10. LAND CONTAMINATION

Introduction

10.1 This chapter of the ES assesses the likely significant effects of the Development on the environment in respect of land contamination and ground conditions.

10.2 This chapter has been produced by BRD Environmental Limited (refer to Appendix 1.2).

Policy Context

National Planning Policy

National Planning Policy Framework[i]

10.3 The National Planning Policy Framework (NPPF) updated in February 2019 sets out the Government's planning policies and how these are expected to be applied. In terms of land contamination, the environmental role aims to contribute to protecting and enhancing our environment, by (Section 15, paragraph 170):

- Protecting and enhancing valued landscapes, geological conservation interests and soils;
- Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability; and
- Remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land where appropriate.

10.4 Section 15, sub section: Ground conditions and pollution, paragraph 178 of the revised NPPF states that planning policies and decisions should ensure that:

> *"(a) a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);*
>
> *(b) after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part 11A of the Environmental Protection Act 1990; and*

(c) adequate site investigation information, prepared by a competent person, is available to inform these assessments.

10.5 In addition, if a site is found to be contaminated or has land stability issues, the NPPF states that *"responsibility for securing a safe development rests with the developer and/or landowner"* (paragraph 179).

Planning Practice Guidance[ii]

10.6 To accompany the updated NPPF, the web-based Planning Practice Guidance (PPG) provides additional technical guidance and states that responsibility for securing a safe development, in relation to land contamination, rests with the developer and/or landowner. However, local planning authorities should be satisfied that a proposed development will be appropriate for its location and not pose an unacceptable risk.

10.7 The PPG requires that where there is a reason to believe contamination could be an issue, developers should provide proportionate but sufficient site investigation information (a risk assessment) to determine the existence or otherwise of contamination, its nature and extent, the risks it may pose and to whom/what (the 'receptors') so that these risks can be assessed and satisfactorily reduced to an acceptable level. A risk assessment of land affected by contamination should inform an Environmental Impact Assessment if one is required. The guidance indicates that on a low risk site, a desk study and site walkover would suffice.

10.8 Unless this initial assessment clearly demonstrates that the risk from contamination can be satisfactorily reduced to an acceptable level, further site investigations and risk assessment will be needed before the application can be determined.

Local Planning Policy

Wealden District Local Plan[iii]

10.9 The Wealden District Local Plan states that there is a limited legacy of brownfield land in the area and that the growth required to meet the needs of the area makes the best use of resources without compromising future requirements and makes an overall positive contribution to the environment where possible. Brownfield redevelopment is promoted but it is recognised that the proportion of brownfield redevelopment will be reduced over the coming years as supply of such land declines.

10.10 Wealden District Environmental Protection website[iv] states the following in relation to

contaminated land:

> *'In accordance with the National Planning Policy Framework (2010), land contamination is a material consideration in determining planning applications. We are consulted on all planning applications where there is the possibility of land contamination being present.*
>
> *Examples of land uses that may have caused contamination include petrol stations, garages and haulage depots, mineral extraction plants (sand and gravel works), ex army camps, factories, scrap yards, known or suspected landfill sites or historic fuel storage facilities.*
>
> *As part of the planning process we will make recommendations to the planning department that conditions requiring a site assessment are applied to the planning permission. Sometimes, an informative note is recommended where it is deemed more appropriate than a condition.*
>
> *We will then work with the planning department and the developer to ensure any site investigation and/or remediation is carried out properly to make the development safe for its new use, before the relevant planning conditions can be discharged.'*

Legislative Context

10.11 As a matter of best practice, the chapter has been undertaken based on the relevant guidance and legislation for site investigations as detailed within the Phase 1 Desk Study and Geo-Environmental Site Investigation reports (included as Appendices 10.1 and 10.2), and referred to below. This includes:

- British Standards Institution (2015): Code of practice for site investigations. BS 5930:2015[v];
- British Standards Institution (2011): Code of practice for investigation of potentially contaminated sites. BS10175:2011[vi];
- Building Research Establishment (2007): Radon: guidance on protective measures for new dwellings. BRE Report BR211[vii];
- Land Contamination Risk Management (LCRM) - How to assess and manage the risks from land contamination, www.gov.uk, October 2020 (replaces CLR11)[viii];
- Department for Environment, Food and Rural Affairs (2012): Environmental Protection Act 1990: Part 2A, Contaminated Land Statutory Guidance[ix];
- 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[x];
- CIRIA (2007): Assessing risks posed by hazardous ground gases to buildings[xi]; and
- NHBC/Environment Agency (2008) Guidance for the safe development of housing on land affected by contamination. R&D66[xii].

Environmental Protection Act (EPA) 1990 as amended by the Environment Act 1995[xiii] Part 2A

10.12 The UK legislation on land contamination is principally contained in Part 2A of the Environmental Protection Act, 1990.

10.13 This legislation endorses the principle of a "suitable for use" approach to contaminated land, where remedial action is only required if there are unacceptable risks to health or the environment, taking into account the use of the land and its environmental setting.

10.14 This statutory guidance describes a risk assessment methodology in terms of "significant pollutants" and "significant pollutant linkages" within a source-pathway-receptor conceptual model of a site. The model comprises:

- The principal pollutant hazards associated with the site (the sources);
- The principal receptor(s) at risk from the identified hazards; and
- The existence, or absence, of plausible pathways which may exist between the identified hazards and receptor(s).

10.15 For land to be determined to be statutorily "contaminated" and require remediation or a change to a less sensitive use, all three elements (source-pathway-receptor) of a significant pollutant linkage must be present and a significant possibility of significant harm to one or all of a number of identified receptors should be demonstrated.

Contaminated Land (England) (Amendment) Regulations 2012[xiv]

10.16 The contaminated land regime applies a risk-based approach to land remediation, requiring the action taken to be proportionate and appropriate to the risk. The identification of contaminated land is based upon establishing a pollution linkage from a contaminant, through a pathway to a receptor. The regime identifies the 'appropriate' persons to bear responsibility for remediation as those 'who caused or knowingly permitted the substances to be in, on or under that land' based on the 'polluter pays' principle. If the polluter cannot be found, then responsibility shifts to the owner or occupier of the land

The Waste (England and Wales) Regulations 2011[xv]

10.17 The waste hierarchy has been transposed into UK law through The Waste (England and Wales) Regulations 2011. The regulations came into force on 29 March 2011. The provisions relating to the hierarchy (set out at in Regulations 12, 15 and 35) came into force on 28 September

2011. The prevention of waste offers the best outcomes for the environment. It is at the top of the priority order, followed by preparing for re-use, recycling, other recovery and disposal, in descending order of environmental preference.

Assessment Methodology

10.18 The methodology for the initial assessment of the ground conditions comprises the production of a Phase 1 Desk Study report (Appendix 10.1) which collates and summarises information relating to the Site setting historical records, geological and hydrogeological information and environmental databases. This information is used to produce a preliminary qualitative risk assessment identifying potential hazards which may present risks to local receptors defined using a "source – pathway – receptor pollutant linkage" concept. This concept, introduced in the Environmental Protection Act (1990), as amended by the Environment Act (1995), considers whether potential source contaminants reach targets and the significance of the impact of this linkage.

10.19 To further support the findings of the Phase 1 Desk Study, a ground investigation was undertaken in October 2020 (included in Appendix 10.2) in order to determine the ground conditions at the Site and the extent of any contamination. This comprised the excavation of trial pits and boreholes across the open field areas of the Site together with a series of hand dug sample points across the areas of woodland. Chemical testing soil samples and a series of gas and groundwater monitoring was undertaken. The reports are referenced as follows:

- 'Phase 1 Geo-Environmental Desk Study – Downlands Farm, Uckfield', BRD Environmental Ltd, ref. BRD200653-OR2-C, April 2022; and
- 'Geo-Environmental Site Investigation – Downlands Farm, Uckfield', BRD Environmental Ltd, ref. BRD200653-OR3-D, April 2022.

Assessment Approach

10.20 Current UK guidance (LCRM) promotes the use of a conceptual site model for contaminated land risk assessment. This provides the technical framework for applying a risk management process when dealing with land affected by contamination.

10.21 The magnitude and impact of pathways and receptors will vary according to the proposed use of the site being assessed, including its surroundings and setting. The potential for harm to occur requires three conditions to be present:

- Sources: potential or known contaminant sources e.g. historic Site land uses;
- Pathways: routes to which exposure could occur e.g. direct contact or migration though soil or groundwater; and
- Receptors: sensitive environmental receptors that could be adversely affected by a contaminant e.g. Site occupiers or groundwater / surface water environment.

10.22 Where a source, pathway and receptor are present then a valid pollutant linkage exists and the potential for some environmental harm could occur which has to be assessed and mitigation measures determined.

10.23 The receptors which are potentially sensitive to changes related to ground conditions have been identified following assessment of the baseline conditions and identification of potential sources of contamination.

Methodology for assessing Sensitivity, Magnitude and Significance

10.24 To determine the significance of any land contamination and subsequent effect on ground conditions, the assessment considers the relative importance of the receptors and how these are likely to be affected, as described below.

10.25 The assessment has used a 'significance matrix assessment approach' which is based on the sensitivity of the receptors and magnitude and nature of the impact. This allows the relative significance of effects to be determined on a scale and ultimately the likely significant effects to the ground conditions to be determined.

Receptor Sensitivity

10.26 The sensitivity of a receptor is based on the relative importance of the receptor or resource. Receptors are considered to have varying degrees of sensitivity to contamination potentially present beneath the Site based on potential impacts and the integrity of any Site-specific exposure pathways. The significance of ground conditions impacts is influenced by receptor sensitivity, which is defined in Table 10.1 below.

Table 10.1: Criteria for Defining Impact Sensitivity

Sensitivity	Criteria for defining impact
High	Receptor / resource has little ability to absorb change without fundamentally altering its present character e.g. **Construction Phase:** • People on Site or on neighbouring sites occupying land in residential land use or schools and children's play areas; and • Construction workers engaged in extensive earthworks and exposed to the soils via direct contact, inhalation of gases or ingestion. **Operational Phase:** • Site users (future residents, users of open space) or neighbours may be exposed to contaminants via inhalation of toxic ground gases or those migrating off Site.
Medium	Receptor / resource has moderate capacity to absorb change without significantly altering its present character e.g. **Construction Phase:** • People on Site or in neighbouring areas of land such as 'residential without private gardens' or areas of public open space (exposure to contaminants via direct contact, inhalation or ingestion); • Construction workers engaged in moderate earthworks; • Controlled waters – the construction of foundations and other earthworks has the potential to mobilise contaminants to the underlying principal aquifers and adjacent water courses. The Site is not within a groundwater source protection zone (SPZ) however; and • Locally designated ecological sites. **Operational Phase:** • Future residents or Site users may be exposed to contaminants via ingestion and direct contact pathways.
Low	Receptor/resource is tolerant of change without detriment to its character, is of low or local importance. e.g.: **Construction Phase:** • People in surrounding areas in a commercial / industrial setting; • Construction workers at the Site but with minimal disturbance / exposure to the ground; and • Unproductive strata and water bodies with low recreational qualities. **Operational Phase:** • Residential areas with soft landscaping in planters and designed to utilise imported topsoil.

Magnitude of Impact

10.27 The magnitude of impact (scale of change) is determined by considering the degree of deviation from the baseline conditions and whether this is likely to result in any changes in the use of the receptor concerned. The magnitude of an impact is described as major, moderate, minor or negligible. Impacts are either beneficial or adverse in nature. Such terms are relative to the receptor affected by the impact (i.e. a particular impact can result in a beneficial effect on one receptor and an adverse effect on another), and the criteria associated with them are summarised in Table 10.2.

Table 10.2: Methodology for Assessing Magnitude

Magnitude of Impact	Criteria for defining impact
Major	Total loss or major/substantial alteration to key elements/features of the baseline (pre-Development) conditions such that the post Development character/composition/attributes will be fundamentally changed.
Moderate	Moderate loss or alteration to one or more key elements/features of the baseline.
Minor	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be like the pre-Development circumstances/situation.
Negligible	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.

Assessment of significance of effect

10.28 The relative significance of an effect is largely a product of the value and sensitivity of the identified receptor and the magnitude and duration of the impact, but the assessment is moderated by professional judgement and takes into account the considerations described above. The significance of effect matrix is provided in Table 10.3 below.

Table 10.3: Significance Matrix

Sensitivity / value of receptor	Magnitude of Potential Impact			
	Major	Moderate	Minor	Negligible
High	Major	Major / Moderate	Moderate	Negligible
Medium	Major / Moderate	Moderate	Moderate / Minor	Negligible
Low	Moderate	Moderate / Minor	Minor	Negligible
Negligible	Minor / Negligible	Minor / Negligible	Negligible	Negligible

10.29 Effects can be adverse or beneficial. In the context of the Development, short to medium term (temporary) effects are generally considered to be those associated with the construction phase, and long term (permanent) effects are generally those associated with the operational phase. Effects of moderate and major would be considered as significant in EIA terms.

Limitations and Assumptions

10.30 Several assumptions have been made regarding certain environmental aspects. General assumptions include:

- The baseline is the existing Site as it stands at the time of preparation of this ES;
- The principal land uses adjacent to the Site remain as they are at the time of the ES submission (2021);

- Information provided by third parties, including publicly available information and databases is correct at the time of publication; and
- The Site or adjacent properties will not be the subject of any unforeseen events or subsequent adverse impacts to change the baseline conditions.

10.31 This assessment is based upon information obtained from third party sources together with observations from the Site walkover survey and findings from the geo-environmental site investigation undertaken by BRD (Appendices 10.1 and 10.2). The limitations relating to this aspect are as follows:

- At this stage, a preliminary spread of exploratory holes have been completed at the Site, but due to the low risk nature of the vast majority of the Site, this is considered sufficient, and;
- In the south eastern part of the Site where chicken sheds and some hardstanding were once located, the area is heavily overgrown and only limited ground investigation has been completed to date.

Baseline Conditions

10.32 The baseline conditions have been defined by a desk study and ground investigation reports (Appendices 10.1 and 10.2):

Desk Study Findings

10.33 At the time of the walkover, the Site comprised a series of grass covered open spaces interspersed with areas of woodland. An area of densely overgrown former chicken sheds is present in the south eastern portion of the Site. A plan showing the current site layout is presented in Appendix 2 of the Desk Study report (Appendix 10.1).

10.34 The published geology is shown to comprise superficial Alluvium in the north of the Site, following the stream that originates from a spring on Site, located in the south west corner of the Site. The remainder of the Site is shown to be devoid of Superficial Deposits.

10.35 The bedrock geology is shown to consist of the Lower Tunbridge Wells Sand, Ardingly Sandstone Member, Grinstead Clay Member and the Upper Tunbridge Wells Sand.

10.36 The Alluvium is designated as a Secondary A Aquifer. The Lower Tunbridge Wells Sand, Upper Tunbridge Wells Sand and Ardingly Sandstone Member are designated as Secondary A

Aquifers. The Grinstead Clay Member is designated as Unproductive Strata. The Site is not located within a groundwater SPZ.

10.37 There are a large number of streams and ponds throughout the Site. Most originate from springs located within the Site boundary. Approximately 2.6km south west of the Site is the River Ouse and approximately 1.7km to the east of the Site is the River Uck. The streams from the Site eventually discharge into the River Ouse.

10.38 The whole of the Site is located in Flood Zone 1 and is highly unlikely to be affected by flooding.

10.39 A small area of landfilling is identified on the Site at the northern corner of the middle field (shown on the plan in Appendix 1 of the Desk Study (Appendix 10.1)). The first input date on the database record was December 1990 and the last was December 1991. The deposited waste is recorded to have included inert waste. In 2006 BRD received correspondence from the Environment Agency (EA) with regards to the landfill and it is understood that this landfill site related to the infilling of part of a farm field in 1991. An area of approximately 100m x 40m and to a depth of 1.0m was infilled and it is reported that the material included inert subsoils and soils.

10.40 A series of historic maps are presented in Appendix 2 of the Desk Study (Appendix 10.1). Since the earliest map of 1874 the Site has been shown to consist of agricultural fields and woodlands in the south and predominantly woodlands and residential houses in the north. Some chicken sheds and an unknown building were shown in the south eastern corner of the Site from the 1970s. These are no longer present. The northern half of the Site has remained relatively unchanged in use over the past 100 years.

Potential Contamination Sources

10.41 The potential contamination sources identified by the Phase 1 Desk Study are shown in Table 10.4 and 10.5 below:

Table 10.4: Potential on-site sources of contamination

Historic Land Use	Description of Potential Contamination Hazard	Potential Contaminants of Concern
Infilled land	A small part of the Development area has been infilled, reportedly with inert soils and subsoil. As this operation was performed unsupervised, the nature of the material is unknown and therefore offers the potential for localised contamination risks and for potential gas generation from any organic rich materials.	Metals; Asbestos containing materials (e.g. cement asbestos building products); Landfill gases (e.g. methane and carbon dioxide); and Polycyclic Aromatic Hydrocarbons (PAH) arising from any ash and clinker within the fill.
Historic chicken sheds in the south east corner of the Site and associated farm	As chicken sheds are likely to be heated, there is potential for a heating oil storage tank to have been located within the vicinity of the chicken sheds. Therefore localised fuel oil spillages on Site can be identified as a potential hazard. The small scale storage of potentially contaminative chemicals, such as pesticides and maintenance products, is also common practice in farm operations and therefore can also be identified as a potential localised hazard.	Petroleum hydrocarbons (heating oil).
Asbestos Containing Materials	Discarded asbestos containing materials were previously identified in the vicinity of the four chicken sheds prior to it becoming overgrown.	Asbestos containing materials (e.g. cement asbestos building products).

Table 10.5: Potential off-site sources of contamination

Historic Land Use	Description of Potential Contamination Hazard	Potential Contaminants of Concern
Petrol stations	An active petrol station is located approximately 80m to the west of the Site and a former petrol station is located approximately 30m to the north east of the Site. Contamination arising from petrol filling sites will be predominantly related to leakages and spillages of the fuels stored and sold on the Site. Historic tanks are invariably of single skin construction with a tendency for leakages from degradation of the metal skin. Spillages around filling points may also have occurred. Leakages can also occur from degraded pipework between tanks and filling points / delivery pumps.	Petroleum hydrocarbons (diesel and/or petrol). Lead. Methyl tert-butyl ether.
Above ground fuel tank	An above ground fuel tank is located at White House Farm, next to the eastern boundary in the north eastern corner of the Site. Spillage around above ground fuel tank is common and such contamination could migrate to the Site.	Petroleum hydrocarbons (diesel).

Ground Investigation Findings

10.42 The ground investigation report completed by BRD Environmental Ltd comprised the

excavation of 28No. machine excavated trial pits and 23No. windowless sample boreholes across the open field areas together with 14No. hand dug sample points across the areas of woodland. Chemical testing soil samples and a series of gas and groundwater monitoring were undertaken. A plan showing the location of all of the exploratory holes is included in Appendix 1 of the site investigation report (Appendix 10.2).

10.43 The investigation has proved that in the higher elevations of the eastern and south eastern parts of the Site, sands of the Upper Tunbridge Wells Sand were encountered. Across the southern part of the Site and in the centre of the northern two sections of the Site, the Grinstead Clay Member was encountered.

10.44 Underlying this, and exposed in the north western parts of the Site, sands and sandstones of the Ardingly Sandstone Member were encountered. A few locations penetrated the sandstone and encountered the Lower Tunbridge Wells Sand beneath and in the extreme northern section of the Site (proposed SANG).

10.45 The vast majority of the exploratory holes did not encounter any groundwater whilst being drilled / excavated, but groundwater levels subsequently rose to depths in the range 0.64m to 3.94m, becoming shallower in the winter months.

10.46 The ground investigation targeted the potentially infilled land in the western part of the Site and confirmed that it was found to be largely non-existent and relates to a small area of surface Made Ground at the edge of the woodland, together with a stockpile of waste soil within the woodland. Testing of the soil has not identified any significant contamination.

10.47 Coupled with this, no contamination has been identified with the former agricultural use of the Site, in particular the chicken sheds and former hardstanding in the south east corner of the Site. However, only limited investigation has been undertaken in this area due to it being heavily overgrown.

10.48 No contamination has been identified at the Site from any of the off site sources.

10.49 The extensive gas monitoring completed demonstrates a lack of risk from ground gases at the Site and the Site is classified as Characteristic situation 1 – Very low risk.

10.50 The Preliminary Geo-Environmental Site Investigation has updated the risk assessment provided by the Phase 1 Desk Study, as shown in Table 10.6 below. A Conceptual Site Model drawing showing the valid pollutant linkages is presented in Appendix 1 of the site

investigation report (Appendix 10.2).

Table 10.6: Geo-Environmental Risk Assessment

Sources and contaminants	Pathways (Reference from Model)	Receptors	Potential Risk
Infilled land on site (very localised and shallow)	Ingestion Inhalation Consumption of home grown produce	Future residents	Negligible
	Horizontal & vertical migration	Surface water and Groundwater	Negligible
	Direct contact	Building materials and services	Low
Potential localised contamination associated with the chicken sheds and adjacent buildings including asbestos cement sheets	Ingestion Inhalation Consumption of home grown produce	Future residents	Low*
	Horizontal & vertical migration	Surface water and Groundwater	Negligible
	Direct contact	Building materials and services	Low
Off site farm buildings, tanks and petrol stations in the north of the Site.	Horizontal migration leading to: Ingestion Inhalation Consumption of home grown produce	Future users of SANG area	Negligible
Ground gases from presumed natural bedrock in the south western part of the Site.	Inhalation	Future residents	Negligible

Notes: * subject to recommended further ground investigation.

Future Baseline

10.51 In the absence of the Development, the land uses within the Site will be retained and the existing ground conditions will continue on a similar basis as the existing situation with no significant change to the current baseline.

Likely Significant Effects

10.52 This section defines the likely significant environmental effects (beneficial and adverse) of the Development and identifies receptors and environmental resources which may be impacted directly or indirectly by the Development. Construction and operational effects are assessed separately.

10.53 The potential impacts and the significance of the effects are characterised in the absence of mitigation measures, beyond those identified, described and embedded within the Development. The mitigation measures are then set out prior to the determination of the residual effects.

Construction Phase

Further Intrusive Ground Investigations

10.54 Further Intrusive ground investigations will take place prior to construction commencing on the Site to supplement the existing data. Although the volume of ground disturbance will be relatively minor, there is a potential for some further ground contamination to be encountered on the Site. This would result in the potential for direct contact between contaminants and the personnel engaged in the site investigation if a source is encountered, which would result in a minor adverse effect in terms of health.

Construction effects

10.55 Due to the minimal and localised contamination risks identified, the extent of any potential wider environmental impacts from the construction phase are limited. Potential effects are as follows:

- Potential for construction workers to come into direct contact with possible localised contamination resulting in a minor adverse effect on health;
- Potential for contaminated dusts to impact upon nearby residents resulting in a moderate to minor adverse effect on health;
- Potential for small scale leaks and spillages associated with localised storage and use of small quantities of fuels, paints and other proprietary chemicals, and for contaminated land run-off from vehicle washing, resulting in a moderate to minor adverse effect on the environment.

10.56 Excavation works for foundations and drainage, or possible piled foundations would have the potential to mobilise contaminants or sediments into the groundwater and surface water environment at the Site. However, due to the general lack of contamination risks, coupled with the relatively low permeability soils identified at the Site, it is not considered feasible that groundwater or surface water could be impacted by excavation / piling works, and the effects are therefore considered to be negligible.

Operational Phase

10.57 Due to the minimal and localised contamination risks identified, the extent of any potential wider environmental effects during the operational phase are limited. Potential effects are as follows:

- Future residents or Site users to be exposed to contaminated soils in localised areas of the Site from direct contact, resulting in localised moderate to minor adverse health effects; and
- Subsurface building materials and services – potential degradation of underground services due to contaminated soils and permeation of plastic water supply pipes resulting in minor adverse effects.

10.58 Localised hotspots of contamination (if left in situ) could have ongoing impacts on the groundwater or surface water environment. This could be enhanced by infiltration devices, such as soakaways for discharging surface water drainage into the ground. However, due to the relatively low permeability soils present at the Site, coupled with the low solubility nature of the potential localised contaminants at the Site, no significant risks to groundwater have been identified and the effects are negligible.

Mitigation Measures

10.59 Based on the limited contamination risks identified, the mitigation measures proposed at the Site will be minimal.

Construction Phase

10.60 Prior to the construction works, further ground investigation will be undertaken at the Site in order to establish the extent of any contamination risks in the area of former chicken sheds. Ground investigation personnel will abide by their own health and safety risk assessments and method statements, completed in accordance with the Construction Design Management (CDM) regulations (2015), to ensure that they are not adversely affected by any contaminated soils encountered.

10.61 Following additional investigation it may be that localised remedial measures will be required in the area of former chicken sheds. Based on the investigation completed to date, extensive remedial measures are unlikely to be required, but there could be localised contamination in the form of asbestos fragments in the soils. If discovered, these would be removed from Site

prior to construction under controlled conditions to prevent the generation of any hazardous dusts.

10.62 Two localised areas have been identified where the concentrations of hydrocarbon in the soil, although not exceeding human health thresholds, do exceed the highly stringent water supply pipe thresholds. This relates to the surface Made Ground in the south eastern corner of the Site adjacent to the current Site entrance, as well as a small section at the edge of the woodland in the location of the shallow infilled area. If any water supply pipes are laid in these areas then potential risks to water supply pies will exist. However, it should also be noted that only the surface soils are impacted in both areas so the risks to buried water supply pipes is further reduced. This associated risk would be easily managed through the use of hydrocarbon resistant pipes, for example plastic 'barrier' pipes incorporating an aluminium foil layer or metal pipes.

10.63 If any localised contamination is identified then construction workers may be at risk where they are exposed to the contaminated soils, groundwater and gases, for example during utility services work and foundation construction. During construction of the Development, the presence of contaminated soils will be considered within health and safety plans. Measures to protect the health and safety of workers on the Site will include use of appropriate personal protective equipment, education and good hygiene procedures.

10.64 The generation of dusts and odours from possible localised contaminated soils during construction will be addressed by a Construction Environment Management Plan (CEMP) which will outline the measures to prevent dust generation during the Development i.e. damping down stockpiles, reducing areas of excavations. This will also outline mitigation measures to prevent spills of fuels / other chemicals during the construction process.

Operational Phase

10.65 Once the Development is operational, the Site will consist of an area of residential houses together with a large area of managed SANG comprising landscaped open space. Assuming all of the construction phase mitigation measures are completed, there will be no requirement for any operational phase mitigation measures in relation to the ground conditions.

Residual Effects

Construction Phase

10.66 During the construction phase, the residual effects from the four identified impacts relating to localised soil contamination (site investigation personnel exposure, construction workers exposure, nearby residents exposure and environmental exposure) will all be negligible following the implementation of mitigation measures.

Operational Phase

10.67 Following the construction phase mitigation measures, the residual effects will be negligible as new residents will not be exposed to and localised contamination and new building materials and services will not be impacted by contaminated soils.

10.68 Minor beneficial effects have been identified to users of the open space (SANG) whereby the mitigation measures will result in an improvement in relation to the (current) baseline conditions.

Cumulative Effects

10.69 The remedial measures proposed at the Site in relation to the ground conditions are localised and small scale in relation to the overall Development. Other developments are proposed in the surrounding area (refer to ES Chapter 2: Methodology) however, based on the limited supply of brownfield land in the area, these schemes are very unlikely to have any large scale contaminated land issues to address. In light of this it is not considered that the small scale risks identified are significant enough to result in cumulative effects in relation to other proposed developments in the area.

Summary

10.70 The Site has been subject to a geo-environmental desk study and intrusive ground investigation in order to determine the extent of any soil contamination risks at the Site. The desk study identified a number of localised contamination sources. On-site sources comprised a small shallow area of registered landfill and an area of former chicken sheds. Off-site sources included two nearby petrol filling stations / garages and an off-site tank associated with a farm.

10.71 The subsequent intrusive ground investigation confirmed a general lack of contamination from

all of the potential sources. However, uncertainties remain about the area of former chicken sheds due to limited access to this area, together with a possible low gas risk identified in part of the Site (further monitoring is ongoing).

10.72 Potential minor construction phase impacts have been identified including impacts to construction workers exposed to the ground, dust generation impacting nearby properties and spills of small quantities of fuels / oils during construction.

10.73 Mitigation measures have been outlined which will result in overall minor beneficial residual effects to the soil and groundwater environment from any soil contamination during the operational phase, together with negligible residual effects from construction related activities.

10.74 Table 10.7 contains a summary of the likely significant effects of the Development.

Table 10.7: Table of Significance – Land Contamination

Potential Impact	Nature of Effect (Permanent/Temporary)	Significance (Major/Moderate/Minor) (Beneficial/Adverse/Negligible)	Mitigation / Enhancement Measures	Geographical Importance*							Residual Effects (Major/Moderate/Minor) (Beneficial/Adverse/ Negligible)
				I	UK	E	R	C	B	L	
Construction											
Site Investigation personnel – exposure to localised contaminants	Temporary	Minor adverse	Health and safety risk assessments in place to prevent exposure to contaminants.							X	Negligible
Potential for construction workers, to come into direct contact with possible localised contamination.	Temporary	Minor adverse	Presence of contaminated soils to be considered within health and safety plans. Measures to protect the health and safety of workers on the Site will be implemented including use of appropriate personal protective equipment, education and good hygiene procedures.							X	Negligible
Potential for contaminated dusts to impact upon nearby residents.	Temporary	Moderate / minor adverse	Construction Environment Management Plan (CEMP) which will outline the measures to prevent dust generation during the Development. This will also outline mitigation measures to prevent spills of fuels / other chemicals from the construction process.							X	Negligible
Potential for small scale leaks and spillages associated with localised storage and use of small quantities of fuels, paints and other proprietary chemicals, and for contaminated land run-off from vehicle washing.	Temporary	Moderate / minor adverse	Construction Environment Management Plan (CEMP) which will outline the measures to outline mitigation measures to prevent spills of fuels / other chemicals from the construction process.							X	Negligible

Completed Development											
Future residents or Site users to be exposed to contaminated soils in localised areas of the Site from direct contact.	Permanent	Moderate / minor adverse	Any localised contamination hotspots to be removed from Site.							X	Minor beneficial
Subsurface building materials and services – potential degradation due to contaminated soils and permeation of plastic water supply pipes.	Permanent	Minor adverse	Specialist protective water supply pipework will be utilised where and if required.							X	Negligible
Groundwater and surface water environment – ongoing pollution of via leaching from contamination hotspots within the soils at the Site.	Permanent	Negligible	Any localised contamination hotspots to be removed from Site.						X		Negligible
Cumulative Effects											
Construction & Operation											
None identified											

*** Geographical Level of Importance**

I = International; UK = United Kingdom; E = England; R = Regional; C = County; B = Borough; L = Local

REFERENCES

[i] CLG (February 2019) *National Planning Policy Framework*
[ii] http://planningguidance.planningportal.gov.uk/blog/guidance/land-affected-by-contamination/land-affected-by-contamination-guidance/
[iii] Wealden District Council (February 2013) *Core Strategy Local Plan*
[iv] *https://www.wealden.gov.uk/environment-and-pollution/pollution/land-that-may-be-contaminated/how-we-deal-with-land-contamination/*
[v] British Standards Institution (2015) *Code of practice for site investigations. BS 5930:2015;*
[vi] British Standards Institution (2011) *Code of practice for investigation of potentially contaminated sites. BS10175:2011;*
[vii] Building Research Establishment (2007) *Radon: guidance on protective measures for new dwellings. BRE Report BR211;*
[viii] Land Contamination Risk Management (LCRM) (2020) - *How to assess and manage the risks from land contamination, www.gov.uk, (replaces CLR11);*
[ix] Department for Environment, Food and Rural Affairs (2012) *Environmental Protection Act 1990: Part 2A, Contaminated Land Statutory Guidance;*
[x] 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;*
[xi] CIRIA (2007) *Assessing risks posed by hazardous ground gases to buildings;*
[xii] *NHBC/Environment Agency (2008) Guidance for the safe development of housing on land affected by contamination. R&D66..*
[xiii] CLG (1990) *Environmental Protection Act* (EPA) as amended by the *Environment Act 1995*
[xiv] HMSO (2012) *The Contaminated Land (England) (Amendment) Regulations*
[xv] HMSO (2011) *The Waste (England and Wales) Regulations 2011*