Medworth Energy from Waste
Combined Heat and Power Facility

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Environmental Statement Chapter 13: Geology, Hydrogeology and Contaminated Land

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Contents

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13. Geology, Hydrogeology and Contaminated Land

13.1 Introduction

13.1.1 This chapter presents the environmental assessment of the likely significant effects of the Proposed Development with respect to Geology, Hydrogeology and Contaminated Land including soils and agricultural land, geology and geodiversity, hydrogeology, and land contamination.

13.1.2 The chapter should be read in conjunction with the description of the development provided in **Chapter 3: Description of the Proposed Development (Volume 6.2)** and with respect to relevant parts of other chapters (**Chapter 11: Biodiversity** and **Chapter 12: Hydrology (Volume 6.2)**), where common Receptors have been considered and where there is an overlap or relationship between the assessment of effects. A list of terms and abbreviations can be found in **Chapter 1: Introduction, Appendix 1F Terms and Abbreviations (Volume 6.4)**.

13.2 Consultation and stakeholder engagement

13.2.1 The assessment has been informed by consultation responses and ongoing stakeholder engagement. An overview of the approach to consultation is provided in **Chapter 4: Approach to the EIA (Volume 6.2).**

13.2.2 A summary of the relevant responses received in the EIA Scoping Opinion in relation to Geology, Hydrogeology and Contaminated Land and confirmation of how these have been considered within the assessment to date is presented in **Table 13.1 Summary of EIA Scoping Opinion responses for Geology, Hydrogeology and Contaminated Land**

Table 13.1 Summary of EIA Scoping Opinion responses for Geology, Hydrogeology and Contaminated Land

Consultee(s)	Issue raised	Response and how considered in this chapter
The Planning Inspectorate (PINS)	Taking into consideration the lack of geological designations and the brownfield nature of the EfW CHP Facility site, the Inspectorate is content this matter can be scoped out for the EfW CHP Facility site. However, given the uncertainty regarding the remainder of the application site, the Inspectorate does not agree that effects on geology can be scoped out for the other project elements.	Effects on geological Receptors are scoped out of the assessment for the EfW CHP Facility. In line with the PINS comments, consideration was given to all other components of the Proposed Development to determine whether there is the potential for significant effects on geological Receptors. The baseline condition regarding geological Receptors for all components of the Proposed Development is defined in **Section 13.5**.

Consultee(s)	Issue raised	Response and how considered in this chapter
		In the absence of nationally or locally designated geological sites within the Proposed Development, effects on geological Receptors have been scoped out for all elements of the Proposed Development. The Study Area for geological Receptors is defined in **Section 13.4**. **Tables 13.10** and **13.11** provide the rationale for the scoping out of Receptors from the assessment.
PINS	The Inspectorate agrees that hydrogeological impacts on shallow groundwater at the EfW CHP Facility site are unlikely to result in significant effects and that this matter can be scoped out of the ES. However, given the uncertainty regarding the remainder of the application site, the Inspectorate does not agree that effects on hydrogeology can be scoped out for the other project elements.	Effects on shallow groundwater Receptors are scoped out in the assessment for the EfW CHP Facility Site. The baseline hydrogeological condition for all elements of the Proposed Development is defined in **Section 13.5**. The Study Area for hydrogeological Receptors is defined in paragraph **13.4.5**. Drainage channels in the Study Area are considered as a Receptor for contaminated land effects and are shown on **Figure 13.1i (Volume 6.3)** and in **Chapter 12: Hydrology Appendix 12D: IDB drainage plans (Volume 6.4)**. The superficial deposits and bedrock geology underlying all elements of the Proposed Development are classed as unproductive strata. Whilst shallow groundwater is present, it is typically perched on top of less permeable layers within the tidal flat deposits and does not form a continuous or productive aquifer. There are no known groundwater abstractions within the Study Area. On this basis, in the absence of a sensitive groundwater Receptor, effects on groundwater have been scoped out, however, the assessment does consider the potential for contaminant migration in groundwater to impact on surface water (see **Table 13.12**). **Tables 13.10** and **13.11** provide the rationale for the scoping out of Receptors from the assessment.
PINS	The Inspectorate agrees that impacts from contaminated land on construction workers can be scoped out of the assessment however, the	Impacts from contaminated land on construction workers are scoped out.

Consultee(s)	Issue raised	Response and how considered in this chapter
	The Inspectorate would expect the ES to explain the measures that would be employed to achieve compliance with relevant legislation, and how these would be secured.	The legislation and necessary measures to protect construction workers, including how they will be employed and secured, has been included in **Table 13.24**.
PINS	The Inspectorate agrees that impacts on soil resources at the EfW CHP Facility Site are unlikely to result in significant effects and can be scoped out, however this matter should be assessed for all other project elements, where significant effects are likely.	Impacts on soil are scoped out in the assessment for the EfW CHP Facility. The baseline soil condition for all elements of the Proposed Development is defined in **Section 13.5**. The CHP Connection Corridor, Access Improvements and Water Connections are predominantly brownfield/previously developed land. The EfW CHP Facility (additional area, ~0.8 ha) and the Temporary Construction Compound (TCC) (~1.6 ha) are on previously undeveloped land but together they occupy a small area (<3 ha) in an area allocated for urban extension in Fenland Local Plan 13 (2014), Policy LP8. Effects on soil Receptors can, therefore, be scoped out for these elements of the Proposed Development. The scoping boundary included an area of farmland south of New Bridge Lane which was being considered for use as a Construction Compound, this area is no longer under consideration and has, therefore, not required assessment. At the PEIR stage, the Grid Connection was predominantly greenfield and in agricultural use and the baseline soil and agricultural land classifications for these areas were outlined in **Chapter 13: Geology, Hydrogeology and Contaminated Land, Section 13.5** of the PEIR. The baseline has been updated in **Section 13.5** of this chapter and reflects the Order limits, specifically a large reduction in the Grid Connection land area and it now being wholly within urban land (highway and an existing substation site). **Tables 13.10 and 13.11** provide the rationale for the scoping out of Receptors from the assessment.
PINS	The Inspectorate agrees that impacts from contaminated land on flora, fauna, and ecological systems at the EfW CHP Facility site are unlikely to result in significant effects and can be	Impacts from contaminated land on flora, fauna and ecological systems at the EfW CHP Facility Site are scoped out. Consideration is given in the assessment to impacts from contaminated land on flora,

Consultee(s)	Issue raised	Response and how considered in this chapter
	scoped out, however, this matter should be assessed for the other project elements, the CHP routes, Temporary Construction Compounds or new access routes.	fauna and ecological systems for all the other elements of the Proposed Development. Baseline information for all elements is presented in **Section 13.5**. The baseline ecological conditions for all elements of the Proposed Development are defined in **Chapter 11: Biodiversity (Volume 6.2)**. Phase 1 geo-environmental desk studies have been completed for all areas of the Proposed Development and have confirmed that there are no ecological Receptors within the Order limits or in the Study Area that are likely to be affected by land contamination on the Proposed Development site. Effects from contaminated land on flora, fauna and ecological systems are, therefore, scoped out for all elements of the Proposed Development. The relevant reports are detailed in **Table 13.7.** These are appended to the ES (**Appendices 13A** and **13B (Volume 6.4)**).
PINS	Paragraph 12.4.7 of the Scoping Report states that the Temporary Construction Compound would be located on land which "does not appear to have been developed historically". The Scoping Report does not, therefore, appear to have assessed the possibility of the Temporary Construction Compound being located on land to the south of New Bridge Lane where a residential property is located. The ES should ensure that the assessment of impacts at the chosen Temporary Construction Compound site is robustly undertaken.	The area referred to south of New Bridge Lane is no longer included in the Order limits and has, therefore, not required inclusion in the assessment.
PINS	The Inspectorate notes that the Scoping Report indicates that site investigation may be required. Details of any site investigation undertaken are to be provided in the ES.	Phase 1 geo-environmental desk studies for all elements of the Proposed Development have been completed and the relevant reports are appended to the ES (**Appendices 13A** and **13B (Volume 6.4)**). Information from an intrusive ground investigation of the EfW CHP Facility Site is included in the report covering the EfW CHP Facility. The reports define areas where further investigation is needed to confirm the site's suitability for the Proposed Development in relation to land contamination and to inform

Consultee(s)	Issue raised	Response and how considered in this chapter
		its design. A DCO Requirement will require the submission of reports detailing the further investigation for approval by the relevant local authority. This will be completed during the pre-construction phase.
PINS	The Inspectorate states that if earthworks are required to construct the Proposed Development, these should be described in sufficient detail to allow for a robust assessment of the earthworks and impacts resulting from them to be undertaken and for any potential significant effects to be identified.	The earthworks for the Proposed Development are described in **Chapter 3: Description of the Proposed Development (Volume 6.2)**. **Section 13.9** includes assessment of the effects of earthworks on soil Receptors and considers potential effects in relation to land contamination. Embedded environmental measures to prevent significant effects on soil, agricultural land or contaminated land Receptors are discussed in **Table 13.15**.
PINS	Paragraphs 2.3.32 to 2.3.34 state that SuDS are to be used to control drainage on the EfW CHP Facility site. No further information regarding the type, location, or impact the SuDS could have on the existing drainage regime of the landscape has been included in the Scoping Report. This information should be included in the ES and the location and dimensions of SuDS should be depicted on a figure(s).	Drainage for the EfW CHP Facility and effects on the existing drainage regime within the Study Area are considered in **Chapter 12: Hydrology (Volume 6.2)**. The locations and capacities of SUDs are provided on **Figure 3.11** and **Figure 3.12 (Volume 6.4).**
Anglian Water	Reference is made to potential contamination of soils during construction phase and a risk to consumers of drinking water. Anglian Water therefore advises that a specific risk assessment for the water mains supply network from contaminants should be undertaken by the applicant with the assistance of Anglian Water as water undertaker.	This will be addressed in the design and construction process using the ground investigation data for the EfW CHP Facility Site[1], additional further ground investigation (date and scope to be confirmed) and further consultation with Anglian Water to confirm the approach. The basis of the structural design for the Proposed Development will include mitigation of identified geo hazards. This applies to hazards including contaminants with potential to permeate water pipes.
Cambridgeshire County Council & Fenland District Council	A phase one and two contaminated land investigation should be undertaken.	Phase 1 geo-environmental desk studies for all elements of the Proposed Development, and an intrusive ground investigation of the EfW CHP Facility Site, have been completed

[1] Soil and groundwater data currently held for the site is detailed in the following report: Wood. MVV, Wisbech Phases 1 and 2 Geoenvironmental Desk Study and Interpretative Report (July 2020).

Consultee(s)	Issue raised	Response and how considered in this chapter
		and the relevant reports are appended to the ES (**Appendices 13A** and **13B (Volume 6.4)**). These reports define areas where further investigation is needed to confirm the site's suitability for the Proposed Development in relation to land contamination and to inform its design.
KLWN	The review of ground conditions describes the site's previous use and highlights the presence of fuel storage and made ground. It is noted that the desk study findings will be supplemented by site investigation (where required) and consultation. A reasonable methodology is proposed to manage potential risks.	The Applicant undertook a site investigation of areas within the EfW CHP Facility Site and the results were reported in the PEIR. The baseline as understood is described in **Section 13.5**.
Natural England	Natural England states that assessment will need to consider any impacts upon local wildlife and geological sites, including proposals for mitigation of any impacts and if appropriate, compensation measures, and to contact the local wildlife trust, geoconservation group or local sites body if further information is needed.	As stated in the Scoping Report there are no sites with statutory designations for geological conservation on the EfW CHP Facility Site. The baseline condition regarding geological Receptors for all components of the Proposed Development is defined in **Section 13.5**. It was concluded that, given the absence of nationally or locally designated geological sites within the Proposed Development, effects on geological Receptors can be scoped out for all elements of the Proposed Development. The Study Area for geological Receptors is defined in paragraph **13.4.2**. **Tables 13.10** and **13.11** provide the rationale for the scoping out of Receptors from the assessment. Effects on local wildlife are considered in **Chapter 11: Biodiversity (Volume 6.2).**
Natural England	Natural England states that impacts from the development should be considered in light of the Government's policy for the protection of the best and most versatile (BMV) agricultural land as set out in the NPPF, and that soils should be considered in the context of the sustainable use of land and the	The Applicant has consulted with Natural England with regard to soils and BMV land. Soil resources including agricultural soils were scoped out in the Scoping Report for the EfW CHP Facility Site as described at that time, due to this area being previously developed and used for industrial purposes, not in use for agricultural purposes and with no areas of soft landscaping, other than the

Consultee(s)	Issue raised	Response and how considered in this chapter
	ecosystem services they provide as a natural resource, as also highlighted in paragraph 170 of the NPPF. Note: Best and most versatile (BMV) agricultural land is defined as Grades 1, 2 and 3a in the Agricultural Land Classification (ALC) system defined by the MAFF.	boundary bunds, which were observed to contain made ground, with no natural topsoil at the surface. This indicates that the majority of the natural in situ soils will have been removed during previous site development. The Phase 1 geo-environmental desk studies for all elements of the Proposed Development confirm that the CHP Connection Corridor and Access Improvements are located on brownfield land, and although the EfW CHP Facility Site now includes open land, the relevant area is hedged and overgrown and there is evidence on aerial photography[2] of the land having been disturbed/used for an unknown use, since at least the 1990s. The TCC is located on land currently identified as Provisional ALC Grade 2. However, this area is noted to be allocated for urban extension in Fenland Local Plan 13 (2014), Policy LP8. Additionally, the compound will be temporary (for the Proposed Development construction phase), and the land will be reinstated as greenfield as part of the Proposed Development. However, given the above allocation, it is likely that this area will be developed, after the Proposed Development. At the PEIR stage, the Grid Connection was predominantly greenfield and in agricultural use and the baseline soil and agricultural land classifications for these areas were outlined in Chapter 13: Geology, Hydrogeology and Contaminated Land, Section 13.5 of the PEIR. The baseline has been updated in **Section 13.5** of this ES chapter and reflects the Order limits, specifically a large reduction in the Grid Connection area and it now being wholly within urban land (roads and an existing substation site). **Tables 13.10 and 13.11** provide the rationale for the scoping out of Receptors from the assessment.
Public Health England	Public Health England states that any hazardous contamination present on site (including ground gas) should be identified as part of a site condition	Phase 1 geo-environmental desk studies for all elements of the Proposed Development, and an intrusive ground investigation of the EfW CHP Facility Site as defined at that

[2] Google Earth Pro

Consultee(s)	Issue raised	Response and how considered in this chapter
	report. Public health impacts associated with ground contamination and/or the migration of material off-site should also be assessed and the potential impact on nearby Receptors and control and mitigation measures should be outlined.	time, have been completed and the relevant reports are appended to this ES (**Appendices 13A** and **13B (Volume 6.4)**). These reports include assessment of potential impacts on nearby Receptors and define areas where further investigation is needed to confirm the site's suitability for the Proposed Development in relation to land contamination, including ground gas, and to inform its design.
Public Health England	Emissions to and from the ground should be considered in terms of the previous history of the site and the potential of the site, once operational, to give rise to issues.	Phase 1 geo-environmental desk studies for all elements of the Proposed Development, and an intrusive ground investigation of the EfW CHP Facility Site, have been completed and the relevant reports were appended to the PEIR (**Appendices 13A** and **13B (Volume 6.4))** and are appended to this ES (**Appendices 13A** and **13B (Volume 6.4)**). These reports define areas where further investigation is needed to confirm the site's suitability for the Proposed Development in relation to land contamination, including ground gas, and to inform its design. The only element of the Proposed Development likely to have the potential to impact land quality during the operational phase is the EfW CHP Facility. The operational phase will be regulated under the Environmental Permitting (England and Wales) Regulations 2016, which requires the assessment of site condition, typically including collection of soil and groundwater baseline data for comparison with ongoing monitoring data during the operational phase and then additional data collected at the point of permit surrender. This forms an embedded environmental measure (see **Table 13.15**). If the Environment Agency is not satisfied with the proposed approach to collecting date or the data provided for the baseline for soil and groundwater, then it will request that additional baseline information is obtained through the use of improvement conditions requiring the information by a specific date. Ongoing monitoring of soil and groundwater is also likely to be a permit condition, this measure is designed to provide ongoing assurance that the permitted activity is not resulting in a deterioration in land condition.

Consultee(s)	Issue raised	Response and how considered in this chapter
		In addition, management of risks to the health and safety of workers and visitors to the EfW CHP Facility will be subject to The Health and Safety at Work Act 1974 (see **Table 13.3**).
Public Health England	Public Health England notes the following relevant areas outlined in the Government's Good Practice Guide for EIA including: • effects associated with ground contamination that may already exist • effects associated with the potential for polluting substances that are used (during construction/operation) to cause new ground contamination issues on a site, for example introducing/changing the source of contamination • impacts associated with re-use of soils and waste soils, for example, re-use of site-sourced materials on-site or offsite, disposal of site-sourced materials offsite, importation of materials to the site, etc.	Phase 1 geo-environmental desk studies for all elements of the Proposed Development, and an intrusive ground investigation of the EfW CHP Facility Site as defined at that time, have been completed and the relevant reports are appended to this ES (**Appendices 13A** and **13B (Volume 6.4)**). These reports define areas where further investigation is needed to confirm the site's suitability for the Proposed Development in relation to land contamination and to inform its design. Embedded environmental measures for soil management, handling and storage during construction are also described in **Table 13.15.** The only element of the Proposed Development likely to have the potential to impact land quality during the operational phase is the EfW CHP Facility. The operational phase will be regulated under the Environmental Permitting (England and Wales) Regulations 2016, which requires the assessment of site condition, typically including collection of soil and groundwater baseline data for comparison with ongoing monitoring data during the operational phase and then additional data collected at the point of permit surrender. This forms an embedded environmental measure (see **Table 13.15**). If the Environment Agency is not satisfied with the proposed approach to collecting date or the data provided as baseline for soil and groundwater, then it will request that additional baseline information is obtained through the use of improvement conditions requiring the information by a specific date. Ongoing monitoring of soil and groundwater is also likely to be a permit condition, this measure is designed to provide ongoing assurance that the permitted activity is not resulting in a deterioration in land condition.

13.2.3 A summary of the relevant responses received to the PEIR, together with any subsequent discussions held in relation to Geology, Hydrogeology and Contaminated Land and confirmation of how these have been considered within the

assessment to date is presented in **Table 13.2 Summary of PEIR responses for Geology, Hydrogeology and Contaminated Land together with any subsequent engagement** together with any subsequent engagement.

Table 13.2 Summary of PEIR responses for Geology, Hydrogeology and Contaminated Land together with any subsequent engagement

Consultee	Issue raised	Response
Natural England	In relation to soils where cables are to be laid, requiring existing topsoil and subsoil to be removed, stored and then backfilled, Natural England recommends the use of the Defra Construction Code of Practice for the Sustainable Use of Soils on Construction Sites for soil protection, and also that an appropriately experienced soil specialist is used to advise on, and supervise soil handling, including when soils are dry enough to be handled and how to make the best use of soils on site.	At the PEIR stage, the Grid Connection was predominantly within greenfield land in agricultural use and the baseline soil and agricultural land classifications for these areas was outlined in **Chapter 13: Geology, Hydrogeology and Contaminated Land, Section 13.5** of the PEIR. The Proposed Development included a large area (>20 hectares) with potential to be Grade 1 agricultural land according to the Ministry of Agriculture, Fisheries and Food (MAFF) ALC system[3]. The baseline has been updated in the ES in **Section 13.5** and reflects the Order limits, specifically the large reduction in the Grid Connection area and its location being now predominantly within urban land (roads and an existing substation). Although some soil is present e.g., within the roadside verge, the natural in situ soil is likely to have been previously disturbed and potentially removed for the construction of the road and is not considered to be a sensitive Receptor that could potentially be significantly impacted by the Proposed Development. However, embedded measures include good practice for soil handling in recognition that soil is effectively a non-renewable resource and that it is important to retain soil functions such as land drainage, and supporting plant growth etc. **Tables 13.10 and 13.11** provide the rationale for the scoping out of Receptors from the assessment. Embedded environmental measures relating to soil are set out in **Table 13.15.**
Public Health England (PHE)	During construction activity, PHE welcomes the inclusion of the Construction Management Plan (CMP) with commitments to mitigate	The Applicant has prepared an **Outline CEMP (Volume 7.12)** and has made a commitment to producing a final CEMP, reference to which is included in the embedded environmental measures set out in **Table 13.15** and will **be a** DCO Requirement.

[3] MAFF. Agricultural Land Classification of England and Wales: Revised criteria for grading the quality of agricultural land (ALC011) (1998).

Consultee	Issue raised	Response
	exposure to air pollution, including dust, to as low as possible below air quality standards.	
Environment Agency	The Agency notes that the project is for the construction and operation of a combined heat and power incinerator with a nominal electrical output of 53MWe, and that an environmental permit is required from the Agency before commencement of operations, under the Environmental Permitting (England and Wales) Regulations 2016. (EPR) (as amended). The Agency's determination of an application for a permit will include the following key areas with regard to geology, hydrogeology and land contamination: • "Management: - including general management, accident management.", • "Emissions to air and discharges to water, land and groundwater along with odour, noise and vibration"; The above are assessed within the requirements of Best Available Techniques (BAT). BAT is required to be considered in order to avoid or reduce emissions resulting from certain installations and to reduce the impact on the environment as a whole. The Agency states that it cannot grant a permit until it is satisfied that the operation of the process will not cause significant pollution to the environment or harm to human health.	There is overlap between the Environmental Permitting Regulations 2016, as amended (EPR 2016) and the UK contaminated land regime. However, the permitting regime primarily aims to prevent future pollution of land (soil and groundwater) that could occur due to the operation of a permitted installation, in this case the proposed EfW CHP Facility. Whilst the UK approach to contaminated land assessment for planning purposes is risk based, under EPR 2016 the operational Energy from Waste CHP Facility will not be permitted to release relevant hazardous substances, or other polluting substances, to ground (soil and groundwater). If the Environment Agency believes that contamination of soil or groundwater can reasonably be attributed to the operator of a permitted installation, the operator will typically be liable for carrying out remediation regardless of the level of risk to environmental or other Receptors.
Wisbech Town Council	Response states that it is unclear whether the Study Area concerns the entire	At scoping options were presented for the route of the Grid Connection. At the PEIR stage the assessment of geology,

Consultee	Issue raised	Response
	application site or only the Energy from Waste CHP Facility. It also noted that the Scoping Opinion makes clear that the ES should include an assessment of the effects on geology where a significant effect is likely to occur.	hydrogeology and ground conditions effects included two Grid Connection Corridor options. For the ES the Order limits have been refined based on the Grid Connection to the Walsoken Substation only, and as a result the Study Area has been reduced. To date Phase 2 ground investigation has been completed on land to be occupied by the EfW CHP Facility, and all land in the Order limits has been subject to Phase 1 geoenvironmental desk study assessment, recommendations are made in the reports for further Phase 2 investigation. This will be complete pre-construction and will be secured via a DCO Requirement. In the absence of nationally or locally designated geological sites within the Proposed Development, effects on geological Receptors have been scoped out for all elements of the Proposed Development. The Study Area for geological Receptors is defined in **Section 13.4**. **Tables 13.10** and **13.11** provide the rationale for the scoping out of Receptors from the assessment.
Cambridgeshire County Council	No specific comment with regard to geology, hydrogeology and contaminated land.	Noted no comments on the approach to geology, hydrogeology and contaminated land.
Borough Council of Kings Lynn and West Norfolk	Notes that the Council's comments on the scoping report were not reported in the PEIR summary of EIA Scoping Opinion responses, but that Cambridge County Council and Fenland District Council both required a Phase 1 and Phase 2 contaminated land investigation and that the relevant Receptors in the Kings Lynn and West Norfolk area were scoped in. Notes that a Phase 1 geo-environmental desk study for the Proposed Development, and an intrusive ground investigation, are reported to have been completed and the relevant reports are appended to the PEIR.	Agreement noted that the conclusions in the Phase 1 and Phase 2 geoenvironmental reports included in the PEIR are reasonable. Noted requirement for further land contamination assessment works to be undertaken to inform the design. Embedded mitigation measures relating to soil are set out in **Table 13.14.**

Consultee	Issue raised	Response
	The conclusions and recommendations of the Grid Connection Corridor Phase 1 Geoenvironmental Desk Study and Interpretative Report and the EfW CHP Facility Phases 1 and 2 Geoenvironmental Desk Study and Interpretative Report are reasonable. Further work will be required to include the reports' recommendations in the final design.	

13.3 Relevant legislation, planning policy, technical guidance

Legislative context

13.3.1 Legislation relevant to the assessment of the effects on Geology, Hydrogeology and Contaminated Land Receptors is provided in **Table 13.3 Legislative context for Geology, Hydrogeology and Contaminated Land** below:

Table 13.3 Legislative context for Geology, Hydrogeology and Contaminated Land

Legislation	Implications
European Union Groundwater Directive (2006/118/EC), 2006	The aim of the Groundwater Directive (also known as the 'daughter directive' to the Water Framework Directive[4]) is to protect groundwater against pollution caused by dangerous substances. The potential for the elements of the Proposed Development to have an effect on groundwater bodies through the introduction of dangerous substances during the construction and operation phases requires assessment. The objectives of the Water Framework Directive and the Groundwater Directive are implemented in England through
European Union Water Framework Directive (2000/60/EC), 2000	The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, and elements of the Environmental Permitting (England and Wales) Regulations 2016, these regulations are also the current means by which the EfW CHP Facility will be regulated during its operational phase.
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017	On 31 December 2020, the UK exited the European Union following the expiry of the "transition period", as provided for by the European Union (Withdrawal) Act 2018 (Withdrawal Act 2018). Sections 2-3 of the Withdrawal Act 2018, as amended, provide that direct EU legislation, and EU-derived domestic legislation, continue to have effect in UK domestic law after that date. In summary, the interpretation of any retained EU law is to be the same as it was before that date, insofar as the retained

[4] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

Legislation	Implications
	EU law remains unmodified in UK law and regulations have not been made providing otherwise (s. 6(3) of the Withdrawal Act 2018). Embedded environmental measures detailed in **Table 13.15** of this chapter will help ensure the protection of groundwater during the construction and operational phases.
Water Resources Act 1991 as amended by the Water Act 2003	The Water Resources Act 1991 states that it is an offence to cause or knowingly permit polluting, noxious, poisonous or any solid waste matter to enter controlled waters. The 1991 Act was revised by the Water Act 2003, which provides the definition of and regulatory controls for the protection of water resources, including the quality standards expected for controlled waters. The 2003 Act sets out the definition of controlled waters which has been used to define the scope of Receptors for the assessment in **Section 13.6.** Embedded environmental measures are detailed in **Section 13.7** of this chapter that will help ensure the protection of controlled water during the construction and operational phases.
The Environmental Protection Act 1990	Part 2 of the Act makes provision for the improved control of pollution arising from certain industrial and other processes. Part 2A of the Act provides the regulatory basis for the identification, designation, and remediation of Contaminated Land. The potential for the development, including the EfW CHP Facility, Access Improvements, TCC, CHP Connection and the Grid Connection to be built on land potentially affected by historical contamination requires assessment to ensure the land is suitable for the proposed land-use and that, where necessary, remediation is carried out to ensure the land cannot be determined as Contaminated Land under the Act. The approach to incorporating the requirements on the Act is outlined in **Section 13.7.**
The Town and Country Planning Act 1990	The Act requires the consideration of the potential for contamination to be present and ensure a site is suitable for the proposed end use.
European Union Directive on environmental liability with regard to the prevention and remedying of environmental damage (2004/35/CE), 2004 **Environmental Damage (Prevention and Remediation) (England) Regulations 2015**	Regulations implementing the EU directive on environmental liability (2004/35/CE) setting out the principles for prevention and remedy of environmental damage. Construction and operational activities for all elements of the Proposed Development have the potential to cause pollution and the regulations place emphasis on businesses to proactively implement pollution prevention measures so that damage to the environment does not arise. On 31 December 2020, the UK exited the European Union following the expiry of the "transition period", as provided for by the European Union (Withdrawal) Act 2018 (Withdrawal Act 2018). Sections 2-3 of the Withdrawal Act 2018, as amended, provide that direct EU legislation, and EU-derived domestic legislation, continue to have effect in UK domestic law after that date. In summary, the interpretation of any retained EU law is to be the same as it was before that date, insofar as the retained EU law remains unmodified in UK law and regulations have not been made providing otherwise (s. 6(3) of the Withdrawal Act 2018). Embedded environmental measures are detailed in **Section 13.7** of this chapter that will help ensure the prevention of pollution during the construction and operational phases.

Legislation	Implications
The Environmental Permitting (England and Wales) Regulations 2016, as amended **The Industrial Emissions Directive (2010/75/EU)**	The EfW CHP Facility will require an operating permit from the Environment Agency under the Environmental Permitting (England and Wales) Regulations (EPR) 2016, as amended, as a Schedule 1 Part A installation. The EPR regime in England implements the Industrial Emissions Directive (IED) and requires the assessment of site condition, typically including collection of soil and groundwater baseline data for comparison with ongoing monitoring data during the operational phase and then additional data collected at the point of permit surrender. The EPR regime requires operators to use best available techniques (BAT), and to demonstrate the measures they have taken to protect the land, both in terms of physical pollution prevention measures such as hardstanding and bunds and the management systems and procedures in place to prevent accidental releases of pollutants to land. This lowers the risk of emissions to soil or groundwater occurring during permitted operations and operators cannot surrender their permit until they have demonstrated to the regulator that the land is in a 'satisfactory state' which typically means in no worse a condition than at the beginning of the operations. On 31 December 2020, the UK exited the European Union following the expiry of the "transition period", as provided for by the European Union (Withdrawal) Act 2018 (Withdrawal Act 2018). Sections 2-3 of the Withdrawal Act 2018, as amended, provide that direct EU legislation, and EU-derived domestic legislation, continue to have effect in UK domestic law after that date. In summary, the interpretation of any retained EU law is to be the same as it was before that date, insofar as the retained EU law remains unmodified in UK law and regulations have not been made providing otherwise (s. 6(3) of the Withdrawal Act 2018). Compliance with EPR 2016 forms part an embedded mitigation measure (see **Table 13.15**).
The Construction Design and Management Regulations 2015	The Construction (Design and Management) Regulations 2015 (CDM 2015) place specific duties on clients, designers, and contractors, so that health and safety is considered throughout the life of a construction project from its inception to its subsequent final demolition and removal. They include the requirement to appoint a Principal Designer and Principal Contractor to co-ordinate health and safety aspects during construction. Under CDM 2015, designers must avoid foreseeable risks so far as reasonably practicable by: eliminating hazards from the construction, cleaning, maintenance, and proposed use and demolition of a structure; reducing risks from any remaining hazard; and giving collective safety measures priority over individual measures. Construction of the Proposed Development, will fall under the requirements of CDM 2015, requiring consideration of health and safety to be incorporated into the design and at the construction stage. Phase 1 geoenvironmental desk studies for all areas of the Proposed Development, and an intrusive ground investigation of the EfW CHP Facility, have been completed and the relevant reports will be appended to the ES. These reports define areas where further investigation is needed to confirm the site's suitability for the Proposed Development in relation to land contamination, including ground gas, and to inform its design in relation to geo-hazards including ground instability. Compliance with the requirements of CDM 2015 forms an embedded mitigation measure (see **Table 13.15**).
The Health and Safety at Work Act 1974	The Health and Safety at Work Act and regulations made under the Act (notably The Management of Health and Safety at Work Regulations 1999) place responsibilities upon employers to carry out a risk assessment for every work activity and to document it. Besides carrying out a risk assessment, employers also need to:

Legislation	Implications
	make arrangements for implementing the health and safety measures identified as necessary by the risk assessment; appoint competent people to help them implement the arrangements; set up emergency procedures; provide clear information and training to employees; and work together with other employers sharing the same workplace. Land contamination poses a hazard to groundworkers and potentially others in proximity to the construction work. Appropriate risk assessments must be carried out and arrangements made to protect the health and safety of workers directly involved in groundworks for the Proposed Development, and other human Receptors who could be affected. Compliance with the requirements of the Act in relation to ground conditions during the construction phase is an embedded mitigation measure (see **Table 13.15**).
The Control of Asbestos Regulations 2012	The Control of Asbestos Regulations 2012 (CAR 2012) requires employers to prevent the exposure to asbestos of any employee so far as is reasonably practicable. Where it is not reasonably practicable to prevent exposure, the employer must take the measures necessary to reduce exposure of any such employee to the lowest level reasonably practicable, using measures other than the use of respiratory protective equipment. To comply with CAR 2012, in respect of asbestos-contaminated soil and construction and demolition materials, employers must consider people other than their own employees in the risk assessment required by Regulation 6, and in the action taken to prevent or control exposure required by Regulation 11. The other key regulation relevant to the Proposed Development is the requirement under Regulation 16 to prevent or reduce the spread of asbestos. Every employer must prevent or, where this is not reasonably practicable, reduce to the lowest level reasonably practicable, the spread of asbestos from any place where work under the employer's control is carried out. During construction works for the Proposed Development there is the potential for localised asbestos containing materials or soils to be encountered in the ground. Asbestos can be found on agricultural land because of historical ad hoc waste disposal to land or releases of fibres from Asbestos Containing Materials ('ACM') structures in poor condition, and subsequent spread by farm vehicles. Application of CAR 2012 during the construction works in relation to ground disturbance is an embedded mitigation measure (see **Table 13.15**).
The Building Regulations 2010 (SI 2010/2214)	Regarding contaminated land, the Building Regulations 2010 set out requirements for buildings to be resistant to contaminants and moisture, including dangerous substances such as ground gas (including carbon dioxide and methane) and for water supply pipes to be suitably constructed to prevent contamination of the water supply occurring (including from the surrounding soil or groundwater). Application of the Building Regulations during the construction phase will be addressed through compliance with CDM 2015 and it is not assessed further in the EIA. Compliance with the requirements of CDM 2015 forms an embedded mitigation measure (see **Table 13.15**).

Planning policy context

13.3.2 There are several policies at the national and local level that are relevant to the Proposed Development. The overarching National Policy Statements (NPS), which provide the primary policy basis for the consideration of Nationally Significant Infrastructure Projects, are provided in **Table 13.4 Planning policy context for Geology, Hydrogeology and Contaminated Land: Adopted National Policy Statements**. This section should be read in conjunction with **Chapter 5: Legislation and Policy (Volume 6.2)**.

Table 13.4 Planning policy context for Geology, Hydrogeology and Contaminated Land: Adopted National Policy Statements

Policy reference	Implications	Section addressed
Overarching National Policy Statement for Energy (EN-1)	5.3.3 states that the applicant should ensure that the ES "*clearly sets out any effects on internationally, nationally and locally designated sites of … geological conservation importance*". 5.10.8 states that *"Applicants should seek to minimise impacts on the best and most versatile agricultural land (defined as and in grades 1, 2 and 3a of the Agricultural Land Classification) and preferably use land in areas of poorer quality (grades 3b, 4 and 5) except where this would be inconsistent with other sustainability considerations. Applicants should also identify any effects and seek to minimise impacts on soil quality considering any mitigation measures proposed. For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination."* 5.15.2 states that "*where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment as part of the ES or equivalent*".	The baseline conditions with regard to sites of geological importance is presented in **Section 13.5**. The baseline conditions with regard to controlled waters (hydrogeology) is presented in **Section 13.5** (potential effects on surface water Receptors are assessed in **Chapter 12: Hydrology (Volume 6.2)**). Potential effects on geological Receptors and water environment Receptors scoped out of the assessment are detailed in **Section 13.6**. Embedded environmental measures in relation to soil and agricultural land protection are detailed in **Section 13.7.** The assessment of potential effects on these Receptors is presented in **Section 13.8.**
National Policy Statement for Renewable Energy Infrastructure (EN-3)	2.5.83 notes that the management of hazardous waste in energy from waste plants will be considered by the Environment Agency through the	The regulation of the proposed EfW CHP Facility under the Environmental Permitting Regulations 2016, as amended, is discussed as an embedded

Policy reference	Implications	Section addressed
	Environmental Permitting regime.	mitigation measure in **Section 13.7**.
National Policy Statement for Electricity Networks Infrastructure (EN-5)	EN-5 notes the general duty at Schedule 9 to the Electricity Act 1989 that proposals for new electricity infrastructure should "*have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest*…". 2.8.9 relates to overhead and underground cable options and notes that the Government has not laid down any general rule about when an overhead line should be considered unacceptable. "*The IPC should, however, only refuse consent for overhead line proposals in favour of an underground line if it is satisfied that the benefits from the non-overhead line alternative will clearly outweigh any extra economic, social and environmental impacts and the technical difficulties are surmountable.*" In this context considerations should include *"the environmental and archaeological consequences (undergrounding a 400kV line may mean disturbing a swathe of ground up to 40 metres across, which can disturb sensitive habitats, have an impact on soils and geology, and damage heritage assets, in many cases more than an overhead line would)*".	The baseline conditions with regard to sites of geological importance is presented in **Section 13.5**. Potential effects on geological Receptors scoped out of the assessment are detailed in **Section 13.6**. Embedded environmental measures in relation to soil Receptors are detailed in **Section 13.7**.

13.3.3 In September 2021, The Department of Business, Energy and Industrial Strategy (BEIS) consulted upon a review of energy NPS with consultation closing on 29 November 2021. The energy NPS were reviewed to reflect the policies and broader strategic approach set out in the Energy White Paper and ensure a planning framework was in place to support the infrastructure requirement for the transition to net zero.

13.3.4 **Table 13.5 Planning policy context for Geology, Hydrogeology and Contaminated Land: Draft National Policy Statements** summarises those Draft energy NPS which are considered to be relevant to the Proposed Development.

Table 13.5 Planning policy context for Geology, Hydrogeology and Contaminated Land: Draft National Policy Statements

Policy reference	Implications	Section addressed
Draft Overarching National Policy Statement for Energy (EN-1)	Section 5.11 covers land use and states that applicants should seek to minimise impacts on the best and most versatile agricultural land (grades 1, 2 and 3a of the Agricultural Land Classification (ALC)) and preferably use land in areas of poorer quality (grades 3b, 4 and 5) except where this would be inconsistent with other sustainability considerations. 5.11.8 states: *"Applicants should also identify any effects and seek to minimise impacts on soil quality taking into account any mitigation measures proposed. For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination, and where contamination is present, applicants should consider opportunities for remediation where possible. Applicants are encouraged to develop and implement a Soil Management Plan which could help minimise potential land contamination."* 5.11.18 also refers to the need to protect soils during construction.	The Proposed Development boundary presented in the PEIR included areas of land with potential to be BMV agricultural land, including Grade 1 and 2 ALC land. The Order limits for the Proposed Development now avoid potential Grade 1 ALC land because the proposed underground cable is routed along the highway verge rather than through fields. The area of potential Grade 2 land at the EfW CHP Facility, that has not been previously developed, has been reduced by the revisions to the Order limits. The baseline is described in **Section 3.15**. Likely significant effects are described in **Section 13.16** and embedded environmental measures are covered in **Section 13.7**.
Draft National Policy Statement for Renewable Energy Infrastructure (EN-3)	No specific requirements in relation to Geology, Hydrogeology and Contaminated Land.	Not applicable.
Draft National Policy Statement for Electricity Networks Infrastructure (EN-5)	2.11.14 requires consideration of underground electricity network development effects on soil, geology and agricultural land, particularly BMV land, as described below: *"the developer's commitment, as set out in their ES, to mitigate the potential detrimental effects of undergrounding works on any relevant agricultural land and soils, particularly regarding Best and Most Versatile land. Such a commitment must guarantee appropriate handling of soil, backfilling, and return of the land to the baseline Agricultural Land Classification (ALC), thus ensuring no loss or degradation of agricultural land. Such a commitment should be based on soil and ALC surveys in line with the 1988 ALC*	The baseline condition with regard to soil, geology and agricultural land is detailed in **Section 13.5**. Potential effects on soil, geology and agricultural land scoped out of the assessment are detailed in **Section 13.6**.

Policy reference	Implications	Section addressed
	criteria and due consideration of the Defra Construction Code."	

13.3.5 Other national and local policies which may provide additional guidance which can be considered material to the consideration of a NSIP are detailed in **Table 13.6 Planning policy context for Geology, Hydrogeology and Contaminated Land: National and local planning policies,** below.

Table 13.6 Planning policy context for Geology, Hydrogeology and Contaminated Land: National and local planning policies

Policy reference	Implications	Section addressed
National Planning Policy Framework (NPPF)	In relation to geology and land contamination: The NPPF sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally prepared plans for housing and other development can be produced. The NPPF at Paragraph 8 states that: "Achieving sustainable development means that the planning system has three overarching objectives…: c) an environmental objective – to contribute to protecting and enhancing our natural… environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, … mitigating and adapting to climate change… " Paragraph 120 states that: "planning policies and decisions should: b) recognise that some undeveloped land can perform many functions, such as for wildlife, recreation, flood risk mitigation…carbon storage or food production", and c) give substantial weight to the value of using suitable brownfield land within settlements for homes and other identified needs, and support appropriate opportunities to remediate despoiled, degraded, derelict, contaminated or unstable land.	With regard to paragraphs 120, 174, 183 and 184 the Proposed Development is required to make effective use of land, the site must be demonstrated by the developer to be suitable for the proposed use taking account of ground conditions arising from contamination, using adequate site investigation information, prepared by a competent person, and if remediation is needed then, as a minimum, after remediation, the land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990. The new development should not contribute to unacceptable level of soil or water pollution and this includes taking account of potential impacts on nearby sensitive environmental Receptors through contaminant migration (e.g., through the soil profile or in groundwater). All of the above requirements are dealt with through compliance with the UK Government's Land contamination risk management (LCRM) guidance 2020, which follows an established process of land quality assessment from desk study through to site investigation and, if necessary, remediation to ensure that land contamination does not pose a

Policy reference	Implications	Section addressed
	Paragraph 174 states that: "Planning policies and decisions should contribute to and enhance the natural and local environment by: a) ...protecting and enhancing… valued landscapes, sites of biodiversity… value and soils… (in a manner commensurate with their identified quality in the development plan) b). recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services, including the economic and other benefits of the best and most versatile agricultural land. d)…minimising impacts on and providing net gains for biodiversity" e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil… pollution or land instability f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate." Paragraph 175, footnote 58: "Where significant development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality." Note: Best and most versatile land is defined as land in grades 1, 2 and 3a of the Agricultural Land Classification. Paragraph 183 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", and b) After remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990." Paragraph 184 states that: "Where a site is affected by contamination or land stability issues,	significant risk to sensitive Receptors. The baseline condition with regard to soil, agricultural land, geology and land contamination is detailed in **Section 13.5**. Potential effects on soil, agricultural land, geology and land contamination scoped out of the assessment are detailed in **Section 13.6**. The embedded environmental measures for Geology, Hydrogeology and Contaminated Land Receptors are set out in **Section 13.7**.

Policy reference	Implications	Section addressed
	responsibility for securing a safe development rests with the developer and/or landowner."	
National Planning Policy for Waste (2014)	No specific requirements in relation to Geology, Hydrogeology and Contaminated Land.	Not applicable.
Waste Management Plan for England (2021)	In relation to sustainable waste management, it is noted that the construction, demolition and excavation sector is the largest contributing sector to the total waste generation for the UK and that 43% of this is classed as 'soils'.	The embedded environmental measures to avoid effects on soils and to maximise the reuse of excavated soils within the Proposed Development are outlined in **Section 13.7**.
Resources and Waste Strategy 2018	No specific requirements in relation to Geology, Hydrogeology and Contaminated Land.	Not applicable.
Local Policy		
Cambridgeshire County Council and Peterborough City Council Minerals and Waste Local Plan 2036 (2021)	As described in **Chapter 5 Legislation and Policy**, Cambridgeshire County Council (CCC) and Peterborough City Council Minerals and Waste Local Plan 2036 was adopted on 28 July 2021. Policy 20 includes the requirement to protect geodiversity, avoiding development on sites of international or national importance. Development on Local Geological Sites will only be permitted where the need and benefits of the development clearly outweigh the loss. This policy states that "All developments must: (e)avoid negative impacts on biodiversity and geodiversity." Policy 24 'Sustainable Use of Soils' states that: "waste development which adversely affects agricultural land categorised as 'best and most versatile' will only be permitted where it can be shown that:(a) it incorporates proposals for the sustainable use of soils (whether that be off-site or as part of an agreed restoration scheme); and (b) (for non-allocated sites) there is a need for the development and an absence of suitable alternative sites using lower grade land has been demonstrated." "Peat soils in particular should be protected and preserved. Where development is proposed on land containing peat soils, the developer must	Potential impacts due to the Proposed Development are considered in **Section 13.6.** The baseline review in **Section 13.5** has not identified the potential for significant quantities or thicknesses of peat deposits within the Proposed Development (typical maximum thickness of peat encountered in previous borehole logs in the surrounding area is 0.1m).

Policy reference	Implications	Section addressed
	submit a proportionate evaluation of the impact of the proposal on the peat soils and an appropriate soil management plan. Development proposals that will result in unavoidable harm to, or loss of, peat soils will only be permitted if it is demonstrated that: (c) there is not a less harmful viable option ; (d) the amount of harm has been reduced to the minimum possible; (e) if appropriate, satisfactory provision is made for the evaluation, recording and interpretation of the peat soils before commencement of development; and (f) the peat soils will be temporarily stored and then used, in a way that will limit carbon loss to the atmosphere."	
Cambridgeshire County Council and Peterborough City Council Minerals and Waste Local Plan Adopted Amendments to the Policies Map (2021)	Confirms the majority of the EfW CHP Facility Site is a "Waste Management Area" i.e., it's an existing waste management site. No specific requirements in relation to Geology, Hydrogeology and Contaminated Land.	Not applicable.
Peterborough City Council Minerals and Waste Local Plan Adopted Amendments to the Policies Map (2021), Appendix 3: Location and Design of Waste Management Facilities (2021)	No specific requirements in relation to Geology, Hydrogeology and Contaminated Land.	Not applicable.
Fenland Local Plan (Adopted) (2014)	In relation to agricultural land, Paragraph 2.4.2, Objective 1.1 relates to minimising the irreversible loss of undeveloped land. Objective 5.1 and 5.2 of the Local Plan relate to reducing emissions and risk of pollution from contaminated land. Paragraph 6.2.5 requires risks from landfill gas or suspected land contamination to be brought to the Council's and other relevant stakeholders' attention for discussion and risk assessment in accordance with the 'Model procedures for land contamination (CLR11)', which has now	The Fenland Local Plan is referenced in **Section 13.5** in relation to the future land use. Potential effects on Geology, Hydrogeology and Contaminated Land Receptors scoped out of the assessment are detailed in **Section 13.6**. The embedded environmental measures in relation to Geology, Hydrogeology and Contaminated Land are detailed in **Section 13.7.**

Policy reference	Implications	Section addressed
	been superseded by the UK Government's Land contamination risk management (LCRM) guidance[5]. The local plan notes that The Fens has half of England's Grade 1 and 2 agricultural land. The Council wishes to promote access to healthy and local food, which also has the additional benefit of being low carbon food due to the low mileage such foods have travelled. All development, whenever possible, should contribute to meeting this aim. Council policy LP7 for urban extensions is to make use of the best quality soils for allotments, where the development of the urban extension has to take place on agricultural land of the best and most versatile quality. Policy LP19 relates to conservation of the natural environment including its geological interest. This includes protecting and enhancing sites which have been designated for their international, national or local importance to an extent that is commensurate with their status, in accordance with national policy in the National Planning Policy Framework. The plan identifies current greenfield land as allocated for urban expansion as the 'South Wisbech (Broad Location for Growth)'.	
Fenland District Council Delivering and Protecting High Quality Environments in Fenland Supplementary Planning Document (2014)	Section 12 requires developers applying for development on or near to known or potentially contaminated land to undertake a detailed site investigation and risk assessment set out in a report to accompany the application. Conditions are likely to be applied if contamination is considered to be an issue that can be acceptably resolved at a later stage.	Details of contaminated land assessment for the Proposed Development are provided in **Sections 13.4** and **13.5** and reports are appended to the ES (**Appendix 13A** and **13B (Volume 6.4)**). Embedded environmental measures relating to land contamination assessment are set out in **Section 13.7**.
Norfolk Core Strategy and Minerals and Waste Development Management Policies DPD (2011)	Table 5.1 Aims and objectives states an objective to minimise soil and water contamination arising from waste activities.	The embedded environmental measures to avoid effects on soils, water and other land contamination Receptors, and to protect clean soils and maximise

[5] Environment Agency. Land contamination risk management (LCRM). (2021)

Policy reference	Implications	Section addressed
	Core Strategy Policy CS14 – Environmental Protection requires that developments ensure there are no unacceptable adverse impacts on, and ideally improvements to, natural resources including water and soil, and geodiversity. Development Management Policy DM16 – Soils, states that Development proposals affecting Grade 1 agricultural land will only be permitted in exceptional circumstances, where it is demonstrated that there are no alternative locations for the development.	the reuse of excavated soils within the Proposed Development, are outlined in **Section 13.7**.
Norfolk Minerals Site Specific Allocations DPD 2013 with amendments 2017	No specific requirements in relation to Geology, Hydrogeology and Contaminated Land.	Not applicable.
Norfolk County Council Waste Site Specific Allocations DPD 2013	No specific requirements in relation to Geology, Hydrogeology and Contaminated Land.	Not applicable.
Norfolk County Council, Norfolk Minerals and Waste Development Framework, Revised Policies Map and Site Allocations	No specific requirements in relation to Geology, Hydrogeology and Contaminated Land.	Not applicable.
King's Lynn and West Norfolk Local Development Framework Core Strategy (2011)	CS01 notes that significant emphasis is placed on brownfield redevelopment within the towns and villages. CS06 'Development in Rural Areas' states that the development of greenfield sites will be resisted unless essential for agricultural or forestry needs. CS12, 7.5.5 states that the Council will work to the provisions of the Planning Policy Statements (PPS) (now replaced by the National Planning Policy Framework) to ensure that geodiversity is protected, and that opportunities for enhancement sensitive to the area and feature are grasped. There is no specific policy coverage in respect of geology, soils and agricultural land, hydrogeology, and land contamination.	The embedded environmental measures in relation to potential land contamination/development on brownfield land are detailed in **Section 13.7.** The embedded environmental measures regarding agricultural land protection are outlined in **Section 13.7**.

Policy reference	Implications	Section addressed
King's Lynn and West Norfolk Local Development Framework Site Allocations and Development Management Policies (2016)	C.16.6 requires that land contamination be assessed in relation to relevant standards and national guidance. Policy DM 15 – Environment, Design and Amenity and Policy DM 20 Renewable Energy state that applications will be assessed to determine whether the benefits are outweighed by the impacts with reference to contaminated land. Additionally, the Borough Council of King's Lynn and West Norfolk (KLWN) will resist proposals where the land in the best and most versatile agricultural land are proposed to be used and there is significant loss of agricultural land.	The embedded environmental measures in relation to potential land contamination are detailed in **Section 13.7.** The assessment of potential effects of the proposed development on land contamination Receptors is presented in **Section 13.8.** The embedded environmental measures with regard to agricultural land protection are outlined in **Section 13.7**. The assessment of potential effects of the proposed development on agricultural land is presented in **Section 13.10.**

Technical guidance

13.3.6 Technical guidance used to inform the assessment is listed in **Table 13.7 Technical guidance for Geology, Hydrogeology and Contaminated Land assessment** below.

Table 13.7 Technical guidance for Geology, Hydrogeology and Contaminated Land assessment

Technical guidance	Implications
Land Contamination:	
UK Government (2012), The Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance	The Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance sets out how local authorities should implement the Part 2A regime, including how they should go about deciding whether land is contaminated land as referred to in the Environmental Protection Act 1990. It also elaborates on the remediation provisions of Part 2A, such as the goals of remediation, and how regulators should ensure that remediation requirements are reasonable.
UK Government (2020), Land Contamination Risk Management (LCRM)	Land Contamination Risk Management (LCRM) provides the technical framework for applying a risk management process when dealing with land affected by contamination.
BS10175: 2011 + A2: 2017 Investigation of Potentially Contaminated Sites – Code of Practice	Provides guidance and recommendations for the investigation of potentially contaminated sites.
National House Building Council (NHBC) (2008), Guidance for the Safe Development of Housing on Land Affected by Contamination	The guidance, whilst written to be relevant to housing development, is also generally applicable to other forms of development, to existing developments and to undeveloped land, where such sites

Technical guidance	Implications
	are on land affected by contamination. It was designed to accord with the Model Procedures in Contaminated Land Report 11 (now replaced by the LCRM, however the approach is broadly unchanged) and describes the processes and activities involved in hazard identification and assessment, risk estimation and evaluation and remediation (design, implementation, and verification).
CL:AIRE (2010), A Framework for Assessing the Sustainability of Soil and Groundwater Remediation	A Framework for Assessing the Sustainability of Soil and Groundwater Remediation provides a framework for assessing the sustainability of remediation and informing the decision-making process where remediation measures are required.
CAR-SOIL (2016): Control of Asbestos Regulations 2012, Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials	CAR-SOIL: Control of Asbestos Regulations 2012, Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials provides interpretation and guidance to all involved in the management of asbestos in both soils and construction and demolition arisings in accordance with the Control of Asbestos Regulations 2012. This guidance applies to any work that involves asbestos including construction works where asbestos containing materials or asbestos fibres are present in soil. Key requirements regarding the assessment include preventing the spread of asbestos.
CL:AIRE (2011, Definition of Waste Code of Practice (DoWCoP)	The Code of Practice (CoP) sets out good practice for developers to use when: assessing on a site-specific basis whether excavated materials are classified as waste or not; and, determining on a site-specific basis when treated excavated waste can cease to be waste for a particular use.
HM Government, Site Preparation and Resistance to Contaminants and Moisture (2004) (incorporating 2010 and 2013 amendments)	This deals with the following requirement of the Building Regulations 2010; 'Reasonable precautions shall be taken to avoid danger to health and safety caused by contaminants on or in the ground covered, or to be covered by the building and any land associated with the building.'
Environment Agency (2013), Environmental Permitting Regulations H5 Site Condition Report guidance[6]	This sets out the requirement for site condition reporting during the lifespan of a permit issued under EPR 2016. This is relevant to the construction and operational phase of the EfW CHP Facility (other elements of the Proposed Development will not fall under EPR 2016).
Soils	
CIRIA (2015), CIRIA Report C741: Environmental Good Practice on Site[7]	Provides practical advice about managing construction on site to minimise environmental impacts.

[6] Environment Agency *Environmental Permitting Regulations H5 Site Condition Report guidance* (2013).
[7] CIRIA *Report C741: Environmental Good Practice on Site, fourth edition* (2015).

Technical guidance	Implications
Defra (2009): Construction Code of Practice for the Sustainable Use of Soils on Construction Sites	Outlines current guidance and legislation concerning the use of soil in construction projects, before offering stage by stage guidance on the use, management, and movement of soil on site, and the completion of appropriate soil resource surveys to inform the site working strategy (e.g., Site Waste Management Plan or Material Management Plan) and for the construction phase preparation of a Soil Resource Plan.
BS6031: 2009 Code of practice for earthworks	Provides recommendations and guidance for unreinforced earthworks forming part of general civil engineering construction, except for dams. This standard also gives recommendations and guidance for temporary excavations such as trenches and pits.
BS3882: 2015 Specification for Topsoil	Specifies requirements for the classification and composition of natural and manufactured topsoils that are moved or traded for creating soil profiles intended to support plant growth. The standard is not applicable to subsoil, or to topsoil that is to remain in situ, however, it is not intended to preclude the use of topsoil that is already on site and suitable for its intended purpose. States that if natural topsoil is to be used without stockpiling, the topsoil shall be sampled before stripping, to the full depth that is intended to be stripped. Before sampling, a soil resource survey shall be carried out in accordance with the Defra Code of Practice 2009. Provides recommendations for topsoil stripping, handling, storage and preparation.
Natural England (2021), Guide to Assessing Development Proposals on Agricultural Land	States that Natural England must be consulted for development proposals that are both: likely to cause the loss (or likely cumulative loss) of 20ha or more of BMV land; and, not in accordance with an approved development plan.
Natural England (2012) Technical Information Note TIN049	States that the ALC agricultural land grading system, which considers climate, site, and soil characteristics, is used by Natural England to give advice to planning authorities when development is proposed on agricultural land or other greenfield sites that could potentially grow crops.

13.4 Data gathering methodology

Study Area

13.4.1 Baseline data collection has been undertaken to obtain information over the Study Area as described below. The current baseline conditions (based on information acquired to date) are presented in **Section 13.5**.

13.4.2 For geology, soils and agricultural land assessment, the Study Area is defined as the Order limits for all elements of the Proposed Development. This is because there is no external zone of influence for geology, soils, and agriculture beyond this, as geology, soils and agricultural land are geographically discrete and not substantially

influenced by changes to the surroundings. e.g., effects on soil can occur during the construction phase e.g., due to soil handling, due to vehicle/plant movements over the soil, or due to permanent effects on the soil (or a geological Receptor) such as excavation and offsite disposal or soil sealing (e.g., covering soil in hard surfacing such as concrete). Baseline information for these Receptors has been gathered through desk study, and the findings are reported in **Section 13.5**.

13.4.3 For hydrogeology and land contamination there is a zone of influence beyond the Order limits. Baseline information for hydrogeology and land contamination has been acquired through completion of phase 1 geoenvironmental desk studies for all areas of the Proposed Development, and an intrusive ground investigation of the EfW CHP Facility Site as it existed at the time of survey.

13.4.4 The Scoping Report considered a buffer of 1km to the EfW CHP Facility Site. However, based on the geological and hydrogeological conditions present, 250m is considered the likely maximum spatial extent (considering contaminant degradation, dilution and dispersion in the environment) at which significant land contamination effects are likely to have the potential to be realised through potentially active contaminant linkages.

13.4.5 The 250m zone of influence has also been applied to hydrogeology for all elements of the Proposed Development based on the groundwater conditions within the Study Area, as the superficial and bedrock geology is classified as unproductive strata. Groundwater is present, however, this is typically perched above lower permeability layers, and there is limited potential for vertical or lateral migration.

13.4.6 The Grid Connection is treated as a distinct Study Area from the other components of the Proposed Development due to its linear shape, and the type of development proposed (a linear underground cable with above ground connections to the EfW CHP and Walsoken Substation). As described above, a 250m zone of influence is applied to this area, given the similar geological and hydrogeological conditions across all components of the Proposed Development.

13.4.7 The Phase 1 geoenvironmental reports used to inform **Section 13.5** cover the Study Area for the Proposed Development and include all components within the Order limits and the 250m zone of influence applied in this ES for hydrogeology and ground land contamination. The 250m zone of influence is shown on **Figures 13.1ii Potential land contamination constraints within the Study Area EfW CHP Facility Site** and **Figure 13.1iii**: **Potential land contamination constraints within the Study Area CHP Connection, Access Improvements and Temporary Construction Compound** (**Volume 6.3**).

Desk study

13.4.8 A summary of the desktop data used to inform the assessment is provided in **Table 13.8 Desktop data for Geology, Hydrogeology and Contaminated Land** below.

Table 13.8 Desktop data for Geology, Hydrogeology and Contaminated Land

Desktop data	Source of desktop data	Details of the information
Designated sites **Aquifer designations and groundwater vulnerability** **Geological SSSIs information** **Provisional ALC maps, published by the former Ministry of Agriculture Fisheries and Food (MAFF)** **Post 1988 ALC Grades, published by MAFF** **LandIS Soilscape**	MAGIC.gov.uk website	Full coverage of the Study Area to inform site baseline, presence of Receptors and their sensitivity.
On-line Geoindex **1:50,000 digital geology** **Borehole Record Viewer (offers access to the National Geoscience Data Centre collection of onshore scanned boreholes, shafts and well records)**.	British Geological Survey (BGS)	Full coverage of the Study Area to inform site baseline, presence of Receptors and their sensitivity.
Envirocheck (Order No. 220808700_1_1, October 2019) **Includes regulatory and other database information on water, waste including landfills, geology, hazardous substance, industrial land uses, sensitive land uses**.	Landmark	Partial coverage. Coverage of the EfW CHP Facility Site, data is included in the Geoenvironmental Phase 1 and 2 Desk Study and Interpretative Report[8].
Environmental and GIS data including information on geohazards, **1:10,000 and 1:50,000 historical mapping**.	Groundsure	Full coverage of the Study Area (includes the area already covered by equivalent data supplied by Landmark Envirocheck Report as above).
Unexploded Ordnance (UXO) mapping.	Zetica Limited	Full coverage of the Study Area.
Contaminated land register data **RIGS (regionally important geological sites)**.	Local authorities	Full coverage of the Study Area.
Wood (2021) MVV, Wisbech Phases 1 and 2		A combined Phase 1 and Phase 2 geoenvironmental desk study. This provides full coverage at Phase 1 of the EfW CHP Facility Site,

[8] MVV (2020) Wisbech Phases 1 and 2 Geoenvironmental Desk Study and Interpretative Report, July 2020.

Desktop data	Source of desktop data	Details of the information
Geoenvironmental Desk Study and Interpretative Report, Draft Report, May 2021.		Access Improvements, CHP Connection and TCC with a buffer of at least 250m. The majority of the Water Connections are covered in the Phase 1 report, and the remaining easternmost extent of the Water Connections at New Bridge Lane is covered in the Phase 1 for the Grid Connection (detailed below). The report includes a Phase 2 site investigation completed in July 2020 for the EfW CHP Facility (lease area), as show in Figure 7 in the Phase 1 and Phase 2 geoenvironmental desk study report (**Appendix 13A (Volume 6.4)**). Relevant information has been extracted to inform **Section 13.5.**
Wood (2021) MVV, Medworth Grid Connection Phase 1 Geoenvironmental Desk Study, Draft Report, May 2021		Phase 1 Geoenvironmental Desk Study providing full coverage of the Grid Connection Study Area (the Grid Connection and the 250m zone of influence) assessed in this ES. This Phase 1 Geoenvironmental Desk Study also covers a portion of the Water Connections at New Bridge Lane. Relevant information has been extracted to inform **Section 13.5.**

Survey work

13.4.9 A summary of the survey results used to inform the assessment undertaken to date and the outstanding data requirements are provided in **Table 13.9 Surveys for Geology, Hydrogeology and Contaminated Land** below.

Table 13.9 Surveys for Geology, Hydrogeology and Contaminated Land

Survey	Survey dates	Survey methodology	Outstanding survey requirements
Phase 1 Geo-environmental desk study and Phase 2 intrusive ground investigation of the EfW CHP Facility Site	Walkover survey for desk study completed October 2019, ground investigation completed during February and March 2020.	Works were carried out in general accordance with UK technical guidance and standards for contaminated land and geotechnical assessment, including the • UK Government, Land Contamination Risk Management (LCRM), 2020 (previously CLR11[9] as identified in the Scoping Report) • BSI (2015): BS5930 – Code of Practice	Further Phase 2 ground investigation will be completed, based on the findings of the Phase 1 Geo-environmental desk study and Phase 2 intrusive ground investigation of the EfW CHP Facility Site, and in accordance with the UK Government's LCRM guidance, to target identified potential sources of contamination in areas of the Proposed Development not previously subject to ground investigation (Access Improvements, CHP Connection, TCC and Water

[9] Environment Agency, Contaminated Land Report 11 (CLR11) Model Procedures for the Management of Land Contamination (2004).

Survey	Survey dates	Survey methodology	Outstanding survey requirements
		for ground investigations. • BSI (2004): BS EN 1997-1: Eurocode 7: Geotechnical Design - Part 1: General Rules. • BSI (2004): UK National Annex to Eurocode 7: Geotechnical design – Part 1: General Rules. • BSI (2007): BS EN 1997-2: Eurocode 7 – Geotechnical design – Part 2: Ground Investigation and testing. • BSI (2007): UK National Annex to Eurocode 7 – Geotechnical design – Part 2: Ground Investigation and testing.	Connections). This will be completed prior to construction of the Proposed Development.
Phase 1 Geo-environmental desk study for Grid Connection	-	UK Government, Land Contamination Risk Management (LCRM), 2020.	Phase 2 ground investigation will be completed based on the findings of the Phase 1 Geo-environmental desk study for the Grid Connection, and in accordance with the UK Government's LCRM guidance, to target identified potential sources of contamination within the Grid Connection. This will be completed prior to construction of the Proposed Development.

13.5 Baseline

Current baseline

EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections

Soil and Agricultural Land

13.5.1 BGS 1:50,000 scale mapping on the British Geological Survey (BGS) GeoIndex shows that superficial deposits are present across the EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections and these comprise tidal flat deposits, including mud flat and sand flat deposits. These deposits consist of unconsolidated sediment, mainly mud and/or sand. They are normally encountered as a consolidated soft silty clay, with layers of sand, gravel and peat.

13.5.2 The Soilscape mapping viewed on the MAGIC interactive map shows that the naturally occurring soils in the Study Area are loamy and clayey soils of coastal flats with naturally high groundwater. These soils have a loamy texture, lime-rich to moderate fertility and the main land cover associated with them is arable agricultural land with some grassland. This soil type has medium carbon storage potential. However, most of the land has been previously developed for light industrial use within the last twenty to thirty years or earlier and is now urbanised meaning that most of the natural soils are likely to have been removed, covered by buildings or hardstanding or covered by imported fill materials, in addition to having potential to have been affected by contaminants associated with the historical land uses. The majority of the EfW CHP Facility Site (currently occupied by an existing waste treatment station), the Access Improvements and CHP Connection are located on previously developed land, which is now urban in nature, no longer in agricultural use, and where the natural topsoil is likely to have been removed or sealed (covered by hardstanding or buildings) to facilitate the historical development of the land. Remaining greenfield areas are discussed below in relation to agricultural land.

13.5.3 The EfW CHP Facility Site includes an area of land in the south-east, currently a field with an overgrown square-shaped hedged area in the south, covering approximately 0.77 hectares, which is mapped as being provisional ALC Grade 2. This land will become part of the EfW CHP Facility Site. The southern half of this land comprises a hedged area where there is evidence in 1999 aerial photography[10] of disturbed ground, and this unknown previous use of the land may have resulted in a deterioration in the soil quality.

13.5.4 The TCC is located on land currently mapped as being provisional ALC Grade 2. This land covers an area of approximately 1.6 hectares. This area is noted to be allocated for urban extension in Fenland Local Plan 13 (2014), Policy LP8.

13.5.5 The Water Connections potable connection (HDD option) is partially located on land at the south-western edge of an agricultural field (orchard) covering an area of approximately 0.16 hectares. As the land is at the edge of the field it is noted that

[10] Google Earth Pro

there are vehicle tracks and bare soil visible in 2021 aerial photography and the soil in this area is likely to have undergone some deterioration as a result of compaction by vehicles. This area is also noted to be allocated as urban extension in Fenland Local Plan 13 (2014), Policy LP8.

Geology

13.5.6 No artificial ground or made ground is recorded within the EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections by the BGS[11].

13.5.7 Made ground has been proven on the EfW CHP Facility Site by the Phase 2 geoenvironmental investigation[12], this is typically at 1.0m thickness but up to 2.0m thick where earth bunds are present. There is likely to be made ground within the other components of the Proposed Development including the Access Improvements (due to fill materials used in road construction), CHP Connection (fill materials used on railway land), the TCC (localised infilled former land drains), and Water Connections (due to fill materials used in road construction).

13.5.8 Superficial deposits are present across the EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections, as described above in paragraph 13.5.2. On the EfW CHP Facility Site the tidal flat deposits comprised two stratigraphic groups comprising clay/silt (0.90 to >4.20m thickness), including thin peat bands or peat traces, and very fine sand (15.70 to 20.20m thickness)[13].

13.5.9 Bedrock underlying the EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections is the Ampthill Clay Formation, which comprises mudstone, mainly smooth or slightly silty, pale to medium grey with argillaceous limestone (cementstone) nodules, with some rhythmic alternations of dark grey mudstone in the lower part and topmost beds typically encountered as pale grey marls with cementstone. The Ampthill Clay Formation is typically around 50m in thickness in Fenland[14].

Geodiversity

13.5.10 There are no international or national geodiversity sites located within the EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections.

13.5.11 There are no Regionally Important Geological and Geomorphological Sites (RIGS) or Locally Important Geological Sites (LIGS) located within the EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections.

13.5.12 Cambridgeshire Geological Society is developing walks within Wisbech 'island'[15] in partnership with Wisbech and Fenland Museum and Fenland Archaeology Group. This is due to Wisbech being a major Fenland town on the River Nene and located on the 'Silt Fen', an extensive area of marine silts which, despite the uniformity of its geology, its low-lying character shows small changes in elevation in places, with some land rising above 5m. The silt fen lies on middle Jurassic Clays that come to

[11] British Geological Survey. Geoindex Onshore. Website.
[12] Wood. Wisbech Phases 1 and 2 Geoenvironmental Desk Study and Interpretative Report. (July 2020).
[13] Wood. Wisbech Phases 1 and 2 Geoenvironmental Desk Study and Interpretative Report, (July 2020).
[14] British Geological Survey. The BGS Lexicon of Named Rock Units. Website.
[15] The Fenland Trust, Cambridgeshire Geological Society. The Fen Edge Trail. Website.

the surface to the west where the silts have been eroded. To the east is a band of younger Jurassic Clay and then the Cretaceous rocks of the Greensand and Chalk. The walks will take in features of landscape and historical interest including the river as it winds its way through the town. No areas within the EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections have been identified as being part of the planned walks.

13.5.13 Based on the absence of sensitive geological Receptors and based on agreement from PINS that impacts on geology could be scoped out for the EfW CHP Facility Site, impacts on geology Receptors can, therefore, be scoped out for the Access Improvements, CHP Connection, TCC and Water Connections and are not assessed further in the EIA.

Hydrogeology

13.5.14 The superficial deposits and bedrock underlying the EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections are classed by the Environment Agency as unproductive strata. There are no groundwater Source Protection Zones (SPZ) present. Based on the low groundwater sensitivity it was agreed by PINS that hydrogeological impacts could be scoped out for the EfW CHP Facility Site and the same low hydrogeological sensitivity applies to the Access Improvements, CHP Connection, TCC and Water Connections, and hydrogeological impacts can, therefore, be scoped out for these components of the Proposed Development and are not assessed further in the EIA.

13.5.15 Despite the absence of sensitive groundwater Receptors, the 2020 site investigation on the EfW CHP Facility Site[16] confirmed that shallow groundwater is present and is likely to also be present at the Access Improvements, CHP Connection, TCC and Water Connections.

13.5.16 During the 2020 investigation on the EfW CHP Facility Site, groundwater was encountered in silt/clay (Tidal Flat Deposits) at 2.7m and 4.5m below ground level (bgl) in trial pits. This investigation also found perched groundwater in made ground at 0.32m bgl. Groundwater on the site was noted to be influenced by nearby drainage channels (details of these drainage channels are provided in **Chapter 12: Hydrology (Volume 6.2)**. Groundwater in the deeper Tidal Flat Deposits was found to be under sub-artesian pressure (presenting a positive vertical gradient), due to the overlying low permeability clays, which are underlain by silty sand/sand deposits of between 15 and 20m thickness that were encountered at between 1.7 and 5.0m bgl. Deeper groundwater in the Tidal Flat Deposits was observed to flow in a north-westerly direction, in the direction of the River Nene (see **Chapter 12: Hydrology (Volume 6.2)**). Groundwater monitoring indicated that the drainage channels are unlikely to be in connectivity with this deeper groundwater unit.

13.5.17 Based on the available information dewatering will be required during excavations and any underground works on the EfW CHP Facility Site, and potentially other components of the Proposed Development, depending on excavation depths and water table height during construction. Suitable dewatering systems will be designed to control groundwater during construction and prevent potential effects on the stability of any adjacent structure foundations and underground services. The

[16] Wood. Wisbech Phases 1 and 2 Geoenvironmental Desk Study and Interpretative Report. (July 2020).

management of groundwater in excavations is addressed in the **Outline Construction Environmental Management Plan (CEMP) (Volume 7.12)** which will be secured through DCO Requirement, notably in relation to the prevention of surface water pollution (see **Chapter 12: Hydrology (Volume 6.2)**) and the design of suitable dewatering systems and safe excavations will also be addressed through compliance with The Construction Design and Management Regulations 2015 (CDM 2015). The EfW CHP Facility design, including deep structures such as the waste bunker, will be in accordance with design standards to mitigate geotechnical hazards including shallow groundwater.

Land Contamination

13.5.18 All areas of the Proposed Development have been subject to Phase 1 contaminated land desk study. This has identified potential sources of contamination at the EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections as summarised in **Table 13.10 Sources of Contamination – EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections** below and shown on **Figure 13.1: Potential land contamination constraints within the Study Area EfW CHP Facility Site Potential land contamination constraints within the Study Area EfW CHP Facility Site (Volume 6.3)**. These sources were identified as requiring further assessment which will be undertaken in advance of construction in accordance with a DCO Requirement. Offsite sources within 250m of the Order limits are identified in addition to onsite sources.

Table 13.10 Sources of Contamination – EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections

Relevant Proposed Development Component	Source No.[17]	Source Description[18]
EfW CHP Facility Site	(1)	Fuel tanks; diesel & AdBlue (exhaust gas treatment fluid)
	(2)	Septic tank
	(3)	Household waste storage, including batteries and gas cylinders
	(4)	Current site activities – vehicle movements & material stockpiles (potential for localised contamination in all site areas)
	(5)	Potential made ground (all site areas), including earth bunds

[17] Based on the source numbers in the Wisbech Phases 1 and 2 Geoenvironmental Desk Study and Interpretative Report, unless otherwise specified.
[18] Sources are onsite unless otherwise stated. In some instances, sources that were previously onsite are now offsite as a result of the Proposed Development being revised between PEIR and ES and the point at which the study was undertaken. This is the reason for source numbers not running consecutively.

Relevant Proposed Development Component	Source No.[17]	Source Description[18]
	(6)	Natural peat deposits (source of ground gas including methane)
Temporary Compound	(10)	Unknown storage/other activity within hedged area
CHP Corridor, Access Improvements	(11)	Disused railway line, and former sidings and good shed (on and offsite)
	(12)	Made ground (infilled drainage channels)
	(13)	Offsite: various historical and current works
	(14)	Offsite: former petrol filling station
Water Connections	(7)[19]	Offsite: pollution incident at ditch

13.5.19 The EfW CHP Facility Site was subject to a Phase 2 geonvironmental ground investigation that targeted the relevant sources in this site area.

13.5.20 The ground investigation of the EFW CHP Facility Site found that following the interpretation of the results of soil and groundwater sampling and gas monitoring, the following potential sources of contamination required further assessment:

- Ground gas from natural peat deposits presenting a risk to humans and property through gas ingress into buildings and subsequent inhalation/accumulation; and
- Organic contaminants in soil associated with onsite current activities presenting a risk to services including potable water supply pipes through permeation.

Grid Connection

Soil and Agricultural Land

13.5.21 BGS 1:50,000 scale mapping shows superficial deposits across the Grid Connection Corridor, comprising Tidal Flat Deposits, including mud flat and sand flat deposits. These deposits consist of unconsolidated sediment, mainly mud and/or sand. They are normally encountered as a consolidated soft silty clay, with layers of sand, gravel and peat. Tidal flat deposits are deposited on extensive nearly horizontal marshy land in the intertidal zone that is alternately covered and uncovered by the rise and fall of the tide. They may form the top surface of a deltaic deposit. They are characteristically low relief.

13.5.22 The Soilscape mapping viewed on the MAGIC interactive map shows that across the entire Grid Connection, the naturally occurring soils are loamy and clayey soils

[19] This source is common to the Water Connections and the Grid Connection and is based on source numbers in the Medworth Grid Connection Corridor Phase 1 Geoenvironmental Desk Study and Interpretative Report.

of coastal flats with naturally high groundwater. These soils have a loamy texture, lime-rich to moderate fertility and the main land cover associated with them is arable agricultural land with some grassland.

13.5.23 There are no BGS borehole records within the Grid Connection Corridor. A BGS borehole approximately 3km north of the Grid Connection indicates the following geological sequence:

- BGS ID: 505889: BGS Reference: TF41SE14, British National Grid (27700): 549326,312148: records 0.3m of topsoil, described as firm to stiff brown slightly sandy silty clay with some rootlets and occasional fine gravel, underlain by stiff becoming soft grey and brown mottled thinly laminated friable sandy silty clay with some rootlets and thin soft peat laminations to 2.0m depth, underlain by soft brown very silty clay with some lenses of sand and decayed rootlets to 3.0m. Below 3.0m silty sand and sand extends to 14.0m depth, where glacial till was encountered to 15.0m underlain by glacio-lacustrine clays to the base of the borehole at 26.0m.

13.5.24 The provisional ALC classification grade for the Grid Connection is Grade 1. However, whereas the Proposed Development defined at the PEIR stage included agricultural land, the Grid Connection is now located predominantly within the road verge of the A47 and, therefore, avoids the potential Grade 1 ALC land. Impacts on agricultural land can, therefore, be scoped out for the Grid Connection and are not assessed further in the EIA.

Geology

13.5.25 No artificial ground or made ground is recorded within the Grid Connection by the British Geological Survey (BGS)[20].

13.5.26 Superficial deposits are present across the Grid Connection, as described above in **paragraph 13.5.21**.

13.5.27 Bedrock underlying the Grid Connection is the Ampthill Clay Formation, which comprises mudstone, mainly smooth or slightly silty, pale to medium grey with argillaceous limestone (cementstone) nodules, with some rhythmic alternations of dark grey mudstone in the lower part and topmost beds typically encountered as pale grey marls with cementstone. The Ampthill Clay Formation is typically around 50m in thickness in Fenland.

Geodiversity

13.5.28 There are no international or national geodiversity sites located within the Grid Connection Corridor.

13.5.29 There are no RIGS or LIGS located within the Grid Connection Corridor.

13.5.30 Cambridgeshire Geological Society is developing walks within Wisbech 'island' in partnership with Wisbech and Fenland Museum and Fenland Archaeology Group. This is due to Wisbech being a major Fenland town on the River Nene and located on the 'Silt Fen', an extensive area of marine silts which, despite the uniformity of its geology, its low-lying character shows small changes in elevation in places, with

[20] British Geological Survey. Geoindex Onshore. Website.

some land rising above 5m. The silt fen lies on middle Jurassic Clays that come to the surface to the west where the silts have been eroded. To the east is a band of younger Jurassic Clay and then the Cretaceous rocks of the Greensand and Chalk. The walks will take in features of landscape and historical interest including the river as it winds its way through the town. The Wisbech and Fenland Museum holds important collections of local fossils and rocks. The Grid Connection is largely routed along the highway verge and no areas within the Grid Connection have been identified as being part of the planned walks.

Hydrogeology

13.5.31 The superficial deposits and bedrock underlying the Grid Connection are classed by the Environment Agency as unproductive strata. There are no groundwater Source Protection Zones (SPZ) in the Study Area. Based on the low groundwater sensitivity on the EFW CHP Facility Site it was agreed by PINS that hydrogeological impacts could be scoped out. The Grid Connection has the same low hydrogeological sensitivity as the EFW CHP Facility Site. Significant effects on groundwater are, therefore, unlikely because of the Proposed Development within the Grid Connection and as such hydrogeological impacts have been scoped out and are not assessed further in the EIA.

13.5.32 A BGS borehole (BGS ID: 505889: BGS Reference: TF41SE14, British National Grid (27700): 549326,312148) approximately 3km north of the Grid Connection records groundwater being encountered at 3.0m and rising to 1.8m in 20 minutes. The groundwater was encountered at the interface between a silty clay layer from 2.0 to 3.0 metres below ground level and the underlying silty sand.

13.5.33 Shallow groundwater may be encountered locally in excavations for the Grid Connection in permeable layers within the tidal flat deposits, or, where made ground is present, at the base of made ground above less permeable natural materials.

Land Contamination

13.5.34 The Grid Connection has been subject to a Phase 1 geoenvironmental desk study. This has identified potential sources of contamination, as summarised in **Table 13.11 Sources of Contamination – Grid Connection** and shown on **Figure 13.1 Potential land contamination constraints within the Study Area EfW CHP Facility Site (Volume 6.3)**. These sources were identified as requiring further assessment. Offsite sources within 250m of the Order limits are identified in addition to onsite sources.

13.5.35 In general, the sources are localised and expected to be small scale where they may be encountered within the Proposed Development, except for the historical landfill at Wisbech Canal. The Phase 1 geoenvironmental desk study records that the landfill has been subject to prior ground investigation by ESI in 2010 on behalf of Norfolk Council. It was reported by ESI[21] that domestic type waste materials are present along the majority off the infilled canal but that the northern extent of the infilled canal, north of the Blacksmiths Arms public house, including the section

[21] ESI. Contaminated land investigation: detailed inspection of former Wisbech Canal, Norfolk. (2010).

encountered by the Grid Connection, is likely to contain predominantly inert materials.

13.5.36 Made ground was found in all boreholes located in the former canal footprint and comprised domestic waste material with an overlying cover material (0.4 to 0.8m thickness clayey gravelly sand or sandy gravelly clay with some brick and concrete fragments), the waste material typically included silty gravelly sand containing brick, ceramics, glass, clinker, fabric, plastic, metal and wood, with thickness ranging from 2.0 to 3.6m. This was underlain by natural soils comprising silty clay and slightly sandy clay. Peat lenses were found within the silts. Groundwater levels during monitoring were within the top 3m and mainly at between 1 and 2m below ground level.

13.5.37 Waste samples were sent for laboratory testing at Alcontrol Laboratories for analytes including metals, ammoniacal nitrogen, sulphate, phenol, cyanide, pH, polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons (TPH), volatile organic compounds (VOC) and semi-volatile organic compounds (SVOC), organochloride pesticides and asbestos screen. Groundwater sampling and six rounds of gas monitoring for methane, oxygen, carbon dioxide, carbon monoxide and hydrogen sulphide were also carried out in 2010.

13.5.38 No significant risks to human health were identified by ESI following screening of the soil sampling results against the applied generic assessment criteria (GAC), or assessment of the gas results, and no significant risks to controlled waters were identified. The report concluded that the former canal site did not represent Contaminated Land under Part 2A of the EPA 1990 and no further investigation was recommended.

13.5.39 No significant risks to controlled waters were identified by ESI, however, the report notes that the presence of a continuous shallow groundwater system along the length of the landfill is uncertain and that the degree of interaction between landfill leachate and local surface water features is unclear. It was assumed by ESI that shallow groundwater within the Terrington Beds will be in hydraulic continuity with the local network of surface water channels (not least since these channels are anticipated to have a drainage function), although the rate of movement through the superficial silts was anticipated to be low. There is some risk of pollution to local controlled waters due to the absence of a landfill liner (which would act to contain leachate within the waste materials) and the absence of an engineered cap (which would minimise infiltration and thus leachate generation).

13.5.40 Regarding the assessment of risks to human health by ESI, improvements to asbestos testing techniques applied by environmental laboratories have taken place since 2011, and it might be the case that asbestos would be found now within the waste or cover materials that was not previously identified. This does not necessarily mean that there is a significant risk to current or future site users, however, for the Proposed Development further asbestos testing is recommended during the planned ground investigation to confirm whether asbestos is present and assess the level of risk.

Table 13.11 Sources of Contamination – Grid Connection

Relevant Proposed Development Component	Source No.[22]	Source Description
Grid Connection	(1)	Historical landfill at former Wisbech Canal (waste possibly extending to 4m in depth)
	(2)	Localised made ground (including A47 embankment, former railway line, and onsite fly tipping at New Bridge Lane) (cross boundary source)
	(3)	Walsoken Substation (cross boundary source)
	(4)	Offsite: Former petrol filling stations
	(5)	Natural peat deposits (source of ground gas including methane)
	(7)	Offsite: Pollution incident at the drainage ditch north of the site
	(8)	Offsite: refuse tip dating from 1967 (also the site of the former Walsoken brick and tile works).

Future baseline

EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections

13.5.41 No changes are anticipated in the baseline condition of the EfW CHP Facility Site, Access Improvements, CHP Connection, TCC or Water Connections, as the land is assumed, in the absence of construction works to continue being used and managed in its present function.

13.5.42 The greenfield land on which part of the EfW CHP Facility Site and the TCC are located is likely to undergo commercial development in the short to medium term as a result of the land being allocated for urban extension in Fenland Local Plan 13 (2014), Policy LP8.

13.5.43 With respect to land contamination, this is managed in England by Part 2A of the Environmental Protection Act and the Town and Country Planning Act 1990 (1990 Act). Part 2A requires local authorities to identify potentially contaminated land in their area and ensure potential risks from historical contamination are assessed and mitigated accordingly. For future developments, The 1990 Act requires the consideration of the potential for contamination to be present and ensure a site is suitable for the proposed end use. There is potential for the reintroduction of the disused March to Wisbech Railway to go ahead along the CHP Connection Corridor,

[22] Based on source numbers in the Grid Connection Corridor Phase 1 Geoenvironmental Desk Study and Interpretative Report

and in this instance, it is likely that assessment of the land quality in relation to land contamination would be required by the scheme's promoters, which could result in remediation being needed. Such an assessment would need to be based on consideration of whether the land condition was suitable for a future public railway use and as this is not currently being proposed as part of the Proposed Development, no geoenvironmental assessment for this future land use is proposed.

Grid Connection

13.5.44 The Grid Connection is anticipated, in the absence of construction works, to continue being used and managed in its present function, primarily as roads and land within the footprint of Walsoken Substation.

13.5.45 With respect to land contamination, investigation of the landfill at the former Wisbech Canal within the Grid Connection has already been completed by the Borough Council of King's Lynn and West Norfolk under Part 2A of the Environmental Protection Act and no remedial measures have been deemed necessary within the Grid Connection Study Area. No other potential contamination sources have been investigated under Part 2A within the Grid Connection Study Area and it is, therefore, reasonable to conclude that there would not be a change in its land contamination status over time.

13.6 Scope of the assessment

Spatial scope

13.6.1 The spatial scope of the assessment of Geology, Hydrogeology and Contaminated Land covers the area of the Proposed Development, together with the zones of influence that have formed the basis of the Study Area, the approach to which is described in **Section 13.4.**

13.6.2 The spatial scope of the assessment for soil, agricultural land and geology, covers the Proposed Development site.

13.6.3 The spatial scope of the assessment for hydrogeology and land contamination covers the Proposed Development together with the zone of influence of 250m beyond the Order limits, that forms the basis of the Study Area, as described in **Section 13.4**.

13.6.4 The Grid Connection is treated as a distinct Study Area from the other components of the Proposed Development due to its linear shape, and the type of development proposed, which mainly features lengths of underground cables which will only come above ground where they connect to the Walsoken Substation and the EfW CHP Facility. It also includes infrastructure to connect into the existing Walsoken DNO Substation.

Temporal scope

13.6.5 The temporal scope of the assessment of hydrogeology and land contamination is consistent with the period over which the development would be carried out and, therefore, covers the construction and operational periods. As stated in **Chapter 4:**

Approach to the EIA (Volume 6.2), the environmental effects associated with the decommissioning phase are considered similar to those reported for the construction phase works, albeit with a lesser duration of one year. This is because any decommissioning works would be likely to require a similar working area, and result in similar (or less) ground disturbance. The likely significance of effects relating to the construction phase assessment reported in relation to land contamination, soils and agricultural land are, therefore, applicable to the decommissioning phase.

13.6.6 Effects on geology, soil and agricultural land may arise during the construction period but will not continue into the operational period.

13.6.7 The assessment has been based on the construction programme set out in **Section 3.9** of this ES.

13.6.8 The operational period covers the period 2026 to 2066.

Potential Receptors

13.6.9 The spatial and temporal scope of the assessment enables the identification of Receptors that may experience a change because of the Proposed Development.

13.6.10 The Receptors identified for the EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections that may experience significant effects associated with land contamination are also common to the Grid Connection and are outlined in **Table 13.12 Receptors scoped in for further assessment for Geology, Hydrogeology and Contaminated Land.**

Table 13.12 Receptors scoped in for further assessment for Geology, Hydrogeology and Contaminated Land

Receptor type	Receptors included by type
Human Health	Commercial site users, members of the public/ landowners, nearby residents.
Property	Buildings, structures, utilities and infrastructure.
Controlled Waters	Surface waters (surface water drainage channels).

Likely significant effects

13.6.11 The Geology, Hydrogeology and Contaminated Land Receptors where likely significant effects have been identified and that have been taken forward for assessment are summarised in **Table 13.13 Likely significant effects for Geology, Hydrogeology and Contaminated Land Receptors.**

Table 13.13 Likely significant effects for Geology, Hydrogeology and Contaminated Land Receptors

Receptor	Likely significant effects
Construction phase:	
Human health – commercial site users, members of the public/ landowners, residents	Mobilisation of contamination to human health Receptors via numerous pathways (including groundwater, surface water, leaching from soil, migration of vapours and windblown dusts) resulting in health effects.
Controlled waters – surface water drainage channels	Mobilisation of contamination via numerous pathways (including groundwater, surface water, preferential pathway creation and leaching from soil) resulting in contamination of controlled waters (where potential sources of contamination have been identified).
Human health – commercial site users, members of the public/ landowners, residents **Property (enclosed spaces) – new and existing infrastructure**	Build-up of gases in confined spaces in existing or newly constructed infrastructure on the land required for the Proposed Development. Potential health effects on humans due to gas build up in enclosed spaces via the inhalation pathway, potential for gas build up to result in flammable atmospheres developing that could result in explosion.
Controlled waters – surface water drainage channels	Accidental spillages and leaks resulting in ground contamination and risks to controlled waters during construction. This includes the potential for leakage of bentonite during Horizontal Directional Drilling (HDD) for the Water Connections option.
Operational phase:	
Human health – commercial site users, members of the public/ landowners, residents	The Proposed Development requires excavation of potentially contaminated soils, which if left at or near surface or mixed with surface soils could pose a health risk to site users, resulting in exposure to land contamination via numerous pathways (e.g., inhalation, direct contact, ingestion) resulting in health effects.
Human health – commercial site users, members of the public	Potential for organic contaminants (hydrocarbons) in soils to permeate water supply pipes constructed for the Proposed Development causing degradation in water supply and potential for human health effects.
Human health – commercial site users, members of the public/ landowners, residents **Property (enclosed spaces) – new and existing infrastructure**	Build-up of gases in confined spaces in newly constructed infrastructure for the Proposed Development. Potential health effects on humans due to gas build up in enclosed spaces via the inhalation pathway, potential for gas build up to result in flammable atmospheres developing that could result in explosion.
Controlled waters – surface water drainage channels	The Proposed Development requires excavation of potentially contaminated soils, the groundworks have some potential to create new contaminant migration pathways, such as increasing potential for surface water runoff, there is limited potential for the development to result in

Receptor	Likely significant effects
	increased likelihood of contaminants leaching or migrating in groundwater to surface water, causing deterioration in surface water quality. However, this cannot be ruled out, notably at the Wisbech Canal landfill.
Controlled waters – surface water drainage channels	Accidental spillages and leaks to soil or groundwater subsequently impacting controlled waters including surface water during operation and maintenance activities. Potential requirement for excavation of soil to carry out maintenance activities e.g., for Grid Connection or Water Connections.

13.6.12 The Geology, Hydrogeology and Contaminated Land Receptors/impacts scoped out from being subject to further assessment because the potential effects are not considered likely to be significant are summarised in **Table 13.14 Geology, Hydrogeology and Contaminated Land Receptors scoped out of further assessment.**

Table 13.14 Geology, Hydrogeology and Contaminated Land Receptors scoped out of further assessment

Receptor	Impact	Justification	Agreement
Construction phase:			
Soil and agricultural land quality	Land-take for development, resulting in change of land cover and permanent loss of topsoil resources and soil functions and permanent loss of agricultural land.	The Order limits is now limited to areas that are either urban in nature or, where agricultural land is present, the area permanently or temporarily affected is small (approximately 0.77 hectares of greenfield land to be developed as part of the EfW CHP Site, approximately 1.76 hectares of land within fields is identified for use as the TCC and development of the Water Connections), and the land is located within an area allocated in the Fenland Local Plan for urban extension.	PINS has provided agreement to scope out impact on soil in the assessment for the EfW CHP Facility Site. It was concluded in the PEIR that effects on soil and agricultural land Receptors could be scoped out for the EfW CHP Facility Site, Access Improvements, CHP Connection and the TCC adjacent to the EfW CHP Facility Site on the basis of the land being urban in nature and given that excavated soils will be reinstated wherever possible to minimise soil loss. This rationale also now applies to the Grid Connection due to the change to the Order limits and design decision to route the underground cables within the highway and highway verge, avoiding agricultural fields.

Receptor	Impact	Justification	Agreement
			Although not formally agreed with PINS, agreement in principle is assumed based on changes to the Proposed Development which effectively remove or limit the potential for effects on Receptors.
Soil and agricultural land quality	Changes to soil structure due to inappropriate storage and/or handling and/or due to the use of heavy machinery which causes compaction, resulting in waterlogging of land, potentially soil erosion and loss of soil organic matter and reductions in/loss of soil functions.	The Order limits is now limited to areas that are either urban in nature or, where agricultural land is present, the area temporarily affected by soil handling/disturbance is small (approximately 1.76 hectares of land within fields is identified for use as the TCC and development of the Water Connections), and the land is located within an area allocated in the Fenland Local Plan for urban extension. Embedded environmental measures are in place to limit the potential for soil degradation because of the Proposed Development's construction. These are detailed in **Section 13.7**.	PINS has provided agreement to scope out impact on soil in the assessment for the EfW CHP Facility Site. It was concluded in the PEIR that effects on soil and agricultural land Receptors could be scoped out for the EfW CHP Facility Site, Access Improvements, CHP Connection and the TCC adjacent to the EfW CHP Facility Site on the basis of the land being urban in nature. This rationale also now applies to the Grid Connection due to the change to the Proposed Development and design decision to route the underground cables within the highway verge, avoiding agricultural fields where natural topsoil and subsoil are present. Although not formally agreed with PINS, agreement in principle is assumed based on the Order limits, which effectively remove or limit the potential for effects on Receptors.
Soil and agricultural land quality	Soil erosion (loss of soil resource, degradation of BMV land), caused by run off from stockpiles and/or runoff from stripped soil. Soil erosion can lead to eutrophication of local waterbodies. The risks to water environment Receptors from silty run-	The Order limits is limited to areas that are either urban in nature or, where agricultural land is present, the area temporarily affected by soil handling/disturbance is small (approximately 1.76 hectares of land within fields is identified for use as the TCC and development of the Water Connections), and the	Agreement in principle is assumed based on changes to the Proposed Development. It was concluded in the PEIR that effects on soil and agricultural land Receptors could be scoped out for the EfW CHP Facility Site, Access Improvements, CHP

Receptor	Impact	Justification	Agreement
	off are assessed in **Chapter 12: Hydrology.**	land is located within an area allocated in the Fenland Local Plan for urban extension. Embedded environmental measures are in place to limit the potential for soil degradation because of the Proposed Development's construction. These are detailed in **Section 13.7**.	Connection and the TCC on the basis of the land being urban in nature. This rationale also now applies to the Grid Connection due to the change to the Proposed Development and design decision to route the underground cables within the highway verge, avoiding agricultural fields where natural topsoil and subsoil are present. The changes to the Proposed Development effectively remove or significantly limit the potential for effects on Receptors e.g., through design change to the use of urban land instead of greenfield land in the Grid Connection. The EfW CHP Facility Site will require a small amount [~0.77 hectares] of greenfield land take within an area which has had some previous use other than agriculture, and which is allocated for urban expansion. An area of approximately 1.76 hectares is identified for the TCC and Water Connections at New Bridge Lane. Soils temporarily displaced from these areas will be restored and embedded environmental measures to protect soils are detailed in **Section 13.7**.
Geology and geodiversity	Damage to examples of geodiversity.	There are no designated geological sites within the Study Area.	It was agreed with PINS that effects on geological Receptors could be scoped out of the assessment for the EfW CHP Facility. The EIA Scoping Opinion provided by PINS required that effects on geology be considered for all areas of the Proposed Development.

Receptor	Impact	Justification	Agreement
			The conditions providing justification for scoping out of effects on geology/geodiversity on the EfW CHP Facility Site are common to the entire Study Area, therefore, it is proposed to scope out geology/geodiversity for all components of the Proposed Development.
Hydrogeology	Impacts on groundwater.	The superficial deposits and bedrock geology underlying the Proposed Development are classed as unproductive strata. Whilst shallow groundwater is present, it is typically perched on top of less permeable layers within the tidal flat deposits and does not form a continuous or productive aquifer. There are no known groundwater abstractions within the Study Area and no SPZs. Although there are no sensitive groundwater Receptors, embedded mitigation measures for ensuring that pollution of controlled waters does not occur during the construction phase are outlined in **Section 13.7.**	The EIA Scoping Opinion provided by PINS required that effects on hydrogeology be considered for all areas of the Proposed Development. The conditions providing justification for scoping out of effects on hydrogeology on the EfW CHP Facility Site are common to the entire Study Area, therefore, agreement in principle is assumed for scoping out hydrogeology for the Proposed Development.
Flora, fauna and ecological systems	Impact on flora, fauna and ecological systems from contaminated land	The baseline ecological conditions for all elements of the Proposed Development are defined in **Chapter 11: Biodiversity**. Phase 1 geo-environmental desk studies have been completed for all areas of the Proposed Development and have confirmed that there are no ecological Receptors within the Order limits or in the Study Area that are likely to be affected by land contamination on the Proposed Development site.	The conditions providing justification for scoping out of effects on flora, fauna and ecological systems on the EfW CHP Facility Site are common to the entire Study Area, therefore, agreement in principle is assumed for scoping out flora and fauna for the Proposed Development.
Human health – commercial construction workers	Health effects on construction workers.	Risks to construction workers have been scoped out of the assessment on the basis that these risks will be	Agreed with PINS in the EIA Scoping Opinion. The measures to achieve this are detailed in **Table 13.15** and

Receptor	Impact	Justification	Agreement
		dealt with under health and safety legislation including: The Health and Safety at Work Act 1974; The Management of Health and Safety at Work Regulations 1999; and The CDM 2015. Compliance with this legislation should ensure that no significant adverse effects on these Receptors should occur because of the Proposed Development during its construction or operation.	include compliance with The Health and Safety at Work Act 1974 and CDM 2015. These measures will be secured through the DCO via the **Outline CEMP (Volume 7.12)**, and compliance with the legislation will be achieved through measures such as the sharing of relevant pre-construction information, risk assessment to identify safe working methods, designing for safety (both construction works and built environment) and based on the risk assessment, identifying the required personal protective equipment (PPE) that may be needed.
Operation:			
Human health – commercial site users, members of the public	Effects on human health Receptors due to operation of the EfW CHP Facility.	Standard construction practices and actions would be undertaken to meet the legislative requirements of CDM 2015 in the design of the EfW CHP Facility. Risks to workers and members of the public are dealt with under The Health and Safety at Work Act 1974 as outlined above. During its operation, the EfW CHP Facility will be regulated under an Environmental Permit under the Environmental Permitting (England and Wales) Regulations 2016, which regulates emissions to the environment and requires operators to provide information on the site condition, typically including soil and groundwater quality.	Noted that PHE requires emissions to and from the ground to be considered for the operational phase. Avoidance of significant effects on human health and environmental Receptors will be achieved through regulatory compliance during construction and operation.

13.7 Embedded environmental measures

13.7.1 Environmental measures which have been embedded into the Proposed Development and **Table 13.15 Summary of the embedded environmental**

measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment, summarises how these embedded measures will influence the Geology, Hydrogeology and Contaminated Land assessment.

Table 13.15 Summary of the embedded environmental measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment

Receptor	Potential effects	Embedded measures and influence on assessment
Soil	Compaction of soil during construction.	If ground conditions require it, a temporary track of either metal, wood or plastic, would be used for vehicles to access the working areas. This track would be removed once construction is complete. Measures to avoid soil compaction are integrated into the **Outline CEMP (Volume 7.12)**, secured via a DCO Requirement, to avoid damage to soil. Topsoil and subsoil will be stripped separately from the TCC and stored separately in bunds/stockpiles for use in final reinstatement of the land. This will be carried out in general accordance with the Defra (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites.
Soil	Erosion of soil during construction.	Storage and handling of soil will be based on the Defra (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites to avoid damage to soil structure and help to minimise soil erosion from surface water runoff. This measure is integrated into the **Outline CEMP (Volume 7.12)**, and will be secured via a DCO Requirement.
Soil	Potential for temporary and permanent soil displacement during construction.	The design evolution process for the Proposed Development has resulted in potential effects on soil and agricultural land Receptors being largely avoided by routing the Grid Connection through urban land (highway verge), and through the selection of the closest substation option to the EfW CHP Facility Site. Soil that is temporarily displaced during trenching to install underground cables or water connections will be reinstated approximately in its original location where possible. Permanently displaced soil will be reused within the Order limits where practicable. Construction strategies will be implemented that will seek to maximise the reuse of excavated clean materials where practicable and feasible.

Receptor	Potential effects	Embedded measures and influence on assessment
		Prior to construction, a Materials Management Plan (MMP) will be prepared that outlines where excavated non-waste materials will be reused in line with CL:AIRE (2011) The Definition of Waste: Development Industry Code of Practice (DoWCoP). The MMP will include a declaration by a Qualified Person that the MMP has been completed in accordance with the DoWCoP and that best practice is being followed. This measure, together with an Outline Soil Management Plan is integrated into the **Outline CEMP (Volume 7.12)**, and will be secured via a DCO Requirement.
Controlled waters – surface water drainage channels	Surface water runoff/uncontrolled leachate from exposed soil or other excavated materials migrating to soil and/or groundwater and subsequently to surface water.	Any temporary onsite storage of excavated materials suspected or confirmed to be contaminated will be on impermeable sheeting, covered over and with adequate leachate/runoff drainage to prevent migration of contaminants from the stockpile. Materials will be segregated where possible to prevent cross-contamination occurring. Such materials will only be reused if they are confirmed as suitable for use in line with the requirements of the MMP. Storage and handling of soil will include measures set out in the Defra (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites to avoid damage to soil structure and help to minimise soil erosion from surface water runoff. This measure is integrated into the CEMP and will be secured through the DCO.
Human health: Commercial site users, members of the public/ landowners, residents **Controlled waters – surface water drainage channels**	Creation of new contaminant migration pathways.	Phase 1 geo-environmental desk studies for all elements of the Proposed Development have been completed and the relevant reports are appended to the ES. A Phase 2 contaminated land ground investigation was undertaken for the majority of the EfW CHP Facility Site. Further ground investigation will be completed as required to inform the design of the Proposed Development in accordance with the UK Government's LCRM guidance, so that following development the land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990. Further assessment of the potential for the EfW CHP Facility and Walsoken Substation construction to create new ground gas migration pathways due to the presence of natural peat

Receptor	Potential effects	Embedded measures and influence on assessment
		deposits at depth will be completed to inform detailed design and lower the risk to an acceptable level. Where the grid connection crosses the known historical landfill at the former Wisbech Canal it is possible that using the proposed open cut trench method for cable installation the waste materials will not be encountered within the design depth, this is due to the likelihood of the road being built up over the landfilled material. Ground investigation will be carried out in advance to determine the ground conditions (in relation to land contamination) and inform a suitable design for the trench to mitigate risks to the new infrastructure and to the environment from the landfilled materials or associated leachate. Alternatively, the pre-positioning of a conduit, installed by CCC Highways in connection with committed junction improvement works will be used. The construction works will comply with CDM 2015 which includes the requirement for designers to avoid foreseeable risks so far as reasonably practicable and for health and safety considerations to be incorporated into the design of the construction work as well as the detailed design of the Proposed Development. The construction works will comply with CAR 2012, specifically to prevent the spread of asbestos if it is found or suspected to be present. This measure is integrated into the **Outline CEMP (Volume 7.12)**, and will be secured through the DCO. Contamination if found will be subject to appropriate risk assessment and if necessary, either removed, treated and/or mitigated as part of the Proposed Development. The **Outline CEMP (Volume 7.12)**, includes an unexpected contamination protocol. Best practice air quality management measures will be applied as described in Institute of Air Quality Management (IAQM) (2014) guidance on the Assessment of Dust from Demolition and Construction 2014, version 1.1. Ground gas from natural peat deposits has been identified as posing a potential risk of gas accumulation in enclosed spaces and requires further assessment for detailed design (e.g., for EfW CHP Facility buildings).

Receptor	Potential effects	Embedded measures and influence on assessment
		Potential for organic contaminants (hydrocarbons) to impact on new potable water supply pipes at the EfW CHP Facility Site requires further assessment to ensure suitable design measures such as barrier type potable water supply pipes are in place, these measures are to be agreed in advance with the statutory provider – Anglian Water.
Controlled waters – surface water drainage channels	Release of contaminants to soil and/or groundwater and subsequent migration to surface water during construction.	During both construction and operation, vehicle maintenance and refuelling of machinery will be undertaken within designated areas where spillages can be easily contained, and machinery will be routinely checked to ensure it is in good working condition. Areas at risk of spillage or containing hazardous materials, such as vehicle maintenance areas and hazardous substance stores (including fuel, oils and chemicals) will comply with industry good practice, be bunded, have appropriate containment and segregation and will be risk assessed and carefully sited to minimise the risk of hazardous substances entering the drainage system, or the local watercourses, or sensitive land based Receptors. Where feasible and practical, such areas will be sited at least 10m from a watercourse and away from areas at risk of flooding. Additionally, the bunded areas will have impermeable bases to limit the potential for migration of contaminants into groundwater following any leakage/spillage. Incident response plans will be developed to promptly deal with incidents. Measures to protect surface water during construction are detailed in **Chapter 12: Hydrology (Volume 6.2)**.
Human health: construction workers	Effects on human health due to unanticipated contamination being encountered during construction work.	Contamination if found will be subject to appropriate risk assessment. If necessary, it will be either removed, treated and/or mitigated as part of the Proposed Development. The **Outline CEMP (Volume 7.12)** includes an unexpected contamination protocol. Risks to human health during the construction phase must also be controlled through compliance with The Health and Safety at Work Act 1974 and CDM 2015. The construction works will be carried out in accordance with CAR 2012, which includes the

Receptor	Potential effects	Embedded measures and influence on assessment
		requirement to prevent the spread of asbestos. These measures are integrated into the **Outline CEMP (Volume 7.12)**, and will be secured through the DCO.
Human health: Commercial site users, members of the public/ landowners, residents **Controlled waters – surface water drainage channels** **Property: Built environment**	Effects on human health, damage to the environment or property due to ground instability.	The basis of the structural design for the Proposed Development will be completed in general accordance with applicable design standards to minimise the risk of structural or geotechnical instability.
Human health: Commercial site users, members of the public/ landowners, residents **Controlled waters – surface water drainage channels** **Property: Built environment**	Effects on human health, damage to the environment or property due to poor waste management.	Any disposal off-site of excavated material will be undertaken in accordance with duty of care for waste under section 34(7) of the Environmental Protection Act 1990. Measures to protect surface water during construction are detailed in **Chapter 12: Hydrology (Volume 6.2)**.
Human health: Commercial site users, members of the public/ landowners, residents **Controlled waters – surface water drainage channels** **Property: Built environment**	Effects on human health, damage to the environment or property due to poor management of excavated materials and stockpiles.	Construction strategies will be implemented that will seek to maximise the reuse of excavated clean materials onsite where practicable and feasible. Prior to construction, a MMP will be prepared that outlines where excavated non-waste materials will be reused in line with the DoWCoP. The MMP will include a declaration by a Qualified Person that the MMP has been completed in accordance with the DoWCoP and that best practice is being followed.
Human health: Commercial site users, members of the public/ landowners, residents	Effects on human health, damage to the environment or property due to land contamination.	The Applicant will confirm that the land used for the Proposed Development is suitable with respect to the potential for soil and groundwater contamination and, that where necessary, risk-based remediation is undertaken in line with Environment Agency (2020) LCRM guidance. The precise design of any remediation strategy will be confirmed in the detailed design.

Receptor	Potential effects	Embedded measures and influence on assessment
Controlled waters – surface water drainage channels **Property: Built environment**		
Controlled waters – surface water drainage channels	Pollution of ground or controlled waters (surface water).	In line with good practice, Pollution Prevention Plans (PPPs) will be drawn up to detail how ground and surface waters will be protected in construction and operation. These will include information on the use and storage of any fuels, oils and other chemicals and pollution incidence response planning. Measures to protect surface water during construction are detailed in **Chapter 12: Hydrology (Volume 6.2)**.
Controlled waters – surface water drainage channels	Pollution of ground or controlled waters (surface water).	The drilling fluids used during HDD are bentonite-based muds which are not classified as environmentally hazardous.
Controlled waters – surface water drainage channels	Pollution of ground or controlled waters (surface water).	If water being pumped from excavations is suspected to be contaminated, appropriate measures will be taken in accordance with Environment Agency guidance and the Environmental Permitting Regulations to prevent uncontrolled or unauthorised releases of this water to ground or to the water environment. Measures to protect surface water during construction are detailed in **Chapter 12: Hydrology (Volume 6.2)**.
Soil and controlled waters	Unauthorised emissions to land (soil and groundwater) during the operation of the EfW CHP Facility.	The EPR regime will apply to the EfW CHP Facility Site and requires operators to use best available techniques (BAT), and to demonstrate the measures they have taken to protect the land, both in terms of physical pollution prevention measures such as hardstanding and bunds and the management systems and procedures in place to prevent accidental releases of pollutants to land. This lowers the risk of emissions to soil or groundwater occurring during permitted operations (and the risk of subsequent migration of contaminants in groundwater or leaching of contaminants to impact on nearby surface water). For the other components of the Proposed Development, maintenance activities which require the use of plant/vehicles with potential to

Receptor	Potential effects	Embedded measures and influence on assessment
		cause accidental releases to ground of fuels/oils, or excavation of soil with potential to result in contaminated runoff or leaching/migration in groundwater to surface water, are expected to be infrequent and to involve minimal ground disturbance. For example, the Grid Connection will comprise cables in ducts with joint bays, meaning that only joint bay locations would need to be disturbed in the unlikely event that maintenance is needed. Risks to human health during the operational phase must also be controlled through compliance with The Health and Safety at Work Act 1974.

13.8 Assessment methodology

13.8.1 The generic project-wide approach to the assessment methodology is set out in **Chapter 4: Approach to the EIA (Volume 6.2)**, specifically in **Sections 4.7 to 4.10**. However, whilst this has informed the approach used, it is necessary to set out how this methodology has been applied and adapted to address this assessment's specific needs.

Environmental assessment of Geology, Hydrogeology and Contaminated Land effects

13.8.2 This section describes the approach for the assessment of the effects of the Proposed Development on the land contamination Receptors (see **Table 13.12 Receptors scoped in for further assessment for Geology, Hydrogeology and Contaminated Land**), identified as having potential to be affected by the Proposed Development.

13.8.3 The approach to the assessment and management of contaminated land is based on the risk presented by the contamination for a circumstance, i.e., the probability and consequence of an event occurring. However, the EIA seeks to identify the magnitude of a change in status from baseline (impact) caused by the Proposed Development and the consequences of those changes (effects).

13.8.4 This assessment defines the impact and its effect as a change in risk, and then assess the magnitude of the change in risk from baseline, through the construction phase to post development conditions during operation. The methodology used for assessing the risk presented by contaminated land is set out below.

Risk assessment

13.8.5 The process of managing contaminated land, as set out in LCRM, is based on risk assessment. The assessment of risks from contaminated land is based upon the

identification and subsequent assessment of a contaminant linkage. A contaminant linkage requires the presence of a:

- Source of contamination;
- Receptor capable of being adversely effected; and,
- Pathway capable of exposing a Receptor to the contaminant.

13.8.6 The risk assessment aims to assess the significance of each potential contaminant linkage. The key to the classification is that the designation of risk is based upon the consideration of both:

- The magnitude of the potential consequence (i.e., severity). It takes into account both the potential severity of the hazard and the sensitivity of the Receptor; and,
- The magnitude of probability (i.e., likelihood). It takes into account both the presence of the hazard and Receptor and the integrity of the pathway.

13.8.7 The definitions which are set out below for the qualitative risk assessment have been taken from "Guidance for the Safe Development of Housing on Land Affected by Contamination" Annex 4 R&D Publication 66: 2008 Volume 2.

13.8.8 The likelihood classifications for the contaminant linkages being realised is presented in **Table 13.16 Likelihood classifications of contaminant linkage being realised.**

Table 13.16 Likelihood classifications of contaminant linkage being realised

Classification	Definition	Examples
High Likelihood	There is contaminant linkage, and an event would appear very likely in the short-term and almost inevitable over the long-term, or there is evidence at the Receptor of harm or pollution.	a) Elevated concentrations of toxic contaminants are present in soils in the top 0.5m in a residential garden. b) Ground/groundwater contamination could be present from chemical works, containing several underground storage tanks, having been in operation on the same site for over 50 years.
Likely	There is contaminant linkage, and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.	a) Elevated concentrations of toxic contaminants are present in soils at depths of 0.5-1.0m in a residential garden, or the top 0.5m in public open space. b) Ground/ groundwater contamination could be present from an industrial site containing an Underground Storage Tank (UST) present between 1970 and 1990. The tank is known to be single skin. There is no evidence of leakage although there are no records of integrity tests.

Classification	Definition	Examples
Low Likelihood	There is contaminant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a long period such an event would take place and is less likely in the shorter term.	a) Elevated concentrations of toxic contaminants are present in soils at depths >1m in a residential garden, or 0.5-1.0m in public open space. b) Ground/groundwater contamination could be present on a light industrial unit constructed in the 1990s containing a UST in operation over the last 10 years – the tank is double skinned but there is no integrity testing or evidence of leakage.
Unlikely	There is contaminant linkage, but circumstances are such that it is improbable that an event would occur even in the very long-term.	a) Elevated concentrations of toxic contaminants are present below hardstanding. b) Light industrial unit <10 yrs old containing a double skinned UST with annual integrity testing results available.

13.8.9 The magnitude of the potential consequence of a contaminant linkage gives an indication of the sensitivity of a given Receptor to a particular source or contaminant of concern under consideration. It is based on full exposure via the linkage being examined. The classification of consequence is presented in **Table 13.17 Classification of consequence.**

Table 13.17 Classification of consequence

Classification	Human Health	Controlled Water	Ecology	Property/Structures/Crops and animals	Examples
Severe	Highly elevated concentrations likely to result in "significant harm" to human health as defined by the EPA 1990, Part 2A, if exposure occurs.	Equivalent to Environment Agency (EA) Category 1 pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce.	Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population.	Catastrophic damage to crops, buildings or property.	Significant harm to humans is defined in the Contaminated Land Statutory Guidance as death, life threatening diseases (e.g., cancers), other diseases likely to have serious impacts on health, serious injury, birth defects, and impairment of reproductive functions. Major fish kill in surface water from large spillage of contaminants from site. Highly elevated concentrations of Hazardous or priority substances present in groundwater close to small potable abstraction (high sensitivity). Explosion, causing building collapse (can also equate to immediate human health risk if buildings are occupied).
Medium	Elevated concentrations which could result in "significant harm" to human health as defined by the EPA 1990, Part 2A if	Equivalent to EA Category 2 pollution incident including significant effect on water quality; notification required to abstractors; reduction in	Significant damage to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may	Significant damage to crops, buildings or property.	Significant harm to humans is defined in the Contaminated Land Statutory Guidance as death, life threatening diseases (e.g., cancers), other diseases likely to have serious impacts on health, serious injury, birth defects, and impairment of reproductive functions. Damage to building rendering it unsafe to occupy e.g., foundation damage resulting in instability.

Classification	Human Health	Controlled Water	Ecology	Property/Structures/Crops and animals	Examples
	exposure occurs.	amenity value or significant damage to agriculture or commerce.	endanger the long-term maintenance of the population.		Ingress of contaminants through plastic potable water pipes.
Mild	Exposure to human health unlikely to lead to "significant harm".	Equivalent to EA Category 3 pollution incident including minimal or short-lived effect on water quality; marginal effect on amenity value, agriculture or commerce.	Minor or short-lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population.	Minor damage to crops, buildings or property.	Exposure could lead to slight short-term effects (e.g., mild skin rash). Surface spalling of concrete.
Minor	No measurable effects on humans.	Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems.	Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems.	Repairable effects of damage to buildings, structures and services.	The loss of plants in a landscaping scheme. Discoloration of concrete.

13.8.10 The risk matrix to link the likelihood and consequence is shown in **Table 13.18 Risk Matrix.** Risks of moderate or higher are potentially significant and are shown in bold in the table.

Table 13.18 Risk Matrix

Likelihood:	Unlikely	Low Likelihood	Likely	High Likelihood
Potential Consequence:				
Severe	Moderate/low risk	**Moderate Risk**	**High Risk**	**Very High Risk**
Medium	Low	Moderate/low risk	**Moderate Risk**	**High Risk**
Mild	Very low risk	Low Risk	Moderate/low risk	**Moderate Risk**
Minor	Very low risk	Very low risk	Low Risk	Low Risk

13.8.11 The overall risk definitions are summarised in **Table 13.19 Risk Definitions.**

Table 13.19 Risk Definitions

Risk	Definition
Very High	There is a high probability that severe harm could arise to a designated Receptor from an identified hazard at the site without remediation action OR there is evidence that severe harm to a designated Receptor is already occurring. Realisation of that risk is likely to present a substantial liability to be site owner/or occupier. Investigation is required as a matter of urgency and remediation works likely to follow in the short-term.
High	Harm is likely to arise to a designated Receptor from an identified hazard at the site without remediation action. Realisation of the risk is likely to present a substantial liability to the site owner/or occupier. Investigation is required as a matter of urgency to clarify the risk. Remediation works may be necessary in the short-term and are likely over the longer term.
Moderate	It is possible that harm could arise to a designated Receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely that the harm would be relatively mild. Further investigative work is normally required to clarify the risk and to determine the potential liability to site owner/occupier. Some remediation works may be required in the longer term.
Low	It is possible that harm could arise to a designated Receptor from an identified hazard, but it is likely at worst that this harm if realised would normally be mild. It is unlikely that the site

Risk	Definition
	owner/or occupier would face substantial liabilities from such a risk. Further investigative work (which is likely to be limited) to clarify the risk may be required. Any subsequent remediation works are likely to be relatively limited.
Very Low	It is a low possibility that harm could arise to a designated Receptor, but it is likely at worst that this harm if realised would normally be mild or minor.

13.8.12 Where a risk classification of moderate or greater has been determined it is considered that the source–pathway–Receptor contaminant linkage requires some form of risk management or intervention.

13.8.13 As the first step, such risk management or intervention would normally take the form of further investigation, with the additional knowledge gained allowing the risk to be more accurately assessed and potentially the classification may be lowered. However, if the risk classification remains at moderate or above then remediation, in the form of mitigation, may be required to reduce or remove the source of contamination or disrupt the pathway to the Receptor.

Determination of significance

13.8.14 To use risk assessment as the basis for the evaluation of the significance of effects of a Proposed Development in relation to land contamination, it is necessary to evaluate the change in risk from baseline conditions to those during and following the Proposed Development. To define the baseline risk, the initial assessment and classification of risk is carried out for the Study Area in its pre-development state. A separate assessment of risk will then be conducted for the site post-development (including environmental measures inherently embedded in the development) to enable an evaluation of the change in risk due to the project.

13.8.15 **Table 13.20 Land contamination significance evaluation matrix** uses the risk classification pre- and post-development as the basis for a significance evaluation matrix for the purposes of EIA.

Table 13.20 Land contamination significance evaluation matrix

Risk pre-development		Risk post-development (including embedded measures)					
		Very Low	Low	Moderate / Low	Moderate	High	Very High
Existing Receptors	Very High	Major Positive (Significant)	Major Positive (Significant)	Moderate Positive (Potentially Significant)	Moderate Positive (Potentially Significant)	Minor Positive (Not Significant)	Negligible (Not Significant)
	High	Major Positive (Significant)	Moderate Positive (Potentially Significant)	Moderate Positive (Potentially Significant)	Minor Positive (Not Significant)	Negligible (Not Significant)	Minor Negative (Not Significant)
	Moderate	Moderate Positive (Potentially Significant)	Moderate Positive (Potentially Significant)	Minor Positive (Not Significant)	Negligible (Not Significant)	Minor Negative (Not Significant)	Moderate Negative (Potentially Significant)
	Moderate / Low	Moderate Positive (Potentially Significant)	Minor Positive (Not Significant)	Negligible (Not Significant)	Minor Negative (Not Significant)	Moderate Negative (Potentially Significant)	Moderate Negative (Potentially Significant)
	Low	Minor Positive (Not Significant)	Negligible (Not Significant)	Minor Negative (Not Significant)	Moderate Negative (Potentially Significant)	Moderate Negative (Potentially Significant)	Major Negative (Significant)
	Very Low	Negligible (Not Significant)	Minor Negative (Not Significant)	Moderate Negative (Potentially Significant)	Moderate Negative (Potentially Significant)	Major Negative (Significant)	Major Negative (Significant)
No Receptor present pre-development	N/A	Minor Negative (Not Significant)	Moderate Negative (Potentially Significant)	Moderate Negative (Potentially Significant)	Major Negative (Significant)	Major Negative (Significant)	Major Negative (Significant)

Risks that remain at moderate, high, or very high post-development are unlikely to be considered acceptable and further mitigation or assessment will be required to enable the development to proceed.

13.8.16 If the embedded measures are effective the risks post development should be less than moderate; or the risks from the project are likely to be considered unacceptable.

13.8.17 Although risks of moderate, high or very high post-development are unlikely to be considered acceptable, in some instances, with further consideration and assessment, there may be circumstances where development can proceed, where moderate and above risks remain. This would only be possible with further assessment and consideration e.g., where it can be demonstrated through tools

such as cost benefit analysis that remediation is not appropriate or cost effective. For example, this is sometimes the case with groundwater contamination where removal of the contaminant(s) from an aquifer is not straightforward or guaranteed with available techniques, and cost benefit analysis indicates that remediation is not warranted.

13.8.18 The findings of the desk study and ground investigation form the baseline against which the potential impact of the project, alone and cumulatively with other developments, can be assessed. The assessment is based on both Receptor importance and the nature and magnitude of the impact as a result of the Proposed Development, the mitigation considered necessary is identified and residual effects with the mitigation in place are determined.

EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections

Construction phase: Mobilisation of contamination to human health Receptors via numerous pathways (including groundwater, surface water, leaching from soil, migration of vapours and windblown dusts) resulting in health effects.

13.8.19 The potential sources of contamination identified within the EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections are detailed in **Table 13.10 Sources of Contamination – EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections** and are shown on **Figure 13.1i Potential land contamination constraints within the Study Area EfW CHP Facility Site** and **Figure 13.1ii Potential land contamination constraints within the Study Area CHP Connection, Access Improvements and Temporary Construction Compound (Volumes 6.3)**. The assessment of the risk to Receptors from these potential sources of contamination is presented in the Phase 1 and 2 geoenvironmental report in **Appendix 13A Wisbech Phases 1 and 2 Geoenvironmental Desk Study and Interpretative Report (Volume 6.4)** and summarised below.

13.8.20 Through ground investigation on the EfW CHP Facility Site, the majority of the risks to human health identified at desk study stage in this area of the Proposed Development were downgraded based on the levels of contaminants encountered during the investigation being low. For example, the risks associated with tanks containing diesel and AdBlue were downgraded from moderate/low to low based on the likelihood of a medium consequence being reduced from low likelihood to unlikely. A risk to human health requiring further consideration associated with ground gas was identified and this is discussed below from **paragraph 13.8.29.**

13.8.21 For other components of the Proposed Development, comprising the Access Improvements, CHP Connection, TCC and Water Connections, the Phase 1 (desk-based) risk assessment identified several risks requiring further consideration. The highest level of risk was a moderate risk to future site users associated with potential contamination, including asbestos, on the disused March to Wisbech Railway (at the CHP Connection), based upon a medium consequence and likelihood of likely, if no controls were applied. Moderate/low risks to site users were also identified, associated with sources including onsite made ground and offsite former petrol filling station, the moderate/low risk level is derived from a medium consequence of a

contaminant linkage occurring between source and Receptor, and low likelihood of occurrence. Phase 2 intrusive site investigation is recommended for these sources as part of the detailed design process, and the commitment to carry out further Phase 2 intrusive investigation and further risk assessment is an embedded environmental measure, to be secured by a DCO Requirement for the Proposed Development, as detailed in **Table 13.15 Summary of the embedded environmental measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment.** This will then inform other embedded measures including the use of an MMP.

13.8.22 The Phase 2 investigation results will inform the measures for appropriate storage and handling of soil during construction to be integrated into the **Outline CEMP (Volume 7.12)**, including compliance with CDM 2015 and CAR 2012, and use of an MMP that outlines where excavated non-waste materials will be reused in line with the DoWCoP. Any temporary onsite storage of excavated materials suspected or confirmed to be contaminated will be on impermeable sheeting, covered over and with adequate leachate/runoff drainage to prevent migration of contaminants from the stockpile. Materials will be segregated where possible to prevent cross-contamination occurring. These and other measures detailed in the embedded environmental measures in **Table 13.15 Summary of the embedded environmental measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment** will ensure that the Proposed Development does not result in any increased risk to human health during the construction works**.**

13.8.23 Where the risk level stays at moderate or moderate/low, the effect is Negligible, which is **Not Significant** in EIA terms.

Construction phase: Mobilisation of contamination via numerous pathways (including groundwater, surface water, preferential pathway creation and leaching from soil) resulting in contamination of controlled waters

13.8.24 The potential sources of contamination identified within the EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections are detailed in **Table 13.10 Sources of Contamination – EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections** and are shown on **Figure 13.1i Potential land contamination constraints within the Study Area EfW CHP Facility Site** and **Figure 13.1ii Potential land contamination constraints within the Study Area CHP Connection, Access Improvements and Temporary Construction Compound (Volume 6.3)**. During construction there is potential for contaminants in previously undisturbed ground to become mobilised e.g., during excavation or whilst stored in stockpiles. The highest risk to surface water from the identified sources was assessed as moderate/low, based on a medium consequence and a low likelihood of a contaminant linkage being realised.

13.8.25 Through ground investigation on the EfW CHP Facility Site, the majority of the risks to controlled waters identified at desk study stage in this area of the Proposed Development were downgraded, this was based on the levels of contaminants encountered during the investigation being lower than the levels the desk-based assessment was based upon. For example, the risks to groundwater and surface water associated with tanks containing diesel and AdBlue were downgraded from

moderate/low to low based on the likelihood of a medium consequence being reduced from low likelihood to unlikely, due to measured contaminant concentrations being below laboratory detection limits.

13.8.26 For other components of the Proposed Development, comprising the Access Improvements, CHP Connection, TCC and Water Connections, the Phase 1 (desk-based) risk assessment identified several risks requiring further consideration. The highest level of risk was a moderate/low risk to surface water in drainage channels associated with potential contamination in made ground, based upon a medium consequence and low likelihood of a contaminant linkage. Moderate/low risks to surface water were also identified for former railway activities at the CHP Connection and the unknown land use (storage/other activity within hedged area) at the TCC. Phase 2 intrusive site investigation is recommended for these sources as part of the detailed design process, and the commitment to carry out further Phase 2 intrusive investigation and further risk assessment in accordance with the UK Government's LCRM guidance is an embedded environmental measure, to be secured by the DCO, for the Proposed Development, as detailed in **Table 13.15 Summary of the embedded environmental measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment.** This will then inform other embedded measures including the use of an MMP.

13.8.27 The embedded environmental measures in **Table 13.15 Summary of the embedded environmental measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment** also include control measures during construction for encountering unexpected contamination and for management of potentially contaminated excavated soils, to prevent generation of dusts and leaching of contamination.

13.8.28 Construction activity can increase the potential for contaminants to be mobilised e.g., as surface water runoff, by leaching and subsequent migration to surface water via groundwater, compared to the baseline situation of undisturbed soils. However, with the embedded environmental measures, the likely worst-case scenario is that there is no change to the risk level. Where the risk remains at moderate/low, the effect is Negligible, which is **Not Significant** in EIA terms.

Construction phase: Build-up of gases in confined spaces. Potential health effects on humans and potential for gas build up to result in flammable atmospheres developing that could result in explosion

13.8.29 The potential sources of contamination identified include onsite peat deposits which can generate ground gas including methane. A worst-case consequence from the build-up of gases in enclosed spaces (gas explosion) of severe was therefore assigned in the risk assessment in the Phase 1 and 2 geoenvironmental report in **Appendix 13A Wisbech Phases 1 and 2 Geoenvironmental Desk Study and Interpretative Report (Volume 6.4)**. The risk is assessed as moderate/low based on a low likelihood, as although gas monitoring carried out during the Phase 2 geoenvironmental investigation found limited evidence that ground gas is migrating to the surface, there is potential for new pathways and Receptors to be introduced during construction e.g., of basements/services for the EfW CHP Facility. Embedded environmental measures to address this risk include further assessment to ensure that the construction work accounts for potential gas generation and

accumulation from peat deposits at depth and mitigates this risk. This, and compliance with CDM 2015, is an embedded environmental measure included in **Table 13.15 Summary of the embedded environmental measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment.**

13.8.30 Other embedded environmental measures include a procedure in the **Outline CEMP (Volume 7.12)**, secured by the DCO, for encountering unexpected contamination, including potential ground gas sources, during construction. Any newly identified sources will be assessed in accordance with LCRM guidance.

13.8.31 The embedded measures require further assessment of the risks posed by ground gas to buildings and enclosed spaces to inform the design of the EfW CHP Facility. As ground gas risks can be mitigated through design, there is no likely increase in the risk level between the baseline condition and as a result of the Proposed Development. The effect is Negligible, which is **Not Significant** in EIA terms.

Construction phase: Accidental spillages and leaks resulting in ground contamination and risks to controlled waters during construction. This includes the potential for leakage of bentonite during Horizontal Directional Drilling (HDD)

13.8.32 The construction activities for the Proposed Development include the setup of the TCC and construction works taking place at the EfW CHP Facility, Access Improvements, CHP Connection, and Water Connections. Construction activities will include trenching and potential HDD for the Water Connections. The construction activities will require the storage of fuels including the refuelling of plant and machinery, which have the potential to cause fuel losses either because of loss of bulk containment or from minor leaks/spills.

13.8.33 Embedded environmental measures include the use of designated refuelling areas away from surface water courses, requirements for secondary containment of bulk fuel storage in line with best practice containment guidance, locating of bulk storage and refuelling activities on impermeable bases and development of incident response plans to promptly deal with incidents. HDD crossings, potentially required for the Water Connections, will require the use of drilling fluids to be stored at the HDD site with the potential for a release from loss of bulk containment. The drilling fluids used during HDD are bentonite-based muds which are not classified as environmentally hazardous.

13.8.34 Construction activity will increase the potential for an accidental release of contaminants or polluting substances compared to the baseline situation. However, with the embedded measures the likelihood of a pollution event occurring is assessed to be a low likelihood. The risk to surface water as a result of the construction works is, therefore, assessed as moderate/low based on a medium impact if a spill occurs. As this impact would be unlikely to occur without the proposed development, the likely worst-case scenario is an increase in the likelihood of contamination of controlled waters occurring, by one order of likelihood. This results in a change from low risk (medium consequence, likelihood of unlikely) to moderate/low for surface water Receptors. The effect is Minor and negative, which is **Not Significant** in EIA terms.

Operational phase: Potential for contaminated soils left at or near surface or mixed with surface soils during construction to pose a health risk to site users, resulting in exposure to land contamination via numerous pathways (e.g., inhalation, direct contact, ingestion) resulting in health effects.

13.8.35 The potential sources of contamination identified within the EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections are detailed in **Table 13.10 Sources of Contamination – EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections** and are shown on **Figure 13.1i Potential land contamination constraints within the Study Area EfW CHP Facility Site** and **Figure 13.1ii Potential land contamination constraints within the Study Area CHP Connection, Access Improvements and Temporary Construction Compound (Volume 6.3)**.

13.8.36 Through ground investigation on the EfW CHP Facility Site, most of the risks identified at desk study stage in this area of the Proposed Development were downgraded based on the levels of contaminants encountered during the investigation. For example, the risks associated with tanks containing diesel and AdBlue were downgraded from moderate/low to low based on the likelihood of a medium consequence being reduced from low likelihood to low, based on contaminants being generally measured at low levels. Based on the Phase 1 (desk-based) risk assessment for identified sources in the other components of the Proposed Development (Access Improvements, CHP Connection, TCC and Water Connections), the maximum risk posed to human health due to contaminants in soils was moderate/low, based on a medium consequence and a low likelihood.

13.8.37 The commitment to carry out further Phase 2 intrusive investigation is an embedded environmental measure for the Proposed Development, secured by the DCO, as detailed in **Table 13.15 Summary of the embedded environmental measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment.** This approach will inform the design of the construction works, which will be carried out in accordance with CDM 2015, CAR 2012, and data from the investigation will inform the MMP, which will outline where excavated non-waste materials will be reused in line with the DoWCoP. Any temporary onsite storage of excavated materials suspected or confirmed to be contaminated will be on impermeable sheeting, covered over and with adequate leachate/runoff drainage to prevent migration of contaminants from the stockpile. Materials will be segregated where possible to prevent cross-contamination occurring.

13.8.38 Without control, construction activity can increase the potential for contaminants to be mobilised and new contaminant migration pathways to be created, compared to the baseline situation of undisturbed soils. However, with the embedded environmental measures in **Table 13.15 Summary of the embedded environmental measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment**, the likely worst-case scenario is that the likelihood of encountering contamination within the Access Improvements, CHP Connection, TCC or Water Connections during the operational phase will remain similar to the original risk assessment. The assessment considers that the construction works for some components of the Proposed Development (Access Improvements, CHP Connection, and Water Connections) will not disturb all of the land included in the Proposed Development, and therefore some soil conditions will

remain unchanged from baseline. This means that, for example, the moderate risk associated with possible asbestos on the disused/former railway land (CHP Connection) is likely to remain moderate, and the moderate/low risk for human health Receptors associated with sources including made ground and offsite former petrol filling station where the Proposed Development encounters areas of known or potential contamination will also remain moderate/low. Where the risk level stays at moderate or moderate/low, the effect is Negligible, which is **Not Significant** in EIA terms.

Operational phase: Potential for organic contaminants (hydrocarbons) in soils to permeate water supply pipes constructed for the Proposed Development causing degradation in water supply and potential for human health effects.

13.8.39 The Phase 1 and 2 geoenvironmental report in **Appendix 13A Wisbech Phases 1 and 2 Geoenvironmental Desk Study and Interpretative Report (Volume 6.4)** identified potential for organic contaminants (hydrocarbons) to impact on new potable water supply pipes at the EfW CHP Facility Site. A moderate risk was assessed within the EfW CHP Facility Site based on a severe consequence and a low likelihood. Embedded environmental measures detailed in **Table 13.15 Summary of the embedded environmental measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment** include the requirement for further assessment of the risk to potable water supplies to ensure that suitable design measures, such as barrier type potable water supply pipes, are in place, and the requirement to confirm these measures in advance with the statutory provider, Anglian Water. This measure will be secured by a DCO Requirement and will reduce the risk level by lowering the likelihood of an impact on water supply to unlikely, resulting in a moderate/low risk.

13.8.40 This results in the risk level being reduced from moderate to moderate/low, based on a severe consequence and reduction of likelihood from low likelihood to unlikely. The effect is Minor positive, which is **Not Significant** in EIA terms.

Operational phase: Potential to create new contaminant migration pathways, such as increasing potential for surface water runoff, and there is limited potential for the development to result in increased likelihood of contaminants leaching or migrating in groundwater to surface water, causing deterioration in surface water quality.

13.8.41 The potential sources of contamination identified within the EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections are detailed in **Table 13.10 Sources of Contamination – EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections,** and are shown on **Figure 13.1i Potential land contamination constraints within the Study Area EfW CHP Facility Site** and **Figure 13.1ii Potential land contamination constraints within the Study Area CHP Connection, Access Improvements and Temporary Construction Compound (Volume 6.3)**.

13.8.42 Through ground investigation on the EfW CHP Facility Site, the majority of the risks to controlled waters identified at desk study stage in this area of the Proposed Development were downgraded, this was based on the levels of contaminants encountered during the investigation being lower than the levels the desk-based assessment was based upon. For example, the risks to groundwater and surface

water associated with tanks containing diesel and AdBlue were downgraded from moderate/low to low based on the likelihood of a medium consequence being reduced from low likelihood to unlikely, due to measured contaminant concentrations being below laboratory detection limits.

13.8.43 For other components of the Proposed Development, comprising the Access Improvements, CHP Connection, TCC and Water Connections, the Phase 1 (desk-based) risk assessment identified several risks requiring further consideration. The highest level of risk was a moderate/low risk to surface water in drainage channels associated with potential contamination in made ground, based upon a medium consequence and low likelihood of a contaminant linkage. Moderate/low risks to surface water were also identified for former railway activities at the CHP Connection and the unknown land use (storage/other activity within hedged area) at the TCC.

13.8.44 Without control, changes to the ground (e.g., construction of new below ground infrastructure such as installing service trenches or reinstatement/placement of soils/materials) can result in new contaminant migration pathways being formed for the identified sources, which may then result in pollution of controlled waters occurring during the operational phase, compared to the baseline situation of undisturbed soils.

13.8.45 With the embedded environmental measures in **Table 13.15 Summary of the embedded environmental measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment** including commitment to carry out further Phase 2 intrusive investigation in accordance with the UK Government's LCRM guidance, controls will be in place to ensure, e.g., through use of the MMP, that the land is suitable for use and not capable of being determined as Contaminated Land under Part 2A of the EPA 1990, including in relation to risks to controlled waters. The embedded measures will ensure that there is no increase in the level of risk to controlled waters during the operational phase, and where the risk level stays at moderate/low, the effect is Negligible, which is **Not Significant** in EIA terms.

Operational phase: Accidental spillages and leaks to soil or groundwater subsequently impacting controlled waters including surface water during operation and maintenance activities. Potential requirement for excavation of soil in order to carry out maintenance activities e.g., for Water Connections.

13.8.46 With regard to the potential for future leaks or spills occurring at the EfW CHP Facility Site during the operational phase, this facility will be regulated under the EPR regime. The EPR regime requires operators to use best available techniques (BAT) in the design of their installations, and to demonstrate that they have suitable measures in place to protect the land (soil and groundwater), both in terms of physical pollution prevention measures such as hardstanding and bunds, and management systems and procedures to prevent accidental releases of pollutants to land. This lowers the risk of emissions to soil or groundwater occurring during permitted operations at the EfW CHP Facility Site, and the risk of subsequent migration of contaminants from site groundwater or leaching of contaminants from site soils to impact on nearby surface water.

13.8.47 For the other components of the Proposed Development (Access Improvements, CHP Connection, TCC and Water Connections), maintenance activities with potential to require use of plant/vehicles with potential to cause accidental releases to ground of fuels/oils or excavation of soil with potential to result in contaminated runoff or leaching/migration in groundwater to surface water are expected to be infrequent and to involve minimal ground disturbance.

13.8.48 Given the regulatory controls that will be applied to the operational EfW CHP Facility and the minimal potential for ground disturbance to be required for the other components of the Proposed Development, no increase in risks to surface water Receptors is likely and the risk will remain low. The effect is Negligible, which is **Not Significant** in EIA terms.

Grid Connection

Construction phase: Mobilisation of contamination to human health Receptors via numerous pathways (including groundwater, surface water, leaching from soil, migration of vapours and windblown dusts) resulting in health effects.

13.8.49 The potential sources of contamination identified within the Grid Connection Study Area are detailed in **Table 13.11 Sources of Contamination – Grid Connection** and are shown on **Figure 13.1iii Potential land contamination constraints within the Study Area Grid Connection (Volume 6.3)**. The assessment of the risk to Receptors from these potential sources of contamination is presented in the Phase 1 geoenvironmental report in **Appendix 13B Grid Connection Corridor Phase 1 Geoenvironmental Desk Study and Interpretative Report (Volume 6.4)** and summarised below.

13.8.50 The risk assessment identified moderate/low risks to future site users, based on a medium consequence and a low likelihood of a contaminant linkage occurring, associated with potential contamination associated with sources including a historical landfill in the former Wisbech Canal, made ground, fly tipped waste, the existing Walsoken DNO Substation, two offsite former petrol stations, and a recorded pollution incident at an offsite land drain. There are also moderate/low risks to surface waters (also derived based on a medium consequence and low likelihood) associated with the Wisbech Canal landfill, made ground, the Walsoken DNO Substation and the offsite former petrol stations. Moderate/low risks to future property (based on a severe consequence of explosion and a likelihood of unlikely) were identified due to the potential for ground gas associated with natural peat deposits and an offsite refuse tip. Phase 2 intrusive site investigation was recommended for these sources as part of the detailed design process.

13.8.51 Phase 2 intrusive site investigation was recommended for these sources as part of the detailed design process, and the commitment to carry out further Phase 2 intrusive investigation and further risk assessment is an embedded environmental measure, to be secured by a DCO Requirement, for the Proposed Development, as detailed in **Table 13.15 Summary of the embedded environmental measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment.** This will then inform other embedded measures including the use of an MMP.

13.8.52 The Phase 2 investigation results will inform the measures for appropriate storage and handling of soil during construction to be integrated into the **Outline CEMP (Volume 7.12)**, including compliance with CDM 2015 and CAR 2012, and use of an MMP that outlines where excavated non-waste materials will be reused in line with the DoWCoP. Any temporary onsite storage of excavated materials suspected or confirmed to be contaminated will be on impermeable sheeting, covered over and with adequate leachate/runoff drainage to prevent migration of contaminants from the stockpile. Materials will be segregated where possible to prevent cross-contamination occurring. These and other measures detailed in the embedded environmental measures in **Table 13.15 Summary of the embedded environmental measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment** will ensure that the Proposed Development does not result in any increased risk to human health during the construction works**.**

13.8.53 Where the risk level stays at moderate/low pre and post development, the effect is Negligible, which is **Not Significant** in EIA terms.

Construction phase: Mobilisation of contamination via numerous pathways (including groundwater, surface water, preferential pathway creation and leaching from soil) resulting in contamination of controlled waters

13.8.54 The potential sources of contamination identified within the Grid Connection are detailed in and are shown on **Figure 13.1iii Potential land contamination constraints within the Study Area Grid Connection (Volume 6.3)**. During construction there is potential for contaminants in previously undisturbed ground to become mobilised e.g., during excavation or whilst stored in stockpiles. The highest risk to surface water from the identified sources within the Grid Connection was assessed as moderate/low, based on a medium consequence and a low likelihood of a contaminant linkage being realised.

13.8.55 Based on the findings of the Phase 1 geoenvironmental desk study, further targeted ground investigation is to be undertaken prior to the construction phase. The commitment to carry out further Phase 2 intrusive investigation and further risk assessment in accordance with the UK Government's LCRM guidance is an embedded environmental measure, to be secured by DCO Requirement, for the Proposed Development, as detailed in **Table 13.15 Summary of the embedded environmental measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment.** This will then inform other embedded measures including the use of an MMP.

13.8.56 The embedded environmental measures in **Table 13.15 Summary of the embedded environmental measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment** include control measures during construction for encountering unexpected contamination and for management of potentially contaminated excavated soils, to prevent generation of dusts and leaching of contamination.

13.8.57 Construction activity can increase the potential for contaminants to be mobilised e.g., as surface water runoff, by leaching and subsequent migration to surface water via groundwater, compared to the baseline situation of undisturbed soils. However, with the embedded environmental measures, the likely worst-case scenario is that

there is no change to the risk level. Where the risk remains at Moderate/Low, the effect is Negligible, which is **Not Significant** in EIA terms.

Construction phase: Build-up of gases in confined spaces in existing or newly constructed infrastructure on the land required for the Proposed Development. Potential health effects on humans and potential for gas build up to result in flammable atmospheres developing that could result in explosion

13.8.58 The potential sources of contamination identified include onsite peat deposits which can generate ground gas including methane. The Walsoken Substation may have enclosed spaces where ground gas can potentially accumulate if measures to prevent this are not in place (e.g., GRP Kiosk). A worst-case consequence from the build-up of gases (i.e., a gas explosion) of severe has therefore been assigned. The risk was assessed as moderate/low in relation to construction of the substation based on a severe consequence and a likelihood of unlikely. This is a conservative assessment that considers the possible requirement for deep foundations that may introduce new gas migration pathways. Embedded environmental measures to address this risk include further assessment to ensure that the detailed design accounts for potential gas ingress from peat deposits at depth and mitigates this risk. This is an embedded environmental measure included in **Table 13.15 Summary of the embedded environmental measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment**.

13.8.59 Other embedded environmental measures include a procedure in the **Outline CEMP (Volume 6.3)**, to be secured by the DCO, for encountering unexpected contamination during construction for any newly identified sources to be assessed in accordance with LCRM guidance, this would include assessment of previously unidentified potential sources of ground gas (e.g., if during excavations for the Grid Connection undocumented landfill is encountered).

13.8.60 The embedded measures require further assessment of the risks posed by ground gas to buildings and enclosed spaces prior to the commencement of development via a DCO Requirement. Ground gas risks can be mitigated through design (including design of construction works) and on this basis, there is no likely increase in the risk level between the baseline condition and the condition resulting because of the Proposed Development. The effect is Negligible, which is **Not Significant** in EIA terms.

Construction phase: Accidental spillages and leaks resulting in ground contamination and risks to controlled waters during construction.

13.8.61 The construction activities for the Grid Connection involve excavating and backfilling an open cut trench. The construction activities will require the storage of fuels including the refuelling of plant and machinery, which have the potential to cause fuel losses either because of loss of bulk containment or from minor leaks/spills. The risk to surface water is assessed as moderate/low based on a medium impact and a low likelihood.

13.8.62 Embedded environmental measures detailed in **Table 13.15 Summary of the embedded environmental measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment** to prevent this occurrence

include the use of designated refuelling areas away from surface water courses, requirements for secondary containment of bulk fuel storage in line with best practice containment guidance, locating of bulk storage and refuelling activities on impermeable bases and development of incident response plans to promptly deal with incidents.

13.8.63 Construction activity will increase the potential for an accidental release of contaminants or polluting substances compared to the baseline situation. However, with the embedded measures the likelihood of a pollution event occurring is assessed to be a low likelihood. The risk to surface water as a result of the construction works is therefore assessed as moderate/low based on a medium impact if a spill occurs. As this impact would be unlikely to occur without the proposed development, the likely worst-case scenario is an increase in the likelihood of contamination of controlled waters occurring, by one order of likelihood. This results in a change from low risk (medium consequence, likelihood of unlikely) to moderate/low for surface water Receptors. The effect is Minor and negative, which is **Not Significant** in EIA terms.

Operational phase: Potential for contaminated soils left at or near surface or mixed with surface soils during construction to pose a health risk to site users, resulting in exposure to land contamination via numerous pathways (e.g., inhalation, direct contact, ingestion) resulting in health effects.

13.8.64 The potential sources of contamination identified within the Grid Connection are detailed in **Table 13.11 Sources of Contamination – Grid Connection** and are shown on **Figure 13.1iii Potential land contamination constraints within the Study Area Grid Connection (Volume 6.3)**. Based on the Phase 1 (desk-based) risk assessment for identified sources in the Grid Connection, the maximum risk posed to human health due to contaminants in soils, for sources including the historical landfill at the former Wisbech Canal, was assessed as moderate/low, based on a medium consequence and a low likelihood.

13.8.65 With the embedded environmental measures in **Table 13.15 Summary of the embedded environmental measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment** including commitment to carry out Phase 2 intrusive investigation in accordance with the UK Government's LCRM guidance, controls will be in place to ensure, e.g., through use of the MMP, that the land is suitable for use and not capable of being determined as Contaminated Land under Part 2A of the EPA 1990, including in relation to risks to human health. The embedded measures will ensure that there is no increase in the level of risk to site users during the operational phase, and where the risk level stays at moderate/low, the effect is Negligible, which is **Not Significant** in EIA terms.

Operational phase: Potential to create new contaminant migration pathways, such as increasing potential for surface water runoff, there is limited potential for the development to result in increased likelihood of contaminants leaching or migrating in groundwater to surface water, causing deterioration in surface water quality. However, this cannot be ruled out, notably at the Wisbech Canal landfill.

13.8.66 The potential sources of contamination identified within the Grid Connection are detailed in **Table 13.11 Sources of Contamination – Grid Connection** and are

shown on **Figure 13.1iii Potential land contamination constraints within the Study Area Grid Connection (Volume 6.3)**. A moderate/low risk is assessed for potential impacts on surface water Receptors as a result of the Proposed Development in relation to sources including the historical landfill at the Wisbech Canal and made ground.

13.8.67 Without control, changes to the ground (e.g., construction of new below ground infrastructure such as installing cable trenches or reinstatement/placement of soils/materials) could result in new contaminant migration pathways being formed for identified sources, which may then result in pollution of controlled waters occurring during the operational phase, compared to the baseline situation of undisturbed soils.

13.8.68 With the embedded environmental measures in **Table 13.15 Summary of the embedded environmental measures and how these influence the Geology, Hydrogeology and Contaminated Land assessment** including commitment to carry out further Phase 2 intrusive investigation in accordance with the UK Government's LCRM guidance, controls will be in place to ensure, e.g., through use of the MMP, that the land is suitable for use and not capable of being determined as Contaminated Land under Part 2A of the EPA 1990, including in relation to risks to controlled waters. The embedded measures will ensure that there is no increase in the level of risk to controlled waters during the operational phase, and where the risk level stays at moderate/low, the effect is Negligible, which is **Not Significant** in EIA terms.

Operational phase: Accidental spillages and leaks to soil or groundwater subsequently impacting controlled waters including surface water during operation and maintenance activities.

13.8.69 Grid Connection maintenance activities with potential to require use of plant/vehicles with potential to cause accidental releases to ground of fuels/oils or excavation of soil with potential to result in contaminated runoff or leaching/migration in groundwater to surface water are expected to be infrequent and to involve minimal ground disturbance e.g., the Grid Connection will comprise cables in ducts with joint bays, meaning that only joint bay locations would need to be disturbed in the unlikely event that maintenance is needed.

13.8.70 Given the minimal potential for ground disturbance to be required due to maintenance of the Grid Connection being unlikely to require frequent or extensive ground disturbance, no increase in risks to surface water Receptors is likely and the risk (of water pollution, as a medium consequence) will remain low. The effect is Negligible, which is **Not Significant** in EIA terms.

13.8.71 A summary of the results of the assessment of Contaminated Land is provided in **Table 13.21 Summary of significance of adverse Contaminated Land effects: EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections** and in **Table 13.22 Summary of significance of adverse Contaminated Land effects: Grid Connection.**

Table 13.21 Summary of significance of adverse Contaminated Land effects: EfW CHP Facility Site, Access Improvements, CHP Connection, TCC and Water Connections

	Baseline assessment			Assessment with the Proposed Development			
Receptor and summary of predicted effects	**Likelihood**	**Consequence**	**Risk**	**Likelihood**	**Consequence**	**Risk**	**Change in Risk (Significance)**
Construction:							
Mobilisation of contamination to human health Receptors via numerous pathways (including groundwater, surface water, leaching from soil, migration of vapours and windblown dusts) resulting in health effect.	Low likelihood	Medium	Moderate/Low	Low likelihood	Medium	Moderate/Low	Negligible (**Not Significant**)
Mobilisation of contamination via numerous pathways (including groundwater, surface water, preferential pathway creation and leaching from soil) resulting in	Low likelihood	Medium	Moderate/Low	Low likelihood	Medium	Moderate/Low	Negligible (**Not Significant**)

	Baseline assessment			Assessment with the Proposed Development			
Receptor and summary of predicted effects	**Likelihood**	**Consequence**	**Risk**	**Likelihood**	**Consequence**	**Risk**	**Change in Risk (Significance)**
contamination of controlled water.							
Build-up of gases in confined spaces. Potential health effects on humans and potential for gas build up to result in flammable atmospheres developing that could result in explosion.	Unlikely	Severe	Moderate/low	Unlikely	Severe	Moderate/low	Negligible (**Not Significant**)
Accidental spillages and leaks resulting in ground contamination and risks to controlled waters during construction. This includes the potential for leakage of bentonite during HDD	Unlikely	Medium	Low	Low likelihood	Medium	Moderate/Low	Minor Negative (**Not Significant**)
Operation:							
Potential for contaminated soils left at or near surface or mixed with	Low likelihood	Medium	Moderate/Low	Low likelihood	Medium	Moderate/Low	Negligible (**Not Significant**)

	Baseline assessment			Assessment with the Proposed Development			
Receptor and summary of predicted effects	**Likelihood**	**Consequence**	**Risk**	**Likelihood**	**Consequence**	**Risk**	**Change in Risk (Significance)**
surface soils during construction to pose a health risk to site users, resulting in exposure to land contamination via numerous pathways (e.g., inhalation, direct contact, ingestion) resulting in health effects.							
Potential for organic contaminants (hydrocarbons) in soils to permeate water supply pipes constructed for the EfW CHP Facility causing degradation in water supply and potential for human health effects.	Low likelihood	Severe	Moderate	Unlikely	Severe	Moderate/Low	Minor positive (**Not Significant**)
Potential to create new contaminant migration pathways, such as increasing potential for surface water runoff, and there is limited potential for the	Low likelihood	Medium	Moderate/Low	Low likelihood	Medium	Moderate/Low	Negligible (**Not Significant**)

	Baseline assessment			Assessment with the Proposed Development			
Receptor and summary of predicted effects	**Likelihood**	**Consequence**	**Risk**	**Likelihood**	**Consequence**	**Risk**	**Change in Risk (Significance)**
development to result in increased likelihood of contaminants leaching or migrating in groundwater to surface water, causing deterioration in surface water quality.							
Accidental spillages and leaks to soil or groundwater subsequently impacting controlled waters including surface water during operation and maintenance activities. Potential requirement for excavation of soil in order to carry out maintenance activities e.g., for Water Connections.	Unlikely	Medium	Low	Unlikely	Medium	Low	Negligible (**Not Significant**)

Table 13.22 Summary of significance of adverse Contaminated Land effects: Grid Connection

	Baseline assessment			Assessment with the Proposed Development			
Receptor and summary of predicted effects	**Likelihood**	**Consequence**	**Risk**	**Likelihood**	**Consequence**	**Risk**	**Change in Risk (Significance)**
Construction:							
Mobilisation of contamination to human health Receptors via numerous pathways (including groundwater, surface water, leaching from soil, migration of vapours and windblown dusts) resulting in health effects.	Low likelihood	Medium	Moderate/Low	Low likelihood	Medium	Moderate/Low	Negligible (**Not Significant**)
Mobilisation of contamination via numerous pathways (including groundwater, surface water, preferential pathway creation and leaching from soil) resulting in contamination of controlled waters.	Low likelihood	Medium	Moderate/Low	Low likelihood	Medium	Moderate/Low	Negligible (**Not Significant**)
Build-up of gases in confined spaces. Potential health effects on humans and potential for gas build up to result in flammable atmospheres developing that could result in explosion	Unlikely	Severe	Moderate/low	Unlikely	Severe	Moderate/low	Negligible (**Not Significant**)
Accidental spillages and leaks resulting in ground contamination and risks to controlled waters during construction.	Unlikely	Medium	Low	Low likelihood	Medium	Moderate/Low	Minor Negative (**Not Significant**)

	Baseline assessment			Assessment with the Proposed Development			
Receptor and summary of predicted effects	**Likelihood**	**Consequence**	**Risk**	**Likelihood**	**Consequence**	**Risk**	**Change in Risk (Significance)**
Operation:							
Potential for contaminated soils left at or near surface or mixed with surface soils during construction to pose a health risk to site users, resulting in exposure to land contamination via numerous pathways (e.g., inhalation, direct contact, ingestion) resulting in health effects.	Low likelihood	Medium	Moderate/Low	Low likelihood	Medium	Moderate/Low	Negligible (**Not Significant**)
Potential to create new contaminant migration pathways, such as increasing potential for surface water runoff, and there is limited potential for the development to result in increased likelihood of contaminants leaching or migrating in groundwater to surface water, causing deterioration in surface water quality. However, this cannot be ruled out, notably at the Wisbech Canal landfill.	Low likelihood	Medium	Moderate/Low	Low likelihood	Medium	Moderate/Low	Negligible (**Not Significant**)
Accidental spillages and leaks to soil or groundwater subsequently impacting controlled waters including surface water during operation and maintenance activities.	Unlikely	Medium	Low	Unlikely	Medium	Low	Negligible (**Not Significant**)

Summary

13.8.72 A summary of the results of the assessment of the Geology, Hydrogeology and Contaminated Land is provided in **Table 13.23 Summary of significance of adverse effects for the Proposed Development.**

Table 13.23 Summary of significance of adverse effects for the Proposed Development (all elements including EfW CHP Facility Site, Access Improvements, CHP Connection, TCC, Water Connections and Grid Connection)

Activity and impact	Effect	Receptor	Assessment of residual effect	Summary rationale
Construction:				
Mobilisation of contamination during construction on areas affected by land contamination	Health effects due to exposure to contaminants via numerous pathways (including groundwater, surface water, leaching from soil, migration of vapours and windblown dusts)	Human health Receptors (commercial site users, members of the public/landowners, nearby residents)	Negligible (Not Significant)	The embedded measures (**Table 13.15**) will ensure that further contaminated land assessment is completed pre-construction and that the findings of these investigations will inform the measures in the **Outline CEMP (Volume 7.12)** (secured by a DCO Requirement) to be implemented during the construction phase to prevent the release of contaminants during construction activities.
Mobilisation of contamination during construction on areas affected by land contamination	Migration of contaminants as surface water runoff from soils, groundwater migration, leaching of contaminants, preferential pathway creation	Controlled waters: surface water drainage channels	Negligible (Not Significant)	The embedded measures (**Table 13.15**) will ensure that further contaminated land assessment is completed pre-construction and that the findings of these investigations will inform the measures in the **Outline CEMP (Volume 7.12)** (secured by a DCO Requirement) to be implemented during the construction phase to ensure that materials with potential to be contaminated are handled in a manner that prevents their uncontrolled release to land or water.

Activity and impact	Effect	Receptor	Assessment of residual effect	Summary rationale
Build-up of gases in confined spaces in existing or newly constructed infrastructure on the land required for the Proposed Development. Potential health effects on humans and potential for gas build up to result in flammable atmospheres developing that could result in explosion	Build-up of gases migrating from natural peat deposits (or other sources) into confined spaces. Potential health effects on humans and potential for gas build up to result in flammable atmospheres developing that could result in explosion	Human health Receptors (commercial site users – EfW CHP Facility Site, substation)	Negligible (Not Significant)	The embedded measures (**Table 13.15**) including further ground investigation and land contamination assessment in accordance with LCRM, and compliance with CDM 2015, will ensure that risks associated with ground gas ingress and accumulation to enclosed spaces are mitigated.
Accidental spillages and leaks during construction work, including potential for leakage of bentonite during Horizontal Directional Drilling (HDD) during Water Connections	Spills or leaks to ground of pollutants such as fuels/oils/chemicals/silty water resulting in contaminants migrating to surface water and causing deterioration in surface water quality	Controlled waters: surface water drainage channels	Minor Negative (Not Significant)	The embedded measures include the use of non-hazardous drilling fluids during HDD, the use of designated refuelling areas and secondary containment for fuel/oil/chemical storage, and development of environmental incident plans, mitigate the risks to the environment from HDD.
Operation:				
Potential for contaminated soils to be left at or near surface or mixed with surface soils during construction	Presence of contaminants at surface posing a health risk to site users who could be exposed to land contamination via numerous pathways (e.g., inhalation, direct contact, ingestion) resulting in health effects	Human health Receptors (commercial site users, members of the public/landowners, nearby residents)	Negligible (Not Significant)	The embedded measures (**Table 13.15**) will ensure that further contaminated land assessment is completed pre construction and that the findings of these investigations will inform the measures in the **Outline CEMP (Volume 7.12)** (secured by a DCO Requirement) to be implemented during the construction phase to prevent the release of contaminants during

Activity and impact	Effect	Receptor	Assessment of residual effect	Summary rationale
				construction activities, thus ensuring that the land will be suitable for the proposed use and not capable of being determined as Contaminated Land under Part 2A of the EPA 1990.
Potential for organic contaminants (hydrocarbons) in soils to permeate water supply pipes constructed for the Proposed Development	Degradation in water supply causing potential for human health effects	Human health Receptors (commercial site users – EfW CHP Facility Site)	Minor positive (Not Significant)	The embedded measures (**Table 13.15**) include the requirement for further assessment of the risk to potable water supplies to ensure that suitable design measures, such as barrier type potable water supply pipes, are in place, and the requirement to confirm these measures in advance with the statutory provider, Anglian Water. This will reduce the risk level by lowering the likelihood of an impact on water supply.
Potential for new contaminant migration pathways to exist following site restoration, such as increased potential for surface water runoff from contaminants in near surface soils, also a limited potential for the development to result in increased likelihood of contaminants leaching or migrating in groundwater to surface water	Deterioration in surface water quality	Controlled waters: surface water drainage channels	Negligible (Not Significant)	The embedded measures (**Table 13.15**) will ensure that further contaminated land assessment is completed pre construction and that the findings of these investigations will inform the measures in the **Outline CEMP (Volume 7.12)** (secured by the DCO) to be implemented during the construction phase to prevent the release of contaminants during construction activities, thus ensuring that the land will be suitable for the proposed use and not capable of being determined

Activity and impact	Effect	Receptor	Assessment of residual effect	Summary rationale
				as Contaminated Land under Part 2A of the EPA 1990 due to causing impacts on controlled waters.
Accidental spillages and leaks to soil or groundwater subsequently impacting controlled waters including surface water during operation and maintenance activities. Potential limited requirement for excavation of soil to carry out maintenance activities e.g., for Water Connections and Grid Connection	Spills or leaks to ground of pollutants such as fuels/oils/chemicals/silty water resulting in contaminants migrating to surface water and causing deterioration in surface water quality	Controlled waters: surface water drainage channels	Negligible (Not Significant)	The embedded measures (**Table 13.15**) include the regulation of the EfW CHP Facility under the EPR regime which is an integrated regulatory approach to preventing emissions to air, water and soil from industrial activities and requires operators to demonstrate BAT (i.e., a high standard of environmental protection measures) in the design of their installations. For the other components of the Proposed Development, maintenance activities are expected to be infrequent and to involve minimal ground disturbance, these will therefore have minimal potential to result in future leaks or spills of polluting substances.

13.9 Consideration of optional additional mitigation or compensation

13.9.1 No additional mitigation measures are proposed at this stage to further reduce the Geology, Hydrogeology and Contaminated Land effects that are identified in this chapter of the ES. This is because all relevant and implementable measures have been embedded into the development proposals and are assessed above in this chapter. These measures are considered to be likely to be effective and deliverable and address the likely significant effects of the Proposed Development.

13.10 Implementation of environmental measures

13.10.1 **Table 13.24 Summary of environmental measures to be implemented – relating to Geology, Hydrogeology and Contaminated Land** describes the environmental measures embedded within the Proposed Development and the proposed means by which they will be implemented.

Table 13.24 Summary of environmental measures to be implemented – relating to Geology, Hydrogeology and Contaminated Land

Environmental measure	Responsibility for implementation	Proposed Compliance mechanism	ES section reference
Compliance with LCRM for assessment of potential land contamination and confirming the site is suitable for use for the Proposed Development	Applicant	DCO Requirement, **Outline CEMP (Volume 7.12)**	**Section 13.7**
Ground gas assessment for built environment and implementation of suitable design measures	Applicant/EPC Contractor	DCO Requirement, **Outline CEMP (Volume 7.12)**	**Section 13.7**
Design measures for potable water supply pipes within the EfW CHP Facility Site to be agreed in advance with the statutory provider – Anglian Water	Applicant/EPC Contractor	DCO Requirement, **Outline CEMP (Volume 7.12)**	**Section 13.7**
Compliance with The Health and Safety at Work Act 1974 and regulations made under the Act (notably The Management of Health and Safety at Work Regulations 1999) for the protection of human health during the construction and operation phases	Applicant/EPC Contractor	DCO Requirement, **Outline CEMP (Volume 7.12)**	**Section 13.7**

Environmental measure	Responsibility for implementation	Proposed Compliance mechanism	ES section reference
Soil protection measures defined for construction phase	Applicant/ EPC Contractor	DCO Requirement, **Outline CEMP (Volume 7.12)**	**Section 13.7**
Pollution Prevention Plans for prevention of soil, controlled waters or air pollution (dust)	Applicant/ EPC Contractor	DCO Requirement, **Outline CEMP (Volume 7.12)**	**Section 13.7**
Environmental incident response plan	Applicant/ EPC Contractor	DCO Requirement, **Outline CEMP (Volume 7.12)**	**Section 13.7**
Unexpected ground contamination protocol	Applicant/ EPC Contractor	DCO Requirement, **Outline CEMP (Volume 7.12)**	**Section 13.7**
Compliance with CDM 2015	Applicant/ EPC Contractor	DCO Requirement, **Outline CEMP (Volume 7.12)**	**Section 13.7**
Compliance with CAR 2012	Applicant/ EPC Contractor	DCO Requirement, **Outline CEMP (Volume 7.12**)	**Section 13.7**
Construction strategies will be implemented that will seek to maximise the reuse of excavated clean materials onsite where practicable and feasible through use of a MMP. Waste management during construction in accordance with DoWCoP	Applicant/ EPC Contractor	DCO Requirement, **Outline CEMP (Volume 7.12)**	**Section 13.7**

13.11 Conclusion

13.11.1 The environmental assessment presented in this chapter has concluded that during the construction phase there will be no significant effects upon Geology, Hydrogeology and Contaminated Land.

13.11.2 During operation it is also concluded in the environmental assessment that there will be no significant effects upon Geology, Hydrogeology and Contaminated Land.

13.12 References

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