The Sizewell C Project

6.3 Volume 2 Main Development Site

Chapter 26 Climate Change

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26 Climate Change

26.1 Introduction

26.1.1 This chapter of **Volume 2** of the **Environmental Statement (ES)** presents an assessment of climate related impacts from the construction and operation the Sizewell C Project. The assessment has been undertaken in alignment with the requirements of the:

- Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (Ref. 26.1).
- Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) (Ref. 26.2).
- National Policy Statement for Energy Infrastructure (NPS EN-1) (Ref. 26.3).
- Institute of Environmental Management & Assessment (IEMA) Guidance (Ref. 26.4).

26.1.2 Schedule 4, paragraph 5(f) of the Infrastructure Planning EIA Regulations, and Schedule 3, paragraph 5(f) of the Marine Works EIA Regulations require a description of:

> "*the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change*".

26.1.3 This chapter presents an assessment of climate related impacts. The assessments undertaken to inform this chapter have taken into account the three aspects of climate change set out in **Table 26.1**.

Table 26.1: Summary of elements of climate change assessment

Assessment element	Description
Lifecycle greenhouse gas (GHG) impact assessment	The impact of GHG emissions arising from the Sizewell C Project on the climate, including how it will affect the ability of UK government to meet its carbon reduction plan targets.

Assessment element	Description
Climate change resilience (CCR) assessment	The resilience of the Sizewell C Project to climate change impacts, including how the Sizewell C Project's design will take account of the projected impacts of climate change.
In-combination Climate Change Impact (ICCI) assessment	Combined impact of the Sizewell C Project and potential climate change on sensitive receptors in the surrounding environment.

26.1.4 **Volume 2, Chapters 2** to **4** and **Volumes 3** to **9, Chapter 2** present descriptions of the main development site and associated developments, collectively referred to as the 'Sizewell C Project' considered in this chapter. A summary of the components of the Sizewell C Project is provided in **Table 26.2**.

Table 26.2: Overview of component comprising the Sizewell C Project

Component	Description	Construction duration	Operational life
Main development site	• Main platform: the area that would become the power station itself. • Sizewell B relocated facilities and National Grid land: where certain Sizewell B facilities would be moved to in order to release other land for the Sizewell C Project, and land required for the National Grid infrastructure. • Offshore works area: the area where offshore cooling water infrastructure and other marine works would be located. • Temporary construction area: the area located primarily to the north and west of the proposed Site of Special Scientific Interest (SSSI) crossing, which would be used to support construction activity on the main platform, including the provision of an accommodation campus. • Land to the East of Eastlands Industrial Estate (LEEIE): the	Maximum assumed construction period is 12 years (from 2022-2034).	60 years (proposed)

Component	Description	Construction duration	Operational life
	area to the north of Sizewell Halt and King George's Avenue, which would be used to support construction on the main platform and temporary construction area. • Off-site developments, including off-site sports facilities at Leiston, fen meadow compensation sites south of Benhall and east of Halesworth and, if required, the marsh harrier habitat improvement area (Westleton).		
Associated development sites (temporary)	• Northern park and ride site at Darsham; • Southern park and ride at Wickham Market; • Freight management facility at Seven Hills; and • Green rail route.	No longer than 18 months for construction. Up to 12 months for removal and reinstatement following construction, but expected to be shorter for rail.	Up to 10 years
Associated development sites (permanent)	• Two village bypass; • Sizewell link road; • Yoxford roundabout and other highways improvements; and • Rail improvements to the Saxmundham to Leiston branch line.	Maximum assumed construction timescales for each associated development site are no longer than 2 years.	At least 60 years

26.1.5 A standalone ES was prepared for the Sizewell B Relocated Facilities works for submission with the hybrid planning application under the Town and Country Planning Act 1990 (East Suffolk Council application ref. DC/19/1637/FUL). It is noted that the Sizewell B relocated facilities ES (included in **Volume 1, Appendix 2A**) did not include a separate climate change chapter, as the EIA was prepared in accordance with the Town and

Country Planning (Environmental Impact Assessment) Regulations 2011 ('the 2011 EIA Regulations') (Ref. 26.5), which did not require for a standalone assessment of climate change to be presented as part of the EIA. The assessment presented in this chapter also accounts for the effects of the Sizewell B relocated facilities works, as it forms part of the Sizewell C Project.

26.1.6 A glossary of terms and list of abbreviations used in this chapter is provided in **Volume 1, Appendix 1A**.

a) GHG Impact Assessment

26.1.7 The climate change assessment has been informed by data drawn from other assessments as follows:

- **Chapter 8** of this volume - Conventional waste management: materials required and waste arisings data for site establishment and preparation works, construction, operation and removal of temporary facilities.
- **Transport Assessment** (Doc Ref. 8.5) – data on mode and distance travelled relating to the transportation of construction materials, workers and transportation during the operation of the power station has been taken from the Transport Assessment.

b) CCR assessment

26.1.8 The project design teams and the technical assessments below have provided input into the CCR assessment following review of the identified climate change hazards and impacts from the United Kingdom Climate Projections (UKCP18) (Ref. 26.6):

- Amenity and recreation.
- Coastal geomorphology and hydrodynamics.
- Flood risk.
- Geology and land quality.
- Landscape and visual.

c) ICCI assessment

26.1.9 The following technical assessments have provided input into the ICCI assessment following review of the identified climate change hazards and impacts from UKCP18 (Ref. 26.6):

- Noise and vibration.
- Air quality.
- Landscape and visual.
- Terrestrial ecology.
- Terrestrial historic environment.
- Marine historic environment.
- Amenity and recreation.
- Soils and agriculture.
- Geology and land quality.
- Groundwater and surface water.
- Coastal geomorphology and hydrodynamics.
- Marine water quality and sediment.
- Marine ecology.
- Major accidents and disasters.

26.2 Legislation, policy and guidance

26.2.1 **Volume 1, Chapter 3** identifies and describes legislation and policy of relevance to the assessment of the likely significant effects associated with the Sizewell C Project. Legislation, policy and guidance relevant to climate change is provided in **Volume 1, Appendix 6V**.

26.2.2 This section provides a list of specific legislation, policy and guidance of relevance to the climate change assessment.

a) International

26.2.3 The Paris Agreement (2016) (26.7) is an agreement to enhance the United Nations Framework Convention on Climate Change. Its purpose aims to strengthen the global response to the threat of climate change by holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels. All parties, including the UK, are to undertake and communicate ambitious efforts with the view to achieving this purpose.

b) National

i. National legislation

26.2.4 The following national legislation has been taken into account in undertaking the climate change assessment:

- Climate Change Act 2008 (Ref. 26.8).
- Climate Change Act 2008 (2050 Target Amendment) Order 2019 (Ref. 26.9).
- Carbon Budget Order (2011 (4th Carbon Budget, 2023 to 2027) (Ref. 26.10).
- Carbon Budget Order (2016) (5th Carbon Budget, 2028 to 2032) (Ref. 26.11).
- The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (Ref. 26.1).
- The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) (Ref. 26.2).

ii. National policy

26.2.5 As stated in **Volume 1, Chapter 3**, whilst other matters may constitute important and relevant considerations in the decision making process under section 105(2)(c) of the Planning Act 2008, significant weight should be given to the policies contained within the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) (Ref. 26.3) and the NPS for Nuclear Power Generation (NPS EN-6) (Ref. 26.12).

26.2.6 The NPSs set out the Government's energy policy; the need for new infrastructure; and guidance for determining an application for a DCO. The NPSs include specific criteria and issues which should be covered by applicants' assessments of the effects of their scheme, and how the decision maker should consider these impacts.

26.2.7 **Volume 1, Appendix 6V** identifies the topic and site specific study or assessment requirements in EN-1 and EN-6 and briefly explains how these have been addressed within the climate change chapter.

National Planning Policy Framework (NPPF) (2019)

26.2.8 Chapter 14 of the NPPF (Ref. 26.13) describes the importance of effective planning in ensuring significant reductions in GHG emissions and increasing resilience to adverse effects associated with climate change. Paragraph 148 states:

"The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change"

The National Adaptation Programme and the Third Strategy for Climate Adaption Reporting (2018)

26.2.9 The National Adaptation Programme and the Third Strategy for Climate Adaption Reporting (Ref. 26.14) sets out Government's response to the second Climate Change Risk Assessment (CCRA), showing the actions Government is, and will be, taking to address the risks and opportunities posed by a changing climate. It forms part of the five-yearly cycle of requirements laid down in the Climate Change Act 2008 (Ref. 26.8) to drive a dynamic and adaptive approach to building resilience to climate change.

iii. Strategies

A Green Future: Our 25 Year Plan to Improve the Environment (2018)

26.2.10 This policy document (Ref. 26.15) sets out a range of goals to be achieved, including reducing the risk of harm from environmental hazards such as flooding and drought and mitigating and adapting to climate change.

Biodiversity 2020: A strategy for England's wildlife and ecosystem services (2011)

26.2.11 This strategy (Ref. 26.16) establishes principles for considering biodiversity and the effects of climate change.

c) Regional policy

i. East Inshore and Offshore Marine Plans

26.2.12 The East Inshore and Offshore Marine Plans include the objective to facilitate action on climate change adaptation and mitigation in the East marine plan areas.

ii. Suffolk Climate Action Plan (2017)

26.2.13 The Suffolk Climate Change Partnership (SCCP) consisting of Suffolk's local authorities and the Environment Agency. The plan (Ref. 26.17) explains that in line with the Climate Change Act 2008 (Ref. 26.8), the SCCP has set its own target:

"To facilitate a reduction in absolute carbon emissions in Suffolk of 35% on 2010 levels by 2025 and 75% by 2050, in line with the UK Climate Change Act 2008".

d) Local policy

26.2.14 The Sizewell C Project site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as a new local authority, to replace both SCDC and Waveney District Council (WDC). On 1st April 2019, ESC was formally established in place of SCDC and WDC.

26.2.15 Accordingly, there are two parts to ESC's Local Plan, the Suffolk Coastal Local Plan (Ref. 26.18) and the Waveney Local Plan (Ref. 26.19). The Sizewell C Project is located within the area covered by the Suffolk Coastal Local Plan.

26.2.16 The adopted Suffolk Coastal Local Plan (Ref. 26.17) comprises the 'saved policies' of the:

- Suffolk Coastal Local Plan (incorporating first and second alterations) (2001 and 2006) (Ref. 26.20).

- Core Strategy and Development Policies Development Plan Document (2013) (Ref. 26.21).
- Site Allocations and Area Specific Policies Development Plan Document (2017) (Ref. 26.22).

26.2.17 In March 2019, SCDC submitted their draft new Suffolk Coastal Local Plan (January 2019) (Ref. 26.23) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted local plan listed above.

e) Guidance

26.2.18 This assessment has been undertaken in accordance with the following guidance documents:

- Planning Practice Guidance (2019) (Ref. 26.24): The NPPF is supported by National Planning Practice Guidance (NPPG), which includes the Climate Change PPG, advising how to identify suitable mitigation and adaptation measures in the planning process. This has been considered within the design of the Sizewell C Project to address the impacts of climate change.
- The Greenhouse Gas Protocol, a Corporate Accounting and Reporting Standard, World Resource Institute (WRI) & World Business Council for Sustainable Development (2004) (Ref. 26.25).
- The European Commission (EC) Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (2013) (Ref. 26.26).
- IEMA Principles Series: Climate Change Mitigation & EIA (2010) (Ref. 26.27).
- IEMA The Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (2017) (Ref. 26.4).
- IEMA Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (2015) (Ref. 26.28).

- BS EN 15804:2012+A1:2013 Sustainability of Construction Works. Environmental Product Declarations. Core rules for the product category of construction products (Ref. 26.29).
- BS EN 15978:2011 Sustainability of construction works. Assessment of environmental performance of buildings. Calculation method (Ref. 26.30).
- PAS 2080:2016 Carbon Management in Infrastructure (Ref. 26.31).

f) Data sets

- BEIS (2019) UK Government GHG Conversion Factors for Company Reporting (Ref. 26.32).
- The Inventory of Carbon & Energy (ICE) Database (2019) (Ref. 26.33).
- UKCP18 (Ref. 26.6).

26.3 Scope of the assessment

26.3.1 The generic EIA methodology is detailed in **Volume 1, Chapter 6** of the ES.

26.3.2 The full method of assessment for climate change that has been applied to the Sizewell C Project is detailed in **Volume 1, Appendix 6V**.

26.3.3 This section provides specific details of the climate change methodology applied to the assessment of the Sizewell C Project and a summary of the general approach to provide context for the assessment. The scope of assessment considers the impacts of the construction and operation of the main development site and the construction, operation and the removal and reinstatement (where applicable) of the temporary construction area on the main development site, land east of the Eastlands Industrial Estate and the associated development sites.

26.3.4 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA Scoping Opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019 (see **Volume 1**, **Appendix 6A**).

26.3.5 As the requirement for "the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change" to be assessed within the EIA process was introduced by the 2017 EIA Regulations, a climate change assessment methodology was only provided within the 2019 EIA Scoping Report (**Volume 1, Appendix 6A)**.

26.3.6 Comments raised in the EIA Scoping Opinion received in 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Volume 1, Appendix 6C**.

26.4 Greenhouse gas (GHG) impact assessment

a) Methodology

i. Study area

26.4.1 The GHG impact assessment includes emissions associated with the following:

- All direct GHG emissions arising from the construction and operation of the Sizewell C Project.
- Removal and reinstatement of the temporary associated developments and the temporary construction area on the main development site, once construction of the Sizewell C Project is completed (refer to **Table 26.2**).
- Indirect emissions embedded within construction materials arising from the energy used in their production.
- Emissions arising from the transportation of materials, waste and construction workers.
- Emissions associated with fuel used by the back-up generators in the event of power outages and for any annual testing.

26.4.2 A high-level assessment of the decommissioning of Sizewell C power station is provided in **Chapter 5** of this volume, which takes account of potential GHG emissions. As described in **Chapter 5**, there will be a requirement for to undertake an Environmental Impact Assessment (EIA) and prepare an Environmental Statement under the relevant EIA Regulations, such as Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999. This would include a GHG impact assessment and will be undertaken in the years leading up to End of Generation.

26.4.3 The environmental impact associated with GHG emissions is a national and global issue. Consequently, the potential significance of the Sizewell C Project's lifecycle GHG emissions are assessed by comparing the estimated GHG emissions from the Sizewell C Project against the reduction targets defined in the Climate Change Act 2008 (Ref. 26.8) and associated five-year, legally-binding carbon budgets (Ref. 26.10 and Ref. 26.11).

ii. Assessment scenarios

26.4.4 The GHG impact assessment considers the lifecycle of the Sizewell C Project, including construction, operation and removal and reinstatement of the components described in **Table 26.2**. The proposed operational lifetime for the Sizewell C power station is 60 years.

26.4.5 The GHG impact assessment takes into account emissions associated with:

Construction

- Embodied carbon in materials from their production.
- Land-use change.
- Construction processes (i.e. the use of plant and machinery).
- Worker accommodation campus and caravan site, welfare and site compounds.
- Transport of materials (to site), waste (from site) and workers (to and from site).

Operation

- Nuclear and non-nuclear fuel used for the operation of the main development site.
- Transportation of workers to the site.
- Disposal and transportation of non-nuclear and nuclear waste.

26.4.6 The GHG impact of the Sizewell C Project is compared against a scenario (baseline) where the Sizewell C Project is not built.

iii. Assessment criteria

26.4.7 As described in **Volume 1, Chapter 6**, the EIA methodology considers whether impacts of the Sizewell C Project would have an effect on any receptors. Assessments broadly consider the magnitude of impacts and value/ sensitivity of resources/ receptors that could be affected in order to classify effects.

26.4.8 A detailed description of the assessment methodology used to assess the potential effects on the climate arising from the Sizewell C Project is provided in **Volume 1, Appendix 6V**. A summary of the assessment criteria used in this assessment is presented in the following sub-sections.

Sensitivity

26.4.9 The global climate has been identified as the receptor for the purposes of the GHG emissions assessment. However, to enable the evaluation of significance of the estimated GHG emissions arising from the Sizewell C Project, the UK GHG inventory and the corresponding 5-year UK carbon budget were used as a proxy for the global climate.

26.4.10 There is no published standard definition for receptor sensitivity of GHG emissions set out in the IEMA guidance (Ref. 26.4) or elsewhere. However, IEMA guidance does recommend comparing a project's carbon footprint against available carbon budgets, e.g. national/ sectoral budgets etc. The sensitivity of the receptor, the UK carbon budget (as a proxy for the global climate), has been defined as high. The rationale for this approach is as follows:

- Any additional GHG impacts could compromise the UK's ability to reduce its GHG emissions and therefore the ability to meet its future carbon budgets.
- The commitment to limiting global warming to below 2°C above pre-industrial levels, as broadly asserted by the Paris Agreement (Ref. 26.7) and the climate science community.

Magnitude

26.4.11 In the absence of any defined industry guidance for assessing the magnitude of GHG impacts for EIA, IEMA recommend the use of professional judgement (Ref. 26.4). As such, standard GHG accounting and reporting principles have been followed to assess impact magnitude. In GHG accounting, it is common practice to consider exclusion of emission sources that are <1% of a given emissions inventory on the basis of a *de minimis* contribution.

26.4.12 Both the Department of Energy and Climate Change (DECC), now the Department for Business, Energy and Industrial Strategy (BEIS), (Ref. 26.34) and the Carbon Trust (Ref. 26.35) allow emissions sources of <1% contribution to be excluded from emission inventories on the basis that an emissions source contribution of <1% would not be material to the overall impact. A development with emissions of <1% of the relevant five-year carbon budget would therefore, be minimal in its contribution to the wider national GHG emissions.

26.4.13 The associated magnitude criteria are outlined in **Table 26.3**.

Table 26.3: Magnitude criteria for GHG impact assessment

Magnitude	Magnitude criteria
High	GHG emissions represent, equal to or more than 1% of total emissions from the relevant 5-year National Carbon Budget in which they arise.
Low	GHG emissions represent less than 1% of total emissions from the relevant 5-year National Carbon Budget in which they arise.

26.4.14 The UK carbon budgets restrict the amount of GHG emissions the UK can legally emit in a defined five-year period (Ref. 26.11). In assessing the significance of future GHG emissions from the Sizewell C Project, it is important to consider how they could impact the UK's ability to meet its future carbon budgets. The significance criteria therefore references the appropriate budget periods. The UK is currently in the 3rd carbon budget period, which runs from 2018 to 2022.

26.4.15 It should be noted as a result of the amended 2050 carbon reduction target to net zero carbon, the Committee on Climate Change (CCC) announced it will review the current carbon budgets. The results of their findings will be available in late 2020 when the 6th carbon budget is published. To achieve the revised 2050 target, the emissions reduction trajectory set out in the budgets through to 2050 will need to steepen. As these budgets are not yet available, the current carbon budgets have been used.

26.4.16 The appropriate UK national carbon budgets spanning the 12-year construction programme, which for the purpose of this assessment is expected to be between 2021 and 2034, are the 3rd, 4th and 5th carbon budgets as detailed in **Table 26.4**.

26.4.17 The operational phase of the Sizewell C Project (expected to be fully operational by 2034) has been compared to the appropriate and available carbon budgets within the design life of the Sizewell C Project. To date, the UK has agreed up to the 5th carbon budget period that runs from 2028 to 2032. The Committee on Climate Change have however provided a sectoral budget for electricity generation through to 2034, which covers the first two years of Sizewell C operation.

26.4.18 **Table 26.4** shows the current and future UK carbon budgets up to 2032, highlighting the total amount of GHG the UK can emit legally going into the future. **Table 26.4** also demonstrates the phased contraction of future carbon budgets, which means that any source of emissions contributing to the UK's carbon inventory will have an increasing impact on future UK carbon budgets.

Table 26.4 Relevant carbon budgets for the GHG emissions assessment

Carbon budget	Total UK budget ($MtCO_2e$)
3rd (2018 – 2022)	2,544
4th (2023 – 2027)	1,950
5th (2028 – 2032)	1,725

Effect definitions

26.4.19 **Table 26.5** presents the definitions of effect for the GHG impact assessment.

26.4.20 The assessment of significance differs from the criteria presented in **Volume 1, Chapter 6** of this ES by omitting 'moderate' and 'negligible' effect categories.

- 'Major adverse' is deemed to be 'significant'.
- 'Minor adverse' is considered to be 'not significant'.

Table 26.5: Classification of effects

Magnitude	Significance
Low	Minor adverse
High	Major adverse

iv. Assessment methodology

26.4.21 The GHG impact assessment followed a project lifecycle approach to calculate estimated GHG emissions arising from the construction and operation of the Sizewell C Project and the removal and reinstatement of the temporary associated development. The GHG impact assessment identified GHG 'hotspots' (i.e. emissions sources likely to generate the largest amount of GHG emissions), which enabled the identification of priority areas for mitigation in line with the principles set out in IEMA guidance (Ref. 26.27).

26.4.22 In line with the World Resources Institute (WRI) & World Business Council for Sustainable Development (WBCSD) GHG Protocol (Ref. 26.25), the GHG impact assessment is reported as tonnes of carbon dioxide equivalent (tCO_2e) and includes the seven Kyoto Protocol gases:

- Carbon dioxide (CO_2).
- Methane (CH_4).
- Nitrous oxide (N_2O).
- Sulphur hexafluoride (SF_6).
- Hydrofluorocarbons (HFCs).
- Perfluorocarbons (PFCs).
- Nitrogen trifluoride (NF_3).

26.4.23 The expected GHG emissions arisings and baseline emissions, were estimated using the following equation in alignment with the GHG Protocol (Ref. 26.25):

Activity data x GHG emissions factor = GHG emissions

26.4.24 Defra 2019 emissions factors (Ref. 26.32) and embedded carbon emissions factors from the Inventory of Carbon and Energy (ICE) (Ref. 26.33) were used to derive the GHG emissions factor.

v. Assumptions and limitations

26.4.25 The assumptions made in this assessment are set out in **Table 26.6**.

Table 26.6: GHG impact assessment assumptions

Lifecycle stage	Activity	Primary emission sources	Scoping outcome	Assumptions
Pre-construction stage	Enabling works (i.e. demolition, land clearance, earthworks, etc.)	GHG emissions from energy consumption during construction (i.e. electricity, fuel, etc.)	In	Plant and estimated run times estimated by the project design team, including plant category and estimated percentage run time during the working hours plant is on site. Where a specific plant type is unknown, a typical plant type has been selected so that fuel use can be estimated using plant specifications. Smaller pieces of equipment, such as chainsaws and scaffolding have been excluded.
		Carbon stock loss from land clearance	In	There will be habitat creation to replace any habitat losses resulting from construction. In addition, a proportion of the associated development sites will be returned to agricultural land use the land to be used for the main development site is considered to be of low value with regard to carbon sink.
		GHG emissions from enabling works waste disposal	In	Sizewell B relocated facilities demolition will be the only site pre-construction works with demolition waste arising. The GHG assessment provided in this chapter is based on the waste quantities presented within the Conventional Waste Management Strategy (**Appendix 8A** of this volume). For the purposes of the GHG assessment, it is assumed that 90% of materials will be recycled, while 10% of materials will be sent to landfill in accordance with the Waste Management Strategy.
Product stage	Raw material extraction and manufacturing of products required to build	Embodied carbon associated with enabling works/	In	This assessment is based on material quantities estimates presented within **Volume 2,**

Lifecycle stage	Activity	Primary emission sources	Scoping outcome	Assumptions
	the Sizewell C Project	construction materials		**Chapter 3** and **Volumes 3-9, Chapter 2**. For the purposes of the GHG calculation, it is assumed that all concrete used on the main development site will be standard concrete, rather than high specification nuclear concrete. For the associated developments it was assumed all concrete was standard concrete.
	Transport of materials to site	GHG emissions from transportation of materials to site	In	HGV movements have been taken from the **Transport Assessment** (Doc Ref. 8.5). A 12 year period is assumed as total period for duration of construction. This includes construction of the main development site and associated developments. It has been assumed that the geographical distribution for HGVs is: • 60% from London/ South East. • 15% from Felixstowe. • 10% from Ipswich. • 10% from Lowestoft. • 5% from Norwich. Prior to the green rail route being operational, a temporary single railway track will be constructed within the LEEIE. This would enable two trains per day to be brought in via the Saxmundham to Leiston branch line in the early stage of the construction phase. It has been assumed that once the green rail route is running, there will be three trains travelling to site per day (six movements).

Lifecycle stage	Activity	Primary emission sources	Scoping outcome	Assumptions
Construction process stage	On-site construction activities	GHG emissions from energy consumption during construction (i.e. electricity, fuel, etc.), including operation of the combined heat and power (CHP) plant used to power the on-site accommodation campus	In	Plant and estimated run times provided by project design team, including plant category and estimated percentage run time during the working hours plant is on site. Where a specific plant type is unknown, a typical plant type will be selected so that fuel use can be estimated using plant specifications. Smaller pieces of equipment, such as chainsaws and scaffolding were excluded. CHP emissions have been based on an ENER-G Natural Gas CHP unit (1910kW thermal output).
	Transport of construction workers	Workers travelling to and from the site of the Sizewell C Project	In	Mode of transport and distance travelled are based on information presented in the **Transport Assessment** (Doc. Ref. 8.05). Where no distances are available, a return trip distance of 50km has been assumed. It has been assumed that the distance travelled by the shuttle bus from the park and ride is of about 4km including return journey. Peak construction workforce at Sizewell is estimated to be 7,900 workers at the main development site, 580 at the accommodation campus and caravan park and a further 20 at the freight management facility . Approximately 30% of the workforce will be living/ working in close proximity to the accommodation campus, which is in the proximity of the main development site. 600 construction workers will be in temporary accommodation at the caravan park at LEEIE and the accommodation campus will provide up to 2,400 bed spaces

Lifecycle stage	Activity	Primary emission sources	Scoping outcome	Assumptions
				(**Transport Assessment** (Doc. Ref. 8.05)).
	Disposal of construction waste	GHG emissions from construction waste disposal	In	Waste data was taken from the Conventional Waste Management Strategy **(Appendix 8A** of this volume**)**. Packaging waste data were combined therefore average breakdowns by material type were assumed in accordance with average packaging wastes arising in the UK, DEFRA, 7th March 2019, "UK Statistics on Waste" (26.36 26.36). For the purposes of the GHG assessment, it is assumed that 90% of materials will be recycled, while 10% of materials will be sent to landfill in accordance with the Waste Management Strategy.
Operation stage	Operation of generators	GHG emissions from energy fuel consumption used in back-up emergency diesel generators (EDGs) and ultimate diesel generators (UDGs)	In	Assumed 8x EDGs and 4x UDGs running 60 hours per annum.
	Operation of the retained combined heat and power (CHP) plant used to power the on-site accommodation campus	GHG emissions from gas combustion	In	Based on an ENER-G Natural Gas CHP unit (1910kW thermal output).
	Fuel for power station operation	Embedded carbon in enriched uranium and energy use for fuel	In	The UK EPRTM core consists of 241 fuel assemblies each formed by zirconium alloy tubes made up of 265 fuel rods and 24 guide thimbles. The fuel rods consist of

Lifecycle stage	Activity	Primary emission sources	Scoping outcome	Assumptions
		processing/ fuel assemblies		uranium dioxide pellets stacked in zirconium alloy clad tubes.
	Worker transport	Workers travelling to and from the site	In	There will be 900 operational staff at any one time. In addition, there will intermittently be 1,000 outage staff (approximately every eighteen months during the period in which the power station is shutdown for refuelling or essential maintenance).
	Operational waste	Waste during operation	In	Intermediate Low Level Waste (ILW) is scoped out as the waste will stay on site and not treated until it decays to Low Level Waste (LLW). Final destinations for radioactive wastes calculated in accordance with **Chapter 7** of this volume. Non-radioactive wastes have been based on estimates provided in the Conventional Waste Management Strategy (**Appendix 8A** of this volume).
	Vehicle/ vessel journeys	GHG emissions per vehicle km	In	Where no distances or location of origin were available, a one way trip distance of 50km has been assumed. Deliveries to the beach landing facilities are scoped out as it is expected that they will be very occasional.
Decommission-ing	Removal of the Sizewell C power station.	Reuse and or disposal of materials. Deconstruction activities associated with decommissioning.	Out (see further comment below).	Decommissioning of the Sizewell C power station has been scoped out of the detailed GHG assessment presented in this chapter, as a high level summary of the impacts of decommissioning has been provided in **Chapter 5**. The removal and reinstatement of the temporary developments is included in the construction phase.

b) Baseline environment

26.4.26 This section describes the baseline environmental characteristics for the Sizewell C Project and surrounding areas, with specific reference to GHG emissions.

i. Current baseline

26.4.27 The current baseline for the GHG emissions assessment is considered to be zero.

ii. Future baseline

26.4.28 The future baseline for the GHG impact assessment is a 'do nothing' scenario that takes into account GHG emissions from other sources of grid electricity generation including fossil fuels and renewable energy that may be used to generate the same quantity of electricity assuming the Sizewell C Project is not consented. The GHG baseline applies average forecast grid intensity which ranges from 51 gCO_2e/kWh in 2032 reducing to 20gCO_2e/kWh in 2050 as the grid is decarbonised.

c) Environmental design and mitigation

26.4.29 As detailed in **Volume 1**, **Chapter 6**, a number of primary and tertiary mitigation measures have been identified through the iterative EIA process, and have been incorporated into the design and construction planning of the Sizewell C Project. Tertiary mitigation measures are legal requirements, or are standard practices that would be implemented as part of the Sizewell C Project.

26.4.30 The assessment of likely significant effects of the Sizewell C Project assumes primary and tertiary mitigation measures are in place.

i. Primary mitigation

26.4.31 Primary mitigation is often referred to as 'embedded mitigation', and includes modifications to the location or design of the development made during the pre-application phase that have become an inherent part of the Sizewell C Project.

26.4.32 Mitigation measures will be implemented to reduce emissions across the lifecycle of the Sizewell C Project. Key measures embedded within the design principles of the Sizewell C Project for the reduction of GHG emissions are set out within **Table 26.7**.

Table 26.7: GHG emissions: Primary (embedded) mitigation measures

Reference document	Design Measures	Impact reduced
Associated Developments Design Principles (Doc. Ref. 8.3)	High level design measure: Environmental Design Measures, including measures such as: • All buildings on-site will be pre-fabricated modular buildings with external cladding where practicable. • A low energy design will generally be adopted, based on the hierarchy of minimising use, reducing waste, recycling and on-site generation. • LED lighting and a Central Management System (CMS) for the lighting would be adopted at the park and ride and freight management facility. The CMS would be capable of dimming parts of the site independently from other parts as usage changes through the day and to allow for seasonal variations in the operation of external lighting. • The facilities will include water-efficient fittings which help reduce water consumption.	GHG emission from embodied carbon, waste generation water and fuel use.
Main Development Site Design and Access Statement (Doc. Ref. 8.1) and Sustainability Statement (Doc. Ref. 8.13)	**Principle 1 – Design and Construct for a Low Carbon Future.** • Design Efficiently – prioritise efficient building design, logistics, use of materials. • Use Alternatives – prioritise low carbon electrical supply, sustainable transport modes and alternative fuels. • Specify Low Embodied Carbon – prioritise sustainable aggregates, reuse of materials, locally sourced materials. • Only use fossil fuels where essential to project delivery.	
	Principle 2 – Adopt a circular economy model • Sustainable production - prioritise durable, reusable and low maintenance materials; and prioritise sourcing from local and responsible suppliers. • Sustainable use – prioritise reuse of assets and components; prioritise servicing and sharing models to make better use of resources. • Recycling – prioritise recycling, composting and energy recovery.	

Reference document	Design Measures	Impact reduced
	Principle 3 – Use Water Wisely. Explore measures to: • Reduce demand – specify ultra-low sanitary appliances, reduce water in concrete specifications, avoid water leakage. • Recycle – grey water recycling, collection and reuse in water management zones, • Use alternatives to potable water – rain water harvesting, investigate use of sea water where quality matches need, use groundwater for dust suppression. • Manage and protect – use onsite treatment, full metering strategy, protect groundwater and surface water quality.	
Waste Management Strategy **(Volume 2, Appendix 8A)**	Waste management objectives: • Prevent and reduce the volumes of waste produced through the application of the waste hierarchy. • Maximise re-use and recycling within the wider development; • Maximise re-use and recycling outside of the Sizewell C Project. • Minimise the impact upon the existing waste management infrastructure. The main ways to achieve these objectives are to: • Retain excavated materials on site, wherever possible. • Make sure construction methods follow best practice; • Reduce vehicle movements on the road through two-way trips. • Re-use materials on the associated developments during the removal and reinstatement phase. • Encourage re-use of material through a waste inventory.	GHG emissions from waste generation.
Transport Assessment (Doc Ref. 8.5)	Transport strategy objectives: • Minimise the volume of traffic associated with the construction of the Sizewell C Project as far as reasonably practical.	GHG emissions from transport

Reference document	Design Measures	Impact reduced
	• Maximise the safe, efficient and sustainable movement of people and materials required for the construction of the Sizewell C Project as far as reasonably practicable. The above objectives will be delivered by: • Minimising workforce travel through the use of the accommodation campus, caravan site at LEEIE, park and ride facilities, direct buses to main development site, constrained car parking/ car sharing, public rights of way improvements and the implementation of a Construction Worker Travel Plan. • Minimising freight movements on roads through the provision of the beach landing facility, Saxmundham to Leiston branch line upgrades, rail siding at LEEIE, green rail route, freight management facility and the implementation of a Construction Traffic Management Plan and a delivery management system.	

ii. Tertiary Mitigation

26.4.33 Tertiary mitigation will be required regardless of any EIA assessment, as it is imposed, for example, as a result of legislative requirements and/or standard sectoral practices.

26.4.34 The **Code of Construction Practice** (CoCP) (Doc. Ref. 8.11) sets out for measures for both the main development site (CoCP Part B) and associated development sites (CoCP Part C) to mitigate GHG emissions impacts on the identified receptor (i.e. the global climate), which are summarised in **Table 26.8**.

Table 26.8: Control measures to mitigate GHG climate impacts

Topic	Mitigation measure
Waste Management and Resource Use	Measures to reduce material resource use: • Implementation of a Materials Management Plan (Doc. Ref, 8.11 Parts B and C) in accordance with the Materials Management Strategy (**Appendix 3B** of this volume) and an Outline Soil Management Plan (**Appendix 17C** of this volume) to re-use as much as site-won material as possible. • Delivery of materials to site on an 'as required' basis;

Topic	Mitigation measure
	• Use of locally sourced materials and suppliers, where practicable. • Use of pre-cast elements where practicable.
	Measures for waste reduction: • Management of waste in line with the measures set out within the Waste Management Strategy **(Volume 2 Appendix 8A**). • Implementation of an Outline Site Waste Management Plan (appended to **Volume 2, Appendix 8A).** • Implementation of waste hierarchy and maximising opportunities for reuse and recycling.
Carbon Efficiency Plan	Measures to reduce greenhouse gas emissions: • Training to understand energy use and opportunities for reducing carbon emissions. • Promoting low carbon transport of people, material and equipment. • Minimising energy consumption (including fuels), through efficient working methods, using and specifying low energy equipment, and using smart technologies. • Maximising local sourcing of materials and local waste management facilities. • Using low embodied carbon in materials and incorporating material resource efficiency and waste minimisation best practice into design. • Monitoring and reporting on embodied and emitted greenhouse gas, including achieved reductions as a result of adopting low carbon and sustainable solutions and alternatives.

d) Assessment

i. Introduction

26.4.35 This section presents the findings of the GHG assessment for the construction, operation and removal and reinstatement (where relevant) phases of the Sizewell C Project.

26.4.36 This section identifies any likely significant effects that are predicted to occur and then highlights any secondary mitigation and monitoring measures that are proposed to minimise any adverse significant effects.

ii. Construction

26.4.37 The greatest GHG impact during the construction phase is as a result of embedded carbon in construction materials, accounting for 84% of total construction emissions across the Sizewell C Project. The main development site accounts for 98% of total embedded GHG emissions with the associated development sites accounting for the remainder. Embedded GHG emissions in steel and concrete account for over 71% of total embedded emissions.

26.4.38 Other sources of emissions during construction include energy and fuel use for construction activities, including fuel consumed by construction vehicles, fuel use for the transportation of construction materials to the Sizewell C Project, transportation of construction workers to and from the sites and the transportation and disposal of waste.

26.4.39 Construction of the Sizewell C Project will require the removal of existing deciduous and coniferous woodland, wetlands and agricultural land resulting in the removal of existing carbon sinks. However, enhancement is proposed to existing habitats and new habitats will be created during construction and in the final removal and reinstatement phases **(Volume 2, Chapter 14)**; resulting in an overall carbon sink net gain of 12,150 tCO_2e. In summary land use change as a result of the Sizewell C Project will result in a decrease in GHG emissions.

26.4.40 Total GHG emissions from the construction phase are estimated to be 5,738,084 tCO_2e. A breakdown of estimated GHG emissions from the construction of the Sizewell C Project are shown in **Table 26.9**.

26.4.41 GHG emissions from construction activities will be limited to the duration of the construction programme (12 years). When annualised and assuming approximately 47 working weeks per year in line with assumptions taken from the Transport Assessment (Doc. Ref. 8.5) (excluding public holidays and Sundays), the total average annual construction emissions equate to 478,684 tCO_2e.

Table 26.9: Construction GHG emissions (Sizewell C Project)

Lifecycle stage	Project activity / Emissions source	Emissions (tCO_2e)	% of construction emissions
Construction	Embedded carbon in materials	4,832,242	84%
	Construction activities	204,880	4%
	Transport of materials to site	283,449	5%
	Construction worker commuting	302,566	5%

Lifecycle stage	Project activity / Emissions source	Emissions (tCO_2e)	% of construction emissions
	Waste treatment and disposal	52,735	<1%
	CHP (worker accommodation)	52,735	<1%
	Removal and treatment of materials from temporary associated developments	8,286	<1%
	Total	**5,738,084**	

iii. Operation

26.4.42 The main development site comprises two UK EPR™ reactor units with an expected net electrical output of approximately 1,670 megawatts (MW) each, giving a total site capacity of 3,340MW. The Sizewell C Project has a proposed design life of 60 years and is designed to operate continuously 24-hours a day, except for routine maintenance outages.

26.4.43 GHG emissions sources within the scope of power station operation include embedded carbon in the production of the uranium fuel, combustion of diesel used in back-up generators, fuel used for the transportation of workers to the site and waste disposal.

26.4.44 Embedded carbon as a result of the fabrication and provision of the uranium fuel has been calculated based on 6,800 fuel cells used over a proposed operational period of 60 years. The emissions presented account for the extraction, production and transportation of the fuel to the Sizewell C Project site.

26.4.45 GHG emissions from the combustion of diesel for the back-up generators have been calculated based on 12 generators running an average of 60 hours per annum.

26.4.46 Emissions from the calculation of non-radioactive waste is based on the treatment of inert, commercial and hazardous waste. For the purposes of this assessment, it is assumed that 90% of the waste is inert or non-hazardous and will be recycled while the residual 10% will go to landfill. For radioactive waste, ILW has been scoped out of the assessment as this will stay on site and not be treated until it has decayed to LLW when it will then be transferred to Drigg Low Level Waste Repository. A small amount of remaining sludge, oils and other residual materials will be incinerated.

26.4.47 Emissions from the transportation of workers to and from the site during operation accounts for 900 permanent staff working 235 days per year over the proposed 60 years of operation. It also accounts for an additional 1,000 staff working every eighteen months during outage periods (**Transport Assessment**, Doc Ref. 8.5). For the purpose of this assessment, it has been assumed that workers will each travel an estimated 50km round trip per day and that the majority of these staff will travel by car.

26.4.48 For the purposes of this assessment, the operational phase of the Sizewell C power station is assumed to commence in 2034 when the export of electricity to the national grid begins. The assessment considered a scenario where Sizewell C is operating from 2034 for 60 years. To estimate GHG emissions for the operation phase, it has been necessary to undertake a two-step approach. The first step has been to calculate emissions using the latest set of available emissions factors (2019), resulting in an estimate of approximately 22,739 tCO_2e per annum.

26.4.49 By 2034, however, it is anticipated that Defra and other industry published GHG emissions factors will have considerably declined as the UK transitions towards meeting a net zero carbon emissions target by 2050. For example, emissions from the transportation of people and materials would reduce as the uptake of electric vehicles increases. To account for the influence of decarbonisation activities across multiple sectors as the UK moves towards the 2050 target, a second step to apply a conservative reduction factor has been undertaken. Application of a 15% reduction to the calculation compared to 2019 emission factors is considered a highly conservative reduction factor and likely represents the highest operational emissions which will be experienced in 2034. Ongoing reduction of this figure would be expected as a result of further decarbonisation. The outcome of this is presented in **Table 26.10**.

Table 26.10: Operation GHG emissions

GHG Emission Source	GHG Emissions (tCO_2e) (60 years operation)	% contribution to total operational emissions
Operation: fuel fabrication	894,390	66%
Operation: diesel supply use for generators	250,496	18%
Back-up CHP plant	43,344	3%
Waste	3,380	0%
Vehicle journeys	172,736	13%
Total lifetime GHG emissions	**1,364,346**	
Annual emissions (2019 emissions factors)	**22,739**	

Annual emissions (with reduction factor) likely to be indicative of 2034	**19,328**	

iv. Significance of effect

Construction

26.4.50 **Table 26.11** presents the estimated construction emissions against the carbon budget period during which they arise. Construction emissions will fall under the 3rd, 4th and 5th UK Carbon Budgets. The final full year of construction, 2033, is currently outside of the set carbon budget periods.

Table 26.11: UK carbon budgets relevant to construction period

UK Carbon Budget (applicable years)	UK Carbon Budget ($MtCO_2e$)	Construction emissions during carbon budget period ($MtCO_2e$)	Construction emissions as a proportion of Carbon Budget
3rd (2018 – 2022)	2,554	0.48	0.02%
4th (2023 – 2027)	1,950	2.39	0.12%
5th (2028 – 2032)	1,765	2.39	0.14%

26.4.51 Emissions from the construction of the Sizewell C Project do not contribute to more than 1% of the total emissions during any five year carbon period under which they arise. The magnitude of effect during construction is therefore considered low. The construction of the Sizewell C Project will not have a significant impact on the UK meeting its five carbon budgets through to 2032 and therefore the effect of the is considered **not significant**.

Operation and long term operational benefits

26.4.52 The Sizewell C Project will contribute to the UK meeting the predicted increase in demand for electricity over the coming decades. The BEIS Updated Energy and Emissions Projections 2018 (Ref. 26.41) states that in 2018 the generating capacity in the UK, from all sources, amounts to 108 Gigawatts (GW). The same report predicts an increase in demand over the next two decades of 31 GW due to a combination of demographic change, economic growth and the electrification of heat and transport.

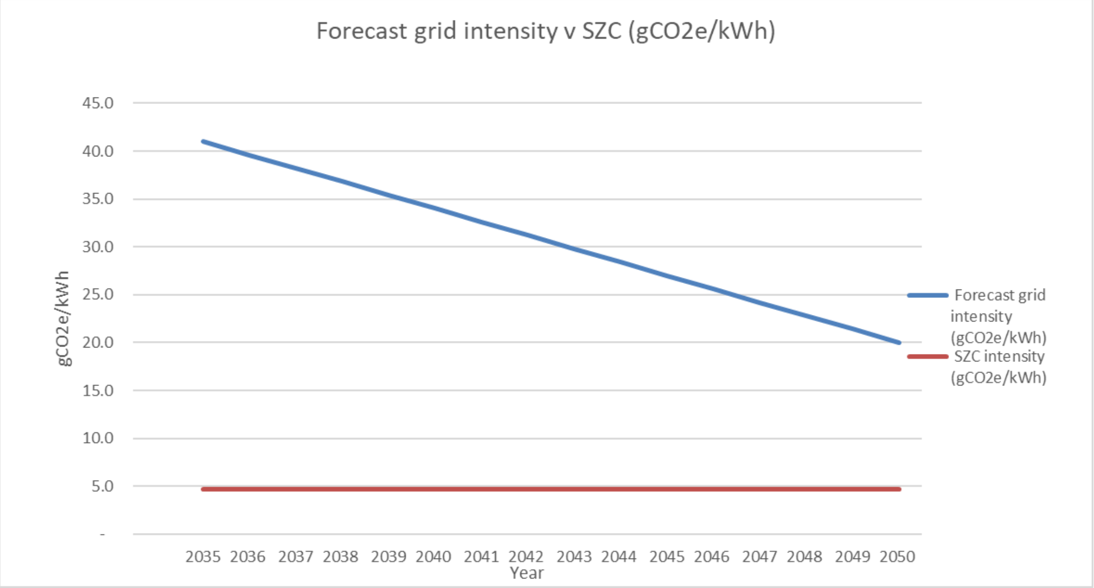
26.4.53 As set out above, nuclear power stations produce minimal GHG emissions while operating. Over the 60 year operational life of the Sizewell C Project, lifecycle GHG emissions are estimated to equate to 4.5g CO_2e/kWh. To put the carbon intensity of Sizewell C into context lifecycle emissions for fossil fuel electricity generation and other low carbon fuel sources such as onshore and offshore wind are provided below (Ref. 26.38 and Ref. 26.39):

- Natural gas 340 gCO_2e/kWh.
- Solar photovoltaic 40-85 gCO_2e/kWh.
- Offshore wind 7-24 gCO_2e/kWh.
- Onshore wind 7-20 gCO_2e/kWh.

26.4.54 **Plate 26.1** presents the GHG intensity of energy generation from the Sizewell C Project (gCO_2e/kWh) alongside forecast average grid GHG intensity. Forecast average grid intensity is based on an anticipated mix of electricity generation sources including fossil fuel, nuclear and renewable energy. Average GHG intensity presented in this figure is based on a combination of forecast data from BEIS (Ref. 26.40) and National Grid (Ref. 26.41). Published in 2019 BEIS 2018 forecasts show a steady decrease in average grid intensity from 160gCO_2e/kWh in 2018 down to 41gCO_2e/kWh in 2035. National Grid has produced GHG grid intensity forecasts for two Future Energy Scenarios (FES) beyond 2030 to 2050. The first scenario 'Community Renewables' is based on the large scale uptake of small, community led renewable energy while the second scenario 'Two degrees' focusses on large centralised initiatives.

26.4.55 The grid average GHG intensity forecast used in **Plate 26.1** for 2050 is based on the 'two degrees' scenario that presents a forecast intensity of 20gCO_2e/kWh. Due to no other available interim data a flat rate of reduction in intensity has been estimated from 2035 to 2050. This forecast decrease is predominantly due to an increased uptake of renewable energy and nuclear generation while the use of fossil fuels to generate energy declines. **Plate 26.1** shows that electricity generation using nuclear energy sits below the grid average through to 2050.

Plate 26.1: Forecast grid intensity vs Sizewell C (gCO$_2$e/kWh) 2034-2050

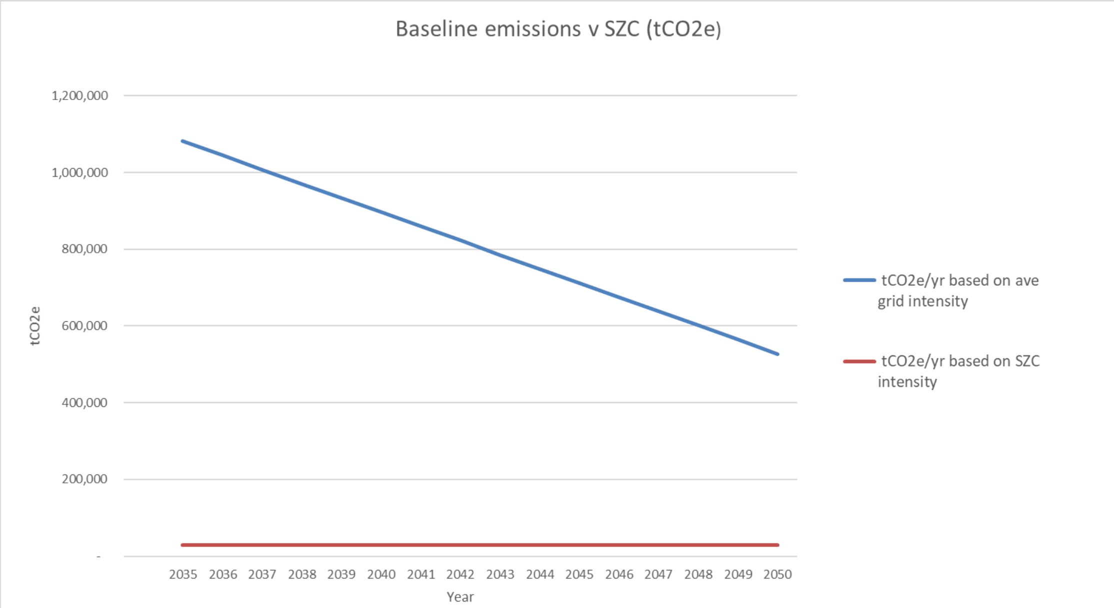


26.4.56 A GHG baseline against which the estimated future operation of the Sizewell C power station can be compared against has been calculated by multiplying the annual energy generation of the Sizewell C Project (MWh/annum) by the forecast annual energy intensity (gCO$_2$e/kWh) to give the tonnes of GHG per annum. This has been calculated from 2034 the year the power station is commissioned through to 2050 in line with the net zero carbon target.

26.4.57 Total operational emissions per annum for the Sizewell C Project have also be presented to allow for a comparison between the baseline and the Sizewell C Project.

26.4.58 **Plate 26.2** presents the variation in the annual GHG impact between the operation of the Sizewell C power station and the generation of an equivalent amount of energy based on the forecast annual average grid GHG intensity. The graph in **Plate 26.2** demonstrates that, even as average grid emissions intensity declines as the UK transitions to a decarbonised grid, the Sizewell C Project is in comparison a low carbon source of electricity generation.

Plate 26.2: Sizewell C vs Baseline emissions (tCO_2e per annum)



26.4.59 **Plate 26.2** The low carbon energy generation performance of Sizewell C, when compared to forecast grid average GHG emissions intensity i.e. assuming the equivalent energy was generated using the likely estimated mix of energy generation sources, results in Sizewell C displacing just over 1 million tCO_2e in 2034, the first year of operation. By 2050, Sizewell C will have displaced a cumulative total of approximately 12 million tCO_{2e} compared to the estimated future energy mix for generation. On this basis, it is conservatively estimated that GHG emissions from the construction of Sizewell C will be offset within the first six years of operation by GHG emissions displaced, assuming the equivalent energy were otherwise to be generated by the anticipated mix of grid electricity generation sources.

26.4.60 This can be regarded as a conservative estimate as the forecast decline in the average grid intensity itself benefits from an assumed increase in nuclear generation.

26.4.61 It is assumed that Sizewell C would be operational from 2034. Currently, carbon budgets have only been set by Government through to 2032, the end of the 5th budget period. It is therefore not possible to assess the operational impact of the Sizewell C Project in the context of the UK meeting its carbon budget targets.

26.4.62 It is possible, however, to put annual operational emissions into the context of the electricity generation sector, without taking into account the displacement of an alternative energy generation. GHG emissions for the “grid electricity production” sectoral scenario (Ref. 26.37) for the years 2034 and 2035 (the only years currently published by the Committee on Climate Change) are 29.3 and 28.5 $MtCO_{2e}$ respectively. When comparing the annual Sizewell C operational GHG emissions against the total projected GHG emissions generated in the UK from the grid electricity production, this equates to around 0.1% of total annual sectoral emissions. GHG emissions per annum once operational are estimated to be 19,328 tCO_{2e} at their peak. Overall, the effect is considered not significant.

26.4.63 When comparing the GHG impact of electricity generated at Sizewell C against the impact of generating the equivalent energy from the anticipated future mix of alternative generation, Sizewell C provides a **significantly beneficial impact**. GHG emissions reduced as a result of Sizewell C equate to over 3% of total energy sector emissions in 2034.

v. Removal and reinstatement

26.4.64 Removal and reinstatement of each of the temporary associated developments will occur during the 12 year construction period. As such emissions from the removal and reinstatement of the temporary associated developments including the removal and treatment of materials and associated deconstruction activities have been considered within the assessment of construction emissions.

26.4.65 Removal and reinstatement of the temporary associated development sites will result in a small net gain in the overall carbon sequestration ability of the Sizewell C Project due to the introduction of new habitats increasing the value of carbon stock.

e) Mitigation and monitoring

i. Introduction

26.4.66 Primary and tertiary mitigation measures that have already been incorporated within the design of the Sizewell C Project are detailed in **Section 26.5**.

26.4.67 Where other mitigation is required to reduce or avoid a significant effect, this is referred to as secondary mitigation.

ii. Mitigation

26.4.68 Proposed embedded and tertiary mitigation measures to be considered for GHG impact are detailed in **Table 26.7** and **Table 26.8** respectively. No proposed secondary mitigation has been identified.

iii. Monitoring

26.4.69 In accordance with the Code of Construction Practice (CoCP) (Doc Ref. 8.11) appointed contractor(s) will develop and implement a Construction Environmental Management Plan (CEMP) to measure, monitor and report energy and water consumption and GHG emissions during construction, which includes but is not limited to the following:

- Training to understand energy use and opportunities for reducing carbon emissions.
- Promoting low carbon transport of people, material and equipment.
- Minimising energy consumption (including fuels), through efficient working methods, using and specifying low energy equipment, and using smart technologies.
- Maximising local sourcing of materials and local waste management facilities.
- Using low embodied carbon in materials and incorporating material resource efficiency and waste minimisation best practice into design.
- Monitoring and reporting on embodied and emitted greenhouse gas, including achieved reductions as a result of adopting low carbon and sustainable solutions and alternatives.

26.5 Climate change resilience (CCR) assessment

a) Methodology

i. Study area

26.5.1 The study area for the CCR assessment comprises any physical assets and associated activities for the construction and operation of the the Sizewell C Project.

ii. Assessment scenarios

26.5.2 The CCR assessment scenarios considers climate change impacts during the construction and operation of Sizewell C on the main development site and the associated developments through to 2099, the last year for which UKCP18 climate projections are provided. The scenario took into account the resilience of construction and operation of the Sizewell C Project to climate change, resulting from projected increases in temperature, high winds, flooding (associated with increases in precipitation and sea level change).

iii. Assessment criteria

26.5.3 A detailed description of the assessment methodology used to assess climate change resilience is provided in **Volume 1, Appendix 6V**, together with the assessment criteria used to determine the significance of effects. A full assessment of the CCR is provided in **Appendix 26A** of this volume, with a summary of the conclusions on the significance of these effects also presented in this chapter.

iv. Assessment approach

26.5.4 The CCR assessment uses a stepped approach to identify potential climate change impacts on the Sizewell C Project. It considers the potential consequence of the impacts and identifies appropriate mitgation/ adaptation measures.

26.5.5 The EIA Regulations require an ES to include a statement describing how a proposed development will be designed to reduce its vulnerability to future climate change. Consideration of climate change impacts within EIAs is an area of emerging practice. The approach outlined below is aligned with existing guidance such as that of IEMA (Ref. 26.4).

26.5.6 As noted by the UK Climate Change Risk Assessment (CCRA) Evidence Report (Ref. 26.45) published by the Committee on Climate Change (CCC) in 2017, England is already impacted by extreme weather events. The report identifies key risks and implications from a changing climate, which include:

- Changes in extreme weather conditions, impacting on infrastructure, through storm damage, flooding and high temperatures.
- Flooding of transport, including roads and rail is likely to increase, affecting both urban and rural access routes.

26.5.7 The following key terms and definitions are used in the CCR assessment:

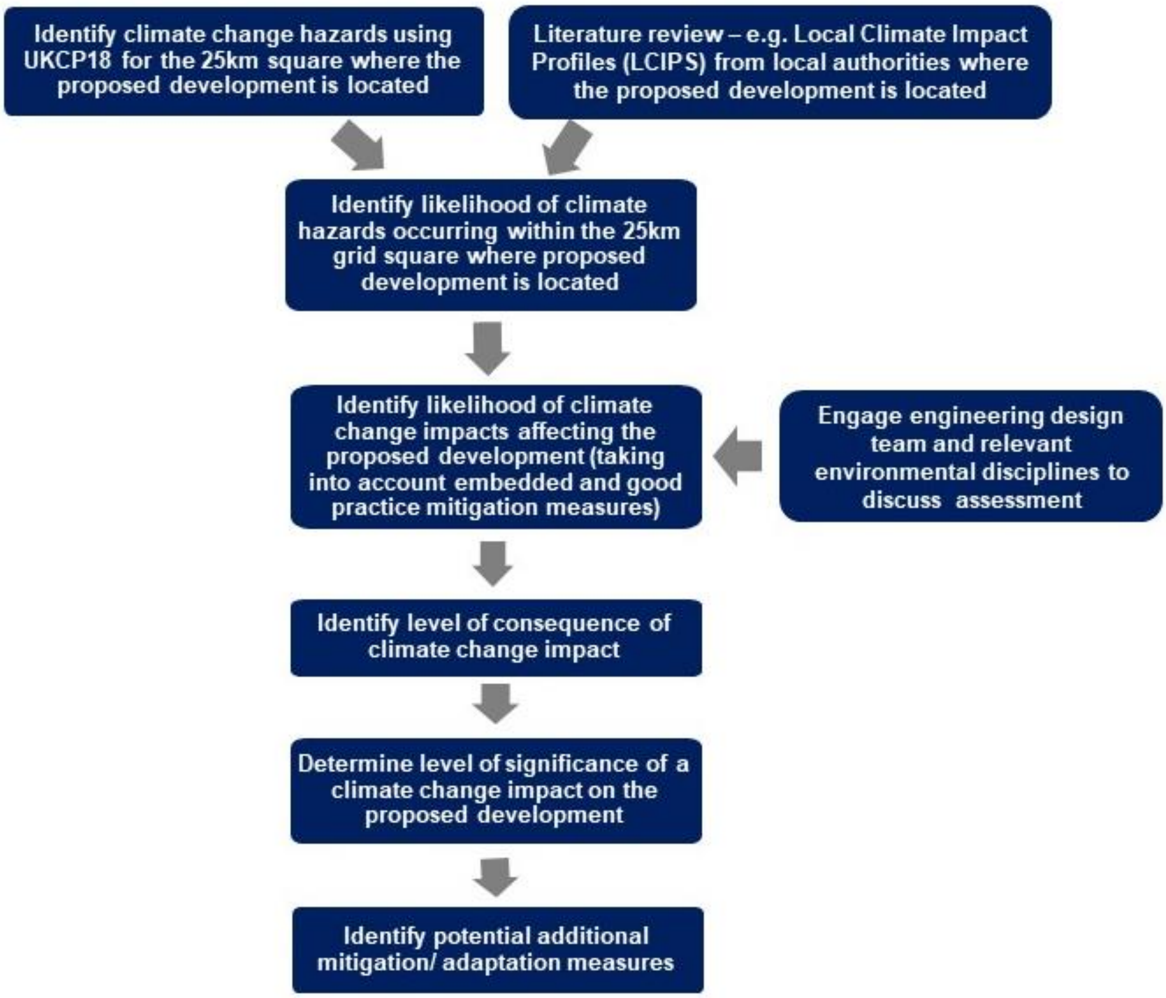
- Climate hazard – a weather or climate related event, which has potential to do harm to environmental or community receptors or assets, for example, increased winter precipitation.

- Climate change impact – an impact from a climate hazard which affects the ability of the receptor or asset to maintain its function or purpose.

- Consequence – any effect on the receptor or asset resulting from the climate hazard having an impact.

26.5.8 The methodology for the CCR assessment follows the approach summarised in **Plate 26.3Error! Reference source not found.**.

Plate 26.3: CCR assessment methodology



26.5.9 Following an assessment of the future climate projections, receptors vulnerable to climate change have been identified as:

- Construction – the workforce and associated construction activities, including the use of plant and machinery.
- Operation – the workforce, assets and their operation, maintenance and refurbishment (i.e. pavements, structures, earthworks and drainage, technology assets, etc.).
- End-users (members of public, commercial operators etc.).

26.5.10 For the operational phase of the Sizewell C Project, once potential impacts have been identified, the likelihood and consequence of each impact occurring to each receptor (where relevant) has been assessed, for the selected future time frame of operation (2090s). The assessment considered operation of the main development site and both permanent and temporary associated developments during their operational life.

26.5.11 Project lifetime is considered to include the construction stage of 12 years and the proposed operational stage of 60 years. With respect to construction, given its near term occurrence and shorter duration compared to the operational phase of the Sizewell C Project, future climate change is less relevant, and the assessment of potential impacts follows a more descriptive approach.

v. Assumptions and limitations

26.5.12 It has been assumed that the main development site design aligns with the Office for Nuclear Regulation (ONR) Nuclear Safety Technical Assessment Guide – External Hazards (Ref. 26.44), in particular:

- Annex 2 – Meteorological hazards (Ref. 26.45).
- Annex 3 – Coastal flood hazards (Ref. 26.46).

26.5.13 This is in respect of the Nuclear Site Licence (NSL) required to allow the power station to operate (Ref. 26.47).

26.5.14 Limitations associated with the approach taken for the CCR assessment relate to uncertainties inherent within UKCP18 (Ref. 26.6).

b) Baseline environment

26.5.15 The baseline for the CCR assessment includes current and future climate conditions for the geographical location of the Sizewell C Project.

i. Current baseline

26.5.16 Historic climate data obtained from the Met Office website (Ref. 26.42) recorded by the meteorological station(Levington Weather Station) closest to the Sizewell C Project for the period 1981 - 2010 indicates the following:

- Average annual maximum daily temperature was 14.2°C.

- Warmest month on average was August (mean maximum daily temperature of 22.4°C).
- Coldest month on average was February (mean minimum daily temperature of 1.8°C).
- Average total annual rainfall levels were 560.5mm.
- Wettest month on average was November (52.7mm of rainfall on average for the month).
- Driest month on average was February (38.7mm of rainfall on average for the month).

26.5.17 In addition, data from the UKCP18 (Ref. 26.6) gridded observational dataset has been collated to complement the existing baseline as shown in **Table 26.12**.

Table 26.12: UKCP18 projection data.

Climate variable	Potential Hazard	Likelihood (2020-2039)	Likelihood (2050-2069)	Likelihood (2080-2099)
Mean annual air temperature anomaly at 1.5m (°C)	Increase in mean annual air temperature	Possible, about as likely as not	Likely	Very likely
Mean summer air temperature anomaly at 1.5m (°C)	Increase in mean summer air temperature	Possible, about as likely as not	Likely	Very likely
Mean winter air temperature anomaly at 1.5m (°C)	Increase in mean winter air temperature	Possible, about as likely as not	Likely	Very likely
Maximum summer air temperature anomaly at 1.5m (°C)	Increase in maximum summer air temperature	Possible, about as likely as not	Likely	Very likely
Minimum winter air temperature anomaly at 1.5m (°C)	Increase in minimum winter air temperatures	Possible, about as likely as not	Likely	Very likely

Climate variable	Potential Hazard	Likelihood (2020-2039)	Likelihood (2050-2069)	Likelihood (2080-2099)
Annual precipitation rate anomaly (%)	Decrease in annual precipitation rate	Possible, about as likely as not	Likely	Very likely
Summer precipitation rate anomaly (%)	Decrease in summer precipitation rate	Possible, about as likely as not	Likely	Very Likely
Winter precipitation rate anomaly (%)	Increase in winter precipitation rate	Likely	Likely	Very likely
Annual specific humidity anomaly at 1.5m (%)	Increase in annual specific humidity	Likely	Likely	Very likely
Time-mean sea level anomaly (m)	Increase in sea level	Likely	Likely	Very Likely

ii. Future baseline

26.5.18 Projected temperature and precipitation variables are presented in **Table 26.13** and **Table 26.14** respectively. UKCP18 probabilistic projections have been analysed for the 25km grid square where the Sizewell C Project is located. These figures are expressed as anomalies in relation to the 1981-2000 baseline selected in UKCP18. This baseline was selected as it provides projections for 20-year time periods (e.g. 2020 – 2039) for the parameters analysed within the assessment compared to the 30-year projections that would be generated from the 1981 – 2010 baseline.

26.5.19 The climate projections for the location of the Sizewell C Project have been presented in the tables below.

Table 26.13: Projected changes to temperature variables (°C) (RCP 8.5).

Climate variable	Time period		
	2020-2039	2050-2069	2080-2099
Mean annual air temperature anomaly at 1.5m (°C)	+1.0 (+0.4 to +1.7)	+2.2 (+1.1 to +3.5)	+4.0 (+2.2 to +6.1)
Mean summer air temperature anomaly at 1.5m (°C)	+1.2 (+0.4 to +2.1)	+2.7 (+1.0 to +4.5)	+4.9 (+2.3 to +7.8)
Mean winter air temperature anomaly at 1.5m (°C)	+0.9 (+0.0 to +2.0)	+2.1 (+0.6 to +3.7)	+3.6 (+1.4 to +5.9)

Climate variable	Time period		
	2020-2039	2050-2069	2080-2099
Maximum summer air temperature anomaly at 1.5m (°C)	+1.3 (+0.3 to +2.5)	+3.0 (+0.9 to +5.3)	+5.5 (+2.1 to 9.1)
Minimum winter air temperature anomaly at 1.5m (°C)	+0.9 (-0.1 to +2.0)	+2.1 (+0.5 to +3.9)	+3.6 (+1.2 to +6.5)

Note: The main central number for each variable at each time period represents the 50 per cent probability level, indicating that the particular change is 'as likely as not' to occur. The figures in brackets show the wider range of probability and potential change (10 per and 90 per cent probability levels).

Table 26.14: Projected changes to precipitation variables (%).

Climate variable	Time period		
	2020-2039	2050-2069	2080-2099
Annual precipitation rate anomaly (%)	+0 (-5 to +5)	-3 (-10 to +4)	-2 (-10 to +6)
Summer precipitation rate anomaly (%)	-9 (-33 to +16)	-23 (-51 to +7)	-35 (-66 to +0)
Winter precipitation rate anomaly (%)	+5 (-5 to +15)	+12 (-4 to +29)	+21 (+1 to +45)

Table 26.15: Projected changes to specific humidity anomaly at 1.5m (%) (RCP 8.5).

Climate variable	Time period		
	2020-2039	2050-2069	2080-2099
Specific humidity anomaly at 1.5m (%)	+6 (-1 to +12)	+13 (+4 to +23)	+25 (+11 to +40)

Table 26.16: Projected changes to mean sea level anomaly (m) (RCP 8.5).

Climate variable	Time period		
	2020-2039	2050-2069	2080-2099
Time-mean sea level anomaly (m)	+0.15 (+0.1 to + 0.21)	+0.37 (+0.27 to +0.48)	+0.65 (+0.49 to +0.86)

Table 26.17: Projected changes to mean sea level anomaly (m) (RCP 8.5).

Climate variable	Scenario year		
	2110	2140	2185
Time-mean sea level anomaly (m)	+0.87 (+0.65 to + 1.17)	+1.2 (+0.88 to +1.63)	+1.64 (+1.19 to +2.28)

26.5.20 As noted by the UK Climate Change Risk Assessment (CCRA 2017) (Ref. 26.43) published by the Committee on Climate Change (CCC) in 2017, the UK is already impacted by extreme weather events. The report identifies key risks and implications from a changing climate, which include:

- Changes in extreme weather conditions, which will impact on infrastructure, through storm damage, flooding and high temperatures.
- Flooding of transport, including roads and rail is likely to increase, affecting both urban and rural access routes.

c) Environmental design and mitigation

i. Primary mitigation

26.5.21 This is often referred to as 'embedded mitigation' and includes modifications to the location or design of the development made during the pre-application phase that are an inherent part of the Sizewell C Project. Details of embedded mitigation for the main development site and associated developments are detailed in **Volume 2, Appendix 26A**. Primary mitigation relevant to this assessment is summarised below.

Design features – main development site

26.5.22 A number of key design features have been embedded that would help to mitigate the measures of climate change impacts, including:

- Main development site parameters (see **Chapter 2** of this volume).
  - Specification of a minimum platform and SSSI crossing height at 7.3m Above Ordnance Datum (AOD), which would reduce the risk of the main platform and access to it from being flooded.
  - Specification of a minimum sea defence crest height at 10.2m AOD to reduce the risk of overtopping, with adaptive design to potentially raise the defence up to 14.2m AOD in the future to

minimise the risk of overtopping in the later stages of the Sizewell C Project lifetime, if required. This would tie into the Sizewell B sea defences.

- Provision of continuous sea defence structures (hard coastal defence feature and soft coastal defence feature, as further described below) and the provision of a rebuilt Northern Mound that would tie into the Sizewell C sea defences.
- During initial stages of construction, a temporary reinforced coastal flood defence with crest level of 7m AOD would be built to form a haul road used for construction until the main sea defence is completed.

- An Outline Drainage Strategy (**Volume 2, Appendix 2A**), which accounts for a change in surface water flows with climate change, has been prepared to detail the principles for drainage and foul water management at the Sizewell C main development site and at the associated development sites.
- Hard coastal defence feature (HCDF):
  - Recessed landward position to maximise the period before the HCDF would interact with coastal processes.
  - Gently curved HCDF corners to minimise effects to longshore transport if the feature becomes exposed.
  - A dissipative rock armour slope, initially protected by the soft coastal defence feature (SCDF) to reduce wave reflections and turbulence if the HCDF were exposed.
- SCDF:
  - The sacrificial SCDF provides relatively small quantities of beach grade sediment during storms.
- The Beach Landing Facility (BLF) has been designed to be highly transmissive to water and sediment flows, by incorporating a small number of marine piles, using slender piles and being of short length.
- Subterranean tunnels of the cooling water infrastructure would avoid climate change impacts on these structures.

- Planting/ landscaping as set out within the **Outline Landscape and Ecology Management Plan (OLEMP)** (Doc. Ref. 8.2):
  - Selection of species tolerant to existing/ future site and environmental conditions;
  - Providing a strategy for the establishment, maintenance, long-term management and monitoring of newly created landscapes/ habitats and existing features/ habitats with consideration to climate change adaptation and resilience.

Design features – associated developments

26.5.23 A number of key design features are embedded in the design of the associated developments that would help to mitigate the impacts of climate change. Further details on the Sizewell C Project for each of the associated developments are provided in **Chapter 2** of **Volumes 3** to **9**.

26.5.24 As set out in the **Outline Drainage Strategy** (**Appendix 2A** of this volume), to reduce flooding at the northern and southern park and ride developments permeable surfaces would be used where possible to manage any increase in surface water due to heavy precipitation events. Both park and rides would also encompass a network of swales and infiltration basins to attenuate surface water run-off and bypass separators where necessary to protect the underlying groundwater and surface water receptors.

26.5.25 To reduce the risk of flooding the design of the two village bypass will include a series of measures including:

- The road would cross over the River Alde via a multi-span bridge (up to 60m long) to allow the river to flow beneath the bypass.
- Eight flood arch culverts (5.4m long, 3m wide) through the embankment (four on either side of the bridge) where the road crosses the River Alde floodplain to maintain flows through embankment in the event of a flood.
- A further culvert located approximately 200m south-east of existing A12 to allow an existing watercourse to pass beneath the road.
- Allowance for flood compensation areas, if required, north of the bypass route to compensate for the loss of floodplain.

- Local drainage from surrounding fields will be directed beneath the overbridge or culverted where practicable to ensure there is no increases risk of flooding.

- Swales will be provided along the route of the bypass (except along the overbridge and along the embankment within the floodplain to minimise sediment generation in the floodplain) to manage additional water run-off.

- Areas for up to three infiltration basins along the length of the road, if required, which will be designed to cater for 100 years flood event plus a 40% allowance for climate change.

- Water draining from the road infrastructure will pass through appropriate drainage, including the incorporation of Sustainable Drainage Systems (SuDS).

26.5.26 The Sizewell Link Road will have a number of key embedded design features to reduce the impact of flood risk including:

- Areas for up to 12 infiltration basins and up to five flood relief basins would be located along the length of the road, if required, and will be designed to cater for 100 years flood event plus a 40% allowance for climate change.

- Swales will be provided along the length of the road.

- Where the road (and realigned junctions) crosses existing watercourses, larger portal culverts (5.4m wide by 1.3m above bank level) would be provided to allow the road to cross over the watercourses, and would straddle the watercourse channel to reduce the disturbance of the bank.

- The watercourse at Fordley Road would be diverted so there would only be one watercourse crossing, and a flood relief culvert provided adjacent to the portal culvert, to reduce flood risk.

- A flood relief culvert is proposed south of Theberton and Brown's planation to maintain a surface water overland route.

- An existing 600mm culvert crossing of the B1122 would be extended beneath the Sizewell link road to maintain a surface water route beneath the new road.
- Water draining from the road infrastructure will pass through appropriate drainage, including the incorporation of SuDS.

26.5.27 Design features embedded into the Yoxford roundabout and other highway improvements include:

- The design of the roundabout and the selection of construction materials will be in accordance with the DMRB, British Standards and best practice guidance at the time of the design.
- SuDS would be implemented to attenuate surface water run-off and minimise sediment generation. The envisaged drainage design will comprise channels, kerb drains or gullies to remove surface water run-off into underground drains.
- An infiltration basin would be provided, which in the event ground conditions prevent full infiltration to ground, could become a combined infiltration and attenuation basin.
- Use of bypass separators where necessary to protect the underlying groundwater and surface water receptors.

26.5.28 To reduce the risk of flooding the design of the freight management facility will include a series of measures including:

- A swale to make sure on-site surface water run-off is contained within the site.
- Geo-cellular storage structures would be installed beneath two of the landscape bunds to attenuate water and regulate water flows within the site.
- Use of bypass separators where necessary to protect the underlying groundwater and surface water receptors.

26.5.29 The proposed rail extension route will be designed with one swale of the northern side of rail extension route (between the landscape bund and the railway track) and a larger infiltration basin proposed at the eastern end of the site, between the proposed rail extension route and the landscape bund to the south, to provide for additional temporary surface water storage if required.

ii. Tertiary mitigation

26.5.30 Tertiary mitigation is required regardless of any EIA assessment, as it is obligatory, for example, as a result of legislative requirements and/or standard sectoral practices. Tertiary mitigation considered within the CCR assessment is provided below.

Construction

26.5.31 The **Code of Construction Practice (CoCP)** (Doc. Ref. 8.11) sets out contractor requirements for both the main development site and associated developments. It has been prepared to detail how construction activities will be managed and controlled in the event of climate change impacts. Measures within the **CoCP** to provide climate resilience include:

- Consideration of the hazards associated with working in more extreme weather conditions including health and safety plans to prevent worker exhaustion due to heat and safety measures to mitigate against issues caused by high winds e.g. increase dust or damage to structures/ construction plant.

26.5.32 The **Traffic Incident Management Plan (TIMP)** (Doc. Ref. 8.6) sets out procedures for the management of construction traffic during severe weather events, including identification of suitable network redundancies and diversion routes; emergency response and contingency plans; and standard operating procedures for use in the event of necessary road closure and/or traffic diversion. For instance, the TIMP sets out procedures for holding Heavy Goods Vehicles (HGVs) en-route along the A14 in the event of Orwell Bridge closures (e.g. due to strong winds).

26.5.33 Impacts on health and safety as a result of climate change impacts will be managed through the **CoCP** and in accordance with Construction Design and Management (CDM) Regulations 2015. The Health and Safety plans will set out how health and safety risks, including those as a direct or indirect result of climate change impacts, will be managed. Further information on Health and Safety requirements and mitigation is included in the major accidents and disasters chapter of the ES (**Volume 2, Chapter 27**).

Operation

Main development site

26.5.34 Under the regulatory and legal requirements for obtaining a Nuclear Site License (NSL), SZC Co. is required to demonstrate that consideration has been given to the potential impacts of climate change and that the necessary measures to adapt the Sizewell C Project have been agreed.

26.5.35 The safety case for licensed nuclear operations is independently verified by the Office for Nuclear Regulation (ONR). The safety case must demonstrate that the Sizewell C Project is safe in normal operation and that any non-standard operations resulting from the impacts of climate change do not lead to nuclear emergencies before the ONR would grant consent.

26.5.36 As part of the NSL application process, SZC Co. must also demonstrate that the design of the Sizewell C power station mitigates external hazards related to climate change, including the following:

- Coastal flooding – tidal effects, wind generated waves, storm surges.
- Rainfall and surface run-off – direct rainfall, run-off, snow melt, fluvial, pluvial, high groundwater.
- Extreme climatic conditions – snow and frost, extreme wind, extreme cold and heat (air), fog.

26.5.37 For each hazard, the ONR is required to verify that sufficient information has been provided on the present day situation, the potential impact and how the design makes an allowance for climate change.

26.5.38 This would include, but not be limited to information on the following measures embedded within design:

- Design of the HCDF to be resilient to a 1 in 10,000 flood event, with future resilience provision in terms of being able to increase its height from 10.2m to 14.2m to provide further protection from overtopping and run-up.
- The design of cooling systems, so that they can cater for the range of temperatures that could be encountered.

- Allowances for sea level changes resulting from climate change are to be incorporated in the design of the pumping station for Sizewell C. Climate change is being taken into consideration in the determination of the 10,000 year return period extreme high (still) water level that is an important parameter determining the configuration of the pumping station.

d) Assessment

i. Introduction

26.5.39 This section presents the findings of the CCR assessment for the construction, operation and removal and reinstatement (where relevant) phases of the Sizewell C Project.

26.5.40 This section identifies any likely significant effects that are predicted to occur and then highlights any secondary mitigation and monitoring measures that are proposed to minimise any adverse significant effects from climate change on the Sizewell C Project.

ii. Construction

26.5.41 The effects of climate change may result in a range of short-term climate risks during the construction of the Sizewell C Project through the potential increase in the occurrence and/or magnitude of extreme weather events, including heatwaves and heavy precipitation.

26.5.42 Throughout the design and the environmental assessment process a wide range of receptors (both terrestrial and marine-based) have been identified that need to be considered during construction of the Sizewell C Project to provide resilience to climate change.

26.5.43 **Appendix 26A** presents a table detailing the identified receptors, climate hazards, climate impacts, mitigation measures, how they will be secured and the likelihood of and significance of any residual effects from following the CCR assessment approach set out in.Error! Reference source not found.

26.5.44 The outcome of the CCR assessment in **Appendix 26A** shows that no significant effects have been identified at this stage of design, taking into account the incorporation of primary (embedded) and tertiary mitigation measures.

iii. Operation

26.5.45 A summary of the assessment is provided in **Table 26.16**. Throughout the design and environmental assessment process, a wide range of receptors (both terrestrial and marine-based) have been identified that need to be considered to increase the resilience of the Sizewell C Project during operation.

26.5.46 **Appendix 26A** presents a table detailing the identified receptors, climate hazards, climate impacts, mitigation measures, how they will be secured and the likelihood of and significance of any residual effects from following the CCR assessment approach set out in .

26.5.47 The outcome of the CCR assessment in **Appendix 26.A** shows that no significant effects have been identified at this stage of design, taking into account the incorporation of primary (embedded) and tertiary mitigation measures.

26.5.48 A summary of the CCR assessment is provided in **Table 26.16**.

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Table 26.18: Climate Change Resilience assessment summary

Receptor	Hazard	Impacts	Primary or tertiary mitigation	How secured	Significance
Construction – main development site					
Built assets, staff facilities and access routes to construction sites	Extreme weather events (such as storms).	Damage to structures/ construction equipment and resulting in delays to construction programme and associated costs and/or unacceptable safety risks, as well as high winds increasing dust (and other construction debris).	A high-level risk assessment of severe weather impacts on the construction process will be undertaken by the main contractor to inform mitigation. The Environmental Management System (EMS) contractor's Construction Environmental Management Plans (EMPs), and construction method statements will consider severe weather events and emergency response provision.	Code of Construction Practice (CoCP) (Doc. Ref. 8.11).	Not significant
Sizewell B relocated facilities land (the area that certain Sizewell B facilities would be moved to in order to release other land for the Sizewell C Project)	Extreme weather events (such as storms).	Damage to existing or new relocated facilities due to flooding and high winds (visitor centre, technical training centre, outage offices, workshop and store areas), resulting in delays in releasing land for Sizewell C main development site.	A high-level risk assessment of severe weather impacts on the relocation process will be undertaken by the main contractor to inform mitigations. The use of appropriate drainage systems in accordance with the Outline Drainage Strategy (**Volume 2, Appendix 2A**) to reduce the potential for flood risk.	CoCP (Doc. Ref. 8.11).	Not significant

Receptor	Hazard	Impacts	Primary or tertiary mitigation	How secured	Significance
Temporary construction area (the area of land located to the north and west of the SSSI crossing which would be used to support construction activity on the main platform)	Extreme weather events (such as storms)/ increase in winter precipitation rate.	Water-logged land due to prolonged rainfall which inhibits the movement of construction machinery resulting in delays to the construction programme of the SSSI crossing, as well as high winds increasing dust (and other construction debris).	A high-level risk assessment of severe weather impacts on the delivery of materials to aid the construction works will be undertaken by the main contractor to inform mitigations. The use of appropriate drainage systems in accordance with the Outline Drainage Strategy (**Volume 2, Appendix 2A**) to reduce the potential for flood risk.	CoCP (Doc Ref. 8.11).	Not significant
Accommodation Campus	Extreme weather events (such as storms).	Damage to construction equipment and localised flooding resulting in delays to the construction programme.	A high-level risk assessment of severe weather impacts on the construction of the Accommodation Campus will be undertaken by the main contractor to inform mitigations. The use of appropriate drainage systems in accordance with the Outline Drainage Strategy (**Volume 2, Appendix 2A**) to reduce the potential for flood risk.	CoCP (Doc Ref. 8.11).	Not significant
LEEIE	Extreme weather events (such as storms).	Water-logged land due to prolonged rainfall which inhibits the movement of construction machinery resulting in delays to the construction programme.	A high-level risk assessment of severe weather impacts on the delivery of materials to aid the construction works will be undertaken by the main contractor to inform mitigations.	CoCP (Doc Ref. 8.11).	Not significant

Receptor	Hazard	Impacts	Primary or tertiary mitigation	How secured	Significance
			A risk assessment for the delivery and implementation of the caravan complex will also be conducted.		
Ground conditions	Decrease in annual/ summer precipitation rate.	Increased risk of soil erosion from exposed soils during construction.	The CoCP includes measures such as minimising the area and duration of soil exposure and timely reinstatement of vegetation or hardstanding to reduce soil exposure/ erosion and increase resilience to climate change.	CoCP (Doc Ref. 8.11).	Not significant
Ground conditions	Increase in winter precipitation rate.	Increase in risk of contamination leaching from soils from precipitation and being carried within soils overland with heavier precipitation events and flooding.	The CoCP includes measures to reduce risk of contamination migration, leaching etc during construction. The contractor's risk assessments and method statements (RAMS) will include good working practices for managing contaminated ground and appropriate risk mitigation is adopted.	CoCP (Doc Ref. 8.11).	Not significant
Ground conditions	Increase in sea level	Increase in risk of contamination leaching from soils with higher sea levels leading to coastal flooding	As construction works progress, measures embedded within design will mitigate the risk of flooding. These measures include: • During initial stages of construction, a temporary reinforced coastal flood defence with crest level of 7m AOD would	Main development site design. CoCP (Doc Ref. 8.11).	Not significant

Receptor	Hazard	Impacts	Primary or tertiary mitigation	How secured	Significance
			be built to form a haul road used for construction until the main sea defence is completed. • A raised platform to a level of 7.3m AOD, which has been set above the still water level for 1 in 1,000-year return period events for the theoretical maximum lifetime of the Sizewell C Project with an allowance for sea level rise with climate change. • The new coastal flood defence crest level would be 10.2m AOD with adaptive design to potentially raise the defence up to 14.2m AOD in the future to minimise the risk of overtopping in the later stages of the Sizewell C Project's lifetime, if required. The crest height has been set above the still water level for 1 in 10,000 year return period events over the lifetime of the Sizewell C Project with an allowance for sea level rise with climate change. The contractor's RAMS will include good working practices for managing contaminated ground and appropriate risk mitigation is adopted.		

Receptor	Hazard	Impacts	Primary or tertiary mitigation	How secured	Significance
			The use of appropriate drainage systems in accordance with the Outline Drainage Strategy (**Volume 2, Appendix 2A**) to reduce the potential for flood risk.		
Construction – associated development sites					
Freight Management Facility (FMF)	Extreme weather events (such as storms).	Damage to construction equipment and localised flooding resulting in delays to the construction programme.	A high-level risk assessment of severe weather impacts on the construction of the FMF will be undertaken by the main contractor to inform mitigations.	CoCP (Doc Ref. 8.11).	Not significant
Operation of the FMF to support the construction of main development site	Strong winds	Increasing frequency of Orwell Bridge closures leading to disruption to heavy goods vehicles (HGVs).	Traffic Incident Management Plan sets out procedures for holding HGVs en-route along the A14 in order to avoid exacerbating congestion in the event of Orwell Bridge closures	TIMP (Doc Ref. 8.6).	Not significant
Park and ride facilities	Extreme weather events (such as storms).	Damage to construction equipment and localised flooding resulting in delays to the construction programme.	A high-level risk assessment of severe weather impacts on the construction of the park and ride facilities will be undertaken by the main contractor to inform mitigations. The use of appropriate drainage systems in accordance with the Outline Drainage Strategy (**Volume 2, Appendix 2A**) to reduce the potential for flood risk.	CoCP (Doc Ref. 8.11).	Not significant

Receptor	Hazard	Impacts	Primary or tertiary mitigation	How secured	Significance
Two village bypass, Yoxford roundabout and other highways improvements	Extreme weather events (such as storms).	Damage to construction equipment and localised flooding resulting in delays to the construction programme.	A high-level risk assessment of severe weather impacts on the construction of the highway improvements will be undertaken by the main contractor to inform mitigations.	CoCP (Doc Ref. 8.11).	Not significant
Green rail route	Increase in maximum summer air temperature	Damage to rail line due to rail buckling resulting in a loss of service and delays in the delivery of freight to the main development site.	A high-level risk assessment of severe weather impacts on the functional operation of the rail route will be conducted.	Construction of rail route in line with UK design standards.	Not significant
	Increase in winter precipitation rate	Delays to services due to sections where localised flooding occurs.	A high-level risk assessment of severe weather impacts on the functional operation of the rail route will be conducted.	Construction of rail route in line with UK design standards.	Not significant
	Extreme weather events (such as storms)	Delays in the delivery of freight to the main development site due to cancelled services due to high winds and the interference of construction debris.	A high-level risk assessment of severe weather impacts on the functional operation of the rail route will be conducted.	Outline Drainage Strategy (**Volume 2, Appendix 2A**).	Not significant
Construction – Main development site					
Hard coastal defence feature (HCDF)	Increase in relative sea level	Increase in risk of exposure of the HCDF due to erosion of SCDF.	Recession of HCDF further landward than the current sea defence; making the HCDF a marine component with no initial exposure to waves.	Requirement of Nuclear Safety case.	Not significant

Receptor	Hazard	Impacts	Primary or tertiary mitigation	How secured	Significance
	Changes in wave climatology		Recession on the HCDF's northern flank. Gently curved HCDF corners would minimise effects to longshore transport if the feature becomes exposed. A dissipative rock armour slope.	Main development site design. Nuclear Site Licence.	
		Increase in risk of flooding with higher sea levels.	Design of HDCF resilient to a 1 in 10,000 flood event – with added future resilience in terms of adding further height to the feature. Soft coastal defence feature (SCDF) – sedimentary, sacrificial, embedded mitigation features to protect the HCDF from exposure.	Requirement of Nuclear Safety case. Main development site design. Nuclear Site Licence.	Not significant
Soft coastal defence feature (SCDF)	Increase in relative sea level	SCDF changes in shoreline position and beach elevation/ volume of SCDF supply events.	The episodic addition of sediment would provide extra material when needed, enhance stability on the shoreline and potentially reduce natural erosion rates in the northern part of the Sizewell C frontage and the southern barrier	Main development site design.	Not significant
Beach landing facility (BLF)	Increase in relative sea level	Impact to the accessibility of the beach landing facility resulting in access/ egress issues. Possible damage to structures/assets.	Design features to make BLF highly transmissive to water and sediment flows:	Main development site design.	Not significant

Receptor	Hazard	Impacts	Primary or tertiary mitigation	How secured	Significance
			• Small number of marine piles, twelve, rising to a maximum of 20 with shoreline retreat. • Use of slender piles – jetty piles approximately 1 metre (m) diameter and the fender and dolphin piles approximately 1.5m diameter. • Short length – approximately 36.5m seaward of mean high water springs (70m seaward of the HCDF).		
Offshore cooling water infrastructure.	Increase relative sea level.	Increased risk of damage to structures as a result of sea level. Reduced efficiency in the operation of the cooling water infrastructure.	Subterranean tunnels connecting the cooling water intakes and outfalls to Sizewell C, their construction would have no impacts for coastal geomorphology.	Main development site design.	Not significant
Coastal path (to form part of future England Coast Path)	Increase in sea level	Increased risk of coastal path not being accessible due to higher sea levels.	Design and maintenance of the sea defences to minimise likelihood of coastal flooding, including addition of sediment to provide extra material to the SCDF, when needed. Availability of alternative access route for users along the top of the HCDF.	Main development site design. Deemed marine licence.	Not significant
Operation – main development site					

Receptor	Hazard	Impacts	Primary or tertiary mitigation	How secured	Significance
Main development site platform	Increase in sea level	Increase sea level rises due to storm events and leading to a risk of flooding of the site, resulting in damage to on-site and off-site properties, critical infrastructure and built environment receptors. This is turn could lead to impeded access/ egress to the site.	SCDF – sedimentary, sacrificial, embedded mitigation features to protect the HCDF from exposure. Measures embedded within design: • Platform designed to a level of 7.3m AOD, which has been set above the still water level for 1 in 1,000-year return period events for the theoretical maximum lifetime of the Sizewell C Project with an allowance for sea level rise with climate change. • The new coastal flood defence crest level would be 10.2m AOD with adaptive design to potentially raise the defence up to 14.2m AOD in the future to minimise the risk of overtopping in the later stages of the Sizewell C Project's lifetime, if required. The crest height has been set above the still water level for 1 in 10,000 year return period events over the lifetime of the Sizewell C Project with an allowance for sea level rise with climate change. • In compliance with the conditions of the NSL, emergency arrangements will be established	Requirement of Nuclear Safety case. Main development site design. Nuclear Site Licence.	Not significant

Receptor	Hazard	Impacts	Primary or tertiary mitigation	How secured	Significance
			and adequate arrangements implemented for safe operation. A periodic and systematic review and reassessment of the safety case would be undertaken. • The use of appropriate drainage systems in accordance with the Outline Drainage Strategy (**Volume 2, Appendix 2A**) to reduce the potential for flood risk.		
Power station access road (linking the site of special scientific interest (SSSI) crossing with a new roundabout onto Abbey Road (B1122))	Increase in maximum summer air temperature	Potential damage to road surfacing due to prolonged exposure to high intensity temperatures, leading to road subsidence and possible temporary road closure until repairs are conducted.	The road will be surfaced to a specific standard to withstand the projected increase in maximum summer temperature. In the event that the main site entrance road has to be closed due to damage as as a result of prolonged exposure to high temperatures.	Main development site design.	Not significant
	Increase in winter precipitation rate/ extreme weather events (such as storms)	Potential flooding to the main site access road due to prolonged periods of high intensity precipitation resulting in temporary road closure	The access road design incorporates sufficient drainage and culverts to withstand projected increase in future rainfall. The use of appropriate drainage systems in accordance with the Outline Drainage Strategy (**Volume 2, Appendix 2A**) to reduce the potential for flood risk.	Main development site design. Outline Drainage Strategy (**Volume 2, Appendix 2A**).	Not significant

Receptor	Hazard	Impacts	Primary or tertiary mitigation	How secured	Significance
Operation – associated developments					
Sizewell link road	Increase in maximum summer air temperature	Potential damage to road surfacing due to prolonged exposure to high intensity temperatures, leading to road subsidence and possible temporary road closure until repairs are conducted.	The Sizewell link road design will be surfaced to a specific standard to withstand the projected increase in maximum summer temperature.	Associated developments design principles. Materials standards as determined in the DMRB.	Not significant
	Increase in winter precipitation rate/ extreme weather events (such as storms)	Potential flooding to the main site access road due to prolonged periods of high intensity precipitation resulting in temporary road closure.	The Sizewell link road design incorporate sufficient drainage and culverts to withstand projected increase in future rainfall.	Outline Drainage Strategy (**Volume 2, Appendix 2A**).	Not significant
Two village bypass	Increase in maximum summer air temperature	Potential damage to road surfacing due to prolonged exposure to high intensity temperatures, leading to road subsidence and possible temporary road closure until repairs are conducted.	The two village bypass design will be surfaced to a specific standard to withstand the projected increase in maximum summer temperature.	Associated developments design principles. Materials standards as determined in the DMRB.	Not significant
	Increase in winter precipitation rate/ extreme weather	Potential flooding to the main site access road due to prolonged periods of high intensity	The two village bypass design incorporate sufficient drainage and culverts to withstand projected increase in future rainfall.	Outline Drainage Strategy (**Volume 2, Appendix 2A**).	Not significant

Receptor	Hazard	Impacts	Primary or tertiary mitigation	How secured	Significance
	events (such as storms)	precipitation resulting in temporary road closure.			

iv. Removal and reinstatement

26.5.49 CCR impacts associated with the removal and reinstatement of the temporary associated development sites have been assessed together with the impacts on construction. These are summarised in **Table 26.16**.

e) Mitigation and monitoring

26.5.50 Primary and tertiary mitigation measures that have already been incorporated within the design of the Sizewell C Project are detailed in **section 26.5**. Where other mitigation is required to reduce or avoid a significant effect, this is referred to as secondary mitigation.

26.5.51 The CCR assessment has not identified any significant climate change impacts (refer to **Volume 2, Appendix 26A**), so further no secondary mitigation measures have therefore been proposed.

26.5.52 No additional monitoring of climate change effects on the Sizewell C Project is necessary, other than those required by the NSL, for example as part of the periodic and systematic review and reassessment of the safety case or under the deemed marine licence for the monitoring of coastal processes.

26.6 In-combination climate change impact (ICCI) assessment

a) Methodology

i. Study area

26.6.1 The study area for the ICCI assessment includes receptors in the surrounding environment, as defined by each environmental discipline in their technical assessments reported in **Volumes 2** to **9** of the **ES**.

ii. Assessment scenarios

26.6.2 The ICCI assessment scenario considers the following scenarios:

- Construction at the main development site (including removal and reinstatement of temporary development).
- Construction at the associated development sites (including removal and reinstatement of temporary development).
- Operation of the main development site.

- Operation of associated developments (considered within the construction assessment).

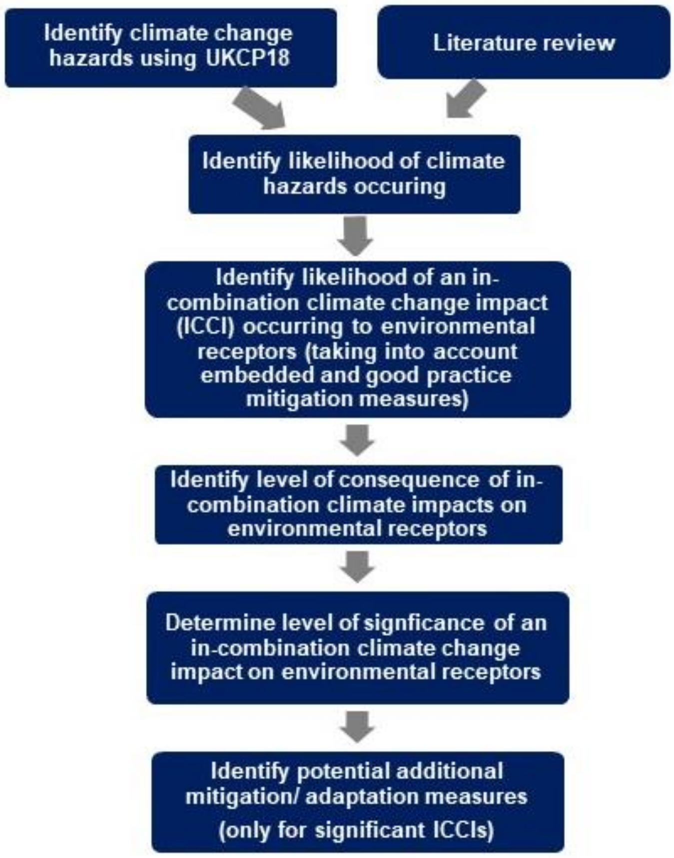
iii. Assessment criteria

26.6.3 A detailed description of the ICCI assessment methodology is provided in **Volume 1, Appendix 6V**, together with the assessment criteria used to determine the significance of effects. A full ICCI assessment is provided in **Appendix 26B** of this volume, with a summary of the conclusions on the significance of these effects presented in this chapter.

iv. Assessment methodology

26.6.4 The ICCI has been undertaken following the stepped approach shown in **Plate 26.4.** The assessment identifies potential ICCI and considers their potential consequence and likelihood of occurrence.

Plate 26.4: ICCI assessment methodology



26.6.5 The likelihood of an in-combination impact occurring is determined based on the likelihood of a climate hazard occurring, combined with the sensitivity of the receptor to the combined impact of the climate hazard and the Sizewell C Project.

26.6.6 The ICCI assessment assumes a temporal scope of 72 years, which includes the construction period and the 60 years of operation for the UK EPR^{TM}. This aligns with NPS EN-1, section 3.5.10 (Ref. 26.3) for the estimated operational design life of a nuclear power station. The ICCI assessment considers a high emissions scenario at the 10%, 50% and 90% probability levels to assess the impact of climate change over the lifetime of the Sizewell C Project.

v. Assumptions and limitations

26.6.7 Limitations associated with the approach taken for the ICCI assessment relate to uncertainties inherent within UKCP18 Projections (Ref. 26.6).

26.6.8 Climate change, by its very nature, is associated with a range of assumptions and limitations. For example, there is uncertainty regarding how global climatic trends will be reflected at the regional scale. To overcome these issues, forecast climate change data has been used from UKCP18. This has been coupled with the replication of proven effective approaches undertaken for similar project types.

26.6.9 Assessments made in relation to ‘consequence’ and ’likelihood’ rely on professional judgement and evidence gathered through other environmental disciplines. All assumptions and limitations, including any exclusions, together with assumptions for choices and criteria leading to exclusion of input and output data have been documented as part of the assessment.

b) Baseline environment

26.6.10 The baseline for the ICCI assessment is the same as that identified for the CCR assessment. It has been informed using historic climate observations and climate change projection data to identify existing and future climate conditions in the geographical location of the site.

c) Environmental design and mitigation

i. Primary mitigation

26.6.11 This is often referred to as ‘embedded mitigation’ and includes modifications to the location or design of the development made during the pre-application phase that are an inherent part of the Sizewell C Project. Full details of embedded mitigation for the main development site and associated developments are provided in **Volume 2 Appendix 26B.** Example mitigation relevant to this assessment is summarised below.

Construction

Ground and surface water

- As part of the Sizewell C Project, realignment of Sizewell Drain includes the installation of a control structure allowing the rate of water leaving the Sizewell Marshes SSSI to be altered. While this is principally to mitigate potential propagation of drawdown during dewatering, it will also allow to maintain stable groundwater levels within the SSSI that may be impacted by the climate hazards considered within this chapter. Further information on the enhanced water level control is provided in the Sizewell C Monitoring and Response Strategy (**Volume 2 Appendix 19F**).

Operation

Terrestrial Ecology:

- Habitat creation requirements and the selection of species for planting will take climate change impacts into consideration. The timing of planting will be advised to align with spring and/or late autumn were rainfall would naturally irrigate. Adequate monitoring of post-planting will be required to make sure establishment. The **OLEMP** (Doc. Ref. 8.2) documents the existing and new habitats and their prescribed management.

- Creation of Sandlings dry grassland and heath is likely to have some resilience to dry summer conditions. Some areas will be encouraged to self-seed to allow a natural resilience. Resilience of long-term restoration habitats will be outlined in the **OLEMP** (Doc. Ref. 8.2) together with monitoring and management requirements.

- Reedbed and ditch habitats created at Aldhurst Farm use groundwater as the water supply and a control structure allows control of water levels reducing loss of water from the basins. In addition, the compensation approach for fen meadow will outline the water requirements for the off-site fen meadow compensation sites making sure it takes account of climate change proposals (refer to **Chapter 14** of this volume for further information).

Amenity and recreation

- Sea defences including the HCDF and SCDF as described in **Volume 2, Chapter 20** would lead to a delay in the rate of erosion to the coast path to the north and south of the main development site.

Landscape and visual

- Consideration will be given to the potential effects of climate change on the selection of species for proposed planting and the management of new and existing planting as detailed in the **OLEMP** (Doc. Ref. 8.2).

ii. Tertiary mitigation

26.6.12 Tertiary mitigation is required regardless of any EIA assessment, as it is obligatory, for example, as a result of legislative requirements, and/or is considered as standard practice.

Soils and agriculture

- The **Outline Soil Management Plan (Volume 2 Appendix 17C)** provides details of how soils should managed on-site during construction and the reinstatement phase, to make sure best practice soil handling and stockpile management, as well as best practice general site management (including cessation of earthworks operations under wet conditions) to limit risk of soil erosion.

Geology and land quality

- The **CoCP** (Doc. Ref. 8.11) includes measures such as minimising the area and duration of soil exposure and timely reinstatement of vegetation or hardstanding to reduce soil exposure/ erosion and increase resilience to climate change.

d) Assessment

i. Introduction

26.6.13 This section presents the findings of the ICCI assessment for the construction, operation and removal and reinstatement (where relevant) phases of the Sizewell C Project.

26.6.14 This section identifies any likely significant effects that are predicted to occur and then highlights any secondary mitigation and monitoring measures that are proposed to minimise any adverse significant effects.

ii. Construction and operation

26.6.15 Discussions with the design and technical assessment teams have identified a wide range of receptors (both terrestrial and marine-based) that may be impacted by the combined impact of future climate change and the Sizewell C Project.

26.6.16 **Appendix 26B** presents a table detailing the outputs of the ICCI assessment. Environmental receptors that have been identified as being potentially sensitive to the combined impacts of climate change and the Sizewell C Project have been assessed to consider the likelihood and consequence of an ICCI occurring.

26.6.17 A summary of the ICCI assessment is provided in **Table 26.17**.

Table 26.19: In-combination Climate Change Impact assessment summary

Environmental Discipline	Climate hazard	Impact of ICCI	Mitigation	Significance of Effect
Construction				
Landscape and Visual	Increased air temperature, increased incidence of heatwaves	Reduced success in establishment of new planting and longevity of existing established trees and woodlands within the EDF Estate	Consideration will be given to the potential effects of climate change on the selection of species for proposed planting and the management of new and existing planting, as set out in the **OLEMP** (Doc. Ref. 8.2).	Not significant
Soils and agriculture	Increase in mean temperature – annual/ seasonal shifts	Increased carbon loss from soils: soils will be disturbed, potentially resulting in more soil organic carbon (SOC) being available for more rapid decomposition	The **Outline Soil Management Plan (Appendix 17C** of this volume) states that soils will be restored to agricultural use at the end of the construction phase. Where land is to be returned to less intense agricultural operations (for example on the EDF Estate) this results in the potential for the replaced soils to start to accumulate SOC to a greater level that under the pre-construction land use.	Not significant
Soils and agriculture	Increase in rainfall intensity	Increased risk of soil erosion from working areas/ stockpiles.	Impacts on farm businesses would be reduced as part of the land acquisition process, including further engagement with land owners regarding the timing of acquisition and access to the necessary land	Not significant
Soils and agriculture	Changes to temperature and rainfall regimes (drought)	Reduced yields over time in combination with reduction in land area under production	Impacts on farm businesses would be reduced as part of the land acquisition process, including further engagement with land owners regarding the timing of acquisition and access to the necessary land	Not significant

Environmental Discipline	Climate hazard	Impact of ICCI	Mitigation	Significance of Effect
Geology and land quality	Decrease in annual precipitation	Increased risk of soil erosion from exposed soils during construction	The **Code of Construction Practice (CoCP)** (Doc Ref. 8.11) and the **Outline Soil Management Plan** (**Appendix 17C** of this volume) includes measures such as minimising the area and duration of soil exposure and timely reinstatement of vegetation or hardstanding to reduce soil exposure/ erosion.	Not significant
Geology and land quality	Decrease in summer precipitation rate	Increased risk of soil erosion from exposed soils during construction	The **CoCP** (Doc Ref. 8.11) and the **Outline Soil Management Plan (Appendix 17C** of this volume**)** includes measures such as minimising the area and duration of soil exposure and timely reinstatement of vegetation or hardstanding to reduce soil exposure/ erosion and increase resilience to climate change	Not significant
Operation				
Landscape and Visual	Increase air temperature, increased incidence of heatwaves/ Changing precipitation patterns	Reduced success in the establishment of new planting	Consideration will be given to the potential effects of climate change on the selection of species for proposed planting and the management of new and existing planting, as described within the **OLEMP** (Doc. Ref. 8.2).	Not significant
Terrestrial Ecology	Increased number of hot days; increase of droughts	Reduced success of establishment of new planting as part of the restoration of temporary associated development sites due to hotter drier conditions	Landscaping/ species choice resilient to climate change The timing of planting to align with spring and/or late autumn were rainfall would naturally irrigate. Secured through the **OLEMP** (Doc. Ref. 8.2) .	Not significant
Terrestrial Ecology	Invasive Non-native Species (INNS)	Hotter weather may provide better conditions for non-native invasive species	Should invasive species be identified, and invasive weed specialist will develop an invasive species management plan, as described within the **OLEMP** (Doc. Ref. 8.2).	Not significant

Environmental Discipline	Climate hazard	Impact of ICCI	Mitigation	Significance of Effect
		leading to greater spread and growth		
Terrestrial Ecology	Increase in volume of water in short periods	Rainfall is likely to be more extreme, larger volumes compressed into shorter times with the potential to flood	Maintain permeability of land, planting of trees that can attenuate up to 60 times more than grassland alone. Monitoring of the habitats via the **OLEMP** (Doc. Ref. 8.2) and adaptation where required.	Not significant
Amenity and recreation	Increased sea level	Erosion of the coast path comprising Public Right of Way (PRoW) E-363/021/0, the Suffolk Coast Path, Sandlings Walk and the future England Coast Path within the Sizewell C Project site	Provision and design of the sea defences to minimise likelihood of coastal retreat. Provision of alternative path on higher ground on the HCDF should the coast path be eroded, ensuring a coast path is always present.	Not significant
Amenity and recreation	Increased sea level	Erosion of the coast path (to north and south) outside of the Sizewell C Project site	Defences including the HCDF and SCDF as described in **Volume 2, Chapter 20** would lead to a delay in the rate of change therefore mitigating the impact of sea level rise on the coastal path..	Not significant
Soils and Agriculture	Increase in rainfall intensity	As land is restored and returned to agricultural use or habitat creation there is the potential for fertilizers or other soil amendments (such as manure) to be added to restore the soils in	The Outline Soil Management Plan (**Appendix 17C** of this volume) will provide details of how soils should be restored, including the measures to be employed to apply soil amendments and to prevent them washing off (for example mixing the materials into the topsoil rather than as a surface addition).	Not significant

Environmental Discipline	Climate hazard	Impact of ICCI	Mitigation	Significance of Effect
		a suitable condition for their proposed end use.		
Geology and land quality.	Increase in winter precipitation rate	Increase in risk of contamination leaching from soils from precipitation and being carried within soils overland with heavier precipitation events and flooding	The Outline Drainage Strategy (**Volume 2, Appendix 2A**) sets out pollution prevention measures and accounts for increased flows resulting from climate change.	Not significant
Groundwater and Surface Water	Increase in mean summer air temperature Decrease in annual precipitation rate Decrease in summer precipitation rate	Increased evapotranspiration leading to lower water table unable to support groundwater dependent ecosystems	Realignment of Sizewell Drain includes the installation of a control structure allowing the rate of water leaving the Sizewell Marshes to be altered (refer to **Chapter 19** of this volume and **Appendix 19F Sizewell C Monitoring and Response Strategy**).	Not significant

iii. Removal and reinstatement

26.6.18 ICCI impacts associated with the removal and reinstatement of the temporary associated development sites has been assessed together with the impacts on construction. These are summarised in **Table 26.17**.

iv. Inter-relationship effects

26.6.19 The assessment of the inter-relationship effects during the operation of the Sizewell C Project is an inherent part of the ICCI assessment. For further details refer to **section 26.5.21** to **section 26.5.23** and **Appendix 26.1B**.

e) Mitigation and monitoring

i. Introduction

26.6.20 Where possible, mitigation measures have been proposed where a significant effect is predicted to occur. Primary and tertiary mitigation measures that have already been incorporated within the design of the Sizewell C Project are detailed in **section 26.5**.

ii. Monitoring

26.6.21 As no significant effects have been identified for the ICCI assessment, no further monitoring of potential effects is proposed.

26.7 Conclusion

i. Greenhouse gas (GHG) impact

26.7.1 As presented in this chapter, there will be unavoidable GHG emissions resulting from both the construction and operation of the Sizewell C Project.

26.7.2 However, the GHG assessment of construction emissions has demonstrated that construction emissions for Sizewell C will not exceed 1% of the total five year UK carbon budget period in which they arise. The construction of Sizewell C will not have a significant impact on the UK meeting its five carbon budgets through to 2032 and therefore the effect is considered **not significant**.

26.7.3 Embedded carbon in materials used to construct the main development site and associated developments accounts for over 80% of total construction emissions. Where feasible materials with lower embedded carbon, e.g. with a higher recycled/ reused content will be specified, however there is still expected to be significant residual emissions, as would be the case with any large scale construction project.

26.7.4 The low carbon energy generation performance of Sizewell C, when compared to forecast grid average GHG emissions intensity i.e. assuming the equivalent energy was generated using the likely estimated mix of energy generation sources, results in Sizewell C displacing just over 1 million tCO_{2e} in 2034, the first year of operation. By 2050, Sizewell C will have displaced a cumulative total of approximately 12 million tCO_{2e} compared to the estimated future energy mix for generation over this period. On this basis, it is conservatively estimated that GHG emissions from the construction of Sizewell C will be offset within the first six years of operation by GHG emissions displaced, assuming the equivalent energy were otherwise to be generated by the anticipated mix of grid electricity generation sources.

26.7.5 When comparing the annual operational Sizewell GHG emissions of 19,328 tCO2e against the total projected GHG emissions generated in the UK from the grid electricity production, this equates to around 0.1% of total annual sectoral emissions. Overall, the effect is therefore considered **not significant.**

26.7.6 When comparing the GHG impact of electricity generated at Sizewell C against the impact of generating the equivalent energy from the anticipated future mix of alternative generation, Sizewell C provides a **significantly beneficial impact.** GHG emissions reduced as a result of Sizewell C equate to over 3% of total energy sector emissions in 2034.

ii. Climate change resilience (CCR)

26.7.7 The CCR assessment considered the resilience of the construction and operation of the Sizewell C Project against the predicted impacts of future climate change. The CCR assessment has demonstrated that further to the inclusion of embedded and tertiary mitigation there are anticipated to be **no significant** climate change impacts on the Sizewell C Project.

26.7.8 As the design of the Sizewell C Project progresses, resilience to climate change hazards would need to be demonstrated as part of the NSL application process and verified by ONR.

iii. In-combination climate change impacts (ICCI)

26.7.9 The ICCI assessment has considered the combined impact of the Sizewell C Project and future climate change on receptors in the surrounding environment. The ICCI assessment has concluded that there are **no**

significant ICCI impacts on identified receptors in the surrounding environment.

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