

Thames river basin district: climate change risk assessment worksheet

Name (as on your part A application form): **Amazon Data Services UK Limited**

Our permit reference number (if you have one): **EPR/DP3442QV/A001**

Your document reference number: **Climate Change Risk Assessment v1.2**

Risk assessment worksheet for the 2050s

Thames river basin district

You must carry out a climate change risk assessment for any new bespoke waste and installations permit applications if you expect to operate for more than 5 years. Use the [user guide](#) to complete the table. You can add in extra pages if necessary.

Consider how your operations will be affected by the changes in weather and climate described in the table. Consider any changes to average climate conditions that may impact on your operations, for example extreme rainfall.

Also consider:

- critical thresholds - where a 'tipping point' is reached, for example a specific temperature where site processes cannot operate safely
- changes to averages - for example an entire summer of higher than expected rainfall causing waterlogging
- where hazards may combine to cause more impacts

You can add in other climate variables if you wish.

If you have stated on your application form that you do not expect to be operational in 2050, you must still consider climate change risks for the time you do intend to operate. Whilst the variables are for the 2050s, this is an estimated date and you may experience these conditions before then.

This worksheet will sit in your management system. It must appear on the management system summary you submit with your application, even if you do not need to submit the whole risk assessment with your application.

If your pre-mitigation risk score (column D) is 5 or higher, you must complete columns E to H.

Potential changing climate variable	A Impact	B Likelihood	C Severity	D Risk (B x C)	E Mitigation (what will you do to mitigate this risk)	F Likelihood (after mitigation)	G Severity (after mitigation)	H Residual risk (F x G)
<p>1. Summer daily maximum temperature may be around 7°C higher compared to average summer temperatures now.</p>	<p>No significant impacts are identified as a result of summer temperatures increasing by 7°C.</p> <p>If a loss of electrical supply from the grid occurs during a period of high temperatures, the emergency back-up generators would operate to ensure the site load and cooling systems are supported. This would result in emissions to air and potential exceedances to local air quality if the outage was prolonged.</p> <p>The likelihood of a grid failure due to increased temperatures is very low. In addition, the reliability of electrical provision to site is very high due to being supplied by two feeds. If one feed was to be compromised, the full electrical load would still be supplied.</p> <p>Other identified issues out with the permit boundary include:</p> <ul style="list-style-type: none"> • Higher maximum temperatures may increase energy requirements for cooling. • Increased cooling demand may impact efficiencies; however, this Data Centre is expected to average 1.16 Power Usage Effectiveness (PUE) annually even during climate extremes. 	2	2	4	<p><u>Combustion Plant</u></p> <p>The data centre has been designed using ASHRAE N=20 climate data for Heathrow Airport with maximum coincident ambient of 35.8°C – 22.3% relative humidity (RH). This anticipates temperatures could reach a maximum of 35°C. The generator warranty allows operation of the generators up to 40°C without any derating. The electrical and cooling systems have been designed to operate in conditions of 42°C, allowing an appropriate allowance for the impact of climate change.</p> <p><u>Rest of Facility</u></p> <p>The Union Park Data Centre design is based on an ASHRAE N=20 maximum coincident ambient of 35.8°C – 22.3%RH. CFD modelling has been completed to verify operation at this condition, an extreme condition in excess of 45°C with commensurate RH has also been modelled, verifying a headroom in excess of 10°C for climate change.</p> <p>Monitor reliability of the two on-site grid connections.</p> <p>Conduct periodic reviews of energy efficiency for cooling plant to identify opportunities for improvements.</p> <p>Conduct periodic reviews of temperature (internal and external), controls, and plant resilience. Contingency measures to be put in place to help ensure operating temperatures can be maintained.</p>	N/A	N/A	N/A

<p>2. Winter daily maximum temperature could be 4°C more than the current average.</p>	<p>An increase of 4°C on winter temperatures would be unlikely to cause any adverse impacts on grid electrical provision. Warmer temperatures may make it less likely that the generators would be required to operate.</p> <p>If power is lost to the site and cooling is required, the emergency back-up generators would cover the site electrical and cooling loads.</p> <p>If cooling is required due to the increase in winter temperatures, the following issues may apply:</p> <ul style="list-style-type: none"> • Higher maximum temperatures may increase energy requirements for cooling. • Increased cooling demand may change efficiencies; however, this Data Centre is expected to average 1.16 Power Usage Effectiveness (PUE) annually even during climate extremes. 	2	1	2	<p><u>Combustion Plant</u></p> <p>The data centre has been designed using ASHRAE N=20 climate data for Heathrow Airport with maximum coincident ambient of 35.8°C – 22.3%RH. This anticipates temperatures could reach a maximum of 35°C. The generator warranty allows operation of the generators up to 40°C without any derating. The electrical and cooling systems have been designed to operate in conditions of 42°C, allowing an appropriate allowance for the impact of climate change.</p> <p><u>Rest of Facility</u></p> <p>The Union Park Data Centre design is based on an ASHRAE N=20 maximum coincident ambient of 35.8°C – 22.3%RH. CFD modelling has been completed to verify operation at this condition, an extreme condition in excess of 45°C with commensurate RH has also been modelled, verifying a headroom in excess of 10°C for climate change. Monitor reliability of the two on-site grid connections.</p> <p>Conduct periodic reviews of energy efficiency for cooling plant to identify opportunities for improvements.</p> <p>The Operator to arrange periodic reviews of temperature (internal and external), controls, and plant resilience. Contingency measures to be put in place to help ensure operating temperatures can be maintained.</p>	N/A	N/A	N/A
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<p>3. The biggest rainfall events are up to 20% more intense than current extremes (peak rainfall intensity) *.</p>	<p>Extreme rainfall events could cause site flooding from the nearby River Crane, Grand Union Canal or surface water runoff.</p> <p>Site is predominantly located within a Flood Zone 1 area which is deemed to have less than a 1 in 1000 (0.1%) chance of river or tidal flooding. The risk assessment shows that the majority of the site is at low risk from surface water flooding. Surface water drainage systems are unlikely to become overwhelmed.</p> <p>Generators and fuel tanks are stored within generator enclosures which are fire and water sealed to prevent ingress. If flood water was to enter the ground floor of Energy Centre 1 (EC1) it is unlikely that the emergency back-up plant would become compromised.</p>	1	2	2	<p>Surface water drainage systems have been designed to accommodate attenuation for up to and including the 1 in 100 year return period, with a 40% allowance on climate change. This complies with 'upper limit' in DEFRA guidance. The system has therefore been designed with an appropriate allowance for the impact of climate change.</p> <p>The Operator to arrange periodic inspection of onsite drainage to help ensure there are no blockages or issues with the surface water drainage systems.</p> <p>Fuel tanks and diesel generators are located internally to EC1 and stored within generator enclosures to reduce the risk of increased rainfall impacting this mission critical equipment. This equipment will be subject to planned preventative maintenance.</p> <p>Fuel tank bunds have leak detection and high-level alarms in the unlikely event that these tanks are compromised. The tanks are located internal to the building and within generator enclosures and are regularly inspected for any issues.</p>	N/A	N/A	N/A
<p>4. Average winter rainfall may increase by 36% on today's averages.</p>	<p>As per item 3 above.</p>	1	2	2	<p>As per item 3 above.</p>	N/A	N/A	N/A
<p>5. Sea level could be as much as 0.6m higher compared to today's level</p>	<p>The site has close proximity to two non-tidal waterways – the Grand Union Canal and River Crane. The risk of flooding from rivers and seas is very low at this site. No impacts are expected for this changing climate variable.</p>	1	1	1	<p>As per item 3 above. N/A</p>	N/A	N/A	N/A

<p>6. Drier summers, potentially up to 42% less rain than now.</p>	<p>There would be limited impacts expected for the permitted installation due to lower annual rainfall.</p> <p>Cooling and fire suppression systems on site utilise water. Water for cooling is initially taken from rainwater stores on site. If these are empty, there are 2 mains-water supplies that will provide the water required. It is unlikely that drier summers will impact cooling at this site as the rainwater harvesting system is designed to capture rainfall year-round for use during months where cooling is required.</p> <p>Fire suppression systems in UP1 utilise water. This is supplied from a 100,000-litre tank which is filled on Day 1 of operations and used solely in the event of a fire.</p> <p>A gas fire suppression system is in place in EC1 and therefore would not be impacted by drier summers.</p>	1	3	3	<p>Fire risk assessment and associated procedures.</p>	N/A	N/A	N/A
<p>7. At its peak, the flow in watercourses could be 35% more than now, and at its lowest it could be 75% less than now.</p>	<p>Due to the proximity of the site to the Grand Union Canal and River Crane an increase in flow could lead to an increase in the risk of flooding at the site.</p> <p>Site is predominantly located within a Flood Zone 1 area which is deemed to have less than a 1 in 1000 (0.1%) chance of river or tidal flooding.</p>	1	1	1	<p>As per item 3 above. N/A</p>	N/A	N/A	N/A

Indicates data has come from climate change allowances as part of the spatial planning process. Evidence from your planning submission is acceptable evidence for this worksheet.