

APPENDIX 9.1 CLIMATE CHANGE RESILIENCE ASSESSMENT

Demolition and Construction Stage

A summary of potential climate change resilience (CCR) impacts during the demolition and construction stage of the Proposed Development is provided in Table 1 below. In line with the Institute of Environmental Management and Assessment (IEMA) guidance, embedded mitigation measures (existing design measures) have been considered.

Table 1 Demolition and Construction Climate Change Resilience Impacts

Climate Change Trend	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Impact Magnitude	Significance and Additional Mitigation Required
Increased frequency and intensity of extreme weather events: Intense rainfall events	Receptor: Buildings receptors Extreme rainfall events could result in the erosion of stockpiles and resultant silting of drainage assets. This could result in secondary impacts such as localised flooding.	As committed to in ES Chapter 5: Construction Methodology and Programme, a Site Waste Management Plan (SWMP) will be developed prior to the commencement of demolition and construction. This should include specific measures to avoid and minimise the potential for contamination impacts including consideration of prefabrication off-site and 'just-in-time' deliveries which will help to minimise stockpiling on-site and ensure the workplace does not become congested. As detailed within the standalone Air Quality Assessment ¹ (submitted as part of the planning application), stockpiles would be covered, seeded or fenced. In addition, soil stockpiles will be revegetated as soon as practicable to stabilise surfaces. As committed to in ES Chapter 5: Construction Methodology and Programme, de-watering of the site will be undertaken by the principal contractor if required. A Construction Environmental Management Plan (CEMP) will be developed by the principal contractor, prior to demolition and construction works on-site, to address construction risks in more detail. It has been assumed that the CEMP and SWMP would contain measures for waste materials to be appropriately stored and removed regularly, with due regard to the potential for mobilisation into surface drainage. Where stockpiles exist on-site, best practice measures for stockpile management will be utilised. For example, control measures and dust suppression techniques, screening and	Likelihood level: Unlikely Consequence level: Low as a result of partial disruption across elements of the site lasting less than a day. Impact Magnitude: Low	Not Significant. Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/extreme weather.

¹ Hilson Moran, Air Quality Assessment, October 2021, Client Ref: ALBH-HMM-ZZ-ZZ-RP-Y-004

Climate Change Trend	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Impact Magnitude	Significance and Additional Mitigation Required
		covering of stockpiles, and the installation of appropriate wheel and body wash facilities It has been assumed that the CEMP would contain measures for the protection of construction materials that are stored on-site to minimise damage by weather and reduce erosion. These measures will also include appropriate storage, handling and management of construction materials with due regard to the potential for mobilisation into surface drainage. It has been assumed that surface water management during demolition and construction would be considered within the CEMP. It has also been assumed that site drainage, including surface run-off and dewatering effluents, would be discharged to sewers where reasonably practicable and relevant permissions would be obtained from the sewerage undertaker. Additionally, it has been assumed that site drainage would meet the requirements for effluent and flood risk standards required by the sewerage undertaker. It has been assumed the relevant sections of BS6031: Code of Practice for Earthworks for the general control of site drainage would be followed.		
	Receptor: Buildings receptors Extreme rainfall events could affect the ability to undertake certain demolition / construction activities leading to programme delays (e.g. pouring of concrete and asphalt).	It has been assumed that works on-site would be undertaken in accordance with the provisions of the Construction (Design and Management) (CDM) Regulations 2015. Furthermore, it has been assumed that in line with best practice construction measures, more vulnerable activities such as the construction of earthworks would take place in appropriate weather conditions (taking into account construction programme timescale constraints). This would reduce the likelihood of weather delays to these activities and would be implemented via the CEMP.	Likelihood level: Unlikely Consequence level: Low due to partial disruption across site lasting less than a day. Impact Magnitude: Low	Not significant. Additional mitigation not required. It has been recommended that more vulnerable activities should be undertaken during appropriate weather conditions and that poor weather conditions be accounted for within the CEMP.
	Receptor: Environmental and human health receptors Extreme rainfall events could spread contaminated soil during ground excavations to nearby	As detailed in ES Chapter 8: Ground Conditions, pre-demolition ground investigation undertaken by Curtins identified limited evidence of contamination in site soils. However, a post-demolition investigation has been recommended. There is the potential that materials within the made ground may pose a risk to construction workers (direct contact/ingestion and inhalation), neighbours (from dust emissions), and controlled	Likelihood level: Possible Consequence level: Low as a result of health and safety impacts. Impact Magnitude: Low	Not Significant. Additional mitigation not required. Existing design and mitigation measures are appropriate to account

Climate Change Trend	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Impact Magnitude	Significance and Additional Mitigation Required
	environmental receptors, which could affect local soil and water quality. Secondary impacts could include harm to site personnel.	waters over a temporary short-term basis, during the excavation and driving through made ground materials. During the redevelopment of the Site it would be necessary to implement measures to protect construction workers from exposure to any contaminated material which is encountered as well as to protect controlled waters. It has been assumed these measures would be incorporated into the CEMP. Wheel and vehicle wash facilities would be in place to ensure delivery wagons leave the Site clean and tidy with regular cleaning of St Mary's Parsonage using road sweepers. It is assumed further mitigation measures to reduce the risk of spreading contaminants during the earthworks phase will be included in the CEMP, but are not limited to: • Made ground beneath the footprint of the proposed building will be removed in order to accommodate the proposed basement, thus removing any associated contamination; and • Where made ground remains beneath proposed areas of soft landscaping, 600m clean soil cover should be anticipated at this stage (to be confirmed on completion of the post-demolition investigation).		for climate change/ extreme weather.
Increased frequency and intensity of extreme weather events: Heatwaves	Receptor: Human health receptors Heatwaves and higher temperatures could impact on-site personnel welfare, for example, causing heat stress and unsafe working conditions.	It is assumed that all works on-site would be undertaken in accordance with the provisions of the Construction (Design and Management) (CDM) Regulations 2015. As detailed in ES Chapter 5: Construction Methodology and Programme, the Principal Contractor will produce a Construction Phase Health and Safety Plan. The risk of heat stress to site personnel working outdoors should be managed through this plan, e.g. provision of necessary personal protective equipment (PPE) and toolbox talks to highlight risks of heatstroke.	Likelihood level: Possible Consequence level: Low as a result of health and safety impacts relating to heat stress. Impact Magnitude: Low	Not Significant. Additional mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.
	Receptor: Human health receptors Heatwaves, higher temperatures and drought conditions could increase dust generated during demolition and construction	As stated within the Air Quality Assessment², which supports this planning application, the control of dust emissions from construction-sites relies upon good site management and mitigation techniques to reduce emissions of dust and limit dispersion. Recommended dust mitigation measures for high-risk sites (provided by the Institute of Air Quality Management (IAQM) guidance) would be detailed within the site's Dust Management Plan	Likelihood level: Unlikely Consequence level: Low as a result of health and safety impacts. Impact Magnitude: Low	Not Significant. Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.

² Hilson Moran, Air Quality Assessment, October 2021, Client Ref: ALBH-HMM-ZZ-ZZ-RP-Y-0004

Climate Change Trend	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Impact Magnitude	Significance and Additional Mitigation Required
	activities which could impact site personnel.	(DMP). This will be secured by means of an appropriately worded planning condition. Other mitigation measures include: • Undertake daily site inspections; • Record and take action for all dust complaints; • Plan the site layout to ensure dust generating activities are far from receptors; • Solid barriers around dusty activities; • Remove materials that have a potential to produce dust from site as soon as possible; and • Ensure adequate water supply on-site for effective dust suppression. The Principal Contractor will produce a Construction Phase Health and Safety Plan and a CEMP. The risk of increased dust generation and its impacts on-site personnel will be addressed through these plans.		
	Receptor: Buildings receptors Heatwaves and higher temperatures could affect the ability to undertake certain demolition/ construction activities leading to programme delays.	It has been assumed that all works on-site would be undertaken in accordance with the provisions of the Construction (Design and Management) (CDM) Regulations 2015. In line with best practice construction measures, more vulnerable activities such as construction of earthworks would take place in appropriate weather conditions (taking into account construction timescale constraints). This will reduce the likelihood of hot weather delays to these activities. For the purposes of this assessment, it has been assumed these measure will be implemented via the CEMP.	Likelihood level: Possible Consequence level: Low as a result of disruption to construction programme lasting less than a day. Impact Magnitude: Low	Not Significant. Additional mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.
Extreme weather events: Windstorms	Receptor: Buildings receptors Winds gusts could result in the damage of stockpiles.	Where stockpiles exist on-site, best practice measures for stockpile management would be utilised. In addition, the following measures would be implemented: Prefabrication off-site would be considered, which would help to minimise stockpiling on-site; Covering, seeding, fencing or damping down stockpiles; • Deliveries would generally be 'just-in-time' to avoid storing large volumes of materials. Any construction materials that are stored on-site would be protected to minimise damage by weather; • Skips would be covered to prevent dust and debris blowing around the site; and	Likelihood level: Unlikely Consequence level: Low as a result of partial disruption across elements of the site lasting less than a day. Impact Magnitude: Low	Not Significant. Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.

Climate Change Trend	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Impact Magnitude	Significance and Additional Mitigation Required
		Solid screens would be placed around stockpiles. It has been assumed that these measures and other best practice measures will be implemented as part of the CEMP.		
Extreme weather events: Windstorms and wind gusts	Receptor: Human health receptors Windstorms could cause wind gust conditions and create unsafe conditions for on-site personnel and pedestrians within the vicinity of the site.	During the demolition and construction stage, health and safety measures would be implemented to ensure that the construction workers are adequately protected from wind conditions. For example, minimising stock piling and positioning in a manner that reduces risk of dust arising through wind action.	Likelihood level: Unlikely Consequence level: Low as a result of health and safety impacts. Impact Magnitude: Low	Not Significant. Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.
	Receptor: Buildings receptors Windstorms could cause the wind gust conditions and damage or disrupt on-site crane operations.	It has been assumed that the CEMP would include best practice and mitigation measures for operating tall cranes during high winds and the contractor will be required to implement all relevant conditions on operating procedures, and other relevant commitments.	Likelihood level: Unlikely Consequence level: High as a result of damage to construction equipment, with indirect health and safety impacts Impact Magnitude: Medium	Not Significant. Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.
	Receptor: Buildings receptors Windstorms could cause the wind gust conditions and result in damage to hoarding.	As committed to in ES Chapter 5: Construction Methodology and Programme, hoarding would be providing during the demolition and construction works. Hoarding locations and specifications would be identified and agreed prior to the commencement of demolition and construction. The Principal Contractor will produce a Construction Phase Health and Safety Plan as well as a CEMP. This should ensure that hoardings would be erected and removed securely.	Likelihood level: Unlikely Consequence level: Low as a result of partial disruption across elements of the site lasting less than a day. Impact Magnitude: Low	Not Significant. Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.

Operational Stage

A summary of potential CCR impacts during the operational stage of the Proposed Development is provided in Table 2 below. In line with IEMA guidance, embedded mitigation (existing design measures) have been considered.

Table 2 Operation Climate Change Resilience Impacts

Climate Change Trend	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Impact Magnitude	Significance and Additional Mitigation Required
Increased frequency and intensity of extreme weather events: Intense rainfall events	Receptor: Buildings receptors Human health receptors Wetter winters and increased frequency of intense rainfall events could result in the overwhelming of drainage assets. This could result in secondary impacts such as localised flooding or mobilisation of contamination.	A Flood Risk Assessment (FRA) and Drainage Strategy (DS) has been prepared and considers the flood risk to the Proposed Development and downstream receptors. According to the FRA and DS, the Site is shown by the Environment Agency flood map for planning to be in the majority, Flood Zone 1 and partially within Flood Zone 3. As a result, the FRA and DS have proposed that the building levels and access routes for the Proposed Development should be set at a minimum of the 1 in 1000-year level +gate failure scenario of 27.30m above ordnance datum (AoD). The current minimum building levels for the Proposed Development are set at 29.140m AoD which meets and exceeds the flood level by 1.84m. In addition, attenuation measures will be required to accommodate the necessary volumes generated up to the 100 year +40% Climate Change (cc) event. The FRA and DS outline the following attenuation measures: • Blue roof with landscaped features at Level 17 (temporary attenuation); and • Planted embankment with 3 trees on ground floor.	Likelihood level: Unlikely Consequence level: Medium as a result of partial disruption lasting more than one day but less than one week. Impact Magnitude: Low	Not Significant. Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.
	Receptor: Buildings receptors Wetter winters and increased frequency of intense rainfall events could result in increased groundwater levels.	The FRA and DS state that the Site is at low risk from groundwater flooding. unlikely to be susceptible to groundwater flooding. This should be confirmed following post demolition ground investigations which will further characterise the groundwater regime for the Site.	Likelihood level: Unlikely Consequence level: Low as a result of disruption across elements of the site lasting less than a day. Impact Magnitude: Low	Not Significant. Additional mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.

Climate Change Trend	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Impact Magnitude	Significance and Additional Mitigation Required
Increased frequency of extreme weather events: Intense rainfall events	Receptor: Buildings receptors Human health receptors Increased frequency of intense rainfall events could result in increased river levels leading to flooding within the vicinity of the site.	According to the FRA and DS, the Site is shown by the Environment Agency Flood Map for Planning to be in the majority, Flood Zone 1 and partially within Flood Zone 3. This is due to the Site being adjacent to the River Irwell. As a result, the FRA and DS has proposed the Proposed Development building levels and access routes should be set at a minimum of the 1 in 1000-year level +gate failure scenario of 27.30m Above Ordnance Datum (AoD). The current minimum building levels for the Proposed Development are set at 29.140m AoD which meets and exceeds the flood level by 1.84m.	Likelihood level: Unlikely Consequence level: Medium as a result of partial disruption across elements of the site lasting more than one day but less than one week. Impact Magnitude: Low	Not Significant Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change.
Increased frequency and intensity of extreme weather events: Heatwaves	Receptor: Environmental receptors Increased frequency and severity of extreme heat events (i.e. heat waves) could result in the landscape design being compromised (e.g. tree and shrubs die).	The Landscape Stage 03 Report ³ identifies that a key design driver for the Proposed Development landscape is to make the design resilient to climate change. Drought tolerant and low maintenance species would be considered for street trees and planting to minimise water use. A diverse tree planting palette would be used to increase overall resilience to disease and climate change. In addition, a Landscape Management and Maintenance Report ⁴ has been prepared for the Proposed Development to implement the up-keep of the soft and hard landscaping. As part of the landscape management and maintenance, drought would be managed through tree watering.	Likelihood level: Possible Consequence level: Low due to cost implications of replacing plants. Impact Magnitude: Low	Not Significant. Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.
	Receptor: Buildings receptors Increased frequency and severity of extreme heat events (i.e. heat waves) could result in overheating of mechanical and electrical equipment.	Air cooled equipment such as air source heat pumps will be designed at detailed design to operate up to a maximum ambient temperature of 35°C dry bulb / 22°C wet bulb to ensure that plant continues to run during extreme heat events. It is anticipated that ventilation of the plant rooms would be provided by a mechanical or natural ventilation system.	Likelihood level: Possible Consequence level: Low as a result of disruption across elements of the site lasting less than a day. Impact Magnitude: Low	Not Significant. Additional Mitigation not required. Existing design and mitigation measures are considered appropriate to account for climate change.

³ Planit, Alberton House Stage 03 Report, May 2022⁴ Planit, Alberton House Landscape Management and Maintenance Report, May 2022

Climate Change Trend	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Impact Magnitude	Significance and Additional Mitigation Required
	Receptor: Human health receptors High temperatures and heatwaves could result in overheating and unsuitable conditions e.g. discomfort for building occupants in the residential element of the proposed development.	The Thermal Comfort Assessment⁵ for the Proposed Development has assessed the proposed facades using probabilistic weather files to project variations in weather data that will occur during the building's life cycle as a result of climate change. The assessment found that the Proposed Development complies with the thermal comfort requirements during the climate change scenario presented within the assessment.	Likelihood level: Unlikely Consequence level: Medium as a result of disruption across elements of the site lasting more than a day and health and safety implications. Impact Magnitude: Medium	Not Significant. Additional Mitigation not required. Existing design and mitigation measures are considered appropriate to account for climate change.
Increased frequency and intensity of high temperatures: Drought conditions.	Receptor: Buildings and human health receptors Prolonged periods of drought could affect potable water availability.	The following monitoring, leak detections and isolation systems will be provided to minimise water waste: - Directly after the United Utilities meter, a second pulse meter complete with volt free connection shall be installed downstream to ensure the water supply is in compliance with BREEAM WAT03 Credits – Water Leak Detection and Prevention. This will allow the Business Management System (BMS) to identify any variations in the flow rate between the two meters and will activate a visual and audible signal in the event of any abnormal flows. In the event of a mains water leak alarm, solenoid valves will isolate the storage tanks. - The boosted cold-water service to each toilet core will include a solenoid valve shut off. The solenoid valve will be operated via the lighting control system in compliance with BREEAM WAT03 to minimise risk of water wastage due to undetected leaks. - In addition, greywater recycling from the swimming pool has been recommended.	Likelihood level: Unlikely Consequence level: Low as a result of disruption across elements of the site lasting less than a day health and safety implications. Impact Magnitude: Low	Not Significant. Additional mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.
Extreme weather events: Windstorms and wind gusts	Receptor: Buildings receptors Windstorm events could cause damage to the proposed development. This could include damage to roof sheeting, wall	The Wind Microclimate Assessment Report⁶ found that there are no adverse wind effects anticipated relating to the Proposed Development. It should also be noted that although the UKCP18 climate data identifies trends for near surface wind speeds for the second half of the 21st century (accompanied by an increase in frequency of winter storms over the UK) any increase will be modest compared to	Likelihood level: Unlikely Consequence level: Medium as a result of partial disruption across elements of the site lasting less than a	Not Significant. Additional mitigation not required. Existing design and mitigation measures are appropriate to account

⁵ Hilson Moran, Alberton House Thermal Comfort Assessment, May 2022

⁶ GIA, Alberton House Wind Microclimate Assessment Report, May 2022

Appendix 9.1 Climate Change Resilience Assessment

Climate Change Trend	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Impact Magnitude	Significance and Additional Mitigation Required
	cladding. This could also create unsafe conditions for users.	interannual variability for the PPE-15 (perturbed parameter ensemble) ⁷ . It has not been considered that climate change would impact the predicted wind microclimate conditions in and around the Proposed Development. The structural design would account for appropriate wind loading at the detailed design stage.	day and health and safety implications. Impact Magnitude: Low	for climate change/ extreme weather.

⁷ UKCP18, 2018. Factsheet: Wind. Available at: <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-wind.pdf>. [Accessed 01/02/2022]