Appendix 13-3: Climate Change Risk Assessment Risk Register

RISK IDENTIFICATION					RISK ASSESSMENT								ADAPTATION MEASURES							
Risk ID	Climate variable	Risk statement	Direct or Indirect Impact	Impact type	Planned Controls	Initial risk rating RCP4.5 (2041-2060)			Initial risk rating RCP8.5 (2041-2060)			Justification	Adaptation Measures	Residual risk rating RCP4.5 (2041-2060)			Residual risk rating RCP8.5 (2041-2060)		
		Description of impacts		e.g. Asset damage, Health & Safety, Operational, Environmental, Financial, Reputation, Cultural	e.g. controls planned within the current design that mitigate the identified risk	Likelihood	Consequence	Risk Rating	Likelihood	Consequence	Risk Rating	Rationale for likelihood and consequences and any changes between climate scenarios	e.g. additional design or operational measures that can be implemented to further reduce the climate risk	Likelihood	Consequence	Risk Rating	Likelihood	Consequence	Risk Rating
Operation:																				
1	Flooding (Pluvial)	Extreme rainfall events causes surface water and or flash flooding to occur, resulting in damage to ground-level infrastructure and critical infrastructure. (e.g. onsite power facilities being down)	Direct	Asset damage, Operational and Financial	Existing Sustainable Drainage Systems (SuDS) at Dublin Airport, including silt traps, petrol interceptors, permeable paving, filter drains, infiltration trenches, soakaways, drainage blankets, ditches, rainwater harvesting systems, attenuation systems and separate surface water and foul drainage networks, will continue to be maintained and operated to manage surface water runoff, improve drainage performance and reduce flood risk across the airport estate. daa will continue drainage inspection, maintenance and asset management procedures to maintain drainage performance and minimise the risk of flooding and blockages. daa will continue to monitor weather forecasts and implement established contingency procedures if required. Where feasible and appropriate permeable materials will be used in paved areas to allow water to be absorb into the ground and not gather on the surface area, increasing overall surface drainage capacity.	Unlikely	Moderate	Medium	Moderate	Moderate	High	Ireland is expected to experience an increase in the frequency of very wet days, particularly in autumn and winter. Dublin Airport and the vicinity surrounding it has experienced flood events in the past and is expected to continue to experiencing them in the future, with a number of these flood events reoccurring in the same area.	Consider introducing a drainage maintenance and operation plan, that ensures the drainage system is monitored and kept blockage free. Consider re-paving key areas with a permeable material to allow water to be absorb into the ground and not gather on the surface area. To help increase the airports surface drainage capacity, consideration should be given to installing a water pump for the areas with critical infrastructure and a key part of airport operations. It is recommended that critical infrastructure is raised above PMF (Probable maximum flood).	Unlikely	Minor	Low	Unlikely	Minor	Low
2	Flooding (Pluvial)	Extreme rainfall events causes surface water and or flash flooding to occur resulting in damage to external ground-level infrastructure and critical infrastructure. (e.g. Runway becomes flooded resulting in flight delays and or cancelations)	Direct	Asset damage, Operational and Financial	Existing Sustainable Drainage Systems (SuDS) at Dublin Airport, including silt traps, petrol interceptors, permeable paving, filter drains, infiltration trenches, soakaways, drainage blankets, ditches, rainwater harvesting systems, attenuation systems and separate surface water and foul drainage networks, will continue to be maintained and operated to manage surface water runoff, improve drainage performance and reduce flood risk across the airport estate. daa will continue drainage inspection, maintenance and asset management procedures to maintain drainage performance and minimise the risk of flooding and blockages. daa will continue to monitor weather forecasts and implement established contingency procedures if required. Where feasible and appropriate permeable materials will be used in paved areas to allow water to be absorb into the ground and not gather on the surface area, increasing overall surface drainage capacity.	Unlikely	Major	High	Moderate	Major	Extreme	Ireland is expected to experience an increase in the frequency of very wet days, particularly in autumn and winter. Dublin Airport and the vicinity surrounding it has experienced flood events in the past and is expected to continue to experiencing them in the future, with a number of these flood events reoccurring in the same area.	Consider introducing a drainage maintenance and operation plan, that ensures the drainage system is monitored and kept blockage free. Consider re-paving key areas with a permeable material to allow water to be absorb into the ground and not gather on the surface area. To help increase the airports surface drainage capacity, consideration should be given to installing a water pump for the areas with critical infrastructure and a key part of airport operations. It is recommended that critical infrastructure is raised above PMF (Probable maximum flood).	Unlikely	Moderate	Medium	Unlikely	Moderate	Medium

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		Description of impacts		e.g. Asset damage, Health & Safety, Operational, Environmental, Financial, Reputation, Cultural	e.g. controls planned within the current design that mitigate the identified risk	Likelihood	Consequence	Risk Rating	Likelihood	Consequence	Risk Rating	Rationale for likelihood and consequences and any changes between climate scenarios	e.g. additional design or operational measures that can be implemented to further reduce the climate risk	Likelihood	Consequence	Risk Rating	Likelihood	Consequence	Risk Rating
3	Flooding (Pluvial and fluvial)	Extreme rainfall over an extended period can lead to nearby rivers exceeding their natural capacity causing flooding. This can result in ground-level infrastructure and equipment being damaged, in addition to operational delays due locally flooded roads limiting access to the airport.	Direct	Asset damage, Operational and Financial	Existing Sustainable Drainage Systems (SuDS) at Dublin Airport, including silt traps, petrol interceptors, permeable paving, filter drains, infiltration trenches, soakaways, drainage blankets, ditches, rainwater harvesting systems, attenuation systems and separate surface water and foul drainage networks, will continue to be maintained and operated to manage surface water runoff, improve drainage performance and reduce flood risk across the airport estate. daa will continue drainage inspection, maintenance and asset management procedures to maintain drainage performance and minimise the risk of flooding and blockages. daa will continue to monitor weather forecasts and implement established contingency procedures if required. Where feasible and appropriate permeable materials will be used in paved areas to allow water to be absorb into the ground and not gather on the surface area, increasing overall surface drainage capacity.	Unlikely	Moderate	Medium	Moderate	Moderate	High	Ireland is expected to experience an increase in the frequency of very wet days, particularly in autumn and winter. Dublin Airport and the vicinity surrounding it has experienced flood events in the past and is expected to continue to experiencing them in the future, with a number of these flood events reoccurring in the same area.	Consider introducing a drainage maintenance and operation plan, that ensures the drainage system is monitored and kept blockage free. Consider re-paving key areas with a permeable material to allow water to be absorb into the ground and not gather on the surface area. To help increase the airports surface drainage capacity, consideration should be given to installing a water pump for the areas with critical infrastructure and a key part of airport operations. It is recommended that critical infrastructure is raised above PMF (Probable maximum flood)	Unlikely	Moderate	Medium	Unlikely	Moderate	Medium
4	Storm events	Severe wind event has higher wind loading than that of the designed infrastructure. This causes stress on the infrastructure, resulting in damage or reduced design life and potential safety hazard. E.g. damage to hanger	Direct	Asset damage, Operational, Health & Safety and Financial	daa will continue to monitor weather forecasts and implement established contingency procedures if required.	Rare	Moderate	Medium	Rare	Moderate	Medium	The number of very intense storms is projected to increase over the North Atlantic region in the future (2041-2060), under both RCP4.5 & RCP8.5.	Wind patterns should be monitored and an early warning system should be in place at the airport. This will allow for contingency plans to be put in place in advance of predicted storm and windy conditions. A wind monitoring plan which establishes procedures and measures that should be instated during period of strong winds should be developed.	Rare	Moderate	Medium	Rare	Moderate	Medium
5	Storm events	Severe wind affects vegetation/ landscaping including trees on or near the airport, causing damage, uprooting or breakage, resulting in damage to infrastructure and potential safety hazard. This can result in debris on the runway and other airport infrastructure causing disruption and ceasing of operations e.g. flights cancelled due to debris on runway.	Direct	Asset damage, Operational, Health & Safety and Financial	daa will continue to monitor weather forecasts and implement established contingency procedures if required. daa will follow the Vegetation Management Plan which outlines regular monitoring procedures for trees and vegetation.	Unlikely	Minor	Low	Unlikely	Minor	Low	The number of very intense storms is projected to increase over the North Atlantic region in the future (2041-2060), under both RCP4.5 & RCP8.5.	Wind patterns should be monitored and an early warning system should be in place at the airport. This will allow for contingency plans to be put in place in advance of predicted storm and windy conditions. A wind monitoring plan which establishes procedures and measures that should be instated during period of strong winds should be developed.	Unlikely	Minor	Low	Unlikely	Minor	Low

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		Description of impacts		e.g. Asset damage, Health & Safety, Operational, Environmental, Financial, Reputation, Cultural	e.g. controls planned within the current design that mitigate the identified risk	Likelihood	Consequence	Risk Rating	Likelihood	Consequence	Risk Rating	Rationale for likelihood and consequences and any changes between climate scenarios	e.g. additional design or operational measures that can be implemented to further reduce the climate risk	Likelihood	Consequence	Risk Rating	Likelihood	Consequence	Risk Rating
6	Storm events	Severe wind affects aircraft operations due to high and varying winds conditions preventing aircraft loading, ground operations and closure to air traffic control towers. This results in disruption to operations and cancellation of flights.	Direct	Asset damage, Operational and Financial	daa will continue to monitor weather forecasts and implement established contingency procedures if required.	Rare	Major	High	Unlikely	Major	High	The number of very intense storms is projected to increase over the North Atlantic region in the future (2041-2060), under both RCP4.5 & RCP8.5.	Wind patterns should be monitored and an early warning system should be in place at the airport. This will allow for contingency plans to be put in place in advance of predicted storm and windy conditions. A wind monitoring plan which establishes procedures and measures that should be instated during period of strong winds should be developed.	Rare	Moderate	Medium	Rare	Moderate	Medium
7	Storm events	Lightning strikes causes dangerous work conditions resulting in suspension of activities on the ramp by ground handling agents, delaying the service and turnaround times for aircraft.	Direct	Asset damage, Operational, Health & Safety and Financial	daa will maintain staff training and operational response procedures for severe weather and lightning events.	Unlikely	Moderate	Medium	Unlikely	Moderate	Medium	It is common consensuses that as the planet continues to warm, areas with warmer temperatures and moist conditions are expected to experience and increase in lightening. It is predicted that the British Isles (Ireland) are expected to experience double the amount of lightening in July & August.	Weather forecasts should be monitored and an early warning system should be in place at the airport. This will allow for contingency plans to be put in place in advance of predicted extreme weather events. Lightening detection and early warning systems should be installed to notify staff of impending conditions. On the ground staff should be trained as to how to respond to lightening conditions and a protocol should be in place.	Unlikely	Minor	Low	Unlikely	Minor	Low

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		Description of impacts		e.g. Asset damage, Health & Safety, Operational, Environmental, Financial, Reputation, Cultural	e.g. controls planned within the current design that mitigate the identified risk	Likelihood	Consequence	Risk Rating	Likelihood	Consequence	Risk Rating	Rationale for likelihood and consequences and any changes between climate scenarios	e.g. additional design or operational measures that can be implemented to further reduce the climate risk	Likelihood	Consequence	Risk Rating	Likelihood	Consequence	Risk Rating
8	Changing Temperatures	Extreme heat days results in discomfort to building occupants due to overheating of buildings and indoor areas. Warm indoor environments can result in health hazards as occupants may become dehydrated or suffer from other heat associated health risks. (This risk is exacerbated by urban heat island effect).	Direct	Health & Safety	The HVAC system has been designed to support occupant comfort and energy-efficient operation through the use of air source heat pumps, mechanical ventilation, free-cooling and high-efficiency heat recovery. These measures reduce cooling demand during warmer periods and heating demand during colder periods, improving the overall energy performance of the building. Where necessary and feasible external shading devices will be favoured over glazing solar coatings as this will allow for heat to be absorbed in winter but reflected in summer. Design standards for taxiway surfaces and runways are intended to withstand high temperatures, allowing them to cope with aircraft braking. Heating, cooling and ventilation systems will be operated and maintained to maintain occupant comfort during periods of extreme temperatures. Storage facilities have been designed with appropriate cooling, ventilation and environmental control systems to maintain operational performance and resilience during periods of elevated temperatures. Buildings will utilise energy-efficient design measures to reduce operational GHG emissions. This includes the use of external shading devices, where appropriate, to reduce solar heat gain during summer while allowing beneficial solar gains during winter, thereby reducing heating and cooling energy demand.	Unlikely	Insignificant	Low	Unlikely	Insignificant	Low	Ireland's climate is changing in line with global trends, with a temperature increase of, on average, 0.8°C compared with 1900. By the middle of this century (2041 – 2060) the average annual temperatures are projected to increase by between 1–1.2°C and 1.3–1.6°C depending on the emissions trajectory. The number of warm days is expected to increase and heat waves are expected to occur more frequently. However it should be noted that the hottest temperature recorded in Ireland to date, since the 1800s, was 33.0°C in July 2022.	Weather forecasts should be monitored and an early warning system should be in place at the airport. This will allow for contingency plans to be put in place in advance of predicted extreme heat events. In advance of expected periods of extreme heat check all HVAC system are working correctly and assess if further temporary fans need to be dispersed in indoor areas.	Rare	Insignificant	Low	Rare	Insignificant	Low

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9	Changing Temperatures	Extreme heat can lead to an increase in demand and consumption of cooling equipment. E.g. cargo storage areas.	Direct	Asset damage, Operational and Financial	The HVAC system has been designed to support occupant comfort and energy-efficient operation through the use of air source heat pumps, mechanical ventilation, free-cooling and high-efficiency heat recovery. These measures reduce cooling demand during warmer periods and heating demand during colder periods, improving the overall energy performance of the building. Where necessary and feasible external shading devices will be favoured over glazing solar coatings as this will allow for heat to be absorbed in winter but reflected in summer. Design standards for taxiway surfaces and runways are intended to withstand high temperatures, allowing them to cope with aircraft braking. Heating, cooling and ventilation systems will be operated and maintained to maintain occupant comfort during periods of extreme temperatures. Storage facilities have been designed with appropriate cooling, ventilation and environmental control systems to maintain operational performance and resilience during periods of elevated temperatures. Buildings will utilise energy-efficient design measures to reduce operational GHG emissions. This includes the use of external shading devices, where appropriate, to reduce solar heat gain during summer while allowing beneficial solar gains during winter, thereby reducing heating and cooling energy demand.	Rare	Minor	Low	Unlikely	Minor	Low	Ireland's climate is changing in line with global trends, with a temperature increase of, on average, 0.8°C compared with 1900. By the middle of this century (2041 – 2060) the average annual temperatures are projected to increase by between 1–1.2℃ and 1.3–1.6℃ depending on the emissions trajectory. The number of warm days is expected to increase and heat waves are expected to occur more frequently. However it should be noted that the hottest temperature recorded in Ireland to date, since the 1800s, was 33.0°C in July 2022.	Weather forecasts should be monitored and an early warning system should be in place at the airport. This will allow for contingency plans to be put in place in advance of predicted extreme heat events.	Rare	Minor	Low	Rare	Minor	Low
10	Changing Temperatures	Extreme heat can impact materials (e.g. asphalt) used in carparks, runways and paved areas, resulting in reduced durability and/or design life. E.g. paved surface may melt under prolonged periods of extreme heat	Direct	Asset damage, Operational and Financial	Taxiway surfaces and runways will be maintained to comply with industry standards. The will be built based on design standards intended to withstand far higher temperatures to be able to cope with aircraft braking.	Rare	Minor	Low	Rare	Minor	Low	Ireland's climate is changing in line with global trends, with a temperature increase of, on average, 0.8°C compared with 1900. By the middle of this century (2041 – 2060) the average annual temperatures are projected to increase by between 1–1.2℃ and 1.3–1.6℃ depending on the emissions trajectory. The number of warm days is expected to increase and heat waves are expected to occur more frequently. However it should be noted that	Weather forecasts should be monitored and an early warning system should be in place at the airport. This will allow for contingency plans to be put in place in advance of predicted extreme heat events. Monitor an maintain key paved areas that may be impacted by extreme heat and result in design standards being compromised. Regular maintenance should be carried out to make sure the paved areas are fit for daily operations.	Rare	Minor	Low	Rare	Minor	Low

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11	Changing Temperatures	Extreme heat events will increase ambient temperatures in external storage locations. e.g. fuel farm and chemical storage facilities Increased temperatures can increase the risk of chemical reactions and fires caused by combustible materials . This could result in injury or mortality, for workers and people within the vicinity.	Direct	Asset damage, Operational, Health & Safety and Financial	Dublin Airport has an operational fire station with fire safety equipment and facilities on site. Fuel storage facilities are regulated under the Seveso Directive to ensure safety.	Rare	Major	High	Rare	Major	High	Ireland's climate is changing in line with global trends, with a temperature increase of, on average, 0.8°C compared with 1900. By the middle of this century (2041 – 2060) the average annual temperatures are projected to increase by between 1–1.2°C and 1.3–1.6°C depending on the emissions trajectory. The number of warm days is expected to increase and heat waves are expected to occur more frequently. However it should be noted that the hottest temperature recorded in Ireland to date, since the 1800s, was 33.0°C in July 2022.	Weather forecasts should be monitored and an early warning system should be in place at the airport. This will allow for contingency plans to be put in place in advance of predicted extreme heat events. On-site rescue and firefighting services must have an emergency plan in pace should there be a chemical / fire risk. Consider moving combustible materials into temperature controlled environment to avoid risk of chemical reaction/fire hazards.	Rare	Moderate	Medium	Rare	Moderate	Medium
12	Changing Temperatures	Snow and frost affects carparks, runways and other outdoor paved areas, resulting in reduced durability and/or design life, as well as health and safety hazards. This could create un-safe surfaces, leading to slips and falls, and potential injury to people. e.g. outdoor paved area becomes frozen	Direct	Asset damage, Operational, Health & Safety and Financial	daa will continue to monitor weather forecasts and implement established contingency procedures if required.	Rare	Minor	Low	Rare	Minor	Low	It is projected that there will be a decrease in frost days and an increase in winter temperatures. However when there has been snow and ice conditions observed in the past this has caused disruption to airport operations and flight cancelations, so it is important that consideration is given to the impact snow and ice conditions will have on airport operations in the future.	Weather forecasts should be monitored and an early warning system should be in place at the airport. This will allow for contingency plans to be put in place in advance of predicted extreme weather events. De-icing facilities should be incorporated into the airport operations to mitigate any impacts associated with extreme cold weather events. Snow and de-icing procedures should be in place for when theses conditions occur, this will minimise disruption caused.	Rare	Minor	Low	Rare	Minor	Low

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13	Changing Temperatures	Extreme cold days results in discomfort to building occupants due to prolonged periods of extreme cold affecting heating. Insufficient heating indoors can result in discomfort to occupants and an increased costs.	Direct	Health & Safety and Financial	Heating, cooling and ventilation systems will be operated and maintained to maintain occupant comfort during periods of extreme temperatures.	Rare	Insignificant	Low	Rare	Insignificant	Low	It is projected that there will be a decrease in frost days and an increase in winter temperatures. However when there has been snow and ice conditions observed in the past this has caused disruption to airport operations and flight cancelations, so it is important that consideration is given to the impact snow and ice conditions will have on airport operations in the future.	Weather forecasts should be monitored and an early warning system should be in place at the airport. This will allow for contingency plans to be put in place in advance of predicted extreme weather events.	Rare	Insignificant	Low	Rare	Insignificant	Low
14	Changing Temperatures	Low temperatures can lead to ground areas becoming frozen. This can lead to delays and disruption to operations as the areas will need to be de-iced. E.g. If the runway becomes frozen it must be fully de-iced prior to aircrafts being able to take off and land.	Direct	Asset damage, Operational and Financial	daa will maintain and implement established snow clearance, de-icing and severe winter weather response procedures to minimise operational disruption and maintain safe airport operations during periods of extreme cold weather. daa will continue to monitor weather forecasts and implement established contingency procedures during periods of forecast extreme weather.	Rare	Moderate	Medium	Rare	Moderate	Medium	It is projected that there will be a decrease in frost days and an increase in winter temperatures. However, when there has been snow and ice conditions observed in the past this has caused disruption to airport operations and flight cancelations, so it is important that consideration is given to the impact snow and ice conditions will have on airport operations in the future.	Weather forecasts should be monitored and an early warning system should be in place at the airport. This will allow for contingency plans to be put in place in advance of predicted extreme weather events. De-icing facilities should be incorporated into airport operations to mitigate any impacts associated with extreme cold weather events. Snow and de-icing procedures should be in place for when theses conditions occur, this will minimise disruption caused.	Rare	Minor	Low	Rare	Minor	Low

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15	Changing Temperatures	Snow and frost affects paved areas, which when thawed can lead to ground instability causing damage both to aircraft movement areas (holes and buckling), and to infrastructures integrity and stability. e.g. cracking of paved surfaces and snow/ice accretion This can cause delays and disruption to airport operations and infrastructures durability.	Direct	Asset damage, Operational and Financial	daa will maintain and implement established snow clearance, de-icing and severe winter weather response procedures to minimise operational disruption and maintain safe airport operations during periods of extreme cold weather. daa will continue to monitor weather forecasts and implement established contingency procedures during periods of forecast extreme weather.	Rare	Major	High	Rare	Major	High	It is projected that there will be a decrease in frost days and an increase in winter temperatures. However when there has been snow and ice conditions observed in the past this has caused disruption to airport operations and flight cancelations, so it is important that consideration is given to the impact snow and ice conditions will have on airport operations in the future.	Weather forecasts should be monitored and an early warning system should be in place at the airport. This will allow for contingency plans to be put in place in advance of predicted extreme weather events. De-icing facilities should be incorporated into airport operations to mitigate any impacts associated with extreme cold weather events. Snow and de-icing procedures should be in place for when theses conditions occur, this will minimise disruption caused.	Rare	Minor	Low	Rare	Minor	Low
16	Fog	Severe fog affects visibility and ability to perform day to day operations. This results in disruption and suspension of activities on the ramp by ground handling agents, delaying the service and turnaround times for aircraft. E.g. visibility conditions are too poor to conduct day to day operations	Direct	Asset damage, Operational, Health & Safety and Financial	daa will continue to monitor weather forecasts and implement established contingency procedures during periods of forecast extreme weather.	Unlikely	Moderate	Medium	Unlikely	Moderate	Medium	It has been observed that an increase in temperature results in a decrease in fog conditions. However when there has been fog conditions observed in the past this has caused disruption to airport operations and flight cancelations, so it is important that consideration is given to the impact fog conditions will have on airport operations in the future.	Weather forecasts should be monitored and an early warning system should be in place at the airport. This will allow for contingency plans to be put in place in advance of predicted extreme weather events. Consider installing outdoor lighting that is designed to maintain visibility and operations during fog conditions.	Unlikely	Minor	Low	Unlikely	Minor	Low