

An aerial photograph of Gatwick Airport's northern runway and taxiway. The runway is a long, straight concrete strip with white markings, including the number '26' and the letter 'L'. Several aircraft are visible on the taxiway and runway. In the foreground, a large white Airbus A380 is taxiing. To its left, a smaller white aircraft is also taxiing. Further up the runway, another white aircraft is visible. In the bottom left corner, a red and white easyJet aircraft is taxiing. The surrounding area includes green grass, taxiway lights, and airport buildings in the distance. The text 'YOUR LONDON AIRPORT' is written in white, uppercase letters, and 'Gatwick' is written in a white, cursive font below it.

YOUR LONDON AIRPORT  
*Gatwick*

*Our northern runway: making best use of Gatwick*

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## 1 Introduction

### 1.1 Overview

1.1.1 This document forms Appendix 5.3.3 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.

1.1.2 This document provides the preliminary results of the assessment of the risks associated with the Project with respect to potential major accidents and disasters.

1.1.3 It is not the intention to repeat the information contained in Volume 1 of the PEIR and therefore, this appendix should be read in conjunction with Chapter 5: Project Description. Information has also been taken from sections of the relevant environmental topic chapters. Where this is the case, this has been signposted throughout this appendix.

### 1.2 Background

1.2.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, as amended (Regulation 5(4) and Schedule 4) require the following to be considered:

- 'the expected significant effects arising from the vulnerability of the proposed development to major accidents or disasters that are relevant to that development' [Regulation 5 (4)]; and
- 'the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)' [Schedule 4, Paragraph 5(d)].

1.2.2 Schedule 4 also requires the following:

- 'a description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned' (Schedule 4, paragraph 8).

1.2.3 The consideration of major accidents and disasters has the objective of building resilience into a project, so that the Project itself, and any relevant environmental and human receptors, are not vulnerable to any significant adverse effects arising from major accidents and/or disasters.

1.2.4 Within the Control of Major Accident Hazard (COMAH) Regulations (2015), a 'major accident' is defined as:

*'An occurrence such as a major emission, fire, or explosion resulting from uncontrolled development, leading to serious danger to human health or the environment (whether immediate or delayed) inside or outside the establishment, and involving one or more dangerous substances.'*

1.2.5 The International Federation of Red Cross and Red Crescent Societies (2019) describes the term 'disaster' as:

*'A sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that exceed the community's or society's ability to cope using its own resources. Though often caused by nature, disasters can have human origins.'*

1.2.6 The United Nations Office of Disaster Risk Management (UNDRR) (UNDRR, 2019) defines vulnerability as:

*'The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards.'*

## 1.3 Structure of this Document

1.3.1 This appendix has been divided into the following sections:

- Section 2: Methodology – describes the scope of the assessment including the study area, types of receptors and the general approach to the evaluation of safety and environmental risk issues. Further detail regarding the environmental risk assessment methodology is presented in Annex 1;
- Section 3: Project Design and Measures Adopted as Part of the Project – describes the Project and the key mitigation and risk control measures that have been incorporated into

the Project design/commitments and which are taken into account in the assessment;

- Section 4: Site Setting and Baseline Conditions and Receptors – describes the existing environment and identifies human and environmental receptors and potential pathways for major accidents and disasters;
- Section 5: Risk Assessment – provides the assessment of the risk of major accidents and disasters, along with a re-evaluation of issues scoped into the study as a result of the Planning Inspectorate's Scoping Opinion (see Consultation and Engagement below);
- Section 6: Requirements for Additional Measures – identifies any additional mitigation and/or control measures that may be required (ie those that would be additional to measures identified in Section 3);
- Section 7: Requirement for Further Work – discusses the requirement for further work or additional studies throughout the EIA process; and
- Section 8: Conclusions.

1.3.2 In addition, the following annexes are provided:

- Annex 1 – Environmental Risk Assessment Methodology;
- Annex 2 – Legislation, Policy and Guidelines;
- Annex 3 – Scoping Outcomes for Potential Major Accidents and Disaster Events;
- Annex 4 – Chemical and Downstream Oil Industries Forum Guidelines: Major Accident to the Environment Tolerability and Risk Tables; and
- Annex 5 – Literature Review of Major Fires.

## 2 Methodology

2.1.1 This section describes the scope of and approach to the assessment for major accidents and disasters and outlines the various receptor groups that the assessment has considered.

2.1.2 The information within the PEIR is 'preliminary' at this stage. Further refinement of the scope may be required as the Project continues to evolve, and to account for ongoing assessment findings, engagement and consultation.

### 2.2 Relevant Policy, Legislation and Guidance

2.2.1 In addition to the EIA Regulations, there is a range of legislation and policy applicable to the assessment of major accidents and disasters. This is detailed in Annex 2.

2.2.2 Currently, there is no well-established guidance or standard for assessment of major accidents and disasters within EIA, and various approaches have been adopted in recent practice. The approach to this assessment has been developed based on principles set out in the following:

- The Control of Major Accidents Hazards Regulations 2015;
- Reducing Risk, Protecting People (Health and Safety Executive, 2001); and
- Environmental Risk Tolerability for COMAH Establishments (Chemical and Downstream Oil Industries Forum, 2016 (CDOIF, 2016)).

2.2.3 Emerging best practice for the evaluation of major accidents and disasters for other recent airport projects has been reviewed and integrated into the approach adopted within this assessment.

## 2.3 Scope of the Assessment

2.3.1 The major accident and disaster assessment considers events/scenarios in two main categories:

- vulnerability of the Project to external natural and man-made hazards; and
- major accident and disaster events and risks which could be generated or exacerbated by the Project.

2.3.2 Major accidents and disasters, by their nature, are 'unplanned' (ie with the potential for effects that are not part of the intended design, construction or operation) and would be infrequent. The assessment of possible major accident and disaster events/scenarios therefore focusses on the determination of the potential risk and the 'tolerability' of that risk.

### Receptors

2.3.3 Receptors that may be affected by major accidents and disasters are both human and environmental. They have been identified through the review of each of the topic assessments within this PEIR.

2.3.4 For human receptors, the following receptor groups have been considered:

- local residents;
- operational staff (Gatwick Airport staff and any other persons legally employed within the Project site boundary);
- construction workers;
- travellers and other customers using airport facilities and onboard aircraft; and

- users of local transport (road and rail).

2.3.5 For environmental receptors, the established CDOIF guideline (CDOIF, 2016) identifies the broad groups of environmental receptors that are likely to be relevant to the assessment as:

- designated areas (land/water):
  - nationally important;
  - internationally important;
  - other designated land, and
  - scarce habitat.
- widespread habitat (land/water):
  - non-designated land; and
  - non-designated water.
- groundwater (water):
  - groundwater bodies – source of public or private drinking water, and
  - groundwater bodies – non-drinking water source.
- soil or sediment (land/water);
- built environment (land/man-made);
- species of flora and fauna (land/water/air);
- marine (water); and
- freshwater (water).

2.3.6 Table 2.3.1 illustrates the sources of baseline information used for each receptor group.

**Table 2.3.1: Sources of Information for Receptors**

Receptor Group	ES topic area
Designated land/water sites (nationally important)	Chapter 9: Ecology and Nature Conservation
Designated land/water sites (internationally important)	Chapter 9: Ecology and Nature Conservation
Other designated land	Chapter 8: Landscape, Townscape and Visual Resources Chapter 9: Ecology and Nature Conservation
Scarce habitat	Chapter 9: Ecology and Nature Conservation
Widespread habitat	Chapter 18: Agricultural Land Use and Recreation Chapter 11: Water Environment

Receptor Group	ES topic area
Groundwater (drinking water and non-drinking water)	Chapter 11: Water Environment
Soil or sediment	Chapter 9: Ecology and Nature Conservation Chapter 10: Geology and Ground Conditions
Built environment (designated buildings/sites)	Chapter 7: Historic Environment
Particular species	Chapter 9: Ecology and Nature Conservation
Freshwater	Chapter 11: Water Environment
Population and human health	Chapter 13: Air Quality Chapter 12: Traffic and Transport Chapter 14: Noise and Vibration Chapter 16: Socio-economic Effects Chapter 17: Health and Wellbeing

2.3.7 See Annex 1 for a summary of the receptors considered for each receptor group.

### Study Area

2.3.8 The distances and buffers used for the study area are based on the consideration of the nature of potential major accidents and disasters associated with the Project, as well as the range of receptors present. They have been informed by expert judgement aligned with practice employed in the assessment of major accidents and disasters at similar facilities, and industry guidance.

2.3.9 In relation to the potential for a 'major accident to the environment' (MATTE), the CDOIF guideline observes that "when considering receptors with MATTE potential, note that the [COMAH Competent Authority's] Safety Report Assessment Manual (SRAM) indicates that it is reasonable to screen within 10 km of the establishment". This is the approach that has been taken for the most sensitive receptors (sites designated at a National, European / International level) and for water bodies with hydraulic connectivity to the Project site.

2.3.10 For land-based sources of hazard with no surface/groundwater pathway, a 10 km buffer for land-based receptors is not considered appropriate as there are no accident scenarios that could give rise to a large toxic gas/vapour cloud or explosion that

would be expected to result in effects beyond 1 km. Similarly, a 1 km buffer is considered conservative for fire scenarios (eg those associated with fuel storage, or storage of hazardous substances).

- 2.3.11 The study areas for the identification of receptors (baseline environment) are therefore as follows:
- 10 km from the Project site boundary for land-based receptors and hazards including: human populations outside of the airport (workers and the public), inside the airport (workers, third parties, the public and occupants of aircrafts), designated land/water sites (internationally designated, ie Special Protection Areas (SPAs), Special Area of Conservation (SACs) and Ramsar Sites) and designated land/water sites (nationally designated, ie Sites of Special Scientific Interest (SSSIs)), and where water bodies could act as pathways to more distant receptors; and
  - 1 km from the Project site boundary for all other environmental receptor groups<sup>1</sup> (eg other designated land, biodiversity and heritage assets).
- 2.3.12 The study areas for the assessment of effects are:
- 10 km from the Project site boundary for wider events; and
  - 1 km from the Project site boundary for ground-based/on-site events.

2.3.13 These distances are considered to be sufficient to capture any effects related to potential serious damage or harm to receptors.

### Temporal Scope

2.3.14 The assessment of major accidents and disasters addresses the construction (including demolition) and operational phases of the Project. The operational phase of the Project is considered in its entirety, rather than in stages based on when each element becomes operational. This is because the potential types and magnitude of risks for each element of the Project in relation to major accidents and disasters are not considered likely to vary significantly and because the entire Project represents the worst-case scenario from an operational perspective.

## 2.4 Approach to Risk Assessment

2.4.1 The methodology developed for assessing the risk of major accidents and disasters to human and environmental receptors includes the following steps:

- identification of major accident and disaster events/scenarios;
- evaluation of the severity/consequences of the events/scenarios;
- determination of the likelihood of occurrence; and
- assessment of the risk posed by each event/scenario and the tolerability of the risk(s).

### Preliminary Identification of Scenarios

2.4.2 The first stage in the approach was to identify a comprehensive list of possible major accident and disaster events/scenarios. As set out above, the assessment considers those events that could arise externally and those that could occur as a result of the Project during both construction and operational phases.

2.4.3 A comprehensive long-list of major accident and disaster events/scenarios with the potential to impact human and environmental receptors was generated. The list was initially developed from the events included in the National Risk Register of Civil Emergencies (Cabinet Office, 2017). This list was then expanded by considering events included in the Major Accident Reporting System (eMARS) and CAP 1036: Global Fatal Accident Review 2002 to 2011 (EC, 2018; CAA, 2013) guidance documents. In addition, information on potential major accident and disaster events/scenarios was also collated from key Gatwick Airport safety staff.

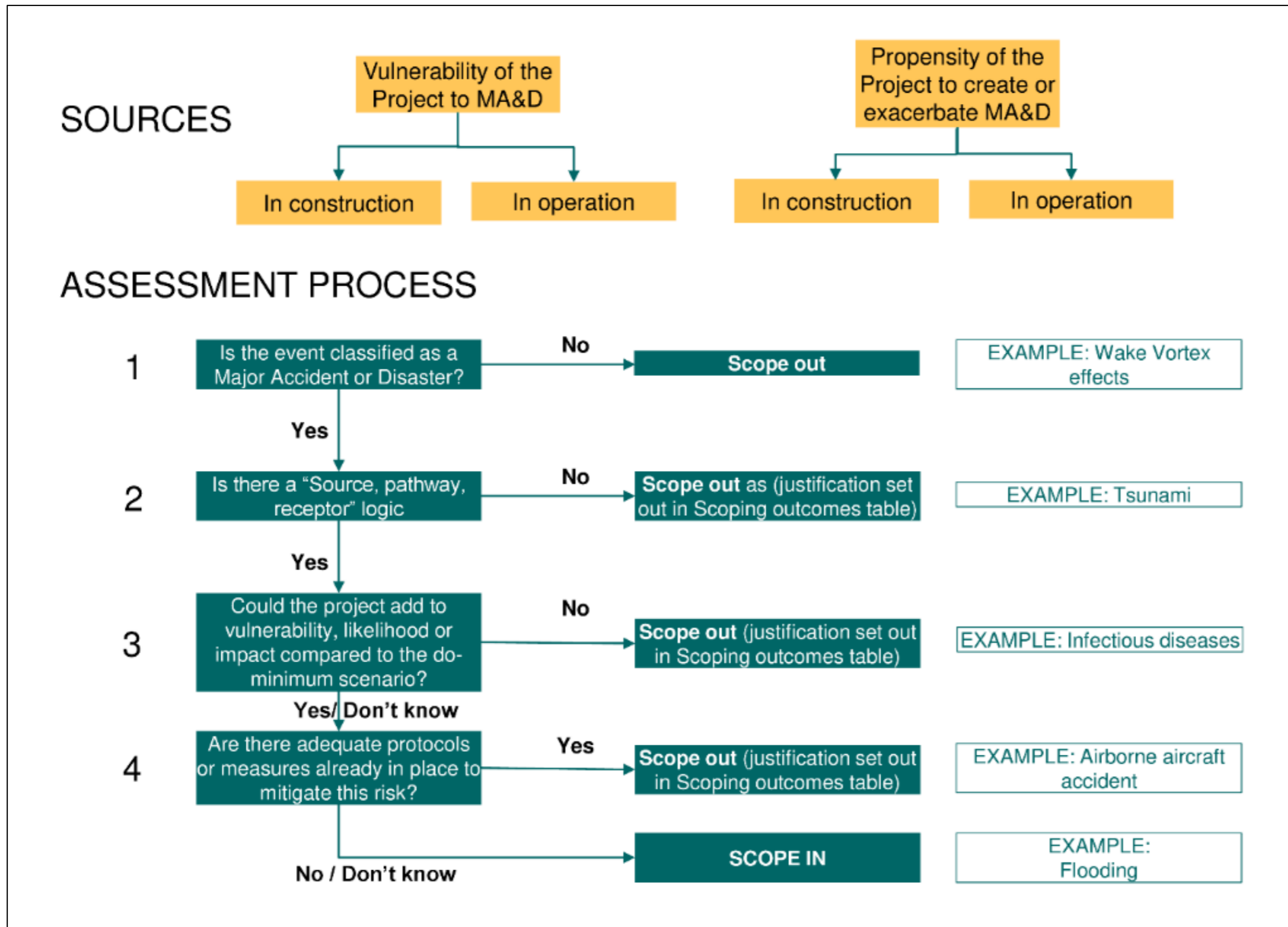
2.4.4 The list of potential major accident and disaster events/scenarios was subject to a preliminary exercise to determine whether there was potential for a risk to occur in the study area. Four 'scoping tests' were applied to determine whether a particular event should be scoped in or out of the EIA process. This process is set out in Diagram 2.4.1. Major accident and disaster events/scenarios were scoped in to the assessment only if they met all four scoping tests.

2.4.5 The result of this exercise was presented in the EIA Scoping Report and is reproduced in Annex 3. The annex explains the findings for each of the potential events/scenarios in the long list

and provides justification for scoping each event/scenario into or out of the EIA process. Events not classified as 'major' (ie no risk of 'serious' danger or damage) and events/scenarios where there is no source, pathway, receptor route were scoped out of the assessment. Events where the Project would not potentially increase the risk compared to the do-minimum scenario, or where strong measures and protocols are already in place to manage the risk, were also scoped out. Any remaining events on the long-list were scoped into the EIA process. All aircraft within the air space and on the ground at Gatwick Airport were included in the scope of the assessment.

<sup>1</sup> The most sensitive receptors in the CDOIF guideline are nationally and internationally designated land/water sites the description of which is limited to SACs, SPAs, Ramsar sites, SSSIs and NNRs. It is recognised that there are other types of receptors that have a statutory designation (eg LNRs); however, in the CDOIF guideline these are considered as part of the 'other designated land' receptor group. Other designated land receptors have been identified within a 1 km radius.

Diagram 2.4.1: Decision Making Process for Identifying the Scope of Assessment for Major Accident and Disaster Events/Scenarios



2.4.6 The scenarios proposed to be taken forward for assessment are summarised in Table 2.4.1. These scenarios are evaluated in the Safety and Environmental Risk Assessment provided in Section 5 (Table 5.1.1).

**Table 2.4.1: Scenarios Assessed Within this Assessment**

Scenarios	Construction	Operation
Flooding (rainfall and riparian)	✓	✓
Earthquake	✓	✓
Subsidence	✓	✓
Landslide	✓	✓
Extreme heat/cold (runway degradation)	✓	✓
Snow (including ice and hail) (building snow loading)	✓	✓
Extreme storm (building damage)	✓	✓
Lightning	✗	✓
Wildfire	✓	✓
Climate change	✓	✓
Contamination (drinking water)	✓	✓
Transport accident – other vehicles (airside and landside)	✓	✓
Transport accident – rail	✓	✗
Accidental release of hazardous chemical	✓	✓
Fire	✓	✓
Explosion	✓	✓
Structural collapse	✓	✓
Collapse of excavation	✓	✗
Legacy issues (unexploded ordnance)	✓	✗
Occupational hazards	✓	✗
Loss of utilities	✓	✗

### Consultation and Engagement

2.4.7 The EIA Scoping Report was issued in September 2019. It outlined the scope and methodology for the proposed technical EIA studies, and summarised those topics proposed to be scoped in and out of the EIA process (See Annex 3). A justification was provided for those topics scoped out of further assessment

(generally explaining why no significant environmental effects were considered likely to occur).

2.4.8 Following consultation with the statutory bodies, the Planning Inspectorate, on behalf of the Secretary of State, provided a Scoping Opinion on 11 October 2019. Key points raised include:

- in several cases, the Planning Inspectorate did not think sufficient consideration had been given for excluding the event/scenario from further evaluation (response 4.14.5);
- in some areas, the Planning Inspectorate requested further information on the current systems in place at Gatwick Airport to address the potential impacts of an event/scenario (response 4.14.6); and
- the Planning Inspectorate also considered that for a number of events/scenarios it could not definitively be concluded that the corresponding risks associated with the Project were no worse than the existing situation (response 4.14.7).

2.4.9 A description of how these issues have been addressed within the PEIR is provided in Table 2.4.2. In addition to scoping, consultation with key stakeholders in relation to major accidents and disasters has been undertaken through a series of meetings in August and September 2019. Key stakeholders are those with some responsibility or interest in accident and emergency response in the local area including the local authorities, emergency services and local resilience forums. Details of the meetings held to date are listed in Table 2.4.3. Further consultation is also proposed during the ongoing EIA process.

Table 2.4.2: Summary of Scoping Opinion from the Planning Inspectorate with respect to Major Accidents and Disasters

ID & Ref	PINS Scoping Opinion	How/where addressed in PEIR
4.14.1 (7.11.44)	<p><u>Public Safety Zones (PSZ)</u></p> <p>As discussed in section 4.12 of this Scoping Opinion, the Applicant seeks to scope out health and wellbeing implications on PSZ on the basis that such matters will be considered as part of the assessment of major accidents and disasters. The Inspectorate notes that section 7.14 of the Scoping Report and Appendix 7.14.1 do not expressly mention PSZ.</p> <p>Where significant effects are likely to occur, this should be specifically assessed in the ES with cross reference between aspect chapters of the ES where relevant.</p>	<p>The CAA is currently consulting on standardizing PSZs. Depending upon the outcome of that consultation a PSZ assessment may be include in the final Environmental Statement.</p>
4.14.2 (Appendix 7.14.1)	<p><u>Scoping Outcomes for Potential Major Accident and Disaster Events</u></p> <p>Appendix 7.14.1 presents a list of all major accidents and disasters considered by the Applicant during construction and operation of the Proposed Development and the sequential 4-staged approach that has been followed. Where the Applicant has sought to scope out certain matters, these are considered in the following rows.</p>	<p>See below.</p>
4.14.3 (Appendix 7.14.1)	<p><u>Events with no source-pathway-receptor linkages</u></p> <p>The Inspectorate is content that the effects associated with the following matters are unlikely to represent significant major accident and disaster events and can be scoped out of the assessment:</p> <ul style="list-style-type: none"> <li>▪ Flooding (coastal and tidal);</li> <li>▪ Tsunami;</li> <li>▪ Storm surge;</li> <li>▪ Volcanic eruption;</li> <li>▪ Dam failure; and</li> <li>▪ Displaced population.</li> </ul>	<p>Aspects scoped out, as agreed with Planning Inspectorate. No further action needed.</p>
4.14.4 (Appendix 7.14.1)	<p><u>Events not classified as major accidents or hazards</u></p> <p>Damage to important artefacts and aircraft wake vortex have been scoped out by the Applicant on the basis that they do not fall under the definition of 'major accidents and disasters' and the Inspectorate agrees with this conclusion and that these matters can be scoped out.</p>	<p>Aspects scoped out, as agreed with Planning Inspectorate. No further action needed.</p>
4.14.5 (Appendix 7.14.1)	<p><u>No increase to risks compared to existing situation (scoping test 3)</u></p> <p>The Applicant seeks to scope out the following on the basis that there is no increase to risks compared to existing situation:</p> <ul style="list-style-type: none"> <li>▪ Lightning strikes (the Inspectorate agrees that it should be scoped in for operational effects, but that this conclusion should also be applied in respect of construction effects);</li> <li>▪ Infectious diseases (human and animal epidemics and pandemics);</li> <li>▪ Drought;</li> <li>▪ Famine and food security;</li> <li>▪ Severe space weather;</li> <li>▪ Terrorism and malicious biological and chemical attacks (including sabotage and vandalism);</li> <li>▪ Industrial action;</li> <li>▪ Widespread public disorder;</li> <li>▪ Cyber-attacks;</li> <li>▪ Explosion / structural collapse / excavation failure at neighboring sites;</li> <li>▪ Rail accidents (the Inspectorate agrees that it should be scoped in for construction effects, but that this conclusion should also be applied in respect of operational effects); and</li> <li>▪ Occupational hazards.</li> </ul> <p>The Inspectorate does not consider that sufficient consideration or detail has been given to the impacts of the Proposed Development in order to definitively conclude that all of the above matters will be 'no worse' than the existing situation. The Inspectorate therefore does not agree to scope these matters out.</p> <p>The ES should include details of the current systems in place to address impacts for these matters and describe any changes required to account for the Proposed Development. Where significant effects are likely to occur, this should be assessed in the ES.</p>	<p>Following receipt of the Scoping Opinion, a qualitative re-assessment of these accident/disaster scenarios has been undertaken. Details are presented in Section 5 (Table 5.1.2).</p>



ID & Ref	PINS Scoping Opinion	How/where addressed in PEIR
4.14.6 (Appendix 7.14.1)	<p><u>Adequate protocols or measures already in place to mitigate risks (scoping test 4)</u></p> <p>The Applicant seeks to scope out the following on the basis that adequate protocols or measures already in place to mitigate risks:</p> <ul style="list-style-type: none"> <li>▪ Extreme heat and cold (including snow, ice and hail)</li> <li>▪ - Instrument failure               <ul style="list-style-type: none"> <li>- Cold embrittlement</li> <li>- Runway excursion</li> <li>- Impairment of major accident emergency services</li> </ul> </li> <li>▪ Damage to aircraft during extreme storms</li> <li>▪ Ash clouds</li> <li>▪ Aircraft accidents on the runway</li> <li>▪ Aircraft accidents (airborne)</li> </ul> <p>The Inspectorate does not consider that sufficient information regarding the existing protocols being relied upon has been provided. It is also not explained at this stage what (if any) changes would be required to the protocols in light of the changes during construction and operation associated with the Proposed Development. The Inspectorate also notes comments in respect of the airspace change in this regard, and that consideration of major accidents would need to reflect such changes to any existing protocols that are being relied upon (particularly around aircraft accidents).</p> <p>The ES should include a definition of the current systems in place to address impacts for these matters (and explain any changes that may be required to those current systems). Where significant effects are likely to occur, this should be assessed in the ES.</p>	<p>Information on the current systems, plans, and procedures in place at Gatwick Airport to address these events/scenarios is presented in Section 5 (Table 5.1.3).</p>
4.14.7 (Appendix 7.14.1)	<p><u>Scoping out of major accidents and disasters of the basis of scoping tests 3 and 4</u></p> <p>The Applicant explains that the scoping tests are 'sequential', and yet the following are listed in Appendix 7.14.1 as not meeting scoping tests 3 or 4. The Inspectorate understood that where test 3 was not met there would be no need to consider test 4.</p> <ul style="list-style-type: none"> <li>▪ Drones and lasers;</li> <li>▪ External objects (bird strike, fireworks, sky lanterns and wind turbines);</li> <li>▪ Deficient emergency planning;</li> <li>▪ Loss of utilities (operation);</li> <li>▪ Loss of essential air safety or airside systems; and</li> <li>▪ Deficient security provisions.</li> </ul> <p>The Inspectorate does not agree that these matters can be scoped out at this stage...[The] reasons are that insufficient information regarding the existing protocols being relied upon has been provided (and what (if any) changes would be required to the protocols in light of the Proposed Development), and that it cannot be definitively concluded at this stage that all of the above matters will be 'no worse' than the existing situation.</p>	<p>Further information is provided in Section 5 (Table 5.1.4) to justify the conclusion that, during the Project and the subsequent operation of the expanded airport, risks from drones, lasers, etc would be no worse as a consequence of the Project, than the current level of risk.</p>
4.14.8 (Appendix 7.14.1)	<p><u>Unexploded ordnance</u></p> <p>The Inspectorate agrees that unexploded ordnance during operation can be scoped out of the assessment, given that such matters will be assessed and, where applicable, assessed and managed during the construction phase.</p>	<p>Aspect scoped out, as agreed with Planning Inspectorate. No further action needed.</p>
4.14.8 (List the comments in order)	<p><u>Major accidents and disaster study areas</u></p> <p>Whilst the Inspectorate notes there is currently, no well-established guidance or standard for assessment of major accidents and disasters within EIA, there is little justification for the study areas selected (10 km for "wider events" related to airspace and 1 km for ground- based/on-site events) beyond the use of expert judgement.</p> <p>The Applicant also states that the study areas may need to be amended should such a need be highlighted during the assessment process. The ES should clearly evidence and justify the final extent of the study area(s) used in the assessment of this aspect. Based on the description of some of the identified 'events', the Inspectorate does not consider arbitrary distances should be applied. The study area should be sufficient to encompass the extent of the anticipated impacts and the likely significant effects of the Proposed Development from the perspective of major accidents and disasters. The Applicant should make effort to agree the approach with relevant consultation bodies.</p>	<p>The approach is described in Section 2 (Study Area). The defined areas are sufficiently wide to encompass the extent of anticipated impacts and likely significant effects.</p>

Table 2.4.3: Consultation Summary Table

Consultee	Date	Issues addressed	How/where addressed in PEIR
Sussex Local Resilience Forum Surrey Local Resilience Forum Representatives from: Crawley Borough Council Horsham District Council West Sussex County Council Surrey County Council Emergency Services (Sussex Police)	26/09/2019 27/01/2020 11/08/2021	Utilization of community risk registers to ensure that the EIA captures known environmental risks.	<p>The following community registers have been reviewed:</p> <ul style="list-style-type: none"> <li>▪ Sussex Local Resilience Forum Community Risk Register;</li> <li>▪ Surrey Local Resilience Forum Surrey Community Risk Register; and</li> <li>▪ Waverley Borough Council Community Risk Register.</li> </ul> <p>The risks contained within these registers have been captured and addressed in Table 5.1.1.</p>
		The impacts of expansion on other developments	PEIR Chapter 19 presents an assessment of the cumulative environmental effects that could occur as a consequence of the Project and the simultaneous development and/or operation of other schemes, where the coincidence could result in effects greater than if the Project occurred on its own. The assessment includes consideration of particular locations where several effects, for example noise, air quality and visual change, may all occur at the same time or one after another.
		The importance of ensuring good surface access is maintained.	As part of the construction works, a traffic management strategy would be put in place to minimise environmental effects, including effects on highways disruption and safety. A maximum speed limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads/work areas is proposed on internal routes during construction. [Note – text to be checked against updated traffic chapter when received]
		Ensuring that rendezvous points are not compromised during construction works.	Effects during construction would be controlled through the Code of Construction Practice (CoCP) and existing Airport Emergency procedures. Existing security arrangements would remain in place and would not be compromised by the Project.
		Security checking/vetting of employees who work landside as well as in the critical part/airside.	All staff working both landside and airside would be subject to security checks. There would be no change from established airport security arrangements.
		There could be an increased risk of protests from action groups opposed to the proposals (including eg drone attacks).	Issues related to risk of protests (including drones) have been scoped back into the assessment and are assessed in the response to the Scoping Opinion. See Annex 3.
Technical Officers Group	03/09/2019	<p>GAL confirmed that, in view of the minor events that have occurred in the Gatwick area, the potential impact of earthquakes is being considered.</p> <p>GAL should ensure that the risks from earthworks are considered in the design of development.</p>	The issues of earthquakes and earth works are addressed in Section 5 (Table 5.1.1). Occupational hazards associated with earthworks, and airside construction activities generally, will be evaluated in further detail in the Environmental Statement (see Annex 3).

Approach to Risk Assessment

- 2.4.10 The major accident and disaster events/scenarios have been assessed for their potential risks to human and environmental receptors.
- 2.4.11 Assessment of risk tolerability for major accidents and disasters in the UK generally incorporates consideration of the ‘as low as reasonably practicable’ (ALARP) principle. In relation to COMAH, risk can be evaluated as either ‘intolerable’, ‘tolerable if ALARP (TifALARP)’ or ‘broadly acceptable’. A requirement of the COMAH Regulations is to demonstrate that relevant legislation, good practice and ‘all necessary measures’ have been adopted. For the purposes of this assessment, effects have been identified as significant if the risk is identified as intolerable.

Safety Risk Assessment

- 2.4.12 The safety risk assessment approach for effects on human receptors is set out in Table 2.4.4. The evaluation leads to a conclusion regarding the tolerability of the risk. The likelihood and severity definitions are consistent with the Health and Safety Executive’s (HSE) general guidance on the principle of risk being ALARP (see HSE Semi-permanent Circular (SPC) 37 and 39, 2012) and the acceptability of societal risk. The risk assessment matrix below therefore provides a suitable basis for ALARP judgement.

Table 2.4.4: Safety Risk Assessment Matrix

Severity	Likelihood of event/scenario to occur (Likelihood)				
	Extremely unlikely	Very unlikely	Unlikely	Reasonably likely	Likely
None	Green	Green	Green	Green	Green
Minor	Green	Green	Green	Green	Green
Significant	Green	Green	Green	Yellow	Yellow
Severe	Green	Green	Yellow	Yellow	Red
Major	Green	Yellow	Yellow	Red	Red
Catastrophic	Yellow	Yellow	Red	Red	Red

- 2.4.13 The terms used above for severity and likelihood are defined in Table 2.4.5 and Table 2.4.6. The assessment of likelihood has been based on an analysis of airport operations and expert judgement in relation to similar risks within major projects.

Table 2.4.5: Safety Risk Ranking Matrix Definition – Likelihood

Likelihood	Likelihood range
Extremely unlikely	<10 <sup>-5</sup> /year, less than once per 100,000 years
Very unlikely	10 <sup>-5</sup> to 10 <sup>-3</sup> /year, between once per 100,000 and once per 1,000 years
Unlikely	10 <sup>-3</sup> to 10 <sup>-1</sup> /year, between once per 1,000 and once per 10 years
Reasonably likely	10 <sup>-1</sup> to 1/year, between once per 10 years and once per year
Likely	>1 per year, greater than once per year

Table 2.4.6: Safety Risk Ranking Matrix Definition – Severity

Likelihood	Definition	Severity
None	Personnel	No injury or damage to health.
	Public	No injury or damage to health.
Minor	Personnel	Minor injury.
	Public	Nuisance offsite.
Significant	Personnel	Lost time accident.
	Public	Short term, minor effects.
Severe	Personnel	Single or few serious injuries.
	Public	Few people require hospital treatment. Emergency plan in operation.
Major	Personnel	Single or few fatalities (<5). Many serious injuries.
	Public	Serious injuries. Tens in hospital.
Catastrophic	Personnel	Many fatalities (5 or more). Numerous serious injuries.
	Public	One or more fatalities. Several serious injuries.

- 2.4.14 With regard to risk, it is noted that the colour coding in Table 2.4.4 relates to:

- red – intolerable risk;
- yellow – risk is TifALARP; and
- green – risk is ‘broadly acceptable’.

Environmental Risk Assessment

- 2.4.15 A common methodology has been published by the CDOIF for the purpose of determining the tolerability of environmental risks

for COMAH establishments. Once a set of accident scenarios has been identified, the methodology typically involves a similar approach to that for effects on human receptors:

- assess potential impacts of events/scenarios to determine the level of severity/harm and the duration/recovery;
- combine the level of severity/harm and the duration/recovery to determine the ‘consequence level’; and
- use a risk matrix, combining the consequence level and likelihood of major accident and disaster events/scenarios to determine the overall risk and the tolerability of that risk (see Table 2.4.7).

- 2.4.16 The assessment of potential impacts is based on the Source-Pathway-Receptor (SPR) approach. This approach typically involves an estimate of the quantity and composition of material which could escape (the source), the routes by which it could travel to a receptor (pathways), and the environmental sensitivity of the receiving environment (receptors).

- Source – refers to the hazardous materials (pollutants) and physical effects (eg thermal radiation and blast overpressure) that may be released in the event of a major accident.
- Pathway – the means by which any pollutant can escape to the environment. Pathways may be internal (within the boundaries of the site) or external. In the latter case pathways can extend for several kilometres or more.
- Receptor – the features of the environment which could be affected (directly or indirectly) by the escape of pollutants to the receiving environment.

- 2.4.17 For there to be environmental harm with the potential to result in a MATTE, all three components of the SPR process must be present and linked together. Where it is established that a complete linkage exists, an environmental consequence assessment is undertaken. Typically, the assessment is a qualitative or semi-quantitative process. The potential environmental effects are then compared to the criteria provided in the CDOIF guideline (CDOIF, 2016) to determine the level of severity/harm and the duration/recovery rate relevant to the receptor type. The CDOIF severity/harm and duration/recovery criteria take into account the sensitivity of each type of receptor considered.

- 2.4.18 The definitions of ‘severity/harm’ (of an event/scenario) are given in Appendix 4, Table 4.1 of the CDOIF guideline, which is reproduced in Annex 4. Severity is defined as significant, severe,

major or catastrophic, noting that a 'significant' level of harm is the lowest level of harm that would not result in a MATTE (ie it would be 'sub-MATTE'). Therefore, for the purposes of this assessment 'significant' has a different meaning to that set out within the EIA Regulations and does not equate to a likely significant effect. 'Severe' is the lowest level of harm that may be considered to be a MATTE.

- 2.4.19 Duration/recovery criteria (taken from Appendix 4, Table 4.2 of the CDOIF guideline and also reproduced in Annex 4) are based on unmitigated consequences and are different for different types of receptors. Harm/recovery durations are judged to be 'short-term', 'medium-term', 'long-term' or 'very long-term', where 'short term' harm is not considered to be a MATTE (sub-MATTE).
- 2.4.20 If either the severity of an impact or the duration of an event is identified as being sub-MATTE, the event has not been considered further in the risk assessment in accordance with the CDOIF guideline. This indicates that such outcomes are low risk, and at the very least could be considered 'broadly acceptable'.
- 2.4.21 Where both the level of severity/harm or the duration/recovery category of an event are assessed to be of MATTE potential, the Consequence Level (classified A, B, C or D) is determined in accordance with Appendix 4, Table 4.3 of the CDOIF guideline, reproduced in Annex 4. This approach establishes the consequence level. The tolerability of a receptor to a MATTE is then determined through use of a Tolerability Assessment Matrix, which combines the consequence level with the likelihood of the major accident and disaster events/scenarios occurring. The matrix used in this assessment is given in Table 2.4.7.

**Table 2.4.7: CDOIF Guideline Risk Assessment Matrix**

Consequence Level	Likelihood						
	10 <sup>-8</sup> - 10 <sup>-7</sup>	10 <sup>-7</sup> - 10 <sup>-6</sup>	10 <sup>-6</sup> - 10 <sup>-5</sup>	10 <sup>-5</sup> - 10 <sup>-4</sup>	10 <sup>-4</sup> - 10 <sup>-3</sup>	10 <sup>-3</sup> - 10 <sup>-2</sup>	>10 <sup>-2</sup>
D - MATTE	Green	Yellow	Yellow	Red	Red	Red	Red
C - MATTE	Green	Green	Yellow	Yellow	Red	Red	Red
B - MATTE	Green	Green	Green	Yellow	Yellow	Red	Red
A - MATTE	Green	Green	Green	Green	Yellow	Yellow	Red
Sub MATTE	Tolerability not considered.						

This table has been derived from the matrix for deriving receptor tolerability for a major accident to the environment (MATTE) in Appendix 4, Table 4.3 of the CDOIF guideline.

- 2.4.22 Further detail on the environmental risk assessment process is presented in Annex 1. The annex identifies the potential sources

of impact, pathways and receptors considered in the assessment. The outcome of the risk assessment is provided in Section 5 (Table 5.1.1). Major accident and disaster scenarios are considered as having the potential for significant effects to arise where the risk is assessed to be intolerable.

### Assumptions and Limitations

- 2.4.23 The assessment has focussed on effects directly attributable to the Project's construction and operation, and effects on the Project from natural disasters. Instances of double jeopardy (ie domino effects) have not been considered.
- 2.4.24 The assessment of major accidents and disasters is reliant on the information contained in related aspects chapters. The assessment and conclusions are therefore based on the current understanding of the existing baseline conditions. However, it is considered unlikely that new baseline information would significantly change the current assessment findings. This will be reviewed during the ongoing EIA process.
- 2.4.25 The assessment of effects on environmental receptors has focussed primarily on the designation and nature of the sites. Sites are designated based on their cultural and natural importance, including the presence of protected habitats and species. This preliminary assessment does not consider the effects of major accidents and disasters on individual species.
- 2.4.26 The assessment of likelihood has been primarily based on expert judgement.
- 2.4.27 No assumptions and limitations have been identified in the preparation of this assessment that would prevent a preliminary assessment of the potential effects being made.

## 3 Project Design and Measures Adopted as Part of the Project

- 3.1.1 The risk assessment (for human and environmental receptors) considers the mitigation measures that form part of the Project, including:
  - measures included as part of the Project design (ie embedded measures);
  - measures proposed to avoid effects occurring or to minimise environmental effects; and
  - measures required as a result of legislative requirements or standard good practice.

- 3.1.2 Mitigation and monitoring measures identified to control construction effects would be implemented through the CoCP. The CoCP will set out the key management measures that contractors would be required to adopt and implement. These measures would include strategies and control measures for managing the potential environmental effects of construction and limiting disturbance from construction activities as far as reasonably practicable. An Outline CoCP is provided at Appendix 5.3.1 of the PEIR.
- 3.1.3 Measures that form part of the Project design, including those relating to climate change (flooding and extreme weather), are described in Chapter 5: Project Description of the PEIR.
- 3.1.4 In relation to major accidents and disasters, established control measures and guidelines that would safeguard the construction and/or operational phases of the Project, include, but are not limited to:
  - *Fire Fighting and Equipment Maintenance Policy* (GAL, undated);
  - *Contingency Plan for Airside Operations Adverse Weather* (GAL, 2016);
  - *Foul Sewage Infrastructure Failure* (GAL, 2017a);
  - *Contingency Plan for Partial Loss of Electricity to the Airport* (GAL, 2018a);
  - *Contingency Plans for Total Loss of Electricity to the Airport* (GAL, 2018b);
  - *Natural Gas Infrastructure Failure* (GAL, 2018g);
  - *Operational Resilience Report* (GAL, 2018h);
  - *Potable Water Infrastructure Failure* (GAL, 2018i);
  - *Spill prevention, response and reporting requirements* (GAL, 2018j);
  - *Gatwick Aerodrome Manual* (GAL, 2019a);
  - *Gatwick Emergency Orders* (GAL, 2019c);
  - *Life Safety Systems (LSS) Maintenance Policy* (GAL, 2019d);
  - *Safety Management System (SMS) Manual* (GAL, 2019e); and
  - *Control of Major Accident Hazards Regulations 2015 External Emergency Plan V2.0*, Gatwick Airport Storage and Hydrant Company Limited (GASHCo).

## 4 Site Setting and Baseline Conditions and Receptors

### 4.1 Site Setting and Infrastructure

- 4.1.1 Gatwick Airport is located in West Sussex between the towns of Crawley and Horley, approximately 25 miles south of central London.
- 4.1.2 The airport is directly served by the M23 Spur off the M23 which runs approximately 1.7 km to the east of the airport. The A23 (London Road) also serves the airport, running in a north-south direction through the airport.
- 4.1.3 The airport sits on the London to Brighton mainline railway. Gatwick Airport's railway station is located at South Terminal, and there is a direct transit link to North Terminal. The station provides over 120 direct rail connections, including direct trains to central London. These include the Gatwick Express service to London Victoria as well as the Southern and Thameslink networks. The station serves over 20 million journeys per year.
- 4.1.4 The Project site includes the large-scale buildings, extensive hardstanding, transport infrastructure, natural and green infrastructure, and associated facilities of Gatwick Airport. Additional areas of land outside of the operational airport are also included within the Project site boundary. Much of the land within the Project site boundary is of little ecological value; however, there are some small areas of ecological interest, typically located towards the Project site boundary, away from the operational area of the airport.
- 4.1.5 Within the airport, surface water is managed through existing Ponds A to G, Pond M and Dog Kennel Pond. Rainfall runoff from the airport generally drains via attenuation ponds and pollution control structures to one of three watercourses: Crawter's Brook, Gatwick Stream and the River Mole, in accordance with existing discharge consents.
- 4.1.6 Foul water currently passes to the Crawley Sewage Treatment Works to the south east of the airport or Horley Sewage Treatment Works to the north east.

### 4.2 Baseline Conditions and Receptors

- 4.2.1 The baseline conditions relevant to the assessment of major accidents and disasters are primarily informed by the baseline data from the topic chapters of the PEIR. This information has

been used to provide an understanding of the baseline conditions for the Project, how these conditions could influence the effects of major accidents and disasters, and the vulnerability of receptors to major accidents and disasters. It is not the intention of this appendix to duplicate information. However, for ease of reference, key baseline features and receptors have been identified. Summary information on human receptors is provided immediately below, while the more detailed information on environmental receptors is set out in Annex 1.

### 4.3 Human Receptors – Present Day

- 4.3.1 There are human receptors on-site and off-site. Depending on the phase of the Project, on-site receptors would include operational staff, construction workers and the public utilising the airport and its facilities.
- 4.3.2 In 2019 approximately 24,000 staff worked at the airport of which approximately 3,300 were employed directly by GAL. In 2020 with the prevailing pandemic conditions, the number of GAL staff fell to approximately 1,900 although this is expected to return to previous levels in line with recovering passenger numbers. In the absence of the Project the total number of employees on site is forecast to increase to over 27,000 by 2029 and then grow towards 28,800 by 2038. The Project is anticipated to result in an increase in approximately 3,200 airport jobs (to approximately 32,000). It is anticipated that construction would require a workforce of up to approximately 1,300 personnel during peak periods.
- 4.3.3 Off-site receptors include:
- the occupants of residential properties, for example at Horley, Lowfield Heath, Charlwood and Tinsley Green;
  - users of public open spaces, for example the Riverside Garden Park;
  - walkers, equestrians and cyclists using the public rights of way network within and around the Project site;
  - occupiers of vehicles travelling on the local road network (for example A23 Airport Way and London Road, M23, Balcombe Road, Charlwood Road and Lowfield Heath Road);
  - passengers using the rail network (for example on the London to Brighton mainline railway); and
  - passengers, staff and visitors to Gatwick Airport using car parks, hotels, circulation space and transport corridors.

## 5 Risk Assessment

### 5.1 Summary of Risk Assessment

- 5.1.1 Safety and environmental risk assessments were carried out for those events/scenarios listed in Table 2.4.1, and the outcomes are presented in Table 5.1.1. The assessment methodology followed that described in Section 2. In some instances, more than one severity level and its associated likelihood has been considered for a single event. This approach ensures that the worst case for severity is considered as well as accounting for less severe but more likely outcomes.
- 5.1.2 In addition, further evaluation has been carried out for those scenarios referred to in 4.14.5 of the Scoping Opinion, where the Planning Inspectorate stated that insufficient consideration had been given for excluding the event/scenario during the initial scoping exercise. The re-evaluation is qualitative in nature and is aimed at determining whether, on the basis of the further detail provided, a scenario should be considered further within the EIA process and whether more detailed assessment is merited at the next phase of the assessment process. The re-evaluation is presented in Table 5.1.2.
- 5.1.3 Table 5.1.3 responds to the request for further information in 4.14.6 of the Scoping Opinion regarding the current systems in place at Gatwick Airport to address the potential impacts of a variety of events/scenarios.
- 5.1.4 Table 5.1.4 provides further detail to explain why, for a variety of scenarios, implementation of the Project would, of itself, not result in a worsening of the existing situation at Gatwick Airport. The table has been prepared in response to 4.14.7 of the Scoping Opinion.

Table 5.1.1: Safety and Environmental Risk Assessment

Disaster/ Hazard Event	Description	Potential Consequence	Potential Receptors	Risk Assessment			Comment	Further Assessment in EIA
				Severity/ Consequence Level	Likelihood	Risk Rating		
Flooding (rainfall and riparian)	Flooding due to excessive rainfall and fluvial overflow, ie overflow of the River Mole and its tributaries.	Structural failure of excavation, temporary or permanent assets leading to fatalities, injuries to people and damage to property/aircraft within the study area.	People	Major (fatalities)	Very unlikely	Tolerable if ALARP	The Airside Operations Adverse Weather (flooding plan) (Gatwick Airport Limited, 2018) is currently adopted by the Gatwick operations team. This details the planning and operating procedures necessary to ensure the safe operation of the airport in the occasion of actual or potential flood event. At Flood State 2A, the Environment Agency will be able to provide information to Gatwick Airport on the current river levels and how rivers are likely to respond to the rainfall forecast. This will happen before river levels start to respond, up to three days before any operational impacts. The Environment Agency will issue a Flood Alert if needed at this stage if there is a developing risk of river flooding. At Flood State 2B, the Environment Agency will be looking at possible operational impacts and the Flood Warning threshold to be met. Forecast models would be run for Gatwick Upstream (Mole) and Gatwick Stream to understand how the river will respond and at what level the river is expected to peak. The Environment Agency will issue a Flood Warning if they are looking at this scenario. It can be issued 24 hours in advance of the onset of flooding, to provide engineering teams with enough time for their deployments. With respect to airport operations during extreme weather events, the runway state is closely monitored, assessed and reported. As part of the Gatwick Emergency Orders, when the weather has deteriorated to such an extent as to render a landing difficult, the Air Traffic Control (ATC) Watch Manager will initiate a Weather Standby. In the event of runway closure the tower would either put the incoming aircraft in holding patterns until the issue is resolved or aircraft would be diverted.	No further assessment proposed.
		Release of hazardous material (environmentally damaging substance) leading to contamination of local water courses, soil and groundwater. Ecological impact and contamination of water resources.	Environment	Sub-MATTE	n/a(1)	Broadly Acceptable		
Earthquake	Seismic activity strong enough to cause damage to property or endanger life (>6.0 on the Richter scale).	Failure of buildings and structures across the Gatwick site leading to fatalities, injuries to people and damage to property.	People	Catastrophic (fatalities)	Very unlikely	Tolerable if ALARP	As noted by the British Geological Survey (BGS), the UK is not generally associated with earthquakes. There are between 20 to 30 felt by people each year, and a few hundred smaller ones which are recorded by seismic instrumentation. Most of these earthquakes are very small and cause no damage. The largest known British earthquake occurred near the Dogger Bank in 1931, with a magnitude of 6.1. It occurred 60 miles offshore but caused minor damage to buildings on the east coast of England.	No further assessment proposed.
				Severe (injuries)	Unlikely	Tolerable if ALARP		

Disaster/ Hazard Event	Description	Potential Consequence	Potential Receptors	Risk Assessment			Comment	Further Assessment in EIA
				Severity/ Consequence Level	Likelihood	Risk Rating		
		Structural failure of fuel storage and handling systems leading to contamination of soil and groundwater, environmental impact and contamination of water resources.	Environment	Sub-MATTE	n/a(1)	Broadly Acceptable	The local area around Gatwick has been subject to some recent minor earthquakes (in 2018 an earthquake of magnitude 3.1 was recorded at Newdigate at a depth of three miles, and reportedly felt by passengers at Gatwick Airport). However, a larger earthquake which could result in a major accident and disaster is considered unlikely. Airport structures are designed for earthquake resistance as per Eurocodes and the National Annex inclusive of PD 6698 (Recommendations for the design of structures for earthquake resistance to BS EN 1998). Gatwick falls in peak ground acceleration for a 2,500 return period of 0.00 – 0.02 g. No direct policy exists for dealing with structural collapse. However, all structures are designed in line with Eurocodes and disproportionate collapse rules. The Project does not introduce any new features to Gatwick Airport which might increase the vulnerability of the airport to the effects of an earthquake should one occur.	
		Damage to runways leading to crash of inbound and outbound aircraft and injuries and fatalities to passengers.	People	Catastrophic (fatalities)	Extremely unlikely	Tolerable if ALARP	This event scenario relates to the coincidence of aircraft moving on the runway with an earthquake of a magnitude sufficient to cause significant damage to the runway surface. It is a highly unlikely scenario and one which is not, in any case, introduced by the Project. Response to such an event would be through existing emergency arrangements.	No further assessment proposed.
				Severe (injuries)	Unlikely	Tolerable if ALARP		
Subsidence	Downward settling of the ground surface due to underlying geology or flood events.	Vehicular transport accident and fire leading to fatalities, injuries to people and damage to property/aircraft within the study area.	People	Major (fatalities)	Extremely unlikely	Broadly Acceptable	GAL has prepared an Operational Resilience Report for Gatwick Airport in accordance with the Civil Aviation Authority's guidance. The 2018 report identifies the top 10 significant risks and a further 18 'addressable risks', as signed off by the Audit Committee. Damage to the runway or other airport facilities through geological settlement was not identified as a risk.	No further assessment proposed.
				Severe (injuries)	Very unlikely	Broadly Acceptable		
		Damage to runways leading to crash of inbound and outbound aircraft and injuries and fatalities to passengers.	People	Catastrophic (fatalities)	Extremely unlikely	Tolerable if ALARP		
		Severe (injuries)	Very unlikely	Broadly Acceptable				
Landslide		Vehicular transport accident and fire	People	Major (fatalities)	Extremely unlikely	Broadly Acceptable	This event is similar in nature to subsidence although more rapid in terms of its action. However, a landslide of the airport's existing graded surfaces	

Disaster/ Hazard Event	Description	Potential Consequence	Potential Receptors	Risk Assessment			Comment	Further Assessment in EIA
				Severity/ Consequence Level	Likelihood	Risk Rating		
Significant land movement triggered by natural phenomena.		leading to fatalities, injuries to people and damage to property/aircraft within the study area.		Significant (injuries)	Very unlikely	Broadly Acceptable	(runways, taxiways, apron, etc) is highly unlikely given their continuous usage by aviation traffic for well over half a century. Damage to the runway or other airport facilities through land slippage was also not identified as a risk in the Operational Resilience Report.	No further assessment proposed.
		Damage to runways leading to crash of inbound and outbound aircraft and injuries and fatalities to passengers.		People	Catastrophic (fatalities)	Extremely unlikely	Tolerable if ALARP	The rapid development of a landslide on a runway (assumed in this instance to be a sinkhole) coincident with the arrival or departure of an aircraft is not considered to be a realistic scenario in any case, and particularly given the geology at Gatwick.
			Severe (injuries)		Very unlikely	Broadly Acceptable		
				Major (fatalities)	Unlikely	Tolerable if ALARP	The Project is not likely to have any effect on weather extremes (further detail on climate change is presented in Chapter 15: Climate Change and Carbon). Expanded operations would conform with current response practices. New facilities would be constructed to the appropriate codes and standards. GAL operates its Contingency Plan for Airside Operations Adverse Weather. This plan covers all airside operations areas of responsibility including runways, taxiways, aprons, roads, passenger walkways, grass areas and stands. It is designed to enable stable operations to be maintained, as far as is realistically possible, in the event of disruptive adverse weather which is taken to include snow, ice, volcanic ash, flood, wind, heat, and cumulonimbus (CB) activity. The plan addresses airside operations incident and crisis management; monitoring of weather conditions and weather forecasting; response actions and resources; and communications.	No further assessment proposed.
		Severe (injuries)	Reasonably likely	Tolerable if ALARP				
Extreme weather (including snow, storm lightning and wildfire)	Extremes of heat/cold, snow, storms, lightning strikes, wildfire and drought exacerbated by climate change.	Vehicular transport accident and fire leading to fatalities, injuries to people and damage to property/aircraft within the study area.	People	Major (fatalities)	Unlikely	Tolerable if ALARP	The Contingency Plan for Airside Operations Adverse Weather includes a response to CB activity, clouds which are capable of producing lightning and other dangerous severe weather. CB activity may have an impact on the safe operation of aircraft within a 5 nautical mile radius of Gatwick. The plan is aimed at ensuring safe operating conditions exist on all operational airfield areas and that all staff on the airfield are safe from CB activity.	No further assessment proposed.
				Severe (injuries)	Unlikely	Tolerable if ALARP		
		Electrocution.	People	Major (fatalities)	Very unlikely	Tolerable if ALARP	The condition of the runway would be checked following a severe weather event. The likelihood that significant damage would go undetected is considered to be 'highly unlikely'.	No further assessment proposed.
				Severe (injuries)	Unlikely	Tolerable if ALARP		
		Damage to runway leading to crash of inbound and outbound aircraft and fatalities.	People	Catastrophic (fatalities)	Extremely unlikely	Tolerable if ALARP		
				Severe (injuries)	Unlikely	Tolerable if ALARP		



Disaster/ Hazard Event	Description	Potential Consequence	Potential Receptors	Risk Assessment			Comment	Further Assessment in EIA
				Severity/ Consequence Level	Likelihood	Risk Rating		
		Overloading and damage to excavation, temporary or permanent assets leading to fatalities, injuries to people and damage to property.	People	Major (fatalities)	Very unlikely	Tolerable if ALARP	Under the Safety Management System (see Occupational Hazards below), worksite conditions would be inspected following extreme weather in order to identify whether the event could have introduced hazards (such as damage to an excavation) which may have implications for the on-going safety of the construction workforce. Appropriate mitigation would be identified and implemented.	No further assessment proposed.
				Severe (injuries)	Unlikely	Tolerable if ALARP		
		Wildfire leading to fatalities or injuries to people.	People	Major (fatalities)	Extremely unlikely	Broadly Acceptable	Grassed areas at the airport are maintained by cropping to a low level, and the whole aerodrome is regularly inspected by airfield operations. The airport is supported 24 hours a day by a dedicated Gatwick Airport Fire and Rescue Service. It would be unlikely for a fire to start due to the lack of a direct ignition source. However, if one did, it would be spotted very early and dealt with by the fire service. The development of a wildfire on Gatwick Airport is thus not considered a realistic hazard scenario. With respect to wildfires off the airfield, it is noted that the local authority fire service (West Sussex Fire and Rescue Service) have a dedicated wildfire subject matter advisor who can be consulted at any time. The fire service has procedures in place for dealing with all types and sizes of wildfire scenarios.	No further assessment proposed.
				Significant (injuries)	Extremely unlikely	Broadly Acceptable		
Contamination (drinking water)	Failure of on-site monitoring, handling, control and management, including security, leading to contamination of water sources.	Illness or, potentially, fatality in airport staff, air crew, passengers, and construction workforce.	People	Major (fatalities)	Extremely unlikely	Broadly Acceptable	Contamination of the potable water supply has occurred in the UK in the past and cannot therefore be discounted as a potential hazard. However, it is not one introduced by the Project nor, in reality, is it one that can be managed by GAL, only responded to in the remote event of an occurrence. The Project would increase the number of people potentially exposed to contaminated water (if it occurred as an external event due to increased passenger throughput), but not to any significant extent.	No further assessment proposed.
				Significant (injuries)	Extremely unlikely	Broadly Acceptable		
Transport accident	Landside or airside collision between ground	Vehicular transport accident leading to	People	Major (fatalities)	Unlikely	Tolerable if ALARP	<u>Airside</u>	

Disaster/ Hazard Event	Description	Potential Consequence	Potential Receptors	Risk Assessment			Comment	Further Assessment in EIA
				Severity/ Consequence Level	Likelihood	Risk Rating		
	vehicle (car/HGV/passenger vehicle) and other vehicle or airport structure.	fatalities, injuries to people.		Significant (injuries)	Reasonably likely	Tolerable if ALARP	<p>Transport movements around Gatwick are subject to a range of controls including one-way systems, speed limits, access restrictions, permits, etc. The arrangements, which would apply to the Project, are designed to reduce the risk of a traffic accident.</p> <p>To drive a GAL vehicle the appropriate full category of driving licence must be held.</p> <p>All drivers carry out a daily vehicle inspection before using a vehicle for the first time on that day. Vehicles must be safe to operate. It is not permitted to operate vehicles with any safety critical defects present. Records are kept for 15 months.</p> <p>The use of taxiway crossings by airside drivers is subject to a Gatwick Airport Directive (GAD/F:1/18) which imposes restrictions (speed limits, overtaking, give way priorities, etc), clearance and other requirements. Airside driving offences are recorded as minor, major and life-threatening. Life-threatening or possible life-threatening incidents result in immediate removal of all passes. If after 30 days an investigation is not received or completed the ID pass is cancelled. All offences remain on the airside driving licence provider for 12 months. Three minor offences committed within 12 months of a major offence result in the suspension of the Airside Identity card as will a second major offence within a 12 month period. GAL requires all drivers operating vehicles airside to have access to a copy of the latest Airfield Driving Map issued in their airside vehicles. Those vehicles/drivers who are authorised to operate on the manoeuvring area must have access to the two additional Gatwick Airfield Driving Maps relating to the runway in use.</p> <p><u>Landside</u></p> <p>With respect to the risk of landside accidents, ie accidents on the roads open to the public accessing the airport, it is noted that the Project incorporates highway improvements including local widening on the junction entry/exit lanes for both the North Terminal and South Terminal roundabouts, together with improvements at Longbridge Roundabout. These improvements would be expected to reduce the overall risk of road accidents in the vicinity of Gatwick despite the anticipated increase in traffic.</p>	No further assessment proposed.
Transport accident – rail		Vehicular transport accident leading to	People	Major (fatalities)	Very unlikely	Tolerable if ALARP	Any works near to the existing railway would be undertaken in accordance with railway working procedures to ensure safe working practices. It is likely	

Disaster/ Hazard Event	Description	Potential Consequence	Potential Receptors	Risk Assessment			Comment	Further Assessment in EIA
				Severity/ Consequence Level	Likelihood	Risk Rating		
	Collision with trains, trams or inter terminal rail during construction works.	fatalities, injuries to people.		Significant (injuries)	Unlikely	Broadly Acceptable	that risks can be appropriately managed through planning, management and the imposition of a range of controls. However, the issue would be taken forward for assessment in the final ES. The assessment would consider the transportation by rail of construction materials and aggregates.	Review and assess the risks in the EIA.
Accidental release of hazardous chemical	Significant release of hazardous material during demolition, construction, and operation resulting from its storage, transfer and handling.	Illness or, potentially, fatality to exposed parties.	People	Major (fatalities)	Very unlikely	Tolerable if ALARP	During construction, the management of hazardous materials would be covered by the Safety Management System (see Occupational Hazards below). Appropriate controls would be identified and implemented. It is not foreseen that the Project would introduce any new or toxic materials to the site, and risks are therefore likely to be the same as those for typical construction works. The potential presence of hydrocarbon contamination is considered in Chapter 10: Geology and Ground Conditions of the PEIR. During airport operations, hazardous materials handling would be covered by applicable regulations and corresponding handling procedures.	No further assessment proposed.
		Environmental impact and contamination of water resources.	Environment	Sub-MATTE	n/a <sup>(1)</sup>	Broadly Acceptable		
Fire	Failure in the storage and handling of flammable substance (jet fuel) resulting in its release and subsequent ignition.	Injury or fatality to parties immediately exposed to the fire.	People	Major (fatalities)	Very unlikely	Tolerable if ALARP	The fuel farm at Gatwick is designated as an Upper Tier COMAH (Control of Major Accident Hazards) site and as such is highly regulated with established safe systems of work. The fuel farm complies with the recommendations of Buncefield Standard Task Group and HSG176. Both internal and external Emergency Plans are in place to ensure that an effective response can be made in the event of a major accident at the site. A detailed risk assessment of the fuel farm has been carried out. An evaluation has been made of a range of hazard scenarios including bundled pool fires affecting on-site populations, escalated tank fires, and catastrophic tank failure affecting on-site and off-site populations. Risks from the major accident scenarios were assessed as being at worst "Tolerable if ALARP". The Project would result in an increase in fuel throughput due to the increase in the number of aircraft refuelling at Gatwick. However, the tank farm itself would remain unaltered. Risk levels would thus remain unaltered from the present day.	No further assessment proposed.
		Ecological impact and contamination of water resources.	Environment	Sub-MATTE	n/a <sup>(1)</sup>	Broadly Acceptable		
		Atmospheric pollution with public health impacts.		Sub-MATTE	n/a <sup>(1)</sup>	Broadly Acceptable		
Explosion	Rupture of a gas main leading to explosion.	Injury or fatality to nearby personnel. Blast overpressure damage to environmental receptors (eg built heritage, trees, fauna).	People	Major (fatalities)	Very unlikely	Tolerable if ALARP	Key precautions would be followed during construction works, including: obtaining plans of gas pipes, locating the line of the pipes using suitable locating devices, contacting the pipeline/network operator prior to commencement of work activities, ensuring site workers are briefed on the location of the pipes and the precautions required, and adopt safe digging practices (eg mechanical excavators should not be used within 500 mm of a gas pipe).	No further assessment proposed.
				Significant (injuries)	Unlikely	Broadly Acceptable		
		Environment	Sub-MATTE	n/a <sup>(1)</sup>	Broadly Acceptable			

Disaster/ Hazard Event	Description	Potential Consequence	Potential Receptors	Risk Assessment			Comment	Further Assessment in EIA
				Severity/ Consequence Level	Likelihood	Risk Rating		
Structural collapse	Failure of buildings, structures, bridges, tunnels, storage, roads, construction equipment, mobile equipment, waste and spoils.	Injury or fatality to people in the immediate vicinity of the collapse.	People	Major (fatalities)	Very unlikely	Tolerable if ALARP	The new facilities at Gatwick would be constructed to the appropriate current engineering codes and standards. The detailed requirements of Building Regulations in England (and Wales) would be followed, covering aspects such as adequate materials, structure, waterproofing and weatherisation, etc. On this basis, the new facilities would be resistant to the extremes of weather and would not be susceptible to weather-induced structural overload.	No further assessment proposed.
				Significant (injuries)	Very unlikely	Broadly Acceptable		
Collapse of excavation	Collapse of any earthwork, trench, well, shaft, tunnel or underground working.	Injury or fatality to construction personnel.	People	Major (fatalities)	Very unlikely	Tolerable if ALARP	See Occupational Hazards.	No further assessment proposed.
				Significant (injuries)	Unlikely	Broadly Acceptable		
Legacy issues	Detonation of unexploded ordnance.	Injury or fatality to construction personnel.	People	Major (fatalities)	Very unlikely	Tolerable if ALARP	An unexploded ordnance (UXO) risk assessment was undertaken prior to the construction of the Boeing hangar at Gatwick. The assessment identified that items of ordnance have been previously encountered during works at the airport in an around the historic boundary of RAF Gatwick (central and southern areas of the current airport). For the Project, it is anticipated that a similar UXO risk assessment would be undertaken in advance of any construction works starting on the Project site. The report would include an evaluation of the risk posed by any existing or potential explosive ordnance and risk mitigation measures would be recommended if deemed necessary.	No further assessment proposed.
				Significant (injuries)	Very unlikely	Broadly Acceptable		
Occupational hazards	Occupational hazards, including fall from heights.	Injury or fatality to construction personnel.	People	Major (fatalities)	Unlikely	Tolerable if ALARP	Health and safety hazards during the Project's construction phase would be controlled through a Safety Management System (SMS) certified to OHSAS (Occupational Health and Safety Assessment Series) 18001 or ISO 45001, and established health and safety procedures. Jointly, these would address the identification, control and elimination of the typical range of construction hazards and risks: falls, mobile plant, falling material and collapses, electrical accidents manual handling, exposure to hazardous materials, etc. Effective implementation of the SMS would control the risk of a major accident during construction.	No further assessment proposed.
			People	Significant (injuries)	Likely	Tolerable if ALARP		

Disaster/ Hazard Event	Description	Potential Consequence	Potential Receptors	Risk Assessment			Comment	Further Assessment in EIA
				Severity/ Consequence Level	Likelihood	Risk Rating		
Loss of utilities	Disruption to airport operations resulting from severance of utilities (electricity, gas, fuel, water, etc) during construction operations.	Risk to the safe management of the airport.	People	Severe	Unlikely	Tolerable if ALARP	<p>GAL has contingency plans in place for the total and partial loss of electricity, and failure of natural gas, foul sewage, and potable water infrastructure. In each case the plans set out communications requirements, and the priority actions (checking fuel and running condition of all standby generators, isolating equipment, deploying waste tankers, release of trapped persons from lifts, etc) necessary to limit the impact of an event on people and the environment.</p> <p>Life Safety Systems are incorporated into the current airport buildings to protect and preserve human life during an emergency or failure of a critical building system. These include architectural systems that provide emergency egress and protected areas within buildings, and automated mechanical systems that include fire suppression, smoke removal, stairwell pressurisation, water storage, etc.</p> <p>The current contingency planning and safety systems would be extended to cover the construction and operational phases of the Project. Specific arrangements would be examined for the final ES once more design definition is available.</p>	Review and assess the risks in the EIA.

Table Notes

- (1) Where the consequences level is determined to be sub-MATTE there is no requirement to assign a frequency or likelihood as sub-MATTE outcomes are not considered further as part of the risk tolerability assessment in the CDOIF guideline (CDOIF 2016); which implies that such outcomes are of low risk, and at the very least could be considered 'broadly acceptable'.

Table 5.1.2: Evaluation of Issues Identified by Planning Inspectorate as Requiring Further Information

Issue	Comment	Outcome
Lightning strikes during construction	As a matter of standard HSE construction site practice, work would only be carried out when weather conditions would not jeopardise the health and safety of the workers. An electrical storm is clearly jeopardous, and construction activity would thus be suspended prior to the outbreak of such a storm in the vicinity of the airport. Knowledge of a storm's imminence would be established through weather forecasts and visual observation. The issue of lightning strikes in respect of construction effects is therefore not considered to be significant. Nevertheless, the details of the proposed Project construction activities are necessarily broad at this stage. Construction HSE management will therefore be evaluated in detail in the ES. This commitment is echoed under "Occupational hazards" below.	To be considered in more detail in the ES.
Infectious diseases (human and animal epidemics and pandemics)	<p>The control of risks from sick passengers and live animals arriving at Gatwick is managed by the Port Health Authority. The control of disease spread by passengers is managed in accordance with the World Health Organisation's International Health Regulations, which are transposed into UK law as the Public Health (Aircraft) Regulations, as amended. These give legal powers to the Medical Officer and customs officers to carry out any necessary actions. The framework and facilities are subject to inspection by the CAA. Gatwick is one of the UK's live animal border inspection posts (BIP) and requires incoming animals to be appropriately certified or inspected.</p> <p>The response to pandemics, such as COVID-19, are coordinated and managed strategically by government. It is the government that is responsible for establishing local, national and international travel restrictions; identifying red list travel ban countries; enforcing the closure of non-essential shops, restaurants and bars; and determining health and testing pre-requisites, social distancing rules, legal permissions, etc. These requirements are then enforced by the airport, airlines and other travel operators. For example, at the time of writing, any passenger arriving into Gatwick (and England generally) from outside the UK, Ireland the Isle of Man and the Channel Islands is required to complete a Passenger Locator Form, show proof of a negative COVID-19 test taken up to 72 hours prior to departure, quarantine for 10 days (or complete a mandatory hotel quarantine), take a COVID-19 test on day 2 and day 8 of quarantine, and follow the national lockdown rules.</p> <p>The airport also implements pandemic-specific measures aimed at reducing the risk of travel and transit through the airport facilities. With respect to COVID-19, Gatwick has temporarily ceased operations in its southern terminal, installed protective screens at check-ins and boarding gates, increased the cleaning of common use surfaces, touchscreens, handrails etc, installed UV light treatment to the tray system in security areas (to guarantee a 99.9% microbe disinfection rate), and changed seating arrangements to ensure social distancing measures can be observed, etc.</p> <p>The Northern Runway Project would not change Gatwick's approach to biosecurity as outlined above. While the Project is aimed at facilitating the increase in the throughput of passengers it would not therefore measurably increase the likelihood of an outbreak of a communicable disease in the UK compared to the present day or change the response arrangements implemented via government or by GAL.</p>	No further work considered necessary.
Drought	Droughts are relatively common in the UK, with one around every five to ten years on average. They are, however, not particularly severe when compared with more drought-prone regions of the world. In England, the response to an event is managed by the Environment Agency in four stages as the drought worsens: i) an initial media campaign aimed at promoting water conservation by the public, ii) a ban on the use of domestic hose pipes, iii) conserving non-essential supplies of water, eg widening the hosepipe bans to include sprinklers, banning the cleaning of buildings, vehicles, etc, and iv) drastic measures such as water rationing to all businesses and homes. All of these measures were implemented in 1976, the date of the most significant UK drought in recent times. It is not thought likely that the drought response measures would have a severe impact upon the Project (other than in the most extreme case, a possible delay) or the on-going functioning of the airport (which remained operational in 1976). This issue will therefore not be considered further.	No further work considered necessary.
Famine and food security	Famine, by which is meant widespread food shortage leading to acute malnutrition and a significant rise in regional death rates, is not an issue within the UK and has not been since the beginning of the 20th century, including during times of war. Famine could not be caused by the Project nor is there any remotely significant likelihood that it would affect the implementation of the Project or the running of the airport.	No further work considered necessary.
Severe space weather	<p>Space weather is essentially abnormal levels of radiation and high energy charged particles which are released into space as a result of eruptions on the sun's surface. The weather can influence the performance and reliability of space-borne, ground-based or airborne systems and can endanger human life or health.</p> <p>When a space weather event occurs, a wide range of effects can result. The main impacts on aviation are:</p> <ul style="list-style-type: none"> <li>▪ Degradation of radio/satellite communications;</li> <li>▪ Onboard system failure due to radiation;</li> <li>▪ Radiation doses. During radiation storms, unusually high levels of ionizing radiation may lead to an excessive radiation dose for air travellers and crew;</li> <li>▪ Disruption to Global Navigation Satellite System (GNSS) operation;</li> <li>▪ Effects on magnetic based equipment due to a change in the earth's magnetic field; and</li> <li>▪ Possible effects on aircraft electrical systems due to solar electrical coupling mechanisms.</li> </ul>	No further work considered necessary.

Issue	Comment	Outcome
	<p>Other potential effects which may impact aviation are:</p> <ul style="list-style-type: none"> <li>▪ Power grid and ground public communication failure; and</li> <li>▪ Satellite failure.</li> </ul> <p>The Project would increase the number of passengers flying per year and, all other things being equal, would increase the number of people exposed to radiation. However, this is not considered to be a significant issue, and largely one outside the control of the airport. It is noted that when a space weather event causes radiation exposure to exceed the safe level set by aviation authorities, the typical response is to divert an aircraft's flight path. It is not considered that usual aviation practice would be altered by the Project.</p>	
<p>Terrorism and malicious biological and chemical attacks (including sabotage and vandalism)</p>	<p>The issue of terrorism will be addressed through compliance with Airports National Policy. The Airports National Policy Statement states:</p> <p><i>"4.63 National security considerations apply across all national infrastructure sectors. The Department for Transport acts as the sector sponsor department for the aviation sector, and in this capacity has lead responsibility for security matters and for directing the security approach to be taken, working with the Civil Aviation Authority. The Department for Transport works closely with Government agencies, including the Centre for the Protection of National Infrastructure, to reduce the vulnerability of the aviation sector to terrorism and other national security threats.</i></p> <p><i>4.64 Government policy is to ensure that, where possible, proportionate protective security measures are designed into new infrastructure projects at an early stage in the project development. The nature of the aviation sector as a target for terrorism means that security considerations will likely apply in the case of the infrastructure project for which development consent may be sought under the Airports NPS.</i></p> <p><i>4.65 Where national security implications have been identified, the applicant should consult with relevant security experts from the Centre for the Protection of National Infrastructure and the Department for Transport to ensure that physical, procedural and personnel security measures have been adequately considered in the design process, and that adequate consideration has been given to the management of security risks. If the Department for Transport, taking advice from the Civil Aviation Authority, Centre for the Protection of National Infrastructure and others it considers appropriate, forms the opinion that it is satisfied that current and potential future security needs are adequately addressed in the project and that relevant guidance on these matters has been appropriately taken into account in the application, it will provide confirmation of this to the Secretary of State, and the Examining Authority should not need to give any further consideration to the details of the security measures during the examination.</i></p> <p><i>4.69 There remains a considerable threat to aviation security from terrorism. The UK meets this threat with a multi-layered aviation security regime built on intelligence, effective risk management and robust, proportionate measures, brought together under the National Aviation Security Programme. The regulations governing aviation security in the UK have their basis in UK and European law, and are enforced by the Civil Aviation Authority on behalf of the Secretary of State."</i></p> <p>It is not thought likely that the Project's implementation or the operation of the airport post-implementation would directly affect incidents of terrorism and malicious biological and chemical attacks (as distinct from public disorder – see below). In any case, the threat would be controlled through existing security arrangements at Gatwick, as coordinated through the above bodies.</p>	<p>No further work considered necessary.</p>
<p>Industrial action</p>	<p>Industrial action at Gatwick, depending upon its nature, could have an impact on the functioning of the airport, resulting in disruption to flight schedules and passenger movements. In the extreme it could result in the suspension of all flights. However, it would not of itself realistically introduce major hazards into the operation of the airport, and certainly none that could not be countered through the range of contingency measures currently available to GAL. The implementation of the Project and the subsequent operation of the airport with the increase in Air Transport Movements (ATMs) would not change this situation.</p>	<p>No further work considered necessary.</p>
<p>Widespread public disorder</p>	<p>The Project could well be subject to protests, though what form these would take and their size is a matter of speculation. It is possible they could result in disruption but would not realistically introduce major hazards to the operation of the airport.</p> <p>Gatwick Airport is subject to the Airport Security Planning Framework, as set out in the Aviation Security Act 1982 (as amended by the Policing and Crime Act 2009). Under this framework it is required to prepare and maintain an up-to-date Risk Report, assessing each threat to the security of the airport, and an Airport Security Plan (ASP), detailing what security measures will be put in place and which organisation is responsible for the delivery of each measure. Aspects of public disorder and the response thereto are addressed through these arrangements.</p>	<p>No further work considered necessary.</p>
<p>Cyber-attacks</p>	<p>The Project does not introduce anything to Gatwick airport that might make cyber-attacks substantially more or less likely. The technical aspects of cyber security is a topic well outside the scope of this EIA.</p>	<p>No further work considered necessary.</p>
<p>Explosion/structural collapse/excavation</p>	<p>This issue is addressed above (see Table 5.1.1).</p>	<p>Addressed in PEIR. No further work considered necessary.</p>

Issue	Comment	Outcome
failure at neighbouring sites		
Rail accidents (the Inspectorate agrees that it should be scoped in for construction effects, but that this conclusion should also be applied in respect of operational effects)	<p>Network Rail has commenced work on the modernisation of Gatwick Station with the aim of accommodating forecast rail growth up to 2036. Proposals include: almost doubling the size of the concourse; providing eight new escalators, five new lifts and four new stairways to improve accessibility and passenger flow; widening platforms 5 and 6 to reduce overcrowding; providing better connections to the South Terminal with improved passenger information; and installing an ‘attractive’ new roof structure. These improvements are proposed to be complete by 2022.</p> <p>The number of Gatwick passengers travelling to or from the airport by train has grown from 25% in 2005 to 38% in 2019.</p> <p>Statistically, the increase in the throughput of rail passengers would increase the risk of passenger fatality but from a very low base. As an example, in the period 2017/18 there were a total of 298 passenger and workforce fatalities on the entire UK National Network, but 285 of these were either suicides or trespassers. Net fatalities due to travel to and from the airport would in fact be expected to decline as the statistical increase on passenger fatalities due to increased rail usage would be more than offset by the decline in fatalities resulting from travel by road.</p> <p>Outside of the increase in the throughput of passengers enabled by the railway station improvements, there is no obvious linkage between these improvements and the operation of the expanded airport. The issue of rail accidents during operation of the Project will not therefore be considered further in the EIA process.</p>	No further work considered necessary.
Occupational hazards	<p>Runway construction projects involve modification of airport operating conditions with the simultaneous presence of non-aviation staff and equipment in close vicinity to operational runways. They are thus highly significant in terms of the safety of construction personnel. Internationally, records show that accidents and incidents have occurred on runway construction projects. Most of the occupational hazards associated with the construction activities can be significantly mitigated through safe working practices, risk assessment and the implementation of preventative or protective measures, etc. Details of those measures that are currently in place at Gatwick, or which will be put in place for the Project will be described and assessed in detail in the ES.</p>	To be considered in more detail in the ES.

**Table 5.1.3: Definition of the Current Systems in Place to Address a Variety of Major Accident and Disaster Scenarios**

Issue	Comment
<p>Extreme heat and cold (including snow, ice and hail)</p> <ul style="list-style-type: none"> <li>- Instrument failure</li> <li>- Cold embrittlement</li> <li>- Runway excursion</li> <li>- Impairment of major accident emergency services</li> </ul>	<p>Airside Operations are required to plan for adverse weather conditions. The GAL Contingency Plan for Airside Operations Adverse Weather covers all airside operations areas of responsibility including runways, taxiways, aprons, roads passenger walkways, grass areas and stands. The Airside Operations Adverse Weather contingency plan is designed to enable stable operations to be maintained, as far as is realistic, in the event of disruptive adverse weather. The plan assumes that each year one or more adverse weather events will cause disruption to Airside Operations, and the adverse weather will include one or more of: snow, ice, volcanic ash, flood, wind, heat, CB activity.</p> <p>The plan includes: i) a Snow Plan and Ice Plan, and ii) a Heat Plan, both of which specify roles and responsibilities – of the Airside Operations Manager (AOM), Airside Control Lead (ACL), Airside Flow Lead (AFL), etc – and response actions necessary to sustain Airside Operations as far as is reasonably practicable (eg ensuring availability of de-icing fleet, snow clearance, etc).</p> <p><u>Snow Plan and Ice Plan</u></p> <p>The Airside Operations Snow Plan is the start point for the Aerodrome Snow Coordinator (SNOCO)/Airside Operations Manager (AOM) and is adapted to match the situation in consultation with the Airport Bronze Command and Airside Disruption Cell (ADC). The detailed output of the consultation is determined through consideration of factors such as the severity of the snow conditions, the forecast weather conditions, the time of day/night, anticipated traffic movements, and the expected availability of staff and equipment.</p> <p>The plan covers a range of operational weather states:</p> <ul style="list-style-type: none"> <li>▪ Snow State 1: Met Office forecast snow in the next 7 days but not expected to accumulate. No disruption to the operation of the Airfield predicted.</li> <li>▪ Snow State 2: Met Office forecast snow in the next 7 days and expected to accumulate which may cause disruption to the operation of the Airfield.</li> <li>▪ Snow State 3: Met Office forecast snow in the next 24 hours and expected to accumulate which may cause disruption to the operation of the Airfield.</li> <li>▪ Snow State 4: Met Office forecast snow in the next 2 hours and expected to accumulate which may cause disruption to the operation of the Airfield.</li> <li>▪ Snow State 5: Snow is falling and accumulating but is not likely to lead to airfield disruption and can be safely and efficiently managed by the Airfield Operations team.</li> <li>▪ Snow State 6: Snow is falling and accumulating in sufficient amounts to cause disruption to the operation of the Airfield.</li> <li>▪ Snow State 7: Snow has stopped falling and accumulating with no further accumulations forecast, but snow clearing duties continue on the Airfield and/or the operation of the Airport is being disrupted.</li> </ul>



Issue	Comment
	<ul style="list-style-type: none"> <li>▪ Ice State 1: The MET Office forecasts airframe temperatures to drop below zero within the next 24 hours.</li> <li>▪ Ice State 2: The MET Office forecasts airframe and ground temperatures to drop below zero within the next 24 hours.</li> <li>▪ Ice State 3A: The MET Office forecasts airframe and ground temperatures to drop below zero within the next 12 hours. The Met Office forecasts a ground frost and there is no forecast precipitation before ground temperatures rise above zero.</li> <li>▪ Ice State 3B: The MET Office forecasts airframe and ground temperatures to drop below zero within the next 12 hours. The MET Office forecasts a ground frost and there is forecast precipitation before ground temperatures rise above zero.</li> <li>▪ Ice State 4A: Airframe and ground temperatures are below zero and there is no forecast precipitation before ground temperatures rise above zero.</li> <li>▪ Ice State 4B: Airframe and ground temperatures are below zero and there is forecast precipitation before ground temperatures rise above zero.</li> <li>▪ Ice State 5: Airframe and ground temperatures are above zero and not forecast to fall below zero within the next 12 hours.</li> </ul> <p>The plans do not expressly address the issue of cold embrittlement. However, this is considered to be a design issue rather than one of operational planning. In any case, the implementation of the Project would not realistically make cold embrittlement more of an issue at the airport.</p> <p><u>Heat Plan</u></p> <p>The Heat Plan is in place to ensure on-going operation of the airport during an event at the other end of the temperature scale:</p> <ul style="list-style-type: none"> <li>▪ Heat State 1: Met Office forecast high temperatures (&gt;32,18,32 / 48hr) in the next 3 days, but not expected to impact Airfield Operations.</li> <li>▪ Heat State 2A: Met Office forecast high temperatures (&gt;32,18,32 / 48hr) in next 24 hours, heat wave not expected to exceed 48 hrs expected impact to Airfield Operations.</li> <li>▪ Heat State 2B: Met Office forecast high temperatures (&gt;32,18,32 / 48hr) in next 24 hours, heat wave expected to exceed 48 hrs expected impact to Airfield Operations.</li> <li>▪ Heat State 3: Heat Event in Progress.</li> <li>▪ Heat State 4: Met office forecasts no significant temperatures and stable ops returning.</li> </ul> <p>Emergencies associated with runway excursions will be addressed via the Gatwick Emergency Orders. See “<i>Aircraft accidents on the runway</i>” below.</p>
<p>Damage to aircraft during extreme storms</p>	<p>Emergency response to a damaged aircraft arriving at the airport will be addressed through the arrangements set out in the Gatwick Emergency Orders. See “<i>Aircraft accidents on the runway</i>” below. The orders will remain applicable to the altered northern runway following implementation of the Project.</p>
<p>Ash clouds</p>	<p>The GAL Contingency Plan for Airside Operations Adverse Weather referred to above includes a Volcanic Ash Plan which specifies roles and responsibilities and response actions to:</p> <ul style="list-style-type: none"> <li>▪ Volcanic Ash State 1: Volcano erupting, potential airspace disruption.</li> <li>▪ Volcanic Ash State 2A: Volcano erupting, disruption at aerodrome due to capacity.</li> <li>▪ Volcanic Ash State 2B: Volcano erupting, ash expected at aerodrome within 24 hours.</li> <li>▪ Volcanic Ash State 3: Volcano erupting, disruption at aerodrome due to ash falling.</li> <li>▪ Volcanic Ash State 4: Volcano eruption ceased, aerodrome recovery.</li> </ul> <p>Guidance on response to the presence of volcanic ash is given in CAA document “CAP 1236: Guidance regarding flight operations in the vicinity of volcanic ash”, and the European Union Aviation Safety Agency document “EASA NPA 2012-07: Guidance material on volcanic ash safety risk assessment (VA SRA)”.</p> <p>The change in risk levels associated with ash clouds is not expected to change significantly as a result of the Project.</p>
<p>Aircraft accidents on the runway</p>	<p>GAL has in place Gatwick Emergency Orders. These indicate the responsibilities of GAL and Air Traffic Service personnel at Gatwick Airport in the event of an emergency situation, and initial and follow-up actions to be taken. The situations include:</p> <ul style="list-style-type: none"> <li>▪ Imminent Aircraft Accident – If an aircraft accident is considered to be inevitable on or in the vicinity of the Airport.</li> <li>▪ Aircraft Accident – If an aircraft receives substantial damage or causes serious injury or serious damage to property within the perimeter fence.</li> <li>▪ Aircraft Accident off the Aerodrome – Aircraft accident that has occurred beyond the Aerodrome perimeter fence.</li> <li>▪ Aircraft Ground Incident (AGI) – Where an aircraft on the ground is known to have an emergency other than an accident requiring the attendance of the emergency services. AGIs will be inclusive of all incidents which have either endangered an aircraft or have the potential to endanger an aircraft, such as undercarriage collapse, external or internal fire, vehicles or equipment struck aircraft, fuel spillages from aircraft or fuel hydrant system, dangerous goods and vehicle or equipment fires near to aircraft.</li> <li>▪ Full Emergency – If an aircraft in flight is known or suspected to be in such difficulty that there is danger of an accident.</li> <li>▪ Local Standby – When an aircraft is known or suspected to have developed some defect, but one which would not normally involve any difficulty in effecting a safe landing, or the Commander of an aircraft is sufficiently concerned to require assistance with assessment and/or removal of an unidentified/unattended article on board.</li> <li>▪ Weather Standby – When the weather has deteriorated to such an extent as to render a landing difficult (eg when there is a strong cross wind, poor visibility, ice or snow on the runway etc).</li> </ul>

Issue	Comment
	<ul style="list-style-type: none"> <li>Hi-jack – Unlawful Act – Any person on an aircraft who, by the use of force or threat of any kind, seizes the aircraft or exercises control of it, or when a person makes a threat towards, or endangers, the safe operation of an aircraft.</li> <li>Bomb Warnings in Aircraft – Relating to the situation where a message is received alleging that a bomb is in an aircraft on the ground at Gatwick, or arriving at Gatwick.</li> <li>Act of Aggression Ground – The term used to denote an actual or suspected bomb explosion, armed attack, the taking of hostages, and other acts of terrorism within the Divisional boundary.</li> </ul> <p>The Emergency Orders have been developed with input from the following stakeholders: Air Traffic Control, West Sussex Fire and Rescue Services, South East Coast Ambulance Service NHS Foundation Trust, Gatwick Sussex Police, and Handling Agents.</p>

**Table 5.1.4: Demonstration that the Following Matters would be ‘No Worse’ than the Existing Situation Following Implementation of the Project**

Issue	Comment
Drones and lasers	<p><u>Drones</u></p> <p>Given the potential safety implications of a drone strike on an airliner, the presence of a single drone in the vicinity of an international airport can be massively disruptive. The drone sightings at Gatwick in the run-up to Christmas 2018 disrupted around 1,000 flights and affected approximately 140,000 passengers. It was in response to this incident that the UK government extend the area around airports and runways in which the flying of drones is banned. It is now illegal to fly a drone within 5 km of an airport, an increase from the previous figure of 1 km. The new restriction zone includes rectangular extensions from the end of runways measuring 5 km long by 1 km wide to better protect take-off and landing paths.</p> <p>In reality, the threat to civil aviation traffic posed by drones is driven by the huge proliferation of such devices, coupled with the current challenges of deploying counter measures, rather than the increase in aviation traffic. It can therefore reasonably be concluded the Project itself will not make the situation at Gatwick any worse. Improvements to the situation, both in the UK and internationally, will be dependent upon the implementation of a range of technological monitoring and response measures, tighter regulation of drones, and extra police powers in this area.</p> <p><u>Lasers</u></p> <p>The CAA has published “CAP 736: Operation of Directed Light, Fireworks, Toy Balloons and Sky Lanterns within UK Airspace” to provide policy and supporting guidance in this area for both commercial organisations and individuals. The document requires advance notice of events involving these light sources, and is intended to enable the aviation community to properly assess the impact of any such proposed activity and take appropriate measures to mitigate any dangers to flight safety.</p> <p>Safety regulations for laser displays are already taken into consideration by Local Government Authorities (Crawley Borough Council) when carrying out risk assessments for associated planning applications or entertainment licences. A Notification Zone is considered to exist around Gatwick Airport within which laser emissions must be controlled.</p> <p>Under the Air Navigation Order 2009 a person must not in the United Kingdom direct or shine any light at any aircraft in flight so as to dazzle or distract the pilot of the aircraft. The deliberate and malicious laser targeting of airborne aircraft has the potential to impact upon aircraft safety and could lead to civil prosecution. The CAA works in concert with the appropriate authorities in an effort to reduce the number of incidents.</p>
External objects (bird strike, fireworks, sky lanterns and wind turbines)	<p>The following arrangements are in place and would not be expected to change as a result of the Project.</p> <p><u>Bird-strike</u></p> <p>Wildlife at Gatwick is managed, as far as is reasonably practicable, to maintain a bird and animal-free airfield. The Airside Operations Lead (AOL) is responsible for ensuring bird strike management is carried out by the Airside Duty Team 24 hours a day.</p> <p>GAL uses the measures below to control birds on and around the aerodrome in accordance with EASA ADR.OPS.B.020 using CAP 772 (Wildlife hazard management at aerodromes) for guidance:</p> <ul style="list-style-type: none"> <li>Wildlife Habitat Control Management Plan (WHCMP) – The WHCMP defines and implements the appropriate bird control measures to reduce and mitigate the risk and is the responsibility of the AOL.</li> <li>Bird-strike Hazard Map – A bird hazard safeguarding map is maintained. This is based on an Ordnance Survey map and highlights the assessed local hazards and also shows on a wider scale such sites as landfills, gravel extraction, and water bodies.</li> <li>Local Bird Hazard Management Working Group – The group includes airside operations, landscape managers and grass management contractors, and any other individuals concerned with bird hazard management. The group meets quarterly to discuss bird strikes, habitat management issues, risk assessments, and training issues. It also tracks recommendations/action points from audits.</li> <li>UK CAA Bird-strike Committee – Gatwick Airport has representation on this Committee.</li> <li>All Airside Operations personnel who carry out bird hazard management duties are trained and hold a firearms certificate which must be revalidated every five years. The authorisation (The Firearms Act 1968 – Section 5) is held by the Head of Airside Compliance.</li> </ul>

Issue	Comment
	<ul style="list-style-type: none"> <li>▪ All staff attend an approved bird hazard management training course and to ensure competency, periodic refresher training is undertaken in the use of firearms, bird hazard management operations and local ornithology. Comprehensive records are kept of all bird control activities and firearms training and assessments.</li> <li>▪ All vehicles involved in bird hazard management activities are suitably equipped and maintained.</li> <li>▪ Wildlife Patrols are carried out to ensure that the presence of birds and animals on the airfield and in the surrounding area is minimised, an environment is created which is not conducive to the presence of birds, birds on the airfield are detected and dispersed, warning can be passed to aircraft and ATC about the presence of flocks of birds on the airfield, and the formation of night roosts is prevented.</li> <li>▪ Bird hazard assessment is carried out via the tactical bird patrols and strategic analysis by the Bird Co-ordinator and Operations Management.</li> <li>▪ Air crew are warned whenever the presence of birds in large numbers is thought to constitute an immediate hazard. This is done by informing Airside Operations or ATC by radio, this warning then being passed on to aircraft directly or via ATIS.</li> <li>▪ In the event of a prolonged infestation of birds on or immediately adjacent to the airport NOTAM action may be taken to warn air crew of the hazard. This would only cover periods of short to medium duration and would be cancelled when the hazard ceases to exist.</li> <li>▪ All wildlife strikes or suspected strikes are investigated and reported immediately by Airside Operations or ATC. An electronic Wildlife Strike Occurrence Form (CAA Form 1282) is completed online via the CAA website by Airside Operations on all occasions where there is a confirmed or unconfirmed strike.</li> </ul> <p>Notwithstanding the above, the Project would involve additional landscaping, water bodies and flat roof buildings that may present an increased risk of attracting birds and therefore of bird strike. This risk would be addressed through the Project design, in consultation with GAL aerodrome safeguarding, eg evaluating the choice of tree and plant species, netting of open water, bird management plans, etc. It will therefore be considered in more detail in the ES.</p> <p><u>Wind Turbines</u></p> <p>Wind turbines have the ability to impact on primary radar by causing 'clutter' and false aircraft tracks on the radar operator's screen. Secondary radar can also be disrupted as wind turbines can cause misplaced aircraft returns. This issue is addressed through Gatwick Airport's active policy of aerodrome safeguarding. This is the legal process used to ensure the safety of aircraft while taking off and landing, or flying in the vicinity of aerodromes. Aerodrome Safeguarding is required under both ICAO (International Civil Aviation Organisation) Regulations and EASA (European Aviation Safety Agency) Regulations.</p> <p>The process is managed by the airport's aerodrome safeguarding team who are responsible for making sure that no developments within a 30 km radius (for wind turbines) safeguarding zone have an adverse effect on the airport's operation. GAL is a statutory consultee through the Town and Country Planning process and is consulted by the local and county planning authorities about certain developments within the safeguarding consultation zone. GAL will see all applications involving wind turbines and, as required, may request amendments to schemes to ensure that there will be no impact on aerodrome safety.</p> <p><u>Fireworks &amp; Sky Lanterns</u></p> <p>Firework displays within a ten nautical mile radius of an active aerodrome or with an Aerodrome Traffic Zone (ATZ) may require notification and co-ordination action and must be notified by the event organiser to the CAA for consideration. An ATZ is airspace established in the vicinity of an aerodrome with the purpose of providing protection to aircraft landing, taking off and flying in the visual circuit. An ATZ extends to a height of 2,000 ft above aerodrome elevation within a circle centred on the notified mid-point of the longest runway and a radius of two nautical miles. Aerial firework displays should be limited to a height of 1,500 ft above ground level (any firework conforming to BS7114/BS EN 14035-36 will not exceed this height).</p> <p>The situation with respect to sky lanterns is similar. The CAA require advanced notice of an event involving the mass release of lanterns. It will then look to deconflict or co-ordinate the activity, promulgate warnings to the aviation community, and establish any control measures considered necessary.</p>
Deficient emergency planning	<p>In line with the requirements of the Gatwick Aerodrome Manual, all facilities pertaining to the deployment of emergency service vehicles and manpower are tested on a daily basis. All equipment used in emergencies is tested and inspected to company or manufacturers standards and recorded on an electronic database system. This database is programmed and monitored by administrators. Key personnel are trained in its use to retrieve and sign off equipment tests. Bi-annual exercises involving all the Airport Fire Service and all external emergency services are carried out to test the emergency plan.</p> <p>The Project would make no difference to these established arrangements, and would not therefore degrade current emergency planning arrangements.</p>
Loss of utilities (operation)	<p>This issue is addressed in Table 5.1.1 (see above).</p>
Loss of essential air safety or airside systems	<p>The potential for construction works to result in the loss of essential air safety or airside systems will be evaluated in the ES.</p>
Deficient security provisions	<p>See also "<i>Terrorism and malicious biological and chemical attacks</i>".</p> <p>To meet Department for Transport legislation, GAL Security are required to undertake regular security patrols of the airside security fence boundary during daylight hours, to ensure the security fence is in good condition and no security breaches have been made. Entrance gates onto the aerodrome are manned by GAL Security staff or are secured closed at all times.</p>

Issue	Comment
	<p>Operating procedures for the control of access to the aerodrome are detailed in a number of GADs issued by both GAL Airside Operations and Security Departments. The Security GAD deals with personnel access “ID Pass Holder Responsibilities” and the Airside Operations GAD “Airfield Driving and Vehicle Operation” deals with the system of Airside Driving Permit (ADP) and Airside Vehicle Permit (AVP) issue. Third parties operating on the airfield must apply for an Airside Operator’s Licence before commencing operational activities.</p> <p>There is no reason to believe that the implementation of the Project would result in a decline in the effectiveness of security arrangements around the airport. Security arrangements in relation to the embarkation and disembarkation of passengers, animals, and goods would remain unchanged.</p>

## 6 Requirements for Additional Measures

### 6.1 Safety

6.1.1 At this stage of the Project, none of the major accident and disaster scenarios with the potential to result in harm to people have been determined to be in an 'intolerable' risk. Consequently, no significant effects are predicted and no additional measures are proposed.

### 6.2 Environment

6.2.1 At this stage of the Project, all the major accident and disaster scenarios with the potential to result in environmental damage have been determined to result in sub-MATTE consequences implying that such outcomes are of low risk, and at the very least could be considered 'broadly acceptable'. Consequently, no significant effects are predicted and additional measures are not proposed.

## 7 Requirement for Further Work

7.1.1 Any requirements for further assessment work have been documented in Table 5.1.1 to Table 5.1.4. In summary, the following major accidents and disasters issues will be further evaluated in the ES:

- Occupational hazards associated with earthworks, and airside construction activities generally, ie construction HSE management, including a detailed evaluation of lightning strikes during construction.
- Rail transportation accidents including collision with trains, trams or inter terminal rail during construction works. The assessment will consider the transportation by rail of construction materials and aggregates if this Project is taken forward.
- Disruption to airport operations resulting from severance of utilities, including air safety and airside systems, during construction operations.
- Potential for bird strike due to an increased risk of attracting birds from additional landscaping, water bodies and flat roof buildings.

## 8 Conclusions

8.1.1 A risk tolerability assessment has been undertaken for major accident and disaster scenarios identified as having the potential for a 'significant effect'. A potential effect does not mean that the major accident or disaster is likely to occur, only that it has been shown to be present as a potential hazard. Major accident and disaster scenarios have been identified as having the potential for a likely significant effect if the risk is assessed to be intolerable.

8.1.2 All of the identified major accident and disaster scenarios with the potential to result in harm to people are considered 'broadly acceptable' or 'TifALARP'. No scenarios have been identified which are considered 'intolerable'. The Project would not introduce hazards at the construction phase which cannot be effectively managed through the CoCP and existing plans and procedures currently in place at the airport. Operation of the Project would not result in significant increases in risk levels.

8.1.3 All the major accident and disaster scenarios with the potential to result in environmental damage have been determined to result in sub-MATTE consequences. Sub-MATTE consequences are not considered in further detail as part of the risk tolerability assessment in accordance with the CDOIF guideline (CDOIF 2016); implying that such outcomes are of low risk, and at the very least could be considered 'broadly acceptable'.

8.1.4 It is recognised that the major accident and disaster scenarios could result in levels of damage and harm that would be normally considered to be 'significant pollution/damage' in the context of an EIA. However, in the context of a risk assessment of major accidents, these would not be considered a MATTE.

8.1.5 Overall, based on the work undertaken to date, no intolerable risks or significant effects have been identified.

## 9 References

### 9.1 Legislation

The Control of Major Accident Hazards Regulations 2015

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

The Town and Country Planning and Infrastructure Planning (Environmental Impact Assessment) (Amendment) Regulations 2018

### 9.2 Published Documents

Cabinet Office (2017) National Risk Register of Civil Emergencies.

Chemical and Downstream Oil Industries Forum (CDOIF) (2016) Guideline – *Environmental Risk Tolerability for COMAH Establishments, Version 2.0.*

Civil Aviation Authority (CAA) (2001) Operation of Directed Light, Fireworks, Toy Balloons and Sky Lanterns within UK Airspace: CAP 736.

Civil Aviation Authority (CAA) (2013) Global Fatal Accident Review 2002-2011: CAP 1036.

Civil Aviation Authority (CAA) (2017) Guidance Regarding Flight Operations in the Vicinity of Volcanic Ash: CAP 1236.

GAL (undated) *Fire Fighting and Equipment Maintenance Policy.*

GAL (2014) *Aerodrome Manual.*

GAL (2016) *Contingency Plan for Airside Operations Adverse Weather.*

GAL (2017a) *Foul Sewage Infrastructure Failure.*

GAL (2017b) *Gatwick Airport Directive: Airfield Driving Maps (GAD/F:46/17).*

GAL (2017c) *Gatwick Airport Standard Operating Procedure: Dangerous Goods in Transit (Air).*

GAL (2018a) *Contingency Plan for Partial Loss of Electricity to the Airport.*

GAL (018b) *Contingency Plans for Total Loss of Electricity to the Airport.*

GAL (2018c) *Gatwick Airport Directive: Airside Discipline (GAD/F:16/18).*

GAL (2018d) *Gatwick Airport Directive: Use of Taxiway Crossings by Airside Drivers (GAD/F:1/18).*

GAL (2018e) *Gatwick Airport Standard Operating Procedure: Hazardous Substances (COSHH).*

GAL (2018f) *Loss of Runway 08R/26L Contingency Plan.*

GAL (2018g) *Natural Gas Infrastructure Failure.*

GAL (2018h) *Operational Resilience Report*.

GAL (2018i) *Potable Water Infrastructure Failure*.

GAL (2018j) *Spill prevention, response and reporting requirements, Gatwick Airport Directive, GAD F20 18*.

GAL (2019a) *Gatwick Aerodrome Manual*.

GAL (2019b) *Gatwick Airport Standard Operating Procedure: Risk Assessment in the Workplace*.

GAL (2019c) *Gatwick Emergency Orders*.

GAL (2019d) *Life Safety Systems (LSS) Maintenance Policy*.

GAL, 2019e) *Safety Management System (SMS) Manual*.

Gatwick Airport Storage and Hydrant Company Limited (GASHCo), 2015, *Control of Major Accident Hazards Regulations 2015 External Emergency Plan V2.0*.

HSE (2001) *Reducing Risk, Protecting People*.

HSE (2015) *Storage of flammable liquids in tanks (HSG176)* [<https://www.hse.gov.uk/pubns/priced/hsg176.pdf>]

HSE (undated a) *Semi-Permanent Circular 37: Guidance on ALARP Decision in COMAH v 3, SPC/Permissioning/37* [[http://www.hse.gov.uk/foi/internalops/hid\\_circs/permissioning/spc\\_perm\\_37/](http://www.hse.gov.uk/foi/internalops/hid_circs/permissioning/spc_perm_37/)]

HSE (undated b) *Semi-Permanent Circular 39: HID's approach to ALARP decisions v 2, SPC/Permissioning/39* [[http://www.hse.gov.uk/foi/internalops/hid\\_circs/permissioning/spc\\_perm\\_39.htm](http://www.hse.gov.uk/foi/internalops/hid_circs/permissioning/spc_perm_39.htm)]

International Federation of Red Cross and Red Crescent Societies (IFRC) (2019) [<https://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/what-is-a-disaster/>]

United Nations Office of Disaster Risk Management (UNDRR) (2019) [<https://www.unisdr.org/we/inform/terminology>]

## 10 Glossary

### 10.1 Abbreviations

**Table.10.1.1 Abbreviations**

Term	Description
ACL	Airside Control Lead
ADC	Airside Disruption Cell
ADP	Airside Driving Permit
AFL	Airside Flow Lead
AGI	Aircraft Ground Incident
AOL	Airside Operations Lead
AOM	Airside Operations Manager
ATMs	Air Transport Movements
ATZ	Aircraft Traffic Zone
AVP	Airside Vehicle Permit
ALARP	As Low As Reasonably Practicable
AONB	Area of Outstanding Natural Beauty
ATC	Air Traffic Control
BAP	Biodiversity Action Plan
BGS	British Geological Survey
BIP	Border Inspection Posts
CB	Cumulonimbus
CDOIF	Chemical and Downstream Oil Industries Forum
CoCP	Code of Construction Practice
COMAH	Control of Major Accident Hazard
CP	Country Park
EASA	European Aviation Safety Agency
EIA	Environmental Impact Assessment
ES	Environmental Statement
GAD	Gatwick Airport Directive
GAL	Gatwick Airport Limited
GASHCo	Gatwick Airport Storage and Hydrant Company Limited
GNSS	Global Navigation Satellite Systems
HPA	Health Protection Agency
HSE	Health and Safety Executive
ICAO	International Civil Aviation Organisation
ISO	International Organization for Standardization
LGS	Local Geological Site
LNR	Local Nature Reserve
LWS	Local Wildlife Site

Term	Description
eMARS	Major Accident Reporting System
MATTE	Major Accident To The Environment
NNR	National Nature Reserve
OHSAS	Occupational Health and Safety Assessment Series
PEIR	Preliminary Environmental Information Report
PSZ	Public Safety Zones
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SMS	Safety Management System
SNCI	Site of Nature Conservation Importance
SNOCO	Aerodrome Snow Coordinator
SPA	Special Protection Area
SPC	Semi-permanent Circular
SPR	Source-Pathway-Receptor
SPZ	Source Protection Zone
SRAM	Safety Report Assessment Manual
SSSI	Site of Special Scientific Interest
STW	Sewage Treatment Works
TifALARP	Tolerable if As Low As Reasonably Practicable
UNDRR	United Nations Office of Disaster Risk Management
UXO	Unexploded ordnance
VA SRA	Volcanic Ash Safety Risk Assessment
WFD	Water Framework Directive
WHCMP	Wildlife Habitat Control Management Plan

### 10.2 Units

**Table 10.2.1 Units**

Term	Description
g	Gravitational acceleration on earth (9.8 m/s <sup>2</sup> )
ha	Hectare
km	Kilometer
kW/m <sup>2</sup>	Kilowatts per square meter
m	Meter
m <sup>3</sup>	Cubic metres
mg/l	Milligrammes per litre
mm	Millimetre
tdu	Thermal dose unit

Annex 1

Environmental Risk Assessment

## 1 Environmental Risk Assessment

### Overview

A1.1.1 This annex presents an evaluation of environmental risks associated with the occurrence of major accident and disasters at Gatwick Airport. The evaluation is based upon the Source-Pathway-Receptor (SPR) approach described in Section 2, and essentially provides the underpinning detail upon which the summary of findings – Table 5.1.1 – is based.

A1.1.2 The annex provides:

- information on the baseline environment and the environmental receptors in the vicinity of Gatwick Airport;
- a summary of the types of potential harm to the environment resulting from major accidents and disasters;
- an analysis of potential environmental pathways, ie the routes by which a source – pollution or other adverse environmental effect – could travel to a receptor; and
- an assessment of SPR linkages.

A1.1.3 Where a viable SPR linkage exists, the severity/consequence has been assessed in line with the methodology set out in Section 2, and the resultant risk has been assigned and copied to Table 5.1.1. Major accident and disaster scenarios are considered as having the potential for significant effects to arise where the risk is assessed to be intolerable.

### Environmental Receptors – Present Day

A1.1.4 Environmental receptors and receptor groups have been presented to reflect the order and definitions in the CDOIF guidelines (CDOIF, 2016). It is noted that this is not always consistent with the standard approach taken in the other PEIR chapters (in particular that for Chapter 9: Ecology and Nature Conservation). However, this is the accepted and established approach for environmental risk assessments undertaken in accordance with the CDOIF guidelines (CDOIF, 2016).

A1.1.5 Designated sites (national and international) and water bodies with hydraulic connectivity to the Project site have been identified within 10 km from the Project site boundary. For other receptor groups, receptors have been identified with 1 km from the Project site boundary.

### Designated Sites (Nationally Important)

A1.1.6 Nationally designated areas include land and/or water that is designated as a Site of Special Scientific Interest (SSSI) for geological or biological purposes or as a National Nature Reserve (NNR).

A1.1.7 No geological SSSIs are located within 1 km of the Project site and no sites are considered likely to be susceptible to the effects of the major accident scenarios for the Project. Therefore, these receptors are not considered further in this assessment.

A1.1.8 There are a number of nationally designated sites within 10 km of the Project site boundary. The following sites are located within 5 km of the Project site boundary:

- Glover's Wood SSSI: located 1.62 km to the west of the site;
- House Copse SSSI: located 4.34 km to the south west of the site;
- Hedgecourt SSSI: located 4.46 km to the east of the site; and
- Buchan Hill Ponds SSSI: located 4.93 km to the south of the site.

A1.1.9 The nearest SSSI is Glover's Wood, which is approximately 1.62 km from the western edge of the Project site boundary. None of the nationally designated sites within 10 km of the Project site boundary are hydrologically linked to the Project site.

A1.1.10 There are no NNRs within 10 km of the Project site boundary.

A1.1.11 Chapter 9: Ecology and Nature Conservation provides further details on the ecological baseline conditions on and around the site.

### Internationally Important Designated Sites (Statutory Designations)

A1.1.12 Internationally important designated areas include land and/or water that is designated as a Ramsar Site, Special Area of Conservation (SAC) or Special Protection Area (SPA).

A1.1.13 There is one SAC within 10 km of the Project site boundary, Mole Gap to Reigate Escarpment to the north west, which at its closest point, is located 9.22 km from the Project site boundary. The SAC is not hydrologically linked to the Project site. There are no SPAs or Ramsar sites within 10 km of the Project site boundary.

A1.1.14 See Chapter 9: Ecology and Nature Conservation for further details.

### Other Designated Land

A1.1.15 Other designated sites include ancient woodlands, Local Nature Reserves (LNRs), Local Wildlife Sites (LWSs)/Sites of Nature Conservation Importance (SNCIs), Woodland Trust Sites, national forests, community forests, Areas of Outstanding National Beauty (AONBs), National Parks and Registered Parks and Gardens, Royal Society for the Protection of Birds (RSPB) Reserves, and Biosphere Reserves.

A1.1.16 There are no Woodland Trust Sites, community forests, national forests, AONBs, RSPB Reserves, National Parks and Registered Parks and Gardens, or Biosphere Reserves within 1 km of the Project site boundary.

A1.1.17 There are two LNRs within 1 km of the Project site boundary:

- Willoughby Fields LNR: located approximately 800 metre to the south of the site; and
- Broadfield Park LNR: located approximately 800 metres to the south of the site.

A1.1.18 There are several areas of ancient woodland both within the Project site boundary (for example Brockley Wood) as well as within 1 km of the Project site boundary.

A1.1.19 There are several LWSs/SNCIs present in the vicinity of the Project. One of these, Horleyland Wood LWS, is located within the Project site boundary, directly north of Crawley Sewage Treatment Works.

A1.1.20 There are two areas of London Area green belt land, one adjacent to the north eastern Project site boundary and one to the east of the M23.

A1.1.21 See PEIR Chapter 7: Landscape, Townscape and Visual Resources and Chapter 9: Ecology and Nature Conservation for further details.

### Scarce Habitat

A1.1.22 Receptors include Biodiversity Action Plan (BAP) Priority Inventory Habitats. Scarce habitats are awarded protection principally on the basis of declines in distribution and extent of such habitats within the recent past.



- A1.1.23 There are two types of Priority Habitat Inventory/BAP habitats within 1 km of the Project site, both are types of woodland habitats and include:
- areas of deciduous woodland along the Project site boundary as well as within 1 km of the Project site boundary; and
  - one small area of traditional orchard near Hookwood.

#### Widespread Habitat

- A1.1.24 Agricultural fields occur within the Project site boundary (but outside of the existing airport) and in the surrounding area, which are bounded by hedgerows of varying quality.
- A1.1.25 Surface water habitats have been considered as part of the 'freshwater' receptor group.
- A1.1.26 Chapter 18: Agricultural Land Use and Recreation and Chapter 11: Water Environment provide further details.

#### Groundwater

#### Geology

- A1.1.27 The predominant geological stratigraphy is understood to comprise Made Ground, over superficial deposits of Alluvium (clay, silt, sand and gravel) or River Terrace Deposits (sand and gravel). Where present, these superficial deposits are likely to be up to several metres in thickness and overlay Weald Clay Formation bedrock (mudstone) and Upper Tunbridge Wells Sand Formation (sandstone and mudstone), which are likely to be of considerable thickness beneath the site.

#### Hydrogeology

- A1.1.28 The superficial deposits beneath the site are classified as Secondary A aquifers. These are generally aquifers formerly classified as minor aquifers, presenting a range of permeability and storage capacity. The Weald Clay Formation bedrock is designated as unproductive stratum – these are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow. The Upper Tunbridge Wells Sand Formation is classified as a Secondary A aquifer. The groundwater vulnerability in the Secondary A aquifers is classified as 'Minor Aquifer, High'.
- A1.1.29 Shallow groundwater beneath the site is likely to be primarily in the River Terrace Deposits.

- A1.1.30 The Project site is not located within or close to a Source Protection Zone (SPZ). The nearest public water supply with an SPZ is over 8 km to the north, near Reigate, which extracts water from different strata. Consequently, the groundwater in the vicinity of the Project site has not been considered as a source of drinking water.

- A1.1.31 There is one groundwater abstraction for 'general use' 1 km to the south of the southern boundary of the Project site area. However, this is understood to be abstracted from the Tunbridge Wells Sand Formation which, for the majority of the site, is below the Weald Clay bedrock and so for the most part is not hydraulically connected with the superficial deposits beneath the airport.

- A1.1.32 There are no statutory designated sites of nature conservation interest that may rely on groundwater supply within and around the Project site. Consequently, groundwater has not been considered as a pathway to these types of receptors.

- A1.1.33 The Tunbridge Wells Sand is a Water Environment (water Framework Directive) Regulations 2017(WER) groundwater body, which had a good overall status for water quality in 2016.

- A1.1.34 See PEIR Chapter 11: Geology and Ground Conditions and Chapter 10: Water Environment for further details.

#### Soil or Sediment

#### Soil

- A1.1.35 The surface material within the Project site boundary and its surrounds is a mixture of made ground (concrete or tarmac surfacing) and unmade ground (ie pervious, non-surfaced), some of which is vegetated. The agricultural land within the Project site boundary has been classified under the Agricultural Land Classification as sub-grade 3b which is not considered to be best and most versatile land. Further information on the classifications and land quality is presented in Chapter 18: Agricultural Land Use and Recreation.

#### Sediments

- A1.1.36 Base sediments will be present in the water features and these are identified as part of the freshwater receptor group.

#### Built Environment

- A1.1.37 In the context of the CDIOF guideline, 'built environment' receptors include Grade 1 listed buildings, scheduled ancient

monuments and conservation areas. World Heritage Sites have also been considered.

- A1.1.38 There are no World Heritage Sites within 1 km of the Project site boundary.

- A1.1.39 There are no Grade 1 listed buildings or scheduled monuments within the Project site boundary. There are three Grade 1 listed buildings and two scheduled monuments within 1 km of the Project site boundary, as follows.

- A1.1.40 Grade 1 listed buildings within 1 km of the Project site boundary:
- Church of St Bartholomew (Horley), adjacent to the most northerly point of the Project site boundary;
  - Church of St Bartholomew (Burstow), 800 metres to the east of the Project site boundary at Burstow; and
  - Church of St Nicholas, 900 metres to the west east of the Project site boundary at near Charlwood.

- A1.1.41 Scheduled monuments within 1 km of the Project site boundary:
- one located to the south east, just outside of the Project site boundary (Medieval settlement remains at Tinsley Green); and
  - one located approximately 800 metres to the north east of the Project site boundary (Thunderfield Castle medieval moat site, near Horley).

- A1.1.42 There is one Conservation Area partially within the land required for the Project (at Church Road, Horley) and three other Conservation Areas within 1 km of the Project site.

- A1.1.43 Chapter 7: Historic Environment provides further details.

#### Particular Species

- A1.1.44 The use of MATTE criteria for damage to particular species generally requires reliable estimates of population numbers. In general, this receptor group has been considered as part of the other receptor groups (eg designated sites, priority habitat). However, it is noted that ecological surveys undertaken to date have identified populations of the following fauna of conservation interest:

- great crested newt breeding in ponds in woodland adjacent to Horleyland Wood and to the north of the River Mole near to the Bear & Bunny Nursery;
- bat assemblage including Bechstein's bat roosting in Brockley Woods;

- terrestrial invertebrate assemblage;
- dormice in the ancient woodland;
- range of breeding birds of varying status;
- small badger setts to the north and south of the runways; and
- grass snake in grasslands along the River Mole corridor.

A1.1.45 Chapter 9: Ecology and Nature Conservation provides further details.

### Marine

A1.1.46 Marine receptors include: non-estuarine waters; littoral/sub-littoral zones; benthic communities adjacent to the coast; and fish spawning grounds.

A1.1.47 Gatwick airport is approximately 40 km from the sea, therefore marine receptors are not considered further.

### Freshwater Receptors

A1.1.48 Freshwater receptors include estuaries, rivers, streams, canals, lakes or ponds.

A1.1.49 The airport is located in the Upper Mole Catchment area and the River Mole runs through the site from the south. It is culverted under both the main runway and existing northern runway, upon exiting the culvert, it forms the western and northern boundary of the airport before heading north away from the airport at Hookwood. The River Mole is approximately 60 km in length, it originates at Rusper and flows past Gatwick, Horley, Dorking, Leatherhead, Cobham and Esher before its confluence with the Rivers Thames at East Molesey.

A1.1.50 In addition, tributaries of the River Mole, including Crawter's Brook, the Gatwick Stream, Man's Brook and Westfield Stream which all run through or close to the Project site. The Gatwick Stream runs along the eastern airport boundary between the eastern end of the airside operational area and the London to Brighton mainline railway. It is culverted under the South Terminal before running north through and joining the River Mole in Hookwood. Crawter's Brook enters the airport from the south and is canalised along the southern edge of the airside operational area. It joins the River Mole shortly before the culvert under both existing runways. Man's Brook enters the airport from the west and joins the River Mole along the north western boundary of the Project site area.

A1.1.51 Burstow Stream runs to the east of the Project site area, and the Burstow Stream Tributary runs within the Project site area, beneath the M23 access road to the airport.

A1.1.52 There are three WER water bodies which could be directly impacted by the Project, and these are:

- River Mole (upstream of Horley) – consisting of the River Mole, Crawter's Brook and Man's Brook, which in 2016 had an overall status of good;
- River Mole (Horley to Hersham) – consisting of the River Mole and Withy Brook, which in 2016 had an overall status of moderate; and
- Tilgate Brook and Gatwick Stream at Crawley – consisting of Gatwick Stream and Tilgate Brook), which in 2016 had an overall status of moderate.

A1.1.53 In addition, Burstow Steam (a WER water body consisting of Burstow Steam and Burstow Steam Tributary) has the potential to be impacted via the Burstow Steam Tributary. Burstow Stream had an overall status of bad in 2016.

A1.1.54 There are also a number of water features, both highly-engineered surface water management basins and some more natural ponds, within the Project site boundary.

A1.1.55 One historic surface water abstraction consent relating to a transfer from Gatwick Stream has been identified 1.7 km to the south of the Project site boundary. On the basis of the historic status of the licence, and its upstream location, this has not been considered further. See PEIR Chapter 10: Water Environment for further details.

A1.1.56 Sources

A1.1.57 For some of the major accident and disaster scenarios listed in Section 2.4, the potential for environmental damage is self-evident (for example, spillage of hazardous materials). For others, the cause of damage is less obvious as it arises as an indirect consequence of the event. For example, severe flooding causing structural damage to a storage tank which results in a release of hazardous material. Irrespective of whether the cause of potential damage is a direct or indirect consequence of the initiating event, the types of potential harm and the resultant 'sources' can be broadly grouped as:

- fires and explosions, resulting in:
  - heat/flame (thermal radiation);
  - fire plume;

- ash and char;
- firewater;
- overpressure; or
- gas cloud (eg, for natural gas releases where there is no source of ignition).
- spills of hazardous materials; and
- contaminated floodwater.

### Potential Pathways

#### Atmospheric Release Pathways

A1.1.58 For airborne releases (fire plume gases, heat, overpressure and gas clouds), atmospheric dispersion and, potentially, deposition processes would provide a viable pathway for these sources to reach human and environmental receptors. This pathway is therefore considered in the assessment.

#### Liquid Release Pathways

##### Overview

A1.1.59 Accidental liquid releases include spillages of hazardous materials, firewater and contaminated floodwater. Upon release, an uncontained liquid spill would typically spread out until either it reached a barrier (eg a bund wall/earth banking/curbing/process equipment), or until it could spread no further.

A1.1.60 At Gatwick Airport, release of hazardous materials from the major accident scenarios would be expected to be captured by the site's surface water drainage systems. It is also possible, though less likely, that spills could also encounter pervious areas of unmade ground. Spills that reach vegetated/earth surfaces would have the potential to seep into the soils with potential migration into the groundwater beneath the site. Any liquids that were not captured by the drainage system and did not seep into soils could reach on-site/off-site receptors via overland flow.

A1.1.61 On the basis of the above, the potential (theoretical) pathways through which an accidental liquid release could reach environmental receptors resulting from a major accident or disaster at Gatwick airport are considered to be:

- transport of liquids via site surface water drainage system;
- passage of liquids over unmade ground into soils, with possible migration into the groundwater and subsequent migration via groundwater; and

- overland flow of liquids from the point of release, leading to the potential exposure of receptors (excluding soil or groundwater) inside or outside the site boundary.

A1.1.62 The relevance of each of these is discussed in turn below.

#### Transport of Liquids via the Site Drainage System

A1.1.63 There are eight surface water drainage catchments within the Project site that directly receive airport runoff. Generally, four of these serve the main airfield, discharging to Pond A, Pond M, the Dog Kennel Pond and Pond D. The four ponds provide a degree of treatment through aeration and settlement. Drainage from areas of hard standing with a low risk of pollution (eg car parks) pass through at least one stage of treatment (oil interceptors) prior to discharge.

A1.1.64 Pond D is the key drainage pond receiving the majority of runoff from Gatwick. Runoff enters Pond D (upper) via a series of separator channels and discharges to the River Mole. In general, when runoff meets the required water quality standard of below a biochemical oxygen demand of 10 mg/l, the pond discharges to the River Mole. Water is automatically tested for its biochemical oxygen demand.

A1.1.65 Discharge to the River Mole is at a consented rate, controlled by a series of hydrobrakes and pumps. The actual rate of discharge is determined by the flow rate of the River Mole. Higher river flow rates permit a higher rate of discharge from the surface water drainage system.

A1.1.66 If water quality falls below the required standard, the ponds discharge to the 'dirty' water pumped main which conveys runoff via a 3.5 km pipeline for long term storage at two pollution lagoons (with storage capacities 220,000 m<sup>3</sup> and 100,000 m<sup>3</sup>). After aeration in the lagoons, the water is treated at Crawley Sewage Treatment Works. There are restrictions placed on the peak flow that can be transferred to the Sewage Treatment Works under a trade effluent consent agreed with Thames Water. In the event of very heavy rainfall, contaminated water diluted by rainfall may be pumped directly to the River Mole from Pond D if the incoming runoff is greater than the capacity of Pond D and there is insufficient capacity in the pumping system that transfers it to the pollution storage lagoons.

A1.1.67 In summary, the surface water drainage system allows for the collection of rain water, spills, firewater and potentially flood water. If sufficiently clean, the collected water is pumped and discharged to the River Mole. If the water is not clean, it is

pumped to two storage lagoons and then to Crawley Sewage Treatment Works. If water is not clean and there is no capacity in the storage lagoons (as a result of very heavy rainfall) and the peak flow to the sewage treatment work is exceeded, the contaminated water (diluted with rain water) may be pumped directly into the River Mole.

A1.1.68 Only in the event that secondary/tertiary containment measures fail, combined with the failure of all of the site's emergency control measures, and extreme weather events, would this pathway be considered to be theoretically viable. Although unlikely, this pathway has been considered as part of this assessment.

#### Passage of Liquids to and via Soil and Groundwater

A1.1.69 As noted above, the majority of the areas where accidental liquid releases could occur comprise hardstanding which is connected to the surface water drainage system. However, in the event that an accidental liquid release encountered vegetated areas/unmade ground, any components of the spill that are mobile through soils could migrate vertically downwards.

A1.1.70 Areas of the site are underlain by Alluvium or River Terrace Deposits overlying Weald Clay Formation bedrock. The shallow groundwater in the superficial deposits is classified as a Secondary A Aquifer. The majority of the underlying bedrock is unproductive. Thus, the pathway for the migration of liquids through soil to groundwater in the upper aquifer is considered viable.

A1.1.71 The Project site is not located within or close to a SPZ. There are no known licenced groundwater abstractions within 2 km of the site for use as drinking water. Consequently, for the purpose of this assessment it is considered that the secondary aquifer falls under the description 'groundwater – non-drinking water source' in the CDOIF guidelines.

A1.1.72 There are no designated sites of nature conservation interest that rely on the groundwater supply within the Project site boundary. If there is connectivity between groundwater and the surface water features that run through the site, it is feasible that contaminants could migrate through the groundwater into these surface water bodies with the potential for exposure of other receptors. However, taking into account the potential quantities and nature of possible contaminants, along with dilution/dispersion processes and natural fate processes, it is not considered likely that migration through groundwater would result in exposure of

any environmental receptors of the scale that would be considered to be a MATTE.

A1.1.73 Thus, soil beneath the site is considered as a receptor and a pathway to groundwater while groundwater is considered as a receptor only.

#### Overland Flow to Receptors

A1.1.74 On-site receptor types (other than soil and groundwater) include fresh water (the surface water bodies that run through and around the airport), other designated land (ancient woodland), scarce habitat (deciduous woodland), widespread habitat (agricultural fields within the Project site boundary) and the species that use these habitats. The habitats of ecological interest and agricultural fields are generally located towards the Project site boundary, away from the operational area of the airport.

A1.1.75 Due to the likely size, type and location of liquid release scenarios, the topography of the site and the extent of the surface water drainage system none of the accident/disaster scenarios are considered likely to have the potential to reach either on-site or off-site receptors directly through the pathway of overland flow. Consequently, this pathway is not considered further in this assessment.

#### Releases of Solids to Land

A1.1.76 Ash can release contaminants to the environment if the ash disposal process and clean-up is not properly managed. If the ash dries, ash dust can be released to the atmosphere through the action of wind and by physical disturbance during the process of collecting and disposing of the ash. The main routes of exposure are through inhalation of the airborne dust and improper disposal. The main receptors would be humans and the habitat in the immediate vicinity of the site. This element of a major accident can be controlled and managed. In the event of a fire, ash would be disposed of to an appropriate site, in a responsible fashion, using licenced waste contractors. Thus, ash generation, collection and disposal activities are considered unlikely to result in significant environmental damage and no further assessment is proposed.

A1.1.77 Potential Sources and Pathway Linkages

A1.1.78 In summary, the potential pathways by which sources could reach receptors are:

- atmospheric dispersion of thermal radiation, overpressure, and unignited gas;
- atmospheric dispersion and deposition of fire plume gases;
- transport of liquids through the site drainage systems and discharge to the River Mole (during extreme weather conditions only); and
- passage of liquids over unmade ground into the soil and migration into groundwater.

#### Assessment of SPR linkages

A1.1.79 This section provides the basis behind the high-level risk assessment for the major accidents and disasters that have been identified for the Project. A summary of the outcome of the assessment is provided in Table 5.1.1.

A1.1.80 For each of the identified potential source-pathway linkages an assessment has been undertaken to determine whether the receptors identified could be exposed and whether any resultant damage would be considered to be a MATTE.

A1.1.81 In addition to the information provided below, the risk assessment also takes account of the findings of the detailed risk assessment of potential major accidents associated with the Gatwick Airport fuel farm that was carried out for GASHCo as part of its COMAH Safety Report (submitted January 2015). The risk assessment looked at risks to people and the environment resulting from ignited and unignited large-scale releases of jet fuel and from loss of containment of natural gas from supply pipework. For the safety risk assessment (risks to people), risks were assessed as being at worst equivalent to 'TifALARP' on the HSEs risk tolerability framework. Environmental risks were assessed as being 'broadly acceptable'.

#### Summary of Sources, Pathways and Receptors

A1.1.82 For ease of reference, this section provides a summary of the potential sources, pathways and receptors considered in the assessment.

#### 10.3 The sources are:

- fires and explosions, resulting in:
  - heat/flame (thermal radiation);
  - fire plume;
  - ash and char;
  - firewater;
  - overpressure; or

- unignited gas cloud (eg, for natural gas releases where there is no source of ignition).
- spills of hazardous materials; and
- contaminated floodwater.

A1.1.83 The potential for these sources to result in harm that would be considered sufficient to result in death/injury/damage to environmental receptors is considered in the next section.

A1.1.84 The potential pathways by which sources could reach receptors are:

- atmospheric dispersion of thermal radiation, overpressure, and unignited gas;
- atmospheric dispersion and deposition of fire plume gases;
- transport of liquids through the site drainage systems and discharge to the River Mole – during extreme weather conditions only; and
- passage of liquids over unmade ground into the soil and migration into groundwater.

A1.1.85 Annex 1 – Table 1 provides a summary of the nearest potential receptors for each CDOIF environmental receptor category, together with the lowest associated MATTE thresholds for severity and duration.

Annex 1 – Table 1: Summary of Nearest Environmental Receptors and Corresponding MATTE Thresholds

Receptor <sup>(1)</sup>	CDOIF Guideline MATTE Threshold (the lowest level of harm that might be considered a MATTE) <sup>(2)</sup>
<b>Designated sites (nationally important)</b>	
<p>There are four SSSIs within 5 km of the Project site, the nearest is:</p> <ul style="list-style-type: none"> <li>Glover's Wood SSSI – a 74.5 hectare site of semi-natural broadleaved woodland, 1.62 km to the west.</li> </ul>	<p>Severity:</p> <ul style="list-style-type: none"> <li>&gt;0.5 hectares of the site area adversely affected, or</li> <li>10-50% of site area or population.</li> </ul> <p>Duration:</p> <ul style="list-style-type: none"> <li>land-based receptors: recovery takes longer than 3 years; or</li> <li>water-based receptors: recovery takes longer than 1 year.</li> </ul>
<b>Designated sites (internationally important)</b>	
<p>The only site within 10 km is:</p> <ul style="list-style-type: none"> <li>Mole Gap to Reigate Escarpment SAC – a 892 ha site of heath, scrub, woodland and dry grassland, 9.2 km to the north west.</li> </ul>	<p>Severity:</p> <ul style="list-style-type: none"> <li>&gt;0.5 hectares of the site area adversely affected, or</li> <li>5-25% of site area or population.</li> </ul> <p>Duration:</p> <ul style="list-style-type: none"> <li>land-based receptors: recovery takes longer than 3 years.</li> </ul>
<b>Other designated land</b>	
<p>The closest of each type of 'other designated land' are:</p> <ul style="list-style-type: none"> <li>Willoughby Fields Local Nature Reserve (LNR): located approximately 800 metres to the south of the site;</li> <li>Broadfield Park LNR: located approximately 800 metres to the south of the site. areas of ancient woodland within the Project site boundary;</li> <li>Horleyland Wood, located directly north of Crawley Sewage Treatment Works (within the Project site boundary); and</li> <li>London Area green belt adjacent to the Project site boundary.</li> </ul>	<p>Severity:</p> <ul style="list-style-type: none"> <li>10-100 hectares, or</li> <li>10-50% of land.</li> </ul> <p>Duration:</p> <ul style="list-style-type: none"> <li>land-based receptors: recovery takes longer than 3 years.</li> </ul>
<b>Scarce habitat</b>	
<p>The closest receptors are Priority Habitat Inventory habitats:</p> <ul style="list-style-type: none"> <li>areas of deciduous woodland within the Project site boundary; and</li> <li>a small area traditional orchard near Hookwood, approximately 450 metres to the north.</li> </ul>	<p>Severity:</p> <ul style="list-style-type: none"> <li>2-20 hectares, or</li> <li>10-50% of habitat.</li> </ul> <p>Duration:</p> <ul style="list-style-type: none"> <li>land-based receptors: recovery takes longer than 3 years.</li> </ul>
<b>Widespread habitat</b>	
<p>The nearest receptors are:</p> <ul style="list-style-type: none"> <li>agricultural fields within the Project site boundary.</li> </ul>	<p>Severity:</p> <ul style="list-style-type: none"> <li>contamination of 10-100 hectares of land, preventing growing of crops, grazing of domestic animals or renders the area inaccessible to the public because of possible skin contact with dangerous substances. Alternatively, contamination of 10 ha or more of vacant land.</li> </ul> <p>Duration:</p> <ul style="list-style-type: none"> <li>land-based receptors: recovery takes longer than 3 years.</li> </ul>
<b>Groundwater (potential source of drinking water).</b>	
None	n/a (no receptors): groundwater in the Project area is not a source of drinking water.
<b>Groundwater – non-drinking water source</b>	

Receptor <sup>(1)</sup>	CDOIF Guideline MATTE Threshold (the lowest level of harm that might be considered a MATTE) <sup>(2)</sup>
The upper (Secondary) Aquifer beneath the site	<p>Severity:</p> <ul style="list-style-type: none"> <li>1-100 hectares of aquifer where water quality standards are breached (or hazardous substance is discernible).</li> </ul> <p>Duration:</p> <ul style="list-style-type: none"> <li>recovery from WER hazardous substances takes &gt; 3 months and recovery from WER non-hazardous substances takes &gt; 1 year.</li> </ul>
<b>Soil and sediment</b>	
Soil beneath the site	<p>Severity:</p> <ul style="list-style-type: none"> <li>contamination of 10-100 hectares of land preventing growing of crops, grazing of domestic animals or renders the area inaccessible to the public because of possible skin contact with dangerous substances.</li> <li>contamination sufficient to be deemed environmental damage (Environmental Liability Directive).</li> </ul> <p>Duration:</p> <ul style="list-style-type: none"> <li>land-based receptors: recovery takes longer than 3 years.</li> </ul>
<b>Built environment</b>	
<ul style="list-style-type: none"> <li>Church of St Bartholomew Grade 1 listed building, adjacent to the Project site boundary; and</li> <li>Medieval settlement remains (a scheduled monument) just outside the Project site boundary at Tinsley Green.</li> </ul>	<p>Severity:</p> <ul style="list-style-type: none"> <li>damage sufficient for designation of importance to be withdrawn.</li> </ul> <p>Duration:</p> <ul style="list-style-type: none"> <li>land-based receptors: recovery takes longer than 3 years.</li> </ul>
<b>Particular species</b>	
Various (typically considered as part of the other receptor groups (eg the adjacent areas classed as Priority Habitat Inventory)).	<p>Severity:</p> <ul style="list-style-type: none"> <li>Loss of 1-10% of an animal population, or</li> <li>5-50% of plant ground cover.</li> </ul> <p>[Note – these criteria apply nationally – ie England, Wales, Scotland.]</p> <p>Duration:</p> <ul style="list-style-type: none"> <li>land-based receptors: recovery takes longer than 3 years; or</li> <li>water-based receptors: recovery takes longer than 1 year.</li> </ul>
<b>Marine</b>	
No receptors	n/a – no relevant receptors
<b>Freshwater</b>	
<ul style="list-style-type: none"> <li>River Mole (upstream of Horley) – consisting of the River Mole, Crawler’s Brook and Man’s Brook;</li> <li>River Mole (Horley to Hersham) – consisting of the River Mole and Withy Brook;</li> <li>Tilgate Brook and Gatwick Stream at Crawley – consisting of Gatwick Stream and Tilgate Brook); and</li> <li>Burstow Steam (consisting of Burstow Steam and Burstow Steam Tributary).</li> </ul>	<p>Severity:</p> <ul style="list-style-type: none"> <li>WER chemical or ecological status lowered by one class for 2-10 km of watercourse.</li> </ul> <p>Duration</p> <ul style="list-style-type: none"> <li>Recovery takes longer than 1 year.</li> </ul>

Table Notes

1 For receptors outwith Project site boundary, the distance to a receptor is the shortest distance from the Project site boundary to the receptor location/boundary.

2 The CDOIF guideline uses criteria for both the severity and duration of environmental damage to determine the consequence level of a major accident scenario to a particular receptor. The thresholds for both factors must be exceeded for the scenario to be considered to be a potential MATTE.

## Assessment of SPR Linkages

### Atmospheric Transmission of Thermal Radiation

- A1.1.86 It is assumed that any people, fauna or flora within an area that could be directly consumed by a flame zone would be killed or severely injured/damaged. Where possible, people and faunal species are expected to move away from the affected area or find shelter. Radiation levels exceeding 6.3 kW/m<sup>2</sup> are sufficient to result in the death of humans within minutes if shelter is not found. In the absence of animal study data, it is assumed that thermal radiation levels exceeding 6.3 kW/m<sup>2</sup> (or even at lower levels) could also kill fauna<sup>2</sup>. With regard to damage to flora, at levels of thermal radiation of 6.3 kW/m<sup>2</sup> it can be assumed that burning would occur, grasses and leaves being most at risk.
- A1.1.87 Surface waters are not expected to be damaged by thermal radiation. Similarly, land itself is not expected to be damaged by thermal radiation; however, attributes of the land (eg landscape and visual amenity) could be affected as a result of impacts to vegetation.
- A1.1.88 The effects of flame/elevated levels of thermal radiation for the major accident and disaster scenarios identified for the Project are expected to be limited to on-site receptors in the vicinity of the fire. On-site receptor types that could be damaged include humans, other designated land (ancient woodland), scarce habitat (deciduous woodland), widespread habitat (agricultural fields within the Project site boundary) and the species that use these habitats.
- A1.1.89 Vegetation within exposed areas would be expected to experience adverse effects, however, vegetation is only likely to suffer damage to stems and leaves above ground. Root systems and buried seeds may be expected to remain relatively undamaged; hence regeneration is considered likely to occur and effects would not be long-term. Faunal species are expected to move away from the effects of the fire (the exception to this potentially being during nesting/breeding times). The habitats of ecological interest and agricultural fields are generally located towards the Project site boundary, away from the operational area of the airport and away from the likely locations of fire scenarios.
- A1.1.90 In addition, it is expected that fires would be relatively short in duration. On a relative scale, when compared to major accidents

at other COMAH sites, the quantities of flammable substances that could be involved in a fire are relatively small.

- A1.1.91 The most stringent harm criterion for a MATTE for the on-site receptors is for scarce habitat, which is damage to 2-20 hectares, or 10-50% of habitat. The duration criterion is that natural recovery would take longer than 3 years.
- A1.1.92 On the basis of all of the above, it is not considered likely that thermal radiation from a fire would meet the severity or duration MATTE criteria and the risk is considered 'sub-MATTE'. As set out in the methodology section, consequences that are sub-MATTE do not require further assessment.

### Atmospheric Transmission of Overpressure

- A1.1.93 Overpressure from an explosion can result in death or injury to people and fauna in the immediate vicinity of the blast. It can also result in the toppling of trees and damage to buildings and structures.
- A1.1.94 For the major accident and disaster scenarios for the Project, the potential sources of explosions are jet fuel and mains gas. Jet fuel will not give rise to a large vapour cloud and explosion (such as occurred at Buncefield oil depot (see Annex 5)). Damage to the mains gas supply may have the potential to result in an explosion under certain circumstances and if a source of ignition is encountered. This type of accident event is not likely to give rise to an explosion with far reaching effects and, even if effects were experienced at environmental receptors, it is not considered likely to that these would be sufficient to trigger any of the MATTE criteria for environmental receptors and the consequence level would be sub-MATTE. As noted previously, consequences that are sub-MATTE do not require further assessment.

### Atmospheric Transmission of Unignited Gas Clouds

- A1.1.95 A web-based review of available data indicated that no adverse effect is anticipated to occur to plant life from hydrocarbon gas clouds. Natural gas acts primarily as an asphyxiant and potential adverse effects on fauna are reported to be related to oxygen deficient environments; resulting in symptoms such as nausea, retching, stupefaction and anaesthesia. Information relating to animal exposure through inhalation and animal toxicity data indicates that very high concentrations of gas would be required to result in death or serious injury (for example, rabbits can inhale

a mixture of one volume of oxygen and four volumes of methane for any length of time without showing any ill effects). The scale and nature of an unignited accidental gas release for the scenarios identified, along with natural atmospheric dispersion processes, would mean that it is highly unlikely that the concentration of gas at receptors would be sufficiently high to kill or seriously injure faunal receptors. It is not considered likely that an unignited gas cloud would result in effects that these would be sufficient to trigger the MATTE criteria and the consequence level would be sub-MATTE. As noted previously, consequences that are sub-MATTE do not require further assessment.

### Atmospheric Transmission of Fire Plume Gases

- A1.1.96 The severity and extent of impacts of a fire plume are complicated to determine and depend on a number of factors, the key ones being the:
- composition of the fire plume;
  - scale of the fire, in terms of the quantity of material involved in the fire;
  - duration of the fire; and
  - rate and extent of dispersion of the fire plume.
- A1.1.97 Impacts associated with elevated airborne pollutant concentrations, deposition and reduced visibility will be limited by the composition of the fire plume and the small scale and relatively short duration of the potential fires. Effects are expected to occur only in the short-term, for the duration of the fire, with natural dispersion rapidly reducing concentrations to near background levels once the fire has ceased. In addition, animals and birds generally have sufficient mobility to move away from the fire plume.
- A1.1.98 Although the effects of deposition of fire plume particles may be experienced for longer than the duration of the fire, the characteristics of the fire (in terms of scale, duration and the materials involved) mean that deposition effects are also considered unlikely to result in significant environmental damage.
- A1.1.99 The above discussions are supported by a literature review (see Annex 5) of several major accidents involving fires, which do not refer to any environmental damage from smoke plumes. These include the largest crude tank fire in UK history, namely the Tank 13 fire at the Amoco Refinery in Milford Haven on 30 August 1983. Even where the source of the smoke was a major fire

<sup>2</sup> This approach is consistent with the assessment of major accidents and disasters for similar facilities.

consuming toxic chemicals (at Allied Colloids, Low Moor, Bradford), a subsequent survey of contamination of vegetation indicated no significant impacts. In addition, a study published by the Health Protection Agency (HPA) on the impact of the Buncefield oil depot fire (which was a larger fire than that which could occur at Gatwick Airport, see Annex 5), concluded that, even for this major event, the Buncefield oil depot fire did not result in substantial pollution of soil and grasses.

A1.1.100 On the basis of the above and given the characteristics and quantities of the materials that could be involved in an accidental fire with the Project site boundary, it is considered highly unlikely that the resulting fire plume could cause environmental damage that would be sufficient to meet any of the MATTE criteria for any of the environmental receptors on, or in the vicinity of, the Project site boundary. Therefore, the level of harm is sub-MATTE. The duration of effects is also expected to be sub-MATTE for all receptors. The severity of harm and the duration of effects are considered to be sub-MATTE and therefore are not considered further in the risk assessment.

#### Transport of Liquids through the Site Drainage Systems (in Extreme Weather Conditions)

A1.1.101 Typically, accidental spills, contaminated firewater and contaminated floodwater would be retained on site via the site's surface water drainage system and would ultimately be treated at Crawley Sewage Treatment Works.

A1.1.102 In the event of extreme weather conditions, contaminated water could be released directly to the River Mole. The worst-case contaminant is considered to be petroleum hydrocarbons (such as jet fuel). There are no designated receptors of nature conservation interest on the River Mole for at least 10 km downstream. As previously noted, the river is not a drinking water receptor. Thus, the receptor considered for this pathway is:

- freshwater bodies: River Mole (and the species within).

A1.1.103 For fresh surface water, the lowest level of harm that would constitute a MATTE is defined as Severe ('2'):

- WER chemical or ecological status lowered by one class for 2-10 km of watercourse or 2-20 hectares or 10-50% area of estuaries or ponds.

A1.1.104 The shortest duration of harm that would be considered to be a MATTE is defined as:

- medium term – over 1 year (but less than ten years) for surface water.

A1.1.105 Once in the river, the majority of hydrocarbons would float on the surface and spread horizontally over the water, and onto the river banks, presenting a large surface area from which the more volatile components would rapidly partition to the atmosphere. The 'slick' would continue to disperse and break up as it travelled downstream with the flow of the river (the major influencing factors being the rate and direction of the flow of the waterbody and meteorological conditions). However, the majority of the hydrocarbon components would volatilise from the water surface (the estimated volatilisation half-life for hydrocarbons from a model river is 4 to 24 hours) or be subject to biodegradation. Both processes would greatly reduce the quantity of hydrocarbons present. The heavier components may adsorb to sediment or organic matter.

A1.1.106 Adult fish tend to swim away from hydrocarbon spills. Eggs and fish larvae, if present at the time of the spill, may suffer mortalities, but in most of the historical spill cases observed to date, this does not appear to impact on the fish stocks. Even so, fish stocks would be expected to recolonise any affected areas relatively quickly.

A1.1.107 The vulnerability of water bird species (should these be present) to oil pollution is dependent on a number of factors and varies considerably throughout the year. Birds that swim or dive in the water are particularly at risk of becoming oiled. Examination of seabirds oiled during the Sea Empress spill indicated that birds died directly from oil contamination rather than through toxic or food chain effects. Even if invertebrates and fish stocks were depleted, on the basis of the relatively small area that would be affected, it is considered that neighbouring habitat could support the existing bird populations and that natural recolonisation could occur rapidly from upstream areas.

A1.1.108 The criteria for a MATTE to the river as a freshwater receptor are that the WER chemical status or ecological status is lowered by one class for a 2-10 km of watercourse. In 2016 the stretch of the River Mole downstream of the airport (Mole Horley to Hersham) had a 'moderate' overall status; a 'moderate' ecological classification and a 'good' classification for chemical status. The Mole (Horley to Hersham) runs for over 60 km to the River Thames. The WER chemical or ecological status for a water body is based on a number of monitoring results from various locations within the overall catchment area taken over the period of a year. The behaviour of jet fuel in the environment and its associated

environmental fate, coupled with the nature and duration of the effects means that it is not considered likely that a one-off short-term accidental release of diluted hydrocarbons would result in the lowering of the chemical or ecological classifications by one class. The level of harm would therefore be considered to be sub-MATTE.

A1.1.109 Due the behaviour of jet fuel and environmental fate processes, dilution processes and the opportunities for recolonisation, adverse effects to the River Mole, as well as the associated aquatic habitats and ecology, would not be expected to occur for more than one year (water-based receptors) and so the duration would also be short-term (sub-MATTE).

A1.1.110 Since the severity of harm and the duration of effects are considered to be sub-MATTE the overall consequence level is sub-MATTE and these effects do not need to be considered further in the risk assessment.

#### Passage of Liquids over Unmade Ground into the Soil and Migration into Groundwater

A1.1.111 As noted above, the majority of site surfacing in the areas where accidental liquid releases (eg fuel spills, contaminated firewater and floodwater) could occur is hardstanding and linked to the surface water drainage system. However, in the event that an accidental liquid release encountered vegetated areas/unmade ground, any components of the spill that are mobile through soils could migrate vertically downwards. The worst-case spill/contaminant is considered to be hydrocarbons (eg jet fuel).

A1.1.112 As described in Section 4, the soil beneath the site is considered a receptor and a pathway to groundwater, while groundwater is considered as a receptor only.

#### Soil

A1.1.113 For soil, the lowest level of harm that would constitute a MATTE is defined as:

- contamination of 10-100 hectares of land which prevents growing of crops or the grazing of domestic animals or renders the area inaccessible to the public because of possible skin contact with dangerous substances; or
- contamination sufficient to be deemed environmental damage as per the Environmental Liability Directive.

A1.1.114 The shortest duration of harm that would be considered to be a MATTE is defined as:



- medium term – over 3 years, or over 2 years for agricultural land.

A1.1.115 None of the major accident and disaster scenarios are considered likely to have the potential to result in the lowest level of harm required for a MATTE to soil. Furthermore, soil areas on the site in the vicinity of possible accident locations would not generally be accessed by the general public and would not be used for agricultural purposes. The event would not be deemed 'environmental damage' as per the Environmental Liability Directive. Thus, a MATTE to soils is not considered likely to occur and the level of harm is assessed as 'sub-MATTE'.

A1.1.116 For land-based receptors, recovery within three years or less is 'short-term'. The nature and size of the spills, along with natural fate and clean-up processes would mean that recovery would be well within this timeframe. Short-term harm is considered to be 'sub-MATTE'.

A1.1.117 Since the severity of harm and the duration of effects would be sub-MATTE the overall consequence level is sub-MATTE, therefore these effects do not need to be considered further.

#### Groundwater – Non-Drinking Water Source

A1.1.118 For groundwater that is not a source of drinking water, the lowest level of harm that would constitute a MATTE is defined as:

- 1-100 hectares of aquifer where water quality standards are breached (or hazardous substance is discernible).

A1.1.119 The shortest duration of harm that would be considered to be a MATTE is defined as:

- medium term – WER non-hazardous substances for more than 1 year/WER hazardous substances for more than 3 months.

A1.1.120 In accordance with the CDOIF Guidelines, an accidental release affecting the secondary aquifer would be a MATTE if 1-100 hectares of the groundwater body was polluted such that water quality standards are breached. Very little of the hydrocarbon would be expected to actually reach the groundwater. Since jet fuel has low mobility in soils, the majority of the hydrocarbons would pool on soil surfaces and/or adsorb to soil particles and organic matter. The hydrocarbons would then undergo volatilisation and start to biodegrade. The very small proportion of lower molecular weight components that are more mobile would migrate downwards through the unsaturated zone towards

groundwater, adsorbing to soil particles and organic matter. Some of these hydrocarbons will be retained in soil pore spaces. Biodegradation of mobile components would continue to take place in the unsaturated zone, though this is expected to be at a slower rate than for components at the site surface.

A1.1.121 Taking account of all the factors discussed above, and in particular the low mobility and solubility of jet fuel coupled with the expected rates of volatilisation and biodegradation, it is not expected that the worst-case unmitigated releases would affect over 1 hectares of groundwater such that water quality standards are breached, or that a hazardous substance is discernible.

A1.1.122 Thus, the severity of harm to receptors resulting from exposure of unmade ground, and percolation through soils to groundwater in the upper aquifer is considered to be 'sub-MATTE'.

A1.1.123 The recovery period is conservatively assessed to be 'medium term'. However, irrespective of the duration of effects, since the severity of harm is considered to be sub-MATTE, the consequence level is also sub-MATTE and therefore this SPR linkage is not considered further.

#### Conclusions

A1.1.124 All the major accident and disaster scenarios with the potential to result in environmental damage have been determined to result in sub-MATTE consequences. Sub-MATTE consequences are not considered in further detail as part of the risk tolerability assessment in accordance with the CDOIF guideline (CDOIF 2016); implying that such outcomes are of low risk, and at the very least could be considered 'broadly acceptable'.

A1.1.125 It is recognised that the major accident and disaster scenarios could result in levels of damage and harm that would be normally considered to be 'significant pollution/damage' in the context of an EIA. However, in the context of a risk assessment of major accidents, these would not be considered a MATTE.

Annex 2

Policy, Legislation and Guidance

## A2.1 Policy, Legislation and Guidance

### Legislation and Policy

A2.1.1 This section identifies the legislation, planning policy and other documentation that has informed the assessment of effects presented in the major accidents and disasters chapter.

### Legislation

A2.1.2 In addition to main EIA legislation, the legislation relevant to the assessment of major accidents and disasters includes:

- Directive on the Assessment of the Effects of Certain Public and Private Projects on the environment (2014/52/EU);
- The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017;
- The Planning (Hazardous Substances) Regulations 2015;
- Network and Information Systems Regulations 2018;
- Regulation (EU) No 402/2013 on the Common Safety Method for Risk Evaluation and Assessment (as amended by Regulation EU 2015/1136);
- Health and Safety at Work Act 1974;
- The Management of Health and Safety at Work Regulations 1999;
- The Civil Contingencies Act 2004;
- Directive 2012/18/EU 2012 on the control of major-accident hazards involving dangerous substances;
- Control of Major Accident Hazards Regulations 2015 (COMAH);
- Pipeline Safety Regulations 1996;
- Planning (Hazards Substances) Regulations 2015;
- The Workplace (health, safety and welfare) Regulations 1992;
- The Regulatory Reform (Fire Safety) Order 2005;
- Construction (Design and Management) (CDM) 2015 Regulations;
- The Control of Asbestos Regulations 2012;
- The Control of Substances Hazardous to Health Regulations 2002;
- The Building Regulations 2010;
- CAP 1223: Framework for an Aviation Security 2018;
- The Air Navigation Order 2009 SI 2009 No 3015
- CAP 393: The Air Navigation Order 2016 and Regulations; and
- Regulation on Common rules in the field of civil aviation security (EU 300/2008).

### Planning Policy

A2.1.3 Planning policies relevant to the assessment of major accidents and disasters include:

- Airports NPS (Department for Transport, 2018a);
- NPS for National Networks (Department for Transport, 2014);
- National Planning Policy Framework (NPPF) (HM Government, 2021);
- Crawley 2030: Crawley Borough Local Plan 2030 (Crawley Borough Council, 2015);
- Crawley 2035: Draft Crawley Borough Local Plan 2020-2035 (emerging policy);
- Reigate and Banstead Local Plan: Core Strategy 2014;
- Reigate and Banstead Local Plan Development Management Plan 2018-2027;
- Mole Valley Local Plan 2000 (Mole Valley District Council, 2000);
- Mole Valley Core Strategy 2009 (Mole Valley District Council, 2009);
- Horsham District Planning Framework (excluding South Downs National Park) 2015 (Horsham District Council, 2015);
- Tandridge District Core Strategy 2008 (Tandridge District Council, 2008);
- Tandridge Local Plan (Part 2) Detailed Policies 2014-2029 (Tandridge District Council, 2014);
- Mid Sussex District Plan 2014-2031 (Mid Sussex District Council, 2018); and
- Our Local Plan 2033 (Regulation 22 Submission) 2019 (Tandridge District Council, 2019) – Policy TLP17 (emerging policy).

### Guidance Documents

A2.1.4 There is currently no specific established guidance for the assessment of major accidents and disasters within the EIA process. The principles set out in the documents listed below include some guidance relevant to developing the proposed approach to assessment, as well as emerging best practice from recent airport projects:

- Environmental Impact Assessment of Projects, Guidance on the Preparation of the EIA Report (EC, 2017a);
- Guidance on the Interpretation of Major Accidents to the environment for the purposes of COMAH regulations (DETR, 1999);

- Guide to predicting environmental recovery durations for Major Accidents (Energy Institute, 2017);
- Guidelines in Environmental Management for Facilities Storing Bulk Quantities of Petroleum Products and Other Fuels, 3rd edition (Energy Institute, 2015);
- Safety and Environmental Standards for Fuel Storage Sites Process Safety Leadership Group (Health and Safety Executive (HSE), 2009);
- Guidance: Hazardous Substances (Ministry of Housing, Communities & Local Government, 2019d);
- CIRIA C736 Containment Systems for the Prevention of Pollution: Secondary, Tertiary and Other Means for Industrial and Commercial Premises (CIRIA, 2014);
- Reducing Risks Protecting People (R2P2) (HSE, 2001);
- Air Navigation Guidance (Department for Transport, 2017d);
- CAP760: Guidance on the Conduct of Hazard Identification, Risk Assessment and the Production of Safety Cases (CAA, 2010);
- CAP 670: ATS Safety Requirements (CAA, 2014b);
- CAP1616: Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements (CAA, 2017a);
- Guidance on Regulations (L153): Managing health and safety in construction: Construction (design and management) Regulations (HSE, 2015);
- Hazardous Installation Directive (HID) Regulatory Model: Safety Management in Major Hazard Industries (HSE, 2013);
- Control of Development in Airport Public Safety Zones, Department for Transport Circular 01/2010 (Department for Transport, 2010);
- CAP 795: Safety Management Systems - Guidance to Organizations (CAA, 2015b);
- CAP 168: Licensing of Aerodromes (CAA, 2019b);
- CAP 1273: Implementing a Security Management System (CAA, 2018c);
- CAP 738: Aerodrome Safeguarding (CAA, 2006);
- European Action Plan for the Prevention of Runway Incursions EAPPRI edition (EUROCONTROL, 2017);
- CAP 791: Procedures for changes to aerodrome infrastructure (CAA, 2016);
- CAP 493: Manual of Air Traffic Services MATS Part 1 (CAA, 2017c);
- European Union Aviation Safety Agency (EASA) Commission Regulation (EU) No 139/2014 – specifically ADR.OR.D.005 and associated AMC/GM (EASA, 2014);
- Doc 9859 Safety Management Manual (ICAO, 2013);

- Annex 14 – Aerodrome Design and Operations (ICAO, 2014); and
- Chemical and Downstream Oil Industries Forum (CDOIF) Guideline – Environmental Risk Tolerability for COMAH Establishments, Version 2.0, March 2016 (CDOIF 2016).





Annex 3

Scoping Outcomes for Potential Major Accidents and Disaster Events

### A3.1 Scoping Outcomes for Potential Major Accidents and Disaster Events (reproduced from EIA Scoping Report)

Scoping Test Reference	Scoping Test (sequential)
1	Is the event classified as a major accident or disaster?
2	Is there a source, pathway and receptor route for the event?
3	Could the Project add to vulnerability, likelihood or impact compared to the do-minimum scenario?
4	Are there adequate protocols or measures already in place to mitigate this risk?

Scoped In	
Scoped Out	

Event/Scenarios	Description	Construction (including demolition)	Operation	Justification/Comments
Flooding (coastal and tidal)	Flooding of permanent or temporary assets including construction sites (for example terminal building, road access tunnel, cargo and maintenance facilities) leading to damage to people or the environment			<p><b>Scoped out as does not meet Scoping Test 2</b> (no Source-Pathway-Receptor route)</p> <p>Negligible risk of coastal and tidal flooding due to distance from the sea and tidal rivers; flooding from these sources will therefore be scoped out of further assessment.</p>
	Flooding of assets (for example storage tank, packaged goods, vehicles) leading to a hazardous release or casualties			
	Flooding with contamination leading to detriment to environmental receptor			
	Flooding leading to runway excursion			
Flooding (rainfall)	Surface water flooding can happen many miles from a river, often in places that people wouldn't expect			<p><b>Scoped in as meets all scoping tests</b></p> <p>Flood risk from extreme rainfall events has been scoped into the assessment to test the vulnerability of the Project to this type of event.</p> <p>The Airside Operations Adverse Weather (flooding plan) (Gatwick Airport Limited, 2018) is currently adopted by Gatwick operations. This details the planning and operating procedures necessary to ensure the safe operation of the Aerodrome in the occasion of actual or potential flood event. However, this would need to be reviewed in relation to its application to the Project.</p>

Event/Scenarios	Description	Construction (including demolition)	Operation	Justification/Comments
Flooding (riparian)	Increased risk of surface water flooding leading to damage to people and the environment			<p><b>Scoped in as meets all scoping tests</b></p> <p>There is flood risk associated with rivers in the vicinity which have the potential to flood, including Gatwick Stream and River Mole. This risk is therefore scoped in to test the vulnerability of the Project to riparian flooding.</p> <p>The Airside Operations Adverse Weather (flooding plan) (Gatwick Airport Limited, 2018) is currently adopted by Gatwick operations. This details the planning and operating procedures necessary to ensure the safe operation of the Airport in the occasion of actual or potential flood event. However, this would need to be reviewed in relation to its application to the Project.</p>
Earthquake	Seismic event leading to building instability/collapse			<p><b>Scoped in as meets all scoping tests</b></p> <p>The local area around Gatwick has been subject to some recent minor earthquakes. Although a larger earthquake which could result in a major accident and disaster is considered unlikely, this risk is scoped in for further assessment to test the vulnerability of the Project design to earthquake and establish whether mitigation and management protocols would be required.</p>
Subsidence	Subsidence leading to building instability/collapse			<p><b>Scoped in as meets all scoping tests</b></p> <p>There is a potential risk of subsidence due to underlying geology or flood events which could lead to building damage. This risk is therefore scoped in to test the vulnerability of the Project design to this type of event and establish whether mitigation would be required.</p>
Landslide (land slip, land movement)	Significant land movement due to natural phenomena			<p><b>Scoped in as meets all scoping tests</b></p> <p>The local area of Gatwick has been subject to some recent minor earthquakes. This could possibly trigger land movement or slip. This risk is therefore scoped in to test the vulnerability of the Project design to this type of event and establish whether mitigation would be required.</p>
Extreme heat/cold	Degradation of runway surface from extreme heat			<p><b>Scoped in as meets all scoping tests</b></p> <p>There is a potential risk due to extreme heat events. This risk is therefore scoped in to test the vulnerability of the Project design to this type of event and establish whether additional mitigation would be required.</p>
	Instrument/navigation failure resulting from extreme cold			<p><b>Scoped out as does not meet Scoping Test 4</b> (adequate protocols already in place)</p>
Snow (including ice and hail)	Cold Embrittlement			<p>The airport could be subject to extreme snow, cold and heat events in future. These are types of events that the airport already deals with on a 'business as usual' basis. Delivery of the Project would not increase the vulnerability of the airport to this type of event. There are also strong and established protocols in place to manage temperature related risks which meet international best practice. These types of event are therefore scoped out on the basis that there is no increased risk compared to the do-minimum scenario and best practice international standards are already in place.</p>
	Runway excursion			<p>The following safety mitigations are in place currently as part of Gatwick Airport operations:</p> <ul style="list-style-type: none"> <li>EASA Licensing/CAP 168: Licensing of Aerodromes (Civil Aviation Authority, 2019).</li> </ul>
	Leading to impairment of major accident / initiator control (including fire service and policing, insufficient ground crew)			

Event/Scenarios	Description	Construction (including demolition)	Operation	Justification/Comments
				<p>The purpose of this document is to give guidance to applicants and licence holders on the procedure for the issue and continuation of, or variation to, an aerodrome licence issued under Article 211 of the Air Navigation Order 2009, and to indicate the licensing requirements that are used for assessing a variation or an application. The document also describes the CAA's aerodrome licensing requirements relating to operational management and the planning of aerodrome development. This document represents the minimum standards necessary to meet the licensing requirement.</p> <ul style="list-style-type: none"> <li>Airside Operations Adverse Weather (Snow and Ice plan) (Gatwick Airport Limited, 2018). The aim of the Snow and Ice plan is to provide information relating to procedures to sustain Airside Operations as far as is reasonably practicable. The Airside Operations Snow and Ice plan is to be the start point for the Airside Operations Lead/Airside Operations Manager (AOM) and adapted to match the situation in consultation with the Airport Bronze Command and Airside Disruption Cell (ADC).</li> <li>Airside Operations Adverse Weather (Heat plan) (Gatwick Airport Limited, 2018). Details the planning and operating procedures necessary to ensure the safe operation of the Aerodrome in the occasion of an actual or potential heat event.</li> <li>Flight procedures and restrictions in line with EASA and CAA guidelines for adverse weather.</li> </ul>
	Snow loading of building or other properties			<p><b>Scoped in as meets all scoping tests</b></p> <p>There is a potential risk due to snow loading events. This risk is scoped in to test the vulnerability of the Project design to this type of event and establish whether additional mitigation or design measures would be required.</p>
Tsunami	A series of waves in a water body caused by the displacement of a large volume of water, generally in an ocean or a large lake. It can lead to damage to people or environment			<p><b>Scoped out as does not meet Scoping Test 2</b> (no Source-Pathway-Receptor route)</p> <p>Negligible risk of tsunami due to distance from the sea and tidal rivers.</p>
Storm surge	Strong winds blowing over the surface of the sea, large and long waves that can travel long distances until they reach the shore and high-water levels known as storm surge			<p><b>Scoped out as does not meet Scoping Test 2</b> (no Source-Pathway-Receptor route)</p> <p>Negligible risk of storm surge due to distance from the sea and tidal rivers.</p>
Extreme storm	Damage to buildings			<p><b>Scoped in as meets all scoping tests</b></p> <p>There is a potential risk due to extreme storm events. This risk is scoped in to test the vulnerability of the Project design to this type of event and establish whether additional mitigation or design measures would be required.</p>
	Damage to aircraft on ground or in flight under control of Gatwick			<p><b>Scoped out as does not meet Scoping Test 4</b> (adequate protocols already in place)</p> <p>The airport could be subject to extreme storms in future. However, these are types of events that the airport already deals with on a 'business as usual' basis during airspace operations. Delivery of the Project would not increase the vulnerability of the airport to this type of event. There are also strong and established protocols in place to manage extreme storm related risks which meet international best practice. These types of event are therefore scoped out on the basis that there is no increased risk compared to the do-minimum scenario and best practice international standards are already in place.</p> <p>The following safety mitigations will be in place as standard:</p>



Event/Scenarios	Description	Construction (including demolition)	Operation	Justification/Comments
				<ul style="list-style-type: none"> <li>EASA Licensing/CAP 168: Licensing of Aerodromes (Civil Aviation Authority, 2019). The purpose of this document is to give guidance to applicants and licence holders on the procedure for the issue and continuation of or variation to an aerodrome licence issued under Article 211 of the Air Navigation Order 2009, and to indicate the licensing requirements that are used for assessing a variation or an application. The document also describes the CAA's aerodrome licensing requirements relating to operational management and the planning of aerodrome development. This document represents the minimum standards necessary to meet the licensing requirement.</li> <li>Airside Operations Adverse Weather (Wind plan) (Gatwick Airport Limited, 2018). Details the planning and operating procedures necessary to ensure the safe operation of the Aerodrome in the occasion of an actual or potential wind event.</li> </ul>
Lightning	Lightning strike leading to electrocution, fire, building damage/debris resulting in damage to people or environment			<p><b>Scoped out during construction as does not meet Scoping Test 3</b> (no increased risk compared to the do-minimum)</p> <p>As flights not affected during construction period.</p> <p><b>Scoped in for operational effects as meets all scoping tests</b></p> <p>There is a potential risk due to lightning events. This risk is therefore scoped in to test the vulnerability of the Project design to this type of event and establish whether additional mitigation or design measures would be required.</p>
	Lightning strike to aircraft in flight			<p><b>Scoped in for operational effects as meets all scoping tests</b></p> <p>There is a potential risk due to lightning events which would be increased due an increase in the number of flights with the Project in operation. This risk is scoped in to identify whether any additional mitigation measures within the airport's control can be implemented to manage this risk.</p>
Wildfire	Fire threat to permanent or temporary assets, including construction sites (for example terminal building, road access tunnel, cargo and maintenance facilities) leading to damage to people or the environment			<p><b>Scoped in as meets all scoping tests</b></p> <p>There is a potential risk due to wildfire events. This risk is therefore scoped in to test the vulnerability of the Project design to this type of event and establish whether additional mitigation or design measures would be required.</p> <p>Fire prevention and emergency measures currently employed as part of Gatwick Airport operations would be in place and extended to the Project. During construction, specific fire prevention and emergency measures would be developed and set out in the CoCP.</p>
Volcanic eruption	Threat of volcanic eruption individuals and assets			<p><b>Scoped out as does not meet Scoping Test 2</b> (no Source-Pathway-Receptor route)</p> <p>Negligible risk of volcanic activity in the UK.</p>
Ash cloud	Ash released from a volcano after eruption may affect navigation systems, visibility of pilots and flight engines			<p><b>Scoped out as does not meet Scoping Test 4</b> (adequate protocols already in place)</p>

Event/Scenarios	Description	Construction (including demolition)	Operation	Justification/Comments
				<p>There is potential for a similar event to the 2010 Iceland volcanic eruption to occur, disrupting airport operations. However, contingency and safety measures currently as part of Gatwick Airport operations would take effect, and it is considered there would be a negligible risk in relation to major accidents and disasters.</p> <ul style="list-style-type: none"> <li>Airside Operations Adverse Weather (Volcanic ash plan) (Gatwick Airport Limited, 2018).</li> </ul> <p>The planning and operating procedures necessary to ensure the safe operation of the Aerodrome in the event of a volcanic ash event.</p> <ul style="list-style-type: none"> <li>CAP 1236: Guidance regarding flight operations in the vicinity of volcanic ash (Civil Aviation Authority, 2017a). The guidance contains information and advice that may be issued by other States in the form of an Aeronautical Information Circular entitled "The approach to management of volcanic ash events".</li> <li>NPA 2012-07 (European Union Aviation Safety Agency, 2012).</li> </ul> <p>Following the last major eruptions of volcanos and considering the consequences of such eruptions on flight operations, discussion at an ICAO level reached the common position that an operator should not be prevented from operating through, under or over airspace forecast to be contaminated with volcanic ash or aerodromes/operating sites contaminated with volcanic ash, provided it has demonstrated in its management system, the capability to do so through a safety risk assessment.</p>
Infectious diseases (epidemics and pandemics)	Health risks with possible fatalities to workers and visitors, with potential for further infection outside of airport			<b>Scoped out as does not meet Scoping Test 3</b> (would not increase risk compared to do-minimum)
	Impairment of major accident/initiator control (including fire service and policing, insufficient ground crew)			The potential risk from international communicable disease transmission is currently managed through a process that extends well beyond an individual airport and the influence of the UK planning regime. It is driven by the International Health Regulations which place a legally-binding requirement for 196 countries, including all Member States of the WHO, to prevent and respond to acute public health risks that have the potential to cross transnational boundaries and threaten people worldwide. This risk is not considered to be any greater with the proposals compared to the do-minimum scenario. Refer to Section 7.11: Health and Wellbeing.
Infectious animal diseases (epidemics, pandemics, animal plagues and pests)	Animal disease in locality affecting quarantined or imported valuable species			<p><b>Scoped out as does not meet Scoping Test 3</b> (would not increase risk compared to do-minimum)</p> <p>As indicated in the Airports NPS, airport development, as with all infrastructure projects can alter habitats and food chains that might attract opportunistic species that are typically regarded as pests. For airport developments, pests can constitute an unacceptable operational hazard, and must be addressed through design and daily management to deter habitat creation or food chains.</p> <p>Without management, airports could provide good year-round habitat for insects, rodents, rabbits, deer, fox and avian species that could theoretically present an aircraft maintenance and collision hazard. However, the potential hazard is well known, understood and already addressed at Gatwick Airport through existing design and management measures (including habitat, waste management and staff awareness procedures) that prevent, deter and control pests, and the associated operational hazard. Refer to Section 7.11: Health and Wellbeing for more detailed information.</p>

Event/Scenarios	Description	Construction (including demolition)	Operation	Justification/Comments
Climate change	Vulnerability of the Project to future effects of climate change			<b>Scoped in as meets all scoping tests</b> This risk is therefore scoped in to test the vulnerability of the Project design to future climate change and establish whether additional mitigation or design measures would be required. Climate change effects would also be incorporated into the flood risk assessment and considered in detail in the climate change and carbon chapter. Refer to Section 7.5: Water Environment and Section 7.9: Climate Change and Carbon.
Drought	Loss of water supply – leading to welfare issues for passengers and staff			<b>Scoped out as does not meet Scoping Test 3</b> (would not increase risk compared to do-minimum)  Contingency measures in case of disruption to water supply are currently in place as part of Gatwick Airport operations and are well-established. Although there is a risk of drought at Gatwick Airport, this is not considered to be greater than the do-minimum scenario.
	Loss of water supply leading to failure of safety critical service, for example firewater			
	Foundation cracks/settlement leading to failure of buildings/assets and damage to people/the environment			
Famine and food security	A widespread scarcity of food caused by several factors including war, inflation, crop failure, population imbalance, or government policies			<b>Scoped out as does not meet Scoping Test 3</b> (would not increase risk compared to do-minimum)  Operations at the airport in relation to food security would be unchanged as a result of the Project and the risk is considered to be negligible.
Severe space weather	Severe space weather leads to loss of systems, for example primary navigation systems or loss of communications			<b>Scoped out as does not meet Scoping Test 3</b> (would not increase risk compared to do-minimum)  The UK Government has a space weather preparedness strategy in place. Severe space weather events are very rare and the risk in relation to major accidents and disasters is therefore considered negligible. <ul style="list-style-type: none"> <li>Space weather preparedness strategy (Department for Business, Innovation &amp; Skills, 2015)</li> </ul> The UK approach to space weather preparedness is set out in this document and is underpinned by three elements: designing mitigation into infrastructure where possible; developing the ability to provide alerts and warnings of space weather and its potential impacts; and having in place plans to respond to severe events. Preparation is needed on the national level, with the support of local capabilities to deal with the consequences as well as international co-ordination.
Dam failure	Sudden release from dam/reservoir/canal			<b>Scoped out as does not meet Scoping Test 2</b> (no Source-Pathway-Receptor route)  There are no dams, reservoirs or canals located in the immediate vicinity of Gatwick which could result in a significant flood event. Refer also to Section 7.5: Water Environment.  A Flood Risk Assessment will be carried out in accordance with planning guidance on flood risk.
<b>External manmade accidents</b>				
Contamination (drinking water)	Failure of on-site monitoring, handling, control and management, including security leading to contamination of water sources			<b>Scoped in as meets all scoping tests</b>

Event/Scenarios	Description	Construction (including demolition)	Operation	Justification/Comments
				There is potential for contamination of water sources as a result of construction and operational activities. This risk is therefore scoped in to test the vulnerability of the Project design to this type of risk and establish whether additional mitigation or design measures would be required.
Large and small attacks (biological and chemical)	Involves screening (deliberately unidentified or undeclared substance), monitoring, handling, control and management			<b>Scoped out as does not meet Scoping Test 3</b> (would not increase risk compared to do-minimum)
Malicious attack	Major attack on persons at airport, transport system and associated infrastructure or on the environment			Although there is always a risk of a malicious attack, terrorism, sabotage, vandalism and theft, the risk is not considered to be higher with the Project compared to the existing airport operations. In addition, there are extensive mitigation and contingency measures in place to manage these risks. All security measures will be confidential and cannot be detailed in the EIA. These issues are therefore proposed to be scoped out of further assessment. The following mitigation and management measures currently apply:
Terrorism	Unlawful use of violence and intimidation, especially against civilians within the airport			<ul style="list-style-type: none"> <li>CAP 1223: Framework for an Aviation Security (Civil Aviation Authority, 2018a).</li> </ul>
Sabotage, vandalism, trespass and theft	External – leading to major accident/initiator located within the Project area			<p>Security Management Systems (SeMS) provide a formalized, risk-driven framework for integrating security into the daily operations and culture of an entity. The SeMS enables an entity to identify and address security risks, threats, gaps and weaknesses in a consistent and proactive way. SeMS is not a mandated process but if an entity has SeMS which contain all the elements which are identified in CAP 1223, it will help the entity to meet the internal quality control provisions of articles 12, 13 and 14 of EC 300/20081.</p> <ul style="list-style-type: none"> <li>Guidance on policing at airports (National Policing Improvement Agency, 2011).</li> </ul> <p>The Project would be designed and operated in line with the Guidance on policing at airports (National Policing Improvement Agency, 2011) as is the case with the existing airport.</p>
Drones and lasers	External – leading to major accident/initiator located within the Project area			<p><b>Scoped out as does not meet Scoping Tests 3 and 4</b> (no increase in risk due to the Project and adequate protocols already in place)</p> <p>Although there is always a risk of a drone or laser attack, the risk is not considered to be higher with the proposed development compared to the existing airport operations, and there are extensive mitigation and contingency measures in place to manage these risks. All security measures will be confidential and cannot be detailed in the EIA. These issues are therefore proposed to be scoped out of further assessment. The following mitigation and management measures currently apply:</p> <ul style="list-style-type: none"> <li>Detailed guidance on managing risks is also issued by ICAO: Doc 9815 Manual on Laser Emitters and Flight Safety (ICAO, 2003).</li> </ul> <p>This manual supports the laser-related Standards or Recommended Practices (SARPs) in Annexes 11 and 14 (ICAO, 2003). It focuses on the medical, physiological and psychological effects on flight crew of exposure to laser emissions. The information and guidance material provided in this manual are primarily directed to decision-makers at government level, laser operators, air traffic control officers, aircrew, aviation medicine consultants to and medical officers of the regulatory authorities, and doctors involved in clinical aviation medicine, occupational health and preventive medicine. The manual is aimed both at reducing the need for regulatory authorities to seek individual expert advice and at reducing inconsistencies between Member States in the implementation of national regulations.</p>

Event/Scenarios	Description	Construction (including demolition)	Operation	Justification/Comments
				<ul style="list-style-type: none"> <li>▪ CAP 736 Operation of Directed Light, Fireworks, Toy Balloons and Sky Lanterns within UK Air Space (Civil Aviation Authority, 2011a). Provides policy and supporting guidance for commercial organizations and individuals planning to operate directed light, fireworks, toy balloons and sky lanterns in UK airspace. Information on notification procedures and CAA application forms are contained within the document; provided event information will enable the aviation community to properly assess the impact of any such proposed activity and take appropriate measures to mitigate any dangers to flight safety.</li> <li>▪ CAP 722: Unmanned Aircraft System Operations in UK Airspace – Guidance (Civil Aviation Authority, 2015). This guidance has been compiled by the Civil Aviation Authority's Intelligence, Strategy and Policy (ISP) division. It is Intended to assist those who are involved in the development of Unmanned Aircraft System (UAS) to identify the route to certification, outline the methods by which permission for aerial work may be obtained and ensure that the required standards and practices are met by all UAS operators. Furthermore, the document highlights the safety requirements that have to be met, in terms of airworthiness and operational standards, before a UAS is allowed to operate in the UK.</li> <li>▪ CAP 1627: Drone Safety Risk: An assessment (Civil Aviation Authority, 2018b). The Civil Aviation Authority (CAA) supports the safe development of drones in the UK. The CAA has undertaken an assessment of available information about the likelihood of an unintentional drone collision and the severity of any possible impact between an aircraft and a smaller unmanned vehicle (defined as under 2 kg in this report). The findings are: <ul style="list-style-type: none"> <li>▪ The drones most likely to end up in proximity to manned aircraft are smaller drones, typically of 2 kg or less, flown by operators who either do not know the aviation safety regulations or have chosen to ignore them. <ul style="list-style-type: none"> <li>- It is considered unlikely that a small drone would cause significant damage to a modern turbo-fan jet engine; even if it did, a multi-engine aircraft would still be likely to be able to land safely.</li> </ul> </li> </ul> </li> </ul>
Industrial action	An industrial action leading to a major accident. This could be initiated by the fire service, the police or ground crew			<b>Scoped out as does not meet Scoping Test 3</b> (would not increase risk compared to do-minimum)
Widespread public disorder	Conduct in a public place which is likely to cause, or intends to cause harassment, alarm or distress to anyone present			These risks are considered to be the same as for current operations. Contingency measures are already in place as part of Gatwick Airport operations, including restricting operations. The Project would be included under the existing arrangements.
Cyber-attack and digital/data security	Cyber-attack and digital/data security (infrastructure/services), leading to major accident/initiator at airport			<b>Scoped out as does not meet Scoping Test 3</b> (would not increase risk compared to do-minimum)  Although there is always a risk of a cyber-attack, the risk is not considered to be greater with the proposed development compared to the existing airport operations, and there are extensive mitigation and contingency measures in place to manage these risks. These issues are therefore proposed to be scoped out of further assessment. The design and operation of the Gatwick scheme must comply with the National Aviation Security Program regulations and guidance: <ul style="list-style-type: none"> <li>▪ CAP 1574: 26 Security Controls for Regulation Civil Aviation Authority, 2017b). This details 26 cyber security controls as a framework for the regulation of cyber induced risks within the aviation industry, both in respect of aviation safety and economic resilience.</li> </ul>

Event/Scenarios	Description	Construction (including demolition)	Operation	Justification/Comments
Displaced population	Movement of people out of the Project area due to the Project			<p><b>Scoped out as does not meet Scoping Test 2</b> (no source, pathway or receptor route for the event)</p> <p>No populations would be displaced by the Project.</p>
External objects (for example bird strike/fireworks/sky lanterns/wind turbine)	Flying animals or objects that can impact on airport operations			<p><b>Scoped out as does not meet Scoping Tests 3 and 4</b> (no increase in risk due to the Project and adequate protocols already in place)</p> <p>Although there is always a risk of a collision with an external object (non-malicious source), the risk is not considered to be higher with the proposed development compared to the existing airport operations, and there are extensive mitigation and contingency measures in place to manage these risks. The proposals would also not result in an airspace change. There are established management and contingency measures already in place as part of Gatwick Airport operations adhering the following:</p> <ul style="list-style-type: none"> <li>▪ CAP 772: Wildlife Hazard Management at Aerodrome (Civil Aviation Authority, 2017c). The guidance assists aerodrome operators in establishing and maintaining an effective Bird Control Management Plan (BCMP), including the measures necessary to assess the bird strike risk at the aerodrome, and the identification of appropriate action to minimise that risk.</li> <li>▪ CAP 736: Operation of Directed Light, Fireworks, Toy Balloons and Sky Lanterns within UK Air Space (Civil Aviation Authority, 2011a). It provides policy and supporting guidance for commercial organizations and individuals planning to operate directed light, fireworks, toy balloons and sky lanterns in UK airspace. Information on notification procedures and CAA application forms are contained within the document; provided event information will enable the aviation community to properly assess the impact of any such proposed activity and take appropriate measures to mitigate any dangers to flight safety.</li> </ul>
Fire/explosion at neighbouring site	Accidents related to fire and potential explosion, for example a gas explosion at neighbouring sites			<p><b>Scoped out as does not meet Scoping Test 3</b> (no increase in risk compared to do-minimum)</p>
Structural collapse at neighbouring site	Collapse of buildings and other structures at neighbouring sites			<p>Although there is always a risk of events at neighbouring sites, the risk is not considered to be higher with the Project compared to the existing airport operations and do-minimum scenario. In addition, there are extensive mitigation and contingency measures in place as part of Gatwick Airport operations to manage these risks. These issues are therefore proposed to be scoped out of further assessment. The following legislation has also been considered for offsites with extractive industry waste:</p> <ul style="list-style-type: none"> <li>▪ The Major Accident Off-Site Emergency Plan (Management of Waste from Extractive Industries) (England and Wales) Regulations 2009. These Regulations transpose Directive 2006/21/EC of the European Parliament and of the Council on the management of waste from extractive industries and amending Directive 2004/35/EC in respect of the requirements in Article 6 of the Directive concerning the preparation of an off-site (external) emergency plan, which must specify the measures to be taken off-site in the event of an accident.</li> </ul>
Excavation failure at neighbouring site	Accidents related to excavation at neighbouring sites			
Transport accident (runway taxiway and apron)	Aircraft incident on runways, taxiways and apron (note this includes standing, pushback/towing and taxing, take-off and landing)			<p><b>Scoped out as does not meet Scoping Test 4</b> (adequate protocols already in place)</p>

Event/Scenarios	Description	Construction (including demolition)	Operation	Justification/Comments
				<p>There is potential for an incident due to aircraft movements on the ground. However, there are strong established protocols in place to manage these risks which the Applicant would adhere to if the Project were to go ahead. This includes the following management and mitigation guidelines and standards:</p> <ul style="list-style-type: none"> <li>▪ EASA Licensing/CAP 168: Licensing of Aerodromes (Civil Aviation Authority, 2019).</li> </ul> <p>The purpose of this document is to give guidance to applicants and licence holders on the procedure for the issue and continuation of, or variation to, an aerodrome licence issued under Article 211 of the ANO 2009, and to indicate the licensing requirements that are used for assessing a variation or an application. The document also describes the CAA's aerodrome licensing requirements relating to operational management and the planning of aerodrome development. This document represents the minimum standards necessary to meet the licensing requirement.</p> <ul style="list-style-type: none"> <li>▪ CAP 738: Safeguarding of Aerodromes Appendix C/EASA CS-ADRDSN Certification Specifications and Guidance Material for Aerodromes Design – Book 2 – Chapter H (Civil Aviation Authority, 2006).</li> </ul> <p>This document offers guidance to those responsible for the safe operation of an aerodrome or a technical site, to help them assess what impact a proposed development or construction might have on that operation.</p> <ul style="list-style-type: none"> <li>▪ CAP 1168: Guidance Material for Organizations, Operations and Design Requirements for Aerodromes, Chapter: Emergency Planning (Civil Aviation Authority, 2017d).</li> </ul> <p>Emergency planning arrangements at aerodromes may be developed to align with UK best practice and the requirements of civil contingencies legislation. Further guidance can be found in the ICAO Airport Services Manual, Part 7, Airport Emergency Planning (Doc 9137-AN/898). The Aerodrome Emergency Plan may describe how an emergency situation or incident can be managed in order to minimise the effects it may have on life, property, the environment, and aerodrome operations, and how the best use of appropriate available resources should be applied to achieve that aim.</p> <ul style="list-style-type: none"> <li>▪ CAP 748: Aircraft Fueling and Fuel Installation Management (Civil Aviation Authority, 2004).</li> </ul> <p>This CAP is intended to provide guidance to aerodrome licencees whose aerodromes have facilities for fuel storage however complex or simple these facilities may be. This guidance is intended to assist them in the production of procedures for fuel storage, management, handling and distribution where these are required of them by the Air Navigation Order (ANO) 2016, and for the safe delivery of fuel to an aircraft in a condition that is fit for use. Other personnel who have a responsibility towards any part of the safe storage, management, handling or distribution of aviation fuel are encouraged to develop similar appropriate procedures.</p>
<p>Transport accident (airborne)</p>	<p>Aircraft Incident whilst airborne and under control of Gatwick (Includes initial climb, and approach. Departing aircraft that have completed their initial climb and aircraft flying to Gatwick but not yet on approach, are outside the bounds of the assessment)</p>			<p><b>Scoped out as does not meet Scoping Test 4</b> (adequate protocols already in place)</p> <p>A new Runway End Safety Area (RESA) is proposed to be established for the proposed northern runway usage which would reduce the risk to a tolerable level. Any intolerable risk under Department of Transport guidelines would therefore be designed out. In addition, the proposals would not result in a change to airspace. Therefore, the risk of air accidents is scoped out. The following management and mitigation guidelines and standards apply:</p> <ul style="list-style-type: none"> <li>▪ CAP 789: Requirements and guidance materials for operators (Civil Aviation Authority, 2011b).</li> </ul> <p>The risk of aero planes flying into the ground, water or a man-made obstacle requires determined preventive action by operators. Operators should develop and publish procedures that will help flight crew to avoid getting into situations in which controlled flight into terrain (CFIT) becomes a possibility. Guidance as to what should be addressed can be found in UK Aeronautical Information Circulars, in the Flight Safety Foundation's "CFIT</p>

Event/Scenarios	Description	Construction (including demolition)	Operation	Justification/Comments
				<p>Education and Training Aid”, and in its “Approach and Landing Accident Reduction (ALAR) Toolkit”. There is potential for a transport accident as a result of construction activities and changes in airport operations.</p> <ul style="list-style-type: none"> <li>▪ CAP 493: Manual of Air Traffic Services, Section 4 Chapter 2: Area Control Procedures (Civil Aviation Authority, 2017e).</li> </ul> <p>The Manual of Air Traffic Services contains procedures, instructions and information, which are intended to form the basis of Air Traffic Services (ATS) within the UK. It is published for use by civil Air Traffic Controllers and may also be of general interest to others associated with civil aviation.</p> <ul style="list-style-type: none"> <li>▪ EASA Certificate of Airworthiness validated annually with an Airworthiness Review Certificate.</li> </ul> <p>All EASA aircraft types that qualify for an EASA Certificate of Airworthiness (C of A) are issued with a non-expiring C of A, which is validated annually with an Airworthiness Review Certificate.</p> <ul style="list-style-type: none"> <li>▪ CAP 747: Mandatory requirements for Airworthiness (Civil Aviation Authority, 2017f).</li> </ul> <p>This provides a single source of mandatory information for continuing airworthiness as issued by the CAA. Airworthiness Directives for Annex II aircraft published in CAP 476 are included. Airworthiness Directives issued by EASA are available on the EASA website.</p> <ul style="list-style-type: none"> <li>▪ CAP 1616: Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements (Civil Aviation Authority, 2017g).</li> </ul> <p>The CAA’s airspace change process in this published guidance sets out how we give effect to our role to approve changes to airspace design, and to the law and policy which govern our role. This guidance sets out the framework for the stages of the process and activities involved, from the conception of the need for a change to the airspace design, to consulting and engaging with those potentially impacted, assessing the impacts of different design options from a safety, operational and environmental perspective, and ultimately regulatory decision.</p>
Aircraft wake vortex	Wake turbulence is a disturbance in the atmosphere that forms behind an aircraft as it passes through the air			<p><b>Scoped out as does not meet Scoping Test 1</b> (not classified as a ‘major’ accident or disaster)</p> <p>There is potential for pitched roofed properties to be affected by aircraft wake vortex, within 10 degrees of the takeoff/landing zone and within 6 km of the runway. However, the consequence of such an event is not considered to result in ‘serious’ effects and therefore not meet the criteria of a ‘major’ event.</p>
Transport accident – airside (other vehicles)	Collision involving ground vehicle, including air bridges, leading to injury/loss of life			<p><b>Scoped in as meets all scoping tests</b></p> <p>There is potential for changes in risks as a result of changes in airside vehicle operations which would need to be tested and any additional mitigation or management protocols identified. The following management and mitigation guidelines and standards are already established as part of Gatwick Airport operations:</p> <ul style="list-style-type: none"> <li>▪ EASA Licensing/CAP 168: Licensing of Aerodromes (Civil Aviation Authority, 2019).</li> </ul> <p>The purpose of this document is to give guidance to applicants and licence holders on the procedure for the issue and continuation of or variation to an aerodrome licence issued Article 211 of the Air Navigation Order 2009, and to indicate the licensing requirements that are used for assessing a variation or an application. The document also describes the CAA’s aerodrome licensing requirements relating to operational management and the planning of aerodrome development. This document represents the minimum standards necessary to meet the licensing requirement.</p>
Transport accident – landside road or construction site	Vehicle (car/HGV/passenger vehicle) collision with another vehicle, or structure			<p><b>Scoped in as meets all scoping tests</b></p> <p>There is potential for changes in risks as a result of changes in airside vehicle operations which would need to be tested and any additional mitigation or management protocols identified. The following management and mitigation guidelines and standards are already established as part of Gatwick Airport operations:</p> <ul style="list-style-type: none"> <li>▪ EASA Licensing/CAP 168: Licensing of Aerodromes (Civil Aviation Authority, 2019).</li> </ul> <p>The purpose of this document is to give guidance to applicants and licence holders on the procedure for the issue and continuation of or variation to an aerodrome licence issued Article 211 of the Air Navigation Order 2009, and to indicate the licensing requirements that are used for assessing a variation or an application. The document also describes the CAA’s aerodrome licensing requirements relating to operational management and the planning of aerodrome development. This document represents the minimum standards necessary to meet the licensing requirement.</p>



Event/Scenarios	Description	Construction (including demolition)	Operation	Justification/Comments
				<ul style="list-style-type: none"> <li>▪ CAP 738: Safeguarding of Aerodromes Appendix C/EASA CS-ADRDSN Certification Specifications and Guidance Material for Aerodromes Design – Book 2 – Chapter H. This document offers guidance to those responsible for the safe operation of an aerodrome or a technical site, to help them assess what impact a proposed development or construction might have on that operation.</li> <li>▪ CAP 1168: Guidance Material for Organizations, Operations and Design Requirements for Aerodromes, Chapter: Emergency Planning (Civil Aviation Authority, 2017d). Emergency planning arrangements at aerodromes may be developed to align with UK best practice and the requirements of civil contingencies legislation. Further guidance can be found in the ICAO Airport Services Manual, Part 7, Airport Emergency Planning (Doc 9137-AN/898) (ICAO, 1991). The Aerodrome Emergency Plan may describe how an emergency situation or incident can be managed in order to minimise the effects it may have on life, property, the environment, and aerodrome operations, and how the best use of appropriate available resources should be applied to achieve that aim.</li> </ul>
Transport accident – rail	<p>Collision with trains, trams or inter terminal rail</p> <p>Smoke – building fire, warehouse, bonfire, leading to low visibility</p>			<p><b>Scoped in during construction as meets all scoping tests</b></p> <p><b>Scoped out during operation as does not meet Scoping Test 3</b> (no increased risk compared to the do-minimum)</p> <p>The Brighton mainline adjoins the airport to the east. The risk of construction activities affecting operation of the railway will be scoped in. During operation, the risk to the rail line is not considered to be higher with the proposed development compared to the existing airport operations and do-minimum scenario, and there are extensive mitigation and contingency measures in place to manage these risks. Operational risks are therefore proposed to be scoped out of further assessment. The following management and mitigation guidelines and standards are already established as part of Gatwick Airport operations:</p> <ul style="list-style-type: none"> <li>▪ Low visibility operations (LVO) are covered in EASA Licensing/CAP 168: Licensing of Aerodromes (Civil Aviation Authority, 2019).</li> </ul> <p>The purpose of this document is to give guidance to applicants and licence holders on the procedure for the issue and continuation of or variation to an aerodrome licence issued under Article 211 of the under Article 211 of the Air Navigation Order 2009, and to indicate the licensing requirements that are used for assessing a variation or an application. The document also describes the CAA’s aerodrome licensing requirements relating to operational management and the planning of aerodrome development. This document represents the minimum standards necessary to meet the licensing requirement.</p> <ul style="list-style-type: none"> <li>▪ EASA Annex to ED 2012/019/R, Subpart E – Low visibility operations.</li> </ul> <p>For a low visibility take-off (LVTO) with an aero plane the following provisions should apply:</p> <ul style="list-style-type: none"> <li>(a) for an LVTO with a runway visual range (RVR) below 400 m the criteria specified in Table 1.A:</li> <li>(b) for an LVTO with an RVR below 150 m but not less than 125 m: <ul style="list-style-type: none"> <li>(1) high intensity runway center line lights spaced 15 m or less apart and high intensity edge lights spaced 60 m or less apart that are in operation;</li> <li>(2) a 90 m visual segment that is available from the flight crew compartment at the start of the take-off run; and</li> <li>(3) the required RVR value is achieved for all of the relevant RVR reporting points</li> </ul> </li> </ul>

Event/Scenarios	Description	Construction (including demolition)	Operation	Justification/Comments
				(c) for an LVTO with an RVR below 125 m but not less than 75 m: (1) runway protection and facilities equivalent to CAT III landing operations are available; and (2) the aircraft is equipped with an approved CAT III lateral guidance system.
Accidental release of hazardous chemical	From storage, movement via pipeline and other modes and handling of hazardous material including third parties/tenants and contractors during demolition, construction, operation			<b>Scoped in as meets all scoping tests</b> The risk of accidental release of hazardous chemicals or flammable substances, and explosion will need to be tested and any additional design measures, mitigation or management protocols identified.
Fire	Release of flammable substance with ignition from storage and handling			
Explosion	Boiler explosion/pressure vessel failure (or example design, inspection, maintenance, human error, external heating (boilers))			
Structural collapse	Structural collapse/failure leading to injury/loss of life/damage to the environment (from buildings, structures, bridges, tunnels, storage, roads, construction equipment, mobile equipment, waste and spoils)			<b>Scoped in as meets all scoping tests</b> The risk of structural collapse would need to be tested and any additional design measures, mitigation or management protocols identified.
Collapse of excavation	Collapse of any earthwork, trench, well, shaft, tunnel or underground working			<b>Scoped in during construction as meets all scoping tests</b> <b>Scoped out during operation as does not meet Scoping Test 3</b> (no increased risk compared to the do-minimum)  There is potential for collapse of excavations during construction and this topic would therefore be considered further to identify appropriate control measures.
Legacy issues	Unexploded ordnance			<b>Scoped in during construction as meets all scoping tests</b> <b>Scoped out during operation as does not meet Scoping Test 3</b> (no increased risk compared to the do-minimum)  There is potential for unexploded ordnance from previous military activities at the site and bombing during World War II. This risk would therefore be considered further in the assessment. The risk of legacy issues is scoped out for operation as the risk is no greater than in the do-minimum scenario
Occupational hazards	Occupational hazards, including fall from heights			<b>Scoped in during construction as meets all scoping tests</b> <b>Scoped out during operation as does not meet Scoping Test 3</b> (no increased risk compared to the do-minimum)  There is potential for occupational hazards to occur especially as a result of construction activities and this risk is therefore scoped into the assessment. Operational risks are scoped out as there would be no increased risk compared to the do-minimum scenario.

Event/Scenarios	Description	Construction (including demolition)	Operation	Justification/Comments
				<p>The following management and mitigation guidelines and standards apply:</p> <ul style="list-style-type: none"> <li>▪ CAP 642: Airside safety management system (Civil Aviation Authority, 2018c). This document sets out the hazards and risks that respective employers operating in the airside environment should be expected to consider and manage, but it should be noted that this guidance is not necessarily comprehensive nor exhaustive. Employers are ultimately required to determine the hazards their employees and others face and assess the risk posed by these hazards. Where information has not been provided to cover a particular situation, it is expected that users would be guided by the general safety management principles to identify and create a safe working and operating environment.</li> <li>▪ Health and Safety at Work etc. Act 1974. Lays down wide-ranging duties on employers. Employers must protect the 'health, safety and welfare' at work of all their employees, as well as others on their premises, including temps, casual workers, the self-employed, clients, visitors and the general public.</li> </ul>
Damage to important artefacts	Damage to an object made by a human being, typically one of cultural or historical interest			<p><b>Scoped out as does not meet Scoping Test 1</b> (not classified as a major accident or disaster)</p> <p>The Project site is extensively disturbed, and effects on buried artefacts would not result in an event which could be considered a 'major' accident or disaster'. General effects on buried archaeology will be dealt with in the PIER/ES Chapter 7: Historic Environment.</p> <p>Operational risks in relation to handling of nationally and internationally important artifacts are scoped out as there would be no increased risk compared to the do-minimum scenario. The following management and mitigation guidelines and standards apply:</p> <ul style="list-style-type: none"> <li>▪ The CAA has identified ground handling in its Safety Plan (Civil Aviation Authority, 2018d) as one of the 'Significant Seven' – the main seven areas of risk in the UK Aviation sector.</li> </ul>
Deficient safety/environmental management systems	For example, inadequate planning, resource provision, procedures			<p><b>Scoped out as does not meet Scoping Tests 3 and 4</b> (no increase in risk due to the Project and adequate protocols already in place)</p>
Deficient emergency planning, preparedness or provision	For example, a major accident resulting from failure to identify and prepare for foreseeable emergencies (resource, mobilization and communication, information equipment) failure to maintain/train/exercise)			<p>The risk is not considered to be higher with the proposed development compared to the existing airport operations and do-minimum scenario, and there are extensive processes, mitigation and contingency measures currently in place as part of Gatwick Airports operations to manage these risks. The following management and mitigation guidelines and standards apply:</p> <ul style="list-style-type: none"> <li>▪ EASA Licensing/CAP 168: Licensing of Aerodromes CAP 168: Licensing of Aerodromes (Civil Aviation Authority, 2019).</li> </ul> <p>The purpose of this document is to give guidance to applicants and licence holders on the procedure for the issue and continuation of or variation to an aerodrome licence issued under Article 211 of the under Article 211 of the Air Navigation Order 2009, and to indicate the licensing requirements that are used for assessing a variation or an application. The document also describes the CAA's aerodrome licensing requirements relating to operational management and the planning of aerodrome development. This document represents the minimum standards necessary to meet the licensing.</p>

Event/Scenarios	Description	Construction (including demolition)	Operation	Justification/Comments
				<ul style="list-style-type: none"> <li>CAP 670: Air Traffic Services Safety Requirements, Part B Section 2 ATC 03: Emergency or Contingency Facilities (Civil Aviation Authority, 2014). Air Navigation Service Providers (ANSPs) are required, under the EU Regulations, to develop and implement contingency Plans. Advice and guidance on the European requirements and their application to specific units may be obtained from the appropriate Air Traffic Service (ATS) Regional Office (RO).</li> <li>CAP 760: Guidance on the Conduct of Hazard Identification, Risk Assessment and the Production of Safety Cases (Civil Aviation Authority, 2010). The purpose of this document is to provide guidance to aerodrome operators and ANSPs on the development of a Safety Case and, in particular, on hazard identification, risk assessment and the mitigation techniques that may be used.</li> </ul>
Loss of utilities	Electrical/gas/site water/wastewater/refrigeration/fuel leading to injury/loss of life or damage to the environment			<p><b>Scoped in for construction as meets all scoping tests</b> <b>Scoped out for operation as does not meet Scoping Tests 3 and 4</b> (no increase in risk due to the Project and adequate protocols already in place)</p> <p>The risk of loss of utilities, for example due to damage to the electricity or water supply, on airport operations during construction will be scoped in. During operation, the risk is not considered to be higher with the proposed development compared to the existing airport operations and do-minimum scenario, and there are extensive processes, mitigation and contingency measures currently in place as part of Gatwick Airports operations to manage these risks.</p>
Loss of essential air safety or airside systems	Air safety and air side systems (communication, airstrip lighting, emergency lighting, navigational aid, radar signage emergency power, emergency isolation, detection)			<p><b>Scoped out as does not meet Scoping Tests 3 and 4</b> (no increase in risk due to the Project and adequate protocols already in place)</p> <p>During construction and operation, the risk is not considered to be higher with the proposed development compared to the existing airport operations and do-minimum scenario, and there are extensive processes, mitigation and contingency measures currently in place as part of Gatwick Airports operations to manage these risks. The following management and mitigation guidelines and standards apply:</p> <ul style="list-style-type: none"> <li>EASA Licensing/CAP 168: Licensing of Aerodromes CAP 168: Licensing of Aerodromes (Civil Aviation Authority, 2019). The purpose of this document is to give guidance to applicants and licence holders on the procedure for the issue and continuation of or variation to an aerodrome licence issued under Article 211 of the under Article 211 of the Air Navigation Order 2009, and to indicate the licensing requirements that are used for assessing a variation or an application. The document also describes the CAA's aerodrome licensing requirements relating to operational management and the planning of aerodrome development. This document represents the minimum standards necessary to meet the licensing.</li> <li>CAP 670 Air Traffic Services Safety Requirements, Part B Section 2 ATC 03 (Civil Aviation Authority, 2014).</li> </ul>

Event/Scenarios	Description	Construction (including demolition)	Operation	Justification/Comments
				Emergency or Contingency Facilities ANSPs are required, under the EU Regulations, to develop and implement Contingency Plans. Advice and guidance on the European requirements and their application to specific units may be obtained from the appropriate ATS RO.
Deficient security provision	Deficient security management system – for example inadequate planning, resource provision, procedures			<p><b>Scoped out for operation as does not meet Scoping Tests 3 and 4</b> (no increase in risk due to the Project and adequate protocols already in place)</p> <p>During operation, the risk is not considered to be higher with the proposed development compared to the existing airport operations and do-minimum scenario, and there are extensive processes, mitigation and contingency measures currently in place as part of Gatwick Airports operations to manage these risks. The following management and mitigation guidelines and standards apply:</p> <ul style="list-style-type: none"> <li>▪ CAP 1223: Framework for an Aviation Security Management System (SeMS) (Civil Aviation Authority, 2018a)</li> </ul> <p>SeMS provides a formalized, risk-driven framework for integrating security into the daily operations and culture of an Entity. The SeMS enables an Entity to identify and address security risks, threats, gaps and weaknesses in a consistent and proactive way. SeMS is not a mandated process but if an Entity has a SeMS which contains all the elements which are identified in this framework, it will help the Entity to meet the internal quality control provisions of articles 12, 13 and 14 of EC 300/20081.</p> <ul style="list-style-type: none"> <li>▪ Guidance on policing at airports (National Policing Improvement Agency, 2011).</li> <li>▪ Airside Operations Adverse Weather (Security plans) (Gatwick Airport Limited, 2018).</li> </ul> <p>The document contains provisions and procedures in place as regards security in the scenario of an adverse weather event.</p> <p>Current facilities would be extended proportionally to the Project with the same quality of provision.</p>

Annex 4

CDOIF Guideline MATTE Tolerability and Risk Tables

## A4.1 CDOIF Guideline MATTE Tolerability and Risk Tables

CDOIF Annex 4, Table 4.1 Severity / Harm Criteria for Consideration as a Major Accident

Row	DETR Table Ref	Receptor Type	Severity of Harm				Reference to Table 4.2	Comments
			Significant <i>While this level of harm might be significant pollution, it is not considered a MATTE.</i>	Severe <i>DETR Criteria - the lowest level of harm that might be considered a MATTE.</i>	Major	Catastrophic		
Severity Level			1	2	3	4		
1	1	Designated Land/Water Sites (Nationally important)	<0.5 ha or <10%	>0.5 ha or 10-50% of site area, associated linear feature or population.	>50% of site area, associated linear feature or population.	N/A	Land or Surface Water.	NNR, SSSI, MNR
2	2	Designated Land/Water Sites (Internationally important)	<0.5 ha or <5% (<5% LF/Pop)	>0.5 ha or 5-25% of site area or 5-25% of associated linear feature or population.	25-50% of site area, associated linear feature or population.	>50% of site area, associated linear feature or population.	Land or Surface Water.	SAC, SPA, RAMSAR.
3	3	Other Designated Land	<10 ha or <10%	10-100 ha or 10-50% of land.	>100 ha or >50% of land.	N/A	Land.	ESA, AONB, National Park, etc.
4	4	Scarce Habitat	<2 ha or <10%	2-20 ha or 10-50% of habitat.	>20 ha or >50% of habitat.	N/A	Land or Surface Water.	BAP habitats, geological features.
5	5	Widespread Habitat – Non-Designated Land	<10 ha	Contamination of 10-100 ha of land, preventing growing of crops, grazing of domestic animals or renders the area inaccessible to the public because of possible skin contact with dangerous substances. Alternatively, contamination of 10 ha or more of vacant land.	100-1,000 ha (applied as per text under 'Severe').	>1,000 ha (applied as per text under 'Severe').	Land.	Land/water used for agriculture, forestry, fishing or aquaculture.
6	5	Widespread Habitat – Non-Designated Water		Contamination of aquatic habitat which prevents fishing or aquaculture, or renders is inaccessible to the public.	N/A	N/A	Surface Water.	Land/water used for agriculture, forestry, fishing or aquaculture.

Row	DETR Table Ref	Receptor Type	Severity of Harm				Reference to Table 4.2	Comments
			Significant <i>While this level of harm might be significant pollution, it is not considered a MATTE.</i>	Severe <i>DETR Criteria - the lowest level of harm that might be considered a MATTE.</i>	Major	Catastrophic		
Severity Level			1	2	3	4		
7	6	Groundwater Source of Drinking Water	Interruption of drinking water supply <1,000 person-hours or For England & Wales only <1 ha SPZ.	Interruption of drinking water supplied from a ground or surface source (where persons affected x duration in hours [at least 2] > 1,000) or For England & Wales only 1-10 ha of SPZ where drinking water standards are breached.	>1 x 10 <sup>7</sup> person-hours interruption of drinking water (a town of ~100,000 people losing supply for month) or For England & Wales only 10-100 ha SPZ drinking water standards breached.	>1 x 10 <sup>9</sup> person-hours interruption of drinking (~1 million people losing supply for 1 month) or For England & Wales only >100 ha SPZ drinking water standards breached.	Groundwater or surface water drinking water source (public or private).	The 'Severe' to 'Catastrophic' levels of harm are considered to be included as 'Serious' with respect to the COMAH definition of a major accident. Receptors include:
8	6	Groundwater – Non-Drinking Water Source		<1 ha	1-100 ha of aquifer where water quality standards are breached (or hazardous substance is discernible).	100-10,000 ha.		
9	6	Groundwater in Unproductive Strata	Groundwater not a pathway to another receptor.		<i>Where the groundwater is a pathway for another receptor assess against relevant criteria for the receptor.</i>		N/A	Uncoloured areas on aquifer maps.
10	7	Soil or Sediment (ie as a receptor rather than purely a pathway)	Contamination not leading to environmental damage (as per ELD), or not significantly affecting overlying water quality.	Contamination of 10-100 ha of land etc. as per Widespread Habitat; Contamination sufficient to be deemed environmental damage (Environmental Liability Directive).	Contamination of 100-1,000 ha of land, as per Widespread Habitat; Contamination rendering the soil immediately hazardous to humans (eg skin contact) or the living environment, but remediation available.	Contamination of >1,000 ha of land, as per Widespread Habitat; Contamination rendering the soil immediately hazardous to humans (eg skin contact) or the living environment and remediation difficult or impossible.	Land.	
11	8	Built Environment	Damage below a level at which designation of importance would be withdrawn.	Damage sufficient for designation of importance to be withdrawn.	Feature of built environment subject to designation of importance entirely destroyed.	N/A	Built Environment.	This is limited to Grade 1/Cat A listed buildings, scheduled monuments, conservation area, etc.



Row	DETR Table Ref	Receptor Type	Severity of Harm				Reference to Table 4.2	Comments
			Significant <i>While this level of harm might be significant pollution, it is not considered a MATTE.</i>	Severe <i>DETR Criteria - the lowest level of harm that might be considered a MATTE.</i>	Major	Catastrophic		
Severity Level			1	2	3	4		
12	9	Various Receptors. (Should not be used to identify and assess MATTE)	N/A	N/A	N/A	N/A	N/A	Refer to DETR. Standards relating to continuous emissions, contained in other EU legislation.
13	10	Particular Species (Note – these criteria apply nationally – ie England, Wales, Scotland)	Loss of <1% of animal or <5% of plant ground cover in a habitat.	Loss of 1-10% of animal or 5-50% of plant ground cover.	Loss of 10-90% of animal or 50-90% of plant ground cover.	Total loss (>90%) of animal or plant ground cover.	Land.	-
14	11	Marine	<2 ha littoral or sub-littoral zone, <100 ha of open sea benthic community, <100 dead sea birds (<500 gulls), <5 dead/significantly impaired sea mammals.	2-20 ha littoral or sub-littoral zone, 100-1,000 ha of open sea benthic community, 100-1,000 dead sea birds (500-5000 gulls), 5-50 dead/significantly impaired sea mammals.	20-200 ha littoral or sub-littoral zone, 100-10,000 ha of open sea benthic community, 1,000-10,000 dead sea birds (5,000-50,000 gulls), 50-500 dead / significantly impaired sea mammals.	>200 ha littoral or sub-littoral zone, >10,000 ha of open sea benthic community, >10,000 dead sea birds (>50,000 gulls), >500 dead / significantly impaired sea mammals.	Surface Water.	-
15	12	Fresh and Estuarine Water Habitats	Impact below that of Severity level 2.	WER Chemical or ecological status lowered by one class for 2-10 km of watercourse or 2-20 ha or 10-50% area of estuaries or ponds. Plus, interruption of drinking water supplies, as per DETR Table 6.	WER Chemical or ecological status lowered by one class for 10-200 km of watercourse or 20-200 ha or 50-90% area of estuaries and ponds. Plus, interruption of drinking water supplies, as per DETR Table 6.	WER Chemical or ecological status lowered by one class for >200 km of watercourse or >200 ha or >90% area of estuaries and ponds. Plus, interruption of drinking water supplies, as per DETR Table 6.	Surface Water.	-

**Notes for Table 4.1**

In applying the criteria on this sheet, an estimate of the mean population of species would be required, subject to data available. Variability in population might be relevant for later detailed scenario assessments, but a mean is more relevant to the initial selection criteria here.

When applying the criteria above, note that receptors are not mutually exclusive - for example some sites are both Ramsar and SSSI, while the 'widespread habitat' rows might apply irrespective of any specific designations.

To avoid disproportionate application of percentage criteria on small receptors, for small sites, the percentage criteria will not reduce the threshold to lower than half the area/distance criteria.

**Glossary of Terms for Table 4.1**

Littoral: pertaining to the shore of a lake, sea, or ocean.

Sub-littoral zone: from the low water line to the edge of the continental shelf.

Benthic community: is made up of organisms that live in and on the bottom of the ocean floor.

WER: Water Framework Directive.

SAC: Special Area of Conservation.

SPA: Special Protection Area.

RAMSAR: Wetlands of international importance.

NNR: National Nature Reserve.

MNR: Marine Nature Reserve.

BAP habitat: Biodiversity Action Plan habitat.

ESA: Environmentally Sensitive Area.

CDOIF Annex 4, Table 4.2 - Duration / Recovery Criteria

	Short-term	Medium term	Long-term	Very long-term
Description	Harm with such short recovery is not considered a MATTE			
Harm Duration Category	1	2	3	4
Groundwater or surface water drinking water source (public or private)			Harm affecting drinking water source or SPZ: < 6 years	Harm affecting drinking water source or SPZ: >6 years
Groundwater (except drinking water sources): WER hazardous/non-hazardous substances	WER hazardous substances < 3 months	WER hazardous substances > 3 months	WER hazardous substances > 6 years	WER hazardous substances >20 years
	WER non-hazardous substances < 1 year	WER non-hazardous substances > 1 year	WER non-hazardous substances >10 years	WER non-hazardous substances >20 years
Surface water (except drinking water sources – see above)	< 1 year	>1 year	>10 years	>20 years
Land	< 3 years or < 2 growing seasons for agricultural land	> 3 years or > 2 growing seasons for agricultural land	>20 years	>50 years
Built environment	Can be repaired in < 3 years, such that its designation can be reinstated	Can be repaired in > 3 years, such that its designation can be reinstated	Feature destroyed, cannot be rebuilt, all features except world heritage site	Feature destroyed, cannot be rebuilt, world heritage site

N.B. New groundwater duration categories have been included in Version 2 of this guideline (c.f. Version 1) to set a duration threshold below which pollution of groundwater would not be considered a MATTE (irrespective of extent & severity), and to aid prioritisation of larger risk scenarios by further differentiating between different scales of a MATTE to groundwater.

### Notes for Table 4.2

Separate criteria are provided in Table 4.2 depending on the nature of the site, be it land, surface water or groundwater - these shall be applied in conjunction with the corresponding harm criteria in Table 4.1.

Durations have been derived through working group discussion, and expert judgement with reference to other legal requirements. For example, the 6-year threshold for drinking water duration cat. 3 vs 4 has been derived considering the WFD European reporting cycle. The difference between groundwater hazardous substances and surface water is derived from the WFD directive duty to prevent entry to groundwater (see [http://ec.europa.eu/environment/water/water-framework/info/intro\\_en.htm](http://ec.europa.eu/environment/water/water-framework/info/intro_en.htm) for discussion of the different approach to groundwater vs surface water). Land generally takes longer to recover naturally than surface water environments, so has longer duration thresholds. Groundwater generally has the longest recovery periods however due to the Water Framework Directive requirements to prevent pollution to groundwater more stringent thresholds have been applied.

It is common for the chemical quality of receptors to recover more rapidly than ecological/conservation status. Both chemical and ecological/conservation status should be considered, and the duration category should be based on the longest duration. Thus, even if the chemical quality of a receptor can recover in the short-term, ecological damage may have been caused which involves a longer-term recovery.

The criteria are based on estimating the likely time for the habitat (or species, etc.) to substantially recover (unaided) from the damage caused. For ecological criteria, complete recovery is difficult to judge and hence it is suggested that this should be clarified as >80% of the damage recovered. For chemical criteria (eg drinking water standards), recovery to below standard concentration should be considered.

For harm affecting drinking water, duration is also covered by the severity calculation (person-hours) in Table 4.1. For guidance on identifying water framework directive groundwater hazardous substances see (<http://www.wfduk.org/stakeholders/mrv-work-area>).

For harm to particular species, duration of recovery relates to the population as a whole. Further guidance on species recovery can be found in Environmental Damage Regulations Guidance, DEFRA (2009) - eg pages 85 onwards illustrate the issues using a Red Kite example.

The time specified for long and very long-term harm durations are stated as guides to help assess potential recovery time if the impact to the receptor was left to natural recovery alone. Consider the mechanisms that could influence this, such as (weathering, natural bio-remediation or breakdown and replenishment through flushing, dilution, repopulation of species from neighbouring areas etc.) and if these alone could achieve the natural recovery in this specified time. When demonstrating the tolerability of risk, credit can be claimed for intervention where this results in more rapid recovery.



Annex 5

Literature Review of Major Fires

## A5.1 Literature Review of Major Fires

A5.1.1 The findings of a literature review of historical major accidental fires, in terms of their potential to result in environmental damage are summarised below.

### Fires and Explosions involving Oil and Gas

- The Buncefield fire was the largest fire in Europe since the 2nd World War; it involved 22 storage tanks and consumed approximately 60 million litres of fuel oils and generated a large plume of smoke which could be seen from many kilometres away. The Major Incident Investigation Board's Final Report<sup>3</sup> concluded that there were, "no serious health effects reported among the public or the emergency response workers from exposure to the plume of smoke" and that, "any pollutants from the smoke plume were spread over a wide area and caused little damage to soil and plants". The other documents reviewed support this view. However, it was noted that lack of air quality impacts was likely to be due to the combination of the high buoyancy of the plume and the favourable meteorological conditions at the time of the incident and that ground level air pollution impacts would have been higher had this event occurred in the summer months.
- In-situ burning of crude oil, as a means of mitigating crude oil spills on water, has been studied extensively during the early 1990s by the U.S. Minerals Management Service and a consortium of 15 government agencies in the U.S. and Canada. Extensive sampling of downwind pollutants and burn residues were obtained from mesoscale trials<sup>4</sup>. Overall, indications from these trials are that emissions from in-situ burning are low in comparison to other sources of emissions and acceptable beyond 500 metres downwind.
- In an investigation into the potential hazards from operations in the Canvey Island/Thurrock area, the HSE noted that they anticipate that smoke from refinery fires would cause little more than irritation to people<sup>5</sup>.

- Descriptions of a number of major accidents in the Major Hazard Incident Data Service (MHIDAS) accident database<sup>6</sup> do not refer to any environmental damage from oil fire smoke plumes. These include the largest crude oil tank fire in UK history, namely the Tank 11 fire at the Amoco Refinery in Milford Haven on 30 August 1983 (see below).
- The 1983 Amoco Refinery fire started in a crude oil storage tank (Tank 11). At the time of the fire the tank held 60,000 m<sup>3</sup> of material. The fire burned for over 12 hours before the floating roof lost structural integrity and sank into the crude oil. As the roof sank it trapped pockets of water under the oil, which later led to the rare phenomenon of multiple boil-overs. As noted above, the fire is not known to have resulted in significant off-site/environmental damage.
- An explosion at the Texaco Refinery, Pembrokeshire in July 1994 resulted in a major hydrocarbon fire and a number of secondary fires. Although the fires burned for over two days, the HSE report<sup>7</sup> into the incident noted that off-site damage was very limited.
- On 16 April 2001 a fire and explosion incident occurred at the ConocoPhillips Humber Refinery following the catastrophic failure of an overhead gas pipe. The explosion resulted in significant damage to the refinery and to properties nearby. The incident caused concern to residents in the vicinity and received national and local press coverage. The HSE report<sup>8</sup> into the accident noted that, although the incident had the potential to cause fatal injury and environmental impact, no serious injury occurred and there were only short-term impacts on the environment.

### Fires Involving Chemicals and Plastics

- In July 1992 a series of explosions leading to an intense fire took place at Allied Colloid's raw materials warehouse in Bradford. The fire consumed in the region of 400 different chemicals and generated a black cloud of smoke that gave rise to concerns about environmental pollution and the toxicity of the fire plume. The HSE report into the incident<sup>9</sup> stated that there were no fatalities, however, 33 people (including 3 residents) were taken to hospital and treated for

smoke inhalation. Eight properties immediately adjacent to the site were evacuated and approximately 2,000 residents were confined to their properties. After the fire, vegetation and vegetables in nearby properties and gardens was sampled, however the test results did not indicate the presence of any unsafe levels of deposition products (eg dioxins, PAH (Polycyclic Aromatic Hydrocarbons)). The HSE report suggests that despite the scale and nature of the fire, there were no significant or long-term effects to residents or the environment as a result of the fire.

- The British Standards Institute (BSI) has published a British Standard<sup>10</sup> (BS) to provide guidance to site operators, emergency planners and local authorities on the likely environmental impact of large-scale fires involving significant quantities of stored plastics. Due to the chemical characteristics of the materials involved and the use of additives in plastics manufacture, plastics fires are more likely to produce a greater range of toxic combustion products (eg hydrogen chloride, volatile organic compounds (VOCs), dioxins and metals) than hydrocarbon fires. Nonetheless, the BS is considered to be a useful source of information and a summary of some of the findings and examples of the effects of historical plastic fires are presented below.
- The BS concludes that impacts from short-term exposure, arising from atmospheric releases, are principally associated with asphyxiant gases, irritant gases and smoke. The toxic, carcinogenic and "exotic" organic releases (associated with plastics fires) are unlikely to be produced in sufficiently high concentrations to result in short-term impacts and toxicity would only be likely to occur through long-term exposure.
- In October 1995, a fire, involving 10,000 tonnes of materials, occurred in a warehouse of a polypropylene producer at the Wilton site in Cleveland (UK). The predominant materials involved in the blaze were polypropylene and building and construction materials and the firefighting operations lasted for eight hours and involved 200 fire fighters. Despite the occurrence of a large, black plume of smoke, it was concluded that the available evidence indicated that this

3 Buncefield Major Incident Investigation Board, The Buncefield Incident 11 December 2005 - The final report of the Major Incident Investigation Board, Volume 1, 2008 - available at <http://www.buncefieldinvestigation.gov.uk/reports/volume1.pdf>.

4 M. F. Fingas, et al., Emissions from Mesoscale In-situ Oil Fires: The Mobile 1991 and 1992 Tests, presented at 1993 Arctic and Marine Oil Spill Program.

5 An Investigation of Potential Hazards from Operations in the Canvey Island/Thurrock area, HSE 1978, ISBN 011883200X.

6 AEAT, MHIDAS Database.

7 The explosion and fires at Texaco Refinery, Milford Haven 24th July 1994, A report of the investigation by the Health and Safety Executive into the explosion and fires on the Pembroke Cracking Company Plant at Texaco Refinery, Milford Haven on 24th July 1994, HSE, 1997, ISBN 0 7176 1413 1.

8 Public Report of the Fire and Explosion at the CONOCOPHILLIPS Humber Refinery on 16 APRIL 2001, HSE.

9 Angus Fire Material Safety Data Sheet: F02-04/N2 (Tankmaster), Issue 8, 14.10.09 and <http://www.angusfire.co.uk/utcfs/ws-404/Assets/5067-5%20Tankmaster.pdf>; Angus Fire Material Safety Data Sheet: F04-01/N2 (Expandol), Issue 9, 19/05/06 and Angus Fire Material Safety Data Sheet: No:2037 (Polarfoam), 1/12/00.

10 BSI 7982:2001, Guidance on the Environmental Impacts of Large-Scale Fires Involving Plastics Materials, 2001.

incident had no measurable impact on the environment, or on the health of locals.

- In July 1997, a fire occurred at a plastics recycling facility in the urban area of Hamilton, Ontario, Canada. The fire lasted for over two days and involved a minimum of 400 tonnes of polyvinyl chloride and polyurethane foam. Initially the fire resulted in a dense black cloud of smoke rising hundreds of metres into the air before the wind transported the plume over the centre of the city. A strong night time temperature inversion resulted in reduced rise of the plume from the fire, which increased the impacts around the fire site. Four thousand people were evacuated, and a number of residents complained of respiratory symptoms. However, although a number of hazardous substances were emitted during the fire, no long-term or environmental health effects were reported as a result of the fire.