Preliminary Environmental Information Report
Chapter 10: Geology and Ground Conditions

September 2021

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10 Geology and Ground Conditions

10.1. Introduction

10.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) work undertaken to date concerning the potential effects of the proposal to make best use of Gatwick's existing runways (referred to within this report as 'the Project') on geology and ground conditions.

10.1.2 This chapter covers land and groundwater quality, land instability and mineral resources. It includes an appraisal of baseline conditions informed through collation of data from a range of sources, including published data sources and previous ground investigation and assessment reports.

10.1.3 In particular, this PEIR chapter:

- sets out the existing and future environmental baseline conditions, established from desk studies, surveys and consultation to date;
- presents the potential environmental effects on geology and ground conditions arising from the Project, based on the information gathered and the analysis and assessments undertaken to date;
- identifies any assumptions and limitations encountered in compiling the environmental information; and
- highlights any necessary monitoring and/or mitigation measures that could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process.

10.1.4 This chapter is accompanied by:

- Appendix 10.3.1: Summary of Stakeholder Scoping Responses - Geology and Ground Conditions;
- Appendix 10.9.1: Preliminary Risk Assessment;
- Figure 10.6.1: Superficial Geology;
- Figure 10.6.2: Bedrock Geology;
- Figure 10.6.3: Potential Areas of Concern;
- Figure 10.6.4: Previous Ground Investigation Locations and Potential Areas of Concern; and
- Figure 10.6.5: Soils and Groundwater Exceedances.

10.1.5 The PEIR will inform pre-application consultation. Following consultation, comments on the PEIR will be reviewed and taken into account, where appropriate, in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate for development consent.

10.2. Legislation and Policy

10.2.1 This section of the chapter reviews legislation and planning policy that is relevant to assessing the effects of the Project on geology and ground conditions.

Legislation

Water Resources Act 1991 (as amended 2009)

10.2.2 The Water Resources Act principally relates to the protection of controlled water (ie rivers, lakes, canals and groundwater) from pollution. It sets out the responsibilities of the Environment Agency in relation to water pollution, resource management, flood defence, fisheries and, in some areas, navigation. It also regulates discharges to controlled waters, namely rivers, estuaries, coastal waters, lakes and groundwater.

The Environment Act 1995

10.2.3 The Environment Act 1995 (Section 57) amends the Environmental Protection Act (EPA) 1990 and makes provisions for a risk based framework for the identification, assessment and management of contaminated land within the UK. The provisions of the Act came into effect in April 2000.

10.2.4 Part IIA of the EPA 1990 is implemented by the Contaminated Land (England) Regulations 2006 and the Contaminated Land (England) (Amendment) Regulations 2012.

10.2.5 The Part IIA regime is aimed at ensuring that actions taken with respect to contaminated land are directed by a technically well-founded assessment of risk that considers the 'contaminant-pathway-receptor' scenario (contaminant linkage). Under the legislation, contaminated land is defined as:

'…any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

(a) 'Significant harm' is being caused or there is a significant possibility of such harm being caused; or

(b) Significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused.'

10.2.6 Significant harm is defined in the guidance according to risk-based criteria and must be the result of pollutant linkages.

10.2.7 A source, pathway and receptor must be present to complete the pollutant linkage and for a potentially significant risk to exist. As such, the presence of contamination in itself does not necessarily indicate a need for remedial action. Accordingly, a site can only be considered 'contaminated' when a risk to the environment or human health is present due to the presence of a 'source-pathway-receptor' linkage. In such circumstances and where there is a significant risk posed to human health and/or the environment, the above Act states that local planning authorities must adopt a 'suitable for use' approach. This means that the approach to remediating a site is dictated by the site's proposed end use.

The Contaminated Land (England) Regulations 2006 (as amended 2012)

10.2.8 As set out above, these regulations make provisions for a contaminated land regime, in accordance with Part IIA of the EPA 1990, which includes actions for the remediation of such land. These regulations (and the accompanying 2012 statutory guidance (Defra, 2012) introduced a four category test which is intended to clarify when land does, and does not, need to be remediated.

Environmental Damage (Prevention and Remediation) (England) Regulations 2015 (as amended 2019)

10.2.9 The aim of the Environmental Damage Regulations is to prevent and remedy damage to land, water and biodiversity.

Water Supply (Water Quality) Regulations 2016 (as amended 2018)

10.2.10 The Water Supply Regulations set out measures to protect the quality of water intended for human consumption.

Environmental Permitting (England and Wales) Regulations 2016 (as amended (EU Exit) 2019)

10.2.11 These regulations update the Environmental Permitting (England and Wales) Regulations 2010 and incorporate the requirements of the Groundwater (England and Wales) Regulations 2009. These regulations control groundwater pollution, including from contaminated land sources.

Water Environment (Water Framework Directive) Regulations 2017

10.2.12 These regulations were prepared to implement the European Water Framework Directive in the UK. Although the Directive no longer has effect, the regulations remain in place to control groundwater pollution and contaminated land.

The Control of Pollution (Oil Storage) (England) Regulations 2001

10.2.13 These regulations set minimum design standards for new and existing above ground oil storage facilities.

Planning Policy Context

National Policy Statements

10.2.14 The Airports National Policy Statement (NPS) (Department for Transport, 2018), although primarily provided in relation to a new runway at Heathrow Airport, remains a relevant consideration for other applications for airport infrastructure in London and the south east of England.

10.2.15 The NPS for National Networks (Department for Transport, 2015) sets out the need for development of road, rail and strategic rail freight interchange projects on the national networks and the policy against which decisions on major road and rail projects will be made. This has been taken into account in relation to the highway improvements proposed as part of the Project[1].

10.2.16 Table 10.2.1 provides a summary of the relevant requirements of these NPSs and how these are addressed within the PEIR.

[1] It is noted that the Transport Decarbonisation Plan published by the Department for Transport (DfT) on 14 July 2021 announced DfT's intention to review the National Networks NPS in due course once demand patterns post-pandemic become clearer. It is understood DfT intend to commence the review by the end of 2021 and complete it by Spring 2023. In the interim and whilst the review is undertaken, DfT have confirmed the NPS remains relevant government policy and has full force and effect for the purposes of the Planning Act 2008.

Table 10.2.1: Summary of NPS Information Relevant to this Chapter

Summary of NPS requirement	How and where considered in the PEIR
Geology	
Where the development is subject to EIA the applicant should ensure that the Environmental Statement clearly sets out the effects on internationally, nationally and locally designated sites of ecological or geological conservation importance (paragraph 5.89 Airports NPS, paragraph 5.22 National Networks NPS).	No geological Sites of Special Scientific Interest (SSSIs) or Local Geological Sites (LGSs) are located within 500 metres of the Project site. Therefore, designated sites of geological conservation importance are proposed to be assessed further within the EIA process, as set out in Table 10.4.2. Biodiversity is considered in Chapter 9: Ecology and Nature Conservation.
The applicant should show how the Project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests (paragraph 5.91 Airports NPS, paragraph 5.23 National Networks NPS).	
Contamination	
For developments where land may be affected by contamination, or existing mitigation is in place in respect of historic contamination, the applicant should have regard to the statutory regime contained in Part IIA of the EPA 1990 (paragraph 5.116 Airports NPS).	A Preliminary Risk Assessment is presented as Appendix 10.9.1 and addresses the risks from historical contamination. This has been used to inform the assessment within Section 10.9 of this chapter. Impacts on water resources and physical characteristics of water are considered in Chapter 11: Water Environment.
Developments should be on previously developed (brownfield) sites provided that it is not of high environmental value. For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination and how it is proposed to address this (paragraph 5.168 National Networks NPS).	
Where a development is subject to EIA and the development is likely to have significant adverse effects on the water environment, the applicant should ascertain the existing status of, and carry out an assessment of, the impacts of the proposed project on water quality, water resources and physical characteristics (paragraph 5.175 Airports NPS, paragraph 5.221 National Networks NPS).	
Minerals	
The applicant should safeguard any mineral resources on the proposed site for the preferred scheme as far as possible (paragraph 5.117 Airports NPS, paragraph 5.169 National Networks NPS).	Mineral resources underlying the site have been identified and reported in the Baseline Environment section (Section 10.6). In areas where there may be a loss of mineral resources, appropriate mitigation measures have been identified in Section 10.8.
The applicant must put forward appropriate mitigation measures to safeguard mineral resources (paragraph 5.121 Airports NPS, paragraph 5.182 National Networks NPS).	

Summary of NPS requirement	How and where considered in the PEIR
Land Instability	
If land stability could be an issue, the applicant should assess the likely consequences of proposed developments on sites where subsidence, landslides and ground compression is known or suspected (paragraph 5.227 Airports NPS, paragraph 5.117 National Networks NPS).	Potential ground instability risks have been reviewed and are discussed in the Baseline Environment section (Section 10.6) with mitigation provided in Table 10.8.1. .
A preliminary assessment of ground instability should be carried out (paragraph 5.228 Airports NPS, paragraph 5.118 National Networks NPS).	

National Planning Policy Framework

10.2.17 The National Planning Policy Framework (NPPF) (Ministry of Housing, Community and Local Government, 2021) sets out the planning policies for England with those relevant to this chapter summarised below.

Conserving and Enhancing the Natural Environment

10.2.18 Paragraph 174 of the NPPF states that planning policies and decisions should contribute to and enhance the natural and local environment by:

- preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of pollution including soil and water or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality; and
- remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

10.2.19 Furthermore, paragraph 183 requires that planning policies and decisions ensure that:

- a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination;
- after remediation, land should not be capable of being determined as contaminated land under Part IIA of the EPA 1990; and
- adequate site investigation information is available to inform the assessments.

Facilitating the Sustainable Use of Minerals

10.2.20 Paragraph 210 of the NPPF states that planning policies should:

- safeguard mineral resources by defining Mineral Safeguarding Areas; and
- adopt appropriate policies so that known locations of specific mineral resources of local and national importance are not sterilised by non-mineral development where this should be avoided.

10.2.21 The National Planning Practice Guidance (NPPG) (Ministry of Housing, Communities and Local Government, 2019) supports the NPPF and provides guidance across a range of topic areas. The NPPG includes guidance on the following topics relevant to this chapter:

- land affected by contamination;
- land stability;
- minerals;
- natural environment; and
- water supply, wastewater and water quality.

Local Planning Policy

10.2.22 Gatwick Airport lies within the administrative area of Crawley Borough Council and is adjacent to the boundaries of Mole Valley District Council to the north west, Reigate and Banstead Borough Council to the north east and Horsham District Council to the south west. The administrative area of Tandridge District Council is located approximately 1.9 km to the east of Gatwick Airport, while Mid Sussex District Council lies approximately 2 km to the south east. Gatwick Airport is located within the county of West Sussex and is immediately adjacent to the bordering county of Surrey.

10.2.23 The relevant local planning policies applicable to geology and ground conditions based on the extent of the study area for this assessment are summarised in Table 10.2.2 and explained further in the paragraphs below.

Table 10.2.2: Local Planning Policy

Administrative Area	Plan	Policy
Adopted Policy		
Crawley	Crawley 2030: Crawley Borough Local Plan 2015-2030 (2015)	ENV10 Pollution Management and Land Contamination
Horsham	Horsham District Planning Framework (2015)	Policy 24 Environmental Protection
Reigate and Banstead	Reigate and Banstead Local Plan: Core Strategy (2014)	CS10 Sustainable Development
	Reigate and Banstead Local Plan Development Management Plan 2018-2027 (2019)	NHE2 Protecting and Enhancing Biodiversity and Areas of Geological Importance DES8 Construction Management DES9 Pollution & Contaminated Land
Mole Valley	Mole Valley Core Strategy (2009)	CS15 Biodiversity & Geological Conservation
	Mole Valley Local Plan (2000)	ENV16 Regionally Important Geological/Geomorphological Sites
Tandridge	Tandridge District Core Strategy (2008)	CSP15 Environmental Quality
	Tandridge Local Plan Part 2: Detailed Policies 2014-2029 (2014)	DP19 Biodiversity, Geological Conservation & Green Infrastructure DP21 Sustainable Water Management DP22 Minimising Contamination, Hazards & Pollution

Administrative Area	Plan	Policy
Surrey	Surrey Minerals Plan Core Strategy (2011)	MC1 Spatial Strategy – Location of Mineral Development in Surrey MC4 Efficient Use of Mineral Resources MC6 Safeguarding, mineral resources and development
West Sussex	West Sussex Joint Minerals Local Plan 2033 (2021)	M9 Safeguarding minerals
Emerging Policy		
Crawley	Draft Crawley Borough Local Plan 2021-2037 (2021)	EP3 Land Quality
Tandridge	Our Local Plan 2033 (Regulation 22 Submission) (2019)	TLP46 Pollution & Air Quality
Mole Valley	Future Mole Valley 2018-2033 (Consultation Draft Local Plan) (2020)	EN10 Regionally Important Geological and Geomorphological Sites EN13 Promoting Environmental Quality EN14 Responding to Climate Emergency
Horsham	Draft Horsham District Local Plan 2019-2036 (2020)	Policy 25 Environmental Protection Strategic Policy 27 The Natural Environment and Landscape Character

10.2.24 Guidance in the West Sussex Joint Minerals Local Plan (West Sussex Council and South Downs National Park Authority, 2018) indicates that non-mineral development within a mineral safeguarded area should not be permitted unless:

- mineral sterilisation will not occur;
- it is appropriate to extract the mineral prior to the development taking place; or
- the overriding need for the development outweighs the safeguarding of the mineral and it has been demonstrated that prior extraction is not practicable or environmentally feasible.

10.2.25 Pre-application discussions are encouraged to ensure that minerals safeguarding is considered at the earliest opportunity.

10.3. Consultation and Engagement

10.3.1 In September 2019, GAL submitted a Scoping Report (GAL, 2019) to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects and, where necessary, to determine suitable mitigation measures for the construction and operational phases of the Project. It also described those topics or sub-topics which are proposed to be scoped out of the EIA process and provided justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas.

10.3.2 Following consultation with the statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 11 October 2019 (Planning Inspectorate, 2019).

10.3.3 Key issues raised during the scoping process specific to geology and ground conditions are listed in Table 10.3.1, together with details of how these issues have been addressed within the PEIR.

Table 10.3.1: Summary of Scoping Responses

Details	How/where addressed in PEIR
The Scoping Report omits potential impacts in terms of loss, destruction and excavation/storage of soils during construction of the Proposed Development. The ES should include an assessment of such impacts where significant effects are likely to occur.	Effects on agricultural soils are addressed within Chapter 18: Agricultural Land Use and Recreation. Impacts and mitigation in terms of soil loss and handling during construction are presented in Sections 10.8 and 10.9, where relevant to contamination.
The ES should include an assessment of the likely significant effects on nearby sensitive receptors including the public from the removal of any potential contaminants from the site, and quantification of the potential volumes involved (making worst case assumptions where required). This should also be framed in the context of the potential location and capacity of waste disposal infrastructure to handle such wastes, and cross reference will need to be made to relevant assumptions in relation to traffic generation and any consequential effects.	It is the intention of the Project to maximise the reuse of materials and minimize the amount of material sent for off-site disposal. The cut/fill balance will be further considered throughout the Project design and EIA process, and will be reported within Chapter 5: Project Description and in the Waste Strategy for the ES. The Waste Strategy will provide details on likely waste disposal volumes and the capacity of existing infrastructure in tandem with the Transport Assessment and Remediation Strategy. A draft Waste Strategy is provided in Appendix 5.3.2. The Remediation Strategy will provide details of procedures to be adopted during construction, which will include any measures required to protect members of the public, together with the relevant documentation to be provided by the Remediation Contractor. This will be implemented through the Code of Construction Practice (CoCP).

10.3.4 Key issues raised during consultation and engagement with interested parties specific to geology and ground conditions are listed in Table 10.3.2, together with details of how these issues have been addressed within the PEIR.

Table 10.3.2: Summary of Consultation

Consultee	Date	Details	How/where addressed in PEIR
Local Authorities (via Land Based Topics Working Group)	20/08/2019	Discussion on the potential effects on land-based resources arising from the Project and the proposed measures to mitigate these effects.	Mitigation measures relevant to this topic are set out in Section 10.8 and the assessment of potential effects on geology and ground conditions during the construction and operational phases of the Project is set out in Section 10.9.

10.4. Assessment Methodology

Relevant Guidance

10.4.1 The assessment has had due regard to the following guidance, which provides the technical framework for applying a risk management process when dealing with land affected by contamination:

- British Standard BS 10175 Investigation of Potentially Contaminated Sites (BSI, 2011 and amended 2017);
- British Standard requirements for the 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings' (BS8485:2015+A1:2019) (BSI, 2015);
- Construction Industry Research and Information Association (CIRIA) Document C665: Assessing Risks Posed by Hazardous Ground Gases to Buildings (CIRIA, 2007);
- Defra Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (Defra, 2012);
- CIRIA Document C552 – Contaminated Land Risk Assessment: A Guide to Good Practice (CIRIA, 2001a);
- CIRIA Document C532 – Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors (CIRIA, 2001b);
- CIRIA Document C681 – Unexploded Ordnance (UXO): A guide for the construction industry (CIRIA, 2009); and
- Land Contamination: Risk Management (LCRM) (Environment Agency, 2020).

10.4.2 The framework presented in LCRM (Environment Agency, 2020) forms the basis of the risk assessment approach adopted in this chapter.

Scope of the Assessment

10.4.3 The scope of this PEIR has been developed in consultation with relevant statutory and non-statutory consultees, as detailed in Table 10.3.1 and Table 10.3.2.

10.4.4 A desk based Preliminary Risk Assessment (Appendix 10.9.1) has been undertaken which informs this geology and ground conditions chapter.

10.4.5 The assessment includes an evaluation of ground conditions and the nature of any potential contamination present. Part of the assessment includes a review of existing ground investigation data pertaining to the Project site from which a generic quantitative risk assessment has been carried out in accordance with current guidance and best practice. Chemical analytical data, where available, has been compared to published assessment criteria and exceedances identified.

10.4.6 An outline conceptual site model (CSM) for the Project site as a whole has been developed as part of the Preliminary Risk Assessment to identify potential source-pathway-receptor pollutant linkages on the basis of the site reconnaissance and desk study. This outline CSM has been considered within the context of any pre-existing site investigation data and the proposal for each element of the Project. Where the CSM identifies a potential for significant harm to sensitive receptors through active pollutant linkages, further investigation or more detailed risk assessment may be required or, if residual risk remains, remediation or mitigation measures may be appropriate.

10.4.7 The scope of any intrusive investigation will be discussed and agreed in advance with the Environment Agency and Crawley Borough Council prior to undertaking the investigation.

10.4.8 A minerals resource assessment will be undertaken following consultation with West Sussex County Council (as the minerals planning authority) to explain how the Project has addressed the minerals safeguarding policy in the Joint Minerals Local Plan (West Sussex County Council and South Downs National Park Authority, 2018). The minerals resource assessment will be submitted with the ES.

10.4.9 Taking into account the scoping and consultation process, Table 10.4.1 summarises the issues considered as part of this assessment.

Table 10.4.1: Issues Considered within the Assessment

Activity	Potential Effects
Construction Phase (including Demolition): Geology and Ground Conditions	
Construction and demolition activities	Runoff from construction areas to soils (and subsequent leaching into groundwater, including effects on any private water supplies if present). Contamination risk to construction workers, including dermal contact and ingestion; or inhalation of any accumulated ground gases. Contamination risk to public, eg airborne migration and subsequent dermal contact and ingestion.
Construction of updated highways junctions	Runoff from construction areas to soils and subsequent leaching into groundwater, including effects on any private water supplies if present. Contamination risk to construction workers including dermal contact and ingestion; or inhalation of accumulated ground gases. Contamination risk to public, eg airborne migration and subsequent dermal contact and ingestion.
Use of construction compounds and creation of mitigation areas	Runoff from construction areas to soils and subsequent leaching into groundwater, including effects on any private water supplies if present. Contamination risk to construction workers including dermal contact and ingestion; or inhalation of accumulated ground gases.

Activity	Potential Effects
	Contamination risk to public eg airborne migration and subsequent dermal contact and ingestion. Loss of mineral resources.
Operational Phase: Geology and Ground Conditions	
Use of airport, including upgraded highway junctions	Contamination risk from spillages during re-fueling operations/fuel storage leakage/spills etc. Contamination risk to airport workers. Contamination risk to public and local public water supply.

10.4.10 Effects on groundwater resources (eg effects on groundwater availability/flow) are not included within this chapter but are considered within Chapter 11: Water Environment.

10.4.11 Effects which are not considered likely to be significant have been scoped out of the assessment. A summary of the effects scoped out are presented in Table 10.4.2.

Table 10.4.2: Issues Scoped Out of the Assessment

Issue	Justification
Effects on designated geological sites	There are no geological SSSIs or LGSs within 1 km of the Project site. Therefore, no effects are likely and no further assessment is provided.

Study Area

10.4.12 The study area includes the Project site and an additional buffer of up to 500 metres. This is considered sufficient to enable the identification of off-site potential sources of contaminants of concern, other factors which may have influenced site conditions and/or sensitive off-site receptors that require consideration.

Methodology for Baseline Studies

Desk Study

10.4.13 Information on geology, hydrogeology and ground conditions was collected through a detailed desk review of existing studies and datasets as summarised below:

- British Geological Survey, Geology of Britain Viewer (website: http://mapapps.bgs.ac.uk/geologyofbritian/home.html);
- Geological Survey of England and Wales, Sheet 302 Horsham, 1:50,000 scale;
- Groundsure GeoInsight Report (geological and hydrogeological information provided by the British Geological Survey (BGS) and Environment Agency);
- Groundsure EnviroInsight Report (landfills and other contaminative land use information provided by the Environment Agency, local planning authorities and the BGS);
- Groundsure EnviroInsight Report (historical mapping);
- previous geo-environmental investigation and assessment reports (summary provided within Annex 3 of Appendix 10.9.1); and

- Sussex Geodiversity Partnership Records.

Site-Specific Surveys

10.4.14 A site walkover was undertaken in September 2019 by an experienced environmental consultant. The purpose of the walkover was to ground truth the information collected from the desk review and to identify any existing sources of potential contamination. The findings of the walkover are presented within Annex 2 of Appendix 10.9.1.

Assessment Criteria and Assignment of Significance

10.4.15 The significance of an effect is determined based on the sensitivity of a receptor and the magnitude of an impact. This section describes the criteria applied in this chapter to characterise the sensitivity of receptors and magnitude of potential impacts. The terms used to define magnitude and sensitivity are based on, and have been adapted from, those used in the Design Manual for Roads and Bridges (DMRB) methodology (Highways England *et al*., 2020a), which is described in further detail in Chapter 6: Approach to Environmental Assessment.

Receptor Sensitivity/Value

10.4.16 The first step in undertaking the assessment is to identify the value (sensitivity) of the receptor affected by the Project. This has been informed by the descriptors of value described in LA104 (Environmental Assessment and Monitoring) (Highways England *et al.,* 2020a), LA 109 (Geology and Soils (Highways England *et al.,* 2019) and LA 113 (Road Drainage and the Water Environment) (Highways England *et al.,* 2020b) of the DMRB, as shown in Table 10.4.3.

Table 10.4.3: Sensitivity Criteria

Sensitivity	Definition
Very High	**Soils (superficial geology/topsoil and subsoils):** Soils supporting an EU designated site (eg Special Area of Conservation (SAC), Special Protection Area (SPA), Ramsar site). **Hydrogeology (aquifers):** Principal aquifer providing a regionally important resource and/or supporting a site protected under EC or UK legislation. Groundwater locally supports groundwater dependent terrestrial ecosystems (GWDTE)). SPZ1. **Surface water:** Watercourse having a WFD classification in a River Basin Management Plan (RBMP) and $Q_{95} \geq 1.0$ m^3/s. Site protected/designated under EC or UK legislation (SAC, SPA, SSSI, Ramsar site, salmonid water). **Contamination:** Human health: very high sensitivity land use scenario eg residential or allotments. **Unexploded Ordnance (UXO):** Human health.

Sensitivity	Definition
High	**Soils (superficial geology/topsoil and subsoils):** Soils directly supporting a UK designated site (eg SSSI). **Hydrogeology (aquifers):** Principal aquifer providing a locally important resource or supporting a river ecosystem. Groundwater locally supports a GWDTE. SPZ2. **Surface water:** Watercourse having a WFD classification in a River Basin Management Plan (RBMP) and Q_{95} < 1.0 m^3/s. Site protected under EC or UK legislation. **Contamination:** Human health: high sensitivity land use such as public open space or construction workers.
Medium	**Soils (superficial geology/topsoils and subsoils):** Soils supporting non-statutory designated sites (eg Local Nature Reserves, Site of Nature Conservation Importance, mineral safeguarded area) **Hydrogeology (aquifers):** Aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ3. **Surface water:** Watercourses not having a WFD classification in a RBMP and Q_{95} > 0.001 m^3/s. Site protected under EC or UK legislation. **Contamination:** Human health: medium sensitivity land use such as commercial or industrial.
Low	**Soils (superficial geology/topsoils and subsoils):** Soils supporting non-designated notable or priority habitats. **Hydrogeology (aquifers):** Unproductive strata. **Surface water:** Watercourses not having a WFD classification in a RBMP and $Q_{95} \leq 0.001$ m^3/s. **Contamination:** Human health: low sensitivity land use such as highways and rail.
Negligible	**Soils (superficial geology/topsoils and subsoils):** Previously developed land formerly in 'hard uses' with little potential to return to agriculture. **Contamination:** Human health: undeveloped surplus land/no sensitive land use proposed.

Magnitude of Impact

10.4.17 The impacts of the Project have been described using the five-point scale outlined in Table 10.4.4. These follow the general guidance set out in LA104 (Environmental Assessment and Monitoring) (Highways England *et al.,* 2020a), LA 109 (Geology and Soils (Highways England *et al.,* 2019) and LA 113 (Road Drainage and the Water Environment) (Highways England *et al.,* 2020b) of the DMRB and are also informed by CIRIA C552 (CIRIA, 2001a) and by LCRM (Environment Agency, 2020).

Table 10.4.4: Impact Magnitude Criteria

Magnitude of Impact	Definition
High	**Soils (superficial geology/topsoils and subsoils):** Physical removal or permanent sealing of soil resource. **Surface water** Loss of regionally important public water supply. Loss or extensive change to a designated nature conservation site. Reduction in water body WFD classification (adverse). **Hydrogeology (aquifers):** Loss of, or extensive change to, an aquifer. Loss of regionally important water supply. Loss of, or extensive damage to GWDTE or baseflow contribution to protected surface water bodies. Reduction in water body WFD classification (adverse). **Contamination:** Human health: significant contamination identified. Contamination levels significantly exceed background levels and relevant screening criteria with potential for significant harm to human health. Contamination heavily restricts future use of land (adverse).
	Highly beneficial impact on hydrogeological environment/soils resource of the area eg removal of existing polluting discharge to watercourse or aquifer, or removing the likelihood of pollution discharges occurring to a watercourse or aquifer, improvement in water body WFD classification (beneficial).
Medium	**Soils (superficial geology/topsoils and subsoils):** Permanent loss/reduction of one or more soil function(s) and restriction to current or approved future use (eg through degradation, compaction, erosion of soil resources) (adverse). **Surface water:** Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies. Contribution to reduction in water body WFD classification (adverse). **Hydrogeology (aquifers):** Partial loss or change to an aquifer. Partial loss of the integrity of GWDTE. Contribution to reduction in water body WFD classification (adverse). **Contamination:** Human health: contaminant concentrations exceed background levels and are in line with limits of relevant screening criteria. Significant contamination can be present. Control/remediation measures are required to reduce risks to human health/make land suitable for intended use (adverse).
	Moderate benefit to the hydrogeological environment/soils resource of the area (eg the Project results in a brownfield contaminated site that is or is likely to be determined as contaminated land being remediated, contribution to improvement in water body WFD classification, support to significant improvements in damaged GWDTE (beneficial).

Magnitude of Impact	Definition
Low	**Soils (superficial geology/topsoils and subsoils):** Temporary loss/reduction of one or more soil function(s) and restriction to current or approved future use (eg through degradation, compaction, erosion of soil resource) (adverse). **Surface water:** Minor effects on water supplies (adverse). **Hydrogeology (aquifers):** Minor effects on the aquifer, GWTEs, abstractions and structures (adverse). **Contamination:** Human health: contaminant concentrations are below relevant screening criteria. Significant contamination is unlikely with a low risk to human health. Best practice measures can be required to minimise risks to human health (adverse).
	Minor benefit to the hydrogeological environment/soils resource (beneficial).
Negligible	**Soils (Superficial geology/topsoils and subsoils):** No discernible loss/reduction of soil function(s) that restrict current or approved future use (adverse). **Controlled Waters (aquifers/surface water):** Results in effect on surface water or groundwater but is of insufficient magnitude to affect the use or integrity (eg no measurable impact upon groundwater receptors) (adverse). **Contamination:** Human health: contaminant concentrations substantially below levels outline in relevant screening criteria. No requirements for control measures to reduce the risks to human health/make land suitable for intended use (adverse).
	The Project would be of minor benefit or positive addition to local areas of soils resource, by potentially providing protection (beneficial).
No Change	**Soils (Superficial geology/topsoils and subsoils):** No loss/reduction of soil function(s) that restrict current or approved future use. **Contamination:** Human health: reported contaminant concentrations below background levels. **Controlled Waters (aquifers/surface water):** No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Significance of Effect

10.4.18 The significance of the effect upon geology and ground conditions has been determined by taking into account the sensitivity of the receptor and the magnitude of the impact. The method employed for this assessment is presented in Table 10.4.5. Where a range of significance levels is presented, the final assessment for each effect is based upon professional judgement.

10.4.19 In all cases, the evaluation of receptor sensitivity, impact magnitude and significance of effect has been informed by professional judgement and is underpinned by narrative to explain the conclusions reached. For the purpose of this assessment, any effects with a significance level of minor or less are not considered to be significant in terms of the EIA Regulations.

Table 10.4.5: Assessment Matrix

Sensitivity	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very High	No change	Minor	Moderate or Major	Major or Substantial	Substantial

10.4.20 A description of the significance levels is provided in the bullets below:

- Substantial: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
- Major: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
- Moderate: These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
- Minor: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the Project.
- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

10.5. Assumptions and Limitations of the Assessment

10.5.1 The baseline information presented in this PEIR is based on information collated as part of the desk study and consultation process and assessed within the Preliminary Risk Assessment *(*Appendix 10.9.1). Further ground investigation may be required in some cases. Where considered necessary, this may include limited environmental sampling of soil, groundwater and ground gas to verify risks identified in the Preliminary Risk Assessment as well as to inform detailed design.

10.5.2 The limitations of the Preliminary Risk Assessment are set out in Annex 1 of Appendix 10.9.1. No assumptions or limitations have been identified in the preparation of this chapter with regard to geology and ground conditions that would prevent a preliminary assessment of the potential effects being made.

10.6. Baseline Environment

Current Baseline Conditions

10.6.1 Baseline conditions for geology and ground conditions are presented below.

Site History

10.6.2 A summary of the site history is provided in Table 10.6.1.

Table 10.6.1: Site History

Date	Description
From 1870	The site comprised numerous fields bound by trees and hedgerows with wooded areas. A number of farms were present across the site. Charlwood Park was present in the north of the Project site. Several rivers and tributaries ran across the Project site. Fragments of Roman pottery were indicated to have been found in the south east and central regions of the Project site. A large 'Fish Pond' was indicated in the northern part of the Project site. An engine tower and gasometer were indicated to the north of Timberham Lodge and south of the Fish Pond. The London, Brighton and South Coast Railway ran north to south through the central part of the site where Gatwick Station is identified.
From 1879	An unnamed road bisected the site, orientated approximately north to south. A nursery was present in the south west of the site in 1895.
By 1896	Gatwick Race Course constructed in the north east, with orchards indicated in the south east.
By 1913 to 1920s	Gatwick Race Course was now labelled as a golf course and residential dwellings were now present along the unnamed road. By 1914, a number of cottages and a wind pump were indicated across Westfield Common in the south west of the site. Between 1914 and 1919, numerous additional tracks were indicated along the rail line through the centre of the site.
1930s to 1940s	The Project site had predominantly been developed as an aerodrome. By 1946, numerous possible drains and/or ditches were indicated across the west of the Project site.
1950s	Major airport development had occurred by this time. However, no significant development was indicated in the east of the site.
From 1960s	Various industrial and commercial land uses were indicated around the airport including 'Works' (Crawley Sewage Treatment Works). Crawter's Brook and the River Mole were indicated to have been partially culverted under the airport development. The course of Crawter's Brook was indicated to have been diverted by approximately 1965. Several farms across Westfield Common were no longer indicated, with both the northern and main runways partially occupying this area. Gatwick Golf Course was indicated to have been expanded. Gatwick Rail Station had been renamed Gatwick Airport Station by 1961 and the A23 and A217 were first shown at this time. The central southern portion of the Project site was labelled as Gatwick Airport between 1961 and 1963.
From 1970s	Further development of the airport had occurred. The runways had been extended across Westfield Common and the traffic control tower was now indicated. The extensive drainage and balancing pond network, and embankments were indicated to be present from around 1973. Between 1973 and 1978, a Timber Yard was indicated in the south east corner of the Project site along with a Greyhound Training Track. By 1976, the M23, roundabouts and car parks have been constructed to the east of the Project site with embankments either side. The M23

Date	Description
	was indicated running westerly from the east into the A23. Main roads had been constructed into the north east and central area of the Project site by around 1976. Further car parks and a large balancing pond were indicated to be present alongside the River Mole in the north east of the Project site. The London Road (A217) had become more established in the 1970s. By 1977, the Fish Pond in the north of the site was no longer identified as present (potentially infilled).
From 1980s	Land drains were indicated to divert into a surface water feature in the north, and embankments had been constructed south of Charlwood Road, and along the eastern edge of the River Mole. By 1989, the surface water feature in the north, adjacent to Charlwood Park Farmhouse, had been potentially infilled and developed with several car parks. An electrical substation was indicated in the west of the Project site along with possible bunded areas (likely associated with the fire training area). The eastern most roundabout (named Airport Way Roundabout East) and several commercial buildings had been constructed, including a computer centre and a further electrical substation. Further car parking areas had been constructed in the south east. Further expansion of the airport had occurred by this time, including main access roads (Airport Way Roundabout West) and South Terminal Satellite Pier, and Fuel Depots in the north east. Large embankments were identified to the north of the North Terminal Building along with Pier 5 and ancillary buildings/areas associated with the airport. A fire station was indicated in the central southern area of the airport around 1987.
From 2000s	A reservoir bound by embankments was indicated in the south east of the Project site (adjacent to Crawley Sewage Treatment Works). Further expansion/development of the North Terminal area had occurred.

Site Reconnaissance

10.6.3 A site walkover was undertaken in September 2019, the findings of which are presented in detail within Annex 2 of Appendix 10.9.1. A summary is provided below.

10.6.4 The main Project site currently comprises the operational airport and associated infrastructure, including hotels, offices, car parks and a railway station. The airport includes two runways (the main runway and the existing northern runway) located in the southern part of the Project site. A number of car parks, commercial buildings, a hangar and a warehouse are located to the south of the runways. The land to the north west of the runways comprises a fire training ground, with undeveloped land beyond.

10.6.5 The main operational area to the north of the runways includes a number of existing aircraft hangars, aircraft stands and a maintenance area in the north west with car parking areas for long stay parking further to the north west. The central and northern areas comprise a number of taxiways and aircraft stands, a cargo centre, fire station, storage areas, a fuel farm and further car parking areas. To the north east of the runways, are further aircraft stands and taxiways, the two airport terminals and a number of offices and hotels. The airport also includes an area located to the east of the railway line and A23, which comprises a number of car parks, vehicle hire offices, hotels, office buildings, fast food restaurants and petrol filling station. The vehicle hire buildings also include maintenance facilities, car wash areas and vehicle refuelling areas.

10.6.6 A number of areas in addition to the operational airport and associated infrastructure are located within the Project site boundary. These generally comprise undeveloped areas.

Published Geological Mapping and Aquifer Classification

10.6.7 Based on BGS mapping, sheet no. 302 (1:50,000 scale), and the Environment Agency Groundwater Vulnerability mapping (1:100,000 scale), the stratigraphic sequence and aquifer classification beneath the Project site are indicated in Table 10.6.2.

Table 10.6.2: Descriptions of Geological Strata

Strata	Description and Approximate Thickness	Aquifer Classification
Alluvium	This stratum is indicated to comprise clay, silt, sand and gravel. Indicated to be present across parts of the west and north of the Project site (likely to be associated with the River Mole) and also in the east (likely to be associated with Gatwick Stream). The material is likely to be up to several metres in thickness, where present.	Secondary A Aquifer
Head Deposits	This stratum is indicated to comprise clay, silt, sand and gravel. Only indicated to be present in a small area in the centre of the Project site. Likely to be of very limited thickness, where present.	Secondary Undifferentiated Aquifer
River Terrace Deposits (River Mole)	This stratum is indicated to comprise sand and gravel and is indicated to be present across parts of the west, centre and east of the Project site. Likely to be up to several metres in thickness, where present.	Secondary A Aquifer
Weald Clay Formation	This stratum is indicated to comprise mudstone with seams of clay-ironstone in the south east and far east of the Project site. It is indicated to be absent in the far south of the site. Likely to be of significant thickness beneath the site.	Unproductive Stratum
Upper Tunbridge Wells Sand Formation	This stratum is indicated to comprise sandstone and mudstone and is only indicated to be present in the far south of the Project site. Likely to be of significant thickness.	Secondary A Aquifer

Hydrology

10.6.8 The main watercourse flowing northwards through the western part of the Project site is the River Mole. It flows from the south and is culverted under both the main runway and the existing northern runway. Upon exiting the culvert, it forms the western and northern boundary of the airport before heading north away from the airport towards Hookwood.

10.6.9 A main tributary of the River Mole is the Gatwick Stream, which flows from the south, passing west of the Crawley Sewage Treatment Works and beneath the London to Brighton railway line prior to passing northward to run between the railway and the A23 and being culverted under South Terminal. On emergence from the culvert, it flows through Riverside Garden Park to its confluence with the River Mole at the western end of the park.

10.6.10 Other tributaries of the River Mole, including Crawter's Brook, Man's Brook and Westfield Stream, Burstow Stream also flow through or close to the site.

10.6.11 The study area is located within a surface water Nitrate Vulnerable Zone (NVZ) and a surface water Safeguard Zone (SgZ). An NVZ is an area of land draining into water known to be polluted by nitrates. A SgZ is an area that influences the water quality at water abstraction sites at risk of failing the drinking water protection objectives.

10.6.12 There are no surface water or potable water abstraction licences within the vicinity of the Project site.

Minerals

10.6.13 The West Sussex Joint Minerals Local Plan (West Sussex Council and South Downs National Park Authority, 2018) states that '*mineral resources are finite and they must be protected…..from permanent sterilisation where possible'*.

10.6.14 The Project site falls within the Brick Clay Resource Mineral Safeguarding Area. The mineral resource covers a large area of the county, with most of the resource located in the north and west (in other words, the Project site accounts for a small area of the overall Brick Clay Resource Mineral Safeguarding Area within the county). The Project site also falls within the Brick Clay Resource Consultation Area as shown in the Minerals and Waste Safeguarding Guidance (West Sussex Council and South Downs National Park Authority, 2020).

10.6.15 Clay has historically been extracted in West Sussex for the purpose of brickmaking. Wealden stock bricks continue to be produced and have a distinctive character. Clay is also used in the manufacture of tiles, pipes and cement. There are five active brickworks in West Sussex, with their own supplies of clay, which have a total permitted reserve of 18.7 million tonnes (2016 data). National policy dictates that mineral planning authorities provide for a 25 year stock of permitted reserves. Three of the active brickworks have in excess of 25 years of clay reserves, one has 24 years and the brickworks at West Hoathly has less than 10 years of reserves (2016 data). The strategy for clay (as set out in the Minerals Local Plan (West Sussex Council and South Downs National Park Authority, 2018)) is to safeguard brick-making clay; to allocate an extension to the claypit at West Hoathly brickworks and allow extensions or new sites, if existing supplies are exhausted or if a particular source of clay is required to enable appropriate blends to be made. The Project site is not located in an area that is currently used to provide clay resources for the brick works.

Environmental Information

10.6.16 Industrial land use, landfill sites and other waste facilities, and pollution incidents recorded in the vicinity of the Project site are presented in Table 10.6.3.

Table 10.6.3: Environmental Data

Environmental Data	Approx. Distance and Direction
Part A1 and IPPC Authorised Activities	
Installation Name and Detail	
Shell Hydrogen Refuelling Station – issued 2017	On site – north
Gatwick Power Station – issued 2006	On site – south
Crawley Sewage Treatment Works CHP – issued 2010	Adjacent – south east

Environmental Data	Approx. Distance and Direction
Control of Major Accident Hazards	
Name and Detail	
Shell UK Oil Products Ltd – Gatwick Fuel Farm – Upper Tier	On site – north
Registered Waste Sites	
Name and Description	
Gatwick Waste CARE Centre – Special Waste Transfer Station – <25,000 tonnes – issued 2010	On site – central
Austins Land – Landfill accepting Non-Biodegradable Wastes – >25,000 to <75,000 tonnes – issued 1978	On site – east
Platinum International Ltd – Metal Recycling Site – <25,000 tonnes – issued 2017	90 metres – south
Crawley Sewage Treatment Works – Landfill – <25,000 tonnes – issued 2013	Adjacent – south east
DJ Grab Services Ltd – Physical Treatment Facility – >25,000 to <75,000 tonnes – issued 2016	50 metres – north
Simmonds Donald Richard Thomas – Metal Recycling Site – <25,000 tonnes – issued 1994	140 metres – east
Jupp Peter – Treatment of waste to produce soil – <25,000 tonnes – issued 2013	280 metres – east
United Grab Hire Ltd – Physical Treatment Facility – <25,000 tonnes – issued 2013	390 metres – east
National Incidents and Records of Pollution*	
Impact Details	
Significant impact to Gatwick Stream – List 1 substance – 1999	On site – north east
Major impact to water – List 2 substance – 2001	On site – south west
Major impact to water – List 2 substance (surfactants and detergents) – 2002	On site – north
Major impact to water – List 2 substance (biodegradable material or waste) – 2018	On site – north
Major impact to water – List 2 substance (sewage materials) – 2017	On site – east
Significant impact to land and water – List 2 substance (oil or fuel) – 2014	20 metres – south
Significant impact to water – List 2 substance (unspecified) – 2016	On site – south east
Significant impact to water – List 2 substance (gas and fuel oils) – 2002	90 metres – east
Historical Landfill Sites	
Name and Description	
Gatwick Brickworks – inert waste – 1983 to 1984	240 metres north
Blackcomer Wood – inert waste – 1976	330 metres south east

* Significant/major impacts identified only

Ground Stability

10.6.17 The site is indicated to have potential for small scale underground mining in relation to iron ore.

10.6.18 Areas at moderate risk for compressibility are present across the site, which appear to correspond to BGS mapped areas of Alluvium.

10.6.19 A moderate risk of slope instability has been identified for a small area along the A23 embankment.

Previous Ground Investigations

Introduction

10.6.20 A number of ground investigations and assessments have been undertaken across the Project site. A summary of the reports available is provided in Annex 3 of Appendix 10.9.1 and the location of the exploratory holes is shown in Figure 10.6.4.

Site-Specific Geology

Made Ground

10.6.21 Made Ground has been encountered across the majority of the Project site, averaging approximately 1 metre thickness (generally <2 metres). Localised deeper Made Ground was encountered at between 3 and 3.7 metres and up to a maximum of 6.45 metres located directly west of the North Terminal building.

10.6.22 The greatest depth of Made Ground was considered to be a result of the removal of superficial deposits associated with the original course of the Gatwick Stream during construction of Pier 5.

Superficial Deposits

10.6.23 Superficial deposits in the form of Alluvium, Head and River Terrace Deposits have been encountered across the Project site associated with former and existing watercourses. These deposits appear to have been commonly excavated to facilitate airport development.

10.6.24 The Alluvium has been recorded as up to approximately 2.9 metres in thickness, with an average thickness of approximately 1 metre. Localised layers of peat were identified within these deposits.

10.6.25 The River Terrace Deposits were reported to be up to 1.1 metres in thickness, where present.

Solid Geology

10.6.26 The Weald Clay Formation has been encountered across the Project site as part of previous investigations to a maximum depth of 35.5 metres (unproven). This comprised mudstone/siltstone with a weathered upper horizon typically comprising a stiff clay.

Site-Specific Hydrogeology

10.6.27 Shallow groundwater was generally identified between approximately 0.8 metres and 3 metres below ground level (bgl) within Made Ground, superficial deposits or weathered Weald Clay.

10.6.28 Groundwater was identified to generally be perched and discontinuous with these deposits.

Reported Evidence of Contamination

10.6.29 In 2013, a fuel leakage investigation around Pier 4 (Atkins, 2013) was undertaken due to observations of fuel impacted flood water and free phase contamination within a utilities chamber.

10.6.30 The investigation identified hydrocarbon impacted soils and groundwaters with the potential source attributed to underground fuel lines. It is not known if any remediation was completed following this investigation.

10.6.31 A 2017 ground investigation for the Boeing hangar (Arcadis, 2017; Stantec, 2017) identified loose asbestos fibres (chrysotile) within a sample of shallow Made Ground and hydrocarbon impacted perched shallow groundwater along with elevated volatile organic compounds (VOCs) in soil gas samples.

10.6.32 Activities within the firefighting area have involved the burning of pools of kerosene fuel and gas in two separate basins. Firefighting foam is used to extinguish the fires.

Soil and Groundwater Contamination Encountered as Part of Previous Investigations

10.6.33 Historical soil and groundwater data obtained as part of the previous investigations have been compared to contemporary assessment criteria, where available, and the findings (including any exceedances) are presented in Annex 3 of Appendix 10.9.1. This utilises historical ground investigation data associated with exploratory holes located within those parts of the Project site where development is proposed.

10.6.34 Contaminants of concern within soils did not exceed the assessment criteria.

10.6.35 Exceedances of assessment criteria for a number of contaminants of concern (including heavy metals, hydrocarbons and VOCs) have been identified within perched/groundwaters.

10.6.36 Additionally, leachable concentrations of heavy metals and hydrocarbons were identified. It is considered that the exceedances for hydrocarbons were generally confined to the Made Ground and were located close to the boundary of the Made Ground/underlying clay interface.

10.6.37 The results of the leachate analysis suggest that the general quality of Made Ground identified on the Project site may represent a moderate risk with regards to generation of low-quality perched groundwater.

Ground Gas Monitoring

10.6.38 Ground gas monitoring data have been identified from approximately seven previous phases of ground investigations. Elevated methane (up to approximately 32.4%), carbon dioxide (up to approximately 11%), carbon monoxide (up to approximately 313 parts per million (ppm)) and depleted oxygen have been recorded in various parts of the site together with high flows (up to 43.1 litres per hour (l/hr)).

10.6.39 Additionally, soil vapour sampling recorded elevated hydrocarbon vapours during a ground investigation for the construction of the Boeing hangar.

10.6.40 Potential sources of elevated ground gas were attributed to the infilled balancing pond at the North Terminal and a former fuel line at the South Terminal.

10.6.41 The risk of hazardous ground gas to buildings on the Project site has been assessed using the classification method set out in C665 ‘Assessing risks posed by hazardous ground gasses to buildings’ (CIRIA, 2007). The method uses both gas concentrations and borehole flow rates to define a Characteristic Situation for a site, based on the limiting gas volume flow for methane and carbon dioxide. Characteristic Situations (CS) assigned to areas across the Project site ranged between CS1 (very low risk) and CS3 (moderate risk).

Unexploded Ordnance (UXO)

10.6.42 The risk of UXO has been reported for Gatwick Airport within a number of previous reports (Appendix 10.9.1, Annex 3) and a summary is provided below.

UXO Hazard Summary

10.6.43 The main sources of UXO hazard arise from munitions storage/disposal activities undertaken at Gatwick and in the surrounding area during and immediately after World War II. There were munitions supply depots surrounding Gatwick Airport supporting the Royal Air Force (RAF), Home Guard, Special Operations Executive and the Army prior to the D-Day invasions in 1944.

10.6.44 At the end of World War II, some of the unused munitions at the depots were disposed of locally. This included ordnance returned to the depots which were not required in combat but were primed and fused.

UXO in Made Ground

10.6.45 Post-World War II, during the extension of Gatwick Airport, significant earthworks were undertaken during construction of the airfield.

10.6.46 A large number and wide range of live ordnance was found when excavating within Made Ground across much of the airfield. There is consequently a potential for UXO to be present within the Made Ground across the airport and just outside the airfield perimeter, as proven by these post-World War II UXO finds.

10.6.47 Records of finds to date indicate that such ordnance is likely to comprise close combat munitions such as: grenades; mortars; smoke bombs; small arms ammunition; Projector, Infantry, Anti-Tank weapons (PIATs), alongside anti-tank mines and a variety of other ammunition.

10.6.48 The UXO hazard is considered to be confined to the Made Ground. However, potential for some localised munitions stores dating from World War II buried at shallow depth in the natural ground cannot be totally discounted.

Conceptual Site Model Geology and Ground Conditions Baseline Summary

10.6.49 Superficial deposits underlying the west and centre of the Project site comprise Alluvium, Head and River Terrace Deposits. They constitute Secondary A aquifers and Secondary Undifferentiated aquifers. Ground investigations have proven the depths of the deposits to be approximately 2.9 metres bgl. Groundwater has been recorded at depths of approximately 0.8 to 3 metres bgl and is associated with the Made Ground, superficial deposits and weathered layers of the Weald Clay. In most cases, it is likely to be discontinuous and perched, however, there is the potential for hydraulic continuity with the surface watercourses on the Project site. The Weald Clay bedrock has a low permeability and is classified as an unproductive stratum.

10.6.50 The River Mole is the main watercourse flowing through the Project site and is culverted under the main and northern runways. Tributaries of the River Mole, including Crawter's Brook, Gatwick Stream, Man's Brook, Burstow Stream and Westfield Stream, all flow close to or through the Project site.

10.6.51 The historic use of the site has primarily been for aerodrome/airport use, prior to which it was used as a racecourse, golf course, farmland and residential dwellings. Munition storage and disposal activities were undertaken at Gatwick and in the surrounding area during and immediately after World War II. The remaining UXO hazard is likely to be associated with areas of Made Ground, however some localised munition stores in the shallow natural ground cannot be discounted.

10.6.52 A number of potential sources of contamination have been identified from historic and current uses. A review of previous ground investigations has identified elevated levels of contaminants in the soil, groundwater and leachate. Elevated levels of methane and carbon dioxide have also been recorded in some areas.

10.6.53 Much of the Project site is covered by buildings and hard surfacing, which reduces the number of potential pathways to receptors. There are no known active pollutant linkages whilst the Project site remains in its current baseline condition and operates in accordance with existing procedures. However, a number of potential pollutant linkages may become active where areas of the Project site are proposed for development and this is considered in Section 10.9.

Future Baseline Conditions

10.6.54 The assessment of likely effects on geology and ground conditions considers any potential changes in baseline conditions that would alter the conclusions of the assessment. The primary sources of future change with respect to the baseline are changes in land use and climate change.

10.6.55 With respect to geology, hydrogeology and ground conditions there is potential for an increased risk of contamination as a result of future changes to land use. In terms of climate change there is a potential for increased leaching of contaminants from soil as a result of longer and more frequent periods of rainfall.

10.6.56 These factors have been taken into consideration, where practicable, in the assessment of effects.

Initial Construction Phase: 2024-2029

10.6.57 Over this time period, the future baseline in relation to geology and ground conditions is unlikely to significantly change from that described above. It is considered likely that in the absence of the Project, the majority of the Project site would remain in airport use or in uses supporting the airport, with surrounding areas of natural habitat/agricultural land ie no material changes to land use are envisaged in this timescale.

10.6.58 There are a number of identified future developments that would be undertaken in the absence of the Project, such as the extension to Pier 6. In accordance with the conditions of their planning consents and usual good practice, these may require site investigation and remediation to be undertaken where previous investigations have identified exceedances of screening criteria.

10.6.59 Overall, there are unlikely to be any significant changes to the geology and ground conditions described in this chapter during the period up to 2029.

10.6.60 It is unlikely that geology and ground conditions would be specifically vulnerable to the effects of climate change during this period.

2030 to 2038

10.6.61 There are unlikely to be any significant changes to the geology and ground conditions baseline described in this chapter during the period 2030-2038 as a result of the future improvements within Gatwick Airport itself, or in relation to known planning policy given that ground conditions will primarily relate to the specific development parcels within a same use setting. It is recognised that any remediation of adjacent land may remove potential off site sources of contamination. It is unlikely that geology and ground conditions would be materially vulnerable to the effects of climate change during this period.

10.7. Key Project Parameters

10.7.1 The assessment has been based on the parameters identified within Chapter 5: Project Description.

10.7.2 Table 10.7.1 identifies the key parameters relevant to this assessment. Where options exist, the maximum design scenario selected is the one having the potential to result in the greatest effect on an identified receptor or receptor group. Effects of greater adverse significance are not predicted to arise should any other option identified in Chapter 5 be taken forward in the final design of the Project.

Table 10.7.1: Maximum Design Scenarios

Potential Impact	Maximum Design Scenario	Justification
Initial Construction Phase: 2024-2029		
Area within the Project site boundary	820 hectares	This is the maximum area affected by land take or direct construction activity. It is noted that this area includes both the existing operational airport areas of previously undeveloped land.
Depth of excavation: Museum Field (flood compensation areas)	3.5 metres	Maximum potential depth of excavation and therefore maximum effect on existing ground and groundwater and maximum loss of brick clay resource from mineral safeguarding area.
Depth of excavation: Car Park X	2.5 metres	
Depth of excavation: Car Park Y	10 metres	Maximum potential depth of excavation and therefore maximum effect on existing ground and groundwater.
Depth of excavation: fire training ground	5 metres	Maximum potential tank depth and therefore maximum depth of excavation of potentially contaminated material that couldn’t be managed on site.
Depth of excavation: new pumping stations	10 metres	Maximum depth in Weald Clay associated with proposed Pumping Station 2a – and therefore maximum effect on existing ground and groundwater.

Potential Impact	Maximum Design Scenario	Justification
Depth of excavation: new substations	3 metres	Maximum potential depth in Weald Clay of excavation and therefore maximum effect on existing ground and groundwater.
Depth of excavation: CARE, motor transport (Phase 1 and early works for Phase 2) and surface transport facilities	5 metres	
2030-2038		
Land take for junction improvements	South Terminal roundabout compound: 2 hectares. North Terminal roundabout contractor compound: 1.6 hectares. Longbridge roundabout satellite compound: 0.65 hectares. Highway designs as shown in Appendix 5.2.1.	Maximum construction compound areas and current highway designs identified.
Depth of excavation: Gatwick Stream Flood Compensation Area	5 metres	Maximum potential depth of excavation and therefore maximum effect on existing ground and groundwater.
Depth of excavation: Pumping Station 7a	6 metres	
Depth of excavation: new substation north of Pier 7	3 metres	
Design Year: 2038		
Parameters assumed to be as above.		

10.8. Mitigation and Enhancement Measures Adopted as Part of the Project

10.8.1 A number of measures have been designed into the Project to reduce the potential for impacts on geology and ground conditions. These are listed in Table 10.8.1. Those measures applicable to the construction phase would be implemented as part of the Code of Construction Practice (CoCP). An outline CoCP is provided at Appendix 5.3.1.

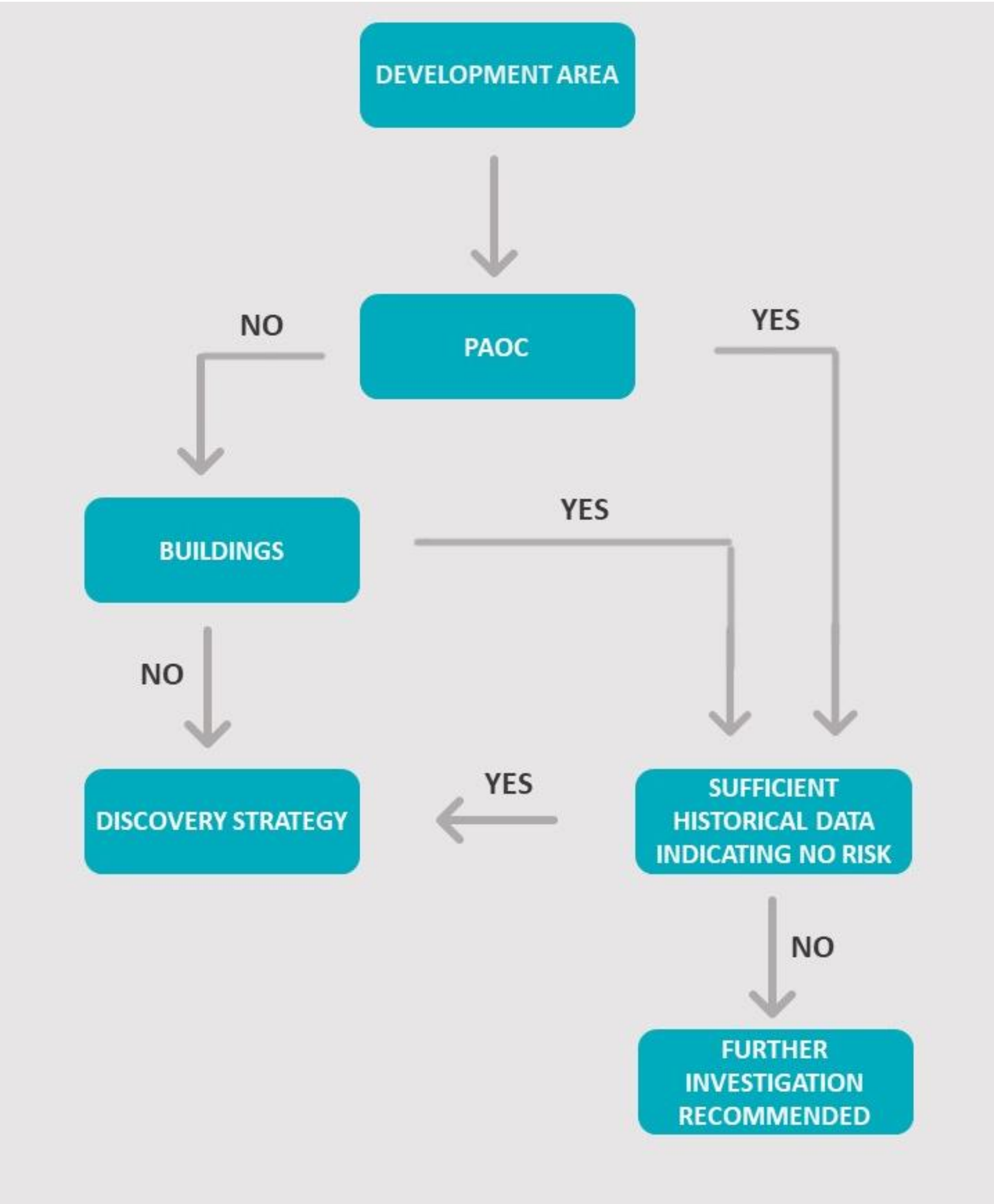
Table 10.8.1: Mitigation and Enhancement Measures

Measures Adopted as Part of the Project	Reason
Mitigation	
A structured approach would be followed to determine which development areas within the Project site require further assessment/ground investigation. The approach is set out in Diagram 10.8.1 and comprises the following elements: ▪ discovery strategy; and ▪ ground investigation. *Discovery strategy* The discovery strategy would comprise a watching brief that would be undertaken by suitably trained personnel during construction activities such as ground clearance and earthworks. The strategy would also include a procedure for construction workers to follow in the event that previously unknown contamination is discovered. *Ground investigations* Where assessment of historical data cannot demonstrate that the risk of contamination is low, intrusive ground investigations would be undertaken. The scope of the investigation would be agreed with the Environment Agency/relevant local planning authority prior to its implementation. Where appropriate, the investigations will include geotechnical testing to provide information on land stability. An appropriate slope stability assessment will be undertaken where considered necessary.	To identify where further investigations are required with regard to contaminated land.
Remediation Strategy Where the results of the ground investigation determine that remediation is required to ensure that the site is suitable for its proposed use, a remediation strategy would be prepared. The strategy would comprise the following: ▪ implementation plan setting out the objectives and requirements of the remediation; ▪ validation sampling to confirm that remediation objectives have been met; and ▪ verification report. The scope of the remediation strategy would be agreed with the Environment Agency/relevant local planning authority prior to its implementation. The verification report would also be sent to the Environment Agency/relevant local planning authority for approval. Subject to the scope and results of the Remediation Strategy, the following would be undertaken where appropriate to inform construction activities and the detailed design of buildings: ▪ piling risk assessment (in accordance with the Environment Agency guidance) including control measures (where appropriate) to mitigate risk to controlled waters during piling installation; ▪ detailed ground gas risk assessment and gas control measures during construction and to be incorporated into building design (where appropriate); and ▪ groundwater and/or surface water monitoring.	To facilitate the remediation of the site.
A Materials Management Plan would be prepared to document the management of soils on the site (including the raising of Pentagon field) and include a risk assessment procedure to demonstrate the soils do not present a risk to human health or the	To facilitate the management of soils.

Measures Adopted as Part of the Project	Reason
environment. The Materials Management Plan will be undertaken in accordance with the CL:AIRE Code of Practice (CL:AIRE, 2011).	
Ongoing consultation with West Sussex County Council Mineral Planning Authority to discuss opportunities to minimise the impacts of the Project of the Mineral Safeguarded Areas at the Project site.	To minimise the area of viable mineral resource affected by the Project.
Implementation of measures to prevent and control spillage of oil, chemicals and other potentially harmful liquids. This would ensure appropriate storage and handling of materials and products in accordance with the Control of Pollution (Oil Storage) (England) Regulations 2001, for example: ▪ avoidance of oil storage within 50 metres of a spring, well or borehole; ▪ within 10 metres of a watercourse; ▪ where oil could run over hard ground into a watercourse; ▪ secondary containment system that can hold at least 110% of the oil volume stored; and ▪ avoidance of storage of oil in areas at risk of flooding. Refuelling of machinery would be undertaken within designated areas where spillages can be easily contained. Machinery would be routinely checked to ensure it is in good working condition; and any tanks and associated pipe work containing oils and fuels would be double skinned and be provided with intermediate leak detection equipment.	To minimise ground contamination and prevent contaminated runoff entering surface water or groundwater.
Implementation of measures to protect groundwater during construction, including good environmental practices based on legal responsibilities and guidance on good environmental management in: guidance in: CIRIA C532 Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors (2001b).	To help avoid pollution incidents occurring.
Implementation of control measures, use of appropriate personal protective equipment and adoption of high levels of personal hygiene by construction workers. Health and Safety risk assessments to be completed prior to construction workers in line with Construction (Design and Management) Regulations 2015.	To mitigate risks to construction workers from contamination including ground gas.
A UXO mitigation strategy would be developed using guidance within Unexploded Ordnance: A guide for the Construction Industry (CIRIA, 2009). The strategy would utilize information from the Explosive Ordnance Threat Assessment Report (Bactec, 2013).	To mitigate risks from unidentified unexploded ordnance.
During operation, maintenance activities may involve the use of chemicals and oils. Secure storage facilities would be provided, including a secondary containment system. A spillage control procedure would be implemented to ensure that any spillages are contained and removed.	To help avoid pollution incidents occurring.
Monitoring	
The discovery strategy would include suitably trained personnel to undertake the watching brief. Groundwater and surface water monitoring may be required as part of the Remediation Strategy.	To minimise impacts to controlled waters.

Measures Adopted as Part of the Project	Reason
Enhancement	
None identified.	

Diagram 10.8.1: Strategy for Identification of Areas for Further Investigation



10.9. Assessment of Effects

Initial Construction Phase: 2024-2029

Impacts on Non-Agricultural Soil Resources

10.9.1 This phase involves the establishment of the construction compounds (excluding the Longbridge roundabout satellite contractor compound for the Longbridge roundabout improvements). The main construction compound and part of the airfield satellite contractor compound are located on land that is currently sealed by existing block paving or hard surfacing; the function of these soils is to provide a platform for man-made structures. The remainder of the airfield satellite contractor compound and the South Terminal roundabout contractor compound comprise vegetation (managed pasture) and do not comprise a notable or priority habitat. The North Terminal surface access satellite contractor compound is currently a car park (Car Park Y). The soil's function to provide a platform for man-made structures would remain unchanged in this area.

10.9.2 Construction compounds would be surfaced where existing surfacing is inadequate or absent; this would reduce the potential for erosion to occur. The temporary loss of the soil function of the airfield satellite contractor compound and the South Terminal roundabout contractor compound is considered to represent a low magnitude of impact. The soils support a managed grassland and are considered to have a low sensitivity. The level of the effect is assessed to be **negligible**, which would not be significant.

10.9.3 The magnitude of impact on soil resources for the other compounds is considered to be 'no change' and the sensitivity of the soil resource at these locations is negligible. On this basis, the level of effect is assessed as **no change**, which would not be significant.

10.9.4 This phase also involves the relocation of many existing facilities within the Project site. In most cases, the areas where facilities are to be relocated are already occupied by buildings, structures or hard surfacing. The function of these soils is to provide a platform for man-made structures. Construction activities such as breaking up of paved areas, earthworks etc. would involve exposure of the soils to rain and the movement of machinery which could lead to erosion and compaction, however, these activities would be temporary. The magnitude of impact on the soil resource is considered to be low as it would not permanently restrict the current or future use of the soil. Given that the soils are already developed, the sensitivity is considered to be negligible. On this basis, the level of effect is assessed as **negligible**, which would not be significant.

Impacts on Aquifers

10.9.5 Construction activities which involve breaking the ground surface increase the potential for existing contaminants in the soil and perched groundwater to be mobilised and migrate through the soil as a result of leaching (from exposure to rainfall) and from the creation of pathways to aquifers at depth (eg piling). There is also the potential for contaminants to occur in the soil during construction as a result of spillages or leakages.

10.9.6 The review of desk study data and the observations from the site walkover identified several potential areas of concern (PAOC) within the Project site (see Figure 10.6.3), based on the methodology set out in Appendix 10.9.1. The PAOC represent potential sources of contamination from existing and historic land uses on the Project site and off-site. Where previous site investigations have been undertaken in areas to be affected by the Project, the results have been reviewed to identify where samples of soil, groundwater and leachate exceeded relevant screening criteria. The proposed development areas within the Project site have been overlain with the PAOC, together with the site investigation locations and results to identify the following:

- development areas that include PAOC;
- the level of existing information available for these PAOCs; and
- the potential for pollutant linkages to be active based on the existing information.

10.9.7 During the initial construction phase, several development areas identified as PAOC would be constructed. These areas include:

- main contractor compound (PAOC 6);
- relocation of the fire training ground (PAOC 15);
- relocation of Taxiway Juliet (PAOC 37 and 41);
- construction of Purple Parking at Crawter's Field (PAOC 43);
- relocation of the CARE and motor transport facilities (Phase 1 and early stages of Phase 2) (PAOC 46);
- changes to the South Terminal forecourt (PAOC 1, 2 and 4);
- clearance works for Charlie Box (PAOC 9);
- construction of a new runway exit to Taxiway Juliet (PAOC 9);
- Virgin hangar pavement works (PAOC 16 and 45);
- provision of new Pier 7 stands (PAOC 35);
- construction of the new Car Park Y surface water runoff storage area (PAOC 36); and
- construction of a South Terminal hotel (PAOC 70).

10.9.8 A staged approach is proposed as part of the mitigation strategy to identify the most appropriate course of action for each development area and to target areas where further investigation is required. The staged approach is set out in Appendix 10.9.1. Further ground investigations are proposed for each of the areas identified above and the scope of the investigations would be agreed with the Environment Agency and Crawley Borough Council prior to their commencement. The results of the investigations/further assessment would determine remediation requirements. A remediation strategy would be prepared and implemented to ensure the area is suitable for its proposed use. The scope of the remediation strategy would be agreed with the Environment Agency and Crawley Borough Council prior to its implementation. Validation works would be undertaken on completion of the remediation and a verification report prepared for regulatory sign off.

10.9.9 For development areas that do not fall within a PAOC (and where no buildings are proposed), a discovery strategy would be implemented whereby procedures are in place for construction staff to follow in the event that currently unknown contamination is encountered during construction activities.

10.9.10 Measures to minimise the potential for spillages and leakages or fuels and chemicals would be implemented through the CoCP. These measures would form part of a pollution prevention plan.

10.9.11 Taking into account the committed mitigation, the magnitude of impact on aquifers would be negligible. River Terrace Deposits are predominantly located in the centre of the Project site. These deposits are a Secondary A aquifer and are of medium sensitivity. The level of effect is assessed to be **minor adverse**, which would not be significant. Weald Clay extends across the majority of the Project site. It is classified as an unproductive stratum and has a low sensitivity. The level of effect on this receptor is considered to be **negligible**, which would not be significant.

10.9.12 The spoil strategy for the Project site estimates the following arisings will be exported off site to a suitably licenced facility:

- Car Park X – (92,000 m^3)
- Museum Field – (98,000 m^3)

10.9.13 Both these areas are not located within PAOC. Full chemical characterisation of the materials will be undertaken and assessed in line with Technical Guidance WM3 (Environment Agency, 2021) and transported and disposed of in line with full Duty of Care Regulations.

Impacts on Surface Watercourses

10.9.14 Impacts of the Project on surface water quality may arise from runoff from construction areas and also as a result of contaminants in soils or perched groundwater migrating to surface waters. These superficial deposits comprise Alluvium and the River Terrace Deposits and are located predominantly in the west and centre of the Project site associated with the surface watercourses. Construction activities in the vicinity of these superficial deposits (eg the relocation of the fire training ground and electricity substations) have the greatest potential to lead to an impact on surface water courses.

10.9.15 The staged approach as summarised in paragraph 10.9.8 would be implemented during this construction stage. The CoCP will also include measures to control surface water runoff. On this basis, the magnitude of impact is predicted to be negligible. The highest sensitivity attributed to surface waters at the Project site as presented within Chapter 11: Water Environment is high. The level of the effect is therefore assessed as **minor adverse**, which would not be significant.

Impacts on Human Health

10.9.16 Construction activities would involve breaking the ground surface and disturbing soil and perched groundwater. Potential impacts to human health may arise as a result of exposure to contaminants via dermal contact, ingestion of soil/soil derived dusts and inhalation of contaminated dusts/fibres and ground gases/vapours. There is the potential for adjacent site users to also come into contact with airborne dusts/fibres.

10.9.17 There is the potential for elevated concentrations of contaminants to exist on the Project site in the PAOCs. Following the staged approach summarised in Appendix 10.9.1, further investigation of the PAOCs listed in paragraph 10.9.7 would be undertaken. Remediation strategies would be developed where appropriate and the area remediated to ensure minimal risk to human health.

10.9.18 The sensitivity of the construction workers is considered to be high, given the potential for exposure to contaminants as part of their role/activity on site, although it would be for a temporary duration.

10.9.19 Where the further assessment/investigation has identified that remediation is required, the magnitude of impact could be medium. These areas are likely to be localised in extent. For the majority of the other development areas the magnitude of impact would be low.

10.9.20 Construction would be undertaken in accordance with specific Health and Safety risk assessments, prepared prior to construction works. In accordance with the Construction (Design and Management) Regulations 2015, construction workers would be provided with appropriate protective equipment and appropriate welfare facilities and any specific control measures would be implemented. With this mitigation in place, the magnitude of impact would be low, and the level of effect would be **minor adverse** across the site, which would not be significant.

Impacts on Mineral Safeguarding Areas

10.9.21 The excavation of soil from the flood alleviation areas may lead to a loss of mineral resources from the Brick Clay Resource Mineral Safeguarded Area. This is considered to be a very small proportion of the total Mineral Safeguarding Area for brick clay, which extends across much of the north and east of the county.

10.9.22 The Joint Minerals Local Plan (West Sussex County Council and South Downs National Park Authority, 2018) indicates that the majority of the brickworks within the county have approximately 25 year supplies (2016 data) and do not rely on the mineral resource at the Project site.

10.9.23 The viability of using the excavated mineral as a mineral resource is dependent on the depth of overburden material, the quality of the mineral resource and the demand for the mineral at the time of the construction works. Assuming the worst case that the excavation of material from the flood compensation areas could not be used as a mineral resource, the magnitude of impact is considered to be low given the limited physical extent in the context of the safeguarding area as a whole. The sensitivity of the Brick Clay Resource Mineral Safeguarded Area is medium and therefore, the level of effect is assessed as **minor adverse**, which would not be significant. However, it is noted that opportunities to use the excavated material as a mineral would be explored.

Further Mitigation

10.9.24 As set out above, opportunities to use the material excavated from the Brick Clay Resource Mineral Safeguarded Area for mineral use would be explored nearer the time, once further details of the likely timing and nature of the material are known. No further mitigation is proposed.

Future Monitoring

10.9.25 On completion of the remediation measures and verification report, future monitoring is unlikely to be required.

Significance of Effects

10.9.26 No further mitigation or monitoring is required. Therefore, the significance of effects would remain as presented above.

2030-2032

Impacts on Non-Agricultural Soil Resources

10.9.27 This phase would include the junction improvement works alongside existing highways. These areas are considered minimal and any loss of the soil function within these areas is considered to represent a low magnitude of impact. The soils support a managed grassland and are considered to have a low sensitivity. The level of the effect is assessed to be **negligible**, which would not be significant.

10.9.28 In 2030, the construction compound for the Longbridge roundabout satellite contractor compound would be established for the Longbridge roundabout improvements. This comprises vegetation (managed pasture) and does not comprise a notable or priority habitat.

10.9.29 Construction compounds would be surfaced where existing surfacing is inadequate or absent; this would reduce the potential for erosion to occur. The temporary loss of the soil function is considered to represent a low magnitude of impact. The soils support a managed grassland and are considered to have a low sensitivity. The level of the effect is assessed to be **negligible**, which would not be significant.

10.9.30 The assessment of effects from the construction of other development areas with regard to non-agricultural soil resources would be the same as described for the initial construction phase (2024-2029).

Impacts on Aquifers

10.9.31 The remediation of many of the PAOCs identified in paragraph 10.9.7 and any areas where previously unknown contamination has been identified would be implemented and complete by this stage.

10.9.32 Between 2030 and 2032, construction activity would be ongoing at the hotels, various car parks and Pier 7, with other areas being operational. Pier 7 and the Car Park Y hotel have been identified as PAOCs due to the presence of balancing ponds and ponds and the unknown nature of infilled materials. Further investigation is proposed, and a remediation strategy would be prepared subject to the results of the investigation. In most cases, the impact of the remaining construction activities on the aquifers would be low. The sensitivity of the resource is medium (Secondary A aquifer) and low (Unproductive aquifer). The level of effect would be **minor adverse to negligible**, which would not be significant.

10.9.33 Potential impacts from spillages and leaks of fuel and chemicals from the construction compounds/areas under construction would remain. There would also be a risk of potential leaks of fuels and chemicals within the operational areas of the Project site. With the implementation of measures identified in Table 10.8.1, the magnitude of the potential impacts would be negligible. The sensitivity of the Secondary A aquifer is medium, and the Unproductive aquifer has a low sensitivity. The level of effect would be **minor adverse** (Secondary A aquifer) and **negligible** (Unproductive aquifer), which would not be significant.

10.9.34 Operational areas would be managed in accordance with standard operational procedures and the mitigation measures in Table 10.8.1. On this basis, the magnitude of impact would be no change and the level of effect would be **no change**, which would not be significant.

Impacts on Surface Watercourses

10.9.35 During this phase, impacts of the Project on surface water quality may still arise from runoff from construction areas and also as a result of contaminants in soils or perched groundwater migrating to surface waters. The junction improvement works would be accompanied by the installation of drainage early in the construction process ensuring that surface water runoff would be suitably managed during construction.

10.9.36 The assessment of effects from the construction of other development areas with would be the same as described for those identified within the initial construction phase (2024-2029).

10.9.37 Potential impacts on surface waters could also arise from leaks and spillages from construction compounds/areas under construction and from operational areas of the Project. With the implementation of the measures identified in Table 10.8.1, the magnitude of impact would be negligible. The receptor is considered to be highly sensitive (as a worst case) and, on this basis, the level of effect would be **minor adverse**, which would not be significant.

10.9.38 Operational areas would be managed in accordance with standard operational procedures and the mitigation measures in Table 10.8.1. On this basis, the magnitude of impact would be no change and the level of effect would be **no change**, which would not be significant.

Impacts on Human Health

10.9.39 Construction is proposed to be ongoing during this period, with further development areas within PAOCs and therefore the assessment of effects from the construction of other development areas with would be the same as described for those identified within the initial construction phase (2024-2029). The overall magnitude of the impact across the site would be low and the level of effect would be **minor adverse**, which would not be significant.

10.9.40 Following the completion of remediation in the PAOCs and other development areas (as appropriate), the magnitude of impact would be negligible. The sensitivity of the airport users and site workers are considered to be medium and therefore, the level of effect would be **negligible**, which would not be significant.

Further Mitigation and Future Monitoring

10.9.41 No further mitigation or monitoring measures are proposed.

Significance of Effects

10.9.42 No further mitigation or monitoring is required. Therefore, the significance of effects would remain as presented above.

2033-2038

Impacts on Non-Agricultural Soil Resources

10.9.43 The assessment of effects with regard to non-agricultural soil resources would be as described for the first full year of opening: 2029.

Impacts on Aquifers

10.9.44 In 2032, the assessment of effects with regard to aquifers would be as described for the first full year of opening: 2029.

10.9.45 Between 2032 and 2038, the majority of construction activity would be complete with some ongoing final construction activities taking place. The assessment of effects from the construction would be the same as described for those identified within the previous construction phase.

Impacts on Surface Watercourses

10.9.46 In 2032, the assessment of effects with regard to surface watercourses would be as described for the first full year of opening: 2029.

10.9.47 The remaining construction activities from 2032 onwards are considered unlikely to have a direct impact on surface watercourses other than with regard to the potential, albeit very limited in areas of previously undeveloped land, for contaminated runoff. In these areas, the magnitude of impact would be negligible, and the sensitivity of the receptor would be high. The level of effect would be **minor adverse**, which would not be significant.

Impacts on Human Health

10.9.48 Where remediation is required for the remaining construction areas from 2032 onwards, the magnitude of impact is predicted to be medium. However, the requirement for remediation is likely to be localised in its extent and complexity. In the majority of the remaining construction areas, remediation is unlikely to be required and the magnitude of impact would be low.

10.9.49 With mitigation implemented as described above for the construction phase, the overall magnitude of impact for construction phase effects would be low and the level of effect would be **minor adverse**, which would not be significant.

10.9.50 In 2032, the long term assessment of effects with regard to operation site users (human health) would be as described for the first full year of opening: 2029.

Design Year: 2038

Impacts on Non-Agricultural Soil Resources

10.9.51 Prior to 2038, the assessment of effects with regard to non-agricultural soil resources would be the same as described for the first full year of opening: 2029.

10.9.52 By 2038 the construction compounds would be demobilised and those compounds on previously undeveloped land would be returned to their former use. The magnitude of the impact would be low and the sensitivity of the resource is low, therefore the level of effect would be **minor beneficial**, which would not be significant.

Impacts on Aquifers

10.9.53 There would be no change in terms of impacts on aquifers in 2038 as only operational activities would be undertaken. Taking into account the proposed drainage strategy, pollution control measures and existing measures in place to control airport operations, no additional effect is likely. The level of effect would be **no change**, which would not be significant.

Impacts on Surface Watercourses

10.9.54 The surface access improvements proposed as part of the Project would result in additional surface water runoff due to the introduction of new impermeable area. As part of these works, it is proposed that a drainage network would be installed, consisting of carrier drains, filter drains, ditches and attenuation ponds, along with flow control arrangements to limit discharges to watercourses.

10.9.55 The installation of interceptors and appropriate pollution control measures as part of the design of the Project’s surface water drainage and pollution control system would control the magnitude of impact on surface watercourses to sure that there would be no change compared to existing operations. The level of effect would be **no change**, which would not be significant.

Impacts on Human Health

10.9.56 Following the completion of remediation, the magnitude of impact would be negligible. The sensitivity of the airport users and site workers is considered to be medium and, therefore, the level of effect would be **negligible**, which would not be significant.

Further Mitigation and Future Monitoring

10.9.57 No further mitigation or monitoring measures are proposed.

Significance of Effects

10.9.58 No further mitigation or monitoring is required. Therefore, the significance of effects would remain as presented above.

10.10. Potential Changes to the Assessment as a Result of Climate Change

10.10.1 The likely ranges of change in climatic parameters, including precipitation, temperature, wind speed, humidity and frequency of extreme weather, are not considered to materially affect the future baseline conditions for geology and ground conditions or increase the sensitivity of receptors to impacts beyond that described in Section 10.9.

10.10.2 Gross contamination that may be represented as an 'infinite source term' for the generation of VOCs has not been identified. Any future potential for increased volatilisation in higher temperatures during operation is not therefore considered significant.

10.11. Cumulative Effects

Zone of Influence

10.11.1 The zone of influence (ZoI) for geology and ground conditions has been identified based on the spatial extent of likely effects. For this topic, the ZoI broadly equates to the study area for the assessment of effects on these resources as described in Section 10.4.

Screening of Other Developments and Plans

10.11.2 The Cumulative Effect Assessment (CEA) takes into account the impact associated with the Project together with other developments and plans. The other developments and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise undertaken as part of the 'CEA short list' of developments (see Appendix 19.4.1). Each development on the CEA long list has been considered on a case by case basis for scoping in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

10.11.3 In undertaking the CEA for the Project, it is important to bear in mind that the likelihood of other developments and plans being constructed varies depending on how far along the planning process they are. For example, relevant developments and plans that are already under construction are likely to contribute to a cumulative impact with the Project (providing impact or spatial pathways exist), whereas developments and plans not yet approved or not yet submitted are less certain to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors. For this reason, all relevant development and plans considered cumulatively alongside the Project have been allocated into 'Tiers', reflecting their current stage within the planning and development process. Appropriate weight is therefore given to each Tier in the decision-making process when considering the potential cumulative impact associated with the Project (eg it may be considered that greater weight can be placed on the Tier 1 assessment relative to Tier 2). Further details of the screening process for the inclusion of other developments and plans in the short list and a description of the Tiers is provided in Chapter 19: Cumulative Effects and Inter-relationships.

10.11.4 The shortlisted developments scoped into the CEA for geology and ground conditions and the Tier in which each has been allocated, is outlined in Table 10.11.1.

Table 10.11.1: List of Other Developments and Plans Considered within the CEA

Description of Development/Plan	Planning Phase	Distance from the Project	Date of Construction (if applicable)	Overlap with the Project?
Tier 1				
Gatwick Station improvements	Underway	0 km	N/A	Not yet known
Tier 3				
Horley Employment Park – Strategic Employment Site	Allocation	0.4 km	N/A	Not yet known
Crawley Sewage Treatment Works extension	Unknown	0 km	N/A	Not yet known
Hookwood Site Allocation – dwellings and pitches	Allocation	0.3 km	N/A	Not yet known

Cumulative Effects Assessment

10.11.5 A description of the significance of cumulative effects upon any geology and ground conditions receptor arising from each identified impact is given below.

Initial Construction Phase: 2024-2029

Non-Agricultural Soil Resource

10.11.6 The Tier 3 development would involve the permanent sealing of the soil resource at the proposed Horley Business Park and Hookwood Site, however the soil is considered to be of low sensitivity as it does not support any statutory or non-statutory designated sites or notable/priority habitats. The cumulative effect of this development with the Project would not be significant.

10.11.7 An area of land has been identified for a potential expansion of the existing Crawley Sewage Treatment Works, if required. In the event that this development comes forward, it would be undertaken by Thames Water. The Tier 1 development at Gatwick Airport would involve no change to the current hard cover. Neither development would be expected to have any significant cumulative effect with this development.

Aquifers

10.11.8 Superficial deposits, which comprise the Secondary A aquifer, are primarily absent from the other development sites. The low sensitivity Weald Clay directly underlies most of the majority of the sites and is, therefore, unlikely to be connected to the Project site. On this basis, there would be no significant cumulative effects.

Surface Watercourses

10.11.9 The two large development sites at Horley and Hookwood have the potential to impact on surface water quality arising from runoff from construction areas.

10.11.10 There are no surface watercourses in the immediate vicinity of the proposed Horley Business Park that connect to watercourses on the Project site. Therefore, no cumulative effects would occur.

10.11.11 Surface waters around the Hookwood development would ultimately discharge to the River Mole at some distance from the project site. Given the measures proposed for the Northern Runway Project, there would be no material contribution to any cumulative effect. With effective measures to control surface water runoff in place for both developments no significant cumulative effects would occur.

Human Health

10.11.12 The planning process for the other developments would involve a risk assessment of the potential for contamination on their sites and the implementation of mitigation/remediation (where appropriate) to reduce risks to on and offsite receptors. On this basis, cumulative effects of the proposed Horley Business Park with the Project would not be significant.

Mineral Safeguarding

10.11.13 The proposed Horley Business Park is not designated as a mineral safeguarding area and therefore, no significant cumulative effects would occur.

2030-2038

10.11.14 No further cumulative effects, other than those set out above, have been identified.

10.12. Inter-Related Effects

10.12.1 This chapter assesses the significance of potential effects on geology and soils. Potential effects on the water environment, including surface water, are considered within Chapter 11: Water Environment, which provides a detailed assessment of the baseline water environment conditions.

10.12.2 The design of the Project elements is discussed within Chapter 5: Project Description. The design aims for all materials (soils and rocks) generated by the Project to be reused within the Project, wherever possible. The reuse of these materials would require demonstration that they are both environmentally and geotechnically suitable.

10.12.3 Loss of soil as a resource has been qualitatively assessed within this chapter. Further assessment is provided within Chapter 18: Agricultural Land Use and Recreation, including the assessment of impacts on agricultural land using the agricultural land classification.

10.12.4 The generation of construction dust is assessed within Chapter 13: Air Quality.

10.12.5 Further details of inter-related effects are provided in Chapter 19: Cumulative Effects and Inter-relationships.

10.13. Summary

10.13.1 The Project site is underlain by superficial deposits including Alluvium, Head and River Terrace Deposits. The deposits are associated with the surface watercourses that flow across the site and are classified as Secondary A aquifers and have a medium sensitivity. The underlying bedrock comprises Weald Clay, which is classified as an unproductive stratum and has a low sensitivity.

10.13.2 The Project site is located within a Brick Clay Resource Mineral Safeguarding Area as designated by the West Sussex County Council Minerals Planning Authority.

10.13.3 A review of historic maps shows that the Project site had been developed as an aerodrome by the 1930s and major airport development had occurred by the 1950s. Prior to this, the site was used as farmland, a racecourse and golf course, with a railway line through the site. The airport has been subject to further development, which has been accompanied by an extensive drainage and balancing pond network and hotel, car parking and commercial development.

10.13.4 A number of previous investigations have been undertaken on the Project site, the review of which has focused on the areas of the site proposed for redevelopment. Elevated levels of contaminants were detected in soil, leachate and groundwater samples taken from various locations, together with elevated levels of ground gas.

10.13.5 A site walkover was undertaken in September 2019 in order to ground truth information from the desk study and to identify potentially contaminating land uses. This information was combined together to identify PAOCs. A strategic approach is proposed to target parts of the Project site where further investigation may be required based on the potential for contamination to exist and the future use of the area.

10.13.6 The assessment has considered potential impacts on the underlying aquifers, surface watercourses, human health (construction workers and future site users) and mineral resources. The significance of effect ranges from temporary minor adverse effects with regard to human health during construction where remediation is required, to no change during the operational phase.

Next Steps

10.13.7 Further ground investigation and assessment will be undertaken in specific areas to verify risks arising from land contamination prior to construction. This will include limited soil, groundwater sampling and testing along with ground gas and groundwater monitoring which will inform any further mitigation to be incorporated within the Project.

Table 10.13.1: Summary of Effects

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Initial Construction Phase 2024-2029							
Non-agricultural soil resource	Low	Use of previously undeveloped land for compounds.	Temporary (medium/long term)	Low (adverse)	Negligible (adverse)	Not Significant	
	Negligible	Other compounds (previously developed).		No change	No change	Not Significant	
	Negligible	Relocation of airfield facilities.	Permanent (long term)	Low (adverse)	Negligible (adverse)	Not Significant	
Aquifers	Medium (Secondary A aquifer) Low (Unproductive strata)	Migration of contaminants in soils and perched groundwater through creation of new pathways including piling.	Short term	Negligible (adverse)	Minor (adverse) Negligible (adverse)	Not significant	
Surface watercourses	High	Migration of contaminants in soils and perched groundwater and surface water runoff into surface waters.	Short term	Negligible (adverse)	Minor (adverse)	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Human health – construction workers	High	Exposure through dermal contact, ingestion and inhalation of contaminated soil derived dusts/ground gases.	Short term	Low (adverse)	Minor (adverse)	Not Significant	
Brick Clay Resource Mineral Safeguarding Area	Medium	Loss of mineral resource.	Permanent (long term)	Low (adverse)	Minor (adverse)	Not Significant	
2030-2032							
Non-agricultural soil resource	Low	Use of previously developed land for junction improvement works.	Permanent (long term)	Low (adverse)	Negligible (adverse)	Not Significant	
Aquifers	Medium (Secondary A aquifer) Low (Unproductive strata)	Spills and leaks of chemicals from construction compounds.	Short term	Negligible (adverse)	Minor (adverse) Negligible (adverse)	Not Significant	
		Operational areas – spillages and leaks of chemicals.	Permanent (long term)	No change	No change	Not Significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Surface watercourses	High	Construction – spillages and leaks of chemicals.	Short term	Negligible (adverse)	Minor (adverse)	Not Significant	
		Operational areas – spillages and leaks of chemicals.	Permanent (long term)	No change	No change	Not Significant	
Human health – construction worker	High	Exposure through dermal contact, ingestion and inhalation of contaminated soil derived dusts/ground gases.	Short term	Low (adverse)	Minor (adverse)	Not Significant	
Human health – future site user	Medium	Exposure through dermal contact, ingestion and inhalation of contaminated soil derived dusts/ground gases.	Permanent (long term)	Negligible (adverse)	Negligible (adverse)	Not Significant	
2033-2038							
Non-agricultural soil resource	Effects as assessed for 2029.						

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Aquifers	Medium (Secondary A aquifer) Low (Unproductive strata)	Remaining construction areas – migration of contaminants in soils and perched groundwater through creation of new pathways including piling.	Short term	Low (adverse)	Minor (adverse) Negligible (adverse)	Not Significant	
Surface watercourses	High	Construction – spillages and leaks of chemicals.	Short term	Negligible (adverse)	Minor (adverse)	Not Significant	
Human health – construction worker	High	Remediation works.	Short term	Low (adverse)	Minor (adverse)	Not significant	
Human health – future site user	Medium	Exposure through dermal contact, ingestion and inhalation of contaminated soil derived dusts/ground gases.	Permanent (long term)	Negligible (adverse)	Negligible (adverse)	Not Significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Design Year: 2038							
Non-agricultural soil resource	Low	Demobilisation of compounds.	Permanent (long term)	Low (beneficial)	Minor (beneficial)	Not Significant	
Aquifers	Medium (Secondary A aquifer) Low (Unproductive strata)	Operational areas – spillages and leaks of chemicals.	Permanent (long term)	No change	No change	Not Significant	
Surface watercourses	High	Operational areas – spillages and leaks of chemicals.	Permanent (long term)	No change	No change	Not Significant	
Human health – future site user	Medium	Exposure through dermal contact, ingestion and inhalation of contaminated soil derived dusts/ground gases.	Permanent (long term)	Negligible (adverse)	Negligible (adverse)	Not Significant	

10.14. References

Arcadis (2017) Gatwick Boeing Hangar – Ground Investigation Report, February 2017.

Atkins (2013) Gatwick Pier 6 Extension Fuel Leakage Investigation, June 2013.

Bactec (2013) Explosive Ordnance Threat Assessment Report, June 2013.

British Standards Institution (2011) British Standard BS 10175:2011+A2:2017: Investigation of Potentially Contaminated Sites: Code of Practice (amended 2017).

British Standards Institution (2015) Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings (BS8485:2015+A1:2019).

Construction Industry Research and Information Association (CIRIA) (1996) R132: A Guide for Safe Working on Contaminated Sites, December 1996.

Construction Industry Research and Information Association (CIRIA) (2001a) C552: Contaminated land risk assessment A guide to good practice.

Construction Industry Research and Information Association (CIRIA) (2001b) C532: Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors.

Construction Industry Research and Information Association (CIRIA) (2007) C665: Assessing Risks Posed by Hazardous Ground Gases to Buildings.

Construction Industry Research and Information Association (CIRIA) (2009) C681: Unexploded Ordnance (UXO): A guide for the construction industry. London, 2009.

Construction Industry Research and Information Association (CIRIA) (2014) C733: Asbestos in Soil and Made Ground: A Guide to Understanding and Managing Risks.

Contaminated Land: Applications in Real Environments (CL:AIRE) (2011) The Definition of Waste: Development Industry Code of Practice v2, March 2011.

CL:AIRE (2014) Contaminated Land: Applications in Real Environments SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination. Revision 2, 24th September 2014.

Crawley Borough Council (2015) Crawley 2030: Crawley Borough Local Plan 2015 – 2030. [Online] Available at: http://publications.naturalengland.org.uk/publication/2671754

Crawley Borough Council (2021) Crawley Local Plan: Draft Crawley Borough Local Plan 2021-2037, January 2021. For Submission Publication Consultation: January-February 2021. Available at: https://crawley.gov.uk/sites/default/files/2021-01/Submission%20Draft%20Local%20Plan%20January%202021.pdf

Defra (2012) Defra Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance.

Department for Transport (2015) National Policy Statement for National Networks. [Online] Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/npsnn-web.pdf

Department for Transport (2018) Airports National Policy Statement: New Runway Capacity and Infrastructure at Airports in the South East of England. [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/714106/airports-nps-new-runway-capacity-and-infrastructure-at-airports-in-the-south-east-of-england-web-version.pdf

Environment Agency (2001) Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention National Groundwater and Contaminated Land Centre report NC/99/73, May 2001.

Environment Agency (2013) Groundwater Protection: Policy and Practice (GP3) v1.1, August 2013.

Environment Agency (2014a) H1 Annex D2: Assessment of sanitary and other pollutants within Surface Water Discharges. Issue 1.0, September 2014.

Environment Agency (2014b) Annex D1 Assessment of hazardous pollutants within discharges to surface waters. Issue 2, October 2014.

Environment Agency (2020) Land Contamination: Risk Management (LCRM).

Environment Agency (2021) Technical Guidance WM3: Waste Classification – Guidance on the classification and assessment of waste, Version 1.1, January 2021.

Gatwick Airport Limited (GAL) (2019) Environmental Impact Assessment Scoping Report [Online] Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR020005/TR020005-000005-GTWK%20-%20Scoping%20Report%20(Vol%201%20Main%20Text).pdf

Highways England, Transport Scotland, Welsh Government and the Department for Infrastructure Northern Ireland (2019) Design Manual for Roads and Bridges: Sustainability and Environmental Appraisal. LA 109: Geology and Soils.

Highways England, Transport Scotland, Welsh Government and the Department for Infrastructure Northern Ireland (2020a) Design Manual for Roads and Bridges: Sustainability and Environmental Appraisal. LA 104: Environmental assessment and monitoring.

Highways England, Transport Scotland, Welsh Government and the Department for Infrastructure Northern Ireland (2020b) Design Manual for Roads and Bridges: Sustainability and Environmental Appraisal. LA 113: Road Drainage and the Water Environment.

Horsham District Council (2015) Horsham District Planning Framework, November 2015. [Online] Available at: https://beta.horsham.gov.uk/__data/assets/pdf_file/0016/60190/Horsham-District-Planning-Framework-2015.pdf

Horsham District Council (2020) Horsham Local Plan: Draft Horsham District Local Plan 2019-2036. Regulation 18 Public Consultation February-March 2020.

Land Quality Management and Chartered Institute of Environmental Health (LQM/CIEH) (2015) S4ULs for Human Health Risk Assessment, 2015.

Ministry of Housing, Communities & Local Government (2019) Planning Practice Guidance. [Online] Available at: https://www.gov.uk/government/collections/planning-practice-guidance

Ministry of Housing, Communities and Local Government (2021) National Planning Policy Framework (NPPF). [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf

Mole Valley District Council (2000) The Mole Valley Local Plan. [Online] Available at: http://www.planvu.co.uk/mvdc/contents_written.htm

Mole Valley District Council (2009) The Mole Valley Local Development Framework: Core Strategy, adopted October 2009. [Online] Available at: https://www.molevalley.gov.uk/media/pdf/6/s/Core_Strategy_DPD_(Adopted).pdf

Mole Valley District Council (2020) Future Mole Valley 2018-2033: Consultation Draft Local Plan. [Online] Available at: https://molevalley.gov.uk/sites/default/files/2020-05/Future%20Mole%20Valley%20draft%20Local%20Plan%20-%202020%20consultation%20version.pdf

Planning Inspectorate (2019). Proposed Gatwick Airport Northern Runway: Scoping Opinion. TR020005-000043-GTWK-Scoping Opinion.pdf

Reigate and Banstead Borough Council (2019a) Reigate and Banstead Local Plan: Core Strategy, Adopted July 2014 and reviewed 2019. [Online] Available at: http://www.reigate-banstead.gov.uk/info/20380/current_planning_policy/24/core_strategy

Reigate and Banstead Borough Council (2019b) Reigate and Banstead Local Plan Development Management Plan, Adopted September 2019. [Online] Available at: http://www.reigate-banstead.gov.uk/info/20380/current_planning_policy/888/development_management_plan

Stantec (2017) Phase II Environmental Site Assessment, Gatwick Airport GoldCare Hangar Site.

Surrey County Council (2011) Surrey Minerals Plan 2011 Core Strategy Development Plan Document, adopted 19 July 2011 [Online] Available at: https://www.surreycc.gov.uk/__data/assets/pdf_file/0007/8143/Adopted-Core-Strategy-Development-Plan-Document.pdf

Tandridge District Council (2008) Tandridge District Core Strategy, Adopted October 2008. [Online] Available at: https://www.tandridge.gov.uk/Portals/0/Documents/Planning%20and%20building/Planning%20strategies%20and%20policies/Current%20and%20adopted%20planning%20policies/Core%20strategy/Core-Strategy.pdf

Tandridge District Council (2014) Tandridge Local Plan – Part 2: Detailed Policies 2014-2029, Adopted October 2008. [Online] Available at: https://www.tandridge.gov.uk/Portals/0/Documents/Planning%20and%20building/Planning%20str ategies%20and%20policies/Current%20and%20adopted%20planning%20policies/Core%20strategy/Local-Plan-part-2-Detailed-policies.pdf

Tandridge District Council (2019) Our Local Plan: 2033 (Regulation 22 Submission), January 2019. [Online] Available at: https://www.tandridge.gov.uk/Portals/0/Documents/Planning%20and%20building/Planning%20strategies%20and%20policies/Local%20plan/Local%20plan%202033/Examination%20library/MAIN%20DOCUMENTS/MD1-Our-Local-Plan-2033-Submission-2019.pdf

UK Technical Advisory Group (UKTAG) on the Water Framework Directive (WFD) (2008) Proposals For Environmental Quality Standards For Annex Viii Substances. January 2008 (Revised June 2008).

UK Technical Advisory Group (UKTAG) on the Water Framework Directive (WFD) (2012a). Final version for UKTAG. Status: final version for UKTAG consultation (v4.2). April 2012.

UK Technical Advisory Group (UKTAG) on the Water Framework Directive (WFD) (2012b). Scoping study for Dangerous Substance Directive List II chemicals. Report Ref. SC080021/5d. April 2012.

UK Technical Advisory Group (UKTAG) on the Water Framework Directive (WFD) (2013). Updated Recommendations on Environmental Standards River Basin Management (2015-21). Final Report, November 2013 (Minor amendments January 2014).

West Sussex County Council (2014). West Sussex Waste Local Plan, April 2014. [Online] Available at: https://www.westsussex.gov.uk/media/3241/waste_local_plan_april2014.pdf

West Sussex County Council (2021) West Sussex Waste Local Plan 2022 to 2036: Draft for Consultation. [Online] Available at: https://www.westsussex.gov.uk/media/16025/draft_wstpv.pdf

West Sussex County Council and South Downs National Park Authority (2018). West Sussex Joint Minerals Local Plan, July 2018 (Partial Review March 2021). [Online] Available at: http://www2.westsussex.gov.uk/ssr/mlp_adoption.pdf

West Sussex County Council and South Downs National Park Authority (2020). Minerals and Waste Safeguarding Guidance [Online] Available at: https://www.westsussex.gov.uk/media/13437/mw_safeguarding_guidance.pdf

10.15. Glossary

Term	Description
bgl	Below ground level
BGS	British Geological Survey
CARE	Central Area Recycling Enclosure
CEA	Cumulative Effects Assessment
CHP	Combined Heat and Power
CIRIA	Construction Industry Research and Information Association
CS	Characteristic Situation
CoCP	Code of Construction Practice
CSM	Conceptual site model
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
EPA	Environmental Protection Act
ES	Environmental Statement
GWDTE	Groundwater dependent terrestrial ecosystems
LGS	Local Geological Sites
l/hr	Litres per hour
MMP	Materials Management Plan
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
NVZ	Nitrate Vulnerable Zone
PAOC	Potential Areas of Concern
PEIR	Preliminary Environmental Information Report
PIAT	Projector, Infantry, Anti-Tank
Ppm	Parts per million
Q95	5 percentile flow
RAF	Royal Air Force
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SgZ	Safeguard Zone
SPA	Special Protection Area
SPZ1	Groundwater Source Protection Zone - Inner Zone
SPZ2	Groundwater Source Protection Zone - Outer Zone
SPZ3	Groundwater Source Protection Zone - Total Catchment
SSSI	Site of Special Scientific Interest
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound
WFD	Water Framework Directive
ZoI	Zone of Influence