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APPENDICES

Appendix 01: Preliminary Land Quality Risk Assessment

8. LAND QUALITY

Introduction

- 8.1 This chapter of the ES considers the potential for environmental and health impacts both from and to land quality at the proposed Ashton Keynes Anaerobic Digestion (AD) Plant. This chapter describes the scope, relevant legislation, assessment methodology, and the baseline conditions existing at the Site and its surroundings. It considers potential significant human health and environmental effects the proposed development (including earthworks and construction) would have on the baseline environment; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed.
- 8.2 Historical land use activities can give rise to contamination of land and water on a site. Such contamination may present ongoing risks to health and the environment long after the activities that caused the contamination have ceased. Assessment of the human health and environmental risks that may be associated with land quality are therefore an integral part of robust planning and preparation for the redevelopment of land.
- 8.3 This chapter is supported by Appendix 01 which includes a Preliminary Land Quality Risk Assessment (PLQRA) completed during 2023.

Methodology

Policy and Regulatory Context

- 8.4 The primary UK regulatory regimes under which potentially contaminated land is managed under the planning process are described in the National Planning Policy Framework (NPPF) (Department for Communities and Local Government, 2012 - revised 2021) and under Part 2A of the Environmental Protection Act 1990 (Department for Environment Food and Rural Affairs, 2012).

National Planning Policy Framework (NPPF)

- 8.5 The NPPF has a core aim to encourage the effective use of land by reusing land that has been previously developed (brownfield land), provided that it is not of high environmental value. The NPPF says the planning system 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 soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and,
 - remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

8.6 Furthermore, the NPPF says that planning policies and decisions should also ensure that:

- 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);
- after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990; and
- adequate site investigation information, prepared by a competent person, is available to inform these assessments.
- In addition, where a site is affected by contamination or land stability issues, responsibility for securing a safe development rest with the developer and/or landowner.

8.7 It is clear that the national planning policy directs those involved in development to ensure sites are suitable for use and not be capable of being determined as contaminated land under Part 2A – which means that the category of land, following remediation (if required) also needs to be considered.

Statutory Contaminated Land Regime

8.8 Contaminated Land Statutory Guidance¹ advocates a precautionary approach to dealing with contaminated land, with clear direction to avoid the “excessive cost burdens” of “wastefully expensive remediation”. For clarity:

- Category 1: describes land which is clearly problematic from a contamination risk perspective;
- Categories 2 and 3: cover the less straightforward land where detailed consideration is needed before deciding whether it is Category 2 (contaminated land requiring remedial action) or Category 3 (not contaminated land) - wider socio-economic factors come into play if health risks assessment fails to produce a decision; and
- Category 4: describes land that is clearly not contaminated land.

8.9 The Category 4 test is particularly important in defining when land is clearly not contaminated land in the legal sense, it would be exceptional for land exhibiting:

- normal background levels of contamination; or
- contaminant levels below published assessment criteria (including Category 4 Screening Criteria)

8.10 To be considered as contaminated land, Regulators can only require remediation to a point where land is no longer contaminated land in the legal sense (i.e. the boundary between Categories 2 and

¹https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/223705/pb13735cont-land-guidance.pdf

3) and not require “unnecessary” clean up to attain Category 4 standards. Exceedance of published assessment criteria should simply trigger further risk assessment.

Other relevant National Land Quality Guidance

- 8.11 The assessment approach adopted in this chapter summarises the information provided to the consenting authority to allow it to determine whether the site is suitable for its proposed end use, taking into account remediation (or mitigation) measures that may be required.
- 8.12 There is no single guidance document that provides a methodology for assessing the environmental effects of developments on geology, soils and land quality receptors. However, there are a number of guidance documents that have been referred to in developing the bespoke EIA methodology used in this assessment, as explained below.
- 8.13 The Institute of Environmental Management and Assessment (IEMA) Guidance for Environmental Impact Assessment (IEMA, 2006) provides general advice on how to undertake an EIA and has been taken into account in this assessment.
- 8.14 In addition to the human health and environmental effects on land quality, other ground related impacts must be considered such as the loss of a resource or a feature that may have protected status, interest or value e.g. the effects on geo-conservation resources (internationally and nationally designated sites, Local Geology Sites etc), mineral resources, soil resources and agricultural land. As such, geology and soils can form an important part of the ground related assessment.
- 8.15 EIA guidance has been published by the Highways Agency in the Design Manual for Roads and Bridges (DMRB), Volume 11 Environmental Assessment, Section 3, Part 11, Geology and Soils (Highways Agency, 1993) for assessing the geology and soils effects of highways schemes. That guidance is not, however, particularly prescriptive on how a practitioner should determine the magnitude of impacts/change and the significance of effects. A later DMRB document: Volume 11 Environmental Assessment, Section 2, Part 5, HA205/08 Assessment and Management of Environmental Effects Highways Agency (Highways Agency, 2008), does provide a commonly used framework for assessing effects using a matrix approach. The IEMA document a ‘New Perspective on Land and Soil in Environmental Impact Assessment’ (2022) provides further supporting guidance on the assessment and management of the effects of developments on land and soil.
- 8.16 In terms of assessing risk from contaminated land, especially Made Ground, the overarching guidance document is the Environment Agency’s Land Contamination Risk Management (LCRM) published in October 2020. This provides a useful risk-based evidence approach for determining whether effects are significant or not. However, it is important to note that there is no commonly accepted guidance within LCRM on how practitioners should utilise the risk assessment approach in EIA. SLR has, therefore, applied a logical approach and defined the significance of contaminated land risk after developing a Conceptual Site Model (CSM) as prescribed in LCRM.

Land Quality Environmental Impact Assessment Criteria

- 8.17 The method for assessing the effects of the development due to land contamination risks is outlined below; this follows a separate risk assessment-based methodology in accordance with published guidance.
- 8.18 The approach to the assessment of the environmental effects on geology and soils resources has been based on a widely used and accepted 'significance matrix assessment approach' (as used in DMRB Volume 11) which is based on the characteristics of the impact (magnitude and nature) and the sensitivity of the receptor. This allows the relative significance of effects to be determined on a scale and ultimately the significant effects determined.
- 8.19 The EIA Regulations require consideration of a variety of types of effect. Each will have a source originating from the development, a pathway and a receptor.
- 8.20 The magnitude and significance of potential impacts on land quality during both construction and operation of the proposed development have been assessed using standard criteria. There is no statutory definition of significance. In this ES the following descriptive terms are used:
- Substantial;
 - Moderate;
 - Minor;
 - Negligible.

The meaning of the terms in relation to magnitude and sensitivity shown below:

Table 8.1 – Environmental Effect Matrix Categories

		Sensitivity of Receptor			
		High	Medium	Low	Negligible
Magnitude of Impact	High	Substantial	Substantial	Moderate	Negligible
	Medium	Substantial	Moderate	Minor	Negligible
	Low	Moderate	Minor	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Contaminated Land Risk Assessment

- 8.21 One key aspect of the assessment of impact relates to the condition and/or quality of the land before any development takes place. This is because land that is due to be developed, especially if it has a historic industrial use, is not necessarily pristine in terms of its existing condition.
- 8.22 In such circumstances it is likely that development will have a material enhancement of the land quality (contamination) through mitigation activities associated with the remediation of the historic contamination such that the land is suitable for the intended use.

- 8.23 Accordingly, there is a standard approach to assess whether the land to be developed and the associated soil, hydrogeological (groundwater) and hydrological (surface water) quality, has been impacted from historic activities. The defining assessment of land contamination/quality is undertaken in accordance with the Environment Agency guidance Land Contamination Risk Management (LCRM).
- 8.24 LCRM is intended to assist all those involved in dealing with land contamination, including landowners, developers, professional advisors, regulatory bodies and financial providers. The technical approach presented in LCRM is designed to be applicable to a range of non-regulatory and regulatory contexts that includes:
- development or redevelopment of land under the planning regime;
 - regulatory intervention under Part 2A of the Environment Protection Act 1990;
 - voluntary investigation and remediation; and
 - managing potential liabilities of those responsible for individual sites or a portfolio of sites.
- 8.25 LCRM is split into stages: risk assessment, options appraisal and remediation and verification, which can be sub-divided as shown in Table 8.2.

Table 8.2 – Extract from LCRM

Stage 1 Risk Assessment		Stage 2 Options Appraisal		Stage 3 Remediation and Verification
Tier 1 - Preliminary risk assessment	>	Identification of feasible remediation options	>	Develop the remediation strategy
Tier 2 - Generic quantitative risk assessment		Detailed evaluation of options		Remediate
Tier 3 - Detailed quantitative risk assessment		Select final remediation option		Produce a verification report Long-term monitoring and maintenance (if required)

- 8.26 The first stage, Risk Assessment, is an essential component in achieving effective management of the risks from land contamination. Risk assessment for chemical contamination can be a highly detailed process as there are a range of specific technical approaches for different contaminants and circumstances. As shown in Table 8.2, the risk assessment stage is itself subdivided or tiered; assessors apply each tier in turn. Higher tiers require the assessment of more detailed information.
- 8.27 The common approach used by practitioners is to assess the direct effects of development on the site's geology and land quality (through changes to ground conditions because of development) and the indirect effects of those changes on the ultimate end users of the land. To enable this assessment there are firstly two risk assessments that are undertaken:
- a **Development Impact Assessment** discusses the potential impacts of the proposed development via loss (removal, erosion, disaggregation or compaction) and pollution. The assessment considers impacts during construction and occupation of the development.
 - a **Land Quality Assessment** of the chemical quality risks posed by the site:

- during the construction phase to construction workers and controlled waters; and;
- the risks of chemical exposure to future human site end-users and Controlled Water receptors from the period following completion of construction, taking into account the change in the land use brought about by the development.

- 8.28 Where there is a historic contaminated land risk at a site, a Conceptual Site Model (CSM) of the development site is prepared.
- 8.29 Potential land contamination impacts and associated risks to human health and controlled waters are assessed using a methodology based upon the CIRIA C552 Contaminated Land Risk Assessment – A Guide to Good Practice document (CIRIA, 2001). This method is specifically tailored to assess the impacts and risks that may arise from exposure to ground contamination and ground gases.
- 8.30 These are then used to inform the significance of environmental impact as shown in Table 8.1.
- 8.31 The CIRIA C522 guidance provides a description regarding the risk categories resulting from the application of the methodology, as summarised in Table 8.3. It is considered that moderate or higher risks are considered to be potentially significant in terms of the EIA as these are likely to require further investigation, remediation or other mitigation in order to reduce risks to acceptable levels.

Table 8.3 – Significance of Generic Qualitative Risk Assessment Categories

Conceptual Site Model Risk Level	Description	Significant/Not significant
Very High Risk	There is a high probability that severe harm could arise or there is evidence that severe harm is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not already undertaken) is required and remediation is likely to be required.	Would be classified as Category 1 or 2 site according to the Part 2A of the Environment Protection Act 1990. Significant.
High Risk	Harm is likely to arise and realisation of the risk is likely to present a substantial liability. Urgent investigation (if not already undertaken) is required and remediation may be necessary in the short term and is likely to be required over the longer term.	Category 1 or 2 site. Significant.
Moderate Risk	It is possible that harm could arise. However, it is either relatively unlikely that harm would be severe or if harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required	Category 2 or 3 site. Significant.

Conceptual Site Model Risk Level	Description	Significant/Not significant
	in the longer term.	
Low Risk	It is possible that harm could arise but it is likely that this harm would at worst normally be mild.	Category 3 site. Not significant.
Very Low Risk	There is a low probability that harm could arise. In the event of such harm it is not likely to be severe.	Category 4 site. Not significant.

Limitations and Assumptions

- 8.32 The assessment undertaken is as objective as possible as it takes into account planning policy, legislation and published guidance in the assessment methodology and determination of significant effects. The assessment uses data from previous desk study and site investigation sources completed during 2022. The method relies on professional judgement in undertaking the qualitative assessment using a matrix approach. Therefore, the assessment results are presented as value judgements using professional experience.

Baseline Conditions

Sources of Information

- 8.33 As part of the assessment of the development's effects on land quality, baseline information has been obtained for the Site and up to a 2km buffer area around the Site boundary (the study area).
- 8.34 Baseline conditions pertaining to the Site have been compiled from a desktop review of readily available published information completed in 2022, and from a site investigation completed in 2023. The desktop assessment completed for the Site is listed below and contained in Appendix 01:
- Ashton Keynes - Anaerobic Digestion Facility, Preliminary Land Quality Risk Assessment (PLQRA). Prepared for Acorn Energy, February 2023.
- 8.35 In developing the understanding of the baseline geology and land quality conditions at the Site, the report listed above refers to sources of desk based publicly available information as follows:
- Historical and current Ordnance Survey maps from 1875 to present and Google Earth aerial images from 1999;
 - Wiltshire Council Planning portal for records of previous planning permissions;
 - Groundsure EnviroGeoInsight report on site conditions dated September 2022;
 - British Geological Survey website (www.bgs.com); and
 - MAGIC website (www.magic.defra.gov.uk).

Site walkover

- 8.36 The Site was inspected by a representative of SLR's Land Quality team on 23rd September 2022. The purpose of the walkover was to visually assess current activities at the Site and on adjacent surrounding land and identify potential sources of land contamination.

Ground Investigation

- 8.37 SLR completed a ground investigation at the Site in February 2023, comprising the completion of:
- 6 x trial pits up to 3m bgl;
 - 6 x window sample boreholes up to 6m bgl and installation of ground gas and groundwater monitoring wells;
 - 2 x cable percussive boreholes up to 10m bgl; and
 - collection of soil samples for chemical and geotechnical analysis.
- 8.38 At the time of preparation of this ES chapter, the technical investigation report has not yet been prepared. Chemical laboratory results have not yet been received to support the completion of generic human health and controlled waters risk assessments (Generic Quantitative Risk Assessment or GQRA). Groundwater and ground gas monitoring is scheduled to be completed after preparation of this chapter to inform groundwater flow elevations and a ground gas risk assessment. However, relevant investigation findings initially obtained pertaining to ground conditions and groundwater have been summarised in this chapter.

Current Land Use

- 8.39 The Site is located immediately west of Ashton Road in an agricultural area approximately 2km north of the village of Ashton Keynes, Wiltshire.
- 8.40 The Site is formed of one complete field and a portion of a second field immediately to the south, which are bound to the east by Ashton Road. Both fields which form the site are in arable use, and the fields are divided by an intermittent hedge and low trees. A shallow drainage ditch lies on the northern side of the divide between the two fields.
- 8.41 The Site is typically bound by hedges on all sides except the southern boundary which bisects the southern field. Further shallow drainage ditches are present outside the north and eastern boundaries. An unsurfaced access track runs along the outside of the western boundary.
- 8.42 The Site is surrounded by agricultural land on all sides. The land east of the Site, beyond Ashton Road is a closed landfill and has been restored to sheep pasture. It is not known if the landfill is lined. The closed landfill access gates remain present, and evidence of former earthworks can be seen by the presence of low mounds and bunds.
- 8.43 A large metal above ground tank is present inside the boundary of the closed landfill, which SLR considers is likely to be a landfill leachate storage tank, given its dimensions and location. Such tanks are typically internally bunded.

Historical Land Use

- 8.44 The Site has a continuous history of being undeveloped open fields as shown on historical mapping dating from 1875, with a public footpath running along the western boundary and Ashton Road running off-site adjacent the eastern boundary.
- 8.45 The surrounding area has remained generally agricultural with progressive history of sand and gravel extraction from the 1950s, and an aggregate and concrete batching works present to the southeast from the 1970s. Small agricultural structures have been intermittently present in the nearby vicinity, with a small barn 10m northwest remaining present, but in a state of disrepair.
- 8.46 The land east of Ashton Road (approximately 20m east of the site) operated as a landfill between around 1987 and 2005. The landfill initially accepted non-biodegradable soil and rubble but from 1993 also accepted dry non-hazardous industrial and commercial waste. A small aggregate processing works was present c.10m east in the 1990s and early 2000s at the landfill site. The landfill has been closed and restored to agricultural pasture.

Ground Conditions

- 8.47 The topography of the Site generally slopes from west to east, from approximately 102m above Ordnance Datum (aOD) in the northwest to 92m aOD at the southeast boundary.
- 8.48 BGS mapping does not record any superficial deposits on-site. However, the superficial Northmoor Sand and Gravel Member is recorded on mapping immediately to the east and the PLQRA discussed the possibility that these deposits may intrude into the eastern site boundary. BGS mapping records the bedrock geology as the Kellaways Clay Member – Mudstone. The Cornbrash Limestone Formation is understood to underlie the Kellaways Clay Member.
- 8.49 The site investigation recorded a geological sequence of topsoil overlying interbedded granular and cohesive horizons of superficial Northmoor Sand and Gravel Member deposits, overlying clay of the bedrock Kellaways Clay Member. Topsoil thickness ranged between 0.2m and 0.36m and was typically described as soft dark brown sandy, silty clay to clayey sand. Granular superficial deposits underlying the topsoil comprised yellowish brown clayey sand, typically ranging between 0.2 to 1.5m below ground level (bgl), but extending up to 2.5m bgl at SBH2 in the west of the Site. SBH2 in the west of the Site was located at a topographically higher elevation than the other investigation locations. Cohesive superficial deposits comprised very soft, orangish brown mottled grey slightly sandy, silty CLAY, ranging between 0.8 to 3m bgl, but typically only extending to between 2m and 2.5m bgl. The top of the Kellaways Clay bedrock deposits comprising firm to stiff grey clay with varying amounts of sand and silt was encountered from 2m to 3m bgl, with the base unproven. In the deeper boreholes the bedrock deposits became stiffer and less sandy with depth and by 6m bgl had become very stiff silty clay with mudstone nodules.
- 8.50 No Made Ground was recorded during the site investigation.
- 8.51 No visual/olfactory indicators of contamination were observed during the investigation.

- 8.52 The Site is reported to be at moderate risk from shrink swell clays, very low risk from running sands, collapsible deposits and landslides and negligible risk of ground dissolution of soluble rocks and compressible deposits.
- 8.53 There are no records of mining activities on-site. There are two BritPit records of mineral workings, comprising surface sand and gravel workings at the closed Barnground landfill 230m east and at Cotswold Community 450m west. There is one surface ground working record 173m southwest for the burial ground at the Cotswold Bruderhof Cemetery.
- 8.54 Site buildings are at low risk from radon and radon protection measures are not required within buildings.

Groundwater and Surface Water Conditions

- 8.55 There are no surface water features on-site except shallow land drains and the risk of surface water flooding is largely designated as negligible.
- 8.56 The nearest surface water feature is a small unnamed inland drain 150m north which drains to the northeast, to the Cerney Wick Brook (350m northeast), a poor quality watercourse. A lake is present 350m southeast, formed by former sand and gravel extraction. Several additional lakes are present within 1km to the west, east and south.
- 8.57 The Northmoor Sand and Gravel Member superficial deposits are designated a secondary A aquifer of high vulnerability. The Kellaways Clay bedrock deposits are designated as unproductive.
- 8.58 The site is located within a groundwater source protection zone (SPZ) 2 – Outer Catchment for a confined aquifer. The abstraction zone is likely to be from the confined Principal Cornbrash Limestone aquifer underlying the Kellaways Clay.
- 8.59 Groundwater was not encountered on-site during the investigation.
- 8.60 There are nine active groundwater abstractions recorded within 2km of the site. The nearest abstraction is 470m southeast, licensed to Aggregate Industries for general use relating to secondary category. A historical abstraction for general use is recorded 11m east of the site at the former aggregate/mineral processing area, between 1995 and 2015. Four of the nine groundwater abstractions are for potable water, with the nearest potable abstraction is 1874m south.
- 8.61 There are no active recorded surface water abstractions within 2km of the site.
- 8.62 Groundwater is sensitive within the area given the presence of the superficial Secondary A aquifer within the adjacent sand and gravel deposits, location within an SPZ and the presence of groundwater abstractions. However, the nearest abstraction is 470m from site, the superficial deposits are not recorded on-site and the superficial aquifer is likely to be relatively thin. The underlying Kellaways Clay bedrock deposits are classified as unproductive, and this low permeability deposit is likely to act as an aquitard confining and protecting the underlying Principal Cornbrash Limestone aquifer to which the SPZ relates. Overall, groundwater is of moderate sensitivity at the Site.

- 8.63 Surface water sensitivity is low given the lack of features on-site and presence of the minor drain located 150m north.

Waste Management Activities

- 8.64 A closed landfill is present at the nearby land east of Ashton Road (c.20m east of the site), recorded as the Barnground closed landfill (EPR ref. EA/EPR/AP3799ES/V007). The Barnground landfill is also recorded as a licensed waste site, as a landfill accepting non-biodegradable wastes.
- 8.65 Planning permission was granted in 1987 for the infilling of the former sand and gravel pit with soils and builders rubble. In 1993 a relaxation of conditions (planning reference N/91/02747/FUL) was granted to permit the importation of dry non-hazardous industrial and commercial waste. Permitted materials under the relaxation of conditions included topsoil, subsoil, non-toxic builders' waste, rubble and dry non-hazardous industrial and commercial waste. Under this permission tipping was to cease by 31st December, 1997. Conditions attached to permission N/91/02747/FUL indicate the landfill was comprised of 14 cells and each cell was finished with an impervious restoration cap of minimum 1m thickness.
- 8.66 Permission to continue infilling past the end date was later granted. The need for the extension arose due to various factors including the site taking less soil and more industrial and commercial waste (i.e. plastic, paper, glass, timber and metal) than was previously the case. The latter materials were more compactable which led to landfill space being utilised at a slower rate than previously anticipated. Also, greater compaction of the waste was being achieved due to more effective machinery.
- 8.67 Another closed landfill is recorded 358m south at the location of a present lake, recorded as an A07 Industrial Waste Landfill (Factory Curtilage) (EPR ref. EA/EPR/RP3099EU/A001). This landfill is also recorded within EA historical landfill records as being operated by Hills Aggregates Ltd and accepting inert waste between 1991 and 2002 (ref. NW/90/0080/WD,TP0236).

Pollution Controls and Authorisations

- 8.68 There are two historical Part B records for licensed pollutant releases 346m southeast and 437m south for other mineral processes. No enforcements were notified.
- 8.69 There are two historical licensed discharges to controlled waters records 357m northeast at the Barnground landfill site for trade discharges to the Cerney Wick Brook, revoked in 2005.
- 8.70 There is one List 2 dangerous substances record 492m north for discharge of iron to the Cerney Wick Brook.
- 8.71 There are no records of any of the following within 500m of the Site: current or recent petrol stations, energy features, electricity cables, gas pipelines, sites determined as Contaminated Land, Control of Major Accident Hazards (COMAH) sites, regulated explosive sites, hazardous substance storage / usage, historical licensed industrial activities (IPC), Part A(1) licensed industrial sites, radioactive substance authorisations, waste exemptions, pollutant release to surface waters (red

List), pollutant release to public sewer, List 1 dangerous substances, pollution incidents and pollution inventory radioactive waste.

Unexploded Ordnance

- 8.72 The Site is within an area which Zetica Ltd classify as low risk for “the potential for Unexploded Bombs to be present as a result of World War Two bombing”.

Ground Gas Conditions

- 8.73 Ground gas monitoring is yet to be undertaken on-site, however monitoring is scheduled to support completion of a ground gas risk assessment. The ground gas risk assessment will assess the risk to future site users and buildings from potential ground gases arising from the off-site landfill, and will be included in the investigation technical report.
- 8.74 If the risk assessment determines that ground gases are present at levels which could potentially present a risk to the development, appropriate mitigation measures will be proposed in accordance with relevant guidance. A remediation strategy and subsequent validation report will be prepared to ensure the effective completion of remedial measures in accordance with planning requirements.

Land Quality Assessment

- 8.75 No potential sources of contamination have been identified on-site.
- 8.76 The Barnground closed landfill has been identified as a potential source of off-site contamination for hazardous ground gases and landfill leachate.
- 8.77 The PLQRA determined the potential impacts from landfill leachate/contaminated groundwater present a low risk to future site users, assuming significant groundwater is not present. Initial findings from the ground investigation on-site recorded that significant groundwater was not encountered and therefore the risk is considered to be low.
- 8.78 The PLQRA determined the potential impacts from hazardous ground gases present a moderate/low risk to future site users and buildings. Ground gas monitoring is scheduled to be completed after preparation of this chapter to support a ground gas risk assessment, in accordance with the recommendations within the PLQRA. The ground gas risk assessment results will be reported in the ground investigation technical report, and appropriate mitigation measures will be recommended if required.

Future Baseline

- 8.79 In the ‘do-nothing’ scenario (e.g., if the development was not proposed) the future baseline would not be expected to change significantly from that described above.

Mitigation Measures

Standard Mitigation Measures

- 8.80 The development scheme and infrastructure have been designed to mitigate potential impacts. Such mitigation design has been based on, or developed from, best practice guidance.
- 8.81 A Construction Environmental Management Plan (CEMP) would be adopted. It is reasonable to accept that there are several ‘tried and tested’ techniques that would be employed on the construction site by a competent contractor, to be prepared at a later date in detail for inclusion in the CEMP, that would reduce the potential for significant effects to arise. Those that are of most relevance to land quality and contaminated land EIA are:
- The works will be designed and carried out in accordance with current Best Management Practices following <https://www.gov.uk/guidance/pollution-prevention-for-businesses> which includes guidance on: activities that produce contaminated water; correct use of drains; storing materials, products and waste; unloading and moving potential pollutants; and, construction, inspection and maintenance.
 - A series of specific method statements identifying methods of working and controls to address all identified ground conditions, hydrogeology and waste environment issues will be created as part of the final CEMP.
 - The management and re-use of topsoil at the Site will be included within the CEMP, and the best practice methods required to ensure its protection as a resource and its soil function such that it is not degraded or despoiled.
 - The CEMP will be designed in response to a detailed review of the detailed principal contractor’s Construction Phase Plan (CPP) and will include all of the key measures identified in this mitigation section, plus additional measures specified in planning conditions required by consultees as relevant to the detailed design of the works proposed. Provision will be made for addressing unexpected events (contingency planning).
 - A working materials management plan (MMP) according to the CL:AIRE Development Industry Waste Code of Practice will be required to specify the reuse of site won materials in conjunction with the Site’s cut and fill earthworks balance assessment.
- 8.82 The anaerobic digestion facility will be regulated as a permitted activity by the Environment Agency under the Environmental Permitting (England & Wales) Regulations 2016 (as amended). As a permitted facility, the operation of the plant will need to conform with certain regulatory requirements. The Site’s environmental management system will include for control measures for the mitigation or management of potential pollution release that will include, for example, checks of drainage systems, secondary forms of containment, spill control and spill release management. Where any impact is identified it will be a requirement under the permit to remediate the land back to its original Site condition. As such, this additional layer of mitigation will ensure that land quality impacts are further mitigated during the operational phase of the facility.

Actionable Mitigation Measures

8.83 The following mitigation measures, contained within or developed from the findings of the PLQRA in Appendix 01 and from the initial findings of the site investigation, are required as part of redevelopment:

- A ground investigation was undertaken in February 2023 following the recommendations of the PLQRA. The PLQRA recommended ground gas monitoring be undertaken to support a ground gas risk assessment given the potential risk of ground gases generated by the off-site closed landfill. Ground gas monitoring is scheduled to be completed after preparation of this chapter, and the investigation and risk assessment findings will be reported in a ground investigation technical report.
- The investigation report will revise the conceptual site model with site-specific data and determine if further mitigation or remediation measures are required if unacceptable risks to receptors are identified.
- If the ground gas risk assessment determines there is a potential risk to future site users and buildings, appropriate ground gas protection measures will be recommended in a remediation strategy in accordance with BS8485:2015² and planning requirements. Following remediation, a verification report will be produced to demonstrate the effective implementation of remediation and submitted to the local planning authority for review and approval.
- Industry best-practice dust management, stockpile and soil handling techniques are to be implemented during construction to mitigate against risks of potential impacts to worker health. Required measures to be adopted will be informed by the results of the ground investigation and will be outlined within a CEMP.
- A watching brief for unexpected contamination is to be maintained for the duration of the intrusive works.
- Control measures are to be implemented for any imported soil and/or aggregate materials, to ensure any imported materials do not contain contaminants which may present an unacceptable risk to receptors for the proposed development.

Assessment of Environmental Impacts

Impact Assessment

8.84 This section details the impacts which might be present assuming the inherent and standard mitigation measures are implemented.

² Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings, The British Standards Institution 2015 (BS8485:2015).

Construction Phase

- 8.85 The conceptual model within the PLQRA discusses the qualitative risks from potential contamination of the site and surrounding soils and groundwater, and assesses them in terms of their likely magnitude, significance and effect. The conceptual model will be revised within the forthcoming ground investigation report based on the results of the ground investigation. The conceptual model for the Site has considered potential contaminants, pathways and receptors, which together form potential pollutant linkages.
- 8.86 The PLQRA and initial investigation findings have not identified any sources of contamination on-site. The risk to construction workers from potential ground gases from the off-site landfill is considered to be low given ground gases will only present a hazard if they accumulate within enclosed spaces. Construction workers will be located outside or within temporary structures which are typically of designs that are unlikely to allow a pathway for ground gases to enter the structure through the floor. Therefore, there are negligible risks to construction workers due to existing land contamination.
- 8.87 Risks to construction workers from soils are typically mitigated through PPE/RPE as detailed in Risk Assessments and Method Statements and behavioural control measures as detailed in a construction environmental management plan (CEMP).
- 8.88 There are no controlled waters surface water receptors within 150m, however shallow land drains are present adjacent the site boundary. BGS mapping indicates a superficial Secondary A aquifer is present adjacent the eastern boundary. Although superficial deposits were recorded on-site during the investigation they were typically less than 1.5m in thickness and no groundwater was recorded.
- 8.89 Chemicals, fuels, wash water and similar liquid contaminants used on-site temporarily during construction will require management to mitigate against releases to nearby surface water and groundwater. Such control procedures will be outlined within construction method statements including the CEMP.
- 8.90 A watching brief for unexpected contamination will be maintained throughout the duration of the intrusive works and a discovery strategy will be outlined within the CEMP.
- 8.91 Deep foundations are not proposed as part of the development and the Kellaways Clay member aquitard confining the Cornbrash Limestone aquifer will not be breached. The Cornbrash Limestone aquifer has therefore not been considered further as a potential receptor.
- 8.92 Given the lack of on-site contamination sources, indicative low risk from the off-site landfill and proposed implementation of construction management procedures, the impact of proposed development during this phase would be **negligible**. The impact assessment during the construction phase is summarised in Table 8.4.

Table 8.4 – Summary of Impact Assessment – Construction Phase

Receptor	Sensitivity	Description of Effect	Inherent & Standard Mitigation Measures	Impact Magnitude	Type of Impact	Impact Significance
Human Health (Construction Worker)	Medium	Dermal contact, inhalation and/or ingestion of soils, inhalation of ground gases in enclosed spaces	Land Quality Risk Assessment, Construction Environmental Management Plan (CEMP). Health and Safety Risk Assessment associated with Contractors duty of care to its workers.	Negligible. The Site is undeveloped land with no potential sources of contamination identified. There is unlikely to be a pathway for hazardous ground gases to accumulate in temporary-style construction buildings.	Temporary and Short-term	Negligible
Controlled Waters (Surface Water – Land Drains)	Low	Runoff and infiltration of accidental chemical spills from fuel or chemical storage, refuelling, washing or leakages from plant onsite to surface water. Erosion and deposition of soils, deposition of dust	Construction Environmental Management Plan (CEMP).	Low. The nearest controlled waters receptor is 150m from site. Impacts to shallow land drains adjacent the site will be minor and localised. Potential discharge incidents will be mitigated by appropriate handling and management procedures outlined within the construction method statements, including the CEMP.	Temporary and Short-term	Minor

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Controlled Waters (Groundwater – Superficial Aquifer)	Medium to High	Infiltration of accidental chemical spills from fuel or chemical storage, refuelling, washing or leakages from plant onsite to groundwater, vertical and lateral migration	Land Quality Risk Assessment, Construction Environmental Management Plan (CEMP).	Negligible. Superficial deposits recorded on-site are thin (<1.5m) and no groundwater is present. Potential discharge incidents will be mitigated by appropriate handling and management procedures outlined within the construction method statements, including the CEMP.	Temporary and short term	Negligible
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Operational Phase

- 8.93 The operational phase constitutes the normal day-to-day activities on the completed development.
- 8.94 No potential on-site sources of contamination were identified during the PLQRA or from the initial findings from the site investigation. Chemical laboratory data from sampled soils is yet to be received but will be used to complete generic human health and controlled waters risk assessments and will be reported in a ground investigation report. The potential for ongoing risks to human health from ground gases is likely to be low but will be assessed using site-specific monitoring data within a ground gas risk assessment. If unacceptable risks to occupational receptors are identified from the risk assessments, or during construction from unexpected contamination, remedial actions will be developed and implemented to ensure the development will be suitable for its intended use in accordance with planning requirements. The effectiveness of remedial actions will be documented within a verification report.
- 8.95 The proposed nature of the scheme is unlikely to result in significant future contaminative impacts to site soils or nearby surface water and groundwater.
- 8.96 The proposed scheme will likely include the small-scale use of chemicals and fuels to facilitate operations. The site will be regulated under an Environment Permit and the use of any chemicals and fuels will be managed using control and handling procedures as per relevant legislative requirements, including pollution prevention and spill response procedures. It is possible some small-scale spills and leaks could occur but given the implementation of these procedures and small scale of any event, they are unlikely to have a significant impact.
- 8.97 The presence of hardstanding across operational areas would act to prevent significant infiltration of any released contaminants into the ground. Engineered drainage systems, storage tanks and lagoons will act to contain runoff from surface spills/releases, 'dirty water' or digestate entering the ground and surface water drains.
- 8.98 As such, it is considered that there are no potential significant risks to controlled waters or human health from the operational phase that cannot be adequately mitigated. Therefore, the impact of proposed development during this phase would be **negligible**. The impact assessment during the operational phase is summarised in Table 8.5.

Table 8-5 – Summary of Impact Assessment – Operational Phase

Receptor	Sensitivity	Description of Effect	Inherent & Standard Mitigation Measures	Impact Magnitude	Type of Impact	Impact Significance
Human Health (Future site workers)	Medium to High	Dermal contact, inhalation and/or ingestion of soils, inhalation of ground gases in enclosed spaces	Land Quality Risk Assessment, remedial strategy and validation report (if required); operational phase environmental management controls	Negligible. No on-site source of contamination identified. Risk assessments using soil chemical data and ground gas monitoring is yet to be completed. If unacceptable risks are identified then a remedial strategy and verification report will be prepared and implemented in accordance with planning requirements.	Long-term and direct	Negligible
Controlled Waters (Surface Water – Land Drains)	Low	Runoff and infiltration of accidental chemical spills from fuel or chemical storage, refuelling, washing or leakages from operational activities to surface water.	Land Quality Risk Assessment, remedial strategy and validation report (if required) Operational phase pollution management and spill response, environmental permit requirements	Negligible. The nearest controlled waters receptor is 150m from site. Where releases occur due to operational activities, these will be addressed quickly and proactively through implementation of spill response planning. Hardstanding and engineered drainage and containment systems will	Long term and direct	Negligible

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				mitigate against releases to the ground.		
Controlled Waters (Groundwater – Superficial Aquifer)	Medium to High	Infiltration of accidental chemical spills from fuel or chemical storage, refuelling, washing or leakages from operational processes to groundwater, vertical and lateral migration	Land Quality Risk Assessment, remedial strategy and validation report (if required). Operational phase pollution management and spill response, environmental permit requirements	Negligible. Superficial deposits recorded on-site are thin (<1.5m) and no groundwater is present. Where releases occur due to operational activities, these will be addressed quickly and proactively through implementation of spill response planning. Hardstanding and engineered drainage and containment systems will mitigate against releases to the ground.	Temporary and short term	Negligible

Residual Impact Assessment

- 8.99 Following implementation of the actionable mitigation measures as set out in Section 8.83 and 8.84, there are not considered to be any significant residual effects on land quality as part of the Proposed Development.

Cumulative Impact Assessment

- 8.100 There were no other schemes identified requiring assessment of significant cumulative effects.

CONCLUSIONS

- 8.101 This chapter has considered the potential for the proposed development to impact upon human health and controlled waters receptors (surface water and groundwater).
- 8.102 The assessment has determined the proposed development will have a negligible impact on human health and minor impact on controlled waters during the construction phase due to the potential for low level and localised impacts during site activities, for example, as a result of leaks and spillages from plant and equipment, or from potential sediment in surface water run-off. The potential impact can be mitigated as part of the construction phase measures and controls detailed in the CEMP.
- 8.103 A ground investigation has been undertaken on the Site to baseline ground conditions and assess the potential risk to receptors. At the time of preparation of this ES chapter the ground investigation report has not yet been prepared. Chemical laboratory results have not yet been received to support the completion of generic human health and controlled waters risk assessments (Generic Quantitative Risk Assessment or GQRA). Groundwater and ground gas monitoring is scheduled to be completed to inform groundwater flow elevations and ground gas risk assessment.
- 8.104 On the basis of the initial findings of the ground investigation, no identifiable sources of on-site contamination have been identified. No made ground is present across the Site and there were no visual or olfactory indications of contamination present. A landfill is located to the east of the Site, and observations have not indicated the potential presence of leachate, ground gases or vapours migrating on to the Site. This will be confirmed through laboratory analysis and ground gas monitoring and the overall investigation and risk assessment findings will be reported in a ground investigation technical report.
- 8.105 The assessment has determined the proposed development will have a negligible impact on human health and controlled waters during the operational phase. The facility will be regulated as a permitted activity by the Environment Agency under the Environmental Permitting (England & Wales) Regulations 2016 (as amended). As a permitted facility, the operation of the plant will need to conform with certain regulatory requirements. It is considered that this additional layer of regulatory control will ensure that land quality impacts are further mitigated during the operational phase of the facility.
- 8.106 No significant effects in terms of the EIA Regulations are therefore predicted on land quality during the construction or operational phases of the Proposed Development.

