

ENVIRONMENTAL STATEMENT (VOLUME II)

CHAPTER 11 – LAND AND SOILS

Padeswood Carbon Dioxide Spur Pipeline Proposed Development

Town and Country Planning Act 1990

Document Reference Number PW.3.2.11

Applicant: Liverpool Bay CCS Limited

English Version

REVISION: A

DATE: March 2025

DOCUMENT OWNER: WSP UK Limited

PUBLIC

QUALITY CONTROL

| Document Reference | | PW.3.2.11 | | | |
|--------------------|------------|---|--------|---------|----------|
| Document Owner | | WSP UK Ltd | | | |
| Revision | Date | Comments | Author | Checker | Approver |
| A | March 2025 | Revision for Pre-Application Consultation | LE/EM | EM | DW |
| | | | | | |
| | | | | | |
| | | | | | |

TABLE OF CONTENTS

| | |
|--|----|
| 11. LAND AND SOILS | 1 |
| 11.1. Introduction | 1 |
| 11.2. Legislative and Policy Framework..... | 1 |
| 11.3. Scoping Opinion and Consultation..... | 5 |
| 11.4. Scope of the Assessment | 5 |
| 11.5. Assessment Methodology and Significance Criteria | 8 |
| 11.6. Sensitive Receptors..... | 40 |
| 11.7. Design Development, Impact Avoidance and Embedded mitigation | 43 |
| 11.8. Preliminary Assessment of Likely Impacts and Effects..... | 44 |
| 11.9. Mitigation and Enhancement measures | 44 |
| 11.10. Assessment of Likely Significant Effects | 47 |
| 11.11. Monitoring..... | 51 |
| 11.12. Residual Effects..... | 51 |
| REFERENCES..... | 54 |

TABLES

| | |
|--|----|
| Table 1-1 - Elements Scoped Out of the Assessment | 5 |
| Table 11-2 - Elements Scoped Out of the Assessment..... | 6 |
| Table 11.3 – Magnitude of Impact | 12 |
| Table 11.4 – Sensitivity Criteria..... | 15 |
| Table 11-5 – Significance Matrix..... | 17 |
| Table 11-6 – Artificial Made Ground..... | 23 |
| Table 11-7 – Locations with Made Ground | 23 |
| Table 11-8 – Preliminary Conceptual Site Model..... | 37 |
| Table 11-9- Sensitive Receptors | 41 |
| Table 11-10 – Construction Stage – Assessment of Significant Effects | 48 |
| Table 11-11 - Summary of Residual Effects..... | 52 |

11. LAND AND SOILS

11.1. INTRODUCTION

- 11.1.1. This Chapter reports the assessment of the likely significant effects of the Padeswood Spur Pipeline Proposed Development on Land and Soils during construction, operation and decommissioning.
- 11.1.2. It includes an assessment of how the Padeswood Spur Pipeline Proposed Development could be impacted by or could impact Land and Soils which includes Contaminated Land, Mineral Resources, Coal Mining and Agricultural Land.
- 11.1.3. This Chapter describes:
- Relevant, legislation, policy and guidance;
 - Consultation undertaken;
 - Assessment methodology;
 - Baseline conditions
 - Potential effects of the Construction, Operational and Decommissioning Stages of the Padeswood Spur Pipeline Proposed Development;
 - Potential design, mitigation and enhancement measures;
 - Residual effects; and
 - Next steps.
- 11.1.4. This chapter (and its associated appendices) is intended to be read as part of the wider ES, with particular reference to **Chapter 18 – Combined and Cumulative Effects**(Document Reference:PW.3.2.18).

11.2. LEGISLATIVE AND POLICY FRAMEWORK

- 11.2.1. A summary of the international, national, and local legislation, planning policy and guidance relevant to the Land and Soil assessment for the Padeswood Spur Pipeline Proposed Development is set out below.

LEGISLATIVE FRAMEWORK

International

- 11.2.2. The Directive on Pollution Caused by Certain Dangerous Substances Discharged into the Aquatic Environment, 2006 (2006/11/EC) (European Commission, 2006) offers protection of watercourses and the marine environment from pollution.

National

- 11.2.3. Contaminated Land Regulations (England), 2006 (amended 2012) (these regulations apply to England only) (UK Government, 2006) and Contaminated Land (Wales) (Amendment) Regulations, 2012 (apply to Wales only) (Welsh Government, 2012) (provide guidance on the how land should be investigated and remediated in relation to contamination in England and Wales accordingly).
- 11.2.4. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (UK Government, 2017) is legislation that seeks to establish an integrated approach to the protection and sustainable use of the water environment.
- 11.2.5. Environmental Damage (Prevention and Remediation) (England) Regulations 2015 (UK Government, 2015) is guidance to provide information to those carrying out activities that may cause threats to environmental damage.
- 11.2.6. The Environmental Permitting (England and Wales) Regulations 2016 (UK Government, 2016) is to streamline the legislative system for industrial and waste installations into a single permitting structure for those activities which have the potential to cause harm to human health or the environment.
- 11.2.7. Control Of Substance Hazardous to Health Regulations (COSHH) 2002 (UK Government, 2002) . COSHH is the law that requires employers to control substances that hazardous to health.
- 11.2.8. Control Of Asbestos Regulations (CAR) 2012 (UK Government, 2012) is legislation to set out the duties to manage risks from asbestos.
- 11.2.9. Construction (Design & Management) Regulations (CDM), 2015 (UK Government, 2015) is legislation to ensure health and safety issues are properly considered during a project's development so that the risk of harm to those who have to build, use and maintain the development is reduced.

POLICY

National - Wales

- 11.2.10. The Planning Policy Wales (PPW) (Welsh Government, 2021) guidance sets out the land use planning policies of the Welsh Government. The primary objective of the PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental, and cultural well-being of Wales.

11.2.11. The PPW (Welsh Government, 2021) is supplemented by a series of Technical Advice Notes (TANS), Government Wales Circulars, and policy clarification letters, which together with the PPW provide the national planning policy framework for Wales. Examples of TANS relevant to land and soils assessment include:

- TAN5: Provides advice about how the land use planning system should contribute to protecting and enhancing biodiversity and geological conservation;
- TAN12: Provides design solutions which maximise the natural landscape and assets and minimise environmental impact on the landscape through the sustainable management of resources such as water and soil on a catchment scale; and
- TAN15: Advises caution in respect of new development in areas at high risk of flooding by setting out a precautionary framework to guide planning decisions.

Local

11.2.12. Relevant adopted policies within:

- Flintshire County Council (FCC) Development Plans and Policy (Flintshire County Council, n.d.).
- Flintshire Local Development Plan (2015 – 2030) (Flintshire County Council, 2015).
- The Council Plan (2017 – 2023) – Flintshire County Council (Flintshire County Council, 2017).
- The Deeside Plan (2017) (Welsh Government, 2017).

GUIDANCE

National

11.2.13. The following guidance has been used to inform the assessment approach, and the mitigation applied.

- Health and Safety Executive (HSE) (1991) (Health and Safety Executive, n.d.) Guidance Note HS(G)66, Protection of Workers, and the General Public during the Development of Contaminated Land ;
- Environment Agency (EA) (2020) Land Contamination Risk Management (LCRM) (Environment Agency, 2020) . Natural Resources Wales (NRW) have adopted the EA guidance on assessing and managing risks from land contamination. In reference to Regulatory Position Statement (RPS) 182 (regulating trials of waste management operations) and 215 (land contamination pilot trials and small-scale remediation schemes), NRW has equivalent regulatory decisions in place for Wales;

- CIRIA C552 (2001), Contaminated Land Risk Assessment: A guide to good practice (CIRIA, 2001);
- CIRIA C532 (2001) Control of Pollution from Construction Sites (CIRIA, 2001).
- Environment Agency and National House Building Council (NHBC) (2008) Guidance for the safe development of housing on land affected by contamination, Environment Agency R&D Publication 66 ((NHBC), Environment Agency and National House Building Council, 2008).
- BS 10175 (2011) Investigation of Potentially Contaminated Sites – Code of Practice (British Standard Institute, 2011).
- Department for Environment, Food and Rural Affairs (DEFRA), Contaminated Land Statutory Guidance April 2012 (Department for Environment, Food and Rural Affairs (DEFRA), 2012).
- Environment Agency (2017) Groundwater Protection (Environment Agency, 2017).
- British Standards Institute (BSI) BS 5930 (2020) The Code of Practice for Site Investigations (British Standard Institute, 2020).
- Design Manuals for Roads and Bridges (DMRB) 104 (Environmental Assessment and Monitoring) ((DMRB), Design Manual for Roads and Bridges, n.d.), 109 (Geology and Soils) (DMRB, n.d.), 110 (material assets and waste) (DMRB, n.d.) and 113 (Road drainage and the water environment) (DMRB, n.d.).
- NRW Guide to the discretionary advice service for development planning and marine advice regarding land contamination and groundwater protection) (Natural Resources Wales, 2018)
- Natural England Environmental Planning Guide to developers and applications for planning, permission in principle and technical details consent (Natural England, 2015).

Local

- 11.2.14. FCC has prepared a set of 18 summary Topic Papers (Flintshire County Council, n.d.) to support the preparation of the Flintshire Local Development Plan (FLDP) (2015 – 2030), the Deposit version of which is currently at Examination Stage (Flintshire County Council, 2015). Each Topic Paper sets out the relevant guidance and identifies issues that the FLDP will need to address as well as possible policy approaches to be incorporated. The Topic Papers are intended to provide an early opportunity for stakeholders and the public to have an input in the FLDP.
- 11.2.15. Topics relevant to land and soils include; landscape, minerals, waste, biodiversity and nature conservation, flooding and environmental

protection. In terms of the ES assessment, the Topic Papers have been used to identify existing policies relevant to land and soils and as a guide to address objectives and requirements in line with the FLDP.

11.3. SCOPING OPINION AND CONSULTATION

RESPONSE TO THE SCOPING OPINION

- 11.3.1.
- An EIA Scoping Opinion was received by the Applicant from the Local Planning Authority (LPA) on 8 May 2024 , including formal responses from Statutory Consultees. The responses from the LPA in relation to Land and Soil and how these requirements should be addressed by the Applicant are set out in **Appendix 1.3 Scoping Opinion Responses (Document Reference: PW.3.3.1.3).**

CONSULTATION UNDERTAKEN TO DATE

- 11.3.2.
- The following consultation has been undertaken to date.

Table 11-1 - Summary of Consultation Undertaken

| Consultee | Outcome |
|---------------------------------|--|
| Flintshire County Council (FCC) | <p>The Scoping Response from FCC is included in Appendix 1.3 and summarised below:</p> <p><i>The council's land contamination pollution officer was consulted, and they consider that the information provided in respect of the assessment of land contamination is reasonable at this stage. However, it was flagged that in relation to minerals that "prior to impacts upon sand and gravel being scoped out that site-specific boreholes are sunk to advise whether any mineral likely to be within the proposal boundaries would merit extraction".</i></p> |
| Coal Authority | <p>The Applicant consulted the Coal Authority and the information regarding this consultation is included in the Coal Mining Risk Assessment, Appendix 11.3 (Document Reference: PW.3.3.11.3).</p> |

11.4. SCOPE OF THE ASSESSMENT

- 11.4.1.
- The scope of this assessment has been established through an ongoing scoping process. Further information can be found in **Chapter 5: EIA Methodology (Document Reference:PW.3.2.5)** of this ES.
- 11.4.2.
- This section provides an update to the scope of the assessment and re-iterates the evidence base for scoping out elements following further iterative assessment.

ELEMENTS SCOPED OUT OF THE ASSESSMENT

- 11.4.3. The elements shown in **Table 11-2** are not considered to give rise to likely significant effects as a result of the Padeswood Spur Pipeline Proposed Development and have therefore not been considered within this assessment.

Table 11-1 - Elements Scoped Out of the Assessment

| Element Scoped Out | Stage | Justification |
|--|---|---|
| Mineral resources - Coal | Construction, operation and decommissioning | Large, economically viable coal deposits are unlikely to be encountered by the Padeswood Spur Pipeline Proposed Development. |
| Mineral resources - Sand and Gravel | Operation and decommissioning | The Red Line Boundary slightly overlaps the edge of the sand and gravel Mineral Safeguarding Area at three separate locations. However, the overlap does not cover a significant area and is considered unlikely to sterilise the mineral resource. |
| Geology – Designated sites | Construction, operation and decommissioning | No geologically designated sites are present within 500m of the Padeswood Spur Pipeline Proposed Development. |
| Agricultural Land | Operation | The pipeline will be predominantly below the ground with limited permanent loss of agricultural land during the Operational Stage. |
| Agricultural Land | Decommissioning | The underground sections of pipeline will remain in place following decommissioning of the Padeswood Spur Pipeline Proposed Development, which will |

| Element Scoped Out | Stage | Justification |
|---|---|--|
| | | prevent the loss of the overlying Areas of Grade 3a (BMV) agricultural land. |
| Human Health – contaminated land | Operation and decommissioning | Contaminant linkages in relation to human health to be addressed via a Remediation Strategy (if required), thereby leaving the site 'suitable for use' during the Operational and Decommissioning Stages. |
| Controlled waters – contaminated land | Operation and decommissioning | Contaminant linkages in relation to controlled waters to be addressed via a Remediation Strategy (if required), thereby leaving the site 'suitable for use' during the Operational and Decommissioning Stages. |
| Built Environment – detriment of pipes and cables from aggressive ground contaminants over time | Construction, Operation and Decommissioning | Insufficient time for contaminants to impact pipe / ducting materials during the Construction Stage of the Padeswood Spur Pipeline Proposed Development. Construction methods will protect against aggressive ground contaminants for operation and decommissioning. |

ELEMENTS SCOPED INTO THE ASSESSMENT

Construction Stage

11.4.4. The potential for likely significant effects to occur during the Construction Stage relate to:

- Sterilisation of mineral resources - sand and gravel.

- Disturbance, permanent and/or temporary loss of agricultural land and soils including Best and Most Versatile (BMV) soils;
- Exposing construction staff to contaminated dust and soil particulates during construction related earthworks activities;
- Mobilising existing contamination in groundwater as a result of ground disturbance and de-watering and creating or optimising migration pathways for contaminants to reach sensitive receptors (e.g. along Padeswood Carbon Dioxide Spur Pipeline);
- Potential ground instability and ground contamination associated with former mining;
- Introduction of new sources of contamination to the ground, such as fuels and oils used in construction plant, associated with any spillages and leaks; and
- Release of hazardous mine gas/ground gas and subsequent accumulation within confined spaces associated with disturbing and potentially grouting coal mining related voids.

Operation Stage

11.4.5. There are no likely significant effects scoped in at the Operation Stage.

Decommissioning Stage

11.4.6. There are no likely significant effects scoped in at the Decommissioning Stage.

11.5. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

11.5.1. A qualitative assessment of potential effects that may arise during the Construction Stage has been carried out. This considers risks to land and soil with reference to the activities at the Construction Stage.

11.5.2. A **Preliminary Risk Assessment** (Appendix 11.1, Document Reference: PW.3.3.11.1) has been undertaken to establish the current baseline condition of the Padeswood Spur Pipeline Proposed Development (defined below) and assess potential constraints relating to land and soil.

11.5.3. The assessment is undertaken in accordance with DMRB document LA 109 Geology and Soils (Wales Annex) (2019) (DMRB, n.d.). While Padeswood Spur Pipeline Proposed Development is not a Highway Project the LA 109 framework provides recognised contemporary guidance on how to assess the impact of a development on land and soils. LA 109 assesses the effects of a development on the following aspects:

- Effects on bedrock geology and superficial deposits; including geological designations (i.e., mineral resources) and sensitive / valuable non-designated features;
- Effects on soil resources (i.e., agricultural land); and,
- Effects from contamination on human health, surface water and groundwater.

11.5.4. When assessing the effects from contamination the guidance Land Contamination Risk Management (LCRM) (Environment Agency, 2020) recommends the use of a Conceptual Site Model (CSM). The basis of this approach comprises three elements: a source, a pathway, and a receptor. Without each of these, there can be no contamination risk. Therefore, the presence of measurable concentrations of contamination within the ground and subsurface does not automatically imply that a contamination risk exists, since the contamination must be defined in terms of pollutant linkages and unacceptable risk of harm. The nature and importance of both pathways and receptors that are relevant to a particular Site will vary according to the intended use of the Site, its characteristics, and its surroundings. The potential for harm to occur requires three conditions to be satisfied:

- The presence of substances (potential contaminants and pollutants) that may cause harm (the 'source');
- The presence of a receptors that may be harmed for example, the water environment or humans (the 'receptor'); and
- The existence of a linkage between the source and the receptor (the 'pathway').

11.5.5. Such an approach recognises that risks relating to land contamination can only exist when all three elements are present constituting a complete pollutant linkage.

11.5.6. Land Contamination: Risk Management (LCRM) will be used as a technical framework in the understanding of how contamination issues that may arise could be managed. The CSM will be used to identify and assess the potential effects on the identified sensitive receptors (including human health, controlled waters, agricultural soils, ecological receptors, buildings and services) and outline mitigation measures to manage the risks identified in the assessment. The assessment will be prepared in accordance with the legislation and guidance referenced above.

11.5.7. The level of risk has been evaluated in accordance with the methodology set out in CIRIA C552: Contaminated Land Risk Assessment: A guide to good practice (CIRIA, 2001) (CIRIA, 2001). This

involves classification of the consequence and probability associated with each potential contaminant linkage and thereby the corresponding level of risk (risk category).

- 11.5.8. The Applicant consulted with the Coal Authority to gather information on the potential Coal Mining Risks associated with the Red Line Boundary.

STUDY AREA

- 11.5.9. The Study Area comprises the Red Line Boundary plus a 50m buffer area. This is considered to be the area that could be impacted in terms of land and soils based on the Padeswood Spur Pipeline Proposed Development, surrounding sensitive environmental receptors, and contamination migration potential.
- 11.5.10. A 250m buffer around the Red Line Boundary will be considered for potential mobile sources of groundwater contamination. This is consistent with Land Contamination Risk Management guidance (Environment Agency, 2020) when considering the impacts of contamination on sensitive environmental receptors.
- 11.5.11. The Study Area complies with the requirements of DMRB LA109 Geology and Soils (DMRB, n.d.). In addition, the 250m buffer is suitable for the requirements of C552 Contaminated Land Risk Management - a guide to good practice (CIRIA, 2001) to assess for sites such as gasworks, landfills, dye works and bleach works, which can be particularly contaminated and from which contamination could have migrated into the Red Line Boundary.

METHOD OF BASELINE DATA COLLECTION

Desk Study

- 11.5.12. The **Preliminary Risk Assessment Report (Appendix 11.1, Document Reference: PW.3.3.11.1)** which comprises a review of the following publicly available data and data purchased from third parties:
- Groundsure Enviro Insight and Geo Insight, Refs and Groundsure Insight Historical Ordnance Survey mapping;
 - Ordnance Survey Historical maps;
 - British Geological Survey (BGS) Onshore GeoIndex online viewer (British Geological Survey, n.d.).
 - Coal Authority Interactive Map viewer (The Mining Remediation Authority (formerly Coal Authority), n.d.).
 - Data Map Wales (Welsh Government, n.d.).

- Natural Resource Wales (NRW) Mapping (Natural Resource Wales, n.d.).
- Flintshire County Council.

Site Visits and Surveys

- 11.5.13. A preliminary Site reconnaissance visit was undertaken between 29 and 31 May 2024 to the Padeswood Spur Pipeline Proposed Development area identified by the **Preliminary Risk Assessment (Appendix 11.1, Document Reference: PW.3.3.11.1)**. The remaining extents of the Red Line Boundary have been reviewed using publicly available data and aerial photography.
- 11.5.14. A **Mineral Resource Assessment (MRA)** has been produced for the Red Line Boundary presented in **Appendix 11.2 (Document Reference: PW.3.3.11.2)**.
- 11.5.15. A **Coal Mining Risk Assessment (CMRA)** has been produced by the Applicant for the Red Line Boundary, presented in **Appendix 11.3 (Document Reference: PW.3.3.11.3)**.
- 11.5.16. A **Ground Investigation Report** will be produced for the final Planning Application.

IMPACT ASSESSMENT METHODOLOGY

- 11.5.17. A detailed assessment of land and soil has been undertaken in accordance with DMRB document LA 109 Geology and Soils (with inclusion of Wales Annex where appropriate) (2019) (DMRB, n.d.) which presents guidance on the methodology for assessing the value / sensitivity of the receptor and magnitude of the impact and covering the elements set out in in the earlier Scoping Section
- 11.5.18. The detailed elements included:
- Review of baseline soil, geological and environmental information for the Red Line Boundary, including historical mapping, to enable an assessment of potential impacts associated with land contamination;
 - Detailed Site survey / walkover;
 - Review of data from GI surveys (where available) to confirm / attribute importance and facilitate Assessment of potential contaminant linkages, as required;
 - Assessment of potential impacts;
 - Assessment of the sensitivity of the attributes; and
 - Evaluation of the likely significance of effects.

11.5.19. Assessment procedures contained within BS10175:2011 (British Standard Institute, 2011) and Environment Agency guidance Land Contamination: Risk Management LCRM (Environment Agency, 2020), including an assessment of risk classification for the source-pathway-receptor protocol based on CIRIA C552 (CIRIA, 2001) were used in a phased approach to inform the sensitivity of the receptor and the magnitude of the impact.

SIGNIFICANCE CRITERIA

11.5.20. The criteria for determining the magnitude of identified impacts, the sensitivity of receptors and the significance of the resulting effects are presented in **Table 11.3, Table 11.4 and Table 11.5.**

Table 11.3 – Magnitude of Impact

| Magnitude* | Criteria |
|------------|---|
| Major | <p>Geology: loss of geological feature / designation and/or quality and integrity, severe damage to key characteristics, features, or elements.</p> <p>Soil: physical removal or permanent sealing of soil resource or agricultural land (soil resource of >20ha of agricultural land).</p> <p>Contamination:</p> <ul style="list-style-type: none"> • Human health: significant contamination identified; • Contamination levels significantly exceed background levels and relevant screening criteria; and • Surface water and groundwater: use relative sensitivity in water environment in LA113 (DMRB, n.d.). |
| Moderate | <p>Geology: partial loss of geological feature / designation, potentially adversely affecting the integrity; partial loss of / damage to key characteristics, features, or elements.</p> <p>Soils: permanent loss / reduction of one or more soil function(s) and restriction to current or approved future use (for example, through degradation, compaction, erosion of soil resource) or physical removal or permanent sealing of 1ha-20ha of agricultural land.</p> <p>Contamination:</p> <ul style="list-style-type: none"> • Human health: contaminant concentrations exceed background levels and are in line with limits of relevant screening criteria. Significant contamination can be present. Control / remediation measures are required to reduce risks to human health / make land suitable for intended use; and • Surface water and groundwater: use relative sensitivity in water environment in LA113 (DMRB, n.d.) |

| Magnitude* | Criteria |
|------------|---|
| Minor | <p>Geology: minor measurable change in geological feature / designation attributes, quality, or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features, or elements.</p> <p>Soils: temporary loss / reduction of one or more soil function(s) and restriction to current or approved future use (for example, through degradation, compaction, erosion of soil resource.)</p> <p>Contamination:</p> <ul style="list-style-type: none"> Human health: contaminant concentrations are below relevant screening criteria. Significant contamination is unlikely with a low risk to human health. Best practice measures can be required to minimise risks to human health; and Surface water and groundwater: use relative sensitivity in water environment in LA113 (DMRB, n.d.) |
| Negligible | <p>Geology: very minor loss or detrimental alteration to one or more characteristics, features, or elements of geological feature / designation. Overall integrity of resource not affected.</p> <p>Soils: no discernible loss / reduction of soil function(s) that restrict current or approved future use, physical removal, or permanent sealing of <1ha of agricultural land should be reported as not discernible.</p> <p>Contamination:</p> <ul style="list-style-type: none"> Human health: contaminant concentrations substantially below levels outlined in relevant screening criteria. No requirement for control measures to reduce risks to human health / make land suitable for intended use; and Surface water and groundwater: use relative sensitivity in water environment in LA113 (DMRB, n.d.) |
| No Change | <p>Geology: no temporary or permanent loss / disturbance of characteristics features or elements.</p> <p>Soils: no loss / reduction of soil function(s) that restrict current or approved future use.</p> <p>Contamination:</p> |

| Magnitude* | Criteria |
|------------|--|
| | <ul style="list-style-type: none"> Human health: reported contaminant concentrations below background levels; and Surface water and groundwater: use relative sensitivity in water environment in LA113 (DMRB, n.d.) |

* Physical removal or permanent sealing of <1ha of agricultural land should be reported as not discernible ((DMRB), Design Manual for Roads and Bridges, n.d.).

Table 11.4 – Sensitivity Criteria

| Sensitivity | Description |
|-------------|---|
| Very High | <p>Geology: very rare and of international importance with no potential for replacement (for example, UNESCO World Heritage Sites, UNESCO Global Geoparks, Sites of Special Scientific Interest (SSSI) and GCR where citations indicate features of international importance). Geology meeting international designation citation criteria which is not designated as such.</p> <p>Soils:</p> <ul style="list-style-type: none"> Soils directly supporting an EU designated Site (for example, Special Areas of Conservation, Special Protections Areas, Ramsar); and / or ALC grade 1, 2 & 3a or LCA grade 1, 2 and 3.1 (N.B. Grade 3a to be defined as Very High BMV agricultural land at the request of Welsh Government consultation). <p>Contamination:</p> <ul style="list-style-type: none"> Human health - very high sensitivity land (for example, residential or allotments); Surface water: watercourse having Good WFD classification or designation under EC or UK legislation; and Groundwater: Principal Aquifer located within source protection zone (SPZ)1. |
| High | <p>Geology: rare and of national importance with little potential for replacement (for example, geological SSSI and National Nature Reserves). Geology meeting national designation citation criteria which is not designated as such.</p> |

| Sensitivity | Description |
|-------------|--|
| | <p>Soils: Soils directly supporting a UK designated Site (for example, SSSI).</p> <p>Contamination:</p> <ul style="list-style-type: none"> • High sensitivity land use such as public open space; • Surface water: Watercourse having Moderate WFD classification; and • Groundwater: Principal Aquifer located within SPZ2. |
| Medium | <p>Geology: of regional importance with limited potential for replacement for example, Regionally Important Geological (and Geomorphological) Sites (RIGS). Geology meeting regional designation criteria which is not designated as such.</p> <p>Soils:</p> <ul style="list-style-type: none"> • Soils supporting non-statutory designated Sites (for example, Local Nature Reserves, Sites of Nature Conservation Importance (SNCIs)); and / or • ALC grade 3b or LCA grade 3.2. <p>Contamination:</p> <ul style="list-style-type: none"> • Medium sensitivity land use such as commercial or industrial; • Surface waters: watercourse not having WFD classification linking to a WFD watercourse within 100m; and • Principal Aquifer located within SPZ3. |
| Low | <p>Geology: of local importance / interest with potential for replacement (for example, non-designated geological exposures, former quarries / mining Sites).</p> <p>Soils:</p> <ul style="list-style-type: none"> • ALC grade 4 & 5 or LCA grade 4.1 to 7; and / or • Soils supporting non-designated notable or priority habitats. <p>Contamination:</p> <ul style="list-style-type: none"> • Low sensitivity land use such as highways and rail; |

| Sensitivity | Description |
|-------------|---|
| | <ul style="list-style-type: none"> • Surface waters - watercourse not having WFD classification linking to a WFD watercourse within 250m; and • Unproductive stratum. |
| Negligible | <p>Geology: no geological exposures, little / no local interest.</p> <p>Soils: previously developed land formerly in 'hard uses' with little potential to return to agriculture.</p> <p>Contamination:</p> <ul style="list-style-type: none"> • Undeveloped surplus land / no sensitive land use proposed; • Surface water: no surface watercourses located within 250m; and • Groundwater: no pathway to underlying aquifer. |

Table 111-5 – Significance Matrix

| | | Magnitude of Impact | | | | |
|-------------|------------|---------------------|-------------------|--------------------|---------------------|---------------------|
| | | No Change | Negligible | Minor | Moderate | Major |
| Sensitivity | Very High | Neutral | Slight | Moderate or Large | Large or Very Large | Very Large |
| | High | Neutral | Slight | Slight or moderate | Moderate or large | Large or very large |
| | Medium | Neutral | Neutral or slight | Slight | Moderate | Moderate or large |
| | Low | Neutral | Neutral or slight | Neutral or slight | Slight | Slight or moderate |
| | Negligible | Neutral | Neutral | Neutral or slight | Neutral or slight | Slight |

11.5.21. DMRB LA 104 (Ref. 11.24) provides the following typical descriptions of the significance criteria:

- **Very Large:** Effects at this level are material in the decision-making process (considered Significant);
- **Large:** Effects at this level are likely to be material in the decision-making process (considered Significant);
- **Moderate:** Effects at this level can be considered to be material decision-making factors (considered Significant);
- **Slight:** Effects at this level are not material in the decision-making process (not considered Significant); and
- **Neutral:** No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error (not considered Significant).

ASSUMPTIONS AND LIMITATIONS

11.5.22. The following assumptions and limitations have been considered as part of the preliminary assessment:

- The report has been prepared based on the current iteration of the Red Line Boundary (D2a). The assessment of effects could change if the design changes;
- It is assumed that the information provided and reviewed in the **Preliminary Risk Assessment (Appendix 11.1, Document Reference: PW.3.3.11.1)** is representative of existing ground conditions. A degree of professional judgement has been used in the interpretation of information and in determining the sensitivity and magnitude; and
- Any decommissioning works will be undertaken in accordance with relevant legislation, permits (if required) and best practice in place at that time.

BASELINE CONDITIONS

11.5.23. The following reports should be read in conjunction with the baseline conditions section:

- **Appendix 11.1: Preliminary Risk Assessment (Document Reference: PW.3.3.11.1);**
- **Appendix 11.2: Mineral Resource Assessment (Document Reference: PW.3.3.11.2);**
- **Appendix 11.3: Coal Mining Risk Assessment (Document Reference: PW.3.3.11.2); and**

EXISTING BASELINE

Current Site Description

- 11.5.24. A detailed description of the Padeswood Spur Pipeline Proposed Development is presented in **Chapter 3 – Description of the Padeswood Spur Pipeline Proposed Development (Document Reference: PW.3.2.3)**. Detailed site descriptions are also provided within the **Preliminary Risk Assessment (Appendix 11.1, Document Reference: PW.3.3.11.1)** with pertinent points summarised below:
- 11.5.25. The Padeswood Spur Pipeline Proposed Development begins within land south of A5118 in Padeswood adjacent to the Padeswood Cement Works and continues in a generally northwest line to land south of the B5125 in Northop Hall.
- 11.5.26. The Padeswood Spur Pipeline Proposed Development has been split into the following sections.
- Section 1: Grid Reference 328103, 362575 – Padeswood to Rose Lane
 - Section 2: Grid Reference 325437, 363661 – Rose Lane to Argoed Hall
 - Section 3: Grid Reference 324863, 364369 – Argoed Hall to Bryn-y-Baal Road
 - Section 4: Grid Reference 325738, 365680 – Bryn-y-Baal to Maes-y-Grug
 - Section 5: Grid Reference 325915, 367461 – Maes-y-Grug to Northop Hall
- 11.5.27. The current land use of the Red Line Boundary is farmland, predominantly used as pastureland for livestock. The fields are divided by mature hedges and wire and wooden post fencing. At points, roads and small streams cut across the Red Line Boundary.
- 11.5.28. Overhead powerlines cross sections 2, 4 and 5 and telephone lines are seen crossing all sections at various points.

Historical Land Use

- 11.5.29. The land within the Red Line Boundary has historically comprised predominantly undeveloped land. However, isolated potentially contaminative land uses have been identified as follows:
- Former coal shafts (centre of section 1, north of section 2, south of section 3, south of section 5),
 - Argoed Colliery (south of section 3)
 - Railway lines (centre of section 1)
 - Kilns (north of section 2, south of section 3)
 - Gravel pits (north of section 2)

- A pump house (centre of section 1)
- Open cast workings (centre of section 2)
- Sewage works (south of section 3)
- Roads (north of section 2, south of section 3, north section 4 and north of section 5).

Soil Quality

11.5.30. The Cranfield Soil and Agri-food Institute Soilscales website (Cranfield University, n.d.) defines the following soil quality classifications to the areas:

- Section 1: Slowly permeable seasonally wet acid loamy and clayey soils with impeded drainage, low fertility. Habitats comprise seasonally wet pastures and woodlands. Soils have medium carbon content.
- Section 2: Predominantly slowly permeable seasonally wet acid loamy and clayey soils as above. In the northwestern limits soils are loamy and clayey floodplain soils with naturally high groundwater which are naturally wet with moderate fertility. Habitats comprise wet flood meadows with wet carr woodlands in old river meanders. Soils have medium carbon content.
- Section 3: Predominantly slowly permeable seasonally wet acid loamy and clayey soils as above. In the southwestern limits soils are loamy and clayey floodplain soils with naturally high groundwater as above.
- Section 4: Predominantly slowly permeable seasonally wet acid loamy and clayey soils as above. In the west soils are slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils with impeded drainage and moderate fertility. Habitats comprise seasonally wet pastures and woodlands. Soils have low carbon content.
- Section 5: In the south soils are slowly permeable seasonally wet acid loamy and clayey soils as above. In the north soils are slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils as above.

Agricultural Soils

11.5.31. In order to assess the potential impact to soil resources, prior to undertaking the intrusive survey the predictive Agricultural Land Classification (ALC) grades (where available) have been reviewed on the Data Map Wales website (Welsh Government, n.d.). The ALC grading is classified as follows:

- Grade 1: Excellent Quality with no limitations to agricultural use;

- Grade 2: Very good quality with minor limitations to agricultural use;
- Grade 3a: Good quality that can produce moderate to high yields of limited crops;
- Grade 3b: Moderate quality that can produce moderate yields of limited crops;
- Grade 4: Poor quality that significantly restricts the range or yield of crops;
- Grade 5: Very poor quality with severe restrictions, generally used for pasture or rough grazing;
- Non Agricultural; and
- Urban.

11.5.32. The NPPF and LA 109 (DMRB, n.d.) (Wales National Application Annex) define Grades 1, 2 and 3a as Best and Most Versatile (BMV) land. The sensitivities are listed in **Table 11.4**.

11.5.33. The soils within the Padeswood Spur Pipeline Proposed Development have been allocated the following predictive ALC:

- Section 1: Predominantly Grade 3b with an area of Urban grade around Padeswood Cement Works.
 - Section 2: Predominantly Grade 3b with Urban grade around the village of Mynydd Isa.
 - Section 3: Predominantly Grade 3b with small areas of Grade 3a, Non Agricultural and Urban grade in the southwest.
 - Section 4: Predominantly Grade 3b with an area of Grade 3a in the west and limited area of Urban grade in the southwest.
- Section 5: Predominantly Grade 3b in the south, Grade 3a in the north with a strip of Non Agricultural Grade in the north associated with Wared Wood.

11.5.34. There is no Grade 1 or Grade 2 agricultural land recorded within the Padeswood Spur Pipeline Proposed Development. Approximately 25 hectares (ha) of Grade 3a land is present, with the majority of the remainder (approximately 180ha) composed of Grade 3b, with minor areas of Grade 4.

11.5.35. Permanent sealing of agricultural land will likely occur at the newly constructed Above Ground Installation (AGI) points at Padeswood. The AGI at Northop Hall was granted under the HyNet Main Onshore Pipeline DCO Application (Reference: EN070007) and is therefore not included in the calculation of agricultural land loss within this ES Chapter. The Padeswood AGI is likely to sterilise approximately 0.14ha of Grade 3b of agricultural land (this land is not BMV land) for the duration of the development.

- 11.5.36. According to LA 109 (Wales Annex) (DMRB, n.d.) physical removal or permanent sealing of <1ha of agricultural land should be reported as not discernible.
- 11.5.37. The loss of less than 1ha of Grade 3b land is considered to be a negligible magnitude of change.

Environmental Designations

- 11.5.38. In Section 4, a SSSI is within 250m of the Red Line Boundary called Maes Y Grug and a Special Area of Conservation within 250m relating to Deeside and Buckley Newt sites.
- 11.5.39. All other, environmental designations that have been identified within the Red Line Boundary are all SSSI Impact Risk Zones. These reflect the particular sensitivities of the features and indicate the types of development proposal which could have potentially adverse impacts.
- 11.5.40. Certain types of development proposals within SSSI Impact Zones including airports, farming units and incineration units require consultation. However, the Padeswood Spur Pipeline Proposed Development does not fall within this requirement.

Geology

Artificial Ground (Made Ground)

- 11.5.41. The Preliminary Risk Assessment (**Appendix 11.1, Document Reference: PW.3.3.11.1**) reviewed published geological information which anticipated that ground conditions will comprise localised areas of Made Ground.
- 11.5.42. According to the BGS Onshore GeoIndex (Ref 11.30) reviewed as part of the Preliminary Risk Assessment (**Appendix 11.1, Document Reference: PW.3.3.11.1**) minimal Artificial/Made Ground is recorded. The Made Ground that is recorded within the Red Line Boundary is detailed in **Table 11.6** below.

Table 11I-6 – Artificial Made Ground

| Section | Artificial/Made Ground |
|---------|--|
| 1 | Small areas of Made Ground in the centre of the southern boundary and towards the northwest of the northern boundary. |
| 2 | Area of infilled ground towards the centre of the site. |
| 3 | None recorded. |
| 4 | None recorded within Proposed Development Area. Area of infilled ground adjacent to the eastern boundary in the north. |
| 5 | Small area of Made Ground towards the north. |

11.5.43. Ground investigations recorded Artificial Ground at seven intrusive locations, summarised in **Table 11-7**.

Table 11I-7 – Locations with Made Ground

| Intrusive Location | Depth m bgl | Made Ground Description | Rationale for presence of Made Ground |
|--------------------|-------------|--|---|
| 19_BH | 1.20 | Gravelly clay with sandstone and coal fragments | Made Ground infill in Coal Mining Risk Area 1 (see 1.5.53 and 1.5.100 for further details.) |
| 29_BH | 9.50 | Sandy gravelly clay with sandstone, mudstone and coal fragments | Made Ground infill in Coal Mining Risk Area 2 (see 1.5.53 and 1.5.100 for further details.) |
| 30_TP | 4.15 | Sandy gravelly clay with mudstone and siltstone | Made Ground infill in Coal Mining Risk Area 2 (see 1.5.53 and 1.5.100 for further details.) |
| 40_WS | 4.00 | Sandy gravelly clay with brick, timber, slag and metal with suspected asbestos containing material (confirmed as chrysotile) and a | Suspected unregistered landfill. |

| Intrusive Location | Depth m bgl | Made Ground Description | Rationale for presence of Made Ground |
|--------------------|-------------|--|---|
| | | strong hydrocarbon odour. | |
| 46_TP | 3.20 | Sandy silty gravel of siltstone and sandstone. | Historical maps indicate the presence of former coal workings and a former sewage works at this location. |
| 75_BH | 1.65 | Gravelly clay with brick and coal fragments | Made Ground infill in Coal Mining Risk Area 4 (see 1.5.53 and 1.5.100 for further details.) |
| 76_BH | 1.20 | Sandy gravelly clay with brick fragments. | Made Ground infill in Coal Mining Risk Area 4 (see 1.5.53 and 1.5.100 for further details.) |

Superficial Deposits

11.5.44. The **Preliminary Risk Assessment (Appendix 11.1, Document Reference: PW.3.3.11.1)** recorded that the Red Line Boundary is almost entirely underlain by Glacial Till. Some small pockets of alluvium associated with water courses and occasional pockets of Head (clay, silt, sand and gravel), alluvial fan deposits (sand and gravel) and Glaciofluvial deposits (sand and gravel). There are occasional areas where Superficial Deposits are absent.

11.5.45. During ground investigations, superficial deposits were recorded that predominantly comprises sandy gravelly clay, silty gravelly clay and gravelly clay which were interpreted to be Glacial Till Deposits. Some localised areas of Glaciofluvial Deposits were recorded at several locations. The depth of the superficial deposits varied from 1.60m bgl to 17.5m bgl at the deepest point (19_BH). Further information will be provided in the **Ground Investigation Report (Appendix 11.4)** in the final Planning Application submission.

Bedrock Deposits

11.5.46. The **Preliminary Risk Assessment (Appendix 11.1, Document Reference: PW.3.3.11.1)** anticipated the bedrock geology varies and generally comprises carboniferous age rocks of the following Formations;

- Gwespvr Sandstone Formation - Sandstone and argillaceous rocks, interbedded
- Pennine Lower Coal Measures Formation - Mudstone, siltstone and sandstone
- Pennine Lower Coal Measures Formation Sandstone
- Pennine Middle Coal Measures Formation - Mudstone, siltstone and sandstone
- Etruria Formation - Mudstone, sandstone and conglomerate
- Bowland Shale Formation – Mudstone
- Hollin Rock - Sandstone.

11.5.47. Ground investigations recorded bedrock in the following locations and depths:

- 12_BH – weathered bedrock recorded at 16.7m bgl;
- 14_BH – weak siltstone recorded at 15.0m bgl;
- 19_BH – light grey mudstone at 17.50m bgl;
- 20_BH – very weak light grey Mudstone at 14.5m bgl;
- 24_BH – fine to coarse grained sandstone at 6.25m bgl;
- 29_BH – weak grey mudstone at 10.08m bgl;
- 38_BH – grey mudstone at 14.60m bgl;
- 57_BH – weak grey fine to medium sandstone at 9.10m bgl;
- 58_BH – Black Coal at 4.70m bgl;
- 62_BH – grey mudstone at 10.30m bgl;
- 68_WS – weak brown mudstone at 1.70m bgl;
- 69_BH – light brown sandstone and mudstone at 2.50m bgl;
- 70_BH - light brown sandstone at 1.70m bgl;
- 73_WS – grey mudstone with coal fragments at 3.20m bgl;
- 75_BH – grey mudstone at 3.90m bgl; and
- 80_BH – grey sandstone at 3.0m bgl;

11.5.48. Further information will be provided in the **Ground Investigation Report (Appendix 11.4)** in the final Planning Application submission

11.5.49. Bedrock appears to be deeper in the southern portion of the Red Line Boundary and shallower towards the north. The bedrock appears to be overlain by the low permeability Glacial Till in the majority of locations.

Faults

11.5.50. The geology beneath and around the Red Line Boundary is highly faulted according to BGS mapping (British Geological Survey, n.d.). The

faults generally have a linear north-south orientation. A total of 31 faults (inferred) are recorded within the Red Line Boundary.

Mineral Resources

- 11.5.51. A **Mineral Resources Assessment (Appendix 11.2, Document Reference: PW.3.3.11.2)** has recorded the following pertinent points:
- The Red Line Boundary in Sections 1 and 2 intersects with mapped Mineral Safeguarding Areas (MSA).
 - Within Section 1 approximately 0.96ha is within an MSA for Glaciofluvial Deposits (sand and gravel).
 - Within Section 2 approximately 1.4ha is within an MSA for sub-alluvial deposits.
 - A review of the geological records indicated that the safeguarded minerals and other minerals do not meet the requirements for quality resource either due to inadequate overburden ratios, area/amount of resource present or proximity to sensitive receptors.
- 11.5.52. Overall, it was considered that none of the safeguarded mineral resources or other potential mineral resources were an economically viable prospect for prior extraction. Despite this, requirements for incidental extraction and re-use of mineral resources are included within the Construction Environmental Management Plan (CEMP).
- 11.5.53. As the safeguarded mineral resources are not viable for the extraction there is considered to be negligible magnitude of change.

Coal Mining

- 11.5.54. The **Preliminary Risk Assessment (Appendix 11.1, Document Reference: PW.3.3.11.1)** reviewed the Coal Authority (CA) national database. This is shown online as an Interactive Map Viewer (The Mining Remediation Authority (formerly Coal Authority), n.d.) which presents the extent of the known Coalfields (Coal Mining Reporting Area) and defines areas of risk relating to mine entries, known shallow mine workings, probable shallow mine workings and known coal seams. If a surface risk could be posed from any of these features, then the area is designated as a Development High Risk Area (DHRA).
- 11.5.55. The Padeswood Spur Pipeline Proposed Development lies within the Coal Authority Coal Mining Reporting Area due to the legacy mining of the region, and potential for underlying historical voids.
- 11.5.56. The **Coal Mining Risk Assessment (Appendix 11.3, Document Reference: PW.3.3.11.3)** has highlighted four main areas that are considered to have potential to impact the construction. These are:

- **Area 1:** In the southern portion of the route – northwest of the Padeswood cement works complex and the location of the historical Padeswood Colliery an area with several mine shafts.
- **Area 2:** Land southwest of Rose Lane, Buckley. This is an area of historic opencast mining where there is considered to be a low risk from coal workings due to shallow coal. However, there is potential for settlement due to backfilling of opencast mine workings.
- **Area 3:** Land around Argoed Hall, near the A549 Mold Road. The woodland gorge was once an area of historical mining and the west of Mold Bypass was Argoed Colliery. Mine shafts are recorded to the south of the A549 Mold Road.
- **Area 4:** Land north of Maes-y-Grug SSSI, Altarnock. This area has recorded multiple mine shafts and an opencast pit.

- 11.5.57. The potential subsidence and any geotechnical issues are outside of the assessment covered within this ES chapter. Additional investigation to further characterise the potential risks from unrecorded mine shafts and subsidence from coal workings has been recommended within the **Coal Mining Risk Assessment (Appendix 11.3, Document Reference: PW.3.3.11.3)**.
- 11.5.58. Ground investigations have recorded deeper Made Ground corresponding with these former Coal Mining Areas. Further information will be provided in the **Ground Investigation Report (Appendix 11.4)** in the final Planning Application submission.
- 11.5.59. The boreholes that recorded the deeper Made Ground located within each of the 5 Sections are as follows:
- Area 1: Padeswood 08 – 13
 - Area 2: Padeswood 26-30
 - Area 3: Padeswood 38 – 40 and then 44-47
 - Area 4: Padeswood 73 - 75
- 11.5.60. **Paragraph 11.4.85** discusses the analytical testing of the soils from these areas further.
- Non-coal Mining*
- 11.5.61. The Preliminary Risk Assessment Report (Appendix 11.1, Document Reference: PW.3.3.11.1) recorded non coal mining within Section 5 of the route; Wared Wood lead mine. The Coal Mining Risk Assessment (Appendix 11.3, PW.3.3.11.3) notes that lead mining was historically carried out to the west of Mold. Results of soil laboratory data for samples collected from ground investigations were compared against generic assessment criteria (GAC) for Public Open Space (POS) end use.

The only exceedances of these criteria for the investigation are for two samples collected from Padeswood_44_BH and Padeswood_45_BH for lead in shallow soils. These two samples were collected from boreholes adjacent to the River Alyn and are shown in **Figure 11.1 Location of Soil GAC Exceedances (Document Reference: PW.3.4.11.1)** . Former Lead mining is located several hundred metres upstream of area where Padeswood_44_BH and Padeswood_45_BH are located. Anecdotal information indicates that lead concentrations within the soils in this area are known to be high from the outwash from former Lead mines being discharged into the River. These lead concentrations will be assessed further in paragraph 11.4.85.

11.5.62. No other specific surface mineral workings were identified within the Red Line Boundary however, a number were identified in the surrounding area (pertinent records within 250m) all of which have been recorded as closed by operator as documented within the **Preliminary Risk Assessment (Appendix 11.1)**, these are described below.

- Pen-y-bont – sand and gravel extraction (105m west, section 2)
- Plas-Ifan – sandstone extraction (45m north, section 4)
- Wared Wood – lead mine (5m south, section 5)
- Wared Wood Quarry – sandstone (40m northwest, section 5)

Regulatory Database Records

Landfills

11.5.63. The **Preliminary Risk Assessment (Appendix 11.1 (Document Reference: PW.3.3.11.1))** identified the following historical landfills within the Proposed Development area:

- Section 1: Nant Mawr Road from 1974-1976 . The boundary appears to correspond with a surface water course. It is unclear if the area was landfilled however, it has been included for completeness.
- Section 2 & 3: Argoed Old Sewage Works from 1940-1958; this is located to the north of the Mold Roundabout.

11.5.64. Ground investigations recorded Made Ground at location Padeswood_46_TP consisting of Grey stained orangish brown sandy very silt angular to subangular fine to coarse gravel of siltstone and sandstone. The maximum depth of the Made Ground was not ascertained at this location; however, the material does not appear to be putrescible material and therefore if it represents landfilled material it appears to be of a non-organic nature. Further discussion on the Ground Investigation is presented in **paragraph 11.4.83** onwards, and will be provided in the **Ground Investigation Report (Appendix 11.4)** in the final Planning Application submission

Hydrogeology

- 11.5.65. The **Preliminary Risk Assessment (Appendix 11.1, Document Reference: PW.3.3.11.1)** recorded superficial Glacial Till and Head deposits covering the majority of the Red Line Boundary. These are classified as Secondary Undifferentiated Aquifers with small areas of Alluvium or Alluvial Fan deposits classified as Secondary A Aquifers. Secondary A Aquifers are formed of permeable layers capable of supporting water supplies at local scale, and in some cases forming an important source of base flow to rivers. A Secondary Undifferentiated classification is allocated when it is not possible to apply either a Secondary A or B definition due to the variable characteristics of the rock type. Secondary Undifferentiated aquifers only have a minor value with respect to groundwater supply.
- 11.5.66. The majority of bedrock deposits across the site are classified as Secondary A Aquifers with very small areas of Secondary Undifferentiated Aquifers relating to Bowland Shale Formation deposits.
- 11.5.67. No Source Protection Zones (SPZ) are recorded within the Red Line Boundary or within 500m.
- 11.5.68. Ground investigations recorded groundwater seepage or strikes at 28 of the 62 intrusive locations. The depths/elevations of the seepage/strikes varied between boreholes locations with the majority recorded within superficial Glacial Till deposits. Faster inflows of groundwater appear to correlate to sporadic sand lenses within lower permeability clay. Post investigation monitoring of the 11 installed monitoring wells recorded groundwater predominantly within Glacial Till with a single install in Made Ground and one in bedrock recording groundwater. It is considered unlikely that the groundwater encountered within the wells is hydraulically connected given that the seepages correlate with sporadic sandy layers within the low permeability clay. It is likely that the groundwater represents perched water within these higher permeability lenses. Further information will be provided in the **Ground Investigation Report (Appendix 11.4)** in the final Planning Application submission.

Hydrology

- 11.5.69. The **Preliminary Risk Assessment (Appendix 11.1, Document Reference: PW.3.3.11.1)** details that sections 1, 2, 3 and 4 are within the river waterbody catchment of the River Alyn – Leadmill to Hope, the operational catchment of the River Alyn and the management catchment of the River Dee.

- 11.5.70. Section 4 and Section 5 are within the Wepre Brook water body catchment, the Dee Estuary operational catchment and the River Dee management catchment.
- 11.5.71. For both the River Alyn and Wepre Brook the overall water quality as recorded in 2016 was moderate with a good chemical rating and moderate ecological
- 11.5.72. Multiple surface water features are present across the Red Line Boundary, and further detail is provided on surface water courses in **Chapter 17 – Water Resources and Flood Risk (Document Reference: PW.3.2.17.**

Radon

- 11.5.73. The interactive **UK Radon Map (Ref 11.36)** indicates the percentage of home above the Radon Action Level above where gas protection measures are recommended within new dwellings and extensions.
- 11.5.74. The Padeswood AGI (the only proposed permanent building structure that workers will enter) is located within an area where 10-30% of properties will be affected by radon. As the building is not residential radon protection measures are not required. In accordance with BRE 211 an appropriate risk assessment which considers radon risks should be undertaken prior to workers using the newly constructed AGI.

Unexploded Ordnance (UXO)

- 11.5.75. The **Preliminary Risk Assessment (Appendix 11.1, Document Reference: PW.3.3.11.1)** includes an Annex containing a Zetica UXO Desk Study and Constraints Assessment. This states that the Padeswood Spur Pipeline Proposed Development lies within an area with a low risk of UXO.
- 11.5.76. From a contaminated land perspective contamination risk from unexploded ordnance and explosive compounds / propellant compounds has not been considered further.

Ground Investigations

- 11.5.77. A ground investigation has been undertaken on the Padeswood Spur Pipeline Proposed Development and the data will be presented within the **Ground Investigation Report (Appendix 11.4)**, in the final Planning Application submission
- 11.5.78. A review of the 2024 ground investigated noted the following pertinent points.

Soils

- 11.5.79. The majority of the Padeswood Spur Pipeline Proposed Development recorded natural deposits, with Made Ground recorded in only 7 out of

62 intrusive locations. None of the borehole locations recorded evidence of gross contamination. A single borehole Padeswood_40_WS recorded notable anthropogenic material comprising brick, timber, slag and metal. Asbestos was identified within this location however none of the samples exceeded the Soil GAC assessment (further details below on mitigation measures relating to the asbestos).

11.5.80. All soil samples analysed recorded concentrations of analytes below respective Public Open Space land use criteria (GAC) with the exception of two samples recording exceedances for lead. These two exceedances were recorded at Padeswood_44_BH and Padeswood_45_ respectively and are shown in **Figure 11.1 Location of Soil GAC Exceedances (Document Reference: PW.3.4.11.1)**. These locations recorded the following concentrations above the lead GAC of 808mg/kg:

- Padeswood_44_BH at 1.50m bgl– 1400mg/kg of lead.
- Padeswood_45_BH at 0.10m bgl – 1100mg/kg of lead.

11.5.81. These exceedances are considered likely to be a result of the upstream lead mining within the area. Acute exposure is not assessed using generic assessment criteria and instead the risks to site workers during the Construction Stage are mitigated with suitable Risk Assessments and Method Statements (RAMS) and an approved Construction Environmental Management Plan (CEMP). The GAC assessment looks at chronic long term risk exposure. The potential long-term exposure receptors are therefore considered to be site users such as members of the public or farmers who may use the land. As the lead exceedances are isolated, in 44_BH at depth and these fields are not used for arable farming, the risk to these receptors of exposure is considered to be low.

11.5.82. Asbestos was recorded within two samples from Padeswood_40_WS (at 2.60m and 3.60m bgl). The quantification for these samples indicates it was chrysotile at 1.4%. An appropriate asbestos risk assessment will be required in order to protect workers during the installation of the pipeline in this area. Given the depth of the asbestos and the presence of 0.30m of topsoil at the surface upon completion of the installation of the pipeline and replacement of the topsoil it is unlikely that a risk will be posed to anyone at the surface given the cement bound nature of the asbestos and the presence of 0.30m of topsoil (which will be the proposed mitigation to protect human health receptors from asbestos within soils).

11.5.83. During the ground investigation severe weather and access issues meant that not all proposed intrusive locations could be undertaken. Appropriately trained ground workers should be vigilant during construction for any unexpected contamination. This will mitigate

against the unknown contamination that could be present and the consultant can assess for visual and olfactory evidence of contamination.

11.5.84. It is assumed that should unexpected visual and olfactory evidence of contamination be encountered that an appropriately qualified environmental consultant will be asked to advise and if appropriate additional investigation and remediation will be undertaken in consultation with regulators.

11.5.85. It is assumed that should unexpected visual and olfactory evidence of contaminated be encountered the LPA and NRW will be notified, and any follow up investigation and remediation will be provided to them for review.

Ground Gas

11.5.86. Seven rounds of ground gas monitoring of the eleven installed monitoring wells have been reviewed to date. The installed monitoring wells are:

- 02_BH
- 12_BH
- 19_BH
- 20_BH
- 24_BH
- 29_BH
- 33_WS
- 57_BH
- 62_BH
- 75_BH
- 80_BH

11.5.87. The following is noted regarding sources of ground gas within the borehole logs and the areas that the boreholes are located:

- There is Made Ground including coal fragments (29_BH) and natural strata including coal fragments (02_BH, 12_BH, 24_BH, 57_BH, 62_BH and 75_BH). These fragments have previously been buried and in an anoxic environment but the drilling and installation of a well has the potential to introduce oxygen to them causing biological respiration and the generation of carbon dioxide.
- There was no putrescible material recorded within any of the borehole logs that were installed which indicates that organic landfill material has not been recorded within these locations.

- A thin layer of organic Peat deposits was recorded within 33_WS. As low volumes of organic material can degrade aerobically and produce carbon dioxide these deposits are considered to be a low generation source of ground gas.
- There are four areas of former opencast mining and underground mining with several recorded mine shafts. Several wells are installed within these areas.

11.5.88. The following assessment has been undertaken to determine the potential risk from ground gas:

- A gas screening value (GSV) calculation for each individual well has been undertaken using the maximum steady state carbon dioxide, methane and flow rate for each well. A worst case scenario for all the wells combined was not considered representative given the distance between the wells.
- Ternary Plots have been produced using the ground gas data to determine the source of ground gas.
- A qualitative review of the conceptual site model in relation to ground gas sources, pathways and receptors.

11.5.89. The GSV calculations for methane and carbon dioxide were all CS1 (Characteristic Situation 1, whereby no gas protection measures are required) with the exception of carbon dioxide in Padeswood_12_BH which was CS2 (Characteristic Situation 2, whereby basic gas protection measures will be required).

11.5.90. Although only a single location has recorded a CS2 classification, a conservative approach has been selected and gas ternary plots have been produced using the maximum steady state gas data from all the monitoring wells. Further detail of these plots will be provided within the **Ground Investigation Report (Appendix 11.4)** in the final Planning Application submission. The ternary plots have determined that the ground gas is indicative of microbial respiration of organic materials in soil with zero methane and low flow.

11.5.91. A review of the ground gas data in general observed the majority of concentrations were low with only two locations recording concentrations of carbon dioxide above 5% (29_BH and 33_WS) and no locations recording greater than 1% methane.

11.5.92. Given the above review of the data there is not considered to be any mitigation required in relation to ground gas to be incorporated into the construction design of the Padeswood Spur Pipeline Proposed Development i.e. gas protection measures.

11.5.93. However, in line with best practice all excavations and trenches should be gas tested before entry and construction operatives should work in accordance with their approved RAMS and the approved CEMP.

Groundwater

11.5.94. A selection of soil samples were analysed for leachable analytes. The soil leachate sample results were screened against both Environmental Quality Stands (EQS) which assess risks to surface waters and Drinking Water Standards (DWS) which assess risk to groundwater within the underlying aquifers.

11.5.95. Exceedances of the EQS criteria were recorded for; metals (chromium, copper, lead, nickel, chromium III and zinc), inorganic determinands (pH, complex cyanide, ammoniacal nitrogen) and organics (benzo(a)pyrene (1 exceedance) and fluoranthene (3 exceedances)).

11.5.96. Exceedances of DWS criteria were recorded for antimony (1No), ammoniacal nitrogen (1No.) and pH (3No.).

11.5.97. The above exceedances are not considered to pose an unacceptable risk to controlled waters receptors given the following points:

- The majority of the above exceedances are for low toxicity, low mobility contaminants that have exceeded conservative assessment criteria.
- With the exception of lead, none of the contaminants exceeding water quality targets presented exceedances within soil samples.
- It should also be noted that the soil leachate preparation process is conservative in nature and likely to provide higher concentrations than will be encountered in the environment. Given the distribution and concentration of soil leachate exceedances, these are considered indicative of background concentrations and not point source contamination. As such, these concentrations are not considered indicative of significant risk to surface waters or groundwater within the Proposed Development.

Human Health and Controlled Waters Conclusions

11.5.98. The results for both soils and soil leachates returned a limited number of exceedances above human health and controlled waters assessment criteria.

11.5.99. Exceedances which have been identified generally relate to low mobility contaminants. Given the low permeability nature of superficial deposits across the Red Line Boundary and the perched nature of the water within deposits these limited exceedances are not considered to pose an unacceptable risk to controlled water.

The potential risk to receptors during the Operational and Decommissioning Stage was scoped out of this assessment and therefore only the risks to human health receptors during the Construction Stage are considered. The acute (short term) risks to construction workers are mitigated via RAMS and the approved CEMP.

Potential Sources of Contamination

11.5.100. Following a review of data from the ground investigation, the potential sources of contamination have been refined and are considered to be the following:

- Contaminants within Made Ground/groundwater related to former predominantly infilled Coal Features and lead mining near Mold;
- Unexpected Made Ground within agricultural land;
- Made Ground within the limited site areas that were not investigated due to access constraints; and,
- Naturally occurring moderate to high radon levels (5-30%).

Potential Source to Receptor Pathways

11.5.101. Relevant potential pathways are considered to include the following:

- Dermal contact with soil bound contamination and dust;
- Ingestion of dusts/soil particles;
- Inhalation of dusts and fibres (on and offsite receptors); and
- Inhalation of hazardous ground gases / vapours (on and offsite receptors)
- Accumulation of hazardous gases within below ground excavations.

Potential Contamination Receptors

11.5.102. Relevant potential receptors are considered to include the following:

Human Health

- Construction workers during the construction; and,
- Neighbouring site users, nearby residential properties or members of the public (i.e., dog walkers) during the construction.

11.5.103. Following the redevelopment, future site users at the AGI and neighbouring site users will not be considered viable receptors. This is because the proposed pipeline will be buried, and the AGI will comprise hardstanding therefore the Scoping assessment scoped these elements out.

Controlled Waters

- Streams within the Red Line Boundary and surrounding area and the adjacent River Alyn that could receive construction surface run-off; and,
- Surface drains and ponds within the Red Line Boundary and surrounding area

Environmentally Sensitive Sites

- Sensitive onsite soils (ALC Grades 3a and 3b) that will be disturbed during construction.

Built Environment

- Padeswood Carbon Dioxide Spur Pipeline; and,
- Infrastructure including the Padeswood Above Ground Installations (AGI) and additional infrastructure for the Northop Hall AGI.

Ground Investigation Contaminated Land Risk Assessment

- 11.5.104. Given the refined sources, pathways and receptors the pollutant linkages that are considered to be viable are presented in **Table 11-8**. A risk grading in accordance with the risk assessment set out in CIRIA C552 (CIRIA, 2001) has been applied. This risk grading will be used to identify sensitive receptors and inform the preliminary assessment of likely impacts and effects with sensitivity and magnitude assessed in accordance with LA 109 (DMRB, n.d.).

Table 111-8 – Preliminary Conceptual Site Model

| Source | Exposure Pathway | Potential Receptor | Probability of Exposure | Consequence of Exposure | Comment | Risk |
|--|--|---|-------------------------|-------------------------|--|----------|
| Localised chemical contamination in soil and groundwater associated with existing and historical use of site(s) and surrounding area | Direct contact, or ingestion of soil bound contaminants / dust (excluding asbestos fibres) | Construction and future maintenance workers | Likely | Minor | Workers are likely to come into direct contact with soil during construction / maintenance activities, although only for a short period of time. Acute risks to construction workers will be mitigated using appropriate RAMS and with the use of standard PPE and hygiene best practice and an approved CEMP. The 2024 ground investigation identified only two minor exceedances of the lead GAC for public open space land use within soils. The locations where these exceedances have been identified are areas for which exposure times will be very limited. Lead has relatively low mobility and the presence of low permeability cohesive deposits will limit the migration of such contamination. | LOW |
| | | Below ground infrastructure / services | Unlikely | Minor | Building foundations and underground infrastructure / services may come into direct contact with contaminants which could affect their integrity. In turn this will result in more frequent maintenance requirements and increased probability of exposure to future maintenance workers. The pipeline design will account for sulphate and pH concentrations within the soils to mitigate the risks to the infrastructure. | LOW |
| | | Third parties (Adjacent site users / residents) | Unlikely | Minor | Dust and fibres generated during construction activities have the potential to migrate offsite and impact adjacent site users (particularly along roads). However, these risks are limited given the relatively rural nature of the surrounding land and these risks can be managed through the use of a robust CEMP. | VERY LOW |
| | Mobile contaminants leaching and migrating into the | Surface waters | Unlikely | Medium | The local surface water network involves a series of drains, some connecting with the wider river network and flowing into the River Alyn (a sensitive receptor). High rainfall | LOW |

| Source | Exposure Pathway | Potential Receptor | Probability of Exposure | Consequence of Exposure | Comment | Risk |
|--|-------------------------------|---|-------------------------|-------------------------|--|--------------|
| | wider water environment | | | | periods could release contaminants from potential Made Ground to the ground surface as flood water. The CEMP will mitigate the mobilisation of any residual contamination that could be present at low concentrations. | |
| | | Superficial aquifer | Unlikely | Medium | The 2024 ground investigation identified limited isolated exceedances of DWS inorganic determinands in soil leachate samples likely attributable to natural sources (coal deposits). The site is dominated by low permeability glacial till deposits which will limit the potential for any contamination to migrate to higher sensitivity Secondary A aquifer alluvial deposits. | LOW |
| | | Bedrock aquifer | Unlikely | Medium | The 2024 ground investigation identified limited isolated exceedances of DWS inorganic determinands in soil leachate. The low permeability superficial deposits encountered in the 2024 investigation) will limit the vertical migration of residual mobile contamination (if present) to the underlying Secondary A bedrock aquifer. | LOW |
| Made ground – asbestos containing materials* | Inhalation of asbestos fibres | Construction and future maintenance workers | Unlikely | Severe | Given the generic nature of Made Ground there is potential that asbestos could be present in any Made Ground. | MODERATE/LOW |
| | | Third parties (adjacent site users and residents) | Unlikely | Severe | An Asbestos Risk Assessment will be required for construction to prevent the generation of dust / dispersion of potential asbestos fibres during works. Appropriate RAMS and an approved CEMP during any ground works will detail mitigation measures to prevent exposure. Asbestos was recorded in one sample from 40_Padeswood. The overall current risk from asbestos is considered to be low. | MODERATE/LOW |

| Source | Exposure Pathway | Potential Receptor | Probability of Exposure | Consequence of Exposure | Comment | Risk |
|---|---|---|-------------------------|-------------------------|--|----------------|
| Hazardous ground gases associated with radon, localised Made Ground and Coal Measures | Migration and inhalation of ground gas resulting in asphyxiation or explosion | Construction and future maintenance workers | Unlikely | Severe | Hazardous ground gases concentrations recorded during the monitoring undertaken to date have been low. A review of the ground gas information has determined that gas protection measures are not required to be included in the pipeline design. However, in accordance with best practice all trenches and excavations should be gas tested prior to entry. These best practices should be included in the RAMS and approved CEMP. Radon protection measures are not required in the AGI however an appropriate risk assessment covering radon will be undertaken prior to workers using the AGI. | LOW / MODERATE |
| | | Below ground infrastructure / services | Unlikely | Severe | | LOW / MODERATE |

** The approach to the assessment of potential asbestos issues on a subject site takes into account the current guidance which recommends that there is no safe threshold of exposure to asbestos fibres. Consequently, the findings present an assessment of the potential likelihood of exposure to asbestos based on the current understanding of the prevalent site conditions. This should not be taken as an assessment of the associated potential risks to human health which may subsequently arise should such exposure occur; the presence, or suspected presence of an asbestos containing materials should be fully assessed by a qualified asbestos surveyor.*

FUTURE BASELINE

- 11.5.105. In the absence of the construction of the Padeswood Carbon Dioxide Spur Pipeline and Padeswood AGI, the current land use will remain the same and the future baseline in relation to land and soil will remain unchanged.
- 11.5.106. It is not anticipated that the geology baseline will change significantly over the lifetime of the Padeswood Spur Pipeline Proposed Development. However, climate change could affect the soils baseline through increased erosion from greater rainfall events due to wetter winter weather and greater likelihood of dust generation during drier summers. This could result in changes to agricultural land classification grades over the lifetime of the Padeswood Spur Pipeline Proposed Development.

11.6. SENSITIVE RECEPTORS

- 11.6.1. The following sensitive Receptors have been assessed and are displayed in **Table 11-9** below.

Table 111-9- Sensitive Receptors

| Value / Sensitivity | Receptor | Comment on Sensitivity |
|---------------------|---|---|
| Human Health | Construction workers during Construction Stage (Operation and Decommissioning stages were scoped out) | Medium There is potential for direct contact, ingestion or inhalation of contaminants for construction works during the Constructions Stage. |
| | Neighbouring site users, nearby residential properties, or members of the public during the Construction Stage. | Medium There is potential for direct contact, ingestion or inhalation of contaminants for third-party neighbours. |
| Controlled Waters | Groundwater within superficial deposits and underlying bedrock. | Medium Groundwater is predominantly within the Superficial Secondary Undifferentiated Aquifers which comprise lower permeability deposits, which have a lesser significance for water supply or river base flow. The water is perched water within granular layers and the presence of low permeability clay will provide protection the underlying bedrock aquifer. No source protection zones are located within 500 m of the Proposed Development Area. |

| Value / Sensitivity | Receptor | Comment on Sensitivity |
|--|---|---|
| | Surface water features. | High The River Alyn and Wepre Book are both classified under the Water Framework Directive as being moderate. |
| Environmentally Sensitive Sites | Flora and fauna within the nearby environmentally sensitive sites | Negligible (one small area of Very High) No environmental designations or designated protected areas which require consultation have been identified within the Proposed Development Area however a SSSI/SAC (Maes y Grug) is recorded adjacent to Section 5 of the Proposed Development Area. |
| Agricultural Soils | Sensitive onsite soils | Medium (small areas of Very High) The majority of the soils are medium sensitivity Grade 3b with some small areas of Grade 3a (which are very high sensitivity). |
| Mineral Resources | Bedrock and superficial mineral resources | Low Mineral resources identified include; sub-alluvial deposits, brick clay and primary and secondary shallow coal. The Mineral Resource Assessment (Appendix 11.2) did not consider them viable deposits for prior extraction. |
| Built Environment | Pipeline infrastructure and Above Ground Installations | Low – Medium Available mapping indicates the route has been occupied by predominantly agricultural land with some areas of infilled former open cast. |

11.7. DESIGN DEVELOPMENT, IMPACT AVOIDANCE AND EMBEDDED MITIGATION

11.7.1. The following construction methods have the potential to reduce adverse impacts and have been considered as part of the Padeswood Spur Pipeline Proposed Development's current design. A full summary of construction methods and mitigations are presented in **Chapter 3 Description of the Padeswood Spur Pipeline Proposed Development** (Document Reference: PW.3.2.3) and **Chapter 4 Consideration of Alternatives** (Document Reference: PW.3.2.4) respectively.

- The selection of the preferred pipeline route will take into account potential constraints (potential contaminative source areas) and minimise impact on existing sensitive land uses;
- Trenchless crossing techniques will be used in specific locations where open cut construction is anticipated to lead to disruption and or/adverse environmental impacts (e.g. major roads or sensitive environmental features such as watercourses and ecologically designated areas).
- Materials excavated for the trenching work will be stockpiled adjacent to the works and reused during backfilling of the trenches. Any topsoil or organic surface material will be stockpiled separately for re-use on completion of the works. These methods reduce loss of site won material
- Agricultural soil will be suitably stored and re-used to reduce adverse effects to quality. The stripping of topsoil will be carried out with care to provide maximum protection for the soil structure (preventing topsoil and subsoil becoming mixed and avoiding soil contamination).
- Any facilities for the storage of oils, fuels or chemicals will be sited on impervious bases and surrounded by impervious bund walls. The volume of the bunded compound will be 110% of the capacity of the tank, all filling points, gauges, vents and sight glasses will be located within the bund. Associated pipework will be located above ground and protected from accidental damage. All filling points and tank overflow pipe outlets will be detailed to discharge downwards into the bund. Refuelling will be supervised at all times, preferably done on an impermeable surface or with suitable ground protection. This system will reduce the potential for the addition of new contaminants to the existing baseline environment (e.g., spill or leak).

- Any waste materials generated during the Padeswood Spur Pipeline Proposed Development will be disposed of satisfactorily and in accordance with Section 34 of the Environment Act 2021 (HM Government, 2021) and NRW relevant guidance on waste management. The Construction Contractor will be responsible for obtaining all required environmental permits, licences and consents from the relevant authorities where required. Uncontrolled disposal or discharge of waste will be strictly forbidden, and compliance of all activities related to the management of waste with all existing local laws and regulations shall be assessed and assured by the subsidiary.

11.7.2. Temporary installation or upgrade of existing access tracks for the Construction Compounds and work-fronts will be undertaken to minimise disruption and local environmental impacts to Land and Soil. Options will include (dependent on local ground conditions and other variables) provision of bog mats, compacted gravel tracks, proprietary aluminium trackways and asphalt or concrete sealed surfaces.

- Any concrete used in below ground infrastructure will be selected based on the appropriate sulphate classification;
- A dewatering management plan will be produced by the Construction Contractor to assess the potential risks arising from dewatering, with particular regard to local private water supplies and ecosystems.

11.8. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

11.8.1. The preliminary assessment of predicted impacts and effects for the Padeswood Spur Pipeline Proposed Development during the Construction Stage (Operational and Decommissioning Stages have been scoped out) identified significant effects related to human health, controlled waters and loss of agricultural land.

11.9. MITIGATION AND ENHANCEMENT MEASURES

11.9.1. This Section sets out the preliminary avoidance, mitigation and compensation measures which are likely to be required to address the significant effects as assessed in **Section 11-9**.

CONSTRUCTION

- 11.9.2. The risks to site workers during the Construction Stage are mitigated with suitable Risk Assessments and Method Statements (RAMS) and an approved Construction Environmental Management Plan (CEMP). These measures are included in the **Outline Environmental Management Plan (Document Reference: PW.4.1)** and will be used to draft the detailed CEMP.

Materials Management Plan

- 11.9.3. The Construction Contractor will produce a Material Management Plan (MMP) in accordance with CL:AIRE DoWCoP (Ref 11:37). The MMP will provide a clear, consistent and efficient process to enable the reuse of excavated material without it being classified as a waste and outline a cut / fill balance to reduce the amount of material permanently removed during the construction of the Padeswood Spur Pipeline Proposed Development.

General Practices

- 11.9.4. The Construction Contractor will follow a Site Waste Management Plan for reducing, storing, handling, transporting and disposing of waste during construction.
- 11.9.5. If, during open trench construction and excavations, unexpected gross contamination is encountered, potential mitigation options including potentially lining the trench in order to inhibit water percolation and subsequent leachate generation will be considered.

Measures contained within the detailed CEMP in relation to land and soil will include:

- Using appropriate risk assessments and method statements (RAMS);
- All site operatives will follow hygiene best practices and be provided with the correct PPE (e.g., safety glasses, gloves and face masks where applicable) to reduce the risk of inhaling / ingesting / touching contaminated materials;
- All site operatives will be made aware of the risks posed from ground conditions likely to be encountered during the construction, for example through toolbox talks before undertaking any works; and

- 11.9.6. All site operatives will be trained and competent in their role. There will be a trained and responsible manager on site during construction works, including any movement of the stockpiles.

- If unexpected visual and olfactory evidence of contamination is encountered an appropriately qualified environmental consultant will be asked to advise and if appropriate additional investigation and remediation will be undertaken in consultation with regulators.
- If unexpected visual and olfactory evidence of contaminated soil is encountered the LPA and NRW will be notified, and any follow up investigation and remediation will be provided to them for review.

- 11.9.7. In line with standard practice all excavations and trenches should undergo gas testing prior to entry. The Construction Contractor will be appropriately experienced and will be briefed in the expected and unknown ground conditions. The Construction Contractors ground workers will be appropriately trained to identify potential contamination. Should unexpected Made Ground or unexpected contaminated ground (i.e. visual or olfactory evidence of contamination) be encountered during the Construction Stage, a suitably qualified person will be employed by the Construction Contractor to advise on the appropriate course of action. Testing of Made Ground for a minimum of asbestos, metals, petroleum hydrocarbons and polyaromatic hydrocarbons to assess suitability for re-use and potential risks to construction works will be undertaken.
- 11.9.8. The Construction Contractor will undertake ongoing monitoring and maintenance to ensure that any temporary or permanent drainage in the Construction Compounds are meeting their operational requirements. This will prevent surface runoff and/ or contamination from entering surface water or groundwater bodies and migrating. Appropriate measures and maintenance procedures will be detailed in the detailed CEMP. Emergency procedures will be in place should a leak of contamination i.e. from a drainage failure or machine tank, occur. These emergency procedures will be documented in the detailed CEMP. Should a leak or drainage failure occur the Qualified Person (Environmental Consultant) will be informed, and appropriate actions taken.
- 11.9.9. Any unexpected disused below ground tanks, structures and / or pipework/ services encountered during construction that cannot be avoided will be appropriately decommissioned and removed (where necessary) by an appropriately qualified person as appointed by the Construction Contractor.
- 11.9.10. Should asbestos containing material (ACM) be encountered during the construction, or soil testing indicate that asbestos fibres are present, the Qualified Person will be notified and appropriate actions taken.

- 11.9.11. For excavation in areas of known Made Ground the Qualified Person will supervise the excavation to observe for visual or olfactory evidence of contamination or ACM.
- 11.9.12. If, following the above, remediation is determined to be required, suitable remediation strategy will be produced. The remediation strategy will be approved by the Local Authority (FCC / NRW) prior to being implemented to mitigate unacceptable contaminated land related risks.

11.10. ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

- 11.10.1. This section details the assessment of significant effects taking account of the secondary and tertiary mitigation detailed in **Section 11.7 and 11.8** above.

CONSTRUCTION STAGE

- 11.10.2. The likely significant effects for Land and Soil associated with the Construction Stage are set out below and detailed further in **Table 11-10**.

Table 11I-10 – Construction Stage – Assessment of Significant Effects

| Resource/Receptor | Sensitivity of Receptor | Effect | Magnitude of Impact | Significance of Effect |
|---|--|---|--|----------------------------------|
| Human Health: Groundworkers above and below ground | Medium | Effect on workers from potential contamination within the underlying soils / groundwater and from ground gas. | Minor (adverse): Construction workers will be wearing PPE to reduce any risk of exposure to contaminants or ground gas. | Slight adverse (not significant) |
| Human Health: Third Party Neighbours | Medium | Effect on third party neighbours from potential contamination within underlying soils / groundwater. | Minor (adverse): Any construction works are unlikely to expose third parties to contaminative substances. | Slight adverse (not significant) |
| Controlled Waters: Groundwater | Medium (bedrock) and Medium (superficial deposits) | Effect on groundwater. | Minor (adverse): The Padeswood Spur Pipeline Proposed Development is unlikely to intercept sources of gross contamination and there is limited potential for groundworks to mobilise and move the limited residual contamination along migratory pathways into the underlying aquifer. | Minor adverse (not significant) |

| Resource/Receptor | Sensitivity of Receptor | Effect | Magnitude of Impact | Significance of Effect |
|--------------------------------------|-------------------------------------|---|--|----------------------------------|
| Controlled Waters: Surface Waters | High (Moderate WFD watercourses) | Effects on surface waters. | Minor (adverse): The Padeswood Spur Pipeline Proposed Development is unlikely to intercept sources of gross contamination and there is limited potential for groundworks to mobilise and move the limited residual contamination along migratory pathways into the adjacent surface watercourses. | Minor adverse (not significant) |
| Environmentally Sensitive Sites | Very high (SSSI, SAC) | Effects on flora and fauna | Minor (adverse): The Padeswood Spur Pipeline Proposed Development is unlikely to intercept sources of gross contamination and there is limited potential for groundworks to mobilise and move the limited residual contamination along migratory pathways into the adjacent SSSI and SAC designated areas. | Minor adverse (not significant) |
| Building Structures | Medium | Effects on the Development Infrastructure | Minor (adverse): Potential contamination within underlying soils and groundwater may adversely affect the Padeswood Spur Pipeline | Slight adverse (not significant) |

| Resource/Receptor | Sensitivity of Receptor | Effect | Magnitude of Impact | Significance of Effect |
|-------------------|----------------------------------|------------------------------------|--|----------------------------------|
| | | | Proposed Development Infrastructure. | |
| Agricultural Soil | Low (3b and 4) to very high (3a) | Effects on soil quality. | Moderate adverse: Potential loss and deterioration of <1ha of BMV (Grade 3b) soil at above ground facilities (AGIs). | Slight adverse (not significant) |
| Mineral Resources | Low | Sterilisation of Mineral Resource. | Moderate (adverse): The MRA has determined that prior extraction is unlikely to be viable. | Minor adverse (not significant) |

ASSESSMENT AGAINST FUTURE BASELINE

- 11.10.3. It is not anticipated that the Land and Soils baseline will change significantly over the lifetime of the Padeswood Spur Pipeline Proposed Development. However, climate change could affect the soils baseline through increased erosion from a higher frequency of rainfall events due to wetter winter weather and greater likelihood of dust generation during drier summers. This could result in changes to agricultural land classification grades over the lifetime of the Padeswood Spur Pipeline Proposed Development.

11.11. MONITORING

- 11.11.1. A groundwater management and monitoring plan and surface water management and monitoring plan will be developed by the Construction Contractor(s) to ensure appropriate monitoring before, during and after the construction works. The details of this monitoring will be agreed between the Construction Contractor(s) and the regulator (Local Contaminated Land Officer, FCC and NRW) prior to the commencement of the Construction Stage.
- 11.11.2. Monitoring of gas ingress, such as mine gas, will be undertaken during trenching and drilling works where necessary. In addition, any trenches / excavations should be gas tested (as it is standard practice) prior to entry as set out in.

11.12. RESIDUAL EFFECTS

- 11.12.1. **Table 11-11** below summarises the residual effects associated with the Padeswood Spur Pipeline Proposed Development during construction (operational and decommissioning were scoped out).

Table 111-21 - Summary of Residual Effects

| Receptor | Pre-mitigation significance of effects | Mitigation measure | Residual effect |
|--|--|---|---------------------------|
| Construction | | | |
| Human Health: Groundworkers above and below ground | Slight adverse (not significant) | Implementation of Risk Assessments and Method Statements (RAMS) Implementation of measures within a CEMP | Neutral (not significant) |
| Human Health: Third Party Neighbours | Slight adverse (not significant) | Implementation of Risk Assessments and Method Statements (RAMS) Implementation of measures within a CEMP | Neutral (not significant) |
| Controlled waters – groundwater | Minor adverse (not significant) | Implementation of measures within a CEMP | Neutral (not significant) |
| Controlled waters – surface water | Minor adverse (not significant) | Implementation of measures within a CEMP | Neutral (not significant) |
| Environmentally Sensitive Sites | Minor adverse (not significant) | Implementation of measures within a CEMP | Neutral (not significant) |
| Built Environment | Slight adverse (not significant) | Implementation of measures within a CEMP | Neutral (not significant) |

| Receptor | Pre-mitigation significance of effects | Mitigation measure | Residual effect |
|-------------------|--|--|---------------------------|
| Agricultural soil | Slight adverse (not significant) | Implementation of measures within a CEMP. | Neutral (not significant) |
| Mineral Resources | Minor adverse (not significant) | Mineral Resource Assessment which has determined the prior extraction is unlikely to be viable but recommended incidental extraction where possible and sustainable material re-use within the Padeswood Spur Pipeline Proposed Development. | Neutral (not significant) |

REFERENCES

- (DMRB), Design Manual for Roads and Bridges, n.d. *LA 104 Environmental Assessment and Monitoring*, s.l.: s.n.
- (NHBC), Environment Agency and National House Building Council, 2008. *Guidance for the safe development of housing on land affected by contamination*, s.l.: s.n.
- BRE 2023 Radon: Guidance on protection measures for new buildings (including supplementary advice for extensions, conversions and refurbishment projects)
- British Geological Survey, n.d. *Onshore Geo Index*, s.l.: s.n.
- British Standard Institute, 2011. *Investigation of Potentially Contaminated Sites - Code of Practice*, s.l.: s.n.
- British Standard Institute, 2020. *The Code of Practice for Site Investigations*, s.l.: s.n.
- CIRIA, 2001. *Contaminated Land Risk Assessment: A Guide to Good Practice*, s.l.: s.n.
- CIRIA, 2001. *Control of Pollution from Construction Sites*, s.l.: s.n.
- Cranfield University, n.d. *Soilscapes*, s.l.: s.n.
- Department for Environment, Food and Rural Affairs (DEFRA), 2012. *Contaminated Land Statutory Guidance*, s.l.: s.n.
- DMRB, n.d. *LA 109 Geology and Soils*, s.l.: s.n.
- DMRB, n.d. *LA 110 Material Assets and Waste*, s.l.: s.n.
- DMRB, n.d. *LA 113 Road Drainage and the Water Environment*, s.l.: s.n.
- Environment Agency, 2017. *Groundwater Protection*, s.l.: s.n.
- Environment Agency, 2020. *Land Contamination Risk Management (LCRM)*, s.l.: s.n.
- European Commission, 2006. *Directive on Pollution Caused by Certain Dangerous Substances Discharged into the Aquatic Environment*, Brussels: European Commission.
- Flintshire County Council, 2015. *Local Development Plan (2015 - 2030)*, s.l.: s.n.
- Flintshire County Council, 2017. *The Council Plan (2017 - 2023)*, s.l.: s.n.
- Flintshire County Council, n.d. *Development Plans and Policies*, s.l.: s.n.
- Health and Safety Executive, n.d. *Guidance Note HS(G) 66 Protection of Workers and General Public during the Development of Contaminated Land*. s.l.:1991.
- Natural England, 2015. *Environmental Planning Guidance: Developers*, s.l.: s.n.
- Natural Resource Wales, n.d. *NRW Mapping*, s.l.: s.n.
- Natural Resources Wales, 2018. *Guide to Development Planning*, s.l.: s.n.

The Mining Remediation Authority (formerly Coal Authority), n.d. *Interactive Map Viewer*, s.l.: s.n.

UK Government, 2002. *Control of Substances Hazardous to Health*, s.l.: s.n.

UK Government, 2006. *Contaminated Land Regulations*, s.l.: s.n.

UK Government, 2012. *Control of Asbestos Regulations*, s.l.: s.n.

UK Government, 2015. *Construction (Design and Management) Regulations CDM*, s.l.: s.n.

UK Government, 2015. *Environmental Damage (Prevention and Remediation) (England)*, s.l.: s.n.

UK Government, 2016. *The Environmental Permitting (England and Wales) Regulations*, s.l.: s.n.

UK Government, 2017. *The Water Environment (Water Framework Directive) (England and Wales) Regulations*, s.l.: s.n.

Welsh Government, 2012. *Contaminated Land Regulations Wales*, s.l.: s.n.

Welsh Government, 2017. *The Deeside Plan 2017*, s.l.: s.n.

Welsh Government, 2021. *Planning Policy Wales*, s.l.: s.n.

Welsh Government, n.d. *Data Map Wales*, s.l.: s.n.