIA. Good practice in managing transportation impacts is considered throughout the discussions in this section.

### Study Area

9.3.2 Three weirs that are located along the River Lugg are scoped for removal as part of the compensation measures for Hinkley Point C.

9.3.3 Eyton Weir and Coxall Weir are accessed to the via the unnamed road that runs from Eyton to the west to B4361 North Road to the east. B4361 North Road forms part of Herefordshire Council’s Strategic Network which is utilised by HGVs.

The A49 forms part of the SRN, which is located approximately 1 mile away from the junction of the unnamed road with the B4361 North Road. It would be accessed by construction vehicles by going south along the B4361 corridor, then going east along the A44 corridor to access the A49.

9.3.4 Mousenatch Weir is located further west along the River Lugg and is accessed from the unnamed road that runs parallel to Oakfields Farm which connects to the B4360. Going northwest, the corridor is approximately 1 mile in length between this junction and the A4110, which forms part of Herefordshire Council’s Strategic Network. To thereafter access the SRN, construction vehicles would travel south along A4110 for approximately 3 miles and then turn left onto the A44 to travel eastbound towards the A49.

9.3.5 Nearby the weirs, there are PRowS located between the unnamed road and each side of the River Lugg.

## Baseline

### Current Baseline

9.3.6 For the two weirs to the east along River Lugg, construction vehicles would have to travel from the unnamed road through the farmland to access the weirs.

9.3.7 The section of the B4360 corridor which is used to access Mousenatch Weir is a single carriageway with a 30-mph speed limit, which changes to 40 mph when meeting the A4110 corridor to its west, and to 60 mph to its east and continuing south.

9.3.8 A number of farms are located within the vicinity of the weirs, namely Broad Farm, The Mill and Coxall Farm.

9.3.9 Footpath EY5 crosses the river between Gilbert’s Weir and Mousenatch Weir. Footpath KL6 runs adjacent to the river, being approximately 85 m south-west of the weir.

9.3.10 Moreover, Footpath KL6 falls within the potential site extent for Mousenatch Weir. The footpath’s current alignment intersects the River Lugg weirs works boundary and the potential access route from the public highway to the weir.

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9.3.11 Footpath KL1 runs parallel to B4360 Longford and is located off the carriageway.

9.3.12 Kingsland C of E Primary School is located off B4360 North Road. This is considered a sensitive receptor as children and their carers interact with the road to access the school during the core drop-off and pickup hours, where conflicts with other road users are most likely to occur.

**Future Baseline**

9.3.13 Due to the low level of traffic anticipated to be generated by the removal of the weirs and operation of the proposed compensation measures for the concerned weirs along the River Lugg and the low level of existing development and population in the study area, we will only consider the current baseline for any assessment of any impacts of the removal of the weirs and operational traffic. No future baseline will be considered.

**Assumptions and Limitations**

9.3.14 Through a high-level review of the size of the River Lugg weirs works boundary, no more than a peak of 20 HGV movements per day (10 HGVs) will be required to travel to the weirs on the River Lugg. Moreover, it is assumed that a maximum of 20 LGV movements would

be required for the proposed compensation measures at the weirs on the River Lugg.

9.3.15 Whilst these caps have been provisionally identified, extensive stakeholder engagement and design developments will be needed to estimate the actual numbers of construction vehicles to the weirs on the River Lugg. Moreover, it should be noted that as these construction vehicle limits will only be reached for a limited period, it is expected that daily construction vehicle movements will be lower for the majority of the programme for removal.

9.3.16 These peak daily movements account for the movement of plant, materials, and equipment to and from the weirs on the River Lugg where necessary.

9.3.17 The day-to-day operation and maintenance of the proposed compensation measures at the weirs on the River Lugg will generate a negligible volume of LGVs, averaging as less than one movement per day annually, meaning that significant impacts during operation can be scoped out of the assessment.

9.3.18 The programme will be designed to minimise the impacts of construction vehicles. The implementation of a CEMP and a CTMP will ensure that good practice is applied during the works.

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- 9.3.19 As outlined for the Upper Lode Weir, a maximum HGV concentration threshold 15 % is considered on affected freight routes, and a 10 % HGV concentration threshold is considered on other main roads.
- 9.3.20 DfT data shows that 91 % of minor roads had HGV concentrations of 5 % of all traffic flows or less in South-West England and West Midlands in 2022, the regions which the compensation measures are located in. 5 % is therefore being considered the maximum concentration of HGVs on the affected road network's other roads (including B-roads).
- 9.3.21 The impacts of the removal activity will not be considered in combination with other works associated with Hinkley Point C development site and compensation measures. This is because the weirs on the River Lugg fall outside of the geography of the local road networks affected by other works, meaning that there will be no substantial interaction with them to generate a cumulative effect. This is also covered in **Volume 4** of this PEIR.
- 9.3.22 DfT traffic count data is not available along the access roads between the main site area and the SRN.

## Likely Significant Effects

- 9.3.23 The immediate area around the two weirs to the east along the River Lugg includes Broad Farm, The Mill and Coxall Farm, along with a small number of residential properties. Access to these receptors will be maintained, with necessary restrictions on construction vehicles being implemented to minimise disruption to them.
- 9.3.24 To access Mousenatch Weir to the west along the River Lugg, the B4360 provides the most direct route from Herefordshire Council's Strategic Network. Kingsland C of E Primary, which is accessed directly from this corridor, would be affected if construction vehicle movements along the corridor clash with the times where pupils are travelling along it as non-motorised users. To eliminate risks to their safety during these periods of high footfall, it is expected that the CTMP will prohibit HGV movements during these time windows. It is expected that this could reduce impacts from moderate to minor. Closures or diversions to any of the affected PRoW may require a Public Path Order. These could generate a minor to moderate adverse impact depending on the extent of severance the closures and diversions will cause. This will need to be considered for Footpath KL6 which would otherwise be severed by the potential construction route for Mousenatch Weir, which conflicts

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with the movement patterns of pedestrians who use the footpath.

- 9.3.25 The unnamed road used to access the two weirs to the east is formed largely of narrow single tracks, meaning that conflicts with oncoming traffic could occur during busier periods. It is expected that HGV movements will be restricted to occur outside of the peak periods. This could generate a moderate adverse impact at most.
- 9.3.26 DfT provides average daily traffic volume data at points along the affected road network between the site’s access point and the SRN. The B4360 count point has data from 2019, whilst the other count points have data from 2022.
- 9.3.27 The count point on the B4360 between Cobnash and B4360 Longford generates around a total of 1,400 daily two-way vehicle movements per day, whilst the countpoint on the A4110 between B4360 North Road and B4529 generates around 2,600. The count point A44 corridor between A4110 and B4360 Cholstrey Road generates around 5,600 daily two-way vehicle movements per day, whilst the count point on A44 Barons’ Cross Road between B4360 Cholstrey Road and A44 Bargates generates over 16,200.
- 9.3.28 At the count point along the B4360 corridor, the additional number of HGVs remains manageable,

equating to one HGV movement per hour in each direction. A relative 76.9 % increase in HGVs is visible on the grounds that there is a very low level of existing HGVs. Nonetheless, the overall percentage of HGVs at this point would increase from 1.9 % to 3.3 %, which remains a very low level of HGV traffic. Relative increases in HGV concentrations are no greater than 10 % at all other count points, with the total percentages of HGVs increasing by less than a percentage point.

- 9.3.29 The impacts of HGVs on existing traffic levels are summarised in **Table 9-5**. The percentage figures are rounded to the nearest whole number.

**Table 9-5: Impacts of construction HGVs for River Lugg Weirs (maximum daily movements)**

Countpoint location	Current HGVs (DfT 2022)	Construction HGVs	Total HGVs with construction HGVs	HGV % with construction peak	% Increase in HGVs
B4360 between Cobnash and B4360 Longford	26	20	46	3 %	77 %

Countpoint location	Current HGVs (DfT 2022)	Construction HGVs	Total HGVs with construction HGVs	HGV % with construction peak	% Increase in HGVs
A4110 between B4360 North Road and B4529	217	20	237	9 %	9 %
A44 between A4110 and B4360 Cholstrey Road	556	20	576	10 %	4 %
A44 Barons' Cross Road between B4360 Cholstrey Road and A44 Bargates	779	20	799	5 %	3 %

9.3.30 The maximum number of LGV movements is the same as those identified for HGVs. Relative increases are slight, being 11.8 % or less at the selected count points. The proportion of LGVs as a percentage of all traffic volumes increases to a negligible extent, being no greater than 20 % at any of the count points.

9.3.31 The impacts of LGVs on existing traffic levels is summarised in **Table 9-6**. The percentage figures are rounded to the nearest whole number.

**Table 9-6: Impacts of construction LGVs for River Lugg Weirs (maximum daily movements)**

Countpoint location	Current LGVs (DfT 2022)	Construction LGVs	Total LGVs with construction LGVs	LGV % with construction peak	% Increase in LGVs
B4360 between Cobnash and B4360 Longford	169	20	189	13 %	12 %
A4110 between B4360 North Road and B4529	509	20	529	20 %	4 %
A44 between A4110 and B4360 Cholstrey Road	975	20	995	18 %	2 %
A44 Barons' Cross Road between B4360 Cholstrey Road and A44 Bargates	2513	20	2533	16 %	1 %

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9.3.32 It is anticipated that these maximum levels of construction movements would occur sporadically over a short duration.

### Proposed Scope

9.3.33 Based on the above assessment, **Table 9-7** presents the potential transport impacts that are proposed to be scoped in and out of requiring further assessment, along with justifications.

**Table 9-7: Summary of transport impacts scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Traffic impacts during removal	IN	It is expected that traffic impacts will be negligible. However, the CTMP will likely be required as a planning obligation. It will include estimates of the total vehicle movements to the weirs on the River Lugg relating to the staff, equipment, and materials. This will enable the impacts on the road network to be assessed at their peak levels.

Potential Effect	Scoped IN or OUT	Justification
Traffic impacts during operations	OUT	The day-to-day operation of the proposed compensation measures at the weirs on the River Lugg will generate a negligible volume of LGVs, averaging as less than one movement per day annually. This is therefore not considered significant to warrant a detailed assessment in the EIA.
Sensitive Receptors	IN	The implementation of a CTMP will likely mitigate these impacts. The CTMP will outline necessary limits and restrictions on construction vehicle movements and speeds, which are expected to include prohibitions during periods where conflicts with vulnerable travellers could occur.
Pedestrians, cyclists and horseriders	IN	One on-site bridleway is expected to be directly affected due to on-site access during removal. Access is expected to sever the route, warranting temporary or potentially permanent closures and diversions.

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## 9.4 Noise and Vibration

### Introduction

9.4.1 The aims of this section are to:

- Evaluate potential activities associated with the proposed compensation measures at the weirs on the River Lugg and identify those activities which could lead to significant effects.
- Identify the relevant human receptors which could potentially be impacted by noise and vibration associated with the proposed compensation measures at the weirs on the River Lugg.
- Outline a proposed scope and methodology for the assessment of potential noise and vibration impacts within the ES.

9.4.2 The potential effects on human receptors (i.e., dwellings and other noise-sensitive locations used by humans) are considered within this section. Effects of noise and vibration on other receptor types are considered in the following sections:

- **Section 9.2 Socio-economics;**
- **Section 9.13 Amenity and Recreation;** and
- **Section 9.14 Population and Human Health.**

### Study Area

9.4.3 Initial Study Areas have been defined for each aspect of the noise and vibration assessment. These areas are defined in terms of distances from the relevant part of the development. These distances have been selected, using professional judgement, based on:

- Initial estimates of noise/vibration levels likely to be generated during the removal of the weirs and operation of the proposed compensation measures at the weirs on the River Lugg.
- Noise/vibration levels thresholds below which effects are unlikely to occur.
- Study Areas defined in relevant guidance documents.

9.4.4 The Study Area selected for noise associated with the removal of the weirs is 500 m from any area where removal activities could take place, including site compounds and laydown areas. At the PEIR stage, it assumed that these activities could occur anywhere within the River Lugg weirs works boundary.

9.4.5 The Study Area for the assessment of vibration associated with the removal of the weirs is 100 m from the River Lugg weirs works boundary, as there is a negligible risk of effects occurring beyond this distance.



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9.4.6 For the assessment of noise and vibration from road traffic during removal and operation, the initial Study Area is based on identifying where the proposed compensation measures at the weirs on the River Lugg would lead to a change in traffic flows on the road network which would cause a change in the Basic Noise Level of 1dB LA10,18hr or greater, based on guidance set out in DMRB LA 111.

### Baseline

#### Current Baseline

9.4.7 Based on a desktop review of the local area, the baseline noise environment is likely to be influenced by local wildlife, agricultural activities, and traffic on the B4361 North Road and the surrounding road network. In general, the baseline noise climate at the nearest residential receptors is expected to be typical of a rural location, with low background levels.

9.4.8 The key receptors and the approximate distance to the River Lugg weirs works boundary are summarised in **Table 9-8**.

**Table 9-8: Noise and vibration receptors**

River Lugg weirs	Receptor Description	Approximate distance to River Lugg weirs works boundary (m)
Coxall Weir	Coxall Farm	370
	Coals View Cottage	535
Eyton Weir	Coxall Farm	500
	Coals View Cottage	500
Mousenatch Weir	Residential	770
	Residential	530

#### Future Baseline

9.4.9 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

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## Assumptions and Limitations

- 9.4.10 At the PEIR stage, various details regarding the proposed compensation measures at the weirs on the River Lugg are not known. In particular, the likely plant and equipment required for the removal of the weirs have not been identified, and the programme of works is not defined.
- 9.4.11 The identification of receptors has been undertaken using aerial photography, and the status of all potential sensitive receptors has not been verified.
- 9.4.12 Professional experience has been used during the evaluation of potential noise and vibration effects.

## Likely Significant Effects

- 9.4.13 There are no activities that are expected to occur during the long-term operation of the proposed compensation measures at the weirs on the River Lugg that could give rise to significant noise or vibration effects. Therefore, it is proposed to scope out the assessment of operational noise and vibration from the ES.
- 9.4.14 The removal of the weirs on the River Lugg is expected to involve the use of inherently noisy plant and

equipment, with the potential to cause temporary noise disturbance at local receptors.

- 9.4.15 As residential receptors are located within the adopted Study Areas for removal, it is considered that the level of noise at receptors during the removal of the weirs could give rise to significant noise effects.
- 9.4.16 BS 5228-1 refers to a period of 10 days as a temporal threshold above which significant effects due to noise associated with the removal of the weirs might be experienced. The removal activities could occur over a period greater than 10 days. Therefore, it is considered that the duration of noise at receptors during the removal of the weirs could give rise to significant noise effects.
- 9.4.17 The daily flows of construction traffic vehicles are likely to be below the DMRB screening criteria for noise effects. It is not considered that the expected volume of construction traffic on public highways has the potential to cause temporary noise effects.

## Proposed Scope

- 9.4.18 Based on the above assessment, **Table 9-9** presents the potential noise and vibration effects that are proposed to be scoped out of requiring further assessment, along with the rationale.

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**Table 9-9: Summary of noise and vibration elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Potential noise and vibration effects during operation of the proposed compensation measures at the weirs on the River Lugg.	OUT	There are no activities expected to occur during the operation of the proposed compensation measures at the weirs on the River Lugg that could give rise to significant noise or vibration effects.
Potential noise effects due to emissions from site plant and machinery.	IN	The removal of the weirs on the River Lugg is expected to involve the use of inherently noisy plant and equipment. Temporary noise disturbance could occur at local receptors located within the Study Area for noise associated with the removal of the weirs.
Potential vibration effects due to emissions from site plant and machinery.	OUT	No receptors are within the Study Area for vibration associated with the removal of the weirs.
Potential noise and vibration	OUT	The construction traffic flows are likely to be less than the DMRB

Potential Effect	Scoped IN or OUT	Justification
effects due to emissions from construction traffic off-site.		screening criteria: Therefore, the associated potential effects would not be likely to cause significant effects.

- 9.4.19 It is proposed that the ES includes a detailed assessment of potential noise and vibration effects that could occur during the removal of the weirs on the River Lugg.
- 9.4.20 In general, the assessment of noise and vibration associated with removal activities shall follow the guidance set out in BS 5228-1 and BS 5228-2.
- 9.4.21 The selected magnitude scale and assessment thresholds, including SOAEL and LOAEL values, that will be adopted in the ES shall be confirmed during the scoping stage.
- 9.4.22 If any of the assessment thresholds agreed during the scoping stage are defined in relation to existing background or ambient noise levels, then a survey of existing noise levels should be undertaken. However, it is recognised that BS 5228-1 sets out suitable thresholds for the assessment of noise associated with

the removal of the weirs that are absolute (rather than set in relation to the existing noise levels), and therefore a survey of existing noise levels may not be necessary.

9.4.23 Should other receptor types or unusual local circumstances be identified, reference will be made in the ES to other absolute noise criteria such as those presented by BS8233 and the WHO.

9.4.24 The ES and/or associated documents shall set out suitable noise and vibration control measures, in accordance with best practicable means (BPM) principles, that would be adopted during removal.

## 9.5 Air Quality

### Introduction

9.5.1 The aims of this section are to evaluate the potential effects of the proposed compensation measures at the weirs on the River Lugg on air quality at sensitive human and ecological receptors.

9.5.2 The assessment considers the following matters:

- potential impacts arising from dust and particulate matter emissions generated during the removal of the weirs on the River Lugg;

- potential impacts on air quality due to emissions from associated on-site plant and machinery; and
- potential impacts on air quality due to emissions from removal and operational-related off-site traffic.

9.5.3 There are no potential impacts from dust and particulate matter emissions generated during operation following the removal of the weirs on the River Lugg.

### Study Area

9.5.4 For dust emissions during the removal of the weirs on the River Lugg, the assessment of human receptors focuses on areas up to 250 m from the River Lugg weirs works boundary or up to 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site exit(s). For ecological receptors, the assessment focuses on areas up to 50 m from the River Lugg weirs works boundary or up to 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site exit(s). This distance is based on the IAQM construction dust guidance<sup>258</sup>.

9.5.5 Human receptors include locations where members of the public could be present for both short or long periods, for example residential properties, schools,

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hospitals, doctors' surgeries, places of worship, streets, shops, playing fields or parks and ProW including footpaths and bridleways.

- 9.5.6 An ecological receptor (also referred to in this section as 'protected conservation areas') refers to any designated habitat that might be sensitive to dust soiling. These can include European sites (i.e. SAC, SPA and Ramsar sites), a SSSI and other nature sites (i.e. ancient woodlands, NNR, LWS and LNR).

## Baseline

### Current Baseline

#### *Sensitive human receptors*

- 9.5.7 The closest residential property to the weirs on the River Lugg is Coxall Farm, which is approximately 370 m from Coxall Weir. A ProW (i.e., Cholstrey Mill Farm to Oakfields and Mousenatch Farms) is approximately 70 m southwest of Mousenatch Weir.

#### *Sensitive ecological receptors*

- 9.5.8 The River Lugg weirs works boundary is located within the River Lugg SSSI, includes the River Lugg Meanders SSSI and is part of the River Lugg meadows SSSI. Further description is provided in **Section 9.10 Ecology (Terrestrial and Freshwater) and Ornithology**.

#### *Air quality*

- 9.5.9 A review of baseline air quality was carried out prior to undertaking the air quality assessment. The following baseline sources were reviewed:
- UK-AIR<sup>259</sup>; and
  - Herefordshire Council air quality monitoring survey<sup>299</sup>.
- 9.5.10 As part of the LAQM process, Herefordshire Council carries out regular assessments and monitoring of air quality within its administrative boundary. The most recent Air Quality Annual Status Report<sup>300</sup> and NO<sub>2</sub> monitoring data report<sup>299</sup> were reviewed to determine concentrations NO<sub>2</sub> and particulate matter (the pollutant of main concern for the dust risk assessment)

<sup>299</sup> Herefordshire Council (2022). Nitrogen dioxide monitoring data 2022.

<sup>300</sup> Herefordshire Council (2021). 2020 Air Quality Annual Status Report (ASR). February 2021.

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in the vicinity of the River Lugg weirs works boundary. Herefordshire Council has declared two AQMAs. The closest AQMA to the weirs on the River Lugg is termed ‘Bargates (Leominster) AQMA’ and was declared by Herefordshire Council in 2006 for elevated concentrations of annual mean NO<sub>2</sub>. This AQMA is approximately 2.2 km southeast of Coxall Weir at its closest point. During 2020, Herefordshire Council undertook monitoring at one automatic (i.e., continuous) monitoring location for NO<sub>2</sub> and PM<sub>10</sub> and during 2022, undertook non-automatic monitoring (i.e. diffusion tubes) at 45 monitoring locations for NO<sub>2</sub>. None of the remaining assessed pollutants are monitored by Herefordshire Council. **Table 9-10** presents information on the nearest monitoring locations to the weirs on the River Lugg.

**Table 9-10: Nearest monitoring locations to the River Lugg weirs works boundary**

Site ID /Description	Site type	Location	Distance and direction from the River Lugg weirs works boundary	2022 Annual mean concentration (µg/m <sup>3</sup> )
<b>Non-automatic monitoring (diffusion tubes)</b>				
46 / Bengry’s Lights, Leominster (A44)	Roadside	E 349409 N 259010	1.8 km, SE	28.0 (NO <sub>2</sub> )
61a / 29 Bargates Leominster (A44)	Roadside	E 349363 N 259013	1.8 km, SE	34.7 (NO <sub>2</sub> )

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Site ID /Description	Site type	Location	Distance and direction from the River Lugg weirs works boundary	2022 Annual mean concentration ( $\mu\text{g}/\text{m}^3$ )
<b>Non-automatic monitoring (diffusion tubes)</b>				
61b / 35 Bargates Leominster (A44)	Roadside	E 349352 N 259015	1.8 km, SE	36.4 ( $\text{NO}_2$ )
109 / Bargates, opp perseverance Road, Leominster	Roadside	E 349176 N 259020	1.7 km, SE	25.1 ( $\text{NO}_2$ )
110 / 56 Bargates, Leominster (A44)	Roadside	E 349262 N 259030	1.7 km, SE	17.8 ( $\text{NO}_2$ )
The Environmental Quality Standard (EQS) for annual mean $\text{NO}_2$ concentrations is $40 \mu\text{g}/\text{m}^3$ .				

9.5.11 Although the annual mean concentrations recorded are well below the relevant EQS (i.e. for the purposes of reporting, the relevant AQOs (i.e. an objective is the target date on which exceedances of a Standard must not exceed a specified number) have been collectively termed as EQSs) (see **Table 9-10**), the non-automatic monitoring locations presented in **Table 9-10** are not considered representative of conditions experienced at the weirs on the River Lugg due to the distance from the River Lugg weirs works boundary and / or monitoring site type.

9.5.12 Information on background air quality in the vicinity of the River Lugg weirs works boundary was obtained from Defra background map datasets. The 2018-based background maps, which are the latest available by Defra, are estimates based upon the principal local and regional sources of emissions and ambient monitoring data. For  $\text{SO}_2$  and CO concentrations, the 2001-based background maps, which are the latest available, were used. These background concentrations are presented in **Table 9-11**.

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**Table 9-11: Background concentrations: adopted for use in assessment for human receptors and protected conservation areas**

Pollutant	Annual mean concentration ( $\mu\text{g}/\text{m}^3$ )	Description
NO <sub>2</sub>	3.3 – 3.5	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration
Nox	4.1 – 4.3	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration
CO	84 – 89	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2001 based map concentration
PM <sub>10</sub>	11.0 – 11.8	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration
PM <sub>2.5</sub>	6.5 – 6.6	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2023 map concentration

Pollutant	Annual mean concentration ( $\mu\text{g}/\text{m}^3$ )	Description
SO <sub>2</sub>	1.5 – 1.7	Defra 1 km x 1 km background map value for the assessed sensitive human receptor locations, 2001 based map concentration
<p>PM<sub>10</sub>, particles with an aerodynamic diameter of 10 microns or less and PM<sub>2.5</sub>, particles with an aerodynamic diameter of 2.5 microns or less</p> <p>The EQS for annual mean NO<sub>2</sub> concentrations is 40 <math>\mu\text{g}/\text{m}^3</math>. The EQS for annual mean PM<sub>10</sub> and PM<sub>2.5</sub> concentrations is 40 <math>\mu\text{g}/\text{m}^3</math> and 20 <math>\mu\text{g}/\text{m}^3</math>, respectively. There is no EQS for annual mean CO and SO<sub>2</sub>.</p>		

9.5.13 The annual mean pollutant concentrations from the Defra background maps are well below the relevant EQS.

#### Future Baseline

9.5.14 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline described.



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## Assumptions and Limitations

9.5.15 The following assumptions and limitations apply to this assessment:

- The assessment provided is based on information available at the time of writing.
- The assessment takes account of best practice mitigation prior to the determination of effects.

## Likely Significant Effects

9.5.16 It should be noted the value of a receptor is incorporated into the specific methods prescribed in the IAQM construction dust guidance<sup>86</sup>. The approach described does not directly align with the overall approach to the categorisation of the value of receptors, magnitude of change and determination of the significance level set out in the EIA significance matrix. This is because the IAQM construction dust guidance on this subject relates to defining whether an air quality effect is significant or not across the study area as a whole, rather than at individual properties, or at specific sensitive ecological sites. As set out in the IAQM construction dust guidance, it is not appropriate to define a level of significance to air quality effects.

## Emission from dust during the removal of the weirs on the River Lugg

- 9.5.17 For emissions from dust during the removal of the weirs on the River Lugg, based on the IAQM construction dust guidance, the anticipated demolition, earthworks and trackout (i.e. the transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network) activities are considered to have the potential to generate a small dust emission magnitude. It should be noted the likely minimal activities associated with removal anticipated means removal was scoped out of the assessment.
- 9.5.18 A further description of the methodology of the dust risk assessment is provided in the IAQM construction dust guidance.
- 9.5.19 Based on the relationship between the sensitivity of the area and the likely dust emission magnitude, as set out in the IAQM construction dust guidance, the proposed demolition, earthworks and trackout activities are predicted to have a negligible to low risk for potential dust soiling impacts (in the absence of mitigation).
- 9.5.20 There is the potential for infrequent, short-term episodes when baseline dust deposition rates could be increased by an amount that nearby human receptors

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could perceive. With regard to human health impacts, following the IAQM construction dust guidance, there is predicted to be a negligible to low risk from demolition, earthworks and trackout activities as there is limited potential for emissions of PM<sub>10</sub> and PM<sub>2.5</sub> to increase baseline conditions to a value that is above the AQO values for the protection of human health.

9.5.21 For ecological impacts (i.e., dust soiling on a sensitive habitat), following the IAQM construction dust guidance, there is also likely to be a negligible to low risk (in the absence of mitigation).

9.5.22 Therefore, it would be necessary to adopt good practice mitigation measures to reduce the risk of causing a significant effect to nearby human and ecological receptors. Examples of good practice mitigation measures are presented in the IAQM construction dust guidance. The mitigation measures taken forward would prevent or reduce potential nuisance dust or PM<sub>10</sub> (including PM<sub>2.5</sub>) emissions, which are associated with health impacts, such as exacerbating existing human health conditions including asthma and other lung conditions. Measures such as those specified in the guidance would normally

be sufficient to reduce construction dust nuisance and risks to human health and ecological receptors to a 'not significant' effect.

### **Emissions from plant and machinery**

9.5.23 Plant and items of machinery would likely be used for the removal of the weirs on the River Lugg. As there would only be a relatively low number of these plant and machinery in operation for only a limited duration and spread across the River Lugg weirs works boundary, it is not considered that there would be any likely significant effects on air quality due to emissions from on-site plant and machinery and it is therefore proposed that this is scoped out of the assessment.

### **Emissions from construction traffic off-site**

9.5.24 The number of construction traffic vehicles used for the removal of the weirs on the River Lugg is likely to be below the EPUK and IAQM screening criteria<sup>301</sup> for identifying roads where there is the potential for a significant effect on local air quality and the need for an air quality assessment. It is not considered likely that there would be any significant effects on air quality due

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<sup>301</sup> Environmental Protection UK (EPUK) & the Institute of Air Quality Management (IAQM) (2017). Land-Use Planning & Development Control: Planning for Air Quality, v1.1. January 2017.

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to emissions from construction traffic off-site and it is therefore proposed that this is scoped out of the assessment.

### Emissions from operational-related off-site traffic

9.5.25 The number of operational-related traffic vehicles used following the removal of the weirs on the River Lugg is also likely to be below the screening criteria<sup>301</sup> for identifying roads where there is the potential for a significant effect on local air quality and the need for an air quality assessment. It is not considered likely that there would be any significant effects on air quality due to emissions from operational related off-site traffic and it is therefore proposed that this is scoped out of the assessment.

### Proposed Scope

9.5.26 Based on the above assessment, **Table 9-12** presents the potential air quality impacts that are proposed to be scoped in or out of requiring further assessment, along with the rationale for the choice.

**Table 9-12: Summary of air quality elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Potential dust soiling, human health and ecological impacts arising from dust and particulate matter emissions generated during the removal of the weirs on the River Lugg.	OUT	Activities associated with the removal of the weirs on the River Lugg have the potential to generate dust, which can cause annoyance and have health effects on local residents and cause harm to nearby ecological receptors. However, providing good practice mitigation measures (as recommended in the IAQM construction dust guidance <sup>86</sup> ) are implemented during the removal of the weirs on the River Lugg, the impact at nearby human and ecological receptors is considered to be negligible (i.e. not significant).
Potential impacts on air quality due to emissions from site plant and machinery.	OUT	Given that relatively low numbers of plant and items of machinery would likely be used for only a limited duration and spread across the River Lugg weirs works boundary, the associated potential effects on air quality are

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Potential Effect	Scoped IN or OUT	Justification
		considered to be negligible (i.e. not significant).
Potential impacts on air quality due to emissions from construction traffic off-site	OUT	The predicted construction traffic flows associated with the removal of the weirs on the River Lugg are likely to be less than the EPUK and IAQM screening criteria <sup>301</sup> . Therefore, the likely effects on air quality are considered to be negligible (i.e., not significant).
Potential impacts on air quality due to emissions from operational-related off-site traffic.	OUT	The predicted operational-related traffic flows associated with the proposed compensation measures at the weirs on the River Lugg are likely to be less than the EPUK and IAQM screening criteria <sup>301</sup> . Therefore, the likely effects on air quality are considered to be negligible (i.e., not significant).

9.5.27 Therefore, it is proposed air quality is scoped out of the ES.

## 9.6 Soils and Land Use

### Introduction

9.6.1 This section describes the current environmental baseline for soils and land-use at the weirs on the River Lugg and the potential impacts which may be associated with the proposed compensation measures at the weirs on the River Lugg.

### Study Area

9.6.2 The potential impacts on soils and land use are likely to be limited to direct disturbance during removal activities, and therefore impacts are expected to be very localised. However, there is the possibility of contaminants being mobilised as a result of site disturbance which may impact soil quality, and so a study area of the River Lugg weirs works boundary with a 250 m buffer in all directions around the River Lugg weirs works boundary is considered appropriate. The 250 m influencing distance has been chosen based on NHBC and Environment Agency guidance (2008)<sup>262</sup>. This distance is considered appropriate and proportionate in the context of the proposed compensation measures at the weirs on the River Lugg, taking into account the distance over which contamination or ground gases can migrate.

## Baseline

### Current Baseline

9.6.3 The following sources of information have been used to obtain the baseline information discussed in this chapter:

- Provisional Agricultural Land Classification<sup>263</sup>;
- MAGIC Maps<sup>264</sup>;
- Groundsure Enviro Data Viewer<sup>265</sup>; and
- Soilscales Online viewer<sup>266</sup>.

### *Soils and Land Use*

9.6.4 The economic resource value of soil is primarily measured by its ability to support agricultural uses. This is quantified by its ALC grade, with six grades defined within the *ALC for England and Wales: Revised criteria for Grading the Quality of Agricultural Land*, as follows:

- Grade 1 (excellent quality);
- Grade 2 (very good quality);
- Subgrade 3a (good quality);
- Subgrade 3b (moderate quality);
- Grade 4 (poor quality); and
- Grade 5 (very poor quality).

9.6.5 Grades 1 to Subgrade 3a are determined as BMV land. BMV agricultural land is the most flexible land in terms of the range of crops that can be grown, the level and consistency of yield and the cost of obtaining the yield and offers the best prospect for both food and non-food crop production.

9.6.6 Pre-1988 ALC data are available for the study area which provides provisional data without site-specific detail. The provisional ALC data do not differentiate between ALC Subgrades 3a (which qualifies as BMV land) and Subgrade 3b. Therefore, at this stage it is conservatively assumed that all Grade 3 land is Subgrade 3a.

9.6.7 This provisional ALC data indicate that the River Lugg weirs works boundary is comprised largely of Grade 3 and Grade 4 soils, with some Grade 2 soils recorded on/near Coxall Weir.

9.6.8 Soils may also be of importance in supporting sites of ecological importance, therefore a high-level review of soil types has been undertaken using the Soilscales web viewer<sup>266</sup>. Soilscales conveys a summary of the broad regional differences in the soil landscapes of England and Wales.

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9.6.9 Soils identifies all three weir locations to be soil type 20 – Loamy and Clayey Floodplain soils with naturally high groundwater.

**Future Baseline**

9.6.10 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

**Assumptions and Limitations**

9.6.11 The assessment is currently based on desk-top information, using publicly available datasets. No site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings presented.

9.6.12 Only provisional ALC data were available for review at the time of this assessment.

9.6.13 The assessment provided is based on information available at the time of writing and a high level of uncertainty remains at this stage.

**Likely Significant Effects**

**Soils and Land Use**

9.6.14 Soils may be impacted in the following ways;

- Permanent or temporary loss of soils due to the works.
- Degradation of soils during stripping, handling and storage, through mechanisms such as erosion, compaction and smearing.
- The deposition of potentially contaminated fugitive dust from machinery required for the removal of the weirs may also impact soil quality.
- Soil quality may also be degraded by mobilising contaminants or from potentially contaminated surface water run-off.
- Loss or disturbance of agricultural land, and potentially BMV soils, given Grade 2 and Grade 3 (to be assumed to be Grade 3a) are present in the area.
- The potential areas of loss are likely to be limited to those areas which will be directly disturbed (i.e.,

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working areas on the river banks either side of the weir).

9.6.15 At this early stage and in the absence of further data or more detailed assessment there may be the potential for significant effects associated with either soils or land use.

### Proposed Scope

9.6.16 Based on the above assessment, **Table 9-13** presents the potential soils and land use impacts that are proposed to be scoped in, requiring further assessment, along with the rationale for the choice.

**Table 9-13: Summary of soils and land use elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Loss of soils and soil quality as a result of the works.	IN	As there will be disturbance, excavations and potential loss of soils and soil quality in this area soils have been scoped in for assessment of the proposed compensation measures at the weirs on the River Lugg.

Potential Effect	Scoped IN or OUT	Justification
Loss or and disturbance to agricultural land	IN	There may be the potential loss of Grade 2 and 3 soils. Grade 3 soils should be assumed to be Grade 3a (BMV) in the absence of further information, land use in terms of ALC has therefore been scoped in for assessment of the proposed compensation measures at the weirs on the River Lugg.

9.6.17 Therefore, it is proposed soils and land use is scoped in for the ES.

9.6.18 A desk study has not been completed at this stage and as such it has not been possible to fully establish baseline conditions at the weirs on the River Lugg, a full desk study will be undertaken and discussed/included within the ES.

## 9.7 Geology and Land Contamination

9.7.1 This section describes the current environmental baseline related to geology and potential land contamination at the weirs on the River Lugg and the potential impacts associated with the proposed

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compensation measures at the weirs on the River Lugg.

## Study Area

9.7.2 For the study area, a 250 m buffer in all directions around the River Lugg weirs works boundary is considered appropriate. The 250 m influencing distance has been chosen based on NHBC and Environment Agency guidance (2008)<sup>262</sup>. This distance is considered appropriate and proportionate in the context of the proposed compensation measures at the weirs on the River Lugg, taking into account the distance over which contamination or ground gases can migrate.

## Baseline

### Current Baseline

9.7.3 The following sources of information have been used to obtain the baseline information discussed in this chapter:

- Geo Index Map<sup>267</sup>;
- MAGIC Maps<sup>264</sup>;

- Groundsure Enviro Data Viewer<sup>265</sup>;
- Historic Landfill Sites<sup>268</sup>;
- National Library of Scotland mapping<sup>269</sup>; and
- Herefordshire Minerals & Waste Local Plan (Draft) (January 2019)<sup>302</sup>.

### Geology

- 9.7.4 Aquifer designations are not covered within this section as they are discussed in the baseline of **Section 9.8 Groundwater**.
- 9.7.5 The BGS Geo Index shows the area of the River Lugg near the weirs to be underlain by superficial deposits of Alluvium comprising clay, silt, sand and gravel.
- 9.7.6 The BGS Geo Index shows the bedrock geology in the weir locations to be the Raglan Mudstone Formation (siltstone and mudstone, interbedded).
- 9.7.7 The BGS Geo Index does not show any areas of artificial ground within the study area.
- 9.7.8 There are no BGS borehole records recorded within the study area.

<sup>302</sup> Herefordshire Minerals & Waste Local Plan (Draft) (January 2019).



- 9.7.9 There are no geological SSSIs recorded within the study area.
- 9.7.10 There is no information available at this stage relating to the presence of Geological Conservation Review sites or geological sites of local or regional importance.
- 9.7.11 The weirs on the River Lugg works boundary is located with a MSA as identified in the Hereford Draft Minerals and Waste Plan<sup>302</sup>.

#### Historical and Current Land Use

- 9.7.12 Limited information is available relating to current and historical land use. A review of the publicly available National Library of Scotland mapping<sup>269</sup> has been completed in order to assess the potential for land contamination at the weirs on the River Lugg.
- 9.7.13 The weirs on the River Lugg are a series of rock weirs on the River Lugg to the north west of Leominster in Herefordshire. The weirs were built in the 1970s as part of the Leominster Flood Defence Scheme, constructed of large masonry block stone.
- 9.7.14 The weirs on the River Lugg are surrounded by agricultural land.

#### Potential sources of contamination

- 9.7.15 There may be the potential for contamination related to the following;
- Any fertilisers or pesticides which may have been applied to the agricultural land; and
  - Potential for contamination within any Made Ground which may be present around the weirs.
- 9.7.16 There are no historical landfills recorded within the study area.

#### Future Baseline

- 9.7.17 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site takes into account changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

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## Assumptions and Limitations

- 9.7.18 This study is based on a desk-based assessment only and no site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings presented.
- 9.7.19 Limited historical mapping was available for review at the time of writing this report. A full set of historical maps will be required in further stages of the assessment.
- 9.7.20 The assessment is limited to publicly available information at the time of writing this report and a high level of uncertainty remains at this stage.

## Likely Significant Effects

- 9.7.21 There may be the following impacts associated with the works:

### Geology

- 9.7.22 Impacts may include temporary or permanent loss of a geological site (or part of it), for example by covering with stockpiles, or damaging key characteristics and features. Impacts may also include temporary or permanent loss of access to the weirs on the River Lugg.

- 9.7.23 Impacts may also include enhancement through exposing a feature or increasing access to a rock exposure.
- 9.7.24 The weirs on the River Lugg works boundary is located with a MSA, therefore there is the potential for sterilisation of mineral resources as a result of the compensation measures.

### Land Contamination

- 9.7.25 Disturbance of potentially contaminated soils may create new pathways for contaminants to impact receptors directly or indirectly as a result of mobilisation of contamination via creation of new pathways.
- 9.7.26 The disturbance of land contamination during the removal of the weirs may result in unacceptable risks to workers or maintenance workers resulting from exposure to contaminants in soils via ingestion, inhalation or dermal contact.
- 9.7.27 Additionally, ground gas from potential Made Ground and natural strata containing organic materials (such as Alluvium) and could accumulate within excavations and confined spaces resulting in explosive or asphyxiant hazards.

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9.7.28 There may also be potentially unacceptable risks to nearby site users from the creation of fugitive dust and vapours from potentially contaminated soils disturbed during the works.

9.7.29 There may be risks posed to surface water quality of the River Lugg, groundwater quality and ecological receptors from the disturbance and mobilisation of contamination.

9.7.30 At this early stage and in the absence of further data or more detailed assessment there may be the potential for significant effects associated with either geology or land contamination.

### Proposed Scope

9.7.31 Based on the above assessment, **Table 9-14** presents the potential geology and land contamination impacts that are proposed to be scoped in, requiring further assessment, along with the rationale for the choice.

**Table 9-14: Summary of geology and land contamination elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Impacts related to geology/geological features	IN	Scoped in, at this stage for the removal of the weirs and operational stages as there is not sufficient information relating to the presence of geological features to complete an assessment.
Impacts related to the disturbance of potentially contaminated land.	IN	There is currently limited information available relating to the history of the weirs on the River Lugg and the potential for contamination to be present within soils, therefore land contamination is scoped in for assessment of the proposed compensation measures at the weirs on the River Lugg
Sterilisation of Mineral Resources	IN	All four sites are located with a MSA.

9.7.32 Therefore, it is proposed geology and land contamination is scoped in for the ES.

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9.7.33 A desk study has not been completed at this stage and as such it has not been possible to fully establish baseline conditions at the weirs on the River Lugg, a full desk study will be undertaken and discussed/included within the ES. GI may also be required at a later stage to confirm ground conditions and further assess the potential for contamination.

## 9.8 Groundwater

### Introduction

9.8.1 The assessment to determine the significance of effects for the groundwater environment in this PEIR is based on known groundwater receptors and the proposed compensation measures at the weirs on the River Lugg.

9.8.2 A high-level, conceptual review of hydrogeological processes has been undertaken for the PEIR. This is based on available desk-based information only. This information has then been used to determine how the proposed compensation measures at the weirs on the River Lugg could impact on identified groundwater receptors.

### Study Area

9.8.3 For the groundwater study area, a 1 km buffer in all directions around the River Lugg weirs works boundary is considered appropriate. This is based on organisational experience regarding the maximum potential extent of effects likely on groundwater receptors in the type of aquifers present, and the uncertainties associated with the degree of heterogeneity of these aquifers.

9.8.4 The three weir sites; Mousenatch Weir, Eyton Weir and Coxall Weir have been assessed together as they are in close proximity to one another along the River Lugg and the works taking place at each would be similar in nature.

### Baseline

#### Current Baseline

##### *Geology and Aquifer Designation*

9.8.5 The geology baseline is described in **Section 9.7 Geology and Land Contamination**. However, a brief summary is provided below.

9.8.6 The weirs on the River Lugg and the majority of the wider study area is underlain by alluvium, with some

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alluvial fan deposits, comprised of gravel, located along the northern edge of the alluvium. Both are classified as Secondary A aquifers.

- 9.8.7 To the north of the study are till and morainic (undifferentiated) deposits, which are classified as Secondary (undifferentiated) aquifers.
- 9.8.8 Bedrock across the entire study area is the Raglan Mudstone Formation, comprised of siltstone and mudstone interbedded. This is classified as a Secondary A aquifer.

*Groundwater levels*

- 9.8.9 There are no Environment Agency or BGS groundwater monitoring locations available in close proximity to the weirs on the River Lugg. There are also no available historical borehole records located within the River Lugg weirs works boundary itself to provide an indication of groundwater seeps, strikes, or rest water levels. Additionally, no GIs have been undertaken at the weirs on the River Lugg.
- 9.8.10 Within the wider study area, there are three historical BGS borehole records to the north of the of the study area. Where encountered, groundwater strikes are recorded between 15-18.5 mbgl. However, it should be noted that these boreholes lie at least 700 m from the

river, upgradient, therefore are unlikely to accurately represent groundwater levels at the weirs on the River Lugg. Groundwater levels closer to the river are likely to be much shallower and coincident with river levels.

*Connection to hydrological features*

- 9.8.11 The local groundwater may be connected (either directly or indirectly) to watercourses (as baseflow, sinks, sources, spreads, collects, issues etc.), and spring discharges. Changes to groundwater quality and levels beneath the weirs on the River Lugg may therefore influence water quality and / or flows in these watercourses/hydrological features or vice versa. On OS mapping there are springs, sinks and issues shown within the wider study area. These are indicative of shallow groundwater conditions.
- 9.8.12 The weirs are located across the River Lugg which could be receiving baseflow contributions from the alluvium and underlying bedrock. Additionally, within the River Lugg weirs works boundary there are multiple drains across the floodplain which could be interacting with shallow groundwater, if present.

*Groundwater as a resource*

- 9.8.13 There is one SPZ 3 (total catchment) within the groundwater study area (Defra, 2022), which underlies

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the weirs on the River Lugg. This is associated with an SPZ 2 and SPZ 1 located approximately 1.3 km and 2.4 km east of the nearest weir, respectively.

- 9.8.14 No information on licensed or private groundwater abstractions have been requested at this stage, therefore the presence or absence of groundwater abstractions cannot be determined. Information on groundwater abstractions will be requested and assessed at ES stage. It should be noted however, that for most PWSs there is an onus on the abstraction owner to provide details to the Local Authority. As such, there may be other PWSs which the Local Authority is not aware of.
- 9.8.15 No wells are shown on OS mapping to be present within the River Lugg weirs works boundary or wider study area.
- 9.8.16 Discharges of liquids to ground or groundwater may be occurring within the groundwater study area. However, no information on licensed discharged to groundwater has been requested at this stage. Information on groundwater discharge will be requested and assessed at ES stage.

### *Groundwater Dependent Terrestrial Ecosystems*

- 9.8.17 There are two statutory designated sites within the study area which are the River Lugg Meanders SSSI and River Lugg SSSI. The presence of GWDTE at these locations, especially the Meanders and floodplain, cannot be ruled out at this stage.

### *Groundwater Vulnerability*

- 9.8.18 The weirs on the River Lugg and majority of the study area is classified as having a medium to high groundwater vulnerability. Where superficial deposits are absent the groundwater vulnerability increases to high, meaning that where bedrock is exposed at the surface there is a high risk of contaminants migrating into an aquifer from ground level.

### *Water Framework Directive*

- 9.8.19 The weirs on the River Lugg overlie a WFD groundwater body the Wye Secondary Devonian ORS Groundwater body (GB40902G205200). This WFD waterbody has a poor overall status with good quantitative status but poor chemical status. The aquifer body is reaching poor status due to poor nutrient management in agricultural and rural land management.

### Future Baseline

- 9.8.20 The groundwater baseline of the site is unlikely to change significantly. However, conditions relating to climate change for groundwater include the potential for increased frequency and magnitude of groundwater flooding events.
- 9.8.21 Groundwater flooding may be exacerbated where the events are linked to fluvial flooding and shallow, near-surface Secondary aquifers.

### Assumptions and Limitations

- 9.8.22 No GIs have been undertaken at the weirs on the River Lugg to confirm groundwater conditions. Therefore, groundwater has conservatively been assumed as being at or near ground level.
- 9.8.23 No information on licensed and private groundwater abstractions and licensed discharges to ground have been requested at this stage therefore their presence and cannot be ruled out. As a result, any significant impacts cannot be ruled out at this stage.
- 9.8.24 No site visits or walkover surveys or UKHab surveys have been undertaken at potential GWDTE sites. From the desk study there is potential for the study area to contain GWDTE. However, the presence and/ or

groundwater dependency of any GWDTE cannot be determined at this stage and would require further assessment to be able to determine if any impacts would be significant.

- 9.8.25 At PEIR stage it is assumed that full weir removal is to take place. Therefore, the following assumptions have been made for the weirs on the River Lugg:
- For topsoil stripping and vegetation clearance a maximum depth of 0.5 m has been assumed;
  - The channel will temporarily be pumped dry during weir removal with a bypass flow in place; and
  - Minor excavation may be required to remove any foundations which could require dewatering.

### Likely Significant Effects

#### Removal of the weirs

- 9.8.26 During removal, it is considered likely that potential impacts to groundwater features (including superficial and bedrock aquifers, and associated groundwater receptors, such as licensed abstractions, PWS, GWDTE etc.) could arise from several activities including;

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- Physical contamination of groundwater from ground disturbance such as soil stripping, haul roads and compounds.
- Mobilisation of suspended solids and accidental leaks and spills during removal of the weirs, especially within the channel could impact groundwater quality in the underlying aquifer and any secondary receptors.
- Changes to groundwater levels and flows from the removal of any below ground structures (e.g. foundations). Removal of any sub surface structures could require minor excavations which would likely need dewatering. At an aquifer scale, impacts would be negligible, however significant impacts to potential groundwater receptors such as abstractions and GWDTE cannot be ruled out at this stage.
- Temporary Bypass flow of the channel during the weir removal could cause a reduction in local groundwater levels and flows if the river is in hydraulic continuity with the underlying aquifer. Any changes would be short-lived and negligible on a groundwater body scale. However, any temporary bypass flow could have a significant impact on flows to nearby groundwater receptors such as GWDTE and abstractions, if present.

## Operation

- 9.8.27 During operation no significant effects are predicted to groundwater. Changes to groundwater levels, flows and quality, due to the removal the weirs could occur due to changes to baseflow conditions locally. However, by removing the weirs and re-establishing the natural channel bed there is the potential to create more connectivity between the aquifer and channel, hence improving baseflow conditions.
- 9.8.28 Additionally, by removing the weirs and re-establishing the natural channel bed more groundwater flow could reach any GWDTE which may be present and help to sustain the habitats. More connectivity between the aquifer and channel could be established therefore having a positive impact to GWDTE. However, it should be noted that any existing established habitats could be reliant on the equilibrium between artificial water levels in the river and surrounding aquifers. Therefore, by returning the area to natural conditions there could be a period of unstable groundwater and surface water levels while a new equilibrium is established which could negatively impact any groundwater receptors in the short term, until a new baseline/ equilibrium is established. This could lead to significant short-term impacts on any GWDTE.



## Proposed Scope

9.8.29 Based on the above assessment, all of the potential impacts have been scoped in for further assessment. **Table 9-15** presents a summary of potential impacts to groundwater that are proposed to be scoped in for further assessment, along with the rationale for the choice.

**Table 9-15: Summary of groundwater elements scoped into the assessment**

Potential Effect	Scoped IN or OUT	Justification
Impacts to groundwater levels and flows during removal	IN	There is no information currently available on groundwater levels within the River Lugg weirs works boundary therefore significant impacts to shallow groundwater levels and flows cannot be ruled out at this stage.
Impacts to groundwater quality during removal	IN	Impacts can arise from removal activities such as excavations, topsoil stripping, accidental leaks, and spills etc. Considering the depth of the water table across the River Lugg weirs works boundary is unknown significant impacts to

Potential Effect	Scoped IN or OUT	Justification
		the underlying aquifers cannot be ruled out.
Impacts to secondary receptors such as groundwater abstractions and GWDTE, this includes both quality and qualitative status	IN	Information on groundwater abstractions have not been requested at this stage. Additionally, there have been no site visits to determine the presence of any potential GWDTE. Therefore, significant impacts to these receptors, if present, cannot be ruled out at this stage.
Changes to baseflow conditions from removal of the weir	IN	Considering the depth of the water table across the River Lugg weirs works boundary is unknown significant changes to baseflow contributions cannot be ruled out.

9.8.30 It is proposed that before the ES is written that GI be undertaken in close proximity to the weirs to determine the ground and groundwater conditions. Given the potential of shallow groundwater, especially in close proximity to the river, as part of any GI the groundwater team should have input into the scope in order to gather data that best characterises groundwater at the weirs on the River Lugg.

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- 9.8.31 Additionally, no site walkovers or habitat surveys have been undertaken to determine the presence of any GWDTE. These should take place before commencing with the ES.
- 9.8.32 Following on from this, any information from any GI, walkover and habitat surveys would then be included in a detailed Conceptual Site Model to refine our hydrogeological understanding of the weirs on the River Lugg.
- 9.8.33 At ES stage information on private and licensed groundwater abstractions would be requested from the local authority and Environment Agency. Information on licensed discharges to ground should also be requested.

## 9.9 Surface Water

### Introduction

- 9.9.1 The aims of this chapter are to:
- Identify the relevant surface water (water quality, hydromorphology and flood risk) receptors which could be impacted by the proposed compensation measures at the weirs on the River Lugg.

- Evaluate potential impacts relevant to the proposed compensation measures at the weirs on the River Lugg.
- Outline the proposed scope of work to assess the potential impacts associated with the removal of the weirs and operational of the proposed compensation measures at the weirs on the River Lugg to surface water.

### Study Area

- 9.9.2 The study area for surface water is defined by adding a 500 m buffer around Mousenatch Weir, Eyton Weir and Coxall Weir combined in all directions. This is based on the anticipated distance of impact pathways associated with surface water impacts. The three weirs have been assessed together as they are in close proximity to one another along the River Lugg.

### Baseline

#### Baseline Sources

- 9.9.3 The baseline conditions have been established based on the following sources:
- Aerial imagery<sup>271</sup>;
  - Canal and River Trust Online Information, including:

[edfenergy.com](http://edfenergy.com)

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- Gloucester Lock to Upper Lode Lock Information<sup>272</sup>;
- River Severn Navigation Guide<sup>273</sup>;
- Environment Agency, Catchment Data Explorer<sup>274</sup>;
- Environment Agency Flood Map for Planning<sup>275</sup>;
- Environment Agency Historic Flood Map<sup>276</sup>;
- Environment Agency Long-Term Flood Risk Information Mapping<sup>277</sup>;
- Environment Agency Reservoir Flood Extents - Dry Day<sup>278</sup>;
- Environment Agency Reservoir Flood Extents - Wet Day<sup>279</sup>; and
- MAGIC Maps<sup>280</sup>.

### Current Baseline

#### *Surface Water Quality*

9.9.4 The only WFD water body that is within or overlaps the study area is the River Lugg from the confluence at Norton Brook to the confluence at the River Arrow water body (WFD ID: GB109055042030). It is not a HMWB, currently classified as achieving moderate ecological potential the chemical status is Fail <sup>274</sup>The reasons for not achieving Good potential include poor nutrient management in agriculture.

9.9.5 The River Lugg SSSI and Hereford Groundwater G4 Nitrate Vulnerable Zone covers the study area<sup>274</sup>.

#### *Surface Water Supply*

9.9.6 The River Lugg weirs works boundary is not located within a Surface Water Drinking Water Safeguard Zone<sup>280</sup>.

9.9.7 No data was available at this stage regarding PWSs.

#### *Geomorphology*

9.9.8 **Table 9-16** presents the location and condition of all geomorphology receptors within the study area of the weirs on the River Lugg.

**Table 9-16: Geomorphology baseline condition of watercourses**

Watercourse	Description
River Lugg from the confluence at Norton Brook to the confluence at the River Arrow Water Body (GB109055042030)	A sinuous watercourse with evidence of natural processes.
Blue Ditch	An artificial channel with some evidence of natural processes

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Watercourse	Description
Minor watercourses and ditches	There are numerous minor watercourses and ditches within the study area, and these will be assessed further in later stages of the environmental assessment.

#### *Fluvial and Tidal Flood Risk*

- 9.9.9 The Environment Agency’s Flood Map for Planning (rivers and sea)<sup>275</sup> indicates that all the weirs on the River Lugg are within Flood Zone 3, meaning that there is a (1 % AEP (1 in 100)) chance of flooding, so it is at high risk of fluvial flooding as the River Lugg is not tidal.

#### *Surface Water Flood Risk*

- 9.9.10 The Long-Term Flood Risk mapping<sup>277</sup> shows the River Lugg weirs works boundary is at variable risk of surface water flooding. Areas at high risk of surface water flooding, a risk greater than 3.3 % AEP (1 in 30), include the River Lugg upstream of the weirs, and two ditches running parallel with the River Lugg to the north and south. Downstream from the area at high risk of flooding, the River Lugg across the study area is at medium to low risk of surface water flooding, a risk between 3.3 % (1 in 30) and 0.1 % (1 in 1000) AEP. In the fields adjacent to the River Lugg there are patches

at low risk of surface water flooding, a risk between 0.1 % (1 in 1000) and 1 % (1 in 100) AEP. Generally, the surface water flood risk within the Study Area corresponds to the routes of watercourses and as such is likely to be representative of risk associated with existing watercourses and better described as fluvial flood risk.

#### *Groundwater Flood Risk*

- 9.9.11 As discussed in the baseline section of **Section 9.8 Groundwater** there are no Environment Agency, BGS or borehole records within the study area to provide an indication of groundwater levels. Given the tidal location and proximity to watercourses, it is likely that groundwater levels are hydraulically linked to fluvial levels.

#### *Reservoir Flooding*

- 9.9.12 According to the Environment Agency Reservoir Flood Maps<sup>278,279</sup> there is no risk of flooding from reservoirs when river levels are normal and when there is also flooding from rivers.

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### *Other Flood Sources*

9.9.13 Water and sewage infrastructure is unlikely to exist in the study area due to its rural nature, therefore the risk of flooding from these sources is very low.

### *Historic Records of Flooding*

9.9.14 Environment Agency historic flood maps<sup>276</sup> provide information in the form of recorded flood outline. This is likely to capture the extent of significant fluvial and tidal flood events. The mapping shows a single event that covers much of the Study Area although no details or date of the event are provided.

### **Future Baseline**

9.9.15 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### **Assumptions and Limitations**

9.9.16 The following assumptions and limitations apply to the Surface Water assessment:

- The assessment of potential impacts on surface water is high-level, with no quantification.
- The assessment of surface water quality has used site-specific data, where available, and available online information.
- The baseline geomorphological assessment of the relevant watercourses has been carried out virtually, using aerial imagery, as waterbodies are yet to be surveyed.
- The assessment of baseline flood risk has been undertaken based on available online information only. No detailed hydraulic modelling of flood risk has been undertaken on the basis that the Environment Agency online flood mapping and local authority sources are reliable and provides a reasonable assessment of existing flood risk.
- It has been assumed that the impact of climate change will not significantly alter the flood risk from that shown in online mapping.

## Likely Significant Effects

### Removal of the weirs

#### *Surface Water Quality*

9.9.17 Potential impacts to surface water quality within the study area during the removal works would include:

- Mobilisation of sediments and potential release of fine sediment to suspension leading to sediment pollution. This may impact the chemical and biological quality of surface water.
- The accidental release of polluting substances, such as fuel leaks, which could have an impact upon the chemical and biological quality of surface water.

#### *Surface Water Supply*

9.9.18 Potential impacts to surface water supply within the study area during the removal works would include:

- Pollution from the removal of the weirs upstream of water supplies.
- Severance due to disruption of pipelines or other buried assets.

#### *Geomorphology*

9.9.19 Potential impacts to the geomorphological receptors within the study area during the removal works would include:

- Loss of riparian vegetation during bankside working.
- Temporary change in local flow dynamics and bed and/or bank scour resulting from either in-channel or bankside working.
- Fine sediment inputs leading to smothering of morphological features of alteration of sediment dynamics which support key habitats.
- Accidental release of fine sediment that would have implications to downstream areas following either bankside or in-channel working.

#### *Flood Risk*

9.9.20 Potential impacts on flood risk during the removal works include:

- Loss of floodplain storage resulting in increased flood risk.
- Interception of overland flow due to site compounds, storage areas or haul routes in the

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Study Area, potentially disrupting local flow routes and increasing surface water flood risk.

- The potential blocking of drainage systems and watercourses with debris associated with the removal of the weirs, potentially resulting in blockage or reduced capacity and therefore increased flood risk.

### Operation

#### Surface Water Quality

9.9.21 No significant effects during operation are anticipated.

#### Surface Water Supply

9.9.22 Potential impacts to surface water supply during the operational phase would include the diversion of utilities and field drains ameliorated.

#### Geomorphology

9.9.23 A potential impact to the geomorphological receptors within the study area during the operation phase would include the return to a more natural state, increasing the natural bed material at the footprint of the weir and restoring natural flow dynamics.

#### Flood Risk

9.9.24 Potential impacts on flood risk during the operational phase of the proposed compensation measures at include:

- Change in flood risk at the weirs on the River Lugg and downstream due to the partial or full removal of the weirs.
- By removing the weir and re-establishing the natural channel bed there is the potential to create more connectivity between the aquifer and channel. This may locally increase groundwater flood risk if emergence is possible.

### Proposed Scope

9.9.25 **Table 9-17** summarises the proposed scope for Surface Water.

**Table 9-17: Summary of Surface Water scope.**

Potential Effect	Scoped IN or OUT	Justification
Potential impacts on surface water quality.	IN	Activities associated with the removal of the weirs have the potential to mobilise sediment or pollutants into the watercourse.

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Potential Effect	Scoped IN or OUT	Justification
Potential impacts on surface water supply.	IN	The diversion of utilities and amelioration of field drains is likely to impact surface water supply within the River Lugg weirs works boundary. Therefore, the potential impacts are considered significant.
Potential impacts on geomorphology	IN	Activities associated with the removal of the weirs have the potential to alter sediment dynamics during removal.
Potential impacts on flood risk	IN	Weir removal may increase flood risk downstream and re-establishing the natural bed may increase connectivity with the aquifer.

9.9.26 The identification of potentially significant effects will be derived from a qualitative assessment of baseline data to inform the receptor importance, professional judgement, combined with quantitative assessment where practical. It is proposed that the ES includes a detailed assessment of flood risk across the weirs on

the River Lugg, produced in accordance with the technical guidance to the National Planning Policy Framework. In addition a Preliminary WFD assessment will be carried out, with a more detailed assessment if impacts are identified and further mitigation is required.

## 9.10 Ecology (Terrestrial and Freshwater) and Ornithology

### Introduction

- 9.10.1 This chapter presents the preliminary environmental information relating to terrestrial and freshwater ecology and ornithology for the proposed compensation measures at the weirs on the River Lugg.
- 9.10.2 Terrestrial and freshwater ecology is concerned with the variety of living organisms and their relationships with each other and their environment. Ecology is the subject of a wide variety of legislation and policies; impacts to ecological receptors could constitute an offence under relevant legislation as well as comprising material considerations within the planning system.
- 9.10.3 The assessment comprises the following terrestrial and freshwater ecology elements:



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- Designated sites – sites designated at all levels (both statutory and non-statutory) for nature conservation reasons, including SPAs, SACs, Ramsar sites, SSSIs, NNRs, LNRs and LWSs;
- Notable habitats – i.e. HPI; and
- Protected and notable species – these include animal and plant species protected by legislation, SPI and species that are not legally protected but have a conservation designation.

9.10.4 A high-level review of the terrestrial and freshwater ecological baseline at the weirs on the River Lugg has been undertaken for the PEIR. This is based on available desk-based information only. This information has then been used to determine how the proposed compensation measures at the weirs on the River Lugg could impact on terrestrial and freshwater ecological receptors.

### Study Area

9.10.5 The study area for terrestrial and freshwater ecology relates to the River Lugg weirs works boundary. The study area comprises the relative areas by which potential pathways to effect on terrestrial and freshwater ecological receptors could occur.

- Internationally important statutory designated sites: SPAs, SACs and Ramsar sites within 2 km of the

weirs on the River Lugg, or within 30 km of a SAC where bats are noted as one of the qualifying interests or where European sites are hydrologically connected to the River Lugg weirs works boundary;

- Nationally and county important statutory designated sites: SSSIs, NNR and LNR within 2 km of the River Lugg weirs works boundary;
- Non-statutory sites of local nature conservation importance: LWS, ancient woodland and habitats of principal importance (HPI) within 1 km of the River Lugg weirs works boundary;
- Desk study records of protected or otherwise notable habitats and species, veteran or ancient trees within 1 km of the River Lugg weirs works boundary; and
- For receptors potentially sensitive to air quality changes (including habitats within SPA, SAC, Ramsar, SSSI, NNR, LNR, LWS, ancient woodland or ancient and veteran trees), sites located within 200 m of proposed construction routes where significant changes are anticipated.

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## Baseline

### Baseline Sources

9.10.6 The following sources have been used to inform a preliminary understanding of the baseline conditions for the assessment of the terrestrial and freshwater ecology aspect:

- Environment Agency freshwater monitoring data (macroinvertebrates, macrophytes and fish)<sup>294</sup>;
- Herefordshire Biological Records Centre data relating to species of conservation importance and INNS, primarily between the 1970's and 2020 recorded in the vicinity of the weirs on the River Lugg;
- Jacobs Report on River Lugg SSSI Restoration<sup>303</sup>;
- SSSI Citation and condition assessments, River Lugg (Natural England)<sup>304</sup>
- Lugg SAC Weirs Project (Environment Agency)<sup>305</sup>;
- MAGIC map application was used to identify international and national statutory and non-

statutory designated sites, HPI, surveyed GCN ponds and granted EPSM licenses and GCN licence returns;

- Aerial photography;
- Standard data forms for SPAs and SACs within the UK national site network of European sites;
- UK Ramsar Information Sheets; and
- SSSI citations.

### Current Baseline

#### *Statutory Designated Sites*

9.10.7 There are no international statutory designated sites within 2 km or within 30 km for bats of the River Lugg weirs works boundary.

9.10.8 There is one national statutory designated site within 2 km of the River Lugg weirs works boundary. The weirs are situated within the River Lugg SSSI and includes the River Lugg Meanders SSSI and is part of the River Lugg meadows SSSI.

<sup>303</sup> Jacobs (2015). River Lugg SSSI Restoration Technical Report. 141 pp.

<sup>304</sup> Natural England (2023) Designated Sites View: River Lugg SSSI. [\[Online\]](#) Accessed 4 December 2023

<sup>305</sup> Environment Agency (Unpubl.) Lugg SAC Weirs Project. 13 pp.

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9.10.9 The SSSI is designated for the following species:

- Atlantic Salmon;
- Atlantic Stream Crayfish;
- Bull head;
- Twaitshad;
- Brook Lamprey; and
- Common Otter.

9.10.10 No LNR are present within the study area.

*Non-statutory designated sites*

9.10.11 Eyton Common LWS is located approximately 500 m north of the weirs.

*Habitats*

9.10.12 The weirs are located entirely within the River Lugg, aerial photography indicates that the river is treelined and surrounded by pastoral fields.

9.10.13 The desk study suggests the presence of the following HPI within 1 km of the River Lugg weirs works boundary: deciduous woodland (which is indicative of lowland mixed deciduous woodland HPI) and Wood pasture and Parkland.

9.10.14 There is no ancient woodland located within 1 km of the River Lugg weirs works boundary.

*Notable Plants*

9.10.15 NBN data suggests typical plant species for grassland and riparian habitats.

*Bats*

9.10.16 There are two granted EPSML for bats within 2 km of the River Lugg weirs works boundary. The following bat species have been identified in the license application details:

- Common pipistrelle (*Pipistrellus pipistrellus*);
- Soprano pipistrelle (*Pipistrellus pygmaeus*);
- Brandts (*Myotis brandtii nii*);
- Brown Long-eared (*Plecotus auritus*);
- whiskered (*Myotis mystacin*); and
- Natter's (*Myotis natteri*).

9.10.17 HBRC identified presence of common pipistrelle, brown long-eared bat, Daubenton's bat and soprano pipistrelle bats.

9.10.18 The linear features such as the river and the trees and riparian habitat are considered to be suitable for commuting/foraging and roosting habitat for bats.

*Badger*

9.10.19 NBN has historic records of badger within 1 km of the weirs. HBRC provided records of setts and road kill within 1 km of the weirs. The pastoral fields and connecting linear features in the vicinity of the weirs are considered suitable foraging/commuting habitat for badgers.

*Otter*

9.10.20 NBN has historic records of otter within 1 km of the weirs, confirmed by records from HBRC. The river and the riparian habitat in the vicinity of the weirs are considered suitable foraging/commuting and potentially holt habitat for otter.

*Other Notable species*

9.10.21 No water vole or dormouse, or records were identified within 1 km of the River Lugg weirs works boundary. Records of grass snake, slow worm, brown hare, hedgehog were provided by HBRC.

*Freshwater Habitats and Species*

9.10.22 The freshwater habitats of the River Lugg SSSI are classed as unfavourable (declining) (Natural England)<sup>304</sup>. The Herefordshire Biological Records centre states that the upper reaches of the River Lugg are fast-flowing over a rocky/gravelly bed. Nearer its confluence with the River Wye, the River Lugg is slower flowing over a silt and gravel bed. An experimental river management scheme has been applied in the past (1993).

9.10.23 The River Lugg weirs works boundary forms an excellent habitat for birds, mammals and invertebrates; kingfisher, heron, sand martin, cormorant, otter and crayfish being amongst those species recorded.”

*Macrophytes*

9.10.24 The weirs on the River Lugg are located within the Lugg – conf Norton Bk to conf R Arrow Waterbody (GB109055042030). The macrophyte element of this waterbody is classed as Moderate.

9.10.25 All the Environment Agency macrophyte monitoring sites in the vicinity of the weirs on the River Lugg are downstream. The macrophyte communities comprise a range of species from submerged to emergent species (e.g. water forget-me-not (*Myosotis scorpiodes*), river

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water crowfoot (*Ranunculus fluitans*), branched bur reed (*Sparganium erectum*), Potamogeton and lesser water parsnip (*Berula erecta*). Herefordshire Biological Records Centre has arrowhead (*Sagittaria sagittifolia*), flowering rush (*Butomus umbellatus*) and purple loosestrife (*Lythrum salicaria*) listed as occurring here.

9.10.26 In the downstream sites around Leominster the INNS Canadian pondweed (*Elodea canadensis*) was recorded.

9.10.27 Stream water crowfoot (*Ranunculus penicillatus* subsp. *Penicillatus*), which is Nationally Scarce and listed as a Species of Conservation Concern within Herefordshire LBAP was also recorded in the vicinity of the weirs on the River Lugg. Other such designated species recorded were Cyperus sedge (*Carex pseudocyperus*), greater tussock-sedge (*Carex paniculata*), horned pondweed (*Zannichellia palustris*). Whorlgrass (*Catabrosa aquatica*), was also present and also in the Cheaton Brook over 2 km downstream with connectivity to the River Lugg, downstream of the weirs (2014 record).

*Macroinvertebrates*

9.10.28 There are three Environment Agency macro-invertebrate monitoring sites within the Lugg – conf Norton Bk to conf R Arrow waterbody. All monitoring sites are upstream of the weirs on the River Lugg. The current WFD classification for macro-invertebrates is High status.

9.10.29 Two species have been identified by the Environment Agency to be of conservation interest, the larvae of the Nationally Scarce<sup>306</sup> diptera yellow-legged water-snipefly (*Atherix ibis*) and the larvae of the Nationally Scarce<sup>307</sup> caddisfly (*Ceraclea albimacula*). Both were recorded from site 100881, on the River Lugg near Kingsland, in spring 2019. No further sampling has been undertaken at this site.

9.10.30 The original River Lugg SSSI citation notes that white clawed crayfish are present in the waters and this species has been found in 2014 by subsequent Environment Agency Surveys<sup>308</sup>. The citation also states that nationally scarce species present include two aquatic beetles (*Riolus cupreus* and *R. subviolaceus*) which live on stones in flowing water,

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<sup>306</sup> Drake, C.M. 2017. A review of the status of Larger Brachycera flies of Great Britain - Species Status No.29. Natural England Commissioned Reports, Number192.

<sup>307</sup> Wallace, I.D. (2016). A review of the status of the caddis flies (Trichoptera) of Great Britain - Species Status No.27. Natural England Commissioned Reports, Number191.

<sup>308</sup> Jacobs (2015). River Lugg SSSI Restoration Technical Report. 141 pp.

and the alderfly (*Sialis nigripes*), a species with an aquatic larva living in silts in large river systems. A range of mayflies (Ephemeroptera) including species with localised distributions are also recorded. The common hawkler (*Aeshna juncea*) is common along the headwaters of the river.

9.10.31 It is noted that the river bed substrate and flow rate determines the distribution of two damselflies listed as Species of Conservation Concern within Herefordshire LBAP, the banded demoiselle (*Calopteryx splendens*) and the beautiful demoiselle (*C. virgo*). The latter is present above and around Leominster but is replaced by the banded demoiselle down to the confluence with the Wye.

9.10.32 No INNS of concern have been recorded in the Environment Agency data. *Potamopyrgus antipodarum* is present but considered naturalised.

#### *Fish*

9.10.33 The fish species that are features of the River Lugg SSSI (Atlantic salmon, bullhead, twaite shad and brook lamprey) are classed as in unfavourable (declining) condition. In terms of Atlantic salmon, Environment Agency (Unpubl.) states that the River Wye and River Lugg are deemed to be iconic for their salmon population, although the salmon population of the

downstream River Wye is in a critical state. This is as the number of returning adult fish to spawn is significantly below those required to meet the minimum biologically safe level for a sustainable fishery. It is also noted that the River Wye has not achieved its salmon Management Objective for several years. In 2021, the reported rod catch was the second lowest rod catch recorded for the Wye (328) (lowest was in 1992 at 320 salmon). As the overall catch of salmon within the Wye rod fishery has declined substantially and the stock has failed to achieve the conservation limit, the stock is projected to be “At Risk” in five years’ time.

9.10.34 Three Environment Agency monitoring site datasets and Herefordshire Biological Records Centre data have been examined, both up and downstream of the weirs on the River Lugg. All sites had broadly similar species composition, comprising species such as bullhead, stone loach, minnow, sea/brown trout and Atlantic salmon, lamprey species, European eel and grayling. The communities contain several species of conservation importance and are characteristic of the faster flowing waters upstream of Leominster, which the SSSI citation notes as a brown trout fishery and the migratory species were present both up and downstream of the weirs on the River Lugg. The citation also states that few coarse fish are found upstream of Aymestry which marks the limit of the Atlantic salmon migration. It should also be noted that

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twaité shad would only reach as far as Urdimarsh (approximately 10 km south of Leominster) on their migration.

### Future Baseline

9.10.35 Water quality of the main rivers will, in the immediate future, continue to reflect existing land and water management practices and is influenced by run off from the surrounding agricultural run-off and purposeful/accidental discharges.

9.10.36 In the longer term, water quality will remain an important factor determining habitat quality. Climate change is predicted to result in increases in freshwater temperatures and increase variability in precipitation resulting in changes to river levels resulting in flooding and droughts. The effects of climate change may progressively worsen the impacts of existing obstacles for fish migration. In terms of freshwater species, improvements in management and water quality in the future are likely to result in an improvement in the status of freshwater communities.

9.10.37 Colonisation of INNS both because of existing or known species colonising new areas or climate change resulting in improved conditions favouring invasive species, could influence the future baseline for example through competition with native species.

### Assumptions and Limitations

9.10.38 This study is based on a desk-based assessment only and no site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings presented. The assessment provided is based on information available at the time of writing.

9.10.39 At this PEIR stage, specific details regarding the proposed compensation measures at the weirs on the River Lugg are not fully known or decided.

9.10.40 At the time of writing, mitigation design is in a preliminary phase. Mitigation will be fully developed for the ES in discussion with stakeholders. Effects that are normally mitigated by best practice/embedded design such as construction of access routes, the control of INNS and pollution from spills and faulty machinery are not considered in the potential effects.

### Likely Significant Effects

9.10.41 This assessment has been undertaken in accordance with the common Framework set out in **Volume 1 Chapter 4**. This chapter uses geographic frame of reference for importance (sensitivity) and follows the CIEEM *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*.

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9.10.42 To allow comparisons with other technical chapters in the ES, importance has also been described (in brackets) using the more familiar terms used for sensitivity as per **Volume 1 Chapter 4**:

- International and European (High) - SACs, SPAs, MCZs and Ramsar sites and habitats or populations of species, outside of protected sites, considered to be important at an international/European level;
- National (Medium) - SSSIs and habitats or populations of species outside SSSIs considered to be important at the National level;
- Regional (Low) - Habitats or populations of species considered to be important within the West of England;
- County (Low) - Non-statutory designated sites (CWS, OSWI or UWS), habitats or populations of species considered to be important in Herefordshire;
- Local (Low) - habitats or species populations considered to be important at the site level and its immediate surrounds, and
- Less than local (Negligible) - habitats or species populations which are common and widespread.

9.10.43 It should be noted that the individual sensitivities will be assigned at the next stage in the ES.

9.10.44 For the purpose of this assessment, the level of impact is described as the ‘magnitude’ of impact to provide consistency across the technical chapters of this ES. The magnitude of impact is reported in accordance with the criteria provided in **Table 9-18**:

**Table 9-18: Description of magnitude**

Level of magnitude (change)		Typical description
High	Negative	Permanent/irreversible damage. The extent, duration and/or frequency/timing of the impact would negatively affect the integrity or key characteristics of the important ecological feature.
	Positive	Permanent addition of, improvement to, or restoration of an important ecological feature. The extent, duration and/or frequency/timing of the impact would positively affect the integrity or key characteristics of the important ecological feature.
Medium	Negative	Temporary/reversible damage. The extent, duration and/or frequency/timing of the impact would negatively affect the integrity or key



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Level of magnitude (change)		Typical description
		characteristics of the important ecological feature.
	Positive	Temporary addition of, improvement to, or restoration of an important ecological feature. The extent, duration and/or frequency/timing of the impact would positively affect the integrity or key characteristics of the important ecological feature.
Low	Negative	Permanent/irreversible damage. The extent, duration and/or frequency/timing of the impact would not affect the integrity or key characteristics of the important ecological feature.
	Positive	Permanent addition of, improvement to, or restoration of an important ecological feature. The extent, duration and/or frequency/timing of the impact would not affect the integrity or key characteristics of the important ecological feature.
Very Low	Negative	Temporary/reversible damage. The extent, duration and/or frequency/timing of the impact would not negatively affect the integrity or

Level of magnitude (change)		Typical description
		key characteristics of the important ecological feature.
	Positive	Temporary addition of, improvement to or restoration of an important ecological feature. The extent, duration and/or frequency/timing of the impact would not affect the integrity or key characteristics of the important ecological feature.

### Terrestrial Ecology

9.10.45 The habitats surrounding the weir are not listed as HPI and are common in the wider landscape. The terrestrial species inhabiting the riparian habitats and surrounding fields and field margins have not been surveyed. Although detailed design is not known at this stage, the removal phase will be temporary, of medium-term duration and will be of very low magnitude. However, until a PEA of the weirs on the River Lugg and necessary working areas is undertaken, as a precautionary approach all species and notable habitats will be scoped in to further assessment.

9.10.46 Until further design information is available an assessment of riparian habitats and the effects of the

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river on these habitats during operation is scoped in for further assessment.

### **Freshwater Ecology**

9.10.47 Potential effects on freshwater ecology are outlined below.

#### *Sediment removal and release during removal activities*

9.10.48 The weir removal activities will cause sediments and the associated habitats built up around the existing structure and upstream to be removed/disturbed and increase suspended sediments within the water column and smother substrate downstream (causing a deterioration in habitats such as gravels). As sedimentary habitats will be removed, so will associated species particularly macrophytes and invertebrates. Mitigation measures and best practices will reduce this effect, but it is likely that there will be effects observable in the vicinity of each of the weirs and downstream. The removal phase effects will likely be temporary, of short-term duration would constitute a moderate magnitude.

#### *Disturbance to fish communities (resident/migratory) during removal activities*

9.10.49 The weir removal activities will disturb and displace fish communities in the river and if these occur during key migratory windows may act as barrier to migration. Mitigation measures would include carrying out the removal activities outside of these migratory windows where possible. The removal phase effects will likely be temporary, of short-term duration would constitute a moderate magnitude.

#### *Spread of INNS during operation*

9.10.50 Although no INNS of fish or invertebrate have been noted here, there have been records of INNS of macrophyte further downstream of the weirs (Canadian pondweed). The area will be checked for such species as part of the mitigation. The removal phase effects will likely be temporary and although of potentially long-term duration would constitute a very low magnitude.

#### *Changes in sediment habitat and deposition during operation*

9.10.51 The removal of the weirs will cause changes over time to the hydrodynamics, riverbed and gradient, altering the aquatic habitats both up and downstream of the

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weirs. The operational phase effects will likely be of long-term duration and moderate magnitude.

*Operational changes to hydrodynamics, water quality and temperature regime*

9.10.52 The removal of the weirs will cause changes to the water environment namely the hydrodynamics which influence the temperature and other water quality parameters in the river which over time will stabilise with the new gradient and loss of impoundment effect. These conditions may increase/decrease the suitability for some aquatic species (invertebrates, fish and macrophytes), e.g., through changes in dissolved oxygen, and a change in communities in the areas affected are likely to occur. Overall, this will improve the freshwater habitat. The operational phase effects will likely be of long-term duration and moderate magnitude.

*Changes to species distribution during operation*

9.10.53 The removal of the weirs will improve access to the upstream habitat particularly for migratory fish species. Species such as Atlantic salmon, river lamprey and European eel will be more able to access the habitat, and this will benefit the populations of these species with associated spawning success and/or escapement from the catchment. The operational phase effects will

likely be of long-term duration and moderate-major magnitude.

### Proposed Scope

9.10.54 It is proposed that the ES includes a detailed assessment of potential terrestrial and freshwater ecology impacts that could occur during the proposed compensation measures at the weirs on the River Lugg. **Table 9-19** summarises the elements scoped into the assessment.

9.10.55 Until further site-specific habitat and species surveys, and subsequent suitability assessments, are completed, a precautionary approach to assessment will be undertaken for the remaining ecological receptors.

9.10.56 Regardless of inclusion in the ES assessment, all relevant species will be reviewed in relation to legislation in a Biodiversity Legislation Compliance Report to be submitted as an appendix to the ES.

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**Table 9-19: Summary of ecology (terrestrial and freshwater) and ornithology elements scoped into the assessment**

Potential Effect	Scoped IN or OUT	Justification
Terrestrial ecology and ornithology		
Disturbance and habitat loss for terrestrial species as a direct result of removal activities	IN	Construction vehicles and human activity will cause temporary disturbance to foraging/commuting terrestrial species. Surveys will need to be undertaken to understand which species are present within the River Lugg weirs works boundary and mitigation will need to consider seasonal timings, type of vehicles and potentially trapping and translocation of species to reduce the disturbance and limit the habitat loss
Changes to riparian habitat once the weirs are removed	IN	The weirs on the River Lugg will need to be assessed ensure once the weirs are removed the riparian habitat is not lost due to the new flow regimen.
Freshwater ecology		

Potential Effect	Scoped IN or OUT	Justification
Sediment removal and emissions generated during the removal of the weirs on the River Lugg	IN	Removal activities associated with the removal of the weirs on the River Lugg have the potential to remove and suspend sediments and increase turbidity and smothering of substrate downstream, causing deterioration in habitats (e.g. gravels), removal of habitats (through sediment removal), reduction in water quality and effects on macrophyte, fish and invertebrate communities.
Disturbance to fish communities and migration during removal activities	IN	Disturbance to fish communities around the weirs during removal in and around the river will be unavoidable through noise and excavations; however, mitigation measures including removal window timing can reduce the effects.
Spread of INNS (operation).	IN	The operational regime may allow any INNS to move to other areas of the River Lugg. The only species recorded in the data available is Canadian

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Potential Effect	Scoped IN or OUT	Justification
		Pondweed at over 2 km distance downstream. Checks to include for this species to be undertaken in the vicinity of the weirs.
Operational changes to sedimentary habitats	IN	The removal of the weirs will permanently change the aquatic habitats owing to changes in sediment distribution and hydrodynamics. Some aquatic species will be displaced because of this, but there will be beneficial effects to other species (e.g., fish through improved spawning habitat) and an overall improvement in habitat.
Operational changes to hydrodynamics, temperature and other water quality parameters	IN	The removal of the weirs will cause changes to hydrodynamics, temperature regime and other water quality parameters in the river which over time will stabilise with the new gradient and loss of impoundment effect. These conditions may increase/decrease the suitability for some aquatic species

Potential Effect	Scoped IN or OUT	Justification
		(invertebrates, fish and macrophytes) and changes in communities in these areas are likely to occur.
Operational changes to distribution in species from removal of weir barriers	IN	The removal of the weirs will improve access to and from the upstream habitat particularly for migratory fish species. This will benefit populations e.g., of Atlantic salmon which are currently in decline.

## 9.11 Landscape and Visual

### Introduction

9.11.1 This section considers the likely significant effects associated with landscape and visual impacts arising as a result of the proposed compensation measures at the weirs on the River Lugg.

### Study Area

9.11.2 The proposed LVIA study area for the assessment of the proposed changes extends to 1 km from the River

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Lugg weir works boundary. This is considered to be the likely maximum distance at which landscape and visual impacts are likely to arise as a result of the relatively limited scale of the proposed compensation measures at the weirs on the River Lugg. Beyond 1 km there is unlikely to be any perceptible change.

## Baseline

### Baseline Sources

9.11.3 The following sources have been used to inform a preliminary understanding of the baseline conditions for the assessment of the landscape and visual aspect:

- Natural England’s National Landscape Character Area Profiles;
- Herefordshire County, Landscape Character Assessment, LUC April 2023<sup>309</sup>;
- The definitive PRow map for Herefordshire County Council<sup>310</sup>;
- MAGIC Maps; and

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309 Herefordshire County, Landscape Character Assessment, LUC April 2023 [[Online](#)]  
Accessed 4 December 2023

310 Herefordshire County Council, Highways and public rights of way map. [[Online](#)]  
Accessed 4 December 2023

- Aerial photography.

### Current Baseline

9.11.4 The proposed compensation measures at the weirs on the River Lugg have the potential to result in impacts on both landscape character and visual amenity. Several landscape and visual receptors have been identified.

#### *National Landscape Character*

9.11.5 The weirs on the River Lugg fall within NCA 100: Herefordshire Lowlands.

9.11.6 Due to the large scale of the NCAs compared to the small scale of the proposed compensation measures at the weirs on the River Lugg, the LCT are more applicable to the weirs on the River Lugg. Therefore, the National Landscape character have been scoped out of the future assessment.

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### *Landscape Character Type*

9.11.7 Herefordshire County, Landscape Character Assessment, 202358 has defined the areas as within the LCT 1 – *River Floodplains* and is described as follows;

*‘The boundaries of the LCT are defined by the extent of Flood Zone 3 along the major rivers, the extent of alluvial deposits, and the extent of riverside meadows, particularly around the Lugg. The landscapes are generally flat, with the superficial geology of alluvium resulting in wide fertile agricultural plains. The flood plains are typically used for pasture, with tree cover along the watercourses. Development and settlement are generally absent.*

*Meandering river channels provide visual interest, framed in places by the rising ground of old river terraces.*

*A small-scale landscape with sinuous field patterns. Fields bound by ditches and intermittent hedgerows.*

*Tree cover is represented by well-defined willow and alder along the river channels and as hedgerow trees.*

*Views vary with the width of the floodplain, from enclosed landscapes in narrow valleys, and expansive views in wider floodplains.*

*Access to the river channels is often restricted.’*

9.11.8 The overall aim for the River Floodplains LCT is ‘to conserve and enhance the rural character of the landscape and sense of place created by the naturally meandering river corridors, pasture land use, wetland habitats, and the undeveloped and tranquil character. Recreational uses that are sensitive and proportional to the setting, should be encouraged, while enhancing water quality and conserving the considerable areas of ecological importance’.

### **Statutory Landscape Designations**

9.11.9 The River Lugg SSSI, follows the length of the River Lugg from Presteigne to its confluence with the River Wyre. Between the weirs on the River Lugg are SSSI units ref 1046037 and 1046038 (Unfavourable Declining) and River Lugg Meanders ref: 1046000 (Favourable).

9.11.10 A Scheduled Monument (Kingsland Castle) is located c.1.6 m to the west.

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9.11.11 The closest Listed Buildings are located c.300 m at Coxall (Grade II), c.400 m at Gilberts Cottage (Grade II), c.700 m at The Broad (Grade II) c.800 m at Eyton Court and The Marsh (Grade II\*) all to the east. Others are located in Kingsland to the west and Leominster to the southeast.

### Access

9.11.12 Two PRoW are in close proximity to the River Lugg weirs works boundary;

- PRoW from Gilbert Cottage, in the north, towards a footbridge over the River Lugg (although this is currently not in use).
- PRoW loops from Cholstrey Mill Farm, in the south, towards the footbridge over the River Lugg and on towards Oakfields and Mousenatch Farms.

9.11.13 There are two areas of Registered Common Land to the north of the River Lugg at Eyton Upper Common (approximately 320 m) and Eyton Common (approximately 420 m).

9.11.14 A Millennium Green has been designated in Kingsland c1.45 km to the west.

### Visual receptors

9.11.15 The visual receptors that are likely to be affected by the proposed compensation measures at the weirs on the River Lugg are outlined in **Table 9-20**.

**Table 9-20: Receptors likely to be affected**

Receptor description	Receptor type	Approximate distance to River Lugg weirs works boundary (at its closest)
LCT 1 – River Floodplains	Landscape Character	0 m
PRoW - Cholstrey Mill Farm to Oakfields and Mousenatch Farms	Recreational	70 m
The Mill	Residential	200 m
PRoW - Gilbert Cottage to footbridge	Recreational	255 m
South Lodge	Residential	265 m
Coward's Mill	Residential	270 m
Coxall Farm	Farm, Residential	372 m
Oakfields Farm	Farm	420 m
Kemble House Farm	Residential	500 m



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Receptor description	Receptor type	Approximate distance to River Lugg weirs works boundary (at its closest)
Residential (350 m east of Gilbert’s Farm)	Residential	531 m
Coals view holiday cottage	Residential, Recreational	535 m
Broad farm	Farm, Residential	550 m
Residential (adjacent Kemble House Farm)	Residential	774 m

### Future Baseline

9.11.16 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

9.11.17 Identification of receptors is based on a desktop study.

9.11.18 At the time of this report the proposed compensation measures at the weirs on the River Lugg are not confirmed, or a mitigation strategy developed, that the impacts and those effects can be fully understood, including the impact of any potential lowering of water levels upstream of the weirs on the River Lugg. It is assumed that where it is not possible to avoid or reduce a significant adverse effect, remediation measures will be used to offset the effect.

9.11.19 It is assumed that temporary access during removal will be via existing highways and / or tracks or where this is not possible a haul road will be created and reinstated to the original land use / condition.

9.11.20 It is assumed that PRow access will not be permanently affected however temporary diversions may be required during the removal works.

9.11.21 All components of the proposed compensation measures at the weirs on the River Lugg will be included in the future assessment.

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## Potential Effects

9.11.22 The likely effects associated with the landscape and visual aspect as a result of the proposed compensation measures at the weirs on the River Lugg are outlined below.

### Local landscape Character

9.11.23 Due to the scale and nature of the proposed compensation measures at the weirs on the River Lugg, effects on local landscape character are unlikely to result in significant change, however this would be considered in detail once a final design is developed.

### Visual receptors

9.11.24 It is anticipated that some, or all, of the visual receptors have the potential to experience temporary visual effects from the removal of the weirs due to temporary access, site compounds and movement of construction vehicles. There is also the potential for them to experience permanent visual effects due to a change in vegetation / water levels.

## Proposed Scope

9.11.25 Based on the above assessment, **Table 9-21** presents the potential Landscape and Visual effects that are

proposed to be scoped in or out of requiring further assessment, along with the rationale for the choice.

**Table 9-21: Summary of landscape and visual elements scoped in and out of the assessment**

Potential Effect	Scope d IN or OUT	Justification
National Landscape Character	OUT	Due to the large scale of the NCA's compared to the small scale of the proposed compensation measures at the weirs on the River Lugg, the LCT are more applicable to the River Lugg weirs. Therefore, the National Landscape character have been scoped out of the future assessment.
Local Landscape Character	IN	Due to the scale and nature of the proposed compensation measures at the weirs on the River Lugg, effects on Landscape character are unlikely to result in significant change, however this would be considered in detail once a final design is developed.
Visual Receptors	IN	It is anticipated that some, or all, of the visual receptors have the potential to experience temporary visual effects from the removal of

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Potential Effect	Scope d IN or OUT	Justification
		the weirs due to temporary works access, site compounds and movement of construction vehicles. There is also the potential for them to experience permanent visual effects due to a change in vegetation / water levels.

9.11.26 Therefore, it is proposed that Landscape and Visual is scoped into the ES.

## 9.12 Historic Environment

### Introduction

9.12.1 The aims of this section are to:

- Identify any heritage assets and archaeological features associated with the weirs on the River Lugg, both within the River Lugg weirs works boundary and a 250 m study area.
- Identify whether the assets could be potentially impacted by the proposed compensation measures at the weirs on the River Lugg.

- Outline a proposed scope and methodology for the assessment of historic environment impacts within the ES.

### Study Area

9.12.2 For the purpose of the assessment a 250 m study area was established around the River Lugg weirs works boundary to identify any nearby heritage assets that could be impacted by the development.

### Baseline

#### Current Baseline

9.12.3 There are no designated heritage assets (Scheduled Monuments, Listed Buildings, Registered Parks and Gardens or Registered Historic Battlefields) recorded within the River Lugg weirs works boundary or 250 m study area by the NHLE. The weirs on the River Lugg are also not located within a World Heritage Site or Conservation Area.

9.12.4 Additionally, the Herefordshire Historic Environment Record database was consulted to determine any archaeological features within the area. For Coxall Weir and Eyton Weir, the review revealed that there were no archaeological features within the Study Area. As such, the assets are considered of negligible

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interest. For Mousenatch Weir, the review revealed that there were some cropmarks on an aerial photograph (grid reference SO 4685 6101) (Hob UID 108488). This asset is considered of negligible interest.

- 9.12.5 Based on the above, the areas are considered of low archaeological significance.

### Future Baseline

- 9.12.6 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purpose of this chapter will remain largely unchanged from the current baseline.

### Assumptions and Limitations

- 9.12.7 At the PEIR stage, various details regarding the proposed compensation measures at the weirs on the River Lugg are not known. In particular the size of the work has not been fully identified which would impact on the archaeological finds and heritage assets to be included within the assessment. However, as

discussed, the area is of low archaeological importance so the removal works would cause a negligible impact on the assets.

- 9.12.8 The study is based on a desk-based assessment only and no site investigation, surveys or walkover visits have been undertaken to inform this study or confirm the findings present. The data used in this report have been derived from external sources, and it is presumed that any third-party information used is accurate.

- 9.12.9 The study has outlined the potential of archaeology in the area as low due to the lack of heritage assets in the surrounding area.

### Likely Significant Effects

- 9.12.10 Based on the available information, the removal of the weirs on the River Lugg are not expected to result in any significant effects in relation to the historic environment.

### Proposed Scope

- 9.12.11 Based on the above assessment, **Table 9-22** presents the historic environmental impacts that are proposed to be scoped out of requiring further assessments along with the rationale of choice.

**Table 9-22: Summary of historic environmental elements scoped in and out of assessment.**

Potential Effect	Scoped IN or OUT	Justification
Potential impacts on assets and archaeological features by proposed compensation measures at the weirs on the River Lugg	OUT	There are no designated heritage assets and non-designated heritage assets within the River Lugg weirs works boundary and study areas, as such the assets are of low archaeological significance.

9.12.12 Therefore, it is proposed that historic environment is scoped out of the ES.

## 9.13 Amenity and Recreation

### Introduction

9.13.1 The section considers the likely impact of the assets and archaeological features on community, recreational and residential receptors within the study area.

9.13.2 Recreational receptors include PRowS, promoted routes, cycle routes, LDWRs, open access land,

bridleways, and any recreational facilities. The assessment considers likely impacts on access to recreational facilities as well as amenity impacts.

9.13.3 Amenity is the term used to describe the character or attractiveness of an area. Amenity can be affected when two or more environmental effects are experienced by the same receptor (e.g., a cycling route) with the potential to deter users of the receptor (e.g. cyclists). The following environmental effects are considered in the amenity assessment: landscape and visual effects, traffic and transport effects, noise and vibration effects and air quality effects. Amenity impacts are considered for residential, community and recreational receptors.

### Study Area

9.13.4 For the purposes of this assessment, the study area includes the River Lugg weirs works boundary, plus a 500 m buffer.

### Baseline

#### Current Baseline

9.13.5 Environmental receptors considered in this assessment include residential properties, community facilities and recreational facilities including PRowS,

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Open Access Land, Public Open Spaces and Recreational sites.

*Residential receptors*

- 9.13.6 There is one residential property within 500 m of Coxall Weir, Coxall farm. The other two weirs on the River Lugg have no residential properties within 500 m. Broad Farm and The Mill Farm and also found near the study site along the River Lugg.

*Community receptors*

- 9.13.7 There are no nearby community receptors for any of the weirs on the River Lugg. Outside of the study site and 500 m buffer is the Kingsland C of E Primary School located off B4360 North Road.

*Recreational receptors*

- 9.13.8 Recreational receptors include; Kingsland KL6 PRow which runs along all River Lugg as well as the River Lugg SSSI and one bridleway. There are PRowS located between the unnamed road and each side of the River Lugg. One bridleway is located within the study site. Footpath EY5 crosses the river between Gilbert's Weir and Mousenatch Weir. Footpath KL6 runs adjacent to the river, being approximately 85 m south-west of the weir.

**Future Baseline**

- 9.13.9 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

**Assumptions and Limitations**

- 9.13.10 At the PEIR stage, specific details regarding the proposed compensation measures at the weirs on the River Lugg are not fully known / decided.
- 9.13.11 The current assumptions in relation to Amenity and Recreation effects are;
- The duration of the removal works will be short term and temporary (4 months); and
  - Land will not be permanently acquired for the proposed compensation measures at the weirs on the River Lugg.

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## Likely Significant Effects

### Access to recreational receptors

#### *PRoWs*

9.13.12 The Kingsland KL6 PRoW falls within the potential site extent for Mousenatch Weir. The footpath's current alignment intersects the River Lugg weirs works boundary. Therefore, this PRoW may be temporarily diverted during the removal works to maintain access for the local community. There will be no permanent effects on this PRoW along the River Lugg.

9.13.13 The bridleway located within the study site may be temporarily diverted or closed during removal. The effect on horse riders is not anticipated to be significant.

#### *Recreational Facilities*

9.13.14 There are no recreational facilities within 500 m of any of the weirs on the River Lugg. No significant effects are therefore anticipated.

#### *Open Access Land and Public Spaces*

9.13.15 The River Lugg SSSI entrance may be temporarily diverted in order to maintain access during the removal works. Access to the SSSI will not be impeded during either the removal of the weirs or operation. The

intervention may improve freshwater biodiversity within and around this SSSI and in turn arise recreational benefits for bird watchers and other recreational activities.

### Access to community receptors

9.13.16 There are no community receptors within 500 m of any of the weirs on the River Lugg. No significant effects are anticipated regarding access to community receptors.

### Amenity Effects

9.13.17 Amenity effects can arise due to a combination of two or more significant effects from Air Quality, Noise and Vibration, Landscape and Visual and Transport.

9.13.18 Amenity effects could arise on prows due to the combined effects of noise and vibration, transport, and landscape and visual. It should be noted that amenity affects could also arise in regard to recreational activities such as angling. Disturbance to angling during the removal stage would be minor and short term. Anglers may experience non-significant benefits during the operation stage.

## Proposed Scope

9.13.19 A summary of the amenity and recreation elements scoped into and out of further assessment is outlined in **Table 9-23**.

**Table 9-23: Summary of amenity and recreation elements scoped in and out of the assessment.**

Potential Effect	Scoped IN or OUT	Justification
Access to recreational receptors	OUT	Temporary diversions to PRowS will be reinstated once removal is complete. This will not be a long-term change and access for the local community will still be maintained. During operation, there could be benefits for those using the river for recreational activities due to potential increased freshwater biodiversity through habitat creation.
Access to community receptors	OUT	There are no community receptors within the study area. Thus, no significant effects anticipated.
Amenity effects	IN	Amenity effects could arise on recreational receptors as a result of the combined effects of noise

Potential Effect	Scoped IN or OUT	Justification
		and vibration, transport and landscape and visual.

## 9.14 Population and Human Health

### Introduction

- 9.14.1 This section considers the impact of the proposed compensation measures at the weirs on the River Lugg on population and human health.
- 9.14.2 The WHO defines human health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”.
- 9.14.3 Health effects can be direct (e.g., air pollution resulting in respiratory problems) or indirect (e.g. reduced community interaction due to increased traffic resulting in adverse effects on well-being). Similarly, prolonged environmental effects (direct effect) can result in changes to quality of life (indirect effects). The assessment follows a source-pathway-receptor model (as shown in **Table 9-24**), only reporting effects through which there is a clear pathway between the source and



the receptor and using evidence to support the conclusions.

**Table 9-24: Source-Pathway-Receptor Model**

Source	Pathway	Receptor	Plausible Health	Explanation
x	✓	✓	No	There is not a clear source from where a potential health impact could originate
✓	x	✓	No	The source of a potential health impact lacks a means of transition to a population
✓	✓	x	No	Receptors that would be sensitive or vulnerable to the health impact are not present
✓	✓	✓	Yes	Identifying a source, pathway and receptor does not mean a health impact is a likely significant effect. The health impact is assessed qualitatively based on the available

Source	Pathway	Receptor	Plausible Health	Explanation
				evidence and through the application of professional judgement.

9.14.4 The assessment of impacts on human health relies on the effects reported by Aspect chapters to identify potential human health impacts. The relevant chapters have been referred to as the ‘constituent aspects’ and the effects they report are termed ‘health determinants’.

9.14.5 Health determinants can be defined as the range of personal, social, economic and environmental factors that influence health status. Where effects are concluded as significant at a constituent aspect level within the PEIR, these have been considered within the assessment as having potential for human health effects. Where effects are concluded not to be significant at a constituent aspect level within the PEIR, these have not been considered in the health assessment. Constituent aspects considered in this assessment include:

- Socio-Economics;
- Noise and Vibration;

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- Soils and Land use;
- Geology and Land Contamination;
- Amenity and Recreation; and
- Landscape and Visual.

### Study Area

9.14.6 For the assessment of impacts on population and human health, the study area will be defined by the scope of the relevant constituent aspect study areas.

### Baseline

#### Current Baseline

9.14.7 Baseline information relevant to population and human health is outlined in the relevant constituent aspects as follows:

- The location and type of community and recreational facilities – Recreation and Amenity;
- The location of green / open space – Soils and Land Use and Recreation and Amenity
- The spatial characteristics of the transport network and usage in the area, including the surrounding road network, PRow (including bridleways), cycle

ways, non-designated public routes and public transport routes –Transport;

- AQMAs and ambient air quality levels – Air Quality;
- Areas recognised as being sensitive to noise (e.g., noise important areas, noise management areas) and the ambient noise environment – Noise and Vibration;
- Sources and pathways of potential pollution (e.g., land/water contamination) – Soils and Land Use and Geology and Land Contamination; and
- Landscape amenity – Landscape and Visual

#### Future Baseline

9.14.8 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site considers changes that are expected to have been made by the time Hinkley Point C is operational, including as a result of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

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## Assumptions and Limitations

9.14.9 At the PEIR stage, specific details regarding the proposed compensation measures at the weirs on the River Lugg are not fully known/ decided.

## Likely Significant Effects

9.14.10 The following constituent aspects have been scoped into the assessment and therefore have the potential to give rise to impacts on human health:

- Landscape and Visual;
- Noise and Vibration;
- Amenity and Recreation;
- Soil and Land Use; and
- Geology and Land Contamination.

## Proposed Scope

9.14.11 A summary of the population and human health scope for further assessment is outlined in **Table 9-25**.

**Table 9-25: Summary of Population and Human Health elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Potential adverse of beneficial population and Human Health effects	IN	It is proposed that the ES includes a detailed assessment of potential population and human health effects that could occur during the proposed compensation measures at the weirs on the River Lugg. At this stage, it is unclear whether potential significant population and human health effects will be realised, thus, with the likelihood of the scoped in constituent aspects giving rise to potential impacts on human health, the full assessment is required.

## 9.15 Climate Change

### Introduction

9.15.1 The aim of this section is to consider the likely significant effects of the proposed compensation measures at the weirs on the River Lugg on

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anthropogenic climate change (i.e. through GHG emissions).

9.15.2 Under Schedule 4 Paragraph 5(f) of the 2017 EIA Regulations, an ES must provide “a description of the likely significant effects of the development on the environment” resulting from “the impact of the project on climate (for example the nature and magnitude of GHG emissions) and the vulnerability of the project to climate change”. Although the Regulations require consideration of the vulnerability to climate change, as the proposals include removal of infrastructure, there is no physical asset remaining, other than reinstating the riverbank, which could be vulnerable to climate change. Therefore, no further consideration of this aspect is included within this section and is scoped out from the ES.

### Study Area

9.15.3 For the assessment of the impacts of GHG emissions on climate, the River Lugg weirs works boundary is considered appropriate. The study area includes the GHG emissions associated with the proposed compensation measures at the weirs on the River Lugg to determine the impact on the climate. The main GHGs relevant to the removal of weirs are CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O. GHG emissions are reported as CO<sub>2</sub> equivalents (CO<sub>2</sub>e), which accounts for the different

GWP of each GHG, relative to CO<sub>2</sub>. Other GHGs are include, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride, but these are not anticipated to be material in the nature of the activities.

### Baseline

#### Current Baseline

9.15.4 Baseline emissions are defined as emissions that occur without the project. For the area of the River Lugg weirs works boundary there are zero emissions associated with the current operation of the river. Therefore, no emissions are associated with the ‘use’ of this land prior to the removal of the weirs on the River Lugg.

#### Future Baseline

9.15.5 As explained in **Volume 1 Chapter 4**, the future baseline for the assessment of the proposed changes off-site accounts for changes that are expected to have been made by the time Hinkley Point C is operational, including because of the currently consented Hinkley Point C Project in the absence of the proposed changes that will be the subject of the material change application. However, the future baseline for the purposes of this chapter will remain largely unchanged from the current baseline.

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### Assumptions and Limitations

9.15.6 At the PEIR stage, specific details regarding the proposed compensation measures at the weirs on the River Lugg are not fully known.

### Likely Significant Effects

9.15.7 GHG emissions associated with the removal of the weirs in the form of emissions from the transport of workers and plant to and from the weirs on the River Lugg, consumption of fuel for the removal activities and wastes generated are expected to be minimal. The GHG emissions would be negligible in comparison to the UK's carbon budgets and represent a not significant adverse effect on climate.

9.15.8 It has been proposed that the block stones are reused to form a new channel and therefore there will be no change to the operational GHG emissions.

### Proposed Scope

9.15.9 Based on the above assessment, **Table 9-26** presents the potential GHG impacts of the proposed compensation measures at the weirs on the River Lugg and shows they are expected to be negligible and not significant and provides a rationale for being scoped out of further assessment.

**Table 9-26: Summary of climate change elements scoped in and out of the assessment**

Potential Effect	Scoped IN or OUT	Justification
Potential GHG emissions from the removal of weirs on the River Lugg	OUT	GHG emissions during the weir removal would be negligible in comparison to the UK's carbon budgets and would be a not significant adverse effect.
Potential GHG emissions from the operation of the proposed compensation measures at the weirs on the River Lugg	OUT	It is unlikely that there would be any GHG emissions following the removal of the weirs on the River Lugg.
Vulnerability to climate change	OUT	There is no physical asset remaining which would be vulnerable to climate change.

9.15.10 Therefore, it is proposed climate change is scoped out of requiring further detailed assessment in the ES.

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## 10. SUMMARY OF PROPOSED SCOPE

10.1.1 This Chapter summarises the proposed scope of the EIA for the sites assessed in **Chapters 5 to 9**. **Table 10–1** summarises the proposed scope of the EIA for Pawlett Hams and The Island (**Chapters 5 and 6**). **Table 10–2** summarises the proposed scope of the EIA for Maisemore Weir on the River Severn, Upper Lode Weir on the River Severn, and the Weirs on the River Lugg (**Chapters 7 to 9**).

10.1.2 As outlined in **Chapter 3**, some Aspects lack a pathway with the proposed changes off-site and consequently, assessments of these Aspects were not included in **Chapters 5 to 9** and they are proposed to be scoped out of the EIA:

- For all compensation measures, an assessment of the Aspects outlined below:
  - Spent Fuel and Radioactive Waste Management;
  - Radiological impacts; and
  - Major Accidents and Disasters.
- For works to the weirs, an assessment of the marine Aspects outlined below:
  - Coastal Hydrodynamics and Geomorphology;
  - Marine Water and Sediment Quality;

- Marine Ecology;
- Offshore and Intertidal Archaeology; and
- Shipping and Navigation.

10.1.3 A preliminary assessment of cumulative and in-combination effects can be found in **Volume 4** of this PEIR.

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**Table 10–1: Summary of the aspects to be scoped into and out of further assessment at the saltmarsh sites**

Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure scoped in (✓) or out (X) of assessment in the ES	
			Saltmarsh at Pawlett Hams	Saltmarsh at The Island
8	Conventional Waste Management	<p>An assessment of waste generated during construction should be conducted when more information is known – particularly whether the excavation material is suitable for use on-site or whether it requires recovery/disposal offsite. Conventional waste generation is predicted to be minimal, and it is unlikely that the amount of waste required to be disposed of would alter the regional capacity in a significant way.</p> <p>Potential reduction in the remaining landfill void and impacts on the capacity of waste management facilities in the region during operation are proposed to be scoped out of further assessment. No operational waste generation and management is expected/planned at this time.</p>	✓	✓

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Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure scoped in (✓) or out (X) of assessment in the ES	
			Saltmarsh at Pawlett Hams	Saltmarsh at The Island
9	Socio-economics	<p>Disruption to commercial receptors during construction and operation at the Pawlett Hams site is proposed to be scoped into further assessment. It is possible that disturbance effects to commercial receptors may arise due to the combined effect of landscape and visual, traffic and transport and noise and vibration impacts. Similarly, disruption to commercial receptors during construction and operation at The Island site is proposed to be scoped into further assessment as it is possible that disturbance effects to the commercial receptors may arise due to the combined effect of landscape and visual and traffic and transport effects.</p> <p>Impacts on commercial and agricultural land use during construction and operation at the Pawlett Hams site are also proposed to be scoped into further assessment. Land use impacts on commercial and agricultural properties are scoped into the assessment due to the potential temporary and permanent uptake of agricultural land.</p> <p>Impacts on commercial and agricultural land use at The Island site are proposed to be scoped out of further assessment due to no anticipated significant effects.</p> <p>Employment and economic investment in the region during construction and operation at both the Pawlett Hams and The Island sites are proposed to be scoped out of further assessment. Given the large size of the local workforce within the Sedgemoor Council Area, the strength of the regional economy and the low level of direct labour requirements to support the scheme, no socio-economic effects are anticipated.</p>	✓	✓



Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure scoped in (✓) or out (X) of assessment in the ES	
			Saltmarsh at Pawlett Hams	Saltmarsh at The Island
10	Transport	<p>Potential traffic impacts during construction need to be understood. Potential impacts on sensitive receptors, including pedestrians, cyclists and horseriders are also proposed to be scoped into further assessment. A Construction Traffic Management Plan ('CTMP') will include estimates of total vehicle movements, equipment and materials and will outline necessary limits and restrictions on construction vehicle movements. Temporary and potentially permanent closures and diversions of bridleways will also need to be explored further when the route options for construction access are confirmed. Relevant mitigation such as traffic management methods will be planned to mitigate any conflict points with construction traffic and other road users.</p> <p>The day-to-day operation of the proposed compensation measures at Pawlett Hams and The Island will generate negligible volumes of traffic and therefore an assessment of traffic impacts during operation is scoped out.</p>	✓	✓
11	Noise and Vibration	<p>Potential noise effects due to emissions from construction site plant and machinery is proposed to be scoped into further assessment for Pawlett Hams. The construction of Pawlett Hams is expected to involve the use of inherently noisy plant and equipment. Temporary noise disturbance could occur at local receptors located within the Study Area for construction noise. An assessment of this is proposed to be scoped out for The Island as there are no receptors within the Study Area for noise.</p> <p>Potential vibration effects due to emissions from construction site plant and machinery at Pawlett Hams and The Island are proposed to be scoped out of further assessment. No receptors are within the Study Areas for construction vibration.</p> <p>Potential noise and vibration effects due to emissions from construction-related off-site traffic at Pawlett Hams are scoped in as there are receptors along smaller routes near Pawlett Hams. An assessment of this is proposed to be scoped out for The Island as the construction-related traffic flows are likely to be less than the DMRB screening criteria.</p> <p>Potential noise and vibration effects during operation at the Pawlett Hams and The Island sites are proposed to be scoped out of further assessment. There are no activities expected to occur during the operation of the sites that could give rise to significant noise or vibration effects.</p>	✓	X

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Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure scoped in (✓) or out (X) of assessment in the ES	
			Saltmarsh at Pawlett Hams	Saltmarsh at The Island
12	Air Quality	<p>Potential dust soiling, human health and ecological impacts arising from dust and particulate matter emissions generated during the construction and operation of Pawlett Hams and The Island are proposed to be scoped out of further assessment. Activities associated with the construction activities have the potential to generate dust however, providing good practice mitigation measures (as recommended in the IAQM construction dust guidance) are implemented, the impact at nearby human and ecological receptors is considered to be negligible. There are no potential impacts from dust and particulate matter emissions generated during the operation of the proposed compensation measures at Pawlett Hams and The Island.</p> <p>Potential impacts on air quality due to emissions from site plant and machinery at both Pawlett Hams and The Island are proposed to be scoped out of further assessment. Given that relatively low numbers of plant and items of machinery would likely be used for only a limited duration and spread across the site, the associated potential effects on air quality are considered negligible.</p> <p>Potential impacts on air quality due to emissions from construction-related and operation-related off-site traffic at both Pawlett Hams and The Island are proposed to be scoped out of further assessment as the traffic flows are likely to be less than the screening criteria.</p>	X	X
13	Soils and Land Use	<p>Loss of soils and soil quality because of construction and operation at both Pawlett Hams and The Island are proposed to be scoped into further assessment as there will be disturbance, excavations and potential loss of soils and soil quality in these areas.</p> <p>Loss or disturbance to agricultural land at both Pawlett Hams and The Island are proposed to be scoped into further assessment as there may be the potential loss of Grade 3 soils, which should be assumed to be Grade 3a best and most versatile ('BMV') soil in the absence of further information.</p>	✓	✓

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Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure scoped in (✓) or out (X) of assessment in the ES	
			Saltmarsh at Pawlett Hams	Saltmarsh at The Island
14	Geology and Land Contamination	<p>Impacts related to geology/geological features at both Pawlett Hams and The Island are proposed to be scoped into further assessment for the construction and operational stages as there is not sufficient information relating to the presence of geological features to complete an assessment at this stage.</p> <p>Impacts related to the disturbance of potentially contaminated land for construction and operational phases at both Pawlett Hams and The Island are proposed to be scoped into further assessment as there is currently limited information available relating to the history of the sites and the potential for contamination to be present within soils.</p> <p>The sterilisation of mineral resources because of the proposed compensation measures at Pawlett Hams and The Island are proposed to be scoped out of further assessment as the proposed Order Limits are not within a Mineral Safeguarding Area and are unlikely to be identified as an area for mineral extraction in the future.</p>	✓	✓

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Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure scoped in (✓) or out (X) of assessment in the ES	
			Saltmarsh at Pawlett Hams	Saltmarsh at The Island
15	Groundwater	<p>Impacts to groundwater levels and flows during construction and operation at both Pawlett Hams and The Island are proposed to be scoped into further assessment as there is no information currently available on groundwater levels so significant effects cannot be ruled out at this stage.</p> <p>Impacts to groundwater quality during construction at both Pawlett Hams and The Island are proposed to be scoped into further assessment. Impacts can arise from construction activities such as excavations, topsoil stripping, accidental leaks, and spills etc. Considering the depth of the water table across the site is unknown significant effects to the underlying aquifers cannot be ruled out.</p> <p>Impacts to secondary receptors such as groundwater abstractions and GWDTE at both Pawlett Hams and The Island are proposed to be scoped into further assessment as information on groundwater abstractions have not yet been requested so significant effects cannot be ruled out at this stage.</p> <p>Potential for saline intrusion during construction and operation which could impact groundwater quality at both the Pawlett Hams and The Island sites are proposed to be scoped into further assessment. Given the tidal nature of the site saline intrusion into the superficial aquifers could result in a deterioration of groundwater quality.</p> <p>Increase in groundwater flood risk at Pawlett Hams is proposed to be scoped into further assessment. The presence of embankments can lead to upswelling of groundwater on the upgradient side of the embankment. Additionally, seepage loss under the embankments during periods of high tide impoundments could lead to groundwater flooding on the landward side of the embankments. The impact of groundwater flood risk at The Island is proposed to be scoped out of further assessment as there are no sub-surface structures or embankments proposed for this site, therefore the groundwater flood risk is not expected to change from baseline conditions.</p>	✓	✓

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Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure scoped in (✓) or out (X) of assessment in the ES	
			Saltmarsh at Pawlett Hams	Saltmarsh at The Island
16	Surface Water	<p>Potential impacts on surface water quality at both Pawlett Hams and The Island are proposed to be scoped into further assessment. Activities associated with construction have the potential to mobilise sediment or pollutants into the watercourse. The storage of water in the saltmarsh is also likely to change the biological and chemical quality of surface water. Therefore, the effects on surface water quality may be significant.</p> <p>Potential impacts on geomorphology due to the creation of new channels and breaching of flood defences at both Pawlett Hams and The Island are proposed to be scoped into further assessment. Activities associated with this have the potential to alter sediment and flow dynamics and there may be significant effects on geomorphology.</p> <p>Potential impacts on flood risk due to breaching of flood defences at both Pawlett Hams and The Island are proposed to be scoped into further assessment as the breaching of flood defences is likely to increase flood risk at the sites. Therefore, there may be significant effects on flood risk.</p> <p>Potential impacts on surface water supply at both Pawlett Hams and The Island are proposed to be scoped out of further assessment given that water infrastructure is unlikely to exist in the proximity of the sites.</p>	✓	✓
17	Coastal Hydrodynamics and Geomorphology	<p>Potential impacts on coastal hydrodynamics and geomorphology at both the Pawlett Hams and The Island sites are proposed to be scoped into further assessment.</p> <p>Activities to develop / enhance saltmarsh habitat at both sites will inevitably and intentionally cause changes to coastal processes (including sediment transport regimes and water movement), channel morphology and coastal / flood defences.</p> <p>There is also the potential for changes to affect several local coastal management policies and plans, primarily the North Devon and Somerset Shoreline Management Plan, and Parrett Catchment Flood Management Plan.</p> <p>Based on the value of receptors, it is anticipated that effects will be of medium magnitude, and minor (not significant) in nature.</p>	✓	✓

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Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure scoped in (✓) or out (X) of assessment in the ES	
			Saltmarsh at Pawlett Hams	Saltmarsh at The Island
18	Marine Water and Sediment Quality	<p>Potential impacts on marine water and sediment quality at both the Pawlett Hams and The Island sites are proposed to be scoped into further assessment.</p> <p>Ultimately, saltmarsh creation / enhancement has the capacity to improve water quality by encouraging sedimentation of suspended matter, filtering run-off and by removing dissolved nutrients from the water.</p> <p>Whilst resuspension of sediment may occur, resulting in release of any contaminants held within the sediment (and subsequent changes to water quality), available data suggests contamination levels are not significant.</p> <p>With a general importance of marine water and sediment quality receptors classed as medium, but with low sensitivity, effects are anticipated to be minor, or not significant in nature.</p>	✓	✓
19	Marine Ecology	<p>Potential impacts on marine ecology at both the Pawlett Hams and The Island sites are proposed to be scoped into further assessment.</p> <p>As described above, there is potential for changes to coastal hydrodynamics, marine water quality, and marine sediment quality, because of the proposed compensation measures at Pawlett Hams and The Island. As a consequence, as well as any direct effects identified in relation to marine ecology, indirect effects may also arise.</p> <p>Receptors addressed within the assessment include intertidal habitats / species, subtidal benthic habitats / species, fish (migratory and non-migratory), and marine mammals, with receptors classed as ranging from having low to high value / sensitivity. On that basis, effects on marine ecological receptors are considered within this interim assessment to range from minor adverse (not significant) and major beneficial (significant) in nature.</p>	✓	✓

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Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure scoped in (✓) or out (X) of assessment in the ES	
			Saltmarsh at Pawlett Hams	Saltmarsh at The Island
20	Ecology (Terrestrial and Freshwater) and Ornithology	<p>Potential effects related to disturbance and habitat loss for terrestrial species and wintering birds as a result of construction activities (including human activity and construction vehicles) at Pawlett Hams and The Island is scoped into further assessment.</p> <p>Loss of grazing marsh at Pawlett Hams and The Island is also scoped into further assessment as surveys are required to understand the condition and abundance of it.</p> <p>The effect of sediment removal and emissions generated during construction at Pawlett Hams is scoped into further assessment for freshwater ecology because of loss of freshwater habitat. Disturbance to fish communities and migration during construction are also scoped into further assessment for Pawlett Hams as disturbance from noise and excavation activities is likely.</p> <p>Operational impacts on Pawlett Hams and The Island, the designated sites, and protected species as a result of increased saltmarsh and associated habitat and creation of new channels and terrestrial habitats are also scoped into further assessment for both terrestrial and freshwater ecology.</p> <p>Changes in sediment habitat and deposition is also scoped in during the operation of the proposed compensation measures at Pawlett Hams as this may permanently alter the freshwater habitats present.</p> <p>Operational changes to salinity, hydrodynamics, water quality and temperature regime at Pawlett Hams are also scoped into further assessment because of breaching and saltmarsh creation.</p> <p>As The Island is already tidally influenced, any effects on freshwater ecology from the enhancement of saltmarsh and associated habitats can be scoped out. The only potential effects on freshwater ecology could occur within the land surrounding the proposed Order Limits during site access. It is considered that these would be mitigated through best practice mitigation (e.g., pollution, runoff, and siting of access tracks).</p>	✓	✓

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Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure scoped in (✓) or out (X) of assessment in the ES	
			Saltmarsh at Pawlett Hams	Saltmarsh at The Island
22	Landscape and Visual	<p>Due to the large scale of National Landscape Character Areas ('NCAs') compared to the small scale of the proposed compensation measures at Pawlett Hams and The Island, only effects on the Local Landscape Character Areas ('LLCA') are proposed to be scoped into further assessment. A significant change in local landscape character is unlikely but will be reviewed when the designs are further developed.</p> <p>Impacts on visual receptors at both Pawlett Hams and The Island are proposed to be scoped into further assessment. It is anticipated that some, or all, of the visual receptors have the potential to experience temporary visual effects from construction due to temporary construction access, compounds, and movement of construction vehicles. There is also the potential for visual receptors to experience permanent visual effects due to a change in vegetation / ground levels.</p>	✓	✓
23	Historic Environment	<p>There are no designated heritage assets within the proposed Order Limits for Pawlett Hams but there are four Grade II listed buildings within a 1 km Study Area which are of high value, but these are on the opposite bank of the River Parrett. There are no designated heritage assets within the proposed Order Limits or Study Area for The Island. Therefore, the effect on designated heritage assets is proposed to be scoped out of further assessment for Pawlett Hams and The Island.</p> <p>The Somerset HER database recorded a variety of non-designated heritage assets dating to the medieval and post-medieval period which are of low/medium value within the vicinity of both Pawlett Hams and The Island. As such, these sites are of high archaeological importance. Therefore, the potential loss or damage of non-designated heritage assets and archaeological features is scoped in for further assessment for Pawlett Hams and The Island.</p>	✓	✓
24	Offshore and Intertidal Archaeology	<p>At this stage, no significant effects on archaeological remains within the intertidal study area are deemed likely; however, this will be scoped into the ES to confirm this position.</p> <p>Studies undertaken to support the DCO ES in 2011 for Comwich Wharf and the Hinkley Point C site found there to be no protected wrecks or other designated heritage assets within the intertidal zone adjacent to Pawlett Hams or The Island.</p>	✓	✓



Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure scoped in (✓) or out (X) of assessment in the ES	
			Saltmarsh at Pawlett Hams	Saltmarsh at The Island
25	Amenity and Recreation	<p>Access to recreational receptors at both Pawlett Hams and The Island are proposed to be scoped into further assessment due to the loss, diversion or temporary closures required to PRow.</p> <p>Access to community receptors at the Pawlett Hams site is proposed to be scoped into further assessment due to the loss of the Elizabeth Boat Room. There are no community receptors within the study area for The Island, so it is proposed that this is scoped out.</p> <p>Amenity effects at Pawlett Hams and The Island are proposed to be scoped into further assessment. Amenity effects could arise on recreational receptors because of the combined effects of Landscape and Visual, Noise and Vibration and Transport (Landscape and Visual and Transport only for The Island).</p>	✓	✓
26	Shipping and Navigation	<p>Effects on shipping and navigation because of works at the Pawlett Hams and The Island sites are proposed to be scoped into further assessment to address the construction of the proposed saltmarsh compensation measures.</p> <p>Potential effects which will be considered within the ES include impacts on vessel movements, including commercial and recreational activities, and operational ports, marinas and wharfs which may be impacted by the proposed habitat creation / enhancement schemes. Possible changes to sediment loads will also be investigated.</p>	✓	✓
New	Population and Human Health	<p>Population and human health effects at both Pawlett Hams and The Island during construction and operation are proposed to be scoped into further assessment as other constituent Aspects have been scoped into further assessment and could give rise to significant effects on physical and mental human health.</p>	✓	✓

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Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure scoped in (✓) or out (X) of assessment in the ES	
			Saltmarsh at Pawlett Hams	Saltmarsh at The Island
New	Climate Change	<p>As GHG emissions associated with the works at Pawlett Hams and The Island will be minimal and likely balanced out or surpassed by the carbon removal resulting from the increased sedimentation at the new sites, the impact on the UK's carbon budgets will be not significant. During operation, it is anticipated that GHG emissions would be minimal and because of the sequestration potential through sediment accumulation and habitat creation, could lead to a net reduction in GHG emissions. This net reduction would be beneficial, but not significant. Therefore, an assessment of potential GHG emissions has been scoped out for Pawlett Hams and The Island.</p> <p>As project climate changes are lower over the short-term and would be mitigated for using best practice construction techniques, impacts related to vulnerability to climate change during construction are expected to be not significant and have been scoped out for Pawlett Hams and The Island.</p> <p>However, an assessment of the vulnerability of the operational sites to climate change has been scoped in to determine the significance of the effects. This would be based on furthermore detailed design information to determine the resilience of the saltmarsh to likely future climate parameters and to inform the design and need for ongoing assessment of the sites.</p>	✓	✓

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**Table 10–2: Summary of the aspects to be scoped into and out of further assessment at the weir sites**

Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure to be assessed		
			Maisemore Weir on the River Severn	Upper Lode Weir on the River Severn	Weirs on the River Lugg
8	Conventional Waste Management	<p>Potential reduction in the remaining landfill void and impacts on the capacity of waste management facilities in the region associated with the removal of the weirs is scoped into further assessment. Opportunities to recycle/recover construction, demolition and excavation (CDE) waste exists in the region. However, waste types and estimated tonnages have not been detailed and may be subject to change as the design develops. Significant effects are not expected, nonetheless a waste assessment should be conducted where potential effects of waste can be eventually scoped out, when there is more information available.</p> <p>An assessment of the same effects during the operation of the proposed compensation measures at the weirs is proposed to be scoped out of further assessment. No waste generation and management activities are expected/planned at the moment during the operational phase.</p>	✓	✓	✓
9	Socio-economics	<p>Disruption to commercial receptors at Maisemore Weir is proposed to be scoped into further assessment. It is possible that disturbance effects to commercial receptors may arise due to the combined effect of Landscape and Visual and Noise and Vibration. Disruption to commercial receptors at Upper Lode Weir and the weirs on the River Lugg is proposed to be scoped out of further assessment as there are no commercial receptors within the study area.</p> <p>Impacts on commercial and agricultural land use at the weirs are proposed to be scoped out of further assessment given that no permanent commercial or agricultural land take is anticipated during removal and operation and the site compound and accesses will only require temporary uptake of land.</p> <p>Impacts on employment and economic investment in the region are proposed to be scoped out of further assessment for all of the weirs given the large size of the local workforce, the strength of the regional economy and the low level of direct labour requirements to support the schemes.</p>	✓	X	X

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Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure to be assessed		
			Maisemore Weir on the River Severn	Upper Lode Weir on the River Severn	Weirs on the River Lugg
10	Transport	<p>Potential impacts related to traffic congestion from construction traffic need to be understood. Potential impacts on sensitive receptors (such as residential settlements), pedestrians, cyclists and horseriders are also proposed to be scoped into further assessment. A Construction Traffic Management Plan (CTMP) will likely be required and will include estimates of total vehicle movements, equipment and materials and will outline necessary limits and restrictions on construction vehicle movements. Temporary and potentially permanent closures and diversions of PRoWs will also need to be explored further when the route options for access during removal are confirmed.</p> <p>The day-to-day operation of the proposed compensation measures at the weirs will generate negligible volumes of traffic and therefore an assessment of traffic impacts during operation is scoped out.</p>	✓	✓	✓
11	Noise and Vibration	<p>Potential noise effects due to emissions from site plant and machinery during the removal of the weirs are proposed to be scoped into further assessment. This is expected to involve the use of inherently noisy plant and equipment and therefore temporary noise disturbance could occur at local receptors located within the Study Area for noise associated with removal.</p> <p>Potential vibration effects due to emissions from site plant and machinery during the removal of the weirs are proposed to be scoped out of further assessment as there are no receptors within the vibration study areas.</p> <p>Potential noise and vibration effects due to emissions from construction traffic off-site for the weirs are proposed to be scoped out of further assessment. The construction traffic flows are likely to be less than the DMRB screening criteria. Therefore, the associated potential effects would not be likely to cause significant effects.</p> <p>Potential noise and vibration effects during operation at the proposed compensation measures at the weirs are proposed to be scoped out of further assessment as there are no activities expected to occur that could give rise to significant noise or vibration effects.</p>	✓	✓	✓

NOT PROTECTIVELY MARKED

Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure to be assessed		
			Maisemore Weir on the River Severn	Upper Lode Weir on the River Severn	Weirs on the River Lugg
12	Air Quality	<p>Potential dust soiling, human health and ecological impacts arising from dust and particulate matter emissions generated during the removal of the weirs and the operation of the proposed compensation measures at the weirs is proposed to be scoped out of further assessment. Activities associated with the removal of the weirs have the potential to generate dust however, providing good practice mitigation measures (as recommended in the IAQM construction dust guidance) are implemented, the impact at nearby human and ecological receptors is considered to be negligible. There are no potential impacts from dust and particulate matter emissions generated during the operation of the proposed compensation measures at the weirs.</p> <p>Potential impacts on air quality due to emissions from site plant and machinery during removal of the weirs are proposed to be scoped out of further assessment. Given that relatively low numbers of plant and items of machinery would likely be used for only a limited duration and spread across the site, the associated potential effects on air quality are considered negligible.</p> <p>Potential impacts on air quality due to emissions from construction- and operation-related off-site traffic for the weirs are proposed to be scoped out of further assessment as the traffic flows are likely to be less than the screening criteria.</p>	X	X	X
13	Soils and Land Use	<p>Loss of soils and soil quality because of the removal of the weirs are proposed to be scoped into further assessment as there will be disturbance, excavations and potential loss of soils and soil quality in this area during the removal of the weirs and operational phases.</p> <p>Loss of and disturbance to agricultural land at each of the weirs are proposed to be scoped into further assessment as there may be the potential loss of Grade 2 and 3 soils (where Grade 3 soils should be assumed to be Grade 3a BMV in the absence of further information).</p>	✓	✓	✓

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Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure to be assessed		
			Maisemore Weir on the River Severn	Upper Lode Weir on the River Severn	Weirs on the River Lugg
14	Geology and Land Contamination	<p>Impacts related to geology/geological features at the weirs are proposed to be scoped into further assessment for the removal of the weirs and operational stages as there is not sufficient information relating to the presence of geological features to complete an assessment.</p> <p>Impacts related to the disturbance of potentially contaminated land at the weirs are proposed to be scoped into further assessment as there is currently limited information available relating to the history of the site and the potential for contamination to be present within soils.</p> <p>The sterilisation of mineral resources because of the proposed compensation measures at all of the weir sites are proposed to be scoped into further assessment as the weirs' works boundaries are all within a Mineral Safeguarding Area.</p>	✓	✓	✓
15	Groundwater	<p>Impacts to groundwater levels and flows during the removal of the weirs are proposed to be scoped into further assessment as there is no information currently available on groundwater levels within the site therefore significant effects to shallow groundwater levels and flows cannot be ruled out at this stage.</p> <p>Impacts to groundwater quality during the removal of the weirs are proposed to be scoped into further assessment. Impacts can arise from activities such as excavations, topsoil stripping, accidental leaks, and spills etc. Considering the depth of the water table across the site is unknown significant effects to the underlying aquifers cannot be ruled out.</p> <p>Impacts to secondary receptors such as groundwater abstractions and GWDTE at the weirs are proposed to be scoped into further assessment. Information on groundwater abstractions have not yet been requested therefore significant effects on these receptors, if present, cannot be ruled out at this stage.</p> <p>Changes to baseflow conditions from removal of the weirs is proposed to be scoped into further assessment. Considering the depth of the water table across the site is unknown significant changes to baseflow contributions cannot be ruled out.</p>	✓	✓	✓

NOT PROTECTIVELY MARKED

Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure to be assessed		
			Maisemore Weir on the River Severn	Upper Lode Weir on the River Severn	Weirs on the River Lugg
16	Surface Water	<p>Potential impacts on surface water quality at the weirs are proposed to be scoped into further assessment as activities associated with the removal of the weirs have the potential to mobilise sediment or pollutants into the watercourse.</p> <p>Potential impacts on surface water supply at the weirs are proposed to be scoped into further assessment. The diversion of utilities and amelioration of field drains is likely to impact surface water supply and therefore, the potential impacts are considered significant.</p> <p>Potential impacts on geomorphology at the weirs are proposed to be scoped into further assessment as activities associated with the removal of the weirs have the potential to alter sediment dynamics.</p> <p>Potential impacts on flood risk at the weirs are proposed to be scoped into further assessment. Weir removal may increase flood risk downstream and re-establishing the natural bed may increase connectivity with the aquifer.</p>	✓	✓	✓
20	Ecology (Terrestrial and Freshwater) and Ornithology	<p>Potential effects related to disturbance and habitat loss for terrestrial species and changes to riparian habitat are proposed to be scoped into further assessment at all of the weirs.</p> <p>The effect of sediment removal and emissions generated during the removal of the weirs is scoped into further assessment for freshwater ecology because of potential deterioration of freshwater habitat.</p> <p>Disturbance to fish communities around the weirs will be unavoidable during removal and therefore an assessment of this is scoped into further assessment.</p> <p>Operational changes including the potential spread of Invasive Non-Native Species, changes to habitats, water quality parameters and the distribution of freshwater species are all proposed to be scoped into further assessment because of removing the weirs.</p>	✓	✓	✓

NOT PROTECTIVELY MARKED

Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure to be assessed		
			Maisemore Weir on the River Severn	Upper Lode Weir on the River Severn	Weirs on the River Lugg
22	Landscape and Visual	<p>Due to the large scale of National Landscape Character Areas (NCAs) compared to the small scale of the proposed compensation measures at the weirs, only effects on the Local Landscape Character Areas (LLCA) are proposed to be scoped into further assessment. A significant change in local landscape character is unlikely but will be reviewed when the designs are further developed.</p> <p>Impacts on visual receptors at the weirs are proposed to be scoped into further assessment. It is anticipated that some, or all, of the visual receptors have the potential to experience temporary visual effects during the removal of the weirs due to temporary access during removal, compounds, and movement of construction vehicles. There is also the potential for visual receptors to experience permanent visual effects due to a change in vegetation / water levels.</p>	✓	✓	✓
23	Historic Environment	<p>The historic environment at Maisemore Weir site is proposed to be scoped out of further assessment. The lock was installed in the 20th century and removed any archaeological significance in the process. There are no designated and non-designated heritage assets within the site and study area. As such, the area is of low archaeological significance.</p> <p>The Upper Lode Weir site is proposed to be scoped out of further assessment. The weir was completed in August 1858 by Severn Commissioners. In May 1995, an archaeological watching brief was undertaken by Cotswold Archaeological Trust for the construction of a new fish pass at the weir. The investigation noticed no archaeological stratigraphy due to the wholesale removal of any archaeological potential during the construction of the weir. As such, it is of low/negligible significance.</p> <p>The River Lugg weir sites are proposed to be scoped out of further assessment. There are no designated heritage assets and non-designated heritage assets within the sites and study areas, as such the assets are of low archaeological significance.</p>	X	X	X



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Volume 2 Hinkley Point C Development Site of the Original ES - Chapter	Aspect	Justification	Compensation measure to be assessed		
			Maisemore Weir on the River Severn	Upper Lode Weir on the River Severn	Weirs on the River Lugg
25	Amenity and Recreation	<p>Amenity effects at the weirs are proposed to be scoped into further assessment because of the combined effects of Landscape and Visual and Noise and Vibration on recreational receptors.</p> <p>Access to recreational receptors at the weirs is proposed to be scoped out of further assessment as temporary diversions or closures to PRowers will be reinstated once removal is complete. This will not be a long-term change and access for the local community will still be maintained. The Upper Lode Angling Club may experience a minor impact from noise associated with removal of the weirs affecting species targeted by anglers, however this is deemed non-significant. During operation, there could be benefits for those using the river for recreational activities due to increased biodiversity through habitat creation and benefits to aquatic communities.</p> <p>Access to community receptors at the weirs are proposed to be scoped out of further assessment. There are no community receptors within the study area. Thus, no significant effects are anticipated.</p>	✓	✓	✓
New	Population and Human Health	Population and human health effects at the weirs during removal and operation are proposed to be scoped into further assessment as other constituent Aspects have been scoped into further assessment and could give rise to impacts on human health.	✓	✓	✓
New	Climate Change	<p>As GHG emissions associated with the removal of the weirs and operation of the river post-removal will be minimal, the removal works will have a negligible impact on the UK's ability to achieve its carbon budget. Therefore, an assessment of potential GHG emissions has been scoped out for all of the weirs.</p> <p>Similarly, there is no physical asset remaining once the weirs are removed that would be vulnerable to climate change. Therefore, an assessment of vulnerability to climate change has also been scoped out for all of the weirs.</p>	X	X	X

## 11. ADDITIONAL COMPENSATION MEASURES

### 11.1 Overview

11.1.1 This Chapter considers the additional compensation measures that are proposed by NNB as part of its package of measures to compensate for the removal of the requirement to install an AFD, including:

- Seagrass bed;
- Kelp forest;
- Oyster bed; and
- Welsh river barrier sites.

### 11.2 Summary of the compensation measures

#### Seagrass bed

11.2.1 It is currently proposed to create / enhance 5 ha of seagrass habitat, with discussions ongoing with

relevant bodies regarding the location, scale and approach to implementation.

11.2.2 Seagrasses are flowering plants capable of living in the marine environment, notably in sheltered areas such as harbours, estuaries, lagoons and bays. There are two genera of seagrass present in English waters: *Ruppia* sp. and *Zostera* sp., however, commonly the use of the term 'seagrass' only refers to *Zostera* sp., which is also known as Eelgrass, with *Ruppia* being a brackish group. Existing *Zostera* spp. beds in UK waters are restricted in distribution with the majority found in sheltered bays, inlets and estuaries<sup>311</sup>. *Zostera marina*, *Zostera noltei* and *Zostera angustifolia*<sup>311</sup> are the species which have been the focus of the majority of seagrass bed creation/enhancement projects within the UK to date.

11.2.3 Seagrass beds are identified under the UK Post-2010 Biodiversity Framework, defined as a Feature of Conservation Importance and protected under the UK's Wildlife and Countryside Act 1981<sup>312</sup>.

11.2.4 Seagrass beds provide important nursery and feeding habitats for invertebrates and fish amongst a range of

<sup>311</sup> Joint Nature Conservation Committee (2016) UK Biodiversity Action Plan Priority Habitat Descriptions: Seagrass beds. [\[Online\]](#) Accessed 4 December 2023

<sup>312</sup> UK Government (1981) Wildlife and Countryside Act 1981. [\[Online\]](#) Accessed 4 December 2023

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environmental benefits. They are recognised as being of potential importance in terms of sequestration of carbon and therefore could assist in meeting the UK Government 2050 net zero target for carbon emissions.

11.2.5 An estimated 92 % of UK seagrass meadows have been lost in the past century, with 44 % of that occurring since 1936. This extensive loss is a result of a complex combination of factors (many of which anthropogenically induced), including habitat loss / degradation, poor water quality, INNS, and outbreaks of seagrass wasting disease *Labyrinthula zosterae*.

11.2.6 The Severn Estuary is a highly dynamic and turbid environment due to its physical shape, very large tidal range and the availability of fine sediment for resuspension during tidal cycles. However, available current evidence and historic records show that it is possible for seagrass to grow within the Estuary and at various other locations in the south-west of the UK (see **Figure 11-1**).

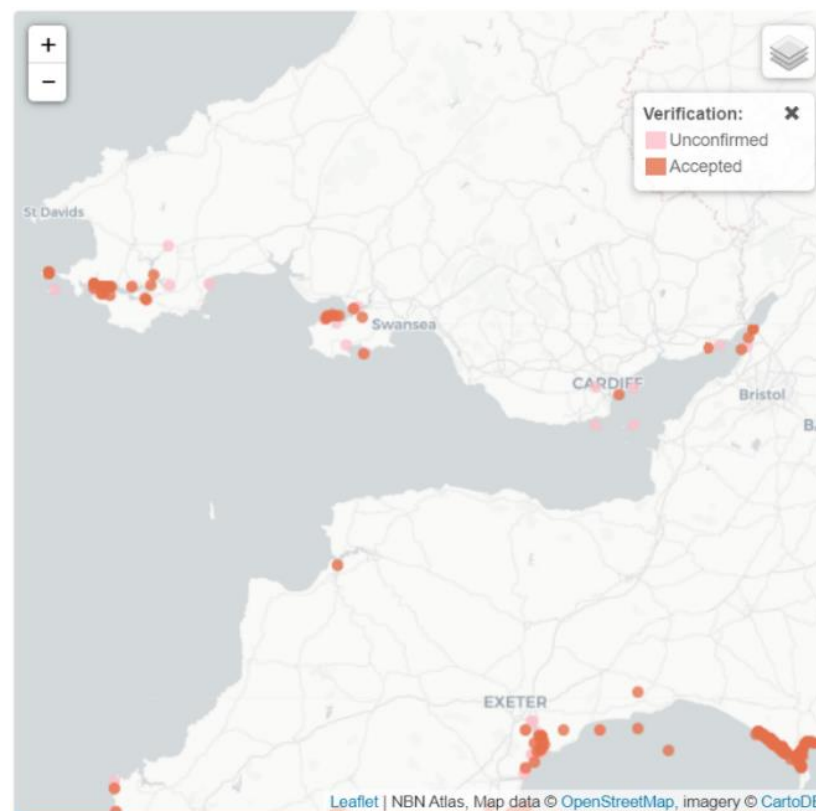


Figure 11-1: Records of *Zostera marina*, south-west UK<sup>313</sup>

<sup>313</sup> NBN Atlas (2023). *Zostera* Linnaeus, 1753: Eelgrass. [\[Online\]](#) Accessed 4 December 2023

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11.2.7 Potential locations within the Severn Estuary and wider area which have conditions which are suitable for creating/enhancing seagrass beds will be considered within the scope of further feasibility and implementation studies. These studies will be informed by experience derived from other seagrass creation/enhancement projects such as that undertaken as that as part of the Save Our Seabed project, which is a four-year marine conservation partnership initiative, led by Natural England, focussing upon five SACs in Southern England. As part of this project, over 4 ha of seagrass has been planted across Plymouth Sound and Solent Maritime, with evidence it is successfully established<sup>314</sup>.

11.2.8 Relevant guidance and published resources will also be considered including The ReSow UK project<sup>315</sup>, Restoring Meadow, Marsh, and Reef (ReMeMaRe<sup>321</sup>); and Seagrass Restoration Handbook<sup>316</sup>).

**Proposed scope of / approach to assessment**

11.2.9 It is proposed that the EIA will focus on the following key technical Aspects:

- Hydrodynamics and sediment regime;
- Marine water and sediment quality; and
- Marine ecology.

11.2.10 Issues to be considered within the assessment include:

- Sediment stabilisation;
- Coastal protection;
- Carbon cycling;
- Improved water quality;
- Nutrient cycling;
- Habitat provision; and
- Support of diverse ecological communities.

11.2.11 Creation/enhancement of seagrass meadows could have direct and indirect effects on the Annex I habitats and Annex II species that are listed within the citation of the Severn Estuary SAC.

11.2.12 The assessment of potential effects arising from seagrass meadow creation/enhancement, the

<sup>314</sup> Save Our Seabed (2023). Restoration in Plymouth Sound. [\[Online\]](#). Accessed 08 October 2023.

<sup>315</sup> SMMR (N/A). ReSOW UK. [\[Online\]](#). Accessed: 04 October 2023.

<sup>316</sup> Gamble C., Debney, A., Glover, A., Bertelli, C., Green, B., Hendy, I., Lilley, R., Nuuttila, H., Potouroglou, M., Ragazzola, F., Unsworth, R. and Preston, J. (eds) (2021). Seagrass Restoration Handbook. Zoological Society of London, UK., London, UK. [\[Online\]](#). Accessed 18 December 2023.

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methodology will follow that set out and applied within the wider EIA / ES. Where sufficient data exists, assessment will be quantitative in nature, noting that work continues to progress with regards to the relevant surveys and feasibility studies.

11.2.13 Where a limited evidence base necessitates that assessment of effects must be qualitative in nature, such assessment will draw on experience from comparable projects, and relevant ecological parameters.

### Kelp forest

11.2.14 It is currently proposed to create / enhance 15 ha of kelp forest, with discussions ongoing with relevant bodies regarding the location, scale and approach to implementation.

11.2.15 Kelps are large brown macroalgae and kelp communities can form dense submerged forests in temperate seas. Kelp forests establish in the photic zone on hard, rocky substrate, and are distributed across the UK. Kelp forests are highly dynamic systems, exhibiting pronounced spatial-temporal

variability, with species composition varying depending on the physical, chemical, and biological environment.

11.2.16 Kelp forests provide a productive habitat that acts as a shelter for marine biota and protects coastal areas by acting as a buffer for high wave energies<sup>317</sup>. The complex three-dimensional habitat structure provides a home to many fish, invertebrates, and other marine organisms. Kelp is an excellent carbon sink. It absorbs and stores significant amounts of carbon dioxide, helping to mitigate climate change. Furthermore, it improves water quality by absorbing excess nutrients, such as nitrogen and phosphorus, from the surrounding waters. This helps prevent nutrient pollution and the resulting harmful algal blooms.

Currently the development of creation/enhancement proposals is focussing on extending the presence of already established native kelp ensuring that any selected site is suitable habitat. The key kelp species of interest are *Laminaria hyperborea* and *Saccharina latissimi*, the distributions of which are shown in **Figure 11-2** and **Figure 11-3** respectively as taken from the National Biodiversity Network ('NBN').<sup>318</sup>

<sup>317</sup> The Wildlife Trusts. 2023. Kelp beds and forests. [\[Online\]](#). Accessed 17 August 2023.

<sup>318</sup> National Biodiversity Network (NBN) (2023) Search for taxa. [\[Online\]](#) Accessed 4 December 2023

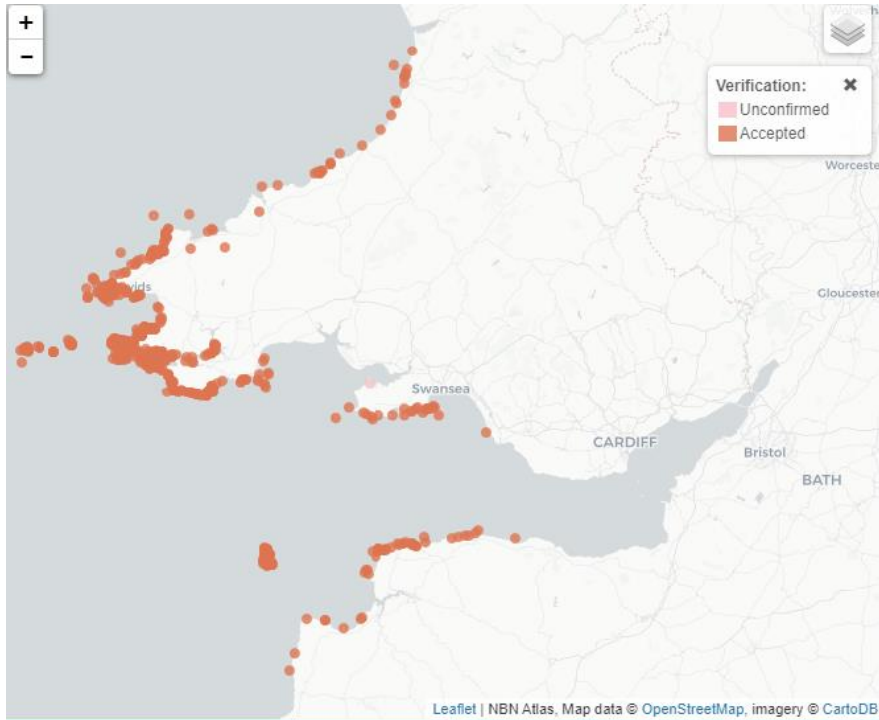


Figure 11-2: Records of *Laminaria hyperborea* in the Bristol Channel and further afield

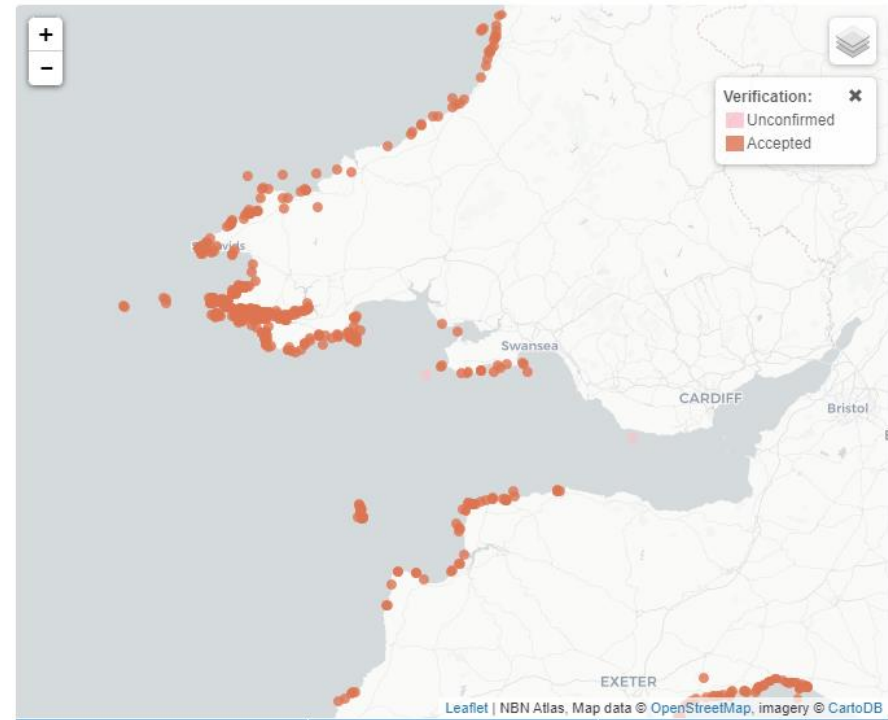


Figure 11-3: Records of *Saccharina latissimi* in the Bristol Channel and further afield

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11.2.17 Suitable enhancement habitat in the Bristol Channel is limited to only *Laminaria hyperborea* with Morte Point and Hartland Devon Coast providing examples of potentially suitable sites for developing kelp forest as identified from a study published by Natural England and The Crown Estate which explores potential restoration habitats.<sup>319</sup>

11.2.18 Kelp forest creation/enhancement proposals will be informed by other project and experience and from relevant guidance and publications including the Kelp Restoration Guidebook: Lessons Learned from Kelp Projects Around the World, and the British Kelp Restoration Feasibility Report<sup>320</sup>.

**Proposed scope of / approach to assessment**

11.2.19 It is proposed that the EIA will focus on the following key technical Aspects:

- Hydrodynamics and sediment regime;
- Marine water and sediment quality; and
- Marine ecology.

11.2.20 Kelp forest creation / enhancement has the potential to result in numerous benefits to Annex I habitats and Annex II species for which the Severn Estuary and other SACs are designated in the vicinity of the Hinkley Point C site.

11.2.21 The assessment methodology will follow that set out and applied within the wider EIA / ES. Where sufficient data exists, assessment will be quantitative in nature, noting that work continues to progress with regards to the relevant surveys and feasibility studies. Where sufficient data exists, assessment will be quantitative in nature, noting that work continues to progress with regards to surveys and studies in this area.

11.2.22 Where a limited evidence base necessitates that assessment of effects must be qualitative in nature, such assessment will draw on experience from comparable projects, and relevant ecological parameters.

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<sup>319</sup> Natural England and The Crown Estate (2023) Marine Restoration Potential MaRePo. [\[Online\]](#). Accessed September 2023.

<sup>320</sup> Wilding, C.M., Earp, H.S., Cooper, C.N., Lubelski, A., Smale, D.A. British Kelp Forest Restoration: Feasibility Report

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## Oyster bed

11.2.23 It is currently proposed to create / enhance 1-2 ha of native oyster beds, with discussions ongoing with relevant bodies regarding the location, scale, and approach to development.

11.2.24 Native oysters (*Ostrea edulis*) are typically associated with shallow, subtidal coastal and estuarine habitats. If left undisturbed oysters can form complex reef structures formed from living oysters and dead shells on the sea floor. The reefs providing habitat and refuge for a diversity of organisms such as juvenile fish and invertebrates which in turn provides capacity as a wider ecological resource for predatory species, such as a larger, adult fish, seabirds, and marine mammals. Native oysters are a keystone species and provide ecosystem services including erosion control and improvement of water quality (through cycling and purification).

11.2.25 Historically, native oyster reefs were widely distributed around UK coasts, however distribution is now limited, with 95 % being lost<sup>321</sup>. Historically, native oysters have been present in the Severn Estuary and Bristol

Channel, including records along the Gower Coast, around Tenby and Caldey Island and off Stackpole Head. There is a lack of historic native oyster reefs in the immediate locality of the Hinkley Point C site.

11.2.26 Potentially suitable oyster reef creation/enhancement locations off the coast of South-West Wales are currently being assessed. Therefore, the native oyster reef habitat may not be located within the Severn Estuary SAC. However, it is considered that placing habitat outwith the boundary of the SAC will still serve to maintain network coherence. The work of Mumbles Oyster Company within Swansea Bay to develop wild native oyster reefs by stocking areas with juvenile oysters is noted. In addition, the Environment Agency has identified potential areas within the English side of the Severn Estuary for potential creation / enhancement, based on key environment variables and these will also be considered as part of the feasibility process.

11.2.27 Experience gained from other projects such as the work of the Blue Marine Foundation across 12 oyster enhancement sites in the Solent, and The Wild Oysters Project in Conwy Bay will also be considered.

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<sup>321</sup> ECSA (2016). Restoring Meadow, Marsh and Reef (ReMeMaRe). [\[Online\]](#). Accessed 04 October 2023.



### Proposed scope of / approach to assessment

11.2.28 Based on the relevant habitat conditions, and known parameters from other, similar projects, it is proposed that the EIA will focus on the following key technical Aspects:

- Hydrodynamics and sediment regime;
- Marine water and sediment quality; and
- Marine ecology.

11.2.29 The assessment will recognise benefits that native oyster reefs provide in terms of ecosystem services.

11.2.30 The assessment methodology will follow that set out and applied within the wider EIA / ES. Where sufficient data exists, assessment will be quantitative in nature, noting that work continues to progress with regards to the relevant surveys and feasibility studies.

11.2.31 Where a limited evidence base necessitates that assessment of effects must be qualitative in nature, such assessment will draw on experience from comparable projects, and relevant ecological parameters.

### Welsh weirs

11.2.32 For the compensation for migratory fish species, NNB has identified five potential locations where appropriate works to weirs would deliver improvements to provide appropriate compensation.

11.2.33 Two of these potential locations are located in Wales. These are Trostrey Weir on the River Usk and Manorafon Weir on the River Towy. Trostrey Weir on the River Usk is presented as one of the preferred proposals while Manorafon Weir on the River Towy is being explored as a potential option in place of a weir on the River Wye. For a description of these sites, refer to **Chapter 3** of **Volume 1** of this PEIR.

11.2.34 A DCO cannot authorise associated development in Wales. If taken forward for the delivery of the compensation package, the weir site(s) in Wales would be consented via a Town and Country Planning Act 1990 application submitted to the relevant local planning authority (Monmouthshire County Council and/or Carmarthenshire County Council) independently of the proposed material change application to obtain the appropriate consent.

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### Proposed scope of / approach to assessment

11.2.35 If taken forward, the Welsh weir(s) will be assessed in the ES that will be submitted in support of the proposed material change application to ensure the decision maker has the requisite information before them.

11.2.36 The EIA will follow a similar methodology to that outlined in **Chapter 4** of **Volume 1**.

11.2.37 Potential works to the Welsh weir(s) include full removal, introducing a technical pass or introducing a bypass channel. It has been assumed that the weir(s) would be fully removed, in line with the assumption of the proposed works to the English weirs. Works associated with a bypass channel would be of a similar physical extent to the bank works associated with full removal. The works may be in different locations but would likely be of a similar footprint. Works to install a technical pass would likely be of a smaller nature and scale to full removal or the construction of a bypass channel. Work to refine the design and extent of work will be confirmed through further feasibility assessment and stakeholder engagement and the environmental impact of the proposed works will be assessed in the ES for the proposed material change application.

11.2.38 Assuming the Welsh weir(s) would be removed, the scope will likely follow that set out for the English weirs

outlined in **Chapters 7 to 9** of this PEIR, with the likely significant effects to be similar to those summarised in **Table 10–2**.