South East Strategic Reservoir Option

Preliminary Environmental Information Report

Appendix 18.3 - In-combination Climate Change Impact Assessment

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1 Preliminary In-combination Climate Change Impacts Assessment

1.1 Introduction

1.1.1 This document forms Appendix 18.3 of the Preliminary Environmental Information (PEI) Report prepared for the Project. Further details regarding the components of the Project can be found in the Chapter 2: Project description.

1.1.2 The in-combination climate change impacts (ICCI) assessment is presented in Section 1.2 below. The assessment considers the extent to which climate change exacerbates an effect on an environmental receptor.

1.1.3 The ICCI assessment follows the same approach to assessing impacts and determining significance of effects as for each of the environmental aspects, but with the added consideration of future climate change projections.

1.1.4 The full ICCI methodology is presented in Section 18.4 of Chapter 18: Climate resilience. Stage 1 aims to screen out any ICCIs that are considered unlikely to occur and therefore do not require further assessment. Only ICCIs requiring further consideration have been presented in the section below.

1.1.5 The ICCI assessment is presented below in a tabular format, providing a clear and consistent structure for identifying and considering climate change impacts across the assessment. The level of detail varies between aspects, reflecting differences in the availability of information at this stage. Aspect authors have applied the ICCI methodology set out in Chapter 18: Climate resilience to differing extents, selecting the steps most relevant and practicable to available baseline and design information, and the level of detail provided in their assessment.

1.1.6 The resource/receptor types listed in Table 1.1 in Section 1.2 were assessed for both the construction and operation phases, unless a specific phase is indicated.

1.1.7 Based on a review of the potential in-combination effects under projected climate change, alongside the embedded design measures and standard good practice mitigation already incorporated into the Project, the identified potential ICCIs are not assessed to result in additional significant effects compared to future baseline conditions used for assessment of effects for each aspect. Existing identified mitigation measures are considered adequate to manage the potential impacts. This conclusion is based on expert judgement, informed by the current evidence base and information available at this stage.

1.2 Preliminary assessment of potential in combination climate change impact effects

Table 1.1 Preliminary assessment of potential in-combination climate change impact effects

Resources/receptor type/groups	Climate change-related hazard	Potential ICCI identified
Water environment: Construction and operation phase		
Surface water resources	Increase in drought conditions.	Could lead to lower flows in watercourses and rivers. This could exacerbate the effects of accidental spillages by increasing the concentration of pollutants in surface water resources. Water quality modelling is being undertaken as part of the Project to inform ongoing design development. This includes testing of future climate change scenarios, including low flows. The potential ICCI is likely non-significant on the basis that existing identified mitigation measures are considered adequate to manage the potential impacts.
	Increased extreme rainfall and pluvial flood frequency/intensity leading to increased surface water run-off.	Increased surface water run-off to sewage systems could overwhelm these systems and cause flooding. This, in turn, could result in increased discharge of contaminated water into surface water resources, increasing the volume of foul flow entering surface water resources from the Project. Hydrological rainfall runoff modelling is being undertaken as part of the Project to inform ongoing design development. The Project has been designed to accommodate an increase in rainfall intensity to account for climate change up to the '2080's' epoch. Therefore, it is considered that the potential ICCIs are expected to be non-significant compared to future baseline conditions.
Groundwater resources	Increased average temperatures and increase in drought conditions could lead to lower flows in watercourses and a reduction in groundwater levels.	Reduced groundwater recharge and groundwater levels could exacerbate the groundwater levels and flows under baseline conditions and the effects of the Project. This could also increase the concentration of pollutants in groundwater resources. This could exacerbate the effects of accidental spillages that release contaminants into the environment. Groundwater modelling is currently being undertaken to inform the ongoing design development. Modelling activities will include testing various climate change scenarios to see that the Project is designed appropriately to accommodate future

Resources/receptor type/groups	Climate change-related hazard	Potential ICCI identified
		climate change. These scenarios will be discussed with the Environment Agency and Oxfordshire County Council and will include testing climate change allowances in wet and dry conditions and modelling of groundwater recharge scenarios. Therefore, it is considered that the potential ICCIs are likely non-significant compared to future baseline conditions.
Flood risk and land drainage	Increased rainfall and increased river flows	Could lead to increased groundwater and fluvial flood risk, which could result in increased surcharging and flooding, including the exceedance of sewers. Increased extreme rainfall could lead to increased discharge volumes, surface water runoff and flood risk. This could increase the risk of accidental spillages and foul water from the Project reaching groundwater and surface water resources, resulting in an increased release of contaminants into the water environment leading to greater contamination of the water environment. Additionally, increased surface water runoff and discharge volumes could lead to an increase in flood risk downstream, impacting residential receptors, access routes and debris/ material blockage.routes and debris/ material blockage. Fluvial flood risk modelling is being undertaken to inform the ongoing design development to accommodate changes in flood risk resulting from future climate change. This will ensure that there is no increase in flood risk to downstream receptors as a result of the Project. Increases in rainfall intensity and peak river flows are being tested as part of the modelling activities to account for future climate change, in discussion with the Environment Agency and Oxfordshire County Council. The Project would be designed to accommodate an increase in rainfall intensity to account for climate change up to the 2080's epoch. A series of increases in peak river flows are being tested as part of the modelling activities, including an increase in peak river flow allowances to account for the '2080's' epoch upper end (95th percentile). A Flood Risk Assessment will be provided as part of the Development Consent Order submission that will outline how climate change has been considered as part of the Project design. Therefore, it is considered that the potential ICCIs are likely non-significant compared to future baseline conditions.

Resources/receptor type/groups	Climate change-related hazard	Potential ICCI identified
Aquatic ecology: Construction phase		
Aquatic species and communities	Increased rainfall and pluvial flood frequency/ intensity	Could exacerbate sedimentation, runoff, and physical disturbance during construction activities including watercourse diversions, which could impact aquatic species and communities. The potential ICCI is likely non-significant on the basis that existing identified mitigation measures are considered adequate to manage the potential impacts.
	Hotter summers and heatwaves combined with drought [leading to reduced summer baseflows]	Reduced summer baseflows could lead to poorer water quality, with low dilution and higher temperatures reducing oxygen levels, making aquatic species and communities more susceptible to pollution and disturbance. Species already stressed by heat, low oxygen, or drought could be more vulnerable to injury or mortality during in-channel works including the watercourse diversions. The potential ICCI is likely non-significant on the basis that existing identified mitigation measures are considered adequate to manage the potential impacts.
	Increase average temperatures	Could support the early establishment and spread of invasive non-native species (INNS) in disturbed areas, particularly in slower-flowing habitats. The potential ICCI is likely non-significant on the basis that existing identified mitigation measures are considered adequate to manage the potential impacts.
Aquatic ecology: Operation phase		
Newly created aquatic habitats (including watercourse diversions, the reservoir, recreational lakes, the canal and the ditch system)	Increase in average temperatures, and increased drought conditions	Could impair the quantity and quality of water available within these habitats, with indirect effects on hydromorphological processes which create and maintain diverse and functioning habitats. The potential ICCI is likely non-significant on the basis that existing identified mitigation measures are considered adequate to manage the potential impacts.
	Increased rainfall and winter recharge to groundwater	Could erode banks and in-channel features. Aquatic habitat creation as part of the Project mitigation and enhancement measures will take into account the predicted effects of climate change at the design stage to improve resilience, promote adaptation and mitigate these effects. The potential ICCI is likely non-significant on

Resources/receptor type/groups	Climate change-related hazard	Potential ICCI identified
		the basis that existing identified mitigation measures are considered adequate to manage the potential impacts.
Aquatic species and habitats (River Thames)	Increased extreme rainfall frequence/intensity and increased drought conditions	In the River Thames prolonged low flows during drought periods can heighten stress on aquatic species and reduce connectivity, while more extreme floods could disrupt marginal refuge and spawning habitats and lead to wash out of species. Flow augmentation from the operation of the Project has the potential to provide beneficial effects during low flow periods, reducing the adverse effects of low flows and droughts on aquatic species. Therefore, it is considered that the potential ICCIs are expected to be non-significant compared to future baseline conditions.
Aquatic species, communities and habitats	Increase in average temperatures, and increased drought conditions	Warmer water temperatures combined with low summer flows could intensify eutrophication and deoxygenation risks and increase the likelihood of harmful algal blooms. Flow augmentation from SESRO operation also has the potential to provide beneficial effects associated with increased water temperatures and risks of algal blooms. Altered flow regimes, rising temperatures, and nutrient enrichment could lead to shifts in primary productivity potentially advancing change to community structure and food web dynamics over time. Climate-driven changes could also promote the wider spread and persistence of INNS and aquatic pathogens, with implications for native biodiversity. On the basis that existing identified mitigation measures are considered adequate to manage the potential impacts, the potential ICCI is likely non-significant., the potential ICCI is likely non-significant.
Terrestrial ecology: Construction and operation phase		
Great crested newt, natterjack toad and other amphibians	Increased drought conditions	Effects associated with habitat loss/ gain, fragmentation and modification are increased drought conditions which could result in the loss of breeding ponds during more frequent and intense drought conditions. Such effects could affect long term population trends. New waterbody creation as part of the Project would take into account the predicted effects of climate change to improve resilience, promote adaptation and

Resources/receptor type/groups	Climate change-related hazard	Potential ICCI identified
		mitigate the effects. Therefore, it is considered that the potential ICCIs are expected to be non-significant compared to future baseline conditions.
Otter	Increased rainfall, increased river flows and increased fluvial flood frequency/ intensity, and increased drought conditions	Effects associated with habitat loss/ gain, fragmentation and modification and hydrological changes could act in combination with the climate change-related hazard. These effects could cause increased variability of river flows, including drying, which could influence prey availability for the species. New watercourse creation as part of the Project would take into account the predicted effects of climate change at the design to improve resilience, promote adaptation and mitigate the effects. Therefore, it is considered that the potential ICCIs are expected to be non-significant compared to future baseline conditions.
Water vole	Increased rainfall, increased river flows and increased fluvial flood frequency/ intensity, and increased drought conditions	Effects associated with habitat loss/ gain, fragmentation and modification and hydrological changes could act in combination with the climate hazard could affect water vole. These effects could act in combination to alter the seasonal availability, quality and extent of suitable habitats. The design of new habitats, especially diverted and new watercourses, would factor the predicted effects of climate change into design to mitigate the effect. Therefore, it is considered that the potential ICCIs are expected to be non-significant compared to future baseline conditions.
Historic environment: Construction and operation phase		
Historic assets: Designated Heritage Assets, non-designated built heritage assets, previously unrecorded archaeological remains (non-designated)	Increased rainfall and increase in convective storms and high rainfall intensity	Could lead to fluvial erosion posing a risk to historic assets (e.g. buried deposits preserved within former floodplain environments, particularly any deposits within river foreshores). The potential ICCI is likely non-significant on the basis that existing identified mitigation measures are considered adequate to manage the potential impacts.
	Hotter summers and heatwaves combined with drought	Could cause ground shrinkage and greater extremes and fluctuations of temperature will increase the thermal expansion and contraction of materials such as wood, stone, metal and paint. Where archaeological remains are present in waterlogged ground, drier conditions could lead to the degradation of such features

Resources/receptor type/groups	Climate change-related hazard	Potential ICCI identified
		and evidence (through drying out), leading to a loss of heritage significance. The potential ICCI is likely non-significant on the basis that existing identified mitigation measures are considered adequate to manage the potential impacts.
Landscape and visual: Operation phase		
Landscape character and visual amenity	Increased drought conditions	Could cause dieback of new planting, particularly when combined with heatwaves. A reduction in proposed tree and vegetation cover (that could provide a screening function) could increase the magnitude of any potential effects on landscape character areas and visual amenity with the effectiveness of any proposed landscape mitigation (e.g. use of planting as screening) being reduced. With good practice measures for establishment of tree and other planting on plant species selection and maintenance, it is expected that the potential ICCI is likely to be non-significant.
Geology and soils: Construction and operation phase		
Soils	Increased average temperatures and high temperatures	Increased temperatures could exacerbate release of carbon from the soil, although there are other important factors where climatic conditions could also contribute to sequestration. There is a high degree of uncertainty in an assessment of this potential ICCI, which will be assessed and reported in the ES. Based on current understanding and the application of existing identified mitigation measures, the potential ICCI is expected to be non-significant. These measures include managing soil resourcing during construction to reduce damage to the soil structure, standard good practice measures for the establishment of tree and other planting, and management and maintenance of plants and habitats to ensure soil health and functions are sustained. These existing identified mitigation measures are considered adequate to manage the potential impacts.
	Increased drought conditions, or droughts combined with hotter summers and heatwaves	Could lead to changes in the soil structure, making it less cohesive. The soil can become more susceptible to wind erosion with potential to increase dust levels. The windblown particles have the potential to impact nearby drainage and surface water systems.

Resources/receptor type/groups	Climate change-related hazard	Potential ICCI identified
		Increased drought conditions could decrease soil water content impacting biological activity and preventing soil aggregation, thereby reducing soil function. The loss of functions to support plant cover leads to loss of vegetation which would normally bind the soil together, increasing susceptibility to erosion. The potential ICCI is likely non-significant since standard good practice and embedded design mitigation will be applied. These measures include managing soil resourcing during construction to reduce damage to the soil structure, standard good practice measures for the establishment of tree and other planting, and management and maintenance of plants and habitats to ensure soil health and functions are sustained. These existing identified mitigation measures are considered adequate to manage the potential impacts.
	Increase in convective storms and high rainfall intensity	Prolonged dry periods followed by heavy rainfall could increase soil erosion and lead to a reduction in soil function. Dry soils, and those where vegetation is removed, can be readily washed away during rainfall / storm events. This can impact nearby controlled water receptors. If soils are handled when wet this could lead to damage to soil structure and compaction during the construction phase decreasing soil health and function. The potential ICCI is likely non-significant since standard good practice and embedded design mitigation will be applied. These measures include managing soil resourcing during construction to reduce damage to the soil structure, standard good practice measures for the establishment of tree and other planting, and management and maintenance of plants and habitats to ensure soil health and functions are sustained. These existing identified mitigation measures are considered adequate to manage the potential impacts.
Pollution to controlled waters or harm to human health from potential	Increased average temperatures and high temperatures	Could cause increased dry, exposed contaminated soils, leading to increased airborne contamination in dust. The airborne contaminated particles can settle in or near to sensitive controlled water receptors, and/ or have the potential to be inhaled, impacting human health.

Resources/receptor type/groups	Climate change-related hazard	Potential ICCI identified
sources of contamination during construction		Increased temperatures could lead to drier soils, causing increased surface cracking which could lead to preferential pathways for gases and volatile contaminants. Increased soil temperatures could also lead to more microbial activity, increased degradation of contaminants and higher emissions of volatile contaminants and gases. Increased changes to weather systems and atmospheric pressure would affect ground gas and vapour emissions, possibly leading to increased emissions. Increased high temperatures could lead to drier soils, decreasing leaching to groundwater which would lead to increased persistence of contaminants in the soil and lower contaminant loads in surface waters and groundwaters. Higher temperatures could also lead to reduced recharge and increased abstraction which could reduce dilution of contaminants in surface waters or groundwaters. Ground investigation, assessment and remediation, removal, or mitigation of any known or encountered contamination would be completed prior to or at construction phase. Modelling work on hydrological rainfall runoff, groundwater and fluvial flood risk considering the impact of climate change are being undertaken to inform the ongoing design development. Therefore, it is considered that the potential ICCIs are expected to be non-significant.
	Increased extreme rainfall frequency/ intensity	Increased rainfall would increase surface water runoff, river flows and groundwater levels. Increased rainfall and groundwater levels could increase mobilisation of contamination within soils, sediment runoff into surface waters and leaching into groundwater, increasing the contaminant load in waters and/or leading to contamination of previously uncontaminated areas. Conversely, increased rainfall could lead to higher surface water or groundwater recharge and lower abstraction which could increase dilution of contamination. Ground investigation, assessment and remediation, removal, or mitigation of any known or encountered contamination would be completed prior to or at construction phase. Modelling work on hydrological rainfall runoff, groundwater and fluvial flood risk considering impact of climate change are being undertaken to

Resources/receptor type/groups	Climate change-related hazard	Potential ICCI identified
		inform the ongoing design development. Therefore, it is considered that the potential ICCIs are expected to be non-significant.
Materials and waste: Construction and operation phases		
Availability of key construction materials	Increased rainfall and increased fluvial flooding frequency/ intensity	An increase in rainfall could result in rising groundwater levels, which has the potential to affect the ability to extract mineral resources, due to a potential increase in inflow of groundwater to the extraction area. Increase in flooding severity and frequency would decrease in land available for the extraction of minerals. If less land is available, the availability of minerals could become more sensitive, increasing the overall sensitivity of receptor. This could lead to a permanent impact on mineral availability. While the impacts of climate change are likely to affect materials and waste in general terms, the impacts will be unlikely to change the outcome of the assessment. Therefore, potential ICCIs are expected to be non-significant.
Inert, non-hazardous and hazardous waste landfill facilities	Increase in flooding frequency/ intensity	Could lead to reduced landfill capacity. However, drainage and related infrastructure would have been designed to allow for future climate change and increased flood risk. While the impacts of climate change are likely to affect materials and waste in general terms, the impacts will be unlikely to change the outcome of the assessment. Therefore, the potential ICCIs are expected to be non-significant.
Traffic and transport: Construction and operation phases		
Non-motorised users (NMU) such as pedestrians, cyclists and Public Rights of Way (PRoW) users	Changes in the frequency of weather events, such as increase in convective storms and high rainfall intensity, convective storms and hotter summers	Could influence travel choices. The impact of this could be to increase or reduce traffic flows, depending on the prevailing nature of weather change. This in turn might alter the effect related to severance of communities, isolation of individuals, NMU amenity and pedestrian safety. Changes in weather events could also influence the number of active travel users, for instance by more people choosing to cycle with warmer days. This could in turn increase or decrease (subject to the weather event) the sensitivity of NMU to the

Resources/receptor type/groups	Climate change-related hazard	Potential ICCI identified
		impacts of the Project, such as those related to NMU delay resulting from the diversion of PRoW. Although it is possible that climate hazards could change travel behavior, the changes would happen over a long time period and are unlikely to result in material differences in the conclusions of the traffic and transport assessment. Therefore it is unlikely to result in material differences in the conclusions of the traffic and transport assessment and the potential ICCI is likely to be non-significant.
	Increase in pluvial flooding	Could lead to the closure of PRoW and footways. However, drainage and related infrastructure would have been designed to allow for future climate change and increased flood risk. Therefore it is unlikely to result in material differences in the conclusions of the traffic and transport assessment and the potential ICCI is likely to be non-significant.
Bus users and car drivers / passengers	Changes in the frequency of weather events, such as an increase in rainfall days, convective storms and hotter summers	Could result in an increase or reduction in traffic flows or public transport use. This in turn might alter the effects related to road vehicle driver and passenger delay and road user safety. Changes in weather events could also influence the number of road users, and thus the performance of the road network, which in turn could increase or decrease the sensitivity of road users to the impacts of the Project. Although it is possible that climate hazards could change travel behavior, the changes would happen over a long time period and are unlikely to result in material differences in the conclusions of the traffic and transport assessment and the potential ICCI is likely to be non-significant.
	Increase in pluvial flooding	Could lead to the closure of roads and junctions which could result in temporary traffic diversions. However, drainage and related infrastructure will be designed to allow for future climate change and increased flood risk. Therefore it is unlikely to result in material differences in the conclusions of the traffic and transport assessment and the potential ICCI is likely to be non-significant.

Resources/receptor type/groups	Climate change-related hazard	Potential ICCI identified
River vessel users	Changes in the frequency of weather events, such as an increase in rainfall days, convective storms and high temperatures	Could affect the number of users on the River Thames, which could increase or decrease the sensitivity of river vessel users to changes resulting from the Project. Although it is possible that climate hazards could change user behavior, the changes would happen over a long time period and are unlikely to result in material differences in the conclusions of the traffic and transport assessment and the potential ICCI is likely to be non-significant.
	Increase flooding frequency/ intensity	Increases in pluvial or fluvial flooding frequency could lead to different conditions on the River Thames, which could alter the number of river users or the navigation conditions on the river. This could alter the sensitivity of river vessel users to changes resulting from the Project or change the degree of impact caused by the Project. Any changes to travel behaviour would happen over a long time period and drainage and related infrastructure would have been designed for future climate change. Therefore it is unlikely to result in material differences in the conclusions of the traffic and transport assessment and the potential ICCI is likely to be non-significant.
Air quality: Construction and operation phases		
Human receptors within 250m of the draft Order limits (Construction phase)	Hotter summers and heatwaves combined with drought	Could exacerbate dust generation and concentrations of certain air pollutants such as NO2, NOx and particulate matter from construction activities, construction vehicles and non-road mobile machinery. With sufficient mitigation measures to limit the generation and dispersion of construction dust, the potential ICCI is unlikely to result in significant effects.
Receptors including residences, roads and pedestrian/cycle links	Hotter summers and heatwaves combined with drought	Could increase concentration of air pollutants such as ozone and NOx and particulate matter from vehicle emissions during construction and operation. However, vehicle emissions are predicted to improve due to advancement in technology and cleaner vehicles and therefore, the potential ICCI is unlikely to result in significant effects.
Noise and vibration		

Resources/receptor type/groups	Climate change-related hazard	Potential ICCI identified
No preliminary significant in-combination effects with the Project have been identified. The main consequence of climate change with regard to noise would relate to changes in humidity and temperature leading to a greater number of people sleeping with windows open. The thresholds used in the assessment for night-time noise are based on World Health Organisation (WHO) Night Noise Guidelines which are set assuming that people should be able to sleep with bedroom windows open.		
Socio-economics and communities: construction phase		
Access to public services	Increased high temperatures	Could lead to increased heat stroke or heat exhaustion for construction workers, and increased demand for emergency response vehicles. Design features such as shaded seating areas and drinking water provision will need to be considered. With these design considerations in place, the potential ICCI would be unlikely to result in altering the significance or non-significance of the effect.
Socio-economics and communities: operation phase		
Access to the proposed outdoor recreational and leisure facilities by local communities and visitors	Increased high temperatures and drier weather	Could increase the appeal of the proposed outdoor recreational and leisure facilities and access to the cooling function of open space in a reservoir setting will become more important. Extreme heat could decrease the appeal of the proposed outdoor facilities for certain users unless sufficient shaded areas are provided. Design issues such as shaded seating areas and drinking water provision will need to be considered. With these design considerations in place, the potential ICCI would be unlikely to result in altering the significance or non-significance of the effect.
	Increased extreme rainfall frequence/intensity	Could reduce the suitability or safety of the proposed outdoor facilities. Taking into considerations that relevant safety measures would be in place, the potential ICCI would be unlikely to result in altering the significance or non-significance of the effect
Human health: Construction and operation phases		

Resources/receptor type/groups	Climate change-related hazard	Potential ICCI identified
Active travel and access to open space	Increased high temperatures and drier weather	Could increase the appeal of active travel, where temperature increases are moderate, and open space. Access to the cooling function of green and blue spaces will become more important. Design issues such as shaded seating areas and drinking water provision will need to be considered. With these design considerations in place, the potential ICCI would be unlikely to result in altering the significance or non-significance of the effect.
	Increased extreme rainfall, high temperatures or other extreme weather events	Could reduce the suitability or safety of active travel and reduce the appeal of open spaces. For effects that relate to worker and visitor safety, it is expected that the Project will have been designed with a tolerance for climate change in place, and that management plans will also mitigate risks from weather events. Taking these into considerations, the potential ICCI would be unlikely to result in altering the significance or non-significance of the effect
Access to healthcare facilities	Increased high temperatures lead to more frequent occupational heat stress days	Could lead to increased heat stroke or heat exhaustion for workers or visitors to the Site, and increased demand for emergency response vehicles. Design features such as shaded seating areas and drinking water provision will need to be considered. With these design considerations in place, the potential ICCI would be unlikely to result in altering the significance or non-significance of the effect.
Community safety	Increased extreme rainfall and pluvial flood frequency/intensity, increased average temperatures and drought conditions	As set out in the Water Environment section, a range of weather hazards could increase the risk of changes to water quality or availability which could impact the safety of the community, however the mitigation measures in place for water quality consider climate change sufficiently that the Water Environment, and therefore the Human health potential ICCI would be unlikely to alter the significance of the effect.
Greenhouse gases: Construction phases		
GHG emissions	Increased extreme rainfall frequency and intensity	Could lead to water accumulation in excavations and compounds, requiring more frequent dewatering and increasing energy use and associated carbon emissions.

Resources/receptor type/groups	Climate change-related hazard	Potential ICCI identified
		Increased rainfall and flooding could disrupt construction logistics and transport networks, leading to delays, detours, and increased fuel consumption - this increasing transport-related GHG emissions. However, baseline conditions allow for road drainage and related infrastructure to be designed for future climate change. Therefore, it is considered that the potential ICCIs are expected to be non-significant compared to future baseline conditions.
	Increased extreme high temperatures	Could affect rail infrastructure (e.g. increased risk of track buckling), potentially reducing rail efficiency and increasing reliance on road transport - thus increasing transport-related GHG emissions. This ICCI is also considered under traffic and transport in the same table. The potential ICCI is likely non-significant on the basis that existing identified mitigation measures are considered adequate to manage the potential impacts.
	Increased high temperatures and drought conditions	High temperatures and drought conditions can reduce soil organic content,and soil moisture and stability, respectively. This could potentially lead to a higher likelihood of the release of stored carbon from soils disturbed during construction, however there are many uncertainties in the assessment of this potential ICCI which will be assessed and reported in the ES. Based on current understanding and the application of existing identified mitigation measures, the potential ICCI is expected to be non-significant. These measures include managing soil resourcing during construction to reduce damage to the soil structure, standard good practice measures for the establishment of tree and other planting, and management and maintenance of plants and habitats to ensure soil health and functions are sustained. These existing identified mitigation measures are considered adequate to manage the potential impacts. These measures include managing soil resourcing during construction to reduce damage to the soil structure, standard good practice measures for the establishment of tree and other planning, and management and maintenance of plants and habitats to ensure soil health and functions are sustained. These existing identified mitigation measures are considered adequate to manage the potential impacts.

Resources/receptor type/groups	Climate change-related hazard	Potential ICCI identified
Greenhouse gases: operation phase		
GHG emissions	Increased average temperature and high temperatures	Increased temperatures could exacerbate release of carbon from the soil, although there are other important factors where climatic conditions could also contribute to sequestration. There is a high degree of uncertainty in an assessment of this potential ICCI, which will be assessed and reported in the ES. The potential ICCI is likely non-significant on the basis that existing identified mitigation measures are considered adequate to manage the potential impacts. These standard good practice measures include measures to support the successful establishment of tree and other planting and maintaining soil health through habitat management
	Increased drought and extreme rainfall	Could reduce carbon sequestration from habitats and planting by negatively affecting plant establishment and growth. Intensified drought conditions could slow biomass accumulation. Further, increased extreme rainfall frequency and intensity could lead to waterlogging and root damage. These factors could delay the time to reach peak sequestration and reduce overall carbon uptake. There are many uncertainties in the assessment of this potential ICCI in terms of its impact on the carbon released or stored. This will be assessed and reported in the ES. The potential ICCI is expected to be non-significant on the basis that existing identified mitigation measures are considered adequate to manage the potential impacts. These standard good practice measures include measures to support the successful establishment of tree and other planting and maintaining soil health through habitat management.
	Increased average temperatures and rainfall.	Could necessitate additional adaptation measures which have the potential to increase GHG emissions. These could marginally increase operational energy use and in-use embodied carbon (e.g. from replacements), though such increases are expected to be minor. The potential ICCI is likely non-significant on the basis that existing identified mitigation measures are considered adequate to manage the potential impacts.

It's everyone's water