

GROUND INVESTIGATION TECHNICAL REPORT (TRACKED)

HyNet Carbon Dioxide Pipeline DCO

Planning Act 2008

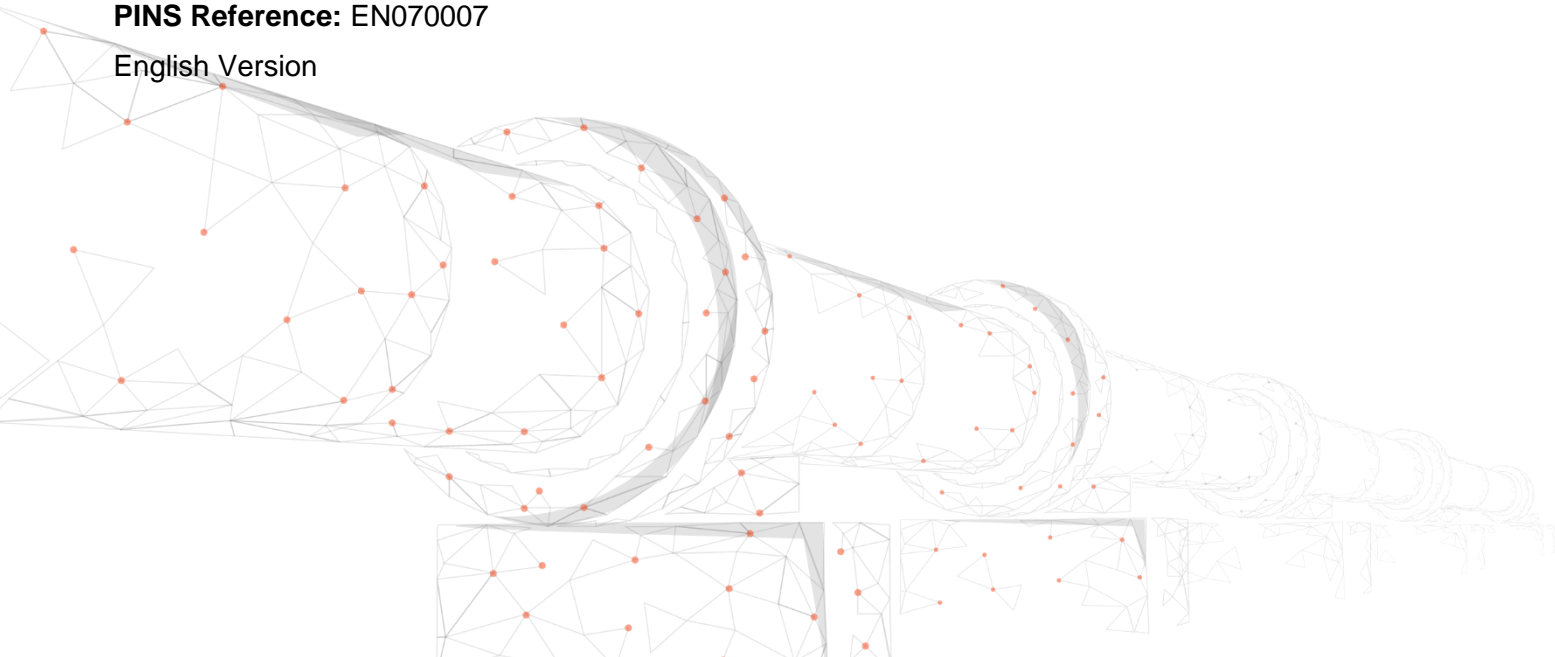
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1. INTRODUCTION

1.1. PURPOSE OF THIS DOCUMENT

- 1.1.1. This document has been prepared on behalf of Liverpool Bay CCS Limited ('the Applicant') and relates to an application ('the Application') for a Development Consent Order (DCO) that has been submitted to the Secretary of State (SoS) for Energy Security & Net Zero (ESNZ) under Section 37 of the Planning Act 2008 ('the PA 2008'). The Application relates to the carbon dioxide (CO₂) pipeline which constitutes the DCO Proposed Development.
- 1.1.2. This technical report has been prepared by the Applicant in response to the submissions made by the Environment Agency **[REP5-033]**, **[REP6-041]** and **[REP6A-021]**. Its purpose is to provide the Environment Agency with further narrative on ground investigations undertaken to date in relation to guidance and best practice, and any proposals to carry out further ground investigation works at detailed design stage for the DCO Proposed Development. The Applicant notes that no new technical information is presented in this report.
- 1.1.3. Given the report is in response to the Environmental Agency, who are a statutory environmental body within England, the content of the report is limited to ground investigations undertaken within England alone.

1.2. THE DCO PROPOSED DEVELOPMENT

- 1.2.1. HyNet (the Project) is an innovative low carbon hydrogen and carbon capture, transport and storage project that will unlock a low carbon economy for the North West of England and North Wales and put the region at the forefront of the UK's drive to Net-Zero. The details of the project can be found in the main DCO documentation.
- 1.2.2. A full description of the DCO Proposed Development is detailed in Chapter 3 of the consolidated Environmental Statement (ES) **[REP74-03629]**, submitted at Deadline 74. ~~On the 12 July 2023, the ExA accepted the Applicant's Change Request 3, subsequently the description of the development has been updated in accordance with Change Request 3 Environmental Technical Note **[CR3-019]**. The Applicant has submitted a further consolidated ES at Deadline 7 which contains the concluding description of the DCO Proposed Development.~~

2. REVIEW OF GROUND INVESTIGATION (GI) WORKS UNDERTAKEN TO DATE IN RELATION TO GUIDANCE AND BEST PRACTICE

2.1. INTRODUCTION

- 2.1.1. The assessment of ground conditions in relation to the DCO Proposed Development has following a phased approach in accordance with standard industry guidance, including BS 5930 (2015) Code of practice for ground investigations (+A1: 2020), and with cognisance of BS 10175 (2011) Investigation of Potentially Contaminated Sites – Code of Practice (+A2:2017) and Environment Agency Land Contamination Risk Management (LCRM) (2020) where the potential for contamination to be present has been identified. A summary of the reported and submitted ground investigation works within England alone is provided in Appendices A and B of this report.
- 2.1.2. The GI design and specification was developed based on the findings of the baseline (desk study) assessments along the DCO Proposed Development. The investigation's scope and aims comprised the following;
- Exploratory holes at approximately 500m centres to provide a good overview of the site conditions along the route;
 - Investigations at major infrastructure and other crossings such as roads, railways, and rivers;
 - Areas of potential concern identified during the desk-based assessments, including current and historical features; and
 - Proposed Above Ground Installation (AGI) and Block Value Station (BVS) locations.
- 2.1.3. Consideration was also required in relation to landowner engagement for access and disruption during works, which limited investigation in some areas. While access constraints were primarily in Wales, sufficient coverage was achieved to provide understanding of the conceptual site model for the majority of the route.
- 2.1.4. In relation to the spacing of GI works to establish baseline conditions, the Applicant notes that the Agricultural Land Classification survey works undertaken in 2022 (see ES Appendix 11.4 [REP7-122]) comprised the examination of 247 soil profiles from augers and soil pits within the DCO Proposed Development. The spacing was 1 location per hectare in permanently sealed areas and 1 location per 2 hectares for areas that would be temporarily disturbed. The observations of the soil profiles and results of testing undertaken enabled the ALC gradings for the agricultural land across the DCO Proposed Development area to be calculated showing that the majority of the DCO Proposed Development area comprises agricultural land classified as moderate to excellent

quality. -This information ~~which~~ further supports the Applicant's assertion/position that such areas are low risk with respect to the presence of contamination.

2.1.4.2.1.5. The Applicant used the desk-based investigations to consider the risks of contamination being present across the route. The dDCO [CR3-008] proposal treats potential contamination in a number of ways depending on the risk identified.

2.1.5.2.1.6. A number of potential point sources or areas whose history creates an increased likelihood of contamination were identified and assessed as 'areas of potential concern' as set out above. These areas are set out in Chapter 11 – Land and Soils of the ES [REP74-0450]. These areas will be subject to further investigation and control through the requirements of the Construction Environmental Management Plan (CEMP) secured under requirement 5 of the dDCO [CR3-008].

2.1.6.2.1.7. The Applicant notes that the Stanlow refinery site, given its historic and current uses, might pose a higher risk for contamination than other sections of the pipeline route. The Applicant has identified the risk on that specific site, which is subject to an environmental permit held by the current operator and not the Applicant, and has set out specific proposals for that in Section 3.5 of this report.

2.1.7.2.1.8. The majority of the proposed Carbon Dioxide pipeline route is located in land in agricultural use with no identified history indicating a likely significant risk of contamination, most of this land is 'greenfield' and has not been previously developed. The Applicant, having identified likely sources of contamination and having undertaken a robust GI campaign to further inform its view, considers that these areas present a very low risk for contamination. Any contamination which may be present is likely to be unrecorded, small in scale and attributable to activities such as burying of waste material by the landowner. These types of contamination sources would not be consistently identified by ground investigations. The Applicant has included within the dDCO [CR3-008] a requirement (9) to address unexpected contamination found during work to address points such as this. Given the assessed risk level of 'low' for such contamination, which is based on both desk-based studies and the GI carried out to date, the Applicant considers that this represents an appropriate and proportionate approach.

2.1.8.2.1.9. The site investigation works included contamination testing of soil samples taken from all exploratory hole locations, even where the potential for contamination was considered low. Locations that targeted infrastructure such as roads, railways and other potential sources of contamination were all tested to understand if there were any risks that could be identified.

2.2. GI SUMMARY TO DATE

- 2.2.1. A summary of the completed works is provided below in Table 5.1 taken from Environmental Statement Appendix 11.6 Ground Investigation Report [REP74-1234 to REP74-1236].

Table 5.1: Scope of Completed Works

Works Performed	Totals and Details
Inspection Pits ¹	57
Trial Pits	61
Cable Percussion	24
Cone Penetration Testing	50
Sonic drilling	16
Rotary Coring	13
Sonic drilling with rotary follow-on	5
Soil Head Space; Photo-ionisation detection tests	211
Soakaway	7
Thermal Testing	Yes
Installation of groundwater monitoring standpipes	2
Installation of ground gas monitoring standpipes	13
Geotechnical laboratory testing	Reported in the laboratory report
Geoenvironmental laboratory testing	Reported in the laboratory report
Post fieldwork monitoring	Reported in the laboratory report
Notes: 1 - Refers to locations which were terminated in the Inspection Pit	

- 2.2.2. The investigation works undertaken are considered by the Applicant to constitute a 'preliminary investigation' as described in BS5930 section 17.2 below:

"The initial phase (preliminary investigation), which might involve widely spaced boreholes, probing or trial pits, should be designed to establish the general geological conditions, the suitability of different methods of investigation and the groundwater conditions."

- 2.2.3. With regard to areas of potential concern in relation to contamination, the investigation works undertaken are considered to constitute an 'Exploratory investigation' as defined in Table 1 of BS10175 below.

<p>Exploratory investigation (optional) (Clauses 7, 8, 9 and 10)</p>	<p>To test the conceptual model(s) of contamination and site characteristics.</p> <p>To obtain further information in relation to potential sources of contamination, likely pathways and features of immediate concern.</p> <p>To obtain further information on the geology, geochemistry, soil, hydrogeology and hydrology of the site.</p> <p>To provide further information to aid the design of the detailed investigation, including health and safety aspects.</p> <p>To provide data for a review of the conceptual model and to update the risk assessment.</p>
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- 2.2.4. The ‘Tier 1: Preliminary risk assessment section’ of LCRM: Stage 1 risk assessment, outlines the expectations for a ‘Preliminary investigation’ which includes an optional exploratory investigation which can be intrusive, non-intrusive or both. For the DCO Proposed Development, as described above, an intrusive exploratory investigation was undertaken which meets the requirements of a preliminary investigation as defined by LCRM, namely;
- 2.2.5. An exploratory investigation is a limited investigation. Its main aims are to:
- get more details about the site and potential contaminant linkages
 - reduce uncertainty
 - test and update the conceptual site model
 - provide information for any planned detailed investigation
- 2.2.6. The GI works undertaken to date are considered by the Applicant to be proportionate and appropriate for a linear infrastructure project of this nature given the level of design maturity being presented and the flexibility being secured in the DCO **[CR3-008]**. These works are considered by the Applicant to be compliant with the LCRM guidance for the limited investigations required at the exploratory stage.
- 2.2.7. Further detailed investigation works will be undertaken ahead of the completion of the detailed design stage. This targeted investigation will include areas that it has not previously been possible to access, areas of concern and, where more information is required for trenchless crossing designs for the detailed design. The targeted detailed design GI would constitute a ‘Detailed Investigation’ as recommended by BS 5930 for structures such as the trenchless crossings or foundations for the AGI/BVS locations. For identified point sources (as referenced under D-LS-020 of the OCEMP **[REP76-008242]**) the detailed design GI would constitute a ‘Detailed Investigation’ as required by BS 10175 and LCRM.
- 2.2.8. Commitment D-LS-021 of the OCEMP **[REP6REP7-008242]** and draft DCO **[CR3-008]** requirements 5 and 9 requires the production and implementation of a remediation strategy (including proposals for verification) following GI and risk

assessment of point sources or if unexpected made ground/contamination is encountered during construction.

- 2.2.9. In Appendix A of this report is a summary of the GI by section with an overview of the results. Appendix B provides a more detailed review of each section with details provided between infrastructure such as a road to a railway. Land plots are also included for reference. An overview of the contamination encountered, if any, is provided. There is information provided on the procedure followed for performing the GI including the review of historic maps and the site walkover. There is also information provided on the GI required for the future.
- 2.2.10. In summary the following four areas (outside of the Stanlow refinery area) where the site walkovers, desk based assessment and investigatory work carried out indicate that further investigation is required are:
- Plot 1-25 near Ince railway which was flooded and unable to be investigated;
 - Plot 4-12 where investigation revealed some made ground (comprising brick and tile materials understood to have been used to infill an old ditch),and
 - Plot 4-20 beside the M56 where borderline levels of groundwater contamination results were obtained.
- 2.2.11. Supplementary investigation is required at Plots 8-10 and 8-12 due to the rerouting of the Carbon Dioxide Pipeline route around the Shropshire Union Canal and not because there is an identified concern. The remainder of the Carbon Dioxide Pipeline route is primarily greenfield land with no prior uses which would raise concern of contamination or any identified results of concern from investigations so far.

3. COMMITMENTS AND MITIGATION

3.1. INTRODUCTION

3.1.1. This section includes the Applicant's contamination commitments and mitigation presented within the Register of Environmental Actions and Commitments (REAC) [REP76-236006], OCEMP [REP76-242008], Outline Soil Management Plan (OSMP) [REP7-2444-240], and Outline Groundwater Management and Monitoring Plan (OGMMP) [REP7-2835-019] submitted into Examination. Paragraph 3.2 to 3.4 concern land within the Order Limits excluding the Stanlow Refinery Site, which is discussed in Paragraph 3.5.

3.2. OUTLINE SOIL MANAGEMENT PLAN [REP4-240]

3.2.1. **Paragraph 7.1.2** - If excavated materials are unsuitable for reuse, such as contaminated soils or hazardous materials (not soils i.e., anthropogenic material) this will be removed off-site and disposed in accordance with an agreed MMP. The Construction Contractor(s) will follow appropriate legislative requirements and best practice. The material would be appropriately classified prior to transport to a suitably licenced landfill /treatment centre.

3.3. OUTLINE GROUNDWATER MANAGEMENT AND MONITORING PLAN [REP5-019]

3.3.1. **Section 3.6** – Potentially contaminating land-use activities (e.g., historic landfills) have been previously recorded within the land required for the DCO Proposed Development, or in close proximity to it (refer to Chapter 11 - Land and Soils [REP74-05045]). These may present a risk to groundwater quality (or groundwater impacts beneath the site that have already been realised). A summary will be provided to add details of known contamination issues within the GMMP. Where a contaminated land risk assessment (CLRA) has been undertaken a succinct summary of the key findings and outcomes will be provided by the Construction Contractor(s) in the GMMP.

3.3.2. **Section 4.3 (Monitoring Programme)** – The Construction Contractor(s) will develop a risk-based monitoring programme that will include field measurements and laboratory analysis. This will be agreed with regulators and details provided in the site-specific GMMP. Typically, groundwater monitoring will be undertaken monthly during the baseline, construction, and post-construction stages. However, the frequency could be increased or reduced at any stage depending on the activities occurring and/or the results of the monitoring e.g. adverse trends appearing in the dataset. Any changes to the agreed programme would need to be justified and reviewed and accepted by the regulator in advance of works. The suite of parameters that should be measured will be based on an understanding

of historical and current land-use; therefore, this may vary between sites. For example, in areas where the potential for contamination to exist occurs, then the results of a contaminated land risk assessment should be used to inform the selection of parameters. The Construction Contractor(s) will develop a site-specific monitoring programme and suite of determinants, based on the outcome of baseline monitoring and agreement with the appropriate regulators.

3.4. OUTLINE CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN [REP6-008]

- 3.4.1. **D-LS-010** – If, during open trench construction and excavations, unexpected contamination is encountered, the open trench will be lined in order to inhibit water percolation and subsequent leachate generation.
- 3.4.2. **D-LS-012** – Acute exposure to potential contamination will be mitigated through normal working practice using appropriate RAMS and use of standard PPE and hygiene best practice. Where contamination is suspected, construction workers will be provided with appropriate Personal Protective Equipment (PPE) or Respiratory Protective Equipment (RPE) (over and above the standard PPE) to prevent direct contact, ingestion or inhalation of potential soil or groundwater contamination.
- 3.4.3. **D-LS-014** – The Construction Contractor will appoint an appropriately qualified person (e.g., Environmental Clerk of Works (EnvCoW)) to maintain a Watching Brief for the duration of any ground excavations. The aim and scope of the Watching Brief will be to identify any unexpected contamination and advise on the correct course of action if discovered. Should unexpected Made Ground or unexpected contaminated ground (i.e. visual or olfactory evidence of contamination) be encountered during the construction phase the ECoW or equivalent qualified person will be notified. Testing of Made Ground for a minimum of asbestos, metals, petroleum hydrocarbons and polycyclic aromatic hydrocarbons to assess suitability for re-use and potential risks to construction works should be undertaken.
- 3.4.4. **D-LS-015** – Ongoing monitoring and maintenance will be undertaken to ensure that any temporary or permanent drainage in the main works area is meeting its 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 provided in the detailed CEMP and Operational and Maintenance Environmental Management Plan (OMEMP). 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 detailed in the detailed CEMP and OMEMP. Should a leak or drainage failure occur during construction the ECoW will be informed, and appropriate actions

taken. Should a leak or drainage failure occur during operation, the Applicant will take appropriate actions.

- 3.4.5. **D-LS-020** – Additional investigation including groundwater monitoring and analysis and ground gas assessment will be undertaken for identified point sources, where not already addressed under a separate legal regime including environmental permitting.
- 3.4.6. **D-LS-021** – If following D-LS-020 above remediation by the Applicant is determined by the appropriate risk assessment process to be required to construct the authorised development, a suitable remediation strategy will be produced following the additional GI of point sources of contamination or if unexpected Made Ground is encountered during the construction phase. The remediation strategy will include a requirement for a verification report which would include details of how the remediation strategy will be verified. The remediation strategy will be approved by the Local Authority (Flintshire County Council / Cheshire West and Chester Council and as appropriate Environment Agency / Natural Resources Wales) prior to being implemented to mitigate unacceptable contaminated land related risks. Ground gas measures are not considered by the Applicant to be necessary. However, following D-LS-024 the requirement for ground gas measures will be reassessed in the areas that are investigated.
- 3.4.7. **D-LS-022** – Areas of known Made Ground are discussed in Ground Investigation Report (Appendix 11.6, Volume III) [**REP74-1234 to REP74-1236**]. These areas of Made Ground have been tested and are below the GAC. They are therefore considered by the Applicant to be suitable for re-use within the DCO Proposed Development subject to confirmation of suitability for use at their destination location and in accordance with the Materials Management Plan (MMP). Material re-use and excavation will be supervised in a watching brief to assess for previously unidentified Made Ground as set out in D-LS-018 of the REAC [**REP76-236006**].

3.5. STANLOW REFINERY SITE

- 3.5.1. The Stanlow refinery site (within which Work No. 5 and part of Work No.7 are located), is subject to Essar's environmental permit, which authorises Essar's operation of the Site. A number of proposed developments are in various stages of planning within the Stanlow site, including a hydrogen production plant, a natural gas AGI, a hydrogen pipeline and AGI as well as the carbon dioxide pipeline and its AGI. The Applicant is not currently in occupation of nor has any control over the Stanlow site. The Applicant considers that any remediation required on this site should be carried out by the site operator in a co-ordinated manner across the wider area of the Stanlow site than is affected by Work Nos. 5

and 7. Not only would this follow the legal approach that the party responsible for contamination should be the party liable to remediate it, but it would allow a single, comprehensive remediation plan to be developed rather than several site specific plans.

- 3.5.2. The Applicant accordingly wishes to retain the flexibility in the DCO to address the Stanlow AGI and Carbon Dioxide Pipeline sites as part of such a wider programme. The Applicant recognises however that where, for timing or other reasons, it wishes to begin works before a wider remediation has been carried out, it will require to investigate and remediate its site. To that end the Applicant has amended DCO requirement 9 to include the areas where further investigation is assessed as being required:

Revised draft DCO Requirement 9

Part A – Stanlow

1) No intrusive works or any works which are likely to cause significant harm to persons or pollution of controlled waters or the environment, other than those necessary to undertake ground investigation for the purposes of identifying any contamination which may be present, can be carried out within plots 3-11, 3-12, 3-13 3-14 and 3-15, unless and until either sub-paragraph (2) or sub-paragraph (3) has been complied with.

(2) The Environment Agency has confirmed in writing that any contamination of the plots listed in sub-paragraph (1) has been remediated to a standard which renders those plots fit for the use consented under this Order.

(3) The undertaker must:

(a) carry out further ground investigations within plots 3-11, 3-12, 3-13 and within the highway verges within plots 3-14 and 3-15 to identify any contamination present. The investigations must include testing for Per- and polyfluoroalkyl substances.

(b) Where no contamination is identified under paragraph (a), the undertaker must submit a report of the investigations undertaken and the results thereof to the relevant planning authority; no works set out in sub-paragraph (1) may be undertaken unless and until the relevant planning authority, following consultation with the Environment Agency, has approved the report submitted.

(c) Where contamination is identified under paragraph (a), a written risk assessment must be completed by the undertaker in order to assess the nature and extent of any contamination. Where having regard to that risk assessment;

(i) the undertaker considers that remediation is required, a detailed remediation scheme must be prepared and submitted by the undertaker for

the approval of the relevant planning authority in consultation with the Environment Agency; or

(ii) the undertaker considers that remediation is not required, the risk assessment must be submitted to the relevant planning authority; and

(iii) remediation is determined by the relevant planning authority, following consultation with the Environment Agency, not to be required, the relevant planning authority must approve the risk assessment and Work Nos. 5 and 7 may commence; or

(iv) remediation is determined by the relevant planning authority, following consultation with the Environment Agency, to be required, a detailed remediation scheme must be prepared and submitted by the undertaker for the approval of the relevant planning authority in consultation with the Environment Agency.

(d) Where a remediation scheme is required under paragraph (c), the remediation must be implemented by the undertaker in accordance with the approved detailed remediation scheme, and a verification report following completion of those remediation works must be submitted to the relevant planning authority before Work Nos 5 and 7 may be commenced.

Part B – Other sites identified as requiring further investigation

(4) No intrusive works or any works which are likely to cause significant harm to persons or pollution of controlled waters or the environment, other than those necessary to undertake ground investigation for the purposes of identifying any contamination which may be present, can be carried out within plots 1-25, 4-12, 4-20, 8-10 and 8-12, unless and until sub-paragraph (5) has been complied with.

(5) The undertaker must:

(a) carry out further ground investigations within plots 1-25 (adjacent to Ince railway), plot 4-12 (in the former gateway), plots 8-10 and 8-12, and groundwater testing in plot 4-20 (to the north of the M56 motorway) to identify any contamination present.

(b) Where no contamination is identified under paragraph (a), the undertaker must submit a report of the investigations undertaken and the results thereof to the relevant planning authority; no works set out in sub-paragraph (1) may be undertaken unless and until the relevant planning authority, following consultation with the Environment Agency, has approved the report submitted.

(c) Where contamination is identified under paragraph (a), a written risk assessment must be completed by the undertaker in order to assess the nature and extent of any contamination. Where having regard to that risk assessment;

(i) the undertaker considers that remediation is required, a detailed remediation scheme must be prepared and submitted by the undertaker for the approval of the relevant planning authority in consultation with the Environment Agency; or

(ii) the undertaker considers that remediation is not required, the risk assessment must be submitted to the relevant planning authority; and

(iii) remediation is determined by the relevant planning authority, following consultation with the Environment Agency, not to be required, the relevant planning authority must approve the risk assessment and Works in the plots listed in sub-paragraph (4) may commence; or

(iv) remediation is determined by the relevant planning authority, following consultation with the Environment Agency, to be required, a detailed remediation scheme must be prepared and submitted by the undertaker for the approval of the relevant planning authority in consultation with the Environment Agency.

(d) Where a remediation scheme is required under sub-paragraph (5), the remediation must be implemented by the undertaker in accordance with the approved detailed remediation scheme, and a verification report following completion of those remediation works must be submitted to the relevant planning authority before any Works in the relevant plots may be commenced.

(6) Approval of the requirements of sub-paragraphs (4) and (5) may be sought in stages provided that plots 1-19; 1-20; 1-21; 1-22; 1-23; 1-24 and 1-25 must all be contained within a single stage, plots 3-18; 4-19; 4-20; 5-02; 5-01; 5-03; 5-04 and 5-05 must all be contained within a single stage and plots 4-11; 4-12; 4-13; 4-14; 4-15; 4-16; 4-17; 4-18; 3-16 must all be contained within a single stage. Nothing in this part of this requirement will prevent the commencement of works in any stage which does not contain any of the plots listed in sub-paragraph (4).

Part C – Unexpected Contamination

(7) In the event that contamination is found at any time when carrying out the authorised development it must be reported in writing to the relevant planning authority as soon as reasonably practicable.

(8) Where contamination has been reported to the relevant planning authority in accordance with sub-paragraph (7), an investigation and risk assessment must be completed by the undertaker in accordance with a contamination scheme to assess the nature and extent of any contamination on the part of the Order limits within which works are being carried out, whether or not that contamination originates on that part of the Order limits; and—

(a) the contents of that contamination scheme are subject to the approval of the relevant planning authority; and

(b) that investigation and risk assessment must be undertaken by the undertaker within timescales agreed with the relevant planning authority and in accordance with the approved contamination scheme, and a written report of the findings must be submitted to the relevant planning authority.

(9) Where remediation is determined by the relevant planning authority to be required having had regard to the results of an investigation and risk assessment carried out under sub-paragraph (8), a detailed remediation scheme must be prepared and submitted by the undertaker for the approval of the relevant planning authority.

(10) Unless otherwise agreed by the relevant planning authority, no intrusive works or other works which would disturb the contaminated land or groundwater can be carried out in the part of the Order limits in which the contamination is identified under sub-paragraph (7) until the investigation and risk assessment in accordance with sub-paragraph (8), and if required, a remediation scheme in accordance with sub-paragraph (9) has been submitted to and approved by the relevant planning authority.

(11) The remediation must be implemented by the undertaker in accordance with the approved detailed remediation scheme under sub-paragraph (9), and a verification report following completion of those remediation works must be submitted to the relevant planning authority.

APPENDIX A

SUMMARY OF GROUND

INVESTIGATION

WORKS BY SECTION

1. SUMMARY OF GROUND INVESTIGATION WORKS

1.1. INTRODUCTION

- 1.1.1. **Table 1-1** below provides a summary of the reported and submitted ground investigation works within England alone. It is intended to inform and signpost the Environment Agency to the submission documents which contain the methodology around GI works and contaminated land.

1.2. INVESTIGATION APPROACH

- 1.2.1. The locations of the exploratory holes along the new proposed pipeline routes were based on a number of factors such as the presence of infrastructure including roads, railways and rivers which require trenchless crossings. Then the location of AGI/BVS were considered and investigation points were placed both for informing the design and for environmental assessment. Additional locations were placed where there were identified potential contamination sources, such as historic sand/clay pits which may have been infilled and, within Wales, in areas potentially associated with historic coal mining. The route was walked to understand if any other items may have required investigation. Once all these positions had been identified, the remaining areas had investigation locations placed at approximately 500m centres. This strategy was implemented to provide a good overview of the site conditions along the route. Geoenvironmental testing was scheduled at every location within 0.20m bgl of ground level and where Made Ground was encountered this was then sampled until natural ground was reached.
- 1.2.2. The choice of borehole or trial pit was based on location and the nature of the infrastructure to be installed. For example, if trenched pipeline installation is proposed, or at locations of potential trenchless crossings or where above ground infrastructure (BVS / AGI) were to be constructed. In the latter cases a borehole was implemented. Investigative works were implemented at locations where the desk studies had indicated a potential for contamination, then in some instances both a borehole and a trial pit nearby were undertaken, depending on the proximity to the potential source.
- 1.2.3. Some of the groundwater monitoring locations were installed to understand the groundwater regime associated with the crossings so as to assess its impact on the proposed construction techniques (such as tidal effects associated with the River Dee). Gas monitoring was implemented as an additional measure at locations where mining or infilling had occurred previously.
- 1.2.4. With regards to groundwater testing originally this was to focus on pH, and sulphate concerns associated with aggressive ground conditions for concrete.

Where visual or olfactory effects of contamination could be identified a full suite of testing of groundwaters was carried out.

Table 1-1: Summary of GI Information by Section

Section	Exploratory Hole Location Plan, ES Appendix 11.6 Ground Investigation Report [REP74-1234 to REP74-1236]	Summary of pre application ground investigation approach adopted (Table 6.1 – 6.3 [REP74-1234])	Summary of ground investigation pre-construction (Table 13.1 [REP74-1234])
Section 1	<p>Section 1.01 to Section 1.07</p> <p>More detailed information in Table 1-2 in Appendix B referencing each section and land parcel in more detail together with cross reference to the land plans for the ground</p>	<p>A site walkover confirmed that this section is predominately agricultural land. It starts in an area that has large drainage ditches on peatland, then crosses the Ince Railway before passing Chester services and travelling westwards towards Stanlow AGI through arable land. At the time of the investigation part of the northern section was flooded with winter rains and the arable area was recently sown crops.</p> <p>GI approach concluded the Made Ground was encountered at only one location which is situated close to the</p>	<p><u>Potential Contaminants</u></p> <p>On Site: Contamination within Made Ground or natural soils associated with current or historic industrial facilities, oil refinery, railway embankments.</p> <p>Off Site: Fuel Station, landfill (vapour, gas).</p> <p><u>Approach to Construction and Need for Further GI</u></p> <p>Geoenvironmental testing indicates that soil contamination at the existing exploratory holes is below the relevant GAC and no exceedances were identified.</p> <p>Insufficient information to assess controlled waters but potential risks identified at Stanlow refinery, further investigation will be undertaken. Specific measures for contamination at Stanlow within the refinery site are</p>

Section	Exploratory Hole Location Plan, ES Appendix 11.6 Ground Investigation Report [REP74-1234 to REP74-1236]	Summary of pre application ground investigation approach adopted (Table 6.1 – 6.3 [REP74-1234])	Summary of ground investigation pre-construction (Table 13.1 [REP74-1234])
	investigation report.	<p>entrance of a field off the B5132. This was identified as anthropogenic due to the presence of granite in the gravel and a slight bitumous odour at 0.85m bgl. Majority of this section comprises of Topsoil overlying the Tidal Flat Deposits, identified above the Glacial Till Deposits. Generally, the various stratum become shallower towards the southwest with the Glacial Till Deposits coming close to surface around Chainage GtS_1000m.</p> <p>Ground investigation to the south of the Ince Railway line was not</p>	<p>proposed as an addition to requirement 9. REAC [REP6-008] entry D-LS-020 and D-LS-021 cover additional ground investigation and is secured through Requirement 5 of the dDCO [CR3-008]. Investigation will also be performed to the south of the Ince Railway line both for contamination purposes (with the presence of the railway nearby) and for design as this area was unable to be investigated due to being flooded.</p> <p>This data will be utilised to produce the risk assessments and method statements for construction workers during the construction phase, to ensure appropriate hazard control measures e.g. control of vapour/gas in confined spaces, use of PPE.</p> <p>Site maintenance workers will undertake risk assessments and use appropriate PPE and mitigation procedures before undertaking maintenance on the</p>

Section	Exploratory Hole Location Plan, ES Appendix 11.6 Ground Investigation Report [REP74-1234 to REP74-1236]	Summary of pre application ground investigation approach adopted (Table 6.1 – 6.3 [REP74-1234])	Summary of ground investigation pre-construction (Table 13.1 [REP74-1234])
		possible due to the area being flooded.	pipeline. Prior to the construction phase the Construction Environmental Management Plan (CEMP) will detail the mitigation measures to prevent neighbouring site users from exposure to potential contamination via direct contact, ingestion or inhalation. Any future structures should be assessed against local potential ground gas sources and appropriate additional investigation / protection measures installed.
Section 2	Section 2.01 to Section 2.12 More detailed information in Table 1-2 in Appendix B referencing each section and land	The route was walked with the majority of the route comprising agricultural land with the majority grassland and occasional arable fields. A section of the route is located at the north end of the Gowy Landfill but in an area that has not been developed for the landfill and is	<p><u>Potential Contaminants</u></p> <p>On Site: Oil Refinery, high soil headspace.</p> <p>Off Site: Historical mineral workings, infilled land (quarry / sand pit), landfill.</p> <p><u>Approach to Construction and Need for Further GI</u></p> <p>Geoenvironmental testing indicates that soil contamination at the existing exploratory holes is below</p>

Section	Exploratory Hole Location Plan, ES Appendix 11.6 Ground Investigation Report [REP74-1234 to REP74-1236]	Summary of pre application ground investigation approach adopted (Table 6.1 – 6.3 [REP74-1234])	Summary of ground investigation pre-construction (Table 13.1 [REP74-1234])
	<p>parcel in more detail together with cross reference to the land plans for the ground investigation report.</p>	<p>a significant distance from the landfill located to the south. Two motorways cross the route and the Shropshire Union Canal. The route crosses several existing pipelines which crisscross the area often leading into or out of Stanlow.</p> <p>Throughout Section 2; near surface stratum predominantly comprises of Topsoil with a maximum thickness of 0.60m bgl.</p> <p>Made Ground is encountered at a few locations of note, the first at the location of the Stanlow AGI (LB_21_01_BH) where Tarmacadam is overlying sand and gravel, with a</p>	<p>the relevant GAC and no exceedances were identified. Potential risk identified to controlled waters from the detection of hydrocarbons in groundwater at the Stanlow refinery requires further investigation, which will be undertaken. Specific measures for contamination at Stanlow within the refinery site are proposed as an addition to dDCO Requirement 9. The historical potentially infilled landfills on the southern side of the M56 did not reveal any items of concern.</p> <p>This data will be utilised to produce the risk assessments and method statements for construction workers during the construction phase, to ensure appropriate hazard control measures e.g. control of vapour/gas in confined spaces, use of PPE.</p> <p>Future site maintenance workers will undertake risk assessments and use appropriate PPE and mitigation</p>

Section	Exploratory Hole Location Plan, ES Appendix 11.6 Ground Investigation Report [REP74-1234 to REP74-1236]	Summary of pre application ground investigation approach adopted (Table 6.1 – 6.3 [REP74-1234])	Summary of ground investigation pre-construction (Table 13.1 [REP74-1234])
		<p>layer of cobbles to 1.20m bgl. groundwater sample indicated a slightly elevated reading within the groundwater at the crossing of the M56. The other is associated with Rockbank BVS (LB_21_21_BH) where 1.50m bgl of mainly clayey gravelly sand was encountered.</p> <p>The natural ground conditions vary considerably within Section 2 as the pipeline moves in a westerly direction it crosses Glacial Till Deposits, Blown Sand Deposits, Peat and Tidal Flat Deposits. The route starts with shallow bedrock near to Stanlow AGI (LB_21_01_BH) which gradually becomes deeper along the route,</p>	<p>procedures before undertaking maintenance on the pipeline.</p> <p>Prior to the construction phase, a Construction Environmental Management Plan (CEMP) will detail the mitigation measures to prevent neighbouring site users from exposure to potential contamination via direct contact, ingestion or inhalation. Any future structures will be assessed against local potential ground gas sources and appropriate additional investigation / protection measures installed.</p>

Section	Exploratory Hole Location Plan, ES Appendix 11.6 Ground Investigation Report [REP74-1234 to REP74-1236]	Summary of pre application ground investigation approach adopted (Table 6.1 – 6.3 [REP74-1234])	Summary of ground investigation pre-construction (Table 13.1 [REP74-1234])
		then blown sands followed by peat and tidal flat deposits associated with the River Gowy, an infilled valley area. It then reverts to glacial tills and shallow bedrock (LB_21_101_TP). The final section becomes cobbly sands near to Liverpool Road.	
Section 3	Section 3.01 to Section 3.07 More detailed information in Table 1-2 in Appendix B referencing each section and land parcel in more	The route walkover was through mainly agricultural land with the start of the route predominately grassland becoming more arable approaching the Welsh Border. An elevated railway crosses the route. Less existing services are crossed in this section compared to the previous section.	<p><u>Potential Contaminants</u></p> <p>On Site: Former rail land.</p> <p>Off Site: Historical mineral workings and infilled land (Sand Pit, gas)</p> <p><u>Approach to Construction and Need for Further GI</u></p>

Section	Exploratory Hole Location Plan, ES Appendix 11.6 Ground Investigation Report [REP74-1234 to REP74-1236]	Summary of pre application ground investigation approach adopted (Table 6.1 – 6.3 [REP74-1234])	Summary of ground investigation pre-construction (Table 13.1 [REP74-1234])
	<p>detail together with cross reference to the land plans for the ground investigation report.</p>	<p>Made Ground was only encountered at one location in Section 3 (LB_21_39_TP) to a maximum thickness of 0.30mbgl. Topsoil is encountered at all other locations within Section 3 comprising of clay with varying proportions of sand and gravel.</p> <p>The underlying superficial deposits in this section comprise predominantly of Glacial Till Deposits before dropping down, at the end of the section onto the Tidal Flat Deposits associated with the River Dee. Generally, the till was identified as a clay with lenses of sand and gravel throughout. The Tidal Flat Deposits,</p>	<p>Geoenvironmental testing indicates that soil contamination at the existing exploratory holes is below the relevant GAC and no exceedances were identified.</p> <p>Low potential risk to controlled waters due to an absence of potential sources.</p> <p>This data will be utilised to produce the risk assessments and method statements for construction workers during the construction phase, to ensure appropriate hazard control measures e.g. control of vapour/gas in confined spaces, use of PPE.</p> <p>Future site maintenance workers will undertake risk assessments and use appropriate PPE and mitigation procedures before undertaking maintenance on the pipeline. Prior to the construction phase a Construction Environmental Management Plan (CEMP) will detail the mitigation measures to prevent neighbouring site users</p>

Section	Exploratory Hole Location Plan, ES Appendix 11.6 Ground Investigation Report [REP74-1234 to REP74-1236]	Summary of pre application ground investigation approach adopted (Table 6.1 – 6.3 [REP74-1234])	Summary of ground investigation pre-construction (Table 13.1 [REP74-1234])
		<p>within Section 3 are predominantly sands with varying proportions of clay and gravel.</p> <p>No bedrock was encountered in this section.</p>	<p>from exposure to potential contamination via direct contact, ingestion or inhalation.</p> <p>An investigation will be required on the western side of the Shropshire Union Canal as there is a potential infilled area revealed from historic maps. The pipeline route passes close to this area which was not investigated in the past as there was a route change for the canal crossing.</p>

APPENDIX B

SUMMARY OF GROUND

INVESTIGATION

WORKS BY LAND PLOT

Table 1-2: Summary of GI Information by Land Plots

				Location	Landplots	Environment - From site walkover assessment	Site Investigation	GI Report ref	Geology	Contamination	History	Comments	Geotechnical GI Required	Environmental GI Required
1	EN70007-D.2.2-LP-Sheet 1	G	26/06/2023	From Ince AGI to Ince Railway Line	1-09; 1-10; 1-11; 1-12; 1-13; 1-15; 1-16; 1-17; 1-18; 1-05; 1-08	Grass Fields, with frequent drainage ditches	3 boreholes performed; 5 CPT's and corresponding inspection pits	1025H0BRGV09408 - Appendix B - Section 1.01	Peat and very soft clay to approx 12m before then firm clay	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.	Fields until 1968, then some development with the construction of CF Fertilisers to north and spur railway line		Land parcel 1-09; Additional GI will be performed for foundation design of AGI together with railway crossing	
2	EN70007-D.2.2-LP-Sheet 1	G	26/06/2023	Ince Railway Line	1-19; 1-20; 1-21; 1-22; 1-23	Railway	None performed as active railway line		Expected: Unknown made ground before then expected to be similar to surrounding land	Unknown	Railway line built prior to 1897; spur railway line shown in 1968	Area will be trenchlessly crossed	Land parcel 1-25; Additional GI required on the southern side for the railway crossing as was previously flooded for detailed design	Land Parcel 1-25: Contamination testing required as none performed here so far due to area being flooded previously. Boreholes required to understand the depth to competent ground. No contamination expected.
3	EN70007-D.2.2-LP-Sheet 2	G	26/06/2023	From Ince Railway Line to A5117	1-24; 1-25; 2-01; 2-02; 2-03; 2-04; 2-05; 2-06; 2-07	Grass fields to east with several drainage ditches present, at brook travelling westwards narrow grass field before becoming arable fields to A5117.	Borehole, CPT and trial	1025H0BRGV09408 - Appendix B - Section 1.03	On eastern side expected peat and very soft clay overlying firm clay. On western side glacial till	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.	Fields shown throughout	On the eastern side was flooded at the time of the ground investigation		
4	EN70007-D.2.2-LP-Sheet 2	G	26/06/2023	A5117 and road verges	2-08; 2-09; 2-10; 2-11	A5117 road. Chester Services to east and new substation in corner of the Chester Services land	None performed as active road		Expected: Made ground over glacial till	Unknown	Fields with small road until upgraded prior to 1938. Service station shown from 1983	Area will be trenchlessly crossed		
5	EN70007-D.2.2-LP-Sheet 2 & 4	G	26/06/2023	A5117 to Cryers Lane	2-12; 2-13; 2-14; 4-01; 4-02; 4-05; 4-06; 3-02; 3-03;	Predominately arable fields with some grass areas	1 CPT and inspection pit; 1 trial pit	1025H0BRGV09408 - Appendix B - Section 1.04 & 1.05	Glacial Till	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.	Fields shown, A5117 shown in 1938; overhead electric appear in 1954; Motorway in 1968	Area is trenched, additional GI on western side of Cryers Lane		
6	EN70007-D.2.2-LP-Sheet 4	G	27/06/2023	Cryers Lane	4-03; 4-04; 4-09; 4-10	Road	None performed as active road		Expected: Made ground over glacial till	Unknown	Cryers lane shown throughout			
7	EN70007-D.2.2-LP-Sheet 4	G	27/06/2023	Cryers Lane to A5117	4-11; 4-12; 4-13; 4-14; 4-15; 4-16; 4-17; 4-18; 3-16	Predominately arable fields; in the northern section a non-farmed area is present bordering the road where next to the settlement. At the time of the walkover some small pond like structures had been excavated near to the road, their purpose was unknown	1 borehole; 1 CPT and inspection pit	1025H0BRGV09408 - Appendix B - Section 1.06 & 1.07	Glacial Till. Some made ground at surface associated with hardcore material for entrance into field	Made ground of hardcore material on entrance into field in parcel 4-12. Remainder of the section no contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.	Fields shown, A5117 shown in 1938; overhead electric appear in 1954; Motorway in 1968	Borehole just to the west of land plan 3-18 which should shallow bedrock	Land parcel 4-12: The route through this area was modified after the GI. There will need to be GI by the road for confirmation of crossing this section.	Original GI indicated brick/tile in gateway area. Route has moved to the south. Material associated with gateway entrance in Plot 4-12.
8	EN70007-D.2.2-LP-Sheet 4	G	27/06/2023	A5117 and road verges	3-13; 3-14; 3-15	Road	None performed as active road		Expected: Made ground over glacial till/sand	Unknown	A5117 shown in 1938	Area will be trenchlessly crossed		
9	EN70007-D.2.2-LP-Sheet 3	G	27/06/2023	Stanlow Oil Refinery	3-11; 3-12; 3-04; 3-05; 3-06; 3-07; 3-08; 3-09; 3-10	Hardstanding; buildings; services; part of the operational site area	1 borehole on western edge of 3-12	1025H0BRGV09408 - Appendix B - Section 1.07	Made Ground over sand and gravel. Bedrock from 2m depth approximately	Slightly elevated levels. Additional GI will be required to confirm any contamination prior to the AGI development.	Railway line shown in 1897; Stanlow developed prior to 1968; AGI area shown as fields until 1983 map		Additional GI will be required for AGI location	Further investigation works at Stanlow to be undertaken and will be agreed
10	EN70007-D.2.2-LP-Sheet 4	G	27/06/2023	A5117 to M56	3-18; 4-19; 4-20; 5-02; 5-01; 5-03; 5-04; 5-05	Grass fields with electric fences partitioning several of them fields. Towards the south some small wooded areas present	2 boreholes and 2 trial pits	1025H0BRGV09408 - Appendix B - Section 1.08; 2.01 & 2.02	Glacial till over sandstone bedrock	Slightly elevated levels recorded in the groundwater by the M56 on the northern side. No contamination observed in the rest of the section. The remainder of the section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.	Area shown as fields. Overhead power lines shown in 1968	Area will be trenched	Land parcel 4-20; Additional GI will be required for the crossing of the A5117 and for the M56 for detailed design	Land Parcel 4-20: Additional groundwater testing to be performed to north of M56 to confirm if the previously slightly elevated levels are reconfirmed. This will require additional boreholes to monitor the groundwater.
11	EN70007-D.2.2-LP-Sheet 4	G	27/06/2023	M56	5-06	Motorway	None performed as active road		Expected made ground over bedrock	Unknown	Motorway shown in 1968	Area will be trenchlessly crossed		
12	EN70007-D.2.2-LP-Sheet 5	G	27/06/2023	M56 to Thornton Green Lane	5-07; 5-08	Grass field with horses	1 borehole	1025H0BRGV09408 - Appendix B - Section 2.02	Glacial till over sandstone bedrock	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.	Always shown as fields	Area will be trenched	Land parcel 5-07; Additional GI required for motorway crossing	
13	EN70007-D.2.2-LP-Sheet 5	G	27/06/2023	Thornton Green Lane	5-09	Road	None performed as active road		Expected made ground over sand and then bedrock	Unknown	Always shown as a road	Area will be trenched		

14	EN70007-D.2.2-LP-Sheet 5	G	27/06/2023	Thornton Green Lane to River Gowy	5-10; 5-11; 5-12; 5-13; 5-14; 5-15; 5-16; 5-17; 5-18; 5-19; 5-20; 5-21; 5-22; 5-23; 5-24; 5-25; 5-26	Grass fields, then arable fields. There is a small area associated with The Spinney house which at the time of the walkover appeared to be uninhabited. Small woodland areas border the motorway. Then non-farmed area between the Gowy Landfill and the M56 before the River Gowy. The distance to the actual Gowy Landfill is approximately 500m to the south of the route	5 CPT's and inspection pits; 3 boreholes and two trial pits	1025H0BRGV09408 - Appendix B - Section 2.02; 2.03; 2.04	Glacial till over bedrock; around the River Gowy area alluvial deposits including peat, sand and gravels	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.	Two potential historic landfills recorded to the west of Thornton Green Lane which were investigated. Not shown in historic maps but indicated in landfill records	Area will be trenched		
15	EN70007-D.2.2-LP-Sheet 6	G	27/06/2023	River Gowy	6-01; 6-03; 6-04; 6-10; 6-11;	River Gowy	None performed as these land parcels are the river		Expected: River deposits and peat	Unknown	Always shown with drainage ditches in the area. Motorway indicated in 1983	Area will be trenchlessly crossed		
16	EN70007-D.2.2-LP-Sheet 6	G	27/06/2023	River Gowy to Picton Lane	6-06; 6-07; 6-08; 6-09; 6-13; 6-14; 6-15; 6-16; 6-17; 6-18; 6-19; 6-20; 6-22; 6-23; 6-24- 6-25	Grass fields near the River Gowy with drainage ditches and then arable fields over the / arable fields	2 boreholes; 1 CPT and inspection pit	1025H0BRGV09408 - Appendix B - Section 2.04 & 2.05	Alluvial deposits to the brook to the west, then glacial till	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.	River Gowy course has been altered over time with it being straightened before 1954	Area will be trenched. High pressure gas main and water line to be crossed	Land parcel 6-22; Investigation required around the utilities for safe crossing	
17	EN70007-D.2.2-LP-Sheet 6	G	27/06/2023	Picton Lane	6-21; 6-26	Road	None performed as active road		Expected: Made ground over glacial till	Unknown	Always shown as a road	Area will be trenched		
18	EN70007-D.2.2-LP-Sheet 6 & 7	G	27/06/2023	Picton Lane to M53	6-27; 6-28; 6-29; 6-30; 6-31; 7-01; 7-02; 7-02a; 7-02b; 7-03; 7-03a; 7-04	Arable and grass fields	2 boreholes and 2 trial pits	1025H0BRGV09408 - Appendix B - Section 2.06 & 2.07	Glacial Till	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.	No significant change until motorway shown in 1983	Area will be trenched. Borehole was not next to the M53 due to a high pressure gas main which at the time there was no permission to cross so location was as close as could be achieved	Land parcel 7-04; Additional GI next to the M53 for the trenchless crossing	
19	EN70007-D.2.2-LP-Sheet 7	G	27/06/2023	M53	7-05	Motorway	None performed as active road		Expected: Made ground over glacial till	Unknown	Motorway built prior to 1983	Area will be trenchlessly crossed		
20	EN70007-D.2.2-LP-Sheet 7	G	27/06/2023	M53 to Weaver Lane	7-06; 7-07	Grass fields	1 CPT and inspection pit	1025H0BRGV09408 - Appendix B - Section 2.08	Glacial Till	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.	No significant change until motorway shown in 1983	Area will be trenched	Land parcel 7-07; Additional GI next to the M53 for the trenchless crossing	
21	EN70007-D.2.2-LP-Sheet 7	G	27/06/2023	Weaver Lane	7-08	Road	None performed as active road		Expected: Made ground over glacial till	Unknown	Always shown as a road	Area will be trenched		
22	EN70007-D.2.2-LP-Sheet 7 & 8	G	27/06/2023	Weaver Lane to Shropshire Union Canal	7-09; 7-10; 8-01; 8-02	Arable fields and biodiversity section near canal under management of Chester Zoo	2 boreholes	1025H0BRGV09408 - Appendix B - Section 2.09 & 2.10	Glacial Till	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.	Always fields and canal always shown. Woodside farm shown in 1938.	Area will be trenched	Land parcel 8-01; Additional GI likely required for Canal crossing	
23	EN70007-D.2.2-LP-Sheet 8	G	27/06/2023	Shropshire Union Canal	8-03	Canal	None performed as canal		Expected: From BGS it is recorded as an infilled channel of gravels and sands to approximately 8m depth	Unknown	Canal always shown	Area will be trenchlessly crossed		
24	EN70007-D.2.2-LP-Sheet 8	G	27/06/2023	Shropshire Union Canal to Caughall Road	8-05; 8-06	Horse fields	None		Expected: From BGS it is recorded as an infilled channel of gravels and sands to approximately 8m depth by Canal and then to the north glacial till overlying sandstone bedrock	Unknown but expected to be low contamination risk from current information.	Always a field	Area will be trenched	Land parcel 8-05; GI required for canal crossing as no information at present	Land parcel 8-05; Contamination testing will be performed as standard as none yet implemented. No contamination anticipated
25	EN70007-D.2.2-LP-Sheet 8	G	27/06/2023	Caughall Road	8-07; 8-08	Road	None performed as active road		Expected: Made ground over glacial till and bedrock	Unknown	Always a road	Area will be trenched		
26	EN70007-D.2.2-LP-Sheet 8	G	27/06/2023	Field	8-09; 8-10	Arable field	1 borehole; 1 trial pit; 1 CPT and inspection pit	1025H0BRGV09408 - Appendix B - Section 2.10	Glacial till over sandstone bedrock	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered. An old quarry that has not previously been investigated will be assessed as indicated in the Environmental GI column.	Always shown as fields with an old quarry shown on maps from 1898; later shown as a pond until 2001; then no longer shown. Over time fields amalgamated	Area will be trenched	Land parcel 8-10; Area of old quarry required to be investigated if pipeline routing crosses area as identified from historic maps. Not previously investigated due to re-routing design. Ground investigation will be 1 or 2 trial pits and, if required 1 borehole.	
27	EN70007-D.2.2-LP-Sheet 8	G	27/06/2023	Chorlton Lane	8-11	Road	None performed as active road		Expected: Made ground over glacial till and bedrock	Unknown	Always shown as road			

28	EN70007-D.2.2-LP-Sheet 8 & 9	G	27/06/2023	Chorlton Lane to Liverpool Road	8-12; 8-13; 8-14; 8-15; 8-16; 9.01; 9.02; 9.03; 9.04; 9.05; 9.06;	Arable fields to the east and grass fields / horse paddocks in the west	2 boreholes; 3 trial pits; 2 CPT and inspection pits	1025H0BRGV09408 - Appendix B - Section 2.10 & 2.11 & 2.12	Glacial Till over bedrock in the east; in the west gravely cobbly sands over bedrock	Some inert fill of brick and tile observed, likely infilled ditch from field amalgamation at the BVS location. For the remainder of the section it is considered low risk and therefore will be managed under the OCEMP if unexpected contamination is encountered.	Always shown as fields, over time some fields amalgamated; overhead electrics shown in 1967	Area will be trenched with BVS located as well	Land parcel 8-12; Additional GI will be performed for BVS also additional GI for the Liverpool road trenchless crossing	Land parcel 8-12; Additional contamination assessment to confirm what other material may be present in the area of the BVS, however so far inert material observed so more excavation to confirm if only inert material present. Trial pits will be performed to ascertain the extent of the infill material.
29	EN70007-D.2.2-LP-Sheet 9	G	27/06/2023	Liverpool Road	9.07; 9.08. 9.09; 9.10; 9.11; 9.12; 9.13	Road	None performed as active road		Expected: Reviewing BGS a gravely cobbly sand over bedrock	Unknown	Liverpool road always shown; widened prior to 1983	Area will be trenchlessly crossed		
30	EN70007-D.2.2-LP-Sheet 9	G	27/06/2023	Liverpool Road to Mollington Railway	9-14; 9.14a; 9-15; 9-16; 9-16a; 9.16b; 9-17; 9.18; 9.18a; 9.18b; 9-19; 9-19a; 9-20	Grass fields	1 borehole and 1 trial pit. Land ownership was not fully resolved at the time of the GI	1025H0BRGV09408 - Appendix B - Section 3.01	Gravelly cobbly sand in the east; glacial till in the west	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.	To the north of the site were previous WW2 installations but they did not extend this far south from records. Shown as fields, Friars Park developed pre 1968	Area will be trenched and trenchless crossings as high pressure gas mains; raw water mains and veteran trees	Land parcel 9-14; Additional GI will be required for the Liverpool Road crossing together with the high pressure gas main and water mains plus for the railway crossing design. The works required will be boreholes.	
31	EN70007-D.2.2-LP-Sheet 9	G	27/06/2023	Mollington Railway	9-21	Railway	None performed as active railway line		Expected: Made ground over glacial till	Unknown	Railway always shown	Area will be trenchlessly crossed		
32	EN70007-D.2.2-LP-Sheet 9	G	27/06/2023	Mollington Railway to Station Road	9-22	Grass fields	1 borehole	1025H0BRGV09408 - Appendix B - Section 3.02	Glacial till	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.	Lea Farm always shown which has grown over the years. Otherwise fields always shown	Area will be trenched	Land parcel 9-22; Additional GI will be required for the railway crossing and for Station Road crossing. The GI will be a borehole.	
33	EN70007-D.2.2-LP-Sheet 10	G	27/06/2023	Station Road	10-01	Road	None as active road		Expected: Made ground over glacial till	Unknown	Always shown	Area will be trenchlessly crossed		
34	EN70007-D.2.2-LP-Sheet 10	G	27/06/2023	Station Road to Grove Road	10-02	Grass fields	2 borehole	1025H0BRGV09408 - Appendix B - Section 3.03	Glacial till	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.	Area used in WW2 to the east by the railway. Landowner indicated metal springs and other items found in fields to the east but this field was not an issue. Nothing observed during boreholes	Area will be trenched		
35	EN70007-D.2.2-LP-Sheet 10	G	27/06/2023	Station Road	10-04; 10-04a	Road	None as active road		Expected: Made ground over glacial till	Unknown	Always shown			
36	EN70007-D.2.2-LP-Sheet 10	G	27/06/2023	Grove Road to Townfield Lane	10-06; 10-07; 10-08; 10-09; 10-10; 10-11	Grass fields and arable fields	1 borehole; 1 trial pit; 1 CPT and inspection pit	1025H0BRGV09408 - Appendix B - Section 3.03 and 3.04	Glacial till	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.		Area will be trenched		
37	EN70007-D.2.2-LP-Sheet 10	G	27/06/2023	Townfield Road	10-12	Road	None as active road		Expected: Made ground over glacial till	Unknown	Road always shown	Area will be trenched		
38	EN70007-D.2.2-LP-Sheet 10	G	27/06/2023	Townfield Road to Overwood Lane	10-13	Grass and arable fields	1 boreholes; 1 CPT and inspection pit	1025H0BRGV09408 - Appendix B - Section 3.03 and 3.04	Glacial till	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.		Area will be trenched		
39	EN70007-D.2.2-LP-Sheet 10	G	27/06/2023	Overwood Lane	10-15; 10-16; 10-17; 11-01	Road	None as active road		Expected: Made ground over glacial till	Unknown	Always shown	Area will be trenched		
40	EN70007-D.2.2-LP-Sheet 11	G	27/06/2023	Overwood Lane to Parkgate Road	10-18; 10-19; 11-02; 11-03; 11-04; 11-05	Grass and arable fields	1 borehole; 2 trial pits; 3 CPT and inspection pits	1025H0BRGV09408 - Appendix B - Section 3.05	Glacial till	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.		Area will be trenched	Additional GI will be required for the BVS location and for Parkgate Road crossing. Borehole and trial pits as determined by the construction contractor.	
41	EN70007-D.2.2-LP-Sheet 11	G	27/06/2023	Parkgate Road	11-06	Road	None as active road		Expected: Made ground over glacial till	Unknown		Area will be trenchlessly crossed		
42	EN70007-D.2.2-LP-Sheet 11	G	27/06/2023	Parkgate Road to Kingswood Lane	11-07; 11-08; 11-09; 11-10; 11-11; 11-12; 11-13	Arable and grass fields. In places some deep ditches located.	1 trial pit	1025H0BRGV09408 - Appendix B - Section 3.06	Glacial till	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.		Area will be trenched	Additional GI will be required for trenchless crossing of Parkgate Road. Landowner identified late on in the process when GI complete. Borehole required for the crossings.	
43	EN70007-D.2.2-LP-Sheet 11	G	27/06/2023	Kingswood Lane	11-14	Rough track with ditches either side. The road comes from the west but peters out and becomes a track	None as active track		Expected: Made ground over glacial till	Unknown		Area will be trenched		

44	EN70007-D.2.2-LP-Sheet 11 & 12	G	27/06/2023	Kingswood Lane to Hermitage Road	11-15; 11-16; 11-17; 11-18; 11-19; 12-01; 12-02; 12-03; 12-04	Predominately grass fields, arable fields towards Hermitage Road	1 boreholes; 1 CPT and inspection pit	1025H0BRGV09408 - Appendix B - Section 3.07	Glacial till	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.		Area will be trenched	
45	EN70007-D.2.2-LP-Sheet 12	G	27/06/2023	Hermitage Road	12-05	Road	None as active road		Expected: Made ground over glacial till	Unknown		Area will be trenchlessly crossed	
46	EN70007-D.2.2-LP-Sheet 12	G	27/06/2023	Hermitage Road to Saughall Drain (England & Wales Border)	12-06; 2-07; 12-08; 12-09; 12-10	Arable fields and grass paddocks. There is a short steep decline down to the drain at the England/Wales border which is rough ground.	1 trial pit	1025H0BRGV09408 - Appendix B - Section 3.08	Glacial till	No contamination observed. This section is considered a low risk of contamination and therefore will be managed under the OCEMP if unexpected contamination is encountered.		Area will be trenched	Additional GI will be required for trenchless crossing of Hermitage Road. Borehole and trial pits required.