

9 Ground Conditions and Contamination

9.1 Introduction

- 9.1.1 This chapter of the ES Chapter has been produced by Wilson Bailey Partnership and considers the likely significant effects of the Site's ground conditions on the Proposed Development and the effects of the proposed Development upon the surrounding area with regards to ground conditions, contamination and groundwater quality arising from the construction and operational phases.
- 9.1.2 This chapter describes the methodology that has been used and the baseline conditions that have been determined relevant to the assessment, both of which have been used to reach the conclusions presented.
- 9.1.3 The baseline conditions have been established as part of a multi-phased ground investigation report (Appendix 9.1) reference J2524 Issue 4 dated August 2026.
- 9.1.4 A full description of the site and the development proposals are provided in Chapter 3 of this Environmental Statement (ES).

9.2 Assessment methodology

Predicting effects

- 9.2.1 Legislative Framework
- Environmental Protection Act (1990) Part 2A, Section 78A
 - Land Contamination Risk Management (LCRM) updated 12 June 2025;
 - Environment Act, 2021
 - The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017
 - Contaminated Land (England) Regulations 2006
 - Groundwater Directive (2006/118/EC)
 - Construction (Design and Management) (CDM) Regulations 2015
 - Control of Asbestos Regulations 2012
- 9.2.2 The LCRM best practice guidance requires the use of a conceptual model-based risk assessment which comprises three basic elements; a source of ground contamination, a receptor that may be affected by the ground contamination and a pathway through which the contamination may reach the receptor. This is known as source-pathway-receptor pollution linkage model.
- 9.2.3 Under this approach, the presence of measurable concentrations of contaminants within the ground and subsurface does not therefore automatically imply that a contamination risk exists, since the contamination must be defined in terms of pollutant linkages and unacceptable risk of harm. The nature and importance of both pathways and receptors, which are relevant to a particular site, will vary according to the intended use of the Site, its characteristics and its surroundings.

- 9.2.4 This approach therefore recognises that risk relating to land contamination can only exist where all three elements are present and constitute a complete pollution linkage.
- 9.2.5 The Conceptual Site Model has been used to identify and assess the potential effects on the identified sensitive receptors (including human health, Controlled Waters, buildings and services) and outline mitigation measures to manage the risks identified in the assessment. The assessment has been prepared in accordance with the legislation and guidance summarised above.
- 9.2.6 The level of risk has been evaluated in accordance with the methodology set out in CIRIA C552: Contaminated Land Risk Assessment: A guide to good practice (CIRIA, 2001). This involves classification of the consequence and probability associated with each potential contaminant linkage and thereby the corresponding level of risk (risk category).
- 9.2.7 The framework for classification of consequence, presented in full in Table 6.3 of CIRIA C552, is summarised in Table 9.1 below. The consequence classification does not depend on the probability that the consequence will be realised. The 'severe' consequence classification describes acute risk (arising from short-term exposure). The 'medium' classification describes chronic harm (and may constitute 'significant harm' under Part 2A of the Guide).

Table 9.1 Qualitative Risk Assessment - Consequence

Receptor value / sensitivity	Definition
Severe	Severe short-term (acute) risks to human health, likely to result in significant harm. Short-term risk of pollution of sensitive water resource. A short-term risk to a particular ecosystem, or an organism forming part of such an ecosystem.
Medium	Chronic damage to human health (significant harm). Pollution of sensitive water resources. A significant change in a particular ecosystem, or an organism forming part of such an ecosystem.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services. Damage to sensitive buildings / structures / services or to the environment.
Minor	Harm, not necessarily significant, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health. Easily repairable effects of damage to buildings, structures and services.

Table 9.2 Qualitative Risk Assessment - Probability

Magnitude	Description
High Likelihood	There is a contaminant linkage and an event that appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	It is probable that an event will occur. Whilst not inevitable, it is possible in the short term and likely over the long term.
Low Likelihood	Circumstances are possible under which an event could occur, but it is not certain that (even over a long time period) such an event would occur.
Unlikely	It is improbable that an event would occur even in the very long term.

9.2.8 The assessment methodology stages, can be outlined as follows:

9.2.9 Magnitude of impact, based on the change that the Proposed Development would have upon the resource/receptor, is considered within the range of severe, medium, mild, minor. Consideration is given to scale, duration of impact/effect (e.g. for construction, short-term for 1-2 years, medium-term for 3-5 years, long-term for 5 years and greater, and permanent, dependent upon project timeframes) and extent of Proposed Development

9.2.10 The predicted level of effect is based upon the consideration of magnitude of impact and sensitivity of the resource/receptor to come to a professional judgement of how important this effect is. Effects that are Major or Substantial are deemed to be significant.

Table 9.3 Level of effect

Receptor Sensitivity	Magnitude of Impact			
	Severe	Medium	Mild	Minor
High Likelihood	Substantial	Major	Moderate	Negligible
Likely	Major	Moderate	Minor	Negligible
Low likelihood	Moderate	Minor	Minor	Negligible
Unlikely	Negligible	Negligible	Negligible	Negligible

Geographic Scope

9.2.11 In accordance with standard approaches, the study area considered for the purpose of this assessment consists of the area within the Site, as well as identified receptors within a 250m buffer zone from the Site. This study area extends up to 1km from the Site in relation to sensitive Controlled Water receptors only, which is considered appropriate for indirect effects.

Temporal Scope

9.2.12 The assessment of environmental impacts relating to ground conditions comprise of:

- Short (two to five years) and medium term (five to ten years) temporary effects; and
- Long term (ten to fifteen years or more) permanent effects.

Consultation

9.2.13 The requirement for ground conditions and contamination to be scoped into the EIA was established as part of the pre-application submission by Savills to Wokingham Borough Council due to the potential presence of ground contamination being considered possible at that stage due to the historical use of the site. Additional consultation has not subsequently been carried out as part of the assessment that has been undertaken.

Assumptions and Limitations

9.2.14 This assessment is carried out on the basis of a desk study and ground investigation carried out by Wilson Bailey Partnership (Appendix 9.1).

9.2.15 The principal limitation of the assessment carried out to date is associated with the presence of existing buildings and live services that are present across the site, together with the requirement for the disruption associated with the ground investigation works to be minimised.

9.3 Baseline conditions

Current Baseline

9.3.1 Full details of the Site's setting and history are presented as part of the Desk Study and Ground Investigation Report included in the appendix to this chapter (Appendix 9.1).

9.3.2 In summary, the wider Arborfield Garrison, within which the Site forms the northern margins, was initially established as a horse remount division for the Army prior to WW1, through the purchase of three adjoining farms, one of which was Langley Common Farm.

9.3.3 Langley Common Farm buildings formed the northwestern part of the Site with the remainder of the Site having historically been occupied by open agricultural land. A number of the historical farm buildings associated with Langley Common Farm were subsequently retained for use as veterinary facilities as part of the military use. These buildings still remain in the northern corner of the site although they have been subsequently converted to offices.

9.3.4 The original Arborfield Garrison was thereby responsible for the breeding, training and health checking of horses destined for military use, which is not considered to be a potentially significant contaminated or contaminating land use.

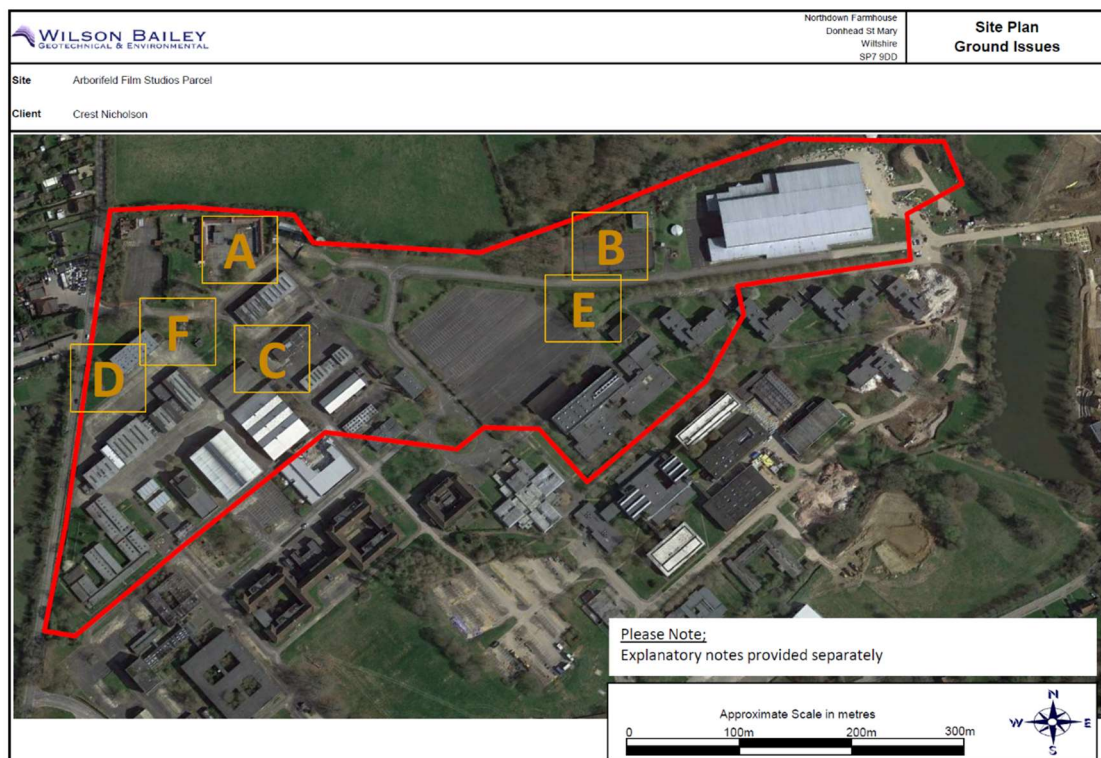
9.3.5 During the interwar period, Arborfield Garrison was extensively redeveloped as the Army became mechanised and the requirement for horses diminished. During this time Arborfield Garrison was repurposed as an Army school of Electrical and Mechanical Engineering.

9.3.6 A substantial phase of expansion and development ensued, including the construction of a range of vehicle workshops, stores, classrooms, office and administration buildings, accommodation buildings and ancillary buildings. As part of these works, additional Petrol, Oil and Lubrication stores (POL) were created including a number of substantial underground fuel

tanks together with several above ground fuel and oil tanks and waste oil stores. A series of Oil and Water Interceptors were also formed at that time as part of the formation of new areas of hardstanding and their associated drainage infrastructure.

- 9.3.7 The subsequent use of the Site as part of a military facility used for training mechanical and electrical engineers is considered to present a significant potentially contaminative history by virtue of the use, storage and potential leakage and spillage of a wide range of oils, fuels, greases and solvents as part of the on-site activities. The anticipated rigorous military control of activities could be considered to reduce the risk, although the site held Crown Immunity, which means that the volume of potential fuels and contaminants stored, and the significance of any leakage or spillages that may have occurred are not held on the public record.
- 9.3.8 Published geological information obtained as part of the desk study indicates the presence of London Clay soils beneath the Site and the surrounding areas.
- 9.3.9 Publicly available information indicates the Site to be underlain by unproductive strata with respect to groundwater and that there are no abstraction wells located nearby. This is consistent with the presence of clay soils of the London Clay.
- 9.3.10 The Site is not shown to be located within an area affected by radon.
- 9.3.11 A comprehensive ground investigation has been carried out, the report on which is appended. As part of these works, the prevailing ground conditions have been determined and the presence of clay soils of the London Clay has been confirmed.
- 9.3.12 Whilst the ground investigation works have not indicated site-wide ground contamination of concern, localised areas of potential contamination of concern have been identified with respect to a proposed residential end use.

Figure 9.1 Site Plan Ground Issues



Contaminated Land Area A

- 9.3.13 Within the courtyard area of the retained former farm buildings that have been subsequently converted to office use, an apparently localised area of contamination characterised as relic degraded oil contamination has been encountered.

Contaminated Land Area B

- 9.3.14 Within the part of the Site that has been used as a car park, and historically as hard surface tennis courts, boreholes have identified the presence of buried metal and concrete within the made ground used to create a levelled playing surface.

Contaminated Land Area C

- 9.3.15 This zone comprises the main underground fuel storage tanks on the site. These tanks are all indicated to have been decommissioned through foam or sand and cement filling, such that the tanks themselves do not pose a risk of ground contamination.
- 9.3.16 As the extent of ground investigation is necessarily limited in this part of the site, due to the presence of the tanks themselves, there remains a potential for ground contamination to be directly associated with the tanks which can only be investigated and assessed as part of the tank removal works.

Contaminated Land Area D

- 9.3.17 An apparently localised and anomalous pocket of buried metal and concrete made ground has been identified in this part of the site.

Contaminated Land Area E

- 9.3.18 In this location, a substantial open oil/water interceptor has been encountered, which currently ensures that any oil spillages or leakages that may occur on areas of hardstanding or that may enter the site-wide surface drainage network are trapped in the interceptor prior to surface water discharge.

Contaminated Land Area F

- 9.3.19 This zone comprises an above ground waste oil tank with signs of leakage and spillage, although targeted ground investigation in the vicinity of this tank has not identified the presence of ground contamination within the clay soils immediately adjacent to the tank.

Contaminated Land Area G

- 9.3.20 As part of the ground investigation, two samples of made ground recovered from beneath an area of tarmac hardstanding in this part of the site identified the presence of above trace concentrations of asbestos.
- 9.3.21 Asbestos is a non-migratory contaminant, other than by wind blown dust, such that these samples are indicative of ground contamination that is effectively encapsulated by the existing hardstand surface.

Future Baseline

- 9.3.22 If the Site were to remain unchanged with the existing areas of hardstanding maintained, there is no potential for increased mobilisation of ground contaminants. There is a low to moderate potential for natural attenuation and dilution to occur, which could reduce the already minimal impact of Areas A, C and F, although no change would be anticipated in Areas B, D and E.

9.4 Potential effects prior to inherent mitigation

Contaminated Land Area A

- 9.4.1 This localised pocket of ground contamination is not significant with respect to the current commercial use of the site but is assessed as significant with respect to a proposed residential redevelopment in terms of dermal contact and inhalation. This localised pocket of ground contamination is not considered to pose a risk to the wider environment due to the low to negligible permeability of the proven clay soils of the London Clay, which will effectively mitigate any migration of potentially mobile contaminants.

Contaminated Land Area B

- 9.4.2 This localised pocket of buried material is not significant with respect to the current commercial use of the site but is assessed as requiring further consideration and potentially removal as part of a proposed residential redevelopment. This localised pocket of buried material is not considered to pose a risk to the wider environment due to the low to negligible permeability of the proven clay soils of the London Clay, which will effectively mitigate any migration of potentially mobile contaminants.

Contaminated Land Area C

- 9.4.3 This localised pocket of ground contamination is not significant with respect to the current commercial use of the site but is assessed as significant with respect to a proposed residential redevelopment in terms of dermal contact and inhalation. The underground fuel tanks and the localised pocket of ground contamination are not considered to pose a risk to the wider environment due to the low to negligible permeability of the proven clay soils of the London Clay, which will effectively mitigate any migration of potentially mobile contaminants.

Contaminated Land Area D

- 9.4.4 This localised pocket of buried material is not significant with respect to the current commercial use of the site but is assessed as requiring further consideration and potentially removal as part of a proposed residential redevelopment. This localised pocket of buried material is not considered to pose a risk to the wider environment due to the low to negligible permeability of the proven clay soils of the London Clay, which will effectively mitigate any migration of potentially mobile contaminants.

Contaminated Land Area E

- 9.4.5 This structure is not considered to pose a risk to the wider environment due to the low to negligible permeability of the proven clay soils of the London Clay, which will effectively mitigate any migration of potentially mobile contaminants.

Contaminated Land Area F

- 9.4.6 This localised pocket of ground contamination is not significant with respect to the current commercial use of the site but is assessed as potentially significant with respect to a proposed residential redevelopment in terms of dermal contact and inhalation. The above ground waste oil tank and any possible localised ground contamination beneath the tank are not considered to pose a risk to the wider environment due to the low to negligible permeability of the proven clay soils of the London Clay, which will effectively mitigate any migration of potentially mobile contaminants.

Contaminated Land Area G

- 9.4.7 This localised pocket of buried material is not significant with respect to the current commercial use of the site but the risks associated with asbestos will need to be managed as part of the demolition and clearance within this part of the site and these soils will need to be delineated and removed prior to the proposed residential redevelopment. This localised pocket of buried material is not considered to pose a risk to the wider environment due to the low to negligible permeability of the proven clay soils of the London Clay, which will effectively mitigate any migration of potentially mobile contaminants.

9.5 Inherent design mitigation

- 9.5.1 The demolition clearance and ground works phase of the development will need to be carried out within the provisions of a Demolition Method Statement (DMS) and a subsequent Construction Environmental Management Plan (CEMP) that will need to be formulated to ensure that appropriate measures are put in place to manage the remediation works and further testing and assessment of the contaminated areas that have been identified. This will be secured through suitably worded planning conditions.
- 9.5.2 The localised pockets of contamination and buried material in Areas A to F will require remediation through either in-situ treatment or excavation and removal prior to any residential development such that it is not considered to pose a future risk.
- 9.5.3 In Area E, once the areas of hardstanding have been removed as part of the demolition and clearance of the site prior to residential redevelopment, the oil / water interceptor will need to be cleaned, decontaminated and emptied, prior to being demolished and removed.
- 9.5.4 The tanks in Area C and Area F will need to be removed as part of the demolition and clearance of the site and an inspection and testing of the soils beneath will need to be carried out, with any possible hydrocarbon impacted soils investigated, assessed and remediated as necessary either through soil removal or in situ treatment prior to development.
- 9.5.5 The residential nature of the proposed redevelopment of this Site is a potentially sensitive end use and as such the remediation objectives will be necessarily stringent to facilitate this new land use.

9.6 Additional Mitigation

- 9.6.1 It is considered that the inherent design mitigation measures that will be necessary to render the site suitable for residential purposes will be sufficient to ensure that the Site does not pose a future environmental risk requiring additional mitigation measures.

9.7 Residual effects

- 9.7.1 No residual effects are anticipated following on from the inherent mitigation measures associated with the demolition and clearance in preparation for residential redevelopment of the Site.

9.8 Implications of Climate Change

- 9.8.1 The impermeable nature of the underlying clay soils will provide resilience with respect to groundwater levels that may be impacted by the predicted changes associated with Climate Change.

9.9 Cumulative effects

Barkham Square

- 9.9.1 The proposed Barkham Square development to the north of the site will not add cumulative effects to the assessment of the Site. The land to the north has been the subject to a separate due diligence level ground investigation carried out by Wilson Bailey partnership and has indicated similar prevailing ground conditions of Lonon Clay beneath a generally nominal depth of locally reworked and historically ploughed topsoil with no indications of ground contamination of significance having been identified as part of the ground investigation works.
- 9.9.2 No wider cumulative effects are anticipated beyond the Site boundary.

Wider Committed Development

- 9.9.3 Due to the localised nature of ground condition and contamination impacts, no further cumulative effects for the Proposed Development, when taken in combination with wider committed development, are identified. The cumulative effect of the Proposed Development together with the wider committed development is therefore assessed as Not Significant.

9.10 Summary

- 9.10.1 The ground investigation works have identified the presence of apparently localised pockets of low level and relic ground contamination associated with the potentially contaminated historical use of the Site as a Military Garisson undertaking military training and mechanical and electrical engineering.
- 9.10.2 Remediation works have been identified as part of the Inherent Mitigation requirements and are required to render the site suitable for the proposed residential end use and these works will ensure that there are no residual effects.
- 9.10.3 The presence of low to negligible clay soils of the London Clay will effectively mitigate the potential for any contamination migration beyond the locations.
- 9.10.4 A summary of the assessment is set out in Table 9.5 overleaf.

9.11 References

- Desk Study, Phase 1 and Phase 2 Ground Investigation Report with Preliminary Remediation Proposals by Wilson Bailey Partnership, reference J2524 Issue 4 dated August 2026

9.12 Assessor information

Table 9.4 Assessor Information

Chapter	Responsibility	Name	Qualifications	Assessor information
Ground Conditions and Contamination	Wilson Bailey Partnership	Dominic Brightman	BSC MSC DIC FGS CGeol ARSM	Chartered Geologist with 29 years of experience in ground investigation and contaminated land assessment.

Table 9.5 Summary of effects

Receptor	Receptor sensitivity	Description of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Construction Phase					
Demolition / construction workers	Low	<u>Areas A, C and F</u> Health and Safety impact associated with the presence of potential fuel related contamination within soils	Appropriate PPE (Inherent)	None	Not significant with appropriate management of site works
Demolition / construction workers	Low	<u>Areas B and D</u> Health and Safety impact associated with the presence of metal shreds and buried debris	Appropriate PPE (Inherent)	None	Not significant with appropriate management of site works
Demolition / construction workers	Low	<u>Area G</u> Health and Safety impact associated with the presence of low concentrations of asbestos	Appropriate PPE (Inherent)	None	Not significant with appropriate management of site works
Operation Phase					
N/A as all remediation works will be carried out prior to occupation					

9.13 Mitigation commitments Summary

Table 9.6 Summary for Securing Mitigation

Identified receptor	Type and purpose of additional mitigation measure (prevent, reduce, offset, enhance)	Means by which mitigation may be secured (e.g. planning condition / legal agreement)	Delivered by	Auditable by
Construction Phase				
Demolition / construction workers	CEMP	Planning Condition	Contractor / Applicant	LPA
N/A as all remediation works will be carried out prior to occupation, such that there will be no additional mitigation measures required				
Operation Phase				
N/A as all remediation works will be carried out prior to occupation, such that there will be no additional mitigation measures required				