Hampshire Water Transfer and Water Recycling Project

Environmental Statement – Appendix 10.3 In-combination Climate Change Impact assessment

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1.1 Introduction

1.1.1 This appendix presents the In-combination Climate Change Impact (ICCI) assessment which considers how predicted impacts identified by other technical topics in the Environmental Statement (ES) (ES Chapters 6 to 19, Volume I) (Document reference 6.1, DCO Volume 6) from the Hampshire Water Transfer and Water Recycling Project (hereafter referred to as the 'Proposed Development') could be exacerbated or reduced by predicted future changes to the climate to the extent that such changes can be identified at this time.

1.2 Baseline conditions

1.2.1 The current and future baseline climate conditions for the ICCI assessment are as set out for the Climate Change Resilience (CCR) assessment in section 10.7 ES Chapter 10 Carbon and climate change, Volume I (Document reference 6.1, DCO Volume 6). The latest UK Climate Projection (UKCP) dataset [1] is used to inform the future baseline.

1.3 Assessment methodology

1.3.1 The ICCI assessment methodology differs from the Environmental Impact Assessment (EIA) methodology presented in ES Chapter 5 EIA approach and methodology, Volume I (Document Reference 6.1, DCO Volume 6), instead being aligned with the best practice detailed in the Institute of Sustainability and Environmental Professionals (ISEP) (formerly the Institute of Environmental Management and Assessment) guidance, 'Environmental Impact Assessment Guide to Climate Change Resilience' (2020) [2].

1.3.2 While the EIA methodology presented in ES Chapter 5 EIA approach and methodology, Volume I (Document Reference 6.1, DCO Volume 6) follows a three-step process. This process includes assigning a receptor sensitivity, determining the magnitude of impact and assessing the significance of effect.

1.3.3 The ICCI assessment considers the ways in which the level of climate change presented in section 10.7 of ES Chapter 10 Carbon and climate change, Volume I (Document reference 6.1, DCO Volume 6), would influence the significance of effect of the Proposed Development on receptors in the surrounding environment as reported in topic chapters of the ES (ES Chapters 6 to 19, Volume I (Document reference 6.1, DCO Volume 6)). This is evaluated by using likelihood and consequence criteria in a risk assessment matrix approach.

1.3.4 The identification of potential ICCIs to occur as a result of climate hazards was carried out in conjunction with each topic lead. The likelihood of the identified ICCI was then evaluated based on the how likely the climate hazard would occur (derived from the climate change projection data presented in presented in section 10.7 of ES Chapter 10 Carbon and climate change, Volume I (Document reference

6.1, DCO Volume 6), the nature of the impact itself, such as the identified receptors and pathways, and whether there would be potential for either to be affected by the influence of climate change, and is based on expert judgement and prevailing good practice.

1.3.5 The definitions for likelihood and consequence are provided in Table 1-1 and Table 1-2, respectively, which are criteria adapted from Highways England guidance [3]. These criteria are considered to be applicable for schemes such as the Proposed Development.

Table 1-1 Definitions for likelihood

Likelihood category	Description
Very high	The impact is expected to occur frequently within the lifetime of the receptor or the Proposed Development (for example every year).
High	The impact is expected to occur several within the lifetime of the receptor or the Proposed Development (for example approximately every five years)
Medium	The impact is expected to limited times within the lifetime of the receptor or the Proposed Development (for example approximately every 10 years)
Low	The impact is expected to occur infrequently within the lifetime of the receptor or the Proposed Development (for example approximately every 30 years)
Very low	The impact is not expected to occur over the receptor's lifetime assuming that today's climate persists.

Table 1-2 Definitions for consequence

Consequence of impact	Description
Very large adverse	The consequence of the effect from the Proposed Development increases to major, as referred to in Table 1-3, when the in-combination effects from climate change are considered.
Large adverse	Disruption to the function of the Proposed Development lasting more than one week.
Medium	Disruption to the function of the Proposed Development lasting between one day and one week.
Low	Disruption to the function of the Proposed Development lasting less than one day.
Very low	Disruption to an isolated section of the Proposed Development lasting less than one day.

1.3.6 Having determined the likelihood and consequence of the ICCI, the magnitude is determined using the criteria provided in Table 1-3, which is adopted from the approach listed ISEP Guidance [2].

Table 1-3 Significance matrix

		Likelihood				
		Very high	High	Medium	Low	Very low
Consequence	Catastrophic	S	S	S	S	NS
	Large adverse	S	S	S	S	NS
	Medium	S	S	S	NS	NS
	Low	S	S	NS	NS	NS
	Very low	NS	NS	NS	NS	NS

S = Significant
NS = Not significant

1.3.7 Where the assessment identifies a significant impact of climate on the Proposed Development design, mitigation measures are proposed to avoid or reduce impacts to an acceptable level. The significance criteria in Table 1-3 are then revisited following the additional mitigation to determine residual effects.

1.4 Future climate within the study area

1.4.1 The future baseline (section 10.7) and the CCR assessment (section 10.8) of ES Chapter 10 Carbon and climate change, Volume I (Document reference 6.1, DCO Volume 6), summarises the likely climate conditions within the study area over three approximately 30-year time horizons, this includes:

1. 2020 – 2049: representative of climate conditions during the construction and operation phase, as assessed in Table 1-4 and Table 1-5 respectively. Construction of the Proposed Development is anticipated to commence in 2028 and take place for a duration of approximately five years.
2. 2050 – 2079: representative of climate conditions on medium term horizon during the operational phase, which is anticipated to be at least 100 years.
3. 2070 – 2099: representative of climate projection data for the furthest time horizon for most climate variables during the operation phase, which represents a reasonable worst case in terms of the degree of climate change from data which is readily available for most climate parameters.

1.4.2 The climate data for the 2070 – 2099 time horizon was used to inform the likely climate conditions in the decommissioning phase. Although it is likely that decommissioning activities would take place beyond 2100, for many parameters 2099 is the latest date of available data, and any climate projection data beyond this date would be subject to a level of uncertainty that would mean that its effectiveness of informing the ICCI assessment would be limited.

1.4.3 The predicted climate change within the study area is summarised below:

4. Average and extreme temperatures will be higher, resulting in more heatwaves and days of extreme heat

5. Increase in sea temperature
6. Drought is likely to be more prevalent, and there will be more extended dry periods
7. An increase in heavy rain is predicted, resulting in an increase to surface water and fluvial flood risk
8. Sea level rise may affect infrastructure in coastal locations
9. More extreme weather events, which could result in damage to infrastructure through high wind speeds and tidal flooding

1.5 In-combination Climate Change Impact assessment

1.5.1 The ICCI assessment is presented in Table 1-4 and Table 1-5 below.

Table 1-4 Construction phase in-combination climate change impact assessment

Impact identified in topic assessments (construction)	Climate hazard	Likelihood of climate hazard	Potential In-combination Climate Change Impact	Likelihood of In-combination Climate Change Impact	Consequence of In-combination Climate Change Impact	Significance
ES Chapter 6 Air quality and odour, Volume I (Document Reference 6.1, DCO Volume 6)						
Construction dust and fine particulate matter	More frequent drought conditions.	The climate change projection data for the construction phase shows the rainfall patterns are unlikely to change significantly from present day conditions.	Dry conditions may exacerbate dust generation from construction activities.	Very low – the mitigation identified in ES Chapter 6 Air quality and odour, Volume I **(Document Reference 6.1, DCO Volume 6)** in relation to dust and fine particulate matter would reduce emissions and the potential for impacts at sensitive receptors, even in drought conditions.	Very low – any impact to receptors would be localised and could be addressed through the mitigation listed in ES Chapter 6 Air quality and odour, Volume I (Document Reference 6.1, DCO Volume 6).	Not significant
Construction phase (Non-Road Mobile Machinery) NRMM emissions	No additional impacts are anticipated as a result of climate change during the construction phase.					
Odour emissions	Higher and more extreme temperatures.	The climate change projection data for the construction phase shows that increases in temperatures from present day conditions will occur, although the magnitude of change would be limited.	Increased risk of odour during construction of the Water Recycling Plant (WRP) site could be exacerbated by higher temperatures.	Unlikely – the risk of odour exposure was identified to be low risk in ES Chapter 6 Air quality and odour, Volume I (Document Reference 6.1, DCO Volume 6). This risk is not considered likely to increase as a result of climate change or associated in-combination impacts	Low – any impact to receptors would be localised, and managed through existing controls in relation to the control of odour during construction.	Not significant
Road traffic emissions	No additional impacts are anticipated as a result of climate change during the construction phase.					
ES Chapter 7 Archaeology and cultural heritage, Volume I (Document Reference 6.1, DCO Volume 6)						
Direct impacts on non-designated heritage assets	Buried archaeological remains would be excavated and recovered, so climate change hazards would have no direct impact. No additional impacts are anticipated as a result of climate change during the construction phase.					
Temporary impact to designated and non-designated heritage assets through change to setting.	No additional impacts are anticipated as a result of climate change during the construction phase.					
Permanent impact to designated and non-designated heritage assets arising through change to setting.	No additional impacts are anticipated as a result of climate change during the construction phase.					
ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I (Document Reference 6.1, DCO Volume 6)						
Impacts on statutory and non-statutory designated sites	Higher average and extreme temperatures, reduced rainfall, more frequent drought conditions. Increased frequency/intensity of flood events.	The climate change projection data for the construction phase shows that increases in temperatures from present day conditions will occur, although the magnitude of change would be limited.	Additional stress placed on nature conservation sites and supporting qualifying features during construction. Reduced resilience of designated sites and qualifying features to recover from construction impacts. Potential exacerbation of impacts identified within ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I (Document Reference 6.1, DCO Volume 6), including changes to water	Very low – Section 8.7 of ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I (Document Reference 6.1, DCO Volume 6), states that climate change is not anticipated to change the biographic envelope for habitats and species within the study area for the assessment within the timeframes of the Proposed Development. Therefore, the predicted effect of climate change is not expected to exacerbate the impact	Medium – any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant

Impact identified in topic assessments (construction)	Climate hazard	Likelihood of climate hazard	Potential In-combination Climate Change Impact	Likelihood of In-combination Climate Change Impact	Consequence of In-combination Climate Change Impact	Significance
		Rainfall patterns are unlikely to be significantly variable from present day conditions.	flows/quality/quantity, disturbance of qualifying features and habitat loss.	of the Proposed Development during construction.		
Habitat loss and degradation during construction	Reduced rainfall, more frequent drought conditions. Increased frequency/intensity of flood events.	Rainfall patterns are unlikely to be significantly variable from present day conditions.	Increased risk of drought may have a detrimental effect on habitats and contribute towards habitat degradation. Reduced resilience of habitats and qualifying features to construction impacts. Potential exacerbation of impacts identified within ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I (Document Reference 6.1, DCO Volume 6), including changes to water flows/quality/quantity, disturbance of qualifying features and habitat loss.	Low - Drought/flood events can be expected to become more frequent and severe which may adversely impact habitats. The potential for greater intensification of drought/flood events during construction, although as this is anticipated to take place within the next ten years, the likelihood is considered to be low.	Medium – any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant
Impact on fauna during construction (Badger, bats, birds, hazel dormouse, otter, water voles, others)	Higher average and extreme temperatures, reduced rainfall, more frequent drought conditions.	The climate change projection data for the construction phase shows that increases in temperatures from present day conditions will occur, although the magnitude of change would be limited. Rainfall patterns are unlikely to be significantly variable from present day conditions.	Reduction in river flows and water levels could impact riparian species such as water voles, otters and prey. Droughts and hardened soil may impact the ability of badgers to forage for food. Changing weather patterns can change the timing of bat migration for some species – causing a potential mismatch with food resources, impacting reproduction and increase in mortality. Warmer temperatures may impact hazel dormouse hibernation periods and associated food availability. Changing weather patterns and a warming climate have the potential to affect terrestrial invertebrate assemblages through the arrival of new, potentially invasive species from continental Europe, the constriction of the distribution of those species requiring cooler climates or the loss of species whose foodplants or habitats are directly affected by climate change.	Very low – predicted climate impacts are expected to be gradual, and are not anticipated to be significant within the expected construction programme.	Medium – any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant
Impact on aquatic habitats and species	Changes in precipitation patterns, changes to water flows/quantity.	Rainfall patterns are unlikely to be significantly variable from present day conditions.	Changes in winter/summer precipitation patterns may have an impact on the life cycle of aquatic species, including fish, invertebrates and macrophytes.	Very low – predicted climate change impacts are expected to be gradual. Likelihood of change not anticipated to be significant within the expected construction programme.	Medium – any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant
ES Chapter 9 Marine biodiversity, Volume I (Document Reference 6.1, DCO Volume 6)						
Pollution events associated with all components of the Proposed Development, including indirect effects	Changes in precipitation patterns, changes	Rainfall patterns are unlikely to be significantly variable from present day conditions.	Increased heavy rainfall events may increase the frequency of pollution events during floods.	Low - ES Chapter 9 Marine biodiversity, Volume I (Document Reference 6.1, DCO Volume 6) identifies that with application of good construction practices set out within the Outline	Medium – any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant

Impact identified in topic assessments (construction)	Climate hazard	Likelihood of climate hazard	Potential In-combination Climate Change Impact	Likelihood of In-combination Climate Change Impact	Consequence of In-combination Climate Change Impact	Significance
resulting in temporary habitat loss from pollution.	to water flows/quantity.			Construction Environmental Management Plan (CEMP) of the Proposed Development, (Document Reference 7.1, DCO Volume 7), potential impacts from pollution events on marine biodiversity receptors are not anticipated during construction, and therefore there would no residual effects.		
Light disturbance associated with the WRP site and task lighting	No additional impacts are anticipated as a result of climate change during the construction phase.					
Underwater noise and vibration associated with the Pipelines between Budds Farm Wastewater Treatment Works and the WRP site	No additional impacts are anticipated as a result of climate change during the construction phase.					
ES Chapter 10 Carbon and climate change, Volume I (Document Reference 6.1, DCO Volume 6)						
Impacts on carbon emissions	Climate hazards are not considered to be likely to result in a change of carbon emissions during construction. Climate adaptation measures will already be factored into construction techniques that the appointed Contractor will adopt for construction activities in the next 10 years, therefore there are not anticipated to be any additional emission sources associated with increasing the resilience of construction activities that not currently accounted for in the carbon assessment.					
ES Chapter 11 Land quality and ground conditions, Volume I (Document Reference 6.1, DCO Volume 6)						
Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts	An increase in the frequency and intensity of precipitation events, particularly during the winter months.	Rainfall patterns are unlikely to be significantly variable from present day conditions.	Increased heavy precipitation events could increase surface water run-off and expose human health receptors to more Potential Contaminants of Concern (PCOC).	Low - risks would be reduced through the implementation of tertiary mitigation measures secured in the Outline CEMP (Document Reference 7.1, DCO Volume 7) as detailed in section 11.4 of ES Chapter 11 Land quality and ground conditions, Volume I (Document Reference 6.1, DCO Volume 6), including covering of stockpiles to prevent windblown dust or ingress of rainwater, where practicable.	Medium – any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant
	More frequent drought conditions.	Rainfall patterns are unlikely to be significantly variable from present day conditions.	Drier weather could result in increased levels of dust, which could have health implications for workforce, landowners and land users.	Low – the mitigation measures secured in the Outline CEMP (Document Reference 7.1, DCO Volume 7) as detailed in ES Chapter 6 Air quality and odour, Volume I (Document Reference 6.1, DCO Volume 6), in relation to dust and fine particulate matter would reduce emissions, and predicted effects of climate change in the construction phase is not expected to exacerbate the impact of the Proposed Development.	Medium – any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant
Direct impacts on groundwater quality and groundwater resources	An increase in the frequency and intensity of precipitation	Rainfall patterns are unlikely to be significantly variable from present day conditions.	Increased heavy precipitation events could increase surface water run-off and disturb PCOCs. This could lead to	Low – the risks would be reduced through the implementation of tertiary mitigation measures secured in the Outline CEMP (Document Reference	Medium – any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant

Impact identified in topic assessments (construction)	Climate hazard	Likelihood of climate hazard	Potential In-combination Climate Change Impact	Likelihood of In-combination Climate Change Impact	Consequence of In-combination Climate Change Impact	Significance
	events, particularly during the winter months.		increased contamination of groundwater resources.	7.1, DCO Volume 7) as detailed in section 11.4 of ES Chapter 11 Land quality and ground conditions, Volume I (Document Reference 6.1, DCO Volume 6). These measures include the storage of contaminated soils in demarcated areas with soil placed on impermeable surfaces, and the implementation of controls for containing surface water run-off from contaminated stockpiles to prevent uncontrolled discharge of contaminated effluent.		
	More frequent drought conditions.	Rainfall patterns are unlikely to be significantly variable from present day conditions.	Drier weather could cause fissures in soil, resulting in rainwater infiltrating to deeper level.	Low – risks would be reduced through measures secured in the Outline CEMP (Document Reference 7.1, DCO Volume 7) and implementation of associated controls which would reduce the likelihood of significant effects on soil during construction.	Medium – any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant
Impacts on surface water quality and the ecological habitats they support from contamination	An increase in the frequency and intensity of precipitation events, particularly during the winter months.	Rainfall patterns are unlikely to be significantly variable from present day conditions.	Increased heavy precipitation events could increase surface water run-off and disturb PCOC, impacting surface water and supported habitats/species.	Low– the risks would be reduced through the implementation of tertiary mitigation measures secured in the Outline CEMP (Document Reference 7.1, DCO Volume 7) as detailed in section 11.4 of ES Chapter 11 Land quality and ground conditions, Volume I (Document Reference 6.1, DCO Volume 6).	Medium – any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant
Impacts on agricultural land	An increase in the frequency and intensity of precipitation events, particularly during the winter months.	Rainfall patterns are unlikely to be significantly variable from present day conditions.	Increased heavy precipitation events could increase surface water run-off and disturb PCOCs on agricultural land.	Low – the risks would be reduced through the implementation of tertiary mitigation measures secured in the Outline CEMP (Document Reference 7.1, DCO Volume 7) as detailed in section 11.4 of ES Chapter 11 Land quality and ground conditions, Volume I (Document Reference 6.1, DCO Volume 6).	Medium – any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant
ES Chapter 12 Land use and agriculture, Volume I (Document Reference 6.1, DCO Volume 6)						
Temporary or permanent loss of agricultural land	An increase in the frequency and intensity of precipitation events, particularly during the winter months.	Rainfall patterns are unlikely to be significantly variable from present day conditions.	Increased storms and flooding may temporarily periodically exacerbate any effects of the Proposed Development on agricultural land.	Very low – As detailed in section 12.4 of ES Chapter 12 Land use and agriculture, Volume I (Document Reference 6.1, DCO Volume 6), the design of the Proposed Development includes the mitigation of avoiding agricultural land where reasonably practicable. Additionally, land would be reinstated to its previous condition where there is a temporary loss of land. Climate change is not predicted to exacerbate any temporary or	Low – any impact to receptors would be localised, and managed through existing controls	Not significant

Impact identified in topic assessments (construction)	Climate hazard	Likelihood of climate hazard	Potential In-combination Climate Change Impact	Likelihood of In-combination Climate Change Impact	Consequence of In-combination Climate Change Impact	Significance
				permanent loss of agricultural land associated with the Proposed Development		
Temporary disruption to soils	An increase in the frequency and intensity of precipitation events, particularly during the winter months.	Rainfall patterns are unlikely to be significantly variable from present day conditions.	Increased precipitation, storms and flooding may temporarily exacerbate any effects of the Proposed Development to soils.	Negligible – As required through the Outline CEMP (Document Reference 7.1, DCO Volume 7), the appointed Contractor will produce a Soils Resource Management Plan (SRMP) and a Site Waste Management Plan (SWMP), and which will contain measures to reduce the likelihood of disruption to soil resources.	Low – any impact to receptors would be localised, and managed through existing controls	Not significant
Temporary loss of access and boundary features to residential properties, community land and facilities (including Public Rights of Way (PRoW)), and commercial property and land	An increase in the frequency and intensity of precipitation events, particularly during the winter months.	Rainfall patterns are unlikely to be significantly variable from present day conditions.	Increased storms and flooding may temporarily disrupt access to residential properties, community land and commercial land, exacerbating any effects of the Proposed Development.	Low – Section 12.4 of ES Chapter 12 Land use and agriculture, Volume I (Document Reference 6.1, DCO Volume 6), includes measures to mitigate impacts on access to the identified features from construction of the Proposed Development. Climate change is not considered likely to exacerbate impacts related to the temporary loss of access and boundary features.	Low – any impact to receptors would be localised, and managed through existing controls	Not significant
ES Chapter 13 Landscape and visual, Volume I (Document Reference 6.1, DCO Volume 6)						
Landscape character, including National, County and Local Character Impact of changes to visual amenity on residents and the public, and their use of public open spaces Impacts of changes to visual amenity on use of PRoW and local/main roads	More frequent drought conditions.	Rainfall patterns are unlikely to be significantly variable from present day conditions.	Increased drought conditions could exacerbate impact on landscape character, as the presence of fieldwork, and woodland areas limited the intervisibility between the sensitive areas and the Proposed Development. Vegetation die-back during a drought may alter views or screening of construction activities.	Low - Section 13.7 of ES Chapter 13 Landscape and visual, Volume I (Document Reference 6.1, DCO Volume 6), considers the impacts of climate change on the pattern and type of vegetation within the landscape, and how this might alter its character were considered as part of establishing the current and future baseline conditions. It is evaluated that the landscape character and visual amenity at receptors would remain the same during the construction phase.	Medium – any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant
	Higher average and extreme temperatures.	The projected climate change data for the construction phase shows that increases in temperatures from present day conditions will occur, although the magnitude of change would be limited.	Higher temperatures could result in longer growing season and increased rate of vegetation growth. More extreme temperatures could also affect the health of vegetation and trees in the area. This could impact the landscape character and visual amenity.	Low - Section 13.7 of ES Chapter 13 Landscape and visual, Volume I (Document Reference 6.1, DCO Volume 6), considers the impacts of climate change on the pattern and type of vegetation within the landscape, and how this might alter its character were considered as part of establishing the current and future baseline conditions. It is evaluated that the landscape character and visual amenity at receptors would remain the same during the construction phase. Changes would be commensurate with annual fluctuations and changes in vegetation	Medium – any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant

Impact identified in topic assessments (construction)	Climate hazard	Likelihood of climate hazard	Potential In-combination Climate Change Impact	Likelihood of In-combination Climate Change Impact	Consequence of In-combination Climate Change Impact	Significance
				growth, and are unlikely to impact the landscape character or visual amenity.		
	Storms and high wind events.	There could be storms and high wind events during construction, although the severity and frequency is unlikely to increase from present day conditions.	Increased extreme weather events could exacerbate the impact on the landscape character and visual amenity, for example if trees are lost in high winds.	Low - Section 13.7 of ES Chapter 13 Landscape and visual, Volume I (Document Reference 6.1, DCO Volume 6), considers the impacts of climate change on the pattern and type of vegetation within the landscape, and how this might alter its character were considered as part of establishing the current and future baseline conditions. It is evaluated that the landscape character and visual amenity at receptors would remain the same during the construction phase. There could be extreme weather events during the construction phase as a result of climate change, although the likelihood of them resulting in impacts to landscape character and visual amenity is uncertain.	Medium – any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant
	Higher average and extreme temperatures.	The climate change projection data for the construction phase shows that increases in temperatures from present day conditions will occur, although the magnitude of change would be limited.	Changing climate conditions could result in increased pests and diseases, and subsequent loss of vegetation which might impact visual amenity.	Low - Section 13.7 of ES Chapter 13 Landscape and visual, Volume I (Document Reference 6.1, DCO Volume 6), considers the impacts of climate change on the pattern and type of vegetation within the landscape, and how this might alter its character were considered as part of establishing the current and future baseline conditions. It is evaluated that the landscape character and visual amenity at receptors would remain the same during the construction phase. Higher temperatures are predicted during the construction phase, but any increase in pests and diseases, as well as loss of vegetation would be gradual.	Medium – any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant
ES Chapter 14 Major accidents and disasters, Volume I (Document Reference 6.1, DCO Volume 6)						
Fire	Higher average and extreme temperatures. More frequent drought conditions, particularly during summer months.	The projected climate change data for the construction phase shows that increases in temperatures from present day conditions will occur, although the magnitude of change would be limited. Rainfall patterns are unlikely to be significantly variable from present day conditions.	Increased temperatures and more frequent heatwaves could increase the likelihood of fires which can affect machinery, buildings, and the surrounding environment and infrastructure.	Very low - the degree of climate change during the construction would not differ significantly from present day conditions, therefore the likelihood of change for the impact would be unlikely. Additionally, the measures secured in the Outline CEMP (Document Reference 7.1, DCO Volume 7) provide good practice measures with regard to the storage of fuel and plant, during construction, to	Medium – any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant

Impact identified in topic assessments (construction)	Climate hazard	Likelihood of climate hazard	Potential In-combination Climate Change Impact	Likelihood of In-combination Climate Change Impact	Consequence of In-combination Climate Change Impact	Significance
				reduce the risk of fire as far as practicable from these sources.		
Unexploded Ordnance (UXO)	Climate hazards are unlikely to impact the likelihood of major accidents from UXO during the construction phase.					
Bird strike (aircraft)	Higher average and extreme temperatures, reduced rainfall, more frequent drought conditions. Increased frequency/intensity of flood events.	The climate change projection data for the construction phase shows that increases in temperatures from present day conditions will occur, although the magnitude of change would be limited. Rainfall patterns are unlikely to be significantly variable from present day conditions.	Changes to the 21 statutory designated sites within the Zone of Influence of the Proposed Development as a result of the climate may affect flocking behaviours in proximity to Southampton Airport	Very low – the degree of climate change is limited during the construction phase, and changes within the designated sites would be gradual. Mitigation for the risk of bird strike (birds striking planes and causing an accident) is secured in the Outline CEMP (Document Reference 7.1, DCO Volume 7), which has been agreed with Southampton Airport and is sufficient to reduce the risk to as low as reasonably practicable.	Large adverse – Any impacts would result in significant damage or loss requiring significant remediation	Not significant
ES Chapter 15 Noise and vibration, Volume I (Document Reference 6.1, DCO Volume 6)						
Direct ground-borne noise impacts on health and quality of life, for occupants of residential dwellings and users of non-residential locations Indirect noise impacts on health and quality of life	Higher average and extreme temperatures.	The climate change projection data for the construction phase shows that increases in temperatures from present day conditions will occur, although the magnitude of change would be limited.	Higher temperatures and increased frequency of heatwaves could result in more internal noise, due to windows being open for longer and more often during the summer months.	Very low - the degree of climate change during the construction would not differ significantly from present day conditions. The outcomes of the noise assessment presented ES Chapter 15 Noise and vibration, Volume I (Document Reference 6.1, DCO Volume 6) the majority of identified likely significant effects are during works on Saturday afternoons, therefore tertiary mitigation measures included in the Outline CEMP (Document reference 7.1, DCO Volume 7) restricts certain activities at sensitive times. Additional mitigation measures presented ES Chapter 15 Noise and vibration, Volume I (Document Reference 6.1, DCO Volume 6) will also reduce the risk of construction noise related impacts.	Low – any impact to receptors would be localised, and managed through existing controls	Not significant
Direct vibration impacts on health, quality of life, and building damage	There is no link between climate hazards and impacts associated with vibration.					
ES Chapter 16 Resources and waste management, Volume I (Document Reference 6.1, DCO Volume 6)						
Mineral safeguarding	ES Chapter 16 Resources and waste management, Volume I (Document Reference 6.1, DCO Volume 6), has not indicated that likely significant effects would result from the Proposed Development with regard to minerals safeguarding, due to the presence of existing constraints/land use or sterilisation. Climate change is unlikely to change this conclusion. For potential ICCI effects relating to waste for the Proposed Development and potential climate change on receptors include the risk of contamination through increased rainfall events and flooding, which may result in a reduced capacity at both non-hazardous waste landfills and hazardous waste landfill facilities. Additionally, wetter conditions from increased heavy rainfall days could lead to excavated materials being classed as unsuitable for re-use, therefore, requiring disposal off-site or treatment to reduce the water content. This may result in further reduced capacity at waste landfill facilities.					

Impact identified in topic assessments (construction)	Climate hazard	Likelihood of climate hazard	Potential In-combination Climate Change Impact	Likelihood of In-combination Climate Change Impact	Consequence of In-combination Climate Change Impact	Significance
Waste	Increased rainfall and flooding	Rainfall patterns are unlikely to be significantly variable from present day conditions.	Risk of contamination through increased rainfall events and flooding, which may result in a reduced capacity at both non-hazardous waste landfills and hazardous waste landfill facilities. Wetter conditions from increased heavy rainfall days could lead to excavated materials being classed as unsuitable for re-use, therefore, requiring disposal off-site or treatment to reduce the water content. This may result in further reduced capacity at waste landfill facilities.	Low – ES Chapter 16 Resources and waste management, Volume I (Document Reference 6.1, DCO Volume 6) advises that the Proposed Development would result in a negligible and minor magnitude of waste at non-hazardous waste landfills and hazardous waste landfill facilities respectively, and that there is sufficient landfill capacity in the region. This does result in a moderate adverse impact on hazardous landfill capacity, but it is noted that regional and national non-hazardous waste landfills and hazardous waste landfill facilities will still have sufficient capacity. Appropriate mitigation has been secured in the Outline CEMP (Document Reference 7.1, DCO Volume 7) which will be included in the SWMP to be produced by the Contractor once appointed.	Low – any impact to receptors would be localised, and managed through existing controls	Not significant
ES Chapter 17 Socio-economics, tourism and health, Volume I (Document Reference 6.1, DCO Volume 6)						
Socio-economics						
Impacts of the Proposed Development on Employment	Climate change is unlikely to have significant effects on socio-economic impacts during construction.					
Supply chain effects						
Training and apprenticeships						
Effects on employment from impacts on allocated land						
Tourism						
Access to strategic tourism receptors	Climate change is unlikely to have significant effects on tourism impacts during construction.					
Amenity effects for strategic tourism receptors						
Effects on tourist accommodation						
Health						
Effects on access to recreational spaces (social infrastructure, green space and recreation and physical	Increased extreme weather events (e.g. drought, flooding, heat waves, storms)	The climate change projection data for the construction phase shows that increases in temperature from present day conditions will occur, although the	Increased extreme weather events could result in recreational spaces being temporarily unviable, exacerbating any impacts of the Proposed Development.	Low - ES Chapter 17 Socio-economics, tourism and health, Volume I (Document Reference 6.1, DCO Volume 6), identifies that any effects on access would be temporary, and access would be maintained by	Low – any impact to receptors would be localised, and managed through existing controls	Not significant

Impact identified in topic assessments (construction)	Climate hazard	Likelihood of climate hazard	Potential In-combination Climate Change Impact	Likelihood of In-combination Climate Change Impact	Consequence of In-combination Climate Change Impact	Significance
activity) and health and social care assets		magnitude of change would be limited. There could be storms and high wind events during, although the severity and frequency is unlikely to increase from present day conditions.		alternative routes. Changes to the climate are likely to be of a low magnitude, and therefore are not considered likely to change the outcomes of the assessment.		
Effects on social cohesion, community safety, access to work and training and neighbourhood amenity	Climate change is unlikely to have significant effects on these impacts during construction.					
ES Chapter 18 Traffic and transport, Volume I (Document Reference 6.1, DCO Volume 6)						
Delays on highways impacting vehicle drivers, bus drivers, passengers, pedestrians, cyclists and horse riders. Accidents and safety (all road users)	An increase in the frequency and intensity of precipitation and storm events, particularly during the winter months.	The climate change projection data for the construction phase shows that there could be storms and high precipitation and wind events during, although the severity and frequency is unlikely to increase from present day conditions.	Increased adverse climate hazards could cause congestion, increasing any highway delays caused by the Proposed Development. Reduced traffic speeds and severance as a result of strong winds, heavy rain, storms and flooding could result in driver stress, exacerbating effects of the Proposed Development. Decreased road safety may occur as a result of increased flooding, strong winds and storms.	Low - The Traffic Management Strategy (TMS) (Document Reference 7.3, DCO Volume 7) includes details for how works in the highway would be managed. The Framework Construction Traffic Management Plan (CTMP) (Document Reference 7.2, DCO Volume 7) includes measures to reduce impacts associated with traffic movements associated with the Proposed Development during the construction phase.	Low – any impact to receptors would be localised, and managed through existing controls	Not significant
Severance (non motorised road users)	There is no link between climate hazards and impacts associated with severance.					
Amenity, fear and intimidation (non motorised road users)	There is no link between climate hazards and impacts associated with amenity, fear and intimation.					
Hazardous and large loads (all road users)	There is no link between climate hazards and impacts associated with hazardous and large loads					
ES Chapter 19 Water environment, Volume I (Document Reference 6.1, DCO Volume 6)						
Direct disturbance, to surface water and groundwater	An increase in the frequency and intensity of precipitation and storm events, particularly during the winter months.	There could be storms and high precipitation events during the construction phase, although the severity and frequency is unlikely to increase from present day conditions.	Increased rainfall, flooding and droughts would result in changes to hydrology and geomorphology of surface water. Flooding, heavy rain and drought may affect quantity of groundwater, affecting any impacts caused by the Proposed Development.	Low - Section 19.4 and 19.8 of the ES Chapter 19 Water environment, Volume I (Document Reference 6.1, DCO Volume 6), outlines mitigation measures that will be adopted during the construction phase, which includes the potential effects of climate change.	Low – any impact to receptors would be localised, and managed through existing controls	Not significant
Release of contaminants, into groundwater, groundwater abstraction site and Source Protection Zone (SPZ).	An increase in the frequency and intensity of precipitation and storm events, particularly during the winter months	There could be storms and high precipitation events during the construction phase, although the severity and frequency is unlikely to increase from present day conditions.	Increased heavy precipitation events could increase surface water run-off and disturb PCOC. This could lead to increased contamination of groundwater and surface water resources.	Low - Section 19.4 and 19.8 of the ES Chapter 19 Water environment, Volume I (Document Reference 6.1, DCO Volume 6), outlines mitigation measures that will be adopted during the construction phase, which includes the potential effects of climate change.	Low – any impact to receptors would be localised, and managed through existing controls	Not significant

Impact identified in topic assessments (construction)	Climate hazard	Likelihood of climate hazard	Potential In-combination Climate Change Impact	Likelihood of In-combination Climate Change Impact	Consequence of In-combination Climate Change Impact	Significance
Changes to flows/flood risk	An increase in the frequency and intensity of precipitation and storm events, particularly during the winter months	There could be storms and high precipitation events during the construction phase, although the severity and frequency is unlikely to increase from present day conditions.	Climate hazards include increased flooding and increased storms, both of which are likely to affect any impact on flood risk caused by the Proposed Development. Impacts of climate change on flood risk have been considered in the ES Appendix 19.1 Flood risk assessment, Volume II (Document Reference 6.2, DCO Volume 6)	Low - Section 19.4 and 19.8 of the ES Chapter 19 Water environment, Volume I (Document Reference 6.1, DCO Volume 6), outlines mitigation measures that will be adopted during the construction phase, which includes the potential effects of climate change.	Low – any impact to receptors would be localised, and managed through existing controls	Not significant

Table 1-5 Operation phase in-combination Climate Change Impact assessment

Impact identified in topic assessments (operation)	Climate hazard	Likelihood of Climate hazard	Potential In-combination Climate Change Impact	Likelihood of In-combination Climate Change Impact	Consequence of In-combination Climate Change Impact	Significance
ES Chapter 6 Air quality and odour, Volume I (Document Reference 6.1, DCO Volume 6)						
Operational phase impacts are scoped out of the ES Chapter 6 Air quality and odour, Volume I (Document Reference 6.1, DCO Volume 6), so have not been considered further.						
ES Chapter 7 Archaeology and cultural heritage, Volume I (Document Reference 6.1, DCO Volume 6)						
Permanent impact to designated and non-designated heritage assets arising through change to setting.	Higher air temperatures and more frequent drought conditions	Climate change projection data shows that there are likely to be higher air temperatures and droughts, particularly during the summer months.	The implementation of landscaping will benefit areas where there are changes to setting arising from the perceptibility of Above Ground Plant (AGP). The viability of the landscaping scheme may be affected by higher air temperatures and more frequent drought conditions.	Low – the landscaping scheme would consider climate resilient species as part of the proposed mitigation to withstand future climate conditions.	Medium – in the event of impacts to the effectiveness of the landscaping scheme, remediation actions would be required, although the impact would be temporary.	Not significant
ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I (Document Reference 6.1, DCO Volume 6)						
Impacts on statutory and non-statutory designated sites during operation	Higher average and extreme temperatures, reduced rainfall, more frequent drought conditions.	The climate projection data shows that there are likely to be higher average temperatures, and periods of extreme heat. There is also likely to be less rainfall in the summer months, which means drought conditions are more likely.	Additional stress placed on nature conservation sites and supporting qualifying features during operation. Potential exacerbation of impacts identified within ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I (Document Reference 6.1, DCO Volume 6), including changes to water flows/quality/quantity, disturbance of qualifying features and habitat loss.	Low - Section 8.7 of ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I (Document Reference 6.1, DCO Volume 6), states that climate change is not anticipated to change the biographic envelope for habitats and species within the study area for the assessment within the timeframes of the Proposed Development.	Medium - changes are likely to be gradual, and the Proposed Development is required to address water supply deficit during normal and drought conditions, it will reduce water stress in the region under drought conditions (e.g. River Itchen). Any impacts of the potential ICCI would require remediation but would be temporary.	Not significant
Impact on fauna during operation (badger, bats, birds, hazel dormouse, otter, water voles, others)	Higher average and extreme temperatures, reduced rainfall, and more frequent drought conditions	The climate projection data shows that there are likely to be higher average temperatures, and periods of extreme heat. There is also likely to be less rainfall in the summer months, which means drought conditions are more likely.	Reduction in river flows and water levels could impact riparian species such as water voles, otters and prey. Droughts and hardened soil may impact the ability of badgers to forage for food. Changing weather patterns can change the timing of bat migration for some species – causing a potential mismatch with food resource availability, impacting reproduction and increase in mortality. Warmer temperatures may impact hazel dormouse hibernation periods and associated food availability. Changing weather patterns have the potential to affect terrestrial invertebrate assemblages through the arrival of new, potentially invasive species from continental Europe. The reduction of the distribution of those species requiring cooler climates or the loss of species whose foodplants or habitats are also directly affected by climate change.	Low – the Outline Landscape and Ecology Management Plan (LEMP) (Document Reference 7.5, DCO Volume 7), would consider the potential impacts from climate change on the selection of species for proposed planting and the management of new and existing planting. In addition, Section 8.7 of ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I (Document Reference 6.1, DCO Volume 6), states that climate change is not anticipated to change the biographic envelope for habitats and species within the study area for the assessment within the timeframes of the Proposed Development.	Medium - changes are likely to be gradual, and the Proposed Development is required to address water supply deficit during normal and drought conditions, it will reduce water stress in the region under drought conditions (e.g. River Itchen). Any impacts of the potential ICCI would require remediation but would be temporary.	Not significant
Impact on aquatic habitats and species	Increased number of hot days, increase of droughts	The climate projection data shows that there are likely to be higher average temperatures, and the number of hot days will increase. There is also likely to be less rainfall in the summer months, which	Hotter weather may provide better conditions for invasive non-native species leading to greater spread and growth, outcompeting native species and supported habitats.	Low– An Outline Invasive Non-Native Species (INNS) Biosecurity Plan (Document Reference 7.10, DCO Volume 7) is submitted with the DCO application. In addition, monitoring of the establishment and maintenance of all landscaping planting would take place. This will include the spread of	Low – any impact to receptors would be localised, and managed through existing controls.	Not significant

Impact identified in topic assessments (operation)	Climate hazard	Likelihood of Climate hazard	Potential In-combination Climate Change Impact	Likelihood of In-combination Climate Change Impact	Consequence of In-combination Climate Change Impact	Significance
		means drought conditions are more likely.		pests and diseases. The consequence is therefore considered to be low.		
ES Chapter 9 Marine biodiversity, Volume I (Document Reference 6.1, DCO Volume 6)						
Impacts on designated sites	Changes in sea temperature	Sea temperatures are likely to rise over the course of the operational phase.	Potential for designated sites to be unable to tolerate temperature changes, increasing potential residual effects at the Eastney Long Sea Outfall (LSO) which may occur from a decrease in water quality.	Very low – Modelling of water quality, summarised in ES Chapter 19 Water environment, Volume I (Document Reference 6.1, DCO Volume 6), highlights that the release of reject water from the WRP via the Eastney LSO is predicted not to result in any significant changes to water quality associated with its current consented parameters. Any water quality impacts would also be considered through an Environmental Permit application process.	Large adverse – any impacts would result in reportable, significant damage to the designated sites, requiring significant remediation	Not significant
Impacts on marine mammals	Changes in sea temperature	Sea temperatures are likely to rise over the course of the operational phase.	Potential for marine mammals to be unable to tolerate temperature changes, increasing potential residual effects at the Eastney LSO which may occur from a decrease in water quality. Potential for climate change impacts to impact marine mammals' prey (commercial and non-commercial fish species). Additional stresses associated with climate change (e.g. increased exposure to algal toxins) may increase the vulnerability of marine mammals to physiological impacts.	Low - climate change and rising sea temperatures are not anticipated to exacerbate impacts on marine mammals as a result of the Proposed Development.	Large adverse – any impacts would result in reportable, significant damage.	Not significant
Impacts on fish/fish spawning and nursery grounds	Changes in sea temperature	Sea temperatures are likely to rise over the course of the operational phase.	Potential for non-migratory fish to be unable to tolerate temperature changes, increasing potential residual effects at the Eastney LSO which may occur from a decrease in water quality. Change in phenology (e.g. spawning periods) as a result of changes in temperature. Potential impacts on prey species. Rising sea temperatures may impede spawning and recruitment success.	Low – Modelling of water quality, summarised in ES Chapter 19 Water environment, Volume I (Document Reference 6.1, DCO Volume 6), highlights that the release of reject water from the WRP via the Eastney LSO is predicted not to result in any significant changes to water quality associated with its current consented parameters.	Large adverse – any impacts would result in reportable, significant damage.	Not significant
Impacts on benthic marine species	Changes in sea temperature	Sea temperatures are likely to rise over the course of the operational phase.	Potential for benthic species to be unable to tolerate temperature changes, increasing potential residual effects at the Eastney LSO, which may occur from a decrease in water quality.	Low–benthic species are expected to be relatively tolerant to changes in temperature. Modelling of water quality summarised in ES Chapter 19 Water environment, Volume I (Document Reference 6.1, DCO Volume 6), highlights that the release of reject water from the WRP via the Eastney LSO is predicted not to result in any significant changes to water quality associated with its current consented parameters.	Large adverse – any impacts would result in reportable, significant damage.	Not significant
Impacts on fisheries	Changes in sea temperature	Sea temperatures are likely to rise over the course of the operational phase.	Potential for non-migratory fish to be unable to tolerate temperature changes, increasing potential residual effects at the	Low – Modelling of water quality, summarised in ES Chapter 19 Water environment, Volume I (Document	Large adverse – any impacts would result in reportable, significant damage.	Not significant

Impact identified in topic assessments (operation)	Climate hazard	Likelihood of Climate hazard	Potential In-combination Climate Change Impact	Likelihood of In-combination Climate Change Impact	Consequence of In-combination Climate Change Impact	Significance
			Eastney LSO which may occur from a decrease in water quality. Change in phenology (e.g. spawning periods) as a result of changes in temperature. Potential impacts on prey species Rising sea temperatures may impede spawning and recruitment success and encourage commercial fish species to move to different areas.	Reference 6.1, DCO Volume 6), highlights that the release of reject water from the WRP via the Eastney LSO is predicted not to result in any significant changes to water quality associated with its current consented parameters.		
ES Chapter 10 Carbon and climate change, Volume I (Document Reference 6.1, DCO Volume 6)						
Impact on carbon emissions	The carbon modelling undertaken to inform the carbon assessment in ES Chapter 10 Carbon and climate change, Volume I (Document Reference 6.1, DCO Volume 6), has considered the frequency of use of the Proposed Development in response to likely increases in drought conditions. The Proposed Development is also considered to be resilient to climate change, and no additional mitigation was recommended. Climate change is considered to be unlikely to impact the level of emissions predicted in the carbon assessment.					
ES Chapter 11 Land quality and ground conditions, Volume I (Document Reference 6.1, DCO Volume 6)						
Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts						
Direct impacts on groundwater quality and groundwater resources						
Impacts on surface water quality and the ecological habitats they support from contamination	There is limited potential for climate change hazards to affect these impacts, due to the majority of operational infrastructure being underground and remediation works undertaken prior to the commencement of construction would mitigate potential risks during the operation of the WRP. Remediation of soils is defined as the reduction, treatment and removal of soil contaminants, in order to reduce the subsequent impact on the environment and human health.					
Potential impacts on the built environment						
Exposure of workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts						
ES Chapter 12 Land use and agriculture, Volume I (Document Reference 6.1, DCO Volume 6)						
Temporary disruption to soils	Operational effects on soils are scoped out of the operational phase assessment. Should maintenance or repair works be required which would result in disturbance or other impacts to soils, good practice measures would be incorporated into the detailed SRMP prepared by the appointed Contractor substantially in accordance with the Outline SRMP (Document reference 7.1, DCO Volume 7) appended to the Outline CEMP (Document reference 7.1, DCO Volume 7) as required by the Operational Environmental Management Plan (OEMP) (Document reference 7.7, DCO Volume 7).					
ES Chapter 13 Landscape and visual, Volume I (Document Reference 6.1, DCO Volume 6)						
Landscape character, including National, County and Local Character Areas Impact of changes to visual amenity on residents and the public, and their use of public open spaces	More frequent drought conditions.	Climate change projection data shows that there are likely to be more periods of drought, particularly during the summer months.	Increased drought conditions or flooding could exacerbate impact on landscape character.	Low - the Indicative Environmental Masterplan appended to the Design Approach Document (Document Reference 5.12, DCO Volume 5), places the multi-functional environmental mitigation and enhancement measures within the framework of the landscape design. Due to the consideration of climate resilient species in the landscape design, and the adoption of monitoring	Medium - changes are likely to be gradual. Any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant

Impact identified in topic assessments (operation)	Climate hazard	Likelihood of Climate hazard	Potential In-combination Climate Change Impact	Likelihood of In-combination Climate Change Impact	Consequence of In-combination Climate Change Impact	Significance
Impacts of changes to visual amenity on use of PRoW and local/main roads.				requirements set out in ES Chapter 13 Landscape and visual, Volume I (Document Reference 6.1, DCO Volume 6), and secured in the Outline LEMP (Document reference 7.5, DCO Volume 7), there is considered to be a low likelihood of the identified ICCIs.		
	Higher average and extreme temperatures	Climate change projection data shows that there are likely to be higher average and extreme air temperatures, particularly during the summer months.	Higher temperatures could result in longer growing season and increased rate of vegetation growth. This could impact the landscape.	Low - Monitoring of the growth and maintenance of planting would be undertaken by the Applicant during the first five years following planting to ensure its successful establishment. All planting incorporated into the design of the Proposed Development would be routinely inspected, managed and maintained during the contract period in accordance with the requirements as stipulated within the final LEMP, which would be developed post- consent.	Medium - changes are likely to be gradual. Any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant
	Storms and high wind events	The climate projection data shows that storms and high wind events could be more frequent and intense over the operational lifespan of the Proposed Development.	Increased extreme weather events could exacerbate the impact on the landscape character and visual amenity, for example if trees are lost in high winds.	Low - if landscape planting is found to be damaged or be insufficient to provide the required level of screening following a storm event, remedial works would be undertaken as necessary.	Large adverse – any impacts would result in reportable, significant damage.	Not significant
	Higher average and extreme temperatures	Climate change projection data shows that there are likely to be higher average and extreme air temperatures, particularly during the summer months.	Changing climate conditions could result in increased pests and diseases, and subsequent loss of vegetation.	Low - The Outline LEMP (Document reference 7.5, DCO Volume 7) explains that after the five-year establishment period, the longer-term maintenance and management of landscape planting would commence. Should the planting be found not to have established as intended or be insufficient to provide the required level of screening and integration, remedial works would be undertaken as necessary.	Medium - changes are likely to be gradual. Any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant
ES Chapter 14 Major accidents and disasters, Volume I (Document Reference 6.1, DCO Volume 6)						
Fire	Higher average and extreme temperatures More frequent drought conditions	Climate change projection data shows that there are likely to be higher average and extreme air temperatures, particularly during the summer months. There is also likely to be less rainfall in the summer months, which means drought conditions are more likely.	Increased temperatures and more frequent heatwaves could increase the likelihood of fires which can affect the AGP and buildings, and electrical equipment associated with the Proposed Development.	Low - A ground gas risk assessment has been undertaken in ES Appendix 11.2 Ground investigation reports, Volume II (Document Reference 6.2, DCO Volume 6), which states that, based on a reasonable worst case scenario, gas protection measures would be implemented. These measures may include the structural barrier of the floor slab, ventilation measures and a gas resistant membrane. A specialist gas protection measures designer would be engaged to design these measures. These measures are in line with the design principles for safety as secured in the Design Principles Document,	Medium – impacts would be localised but would need remediation.	Not significant

Impact identified in topic assessments (operation)	Climate hazard	Likelihood of Climate hazard	Potential In-combination Climate Change Impact	Likelihood of In-combination Climate Change Impact	Consequence of In-combination Climate Change Impact	Significance
				(Document Reference 5.11, DCO Volume 5). Mitigation measures for the risk of fire from increased temperatures, including wildfires, during the operation of the Proposed Development, are secured in the OEMP (Document Reference 7.7, DCO Volume 7).		
Nuclear submarine port (Southampton Docks)	The Order Limits are outside a 5km buffer of this receptor (Southampton Docks). Climate hazards are unlikely to impact the likelihood of major accidents associated with the nuclear submarine port at Southampton docks during the operation phase.					
Industrial accidents	An increase in the frequency and intensity of precipitation events, particularly during the winter months	The climate projection data shows that high precipitation events could be more frequent and intense over the operational lifespan of the Proposed Development.	Increased heavy rain could exacerbate major accidents and disasters caused by pollution incidents, as it could result the spread of dangerous chemicals.	Low - mitigation measures for the risk of hazardous chemical storage, transport and use during operation of the Proposed Development are secured in the OEMP (Document Reference 7.7, DCO Volume 7). These measures include the isolation of bunded fuelling areas, safety procedures for chemical and refuelling processes and interceptors in drainage systems that can be shut off with isolation valves, which will reduce the risk of industrial accidents.	Medium – impacts would be localised but would need remediation.	Not significant
Pollution incidents	Climate change hazards are unlikely to have effects on pollution incidents. Impacts associated with potential ICCIs in relation to transport accidents (in relation to transport accidents involving operational vehicles transporting hazardous substances) are covered in the entry below.					
Flooding	An increase in the frequency and intensity of precipitation events, particularly during the winter months	The climate projection data shows that high precipitation events could be more frequent and intense over the operational lifespan of the Proposed Development.	There is the potential for an increase in flood events during the operation phase	Low - predicted sea-level rise would reduce the level of protection provided by the sub-region's flood defences, however the FRA indicates that the AGPs and the WRP site would remain resilient to flood risk over their intended design lifetime based on future flood risk mapping for the 2115 horizon adapted from the Partnership for Urban South Hampshire (PUSH) Strategic Flood Risk Assessment. In addition, mitigation measures for the flooding are provided in ES Chapter 19 Water environment, Volume I (Document Reference 6.1, DCO Volume 6),	Medium – impacts would be localised but would need remediation.	Not significant
Transport Accidents	An increase in the frequency and intensity of precipitation and storm events, particularly during the winter months	The climate projection data shows that high precipitation events could be more frequent and intense over the operational lifespan of the Proposed Development.	Increased heavy rain could exacerbate major accidents and disasters caused by pollution incidents, as it could result the spread of dangerous chemicals.	Very low - ES Chapter 18 Traffic and transport, Volume I (Document Reference 6.1, DCO Volume 6), assesses the risk of hazardous loads during operation of the Proposed Development. It concludes that the minor increase in daily vehicle movements involving hazardous loads means there is no likely significant effect and therefore the risk is negligible. If a spillage were to occur, the pollution prevention management plan would be employed as well as the aforementioned safety measures for handling dangerous chemicals. This	Medium – impacts would be localised but would need remediation.	Not significant

Impact identified in topic assessments (operation)	Climate hazard	Likelihood of Climate hazard	Potential In-combination Climate Change Impact	Likelihood of In-combination Climate Change Impact	Consequence of In-combination Climate Change Impact	Significance
				mitigation is sufficient to reduce the risk to as low as reasonably practicable, and the risk is not considered to be exacerbated by climate change.		
ES Chapter 15 Noise and vibration, Volume I (Document Reference 6.1, DCO Volume 6)						
Direct airborne noise impacts on health and quality of life, for occupants of residential dwellings	Higher average and extreme temperatures	Climate change projection data shows that there are likely to be higher average and extreme air temperatures, particularly during the summer months.	Higher temperatures and increased frequency of heatwaves could result in more internal noise, due to windows being open for longer and more often during the summer months.	Low - The criteria used to evaluate the significance of effects in ES Chapter 15 Noise and vibration, Volume I (Document Reference 6.1, DCO Volume 6), includes the potential for open windows at residential receptors. Therefore, there is a low likelihood for and the potential ICCI impact.	Low – the effects would be localised, and additional mitigation could be implemented in the event of recorded impacts.	Not significant.
ES Chapter 16 Resources and waste management, Volume I (Document Reference 6.1, DCO Volume 6)						
Waste	Climate change is unlikely to have significant effects on impacts of resources and waste management during the operational phase of the Proposed Development.					
ES Chapter 17 Socio-economics, tourism and health, Volume I (Document Reference 6.1, DCO Volume 6)						
Socio-economics						
Impacts of the Proposed Development on Employment	Effects on employment from impacts on allocated land, impacts on tourism within the South Downs National Park as a whole, and impacts on tourist accommodation were scoped out of the operational assessment. The Outline Skills and Employment Plan (SEP) (Document Reference 7.9, DCO Volume 7) secures the delivery of some of the economic and social benefits of the Proposed Development, including new job opportunities. Anticipated impacts to the workforce required to operate Proposed Development would not be impacted by climate change.					
Supply chain effects	The operation of the Proposed Development would create opportunities in the supply chain, particularly around maintenance activities. The Outline SEP (Document Reference 7.9, DCO Volume 7) secures the delivery of some of the economic and social benefits of the Proposed Development, including supply chain opportunities. Climate change is unlikely to have significant effects on impacts to the supply chain during the operational phase of the Proposed Development.					
Training and apprenticeships	Training and apprenticeship opportunities are unlikely to be impacted by climate change.					
Tourism						
Access to strategic tourism receptors	ES Chapter 18 Traffic and transport, Volume I (Document Reference 6.1, DCO Volume 6), has not identified any likely significant effects during operation, and so it is not expected that there would be any impacts on access to strategic tourism receptors as a result of operational phase activities. Climate change is unlikely to have significant effects on access to strategic tourism receptors as a result of the Proposed Development during the operational phase.					
Amenity effects for strategic tourism receptors	Climate change is unlikely to have significant effects on amenity effects for strategic tourism receptors as a result of the Proposed Development during the operational phase.					
Health						
Effects on access to recreational spaces (social infrastructure, green space and recreation and physical activity)	Climate change is unlikely to have significant effects on amenity effects on access to recreational spaces as a result of the Proposed Development during the operational phase.					
Effects on social cohesion, community safety, access to work and training and neighbourhood amenity	Climate change is unlikely to have significant effects on social cohesion, community safety, access to work and training and neighbourhood amenity during the operational phase.					
ES Chapter 18 Traffic and transport, Volume I (Document Reference 6.1, DCO Volume 6)						
Pedestrian, cyclist and horse rider delays	Climate change is unlikely to have significant effects on pedestrian, cyclist and horse rider delays during the operational phase of the Proposed Development.					

Impact identified in topic assessments (operation)	Climate hazard	Likelihood of Climate hazard	Potential In-combination Climate Change Impact	Likelihood of In-combination Climate Change Impact	Consequence of In-combination Climate Change Impact	Significance
Amenity, fear and intimidation	Climate change is unlikely to have significant effects on amenity, fear and intimidation during the operational phase of the Proposed Development.					
Hazardous and large loads	Climate change is unlikely to have significant effects on hazardous and large loads during the operational phase of the Proposed Development.					
Abnormal loads	There are no abnormal loads anticipated to be associated with the operational phase of the Proposed Development.					
ES Chapter 19 Water environment, Volume I (Document Reference 6.1, DCO Volume 6)						
Direct disturbance, to surface water and groundwater	No further disturbance anticipated. Pipeline crossings beneath Main Watercourses and Ordinary Watercourses would be buried 2.5 m and 1.2 m beneath the riverbed respectively. Although climate change could result in geomorphological adjustments in the longer term, the prevailing low energy characteristics of the river systems are unlikely to change sufficiently to interact with buried infrastructure.					
Release of contaminants, into groundwater, groundwater abstraction site and SPZ.	Once reinstated, the operational infrastructure would not interact with surface waters or result in significant changes to groundwater quality. All AGPs and WRP site would include an operational drainage system to manage surface water runoff, including its quantity and quality. Therefore, the Proposed Development should not lead to significant problems relating to surface water or groundwater contamination, during operation, an outcome which would not be affected by climate change.					
Changes to flows/flood risk	Once reinstated, the operational infrastructure would not interact with surface waters or result in significant changes to groundwater flows. All AGP would include an operational drainage system to manage surface water runoff, including its quantity and quality. Therefore, the Proposed Development should not result in changes to surface/groundwater flows or flood risk during operation.					
Continuous releases	Changes to precipitation rates	Climate change projection data shows that summer are likely to have less rainfall, and drought periods would be more frequent. In addition, winters are more likely to be wetter, and more frequent heavy rainfall events are anticipated.	The volume of continuous releases of recycled water into Havant Thicket Reservoir and releases of reject water into the Solent from Eastney LSO could potentially change in response to future climate changes. This could result in changes to the proportion of water in the reservoir derived from groundwater, surface water and recycled water from the WRP site, which could affect water quality in the reservoir and also in surface waters that receive flow from the reservoir. Modelling of water quality in Havant Thicket Reservoir and downstream water bodies that would receive compensatory flows indicate that some changes in water quality (notably phosphorus and Biochemical Oxygen Demand) could occur.	Low - Phosphorus reduction measures would therefore be included as part of the WRP site design. Although the proportion of water inputs to the reservoirs from rainfall, runoff, groundwater and recycled water could change due to climate change, adverse impacts on water quality in the reservoir and downstream watercourses are not anticipated. However, any changes in water chemistry would be controlled/managed through monitoring and Environmental Permit requirements.	Large adverse – any impacts would result in reportable, significant damage.	Not significant
Intermittent or unplanned releases	An increase in the frequency and intensity of precipitation and storm events, particularly during the winter months	The climate projection data shows that storms and high precipitation events could be more frequent and intense over the operational lifespan of the Proposed Development	More frequent heavy rain and flooding could lead to more frequent releases of water into rivers from surface water drainage systems.	Low - All AGPs and the WRP site would include an operational drainage system to manage surface water runoff, including its quantity and quality.	Medium - changes are likely to be gradual. Any impacts of the potential ICCI would require remediation, but would be temporary.	Not significant

1.6 Decommissioning

1.6.1 A number of ES topic chapters conclude that effects from decommissioning of the Proposed Development are expected to be no greater than those identified during the construction phase and are therefore assessed as being the same as construction effects as a reasonable worst case scenario. This is based on the expected activities associated with decommissioning being less than construction, for example buried pipeline infrastructure would be left in situ following the end of the solution life cycle, once drained and capped, thus reducing the potential for likely significant effects.

1.6.2 It is however noted that climate change projection data shows that the degree of climate change will be greater in the decommissioning phase compared to the construction phase, which means that further consideration of decommissioning effects is required.

1.6.3 Decommissioning activities are likely to take place after 2100, which is currently the maximum period for available climate change projection data in the UKCP dataset. Any projection data beyond this date are subject to a high degree of uncertainty, therefore climate projections beyond 2100 for the decommissioning phase were not accessed for the assessment.

1.6.4 As detailed information on the decommissioning of the Proposed Development is limited at this time, a meaningful assessment of the ICCI of climate change at the time of decommissioning is not possible. However, any decommissioning works for the Proposed Development would be undertaken using good industry practice and relevant statutory requirements applicable at the time.

1.6.5 Based on the above, it is considered that there would be a low likelihood of ICCIs to adversely affect the Proposed Development in the decommissioning phase. However, it is recommended that a more detailed assessment of this phase should be undertaken prior to decommissioning, where more up to date climate projection data would be available and more information on the decommissioning policy would be known.

1.7 Summary

1.7.1 The consequence of the ICCI for all identified effects of the Proposed Development was considered to be not significant during the construction and operation phases.

1.7.2 It was concluded that there would be a low likelihood of ICCI to adversely affect the Proposed Development in the decommissioning phase.

References

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