West Sussex County Council

A29 REALIGNMENT PHASE 1

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12 GEOLOGY AND SOILS

12.1 INTRODUCTION

12.1.1. This chapter provides a summary of the Preliminary Risk Assessment (PRA), provided in **Appendix 12.1**, based on the CIRIA Publication C552, Contaminated Land Risk Assessment – A Guide to Good Practice (Ref. 12.1) and outlines the potential risks of the Scheme in relation to ground contamination issues. At the request of WSCC during the EIA scoping process, consideration is given here as to whether or not there is the potential for significant effects on geology and soils as a result of the Scheme. Consideration of potential contamination impacts on surface water bodies and groundwater is provided in **Chapter 11: Water Resources and Flood Risk**, and hence is not repeated here.

12.1.2. An Outline Construction Environmental Management Plan (CEMP) has been prepared which sets out control measures and monitoring to be adopted by the Contractor to avoid any potential effects on the environment, based on good construction practice, including measures to avoid contamination/pollution events. In addition, geotechnical ground investigations will be undertaken prior to construction works starting, which will include contamination testing. In the event that contamination is present a suitable mitigation strategy will be developed.

12.1.3. In consideration of the findings of the PRA, the implementation of the measures set out in the Outline CEMP and the planned ground investigations, the potential for residual risks on geology and soils as a result of the Scheme is low (not significant).

12.1.4. This chapter is intended to be read as part of the wider ES and with the PRA (**Appendix 12.1**).

12.2 LEGISLATIVE FRAMEWORK, POLICY AND GUIDANCE

LEGISLATIVE FRAMEWORK

12.2.1. The applicable legislative, policy framework and guidance documents are summarised in **Table 12-1** below.

Table 12-1 - Geology and Soils: Summary of Legislation, Policy and Guidance Documents

Legislation	Summary
Part 2A of The Environmental Protection Act (1990) (Ref. 12.2)	This Guidance is intended to explain how local authorities should implement the regime, including how they should go about deciding whether land is contaminated land in the legal sense of the term. 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. This Guidance also explains specific aspects of the Part 2A liability arrangements, and the process by which the enforcing authority may recover the costs of remediation from liable parties in certain circumstances.
The National Planning Policy Framework (2019) (Ref. 12.3)	The National Planning Policy Framework 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.

Legislation	Summary
Environment Agency 'Model Procedures for the Management of Land Contamination', CLR11 (2004) (Ref. 12.4)	The Model Procedures for the Management of Land Contamination (CLR 11), have been developed to provide the technical framework for applying a risk management process when dealing with land affected by contamination. The process involves identifying, making decisions on, and taking appropriate action to deal with land contamination in a way that is consistent with government policies and legislation within the UK.
CIRIA C552 'Contaminated Land Risk Assessment. A guide to good practice' (2001) (Ref. 12.1)	This book and the associated training pack (CIRIA C553, 2001) examine the risk assessment of contaminated land and explains the key elements of risk assessment practices and procedures.

CONSULTATION, SCOPE, METHODOLOGY AND SIGNIFICANCE CRITERIA

CONSULTATION UNDERTAKEN TO DATE

Table 12-2 provides a summary of the consultation activities undertaken in support of the preparation of this chapter.

Table 12-2 - Geology and Soils: Summary of Consultation Undertaken

Body / organisation	Individual / stat body / organisation	Meeting dates and other forms of consultation	Summary of outcome of discussions
The Envirocheck report includes information and data collected from several organisations.	Includes the Environment Agency (EA), the Local Authority, the British Geological Survey (BGS), Department for Environment, Food & Rural Affairs (Defra) and Health & Safety Executive (HSE).	N/A – Desktop based. February 2018	The summary of database searches is presented in Table 5-1 of Appendix 12.1 (PRA).
Planning Portal search	Arun District Council	N/A – Desktop based. June 2020	No significant planning applications have been submitted for the land located within the Site boundary.
Unexploded Ordnance (UXO)	Zetica	N/A – Desktop based. June 2020	The Zetica online bomb map indicates that there is a low risk from UXO. A detailed UXO desk study and risk assessment would not be required for the Site based on a Low risk.

Body / organisation	Individual / stat body / organisation	Meeting dates and other forms of consultation	Summary of outcome of discussions
West Sussex County Council, County Planning	Jane Moseley, County Planning Team Manager	Email – March 2020 (Appendix 5.1)	The information [in relation to geology and soils] should be included, even if initial surveys have confirmed that there would be no significant effect. The information in the relevant chapter should present this conclusion.

SCOPE OF THE ASSESSMENT

12.2.2. The scope of this chapter has been established through an ongoing scoping process. Further information can be found in **Chapter 5: Approach to EIA**.

ELEMENTS SCOPED OUT OF THE ASSESSMENT

12.2.3. The elements shown in **Table 12-3** are not considered to give rise to likely significant effects as a result of the Scheme and have therefore not been considered within the ES.

Table 12-3 - Elements Scoped Out of the Geology and Soils Assessment

Element scoped out	Justification
Road users	The road is not a sensitive end-use.
Agricultural Land/Loss of Land; and Agricultural and rural dwellings	The principal of the loss of agricultural land to the Scheme has already been accepted in the adopted local development and transport plans. Its loss is appropriately accounted for in the sustainability appraisal of the local plans, rather than at project level. This is set out in the Planning Statement. It is noted that the undeveloped parts of the land are not currently being used for agricultural purposes and that a sizeable proportion of the Site is under non-agricultural uses (such as orchard, woodland and hedgerows). In addition, due to the size of the Scheme and the required land take, the amount of best and most versatile agricultural land lost will not be significant.
Safeguards for Soil and Gravel	The area is safeguarded for soil and gravel in the West Sussex Joint Minerals Local Plan (2018). A Minerals Safeguarding Assessment has been prepared and will be submitted with the application, without the need for inclusion in the ES. It is considered unlikely to be economically viable to extract the underling mineral deposits on-site (sands and gravels) due to the high percentage of recorded clay cohesive bands. Pockets of higher quality granular stratum could be recovered as part of the construction/earthworks phases of the Scheme. Although it is considered that the implementation of a small-scale incidental / opportunistic approach to mineral extraction may be possible the

Element scoped out	Justification
	costs are likely to outweigh the benefits of extraction and sale/reuse of the aggregate.
Flood Risk	Flood Risk is considered in Chapter 11 – Water Resources and Flood Risk.
Contamination to surface water bodies and groundwater.	Consideration of the potential for contamination to surface water bodies and groundwater during both construction and operation of the Scheme is covered in Chapter 11 – Water Resources and Flood Risk.

ELEMENTS SCOPED INTO THE ASSESSMENT

Construction Phase

12.2.4. The following elements are considered to have the potential to give rise to likely significant effects during construction of the Scheme and have therefore been considered within the ES:

- Pre-existing contamination and effects on construction workers.

Operation Phase

12.2.5. The potential for significant effects on surface water bodies and groundwater (including accidents and spills) during the operation phase of the Scheme is considered in **Chapter 11: Water Resources and Flood Risk**. Operational effects are therefore scoped out of this chapter.

EXTENT OF THE STUDY AREA

12.2.6. The geographical extent of the assessment is the Site and a 1km study area.

METHOD OF BASELINE DATA COLLATION & ASSESSMENT METHODOLOGY

12.2.7. As stated in the Introduction, this assessment is based on the PRA (**Appendix 12.1**.) and perceived risks based on the information reviewed. Following ground investigations to be undertaken prior to construction works, a more detailed assessment of the actual risks can be undertaken, and mitigation identified where applicable.

12.2.8. The preliminary assessment presented herein is qualitative based on professional judgements following the review of available data and within the context of the existing/proposed use, as set out in the PRA. A conceptual site model has been prepared (presented in **Appendix 12.1**) which considers the risk associated with the Scheme. This model considers the potential sources of contamination, sensitive receptors and the pathway linking them together, based on the CIRIA guidance (Ref. 12.1) as summarised below.

12.2.9. The risk categories presented (very low, low, low to moderate, moderate, high and very high) follow the CIRIA Publication C552, Contaminated Land Risk Assessment – A Guide to Good Practice (Ref. 12.1). CIRIA states that the risk levels should be based on an understanding of both the probability (likelihood) of a risk occurring and the magnitude of the potential consequence (severity) of a risk. CIRIA defines four levels of probability and four levels of severity in relation to contaminated land.

12.2.10. Following mitigation, any residual risks considered to be moderate or above are considered to represent a significant effect. Risks deemed as low or below are considered to represent a not significant effect.

12.2.11. The following bullets set out the method of data collation:

- Site walkover;
- A review of relevant previous reports pertaining to the site, where available;
- A review of publicly available historical maps and site plans (where available) to identify former land uses and potential contaminative activities on and surrounding the Site;
- A review of relevant regulatory databases; and
- A review of relevant publicly available information relating to hydrological features, hydrogeology, neighbouring land use, ecologically sensitive uses and geology in order to establish the environmental setting of the Site.

12.3 BASELINE CONDITIONS

12.3.1. The Site is located in Eastergate between Fontwell Avenue (A29) and Barnham Road (B2233) and is approximately 11.8 hectares (Ha).

12.3.2. The Site is situated to the north, north east and east of the Eastergate Village in West Sussex. The Site generally comprises undeveloped land for the majority of the Site including a mix of agricultural land and undeveloped grass land and sparsely wooded areas. The one part of developed land on the Site is located to the south of Barnham Road (B2233). The route runs through the Fleurie Horticultural Nursery to the south of Barnham Road and ends short of the agricultural land to the south. An electrical substation is also present in the north-west corner of the Site on the existing A29 road. Part of the Scheme enters the Halo site in the form of a new entrance.

12.3.3. The north of the Site is generally bounded by agricultural land and undeveloped land. The south of the Site is bound by commercial units associated with a plant nursery and agricultural land. The east of the Site is bound by a mix of agricultural land, residential housing and a plant nursery. The western part of the route is bounded by a mixture of undeveloped land and agricultural land to the north, with small farms and residential properties beyond and a road (Eastergate Lane). The south-western part of the route is bound by a mix of agricultural land and commercial units Fleurie Horticultural Nursery and the Halo site.

12.3.4. Historical mapping provided in the Envirocheck report appended to the PRA indicates that the majority of the Site has never been developed. A gravel pit was excavated in the north-west corner of the Site in 1897 and was subsequently filled in between 1937 and 1939. The Fleurie Horticultural Nursery was first constructed in 1912 (originally named The Brooks). By 1974 additional buildings had been built in the plant nursery to resemble the current layout as well as two tanks. A rectangular reservoir structure is shown at the southern end of the Fleurie Horticultural Nursery.

12.3.5. BGS maps and historical logs indicate the underlying geology at the Site is likely to comprise superficial deposits of Head (Secondary Undifferentiated Aquifer) and River Terrace Deposits (Undifferentiated) (Secondary A Aquifer) with the bedrock of the London Clay Formation (Unproductive), Lambeth Group (Secondary A Aquifer) and the Chalk Group (Principal Aquifer) at depth. Limited Made Ground may be present above the natural drift deposits.

12.3.6. The topography of the Site is relatively flat ranging from 8 and 16 m above ordinance datum (m AOD). The ground cover is predominantly covered with vegetation of grassland and wooded areas. The area south of Barnham Road currently supports greenhouses.

12.3.7. Underground utilities including Scottish and Southern electricity service cable, Scottish and Southern electricity high voltage cable, Southern gas networks low pressure main, BT Telecoms, Portsmouth Water mains and Southern Water foul drainage are present along the existing A29 at Fontwell Avenue and along Barnham Road.

12.3.8. Ground investigations were undertaken in 2018 to inform the Scheme design, as reported in the PRA. Across the Site, no gross contamination was identified. However, as noted previously a buried feature was noted within the western fields. The nature of the buried material is unknown, therefore, supervision by a Geo-Environmental Engineer during excavations within this area are recommended to ensure that any risks possibly associated with the buried material can be managed.

12.3.9. It was identified that the man-made bund at the southern end of the site exhibits slightly elevated Benzo[a]yrene results. Compared to the LQM/CIEH Suitable 4 Use Levels [Ref 27], this exceeds the threshold for residential land uses (please note, this has been used as a guide only). Therefore, care should be taken when handling this material. The bund was not fully penetrated due to refusal upon metallic objects and the extent of Made Ground not fully proven. Therefore, subject to the state in which this bund is to be left, further investigation and contamination testing is recommended to fully identify the nature and extent of the fill material.

FUTURE BASELINE

12.3.10. **Chapter 2 – The Existing Site**, sets out the future details of the surrounding area from a planning perspective. Schedule 4 of the EIA Regulations requires consideration of the likely evolution of the current baseline in the absence of the Scheme.

12.3.11. No evidence has been presented that the future baseline will be significantly different from the current baseline. The Scheme will unlock development land to the west and south west. If this development were to take place in the absence of the Scheme, the future baseline would introduce new residential receptors. The Scheme would introduce new sensitive receptors but would also remediate any contamination in line with legislation and best practice.

12.4 SENSITIVE RECEPTORS

12.4.1. The following potential sensitive receptors have been considered:

- Human health, including construction workers.

12.5 CONCEPTUAL SITE MODEL

12.5.1. The conceptual site model presented in the PRA identifies there to be a low risk to construction workers during the construction phase of the Scheme.

12.6 OVERVIEW OF EFFECTS, MITIGATION AND RESIDUAL EFFECTS

12.6.1. **Table 12-4** below set out the effects in the construction phase.

CONSTRUCTION PHASE

Table 12-4 - Assessment of Effects, Mitigation and Residual Effects (Construction)

Assessment Component	Commentary
Human Health	Ingestion, inhalation and dermal contact with contaminated soil and ground gases; inhalation of windblown dust; and soil vapour inhalation are some of the potential pathways to impact human health. There is likely to be a direct, temporary not significant effect on human health prior to the implementation of mitigation measures.
Secondary Mitigation	To minimise the risk of adverse impacts during construction, industry best practice measures will be employed. Appropriate measures are specified in the outline CEMP, which will become the Contractor CEMP during-construction works. As part of the Ground Investigations (geotechnical), contamination testing will be undertaken to ensure suitable mitigation is in place and if present, a suitable mitigation strategy developed which could include removal of contaminated material ad disposal at authorised sites.
Residual Effects and Monitoring	Following the implementation of mitigation, there will be a not significant residual effect on surface water, ground water and human health. The CEMP will include a monitoring log to ensure measures to mitigate effects relating to geology and soils are in place and are effective. No other specific monitoring arrangement has been identified at this stage.

12.7 LIMITATIONS AND ASSUMPTIONS

12.7.1. The assessment presented above is qualitative, and based on the information presented in the PRA (**Appendix 12.1**).

12.8 CUMULATIVE EFFECTS

12.8.1. As set out in Chapter 14 – Cumulative Effects in agreement with WSCC and Arun District Council, 19 committed developments have been considered for potential cumulative effects with the Scheme. Of particular note is the 'Barratts Development' "Adjacent Proposed Scheme" which is currently being progressed towards a planning application to be submitted later in 2021 or 2022.

12.8.2. Due to the limited geographical nature of the effects on geology and soil, it is predicted that effects will not occur beyond the boundary of the Scheme and therefore will not result in cumulative effects in association with other schemes.

12.8.3. No further cumulative effects are anticipated provided that all other schemes apply best practice methods and ensure pre-existing contamination, if found, is remediated in line with national guidance for the intended end land uses.

12.9 SUMMARY

12.9.1. The scope of the geology and soils assessment has focused on the potential risk to human health (construction workers) during the construction phase of the Scheme, with all other issues either scoped out or considered elsewhere within the ES.

12.9.2. At present the majority of the Site is undeveloped and is situated in agricultural land. The southern part of the Site is currently occupied by the Fleurie Horticultural Nursery which has a loose gravel

surface and is occupied by several greenhouse buildings and other smaller ancillary buildings. An electrical substation is present in the north-western corner of the Site adjacent the existing A29 road.

12.9.3. Historical mapping indicates that the majority of the Site has never been developed.

12.9.4. A conceptual risk model has been undertaken considering the potential sources and pathways of pollution to sensitive receptors (i.e. human health/construction workers). This has concluded that there is a low risk to construction workers. The proposed geotechnical investigations will include contamination testing. The findings of this will feed into any subsequent remediation strategy ahead of construction works.

12.9.5. During construction, standard mitigation be required in the form of industry best practice and will be set out in the CEMP. The Scheme will be designed to industry standards, including oil interceptors in the drainage system to ensure pollutants entering the system do not flow into ground or surface water bodies.

12.9.6. **Table 12-5** provides a summary of the findings of the assessment.

Table 12-5 - Summary of Effects Table for Geology and Soils

Description of Effects	Receptor	Significance and Nature of Effects Prior to Secondary Mitigation	Summary of Secondary Mitigation	Significance and Nature of Residual Effects
Construction Phase				
Ingestion, inhalation and dermal contact with contaminated soil and ground gases; inhalation of windblown dust; or soil vapour inhalation are some of the potential pathways.	Human Health – Construction workers and those living in proximity to construction works.	Not Significant -/T/D/ST	CEMP to be followed.	Not Significant -/T/D/ST

Key to table:

+ / - = Beneficial or Adverse; P / T = Permanent or Temporary; D / I = Direct or Indirect; ST / MT / LT = Short Term; Medium Term or Long Term; N/A = Not Applicable

REFERENCES

Ref. 12.1 - CIRIA C552 ‘Contaminated Land Risk Assessment. A guide to good practice’ (2001)

Ref. 12.2 - Part 2A of The Environmental Protection Act (1990)

Ref. 12.3 - The National Planning Policy Framework (2019)

Ref 12.4 - Environment Agency ‘Model Procedures for the Management of Land Contamination’, CLR11 (2004)

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