

Preliminary Environmental Information Report Appendix 15.9.1: Climate Change Resilience (CCR) Assessment September 2021

Our northern runway: making best use of Gatwick

YOUR LONDON AIRPORT Gatwick

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1 Introduction

1.1.1 This document forms Appendix 15.9.1 of the Preliminary Environmental Information Report (PEIR) prepared on behalf of Gatwick Airport Limited (GAL). The PEIR presents the preliminary findings of the Environmental Impact Assessment (EIA) process for the proposal to make best use of Gatwick Airport's existing runways (referred to within this report as 'the Project'). The Project proposes alterations to the existing northern runway which, together with the lifting of the current restrictions on its use, would enable dual runway operations. The Project includes the development of a range of infrastructure and facilities which, with the alterations to the northern runway, would enable the airport passenger and aircraft operations to increase. Further details regarding the components of the Project can be found in the Chapter 5: Project Description.

2 Climate Change Resilience Assessment

2.1 Introduction

- 2.1.1 The full climate change resilience (CCR) assessment is presented in Table 2.1.1 below. The assessment considers how resilient the development is against projected climate change.
- 2.1.2 A risk analysis-based approach has been undertaken. The risk assessment uses a combination of likelihood and consequence to determine the level of risk.
- 2.1.3 The full CCR methodology is presented in Section 15.4 of Chapter 15 and the criteria to assess the likelihood of the climate change impact and the consequence of the climate change impact can be found in Table 15.4.5 and Table 15.4.6 of Chapter 15: Climate Change and Carbon.
- 2.1.4 The likelihood of the climate impact occurring has been assessed qualitatively, based on expert judgement and in discussion with the design team as well as accounting for existing or embedded mitigation.
- 2.1.5 The risk level is determined based on a combination of the likelihood and consequence of the climate change impact as set out in the risk matrix in Table 15.4.7 in Chapter 15: Climate Change and Carbon.



Table 2.1.1: Climate Change Resilience Assessment

	Construction	Climate	Trend or			Existing or	Result of	Assessi Climate Impact			Justification		Proposed Additional Resilience Measure	Reference
Risk ID	/ Operation Stage	Change Hazard	of Climate Hazard occurring	Asset Type	Climate Change Impact	Embedded Mitigation Measure	Mitigation Measure on Resilience	Likelihood	Consequence	Risk Rating	For the Likelihood of the Hazard Impact	For the Consequence of the Hazard Impact	(only if Risk Rating = 'High' (4) or 'Very high' (5))	Documenting Relevant Mitigation
1	Construction	Increased number of extremely hot days.	Increasing trend Likely	Temporary buildings for construction workers and site offices	Increased risk of overheating in temporary building accommodation for constructions workers during construction (14-year period) of the Project, negative impacts of working conditions.	No information currently regarding existing or embedded mitigation measures.	No resilience measures in place.	Likely	Major	High	Initial assessment is Likely as heatwaves are expected to occur several times over the course of the construction period and are likely to cause overheating unless mitigated against through the design of the buildings or implementation of Code of Construction Practice (CoCP)	Major as could cause delays > 1 day due to buildings becoming unusable and/or create public disputes with contractors using the buildings	It is recommended that cooling and ventilation systems are included in the design of temporary office buildings during construction that are sufficient to deal with projected climate changes over this period, for example using the appropriate guidance from the Chartered Institution of Building Services Engineers (CIBSE). Or evidence of climate change projections to be considered in risk assessments and CoCP. Design of resilience measures to be developed during next Phase and assessed as part of the Environment Statement (ES).	
2	Construction	Increased probability of extreme weather events (e.g.	Increasing trend Likely	Construction processes	Disruption or hinderance of construction processes	No information currently regarding existing or embedded mitigation measures.	No resilience measures in place.	Likely	Major	High	Initial assessment is Likely as impacts are likely to occur several times during the construction period unless	Potentially Major due to disruption and delays caused	Mitigation should comprise requirements for high level risk assessments of extreme weather impacts on construction processes.	



			Trend or				Result of	Assessn Climate Impact			Justification		Proposed Additional	Reference
Risk ID	Construction / Operation Stage	Climate Change Hazard	Likelihood of Climate Hazard occurring	Asset Type	Climate Change Impact	Existing or Embedded Mitigation Measure	Mitigation Measure on Resilience	Likelihood	Consequence	Risk Rating	For the Likelihood of the Hazard Impact	For the Consequence of the Hazard Impact	Resilience Measure (only if Risk Rating = 'High' (4) or 'Very high' (5))	Documenting Relevant Mitigation
		heatwaves , flooding).									enhanced mitigation measures are in place		It should also provide details on measures considered necessary to appropriately manage extreme weather events including training for staff. Design of resilience measures to be developed during next Phase and assessed as part of the ES.	
3	Operation	Increased number of extremely hot days.	Increasing trend Very likely	Airport Operation	Increased risk of overheating in terminal buildings, hotels, and other buildings, posing risk of thermal discomfort and heat stress for passengers and staff during operation of the airport; negative impacts on passenger experience.	No detailed mitigation to reduce overheating risk has been developed	No resilience measures in place.	Likely	Major	High	Initial assessment is Likely because heatwaves are expected to occur several times over the course of operation and are likely to cause overheating unless mitigated against through the design of the buildings	Major as could cause delays > 1 day due to buildings becoming unusable and/or create public disputes with staff and passengers	The heating and cooling strategies for existing buildings needs to be considered as part of the design of proposed buildings to ensure future climate impacts can be accounted for. Resilience measures for reducing overheating risk are expected to be developed during the next Phase and reported on as part of the ES.	
4	Operation	Increased number of extremely hot days.	Increasing trend Very likely	Airport infrastructure	In hot weather, air is less dense which means there are less molecules for the wings of the plane	Mitigation has not yet been considered	No resilience measures in place.	Likely	Moderat e/ Major	Medium/ High	Initial assessment is likely because increased temperatures are expected to occur	Moderate as changing flight times to cooler times of the day or changing weight	Consideration of the impact of warmer temperatures on take off procedures is key to ensuring the aircraft infrastructure is resilient	

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					to push down and produce lift. If a plane is taking off in such conditions, then it must travel much faster before it is able to generate enough thrust to take off and may therefore require a longer runway, or rescheduling flights during cooler times of the day or increased weight restrictions on flights.						during the operation period	restrictions will result in lower revenues on flights	to future changes in temperature. More information is required to better understand the nature of resilience measures. This impact will be reviewed and developed as part of the next Phase and reported on in the ES.	
5	Operation	Increased number of extremely hot days.	Increasing trend Very likely	Electronic Equipment	Sensitive electronic equipment and mechanical operating mechanisms may fail to operate correctly due to high temperatures.	Electronic equipment is designed to current temperature ranges based on existing standards. Upgrades will be completed as part of BAU operations for existing equipment reaching the end of its design life. New/ upgraded products will be sourced	Resilience achieved through existing specifications	Unlikely	Major	Medium	Unlikely as future design will address future climate risks. It is assumed that the industry would change its design standards in line with projected changes to the climate to ensure equipment is resilient to climate change	Major as could cause delays > 1 day due to sensitive electronic equipment and mechanical operating mechanisms failing	Embedded mitigation measures are likely to be sufficient.	

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						based on latest								
6	Operation	Increased number of extremely hot days.	Increasing trend Likely	Flights	Flashpoint of aviation fuel exceeded on hot days, leading to delays in refueling procedures.	design standards. The Airside Fire Service is embedded in Gatwick's Heat Plan as set out in the Airside Operations Adverse Weather Plan (GAL, 2020)	Resilience achieved through existing procedures.	Unlikely	Moderat e	Low	Unlikely because Gatwick has existing procedures in place to minimise the risk of fuel combustion during hot weather	Moderate as could cause delays of up to 2hrs on multiple days and > 2hrs on one single day	Embedded mitigation measures are likely to be sufficient.	Airside Operations Adverse Weather Plan (GAL, 2020)
7	Operation	Increased number of extremely hot days.	Increasing trend Likely	Flights	Possible increase in occurrence of days outside the acceptable range of temperatures affects aircraft and their utilisation schedule, due to air pressure changes affecting maximum take-off weight capacity.	Measures relating to allowances in maximum take-off weight and maximum plane operating temperature are managed by standard flight operation procedures	Resilience achieved through existing procedures.	Unlikely	Major	Medium	Unlikely impact as mitigation measures are sufficient	Major because it could result in closure of runway during peak heat hours	Embedded mitigation measures are likely to be sufficient.	
8	Operation	Extreme cold weather.	Decreasing trend Very unlikely	Electronic Equipment	Sensitive electronic equipment and mechanical operating mechanisms may fail to operate correctly due to low temperatures or freezing	Electronic equipment is already specified for low temperatures expected to be experienced under future climate conditions	Resilience achieved through existing specifications	Unlikely	Major	Medium	Unlikely as future cold weather is not expected to be more extreme than current cold events.	Major as could cause delays > 1 day due to sensitive electronic equipment and mechanical operating mechanisms failing	Embedded mitigation measures are likely to be sufficient.	

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9	Operation	Extreme cold weather.	Decreasing trend Very unlikely	Airport Infrastructure	Reliability of journeys may reduce at low temperatures due to cracking of pavement surfaces and snow/ice accretion on aircraft and runways/airfield pavements causing delays.	Gatwick has snow clearance and deicing plans in place as part of the Airside Operations Adverse Weather Plan (GAL, 2020)	Resilience achieved through implementing the snow clearance contingency plan and de- icing procedures which has proven to work in the past when no operational hours were lost during a period of cold weather	Unlikely	Major	Medium	Unlikely as low temperatures are less likely in future and Gatwick already has sufficient snow and de-icing mechanisms in place to mitigate against this hazard	Major as could cause delays > 1 day and major financial loss due to reduced number of take offs and landings	Embedded mitigation measures are likely to be sufficient.	Airside Operations Adverse Weather Plan (GAL, 2020)
10	Operation	Extreme cold weather.	Decreasing trend Very unlikely	Airport Operation	Possible negative health implications for passengers and staff, disruption to service operation.	Existing operational procedures are in place to ensure health and wellbeing of passengers and staff during cold weather	Resilience provided by the procedures set out in the Adverse Weather Plan	Unlikely	Moderat e	Low	Unlikely as low temperatures are less likely in future and Gatwick has sufficient measures in place to ensure health and wellbeing during cold spells.	Moderate as could result in the inability to work and moderate financial loss	Embedded mitigation measures are likely to be sufficient.	Airside Operations Adverse Weather Plan (GAL, 2020)
11	Operation	Extreme cold weather.	Decreasing trend Very unlikely	Airport Infrastructure	Possible increase in number of days outside the normally acceptable range of conditions for	Assumed that HVAC equipment will be designed to cope with current range of cold temperatures, but		Unlikely	Minor	Very Low	Unlikely as low temperatures are less likely in future and HVAC equipment is likely to be designed to	Minor as the impacts on persons is considered to be short term.	Embedded mitigation measures are likely to be sufficient, but this will be confirmed as part of the ES.	



Risk ID	Construction / Operation Stage	Climate Change Hazard	Trend or Likelihood of Climate Hazard occurring	Asset Type	Climate Change Impact	Existing or Embedded Mitigation Measure	Result of Mitigation Measure on Resilience	Assessn Climate Impact		Risk Rating	Justification For the Likelihood of the Hazard Impact	For the Consequence of the Hazard Impact	Proposed Additional Resilience Measure (only if Risk Rating = 'High' (4) or 'Very high' (5))	Reference Documenting Relevant Mitigation
					heating systems and increased risk of heating, ventilation and air conditioning (HVAC) failure.	information regarding existing or embedded mitigation measures					cope with cold temperatures			
12	Operation	Increased frequency of flooding from river, surface-and ground-water sources.	Increasing trend Likely	Airport Infrastructure	Flooding of infrastructure during operation: inundation of airfield, airport building basements and sub-structures, utility cables/tunnels	Infrastructure assets will be designed for the climatic conditions experienced at the end of their life cycle using appropriate climate change allowances. Permanent site drainage proposals include allowance for projected climate change. This will help mitigate the risk to underground structures being exceeded during operation. Gatwick's Airside Operations Adverse Weather Plan contains mitigation measures to monitor flood risk on airside and landside operations is in	Resilience achieved through design of assets	Unlikely	Major	Medium	Unlikely as flood resilience has been built into the design of infrastructure assets and Gatwick has procedures in place to mitigate any potential flood risk	Major as could cause delays > 1 day and extensive damage to infrastructure	If further mitigation is required, following further refinement of flood mitigation during Phase 2 this will be updated as part of the ES.	Airside Operations Adverse Weather Plan (GAL, 2020)



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						place as good practice								
13	Operation	Increased frequency of flooding from river, surface and groundwat er sources.	Increasing trend Likely	Airport Infrastructure	Flooding of road infrastructure connecting to the airport during operation: inundation of access roads and railways. Effects of infrastructure interdependencies	Road infrastructure assets will be designed to the climatic conditions experienced at the end of their life cycle using appropriate climate change allowances.	Resilience achieved through design of flood drainage to the correct EA climate change allowances	Unlikely	Major	Medium	Unlikely as flood resilience has been built into the design of road infrastructure assets	Major as could cause delays > 1 day and extensive damage to infrastructure	If further mitigation is required, following further refinement of flood mitigation during Phase 2 this will be updated as part of the ES.	
14	Operation	Increased frequency of flooding from river, surface and groundwat er sources.	Increasing trend Likely	Airport Operation	Flooding of electrical equipment and mechanical operating mechanisms	The FRA sets out a fluvial flood mitigation strategy and surface water management strategy to increase flood storage capacity at site and reduce flood risk for all assets including electrical equipment and/ or mechanical operating mechanisms.	Resilience will be achieved by creating additional compensatory flood areas to improve flood storage capacity for fluvial flooding and provision of additional attenuation storage and flow control measures to reduce surface water flood risk.	Unlikely	Major	Medium	Unlikely to occur as impact will be mitigated, via compensatory flood storage areas, additional attenuation storage and flow control measures.	Major as could cause the runway to be closed for 1 day	These existing approaches will be reviewed against the flood risk modelling, during the next Phase, to check their future suitability and incorporate additional mitigation if required. Further assessment will be undertaken and included as part of the ES.	Airside Operations Adverse Weather Plan (GAL, 2020)

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15	Operation	Increased risk of drought.	Increasing trend Likely	Landscaping	Increased heat stress to plants/landscaped areas	Planting schemes for the proposed development will select species that are resistant to warmer temperatures	Resilience will be achieved by planting vegetation that is resilient to warmer conditions	Unlikely	Major	Medium	Unlikely as embedded mitigation measures will comprise vegetation that is resilient to drought conditions and therefore the event is not expected to occur more than once during the lifetime of the Project	Major could result in widespread damage to asset requiring substantial replacement work	No additional resilience measures required.	
16	Operation	Increased risk of drought.	Increasing trend Likely	Airport Operation	Increased water stress for new buildings (hotel and office space)	No information obtained currently regarding existing or embedded mitigation measures.	No resilience measures in place.	Likely	Major	Very high	Initial assessment is Likely because droughts are likely to occur more often in future and there is no evidence to suggest that proposed building design considers the impact of increased water stress during the lifetime of the Project	Major as could cause delays of > 1 day	It is recommended that the design of new buildings consider the potential impact of increased water stress. An assessment of this impact will be completed as part of the next phase and reported in the ES.	
17	Operation	Extreme wind speeds	Possible – low certainty	Airport Infrastructure	Possible debris on runways and other airport infrastructure causing delays	Gatwick's wind plan ensures save operation on the Aerodrome during a wind event and includes monitoring	Current resilience measures in place, with emergency planning	As likely as not	Moderat e	Medium	As likely as not as changes to wind speeds remain uncertain and therefore this impact could occur during	Moderate as impact could result in delays of >2 hours and damage to infrastructure	Embedded mitigation measures are likely to be sufficient.	Airside Operations Adverse Weather Plan (GAL, 2020)

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					(foreign object debris).	of equipment areas and infrastructure, implement wind monitoring plan, safety briefings to airside staff, produce procedures to prevent loose and insecure equipment becoming a risk on airside areas					the operational phase of the development	requiring minor repair		
18	Operation	Extreme wind speeds	Possible – low certainty	Airport Infrastructure	Vegetation fall due to strong winds leading to road and rail disruption	Highways England and Network Rail manage mitigation plans for road and rail disruption respectively.	Resilience measures currently in place are considered sufficient	As likely as not	Moderat e	Medium	As likely as not as changes to wind speeds remain uncertain and therefore this impact could occur during the operational phase of the development	Moderate as fallen vegetation could block road/rail infrastructure leading to widespread damage and loss of service.	No additional resilience measures required.	
19	Operation	Extreme wind speeds	Possible – low certainty	Airport Infrastructure	Failure or damage to parts of structure or infrastructure as a result of changes in strong winds and gustiness.	Gatwick's wind plan ensures save operation on the Aerodrome during a wind event and includes monitoring of equipment areas and infrastructure, implement wind monitoring plan, safety briefings to airside staff, produce procedures	Current resilience measures in place, with emergency planning	Unlikely	Major	Medium	Unlikely as Gatwick's Adverse Weather Plan has procedures in place to limit the risk of this impact	Major as could cause extensive damage to service or delays > 1 day	Embedded mitigation measures are likely to be sufficient.	Airside Operations Adverse Weather Plan (GAL, 2020)

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						to prevent loose and insecure equipment becoming a risk on airside areas								
20	Operation	Extreme wind speeds	Possible – low certainty	Flights	Aircrafts not permitted to land or take off, causing delays.	Existing procedures are in place (see Wind Plan) for BAU operations, these are considered sufficient to cope with extreme events in future	Resilience achieved through implementation of procedures	Unlikely	Major	Medium	Unlikely as mitigation measures in place to minimise the impact	Major as could cause delays of 1 day due to aircraft not being permitted to take off or land	No additional resilience measures required.	Airside Operations Adverse Weather Plan (GAL, 2020)
21	Operation	Increased risk of lightning strikes.	Possible – low certainty	Airport Infrastructure	Indirect and direct damage to buildings, infrastructure, aircraft, equipment from lightning strikes.	Gatwick's Adverse Weather Plan includes cumulonimbus (CB) Activity which provides procedures and processes for dealing with lightning strikes. For new assets lightning protection is also included within the design standard	implementation of procedures	Very unlikely	Moderat e	Low	Very unlikely as damage from lightning strikes only occurs in exceptional circumstances	Moderate as could lead to partial loss of local infrastructure but damage is recoverable by maintenance and minor repair	No additional resilience measures required.	Airside Operations Adverse Weather Plan (GAL, 2020)
22	Operation	Increased risk of lightning strikes.	Possible – low certainty	Flights	Suspension of activities on the ramp by ground handling agents, delaying the service and turnaround times for aircraft and	Gatwick's Adverse Weather Plan includes CB Activity which provides procedures and processes for dealing with lightning strikes	Resilience achieved through implementation of procedures and processes	Very unlikely	Moderat e	Low	Very unlikely as the Gatwick Adverse Weather Plan provides mitigation to reduce the impact from potential lightning strikes	Moderate as could lead to partial loss of local infrastructure but damage is recoverable by	No additional resilience measures required.	Airside Operations Adverse Weather Plan (GAL, 2020)



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Risk ID	Construction / Operation Stage	Climate Change Hazard	Likelihood of Climate Hazard occurring	Asset Type	Climate Change Impact	Existing or Embedded Mitigation Measure	Mitigation Measure on	Likelihood	Consequence	Risk Rating	For the Likelihood of the Hazard Impact	For the Consequence of the Hazard Impact	Resilience Measure (only if Risk Rating = 'High' (4) or 'Very high' (5))	Documenting Relevant
					stressing terminal/							maintenance		
					gatehouses.							and minor repair		



3 References

Gatwick Airport Limited (2020). Gatwick Operations Adverse Weather Plan [Online]. Available at: https://s3.amazonaws.com/helpscout.net/docs/assets/59f9ae610 42863319924181d/attachments/60c863e7af164f7b537ce483/Adverse-Weather-Plan-2020---21-v7.0.pdf

4 Glossary

4.1 Glossary of Terms

Table 4.1.1: Glossary of Terms

Term	Description
СВ	Cumulonimbus
CCR	Climate Change Resilience
CIBSE	Chartered Institution of Building Services Engineers
CoCP	Code of Construction Practice
EIA	Environment Impact Assessment
GAL	Gatwick Airport Limited
PEIR	Preliminary Environment Information Report