H2Teesside Project

Environmental Statement

Volume III – Appendices

Appendix 19B: In Combination Climate Change Impact Assessment

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The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended)

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 - Regulation 5(2)(a)

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19B.0 IN COMBINATION CLIMATE CHANGE IMPACT ASSESSMENT

19B.1 In Combination Climate Change Impact (ICCI) Assessment

Table 19B-1: ICCI Assessment

DISCIPLINE / RECEPTOR	CLIMATE HAZARD	LIKELIHOOD OF CLIMATE HAZARD OCCURING	LIKELY ICCI IDENTIFIED	DESCRIPTION OF ICCI CONSIDERING EMBEDDED MEASURES	LIKELIHOOD OF ICCI OCCURING	CONSEQUENCE	SIGNIFICANCE
Terrestrial Ecology	Increase in annual / summer maximum temperature	Likely	Climate change may alter the distribution of invertebrate species (with species ranges increasing or decreasing). Loss of habitat associated with the Proposed Development could have effects in combination with climate change.	The distribution of invertebrate communities is influenced by the habitat present. Any habitat lost will be reinstated post construction. As open mosaic habitats are transient in nature positive or negative effects on invertebrates could occur.	Possible	Low	Negligible (Not significant)
Surface Water: (River Tees / Tees Transitional WFD waterbody	Increase in mean summer air temperature	Very likely	Water Demand: Should a prolonged drought occur there may be reduced water availability from the River Tees and / or a restriction to the allowable abstraction	Reduced availability of water could limit operation of the Proposed Development. Northumbrian Water's Water Resources Management Plan 2019 indicates that there should be sufficient resources within the network to accommodate the Proposed Development's water demand. The plan undertook a supply and demand forecast	Unlikely	Low	Minor (not significant)

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			(via Northumbrian Water Limited (NWL)). The Proposed Development has a water demand of 227 m^3/hr (Case 1B) or 297 m^3/hr (Case 2B).	for each Water Resource Zone (WRZ) in their jurisdiction (with the Industrial WRZ being relevant for the Proposed Development) for a scenario of a worst historical drought and a 1 in 200 year return period drought. Based on licensed quantities from the River Tees there is 170 Ml/d of water available for the Industrial WRZ under normal operation. In the 1 in 200 design drought year there is only 130 Ml/d of water available for the Industrial WRZ. This means that based on a current demand of 82 Ml/d the WRZ has a headroom of 48 Ml/d in the design drought year. Furthermore, given advancements in water efficiency in industry, future demand is expected to decline. The Plan confirms that a water supply surplus will be maintained up to 2060. Furthermore, the volume of water forecast to be abstracted over the planning period will not lead to deterioration in the status of the waterbodies from which NWL abstract. It should be noted that NWL are producing a new WRMP for publication in 2024			

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				(Northumbrian Water, 2024). Within the draft document, the Industrial WRZ has been integrated into the Kielder WRZ. This is because NWL demonstrate that the Industrial Supply Zone can be supported by Kielder reservoir and the Tyne–Tees Transfer system and is therefore subject to the same risk to supply as the rest of the Kielder WRZ. The final plan supply demand balance in the draft WRMP for 2024 indicates a supply surplus for the Kielder WRZ across the planning period from 2025 to 2084 under a 'dry year annual average' scenario and under a 'dry year critical period' scenario.			
Groundwater aquifers	Increase in winter rainfall	Very likely	Construction: An increase in groundwater level may increase the possibility of groundwater levels rising closer to the ground surface / mixing with potential shallower contamination (within Made Ground) which would otherwise not be	During construction, groundwater quality may be temporarily adversely affected due to potential ground disturbance / dewatering. The potential rise in groundwater level, may require additional dewatering considerations. which may decrease groundwater quality through mobilising existing contamination. However, an appropriate dewatering strategy would be developed to minimise this risk. Additionally, impacts due to climate change	Very Unlikely	Medium	Minor (not significant)

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			encountered. This would increase the likelihood of potential impact on groundwater quality	are unlikely to be significant during the construction period.			
Groundwater aquifers	Increase in winter rainfall	Very likely	Operation: An increase in groundwater level may increase the possibility of groundwater levels rising closer to the ground surface / mixing with potential shallower contamination (within Made Ground) which would otherwise not be encountered. This would increase the likelihood of potential impact on groundwater quality	Contamination which may be encountered during construction will have been removed, remediated or mitigated to some extent. Maintenance and operation of the Proposed Development will be in accordance with environmental legislation and good practice. Therefore, it is unlikely that there will be an increased risk to groundwater quality should levels rise towards Made Ground.	Unlikely	Low	Minor (not significant)
Flood Risk (site workers, infrastructure and	Increase in winter rainfall	Very likely	Operation: Increased precipitation can impact i) the frequency and duration of flooding	The impact of climate change on expected flows will be accommodated in the design of drainage infrastructure to ensure appropriate attenuation and storage for	Unlikely	Medium	Minor (not significant)

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downstream receptors)			from all sources (e.g. tidal, fluvial, surface water, artificial sources, groundwater and drainage infrastructure) – could lead to flooding on or off-site	anticipated flows. Should water be discharged from the Proposed Development Site to Dabholm Gut then this will be limited to the greenfield runoff rate (197 l/s), and water storage will be appropriately sized to accommodate the 1% Annual Exceedance Probability (AEP) event with 30% allowance for climate change. For the option of discharging to the Tees estuary, the local SuDS design guide indicates that the peak flow and volume control standards would not apply in this case. The uncontrolled 1% AEP 60-minute peak discharge from the Proposed Development Site's impermeable areas would be 2,005 l/s (i.e. 2.005 m^3/s) for Phase 1 and 2 combined. The surface water storage requirement for both phases of the Proposed Development is 9,500 m^3.			
Flood Risk (site workers, infrastructure and downstream receptors)	Sea level rise	Very likely	Increased sea level could lead to flooding on or off-site	During a future scenario resulting from climate change up to 2125 or a H++ scenario to 2100, a minimum ground level of 6.83 m AOD following remediation and earthworks at the Main Site ensures that the Proposed Development remains at 'low' risk of flooding during events that exceed a	Unlikely	Medium	Minor (not significant)

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				0.5% AEP (1 in 200 chance) of flooding and the 0.1% AEP (1 in 1000 chance) event. The western extent of the Hydrogen Pipeline Corridor located between the tidal River Tees and Greatham Creek is at a high risk of flooding from tidal sources during events that exceed a 0.5% AEP (1 in 200 chance) flood event and the climate change flooding scenarios. This section of the Proposed Development Site is also at high residual risk of flooding should a failure or breach of the flood defences occur. However, works in this area comprise either underground pipework or installation of pipelines on existing pipe racking and so once construction is complete there should be limited potential for increased risk from flooding.			
Flood Risk (site workers, infrastructure and downstream receptors)	Increase in winter rainfall	Very likely	Operation: Increased intensity of precipitation can impact i) the frequency and duration of flooding (e.g. fluvial, surface water, artificial sources, groundwater and	The impact of climate change on expected flows will be accommodated in the design of drainage infrastructure to ensure appropriate storage for anticipated flows as outline above.	Unlikely	Medium	Minor (not significant)

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			drainage infrastructure), if capacity of river channels or drainage infrastructure is exceeded.				
Surface Water: (River Tees / Tees Transitional WFD waterbody / Dabholm Gut)	Increase in winter rainfall	Very likely	Operation: Increased precipitation can impact peak discharge rates for surface water runoff, which can impact receiving waterbodies (receptors) if the capacity of the drainage infrastructure is exceeded in extreme events. If this results in attenuation features storage capacity being exceeded, then there is potential for The Tees Estuary and Dabholm Gut to receive untreated and polluted water. This could lead to a deterioration in water quality.	The impact of climate change on expected flows will be accommodated in the design of drainage infrastructure to ensure appropriate attenuation and storage for anticipated flows, as outlined above.	Unlikely	Medium	Minor (not significant)

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Ornithology	Increased duration (days) and temperature (˚C) of hot air compared to baseline summer and winter averages	Very likely	During the construction phase, extended hot and dry weather is likely to result in increased dust/particulate production and deposition resulting in degradation of habitats that support important bird species.	Dust/particulate production and deposition will be minimised as far as reasonably practicable, through the measures required by the CoCP/Framework Construction Environmental Management Plan (CEMP), such as suppression through use of water bowsers, effective transportation and storage of materials.	Unlikely	Low	Not Significant (Minor)
Ornithology	Increased duration (days) and rate (%) of precipitation compared to baseline winter average	Very likely	During the construction phase, prolonged precipitation is likely to result in increased surface runoff and flooding/waterlogging resulting in degradation of habitats that support important bird species.	Surface water runoff will be intercepted by drainage infrastructure to ensure appropriate storage for the anticipated flows.	Unlikely	Low	Not Significant (Minor)
Ornithology	Plausible high end projections for air temperature, precipitation	Likely	During the operation phase (25+ years), the abundance and diversity of the Teesside bird assemblage (with species ranges	The distribution of bird species is influenced by the habitats present. Climate change is likely to result in more erosion on habitats created post-construction (in addition to adjacent habitats not affected by the Proposed Development) which is likely to	Possible	Low	Not significant (Minor)

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	and sea level rise compared to baseline		increasing or decreasing). Loss of habitat associated with the Proposed Development could have effects in combination with climate change.	have beneficial and adverse effects to the bird assemblage that currently occurs.			

19B.2 References

- Northumbrian Water (2024). *Revised Draft Water Resources Management Plan 2024.*