

A585 Windy Harbour to Skippool Improvement Scheme

TR010035

6.13 Environmental Statement Chapter 13: Geology and Contaminated Land

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed
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Infrastructure Planning

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The Infrastructure Planning
(Applications: Prescribed Forms and
Procedure) Regulations 2009

**A585 Windy Harbour to Skippool
Improvement Scheme**
Development Consent Order 201[]

**ENVIRONMENTAL STATEMENT CHAPTER 13: GEOLOGY AND
CONTAMINATED LAND**

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13 GEOLOGY AND CONTAMINATED LAND

13.1 Introduction

13.1.1 This Chapter presents the assessment of geology and contaminated land impacts associated with the Scheme. This Chapter presents the regulatory framework, assessment methodology, study area, existing and future baseline, mitigation measures, residual effects, monitoring and a summary.

13.1.2 The reader should note that soils with regards to agricultural soils are assessed within Chapter 10: People and Communities (document reference TR010035/APP/6.10). Information and assessment regarding soils in relation to geology and contaminated land are included in this chapter.

13.1.3 This Chapter should be read in conjunction with Figure 13.1 – Geology and Contaminated Land Features and 13.2 – Mineral Safeguarding Areas, Appendix 13.1 – Consultation (document reference TR010035/APP/6.13.1) and Appendix 13.2 – UXO Desk Study (document reference TR010035/APP/6.13.2).

13.2 Regulatory Framework / National Networks National Policy Statement (NN NPS) Requirements

13.2.1 This assessment has been undertaken considering current legislation, together with national, regional and local plans and policies. A list is provided within Table 13-1 and further detail can be found in the Planning Statement and National Policy Statement Accordance (document reference TR010035/APP/7.1).

Table 13-1: Geology and Contaminated Land – Regulatory Framework and NN NPS Requirements

Policy / Legislation
Environmental Protection Act 1990 including Part 2A
National Planning Policy Framework (NPPF) (2018)
NN NPS (2014)
Adopted Fylde Borough Local Plan (2005)
Fylde Local Plan to 2032 (emerging document – due to be adopted 2018)
Adopted Wyre Local Plan / Fleetwood-Thornton Area Action Plan 2009
Wyre Local Plan to 2031 (emerging document – due to be adopted 2018)

13.3 Methodology

Items Scoped in and out of this Assessment

13.3.1 The Scoping Report and Preliminary Environmental Information Report (PEIR) established there are no sensitive geological features across the Scheme, this Chapter therefore considers the impacts from contaminated land during the construction phase of the Scheme; Geology has been scoped out. This was agreed in the Environmental Impact Assessment (EIA) Scoping Opinion (Arcadis, 2017). As the effect of contaminated land depends on the underlying geology, geological details are included in the baseline given below to provide context to the environmental setting.

- 13.3.2 Operational impacts have been scoped out as agreed in the scoping opinion. Once constructed the road itself would act as a barrier to underlying ground conditions and road users (considered to be low sensitivity / value) would not come into contact with it on a day to day basis.
- 13.3.3 Please note that impact to hydrogeology and hydrology receptors during construction and operational phases are assessed as part of Chapter 12: Road Drainage and the Water Environment (document reference TR010035/APP/6.13). However, this Chapter considers these receptors in relation to existing 'historic' contamination, i.e. pre-construction assessment of whether unacceptable risks are already present. Relevant information is included in the baseline section.

Baseline Information

- 13.3.4 Baseline information has been gathered by:
- Identifying an appropriate study area
 - Taking into consideration issues raised through consultation with interested parties (including during scoping)
 - Undertaking a desk study (including requesting information from third parties) within an agreed study area
 - Undertaking site surveys / investigation within agreed study area(s)
- 13.3.5 Guidance outlined in the following documents has been considered to inform the baseline information gathering and referenced where applicable as part of the impact assessment process:
- Design Manual for Roads and Bridges (DMRB) Volume 11 (Highways Agency) (2009)
 - Model Procedures for the Management of Land Contamination (CLR11) (Environment Agency (EA), 2004)
 - Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (Defra, 2012)
 - Guiding Principles for Land Contamination (EA, 2010)
 - The Definition of Waste: Development Industry Code of Practice (CL:AIRE, 2011)
 - Code of Practice for the Sustainable Management of Soils on Construction Sites (Defra, 2009)
 - Assessing risks posed by hazardous ground gases to buildings (C665) (CIRIA, 2007)
 - Contaminated land risk assessment. A guide to good practice (C552) (CIRIA, 2001)

Post-Scoping and Preliminary Environmental Information Consultation

- 13.3.6 Further consultation has been undertaken since the receipt of the responses to the EIA Scoping Report and the Preliminary Environmental Information Report (PEIR) to agree a range of issues relevant to this Chapter, Table 3-1 of Chapter 3: Consultation (document reference TR010035/APP/6.3) provides full details.

Identifying Mitigation and Enhancement Measures and Assessing Residual Effects

- 13.3.7 The approach outlined below has been followed to identify mitigation measures, and assess likely residual effects:
- Consideration of best practice / guidance outlined above
 - Professional judgement
 - Consideration of the baseline and future baseline information obtained, Scheme details and issues raised through consultation with interested parties as a result of responses to the EIA Scoping Report and statutory consultation
 - Identification of environmental mitigation
 - Prediction of residual effects based on baseline information, Scheme details and mitigation measures
- 13.3.8 There are no specific significance criteria for the assessment of effects on geology and contaminated land therefore, professional judgement is required. However, there is recognised significance criteria for assessing effects on geological Sites of Special Scientific Interest (SSSIs), however, the Scheme does not affect any of these sites.
- 13.3.9 In order to determine the significance of effects resulting from contaminated land, guidance has been sought from CLR11, CIRIA C552 and professional judgement.
- 13.3.10 The value of the identified receptors / resources has been assessed against the criteria in Table 13-2. This is based on the guidance provided in DMRB Volume 11 (Highways Agency, 2009).

Table 13-2: Geology and Contaminated Land – Criteria for Determining Value (sensitivity)

Sensitivity/ Value	Description of resource (receptor)
Very High	<p>Hydrogeology - Principal groundwater aquifers (Source Protection Zone 1)</p> <p>Hydrology – Designated Salmonid/Cyprinid Fishery, Water Framework Directive (WFD) Class 'High, designated sites such as Special Area of Conservation (SAC), Special Protection Area (SPA), Site of Special Scientific Interest (SSSI), Source Protection Zone (SPZ), Ramsar site, salmonid water</p> <p>Human Health* – Current / Future users of residential properties with private gardens</p>
High	<p>Hydrogeology - Principal groundwater aquifers (Source Protection Zone 2)</p> <p>Hydrology – WFD Class 'Good', Major Cyprinid Fishery, Species protected under EC or UK habitat legislation.</p> <p>Human Health* – Current / Future users of allotments / public open space and nearby residents / Construction Workers</p>

Sensitivity/ Value	Description of resource (receptor)
Medium	Hydrogeology - Secondary groundwater aquifers (Source Protection Zone 3) Hydrology – WFD Class ‘Moderate’. Human Health* – Current / Future users of residential properties without private gardens
Low	Hydrogeology - Secondary groundwater aquifers Hydrology – WFD Class ‘Poor’. Human Health* – Current / Future users of the completed highway and associated landscaping
Negligible	Hydrogeology - Non-aquifers Hydrology – WFD Class ‘Poor’. Human Health* – Current / Future users of commercial / industrial properties

*In consideration of human health, the duration of exposure to contamination and number of pathways of exposure to contamination increases from commercial / industrial (minimum) to residential with private garden (maximum) land uses. Therefore, future users of industrial sites are considered to be of negligible importance as they would have minimal contact with underlying soils, whilst residential end users are likely to be in contact with underlying soils on a more regular basis and are therefore attributed very high sensitivity / value.

13.3.11 The magnitude of impacts has been described using the criteria outlined in Table 13-3.

Table 13-3: Geology and Contaminated Land – Criteria for determining the magnitude (scale) of impact on the Geology and Contaminated Land

Magnitude of impact	Definition
Major adverse	Human Health - Significant harm to a designated receptor (e.g. human health) is likely to arise from an identified hazard at the site without appropriate remedial action Hydrogeology - Loss of, or extensive change to an aquifer used for potable supply, potential high risk of pollution of groundwater Hydrology - Major decrease in water quality; Loss or extensive change to a fishery, Loss or extensive change to a designated Nature Conservation Site
Moderate adverse	Human Health - It is possible that without appropriate remedial action, significant harm to a designated receptor (e.g. human health) could arise to a designated receptor but it is relatively unlikely that any such harm would be severe and if any harm were to occur, it is likely that such harm would be relatively mild

Magnitude of impact	Definition
	Hydrogeology - Partial loss or change to an aquifer, potential medium risk of groundwater pollution. Partial loss of the integrity of groundwater supported designated wetlands Hydrology – Moderate decrease in water quality; Partial loss in productivity of a fishery
Minor adverse	Human Health - It is possible that harm could arise to a designated receptor (e.g. human health) from an identified hazard but it is likely that at worst this harm if realised would normally be mild Hydrogeology - No significant change to an aquifer, potential low risk of pollution to groundwater. Minor effects on groundwater supported wetlands Hydrology – Slight decrease in water quality
Negligible adverse	Human Health - There is a low possibility that harm could arise to a designated receptor. In the event of such harm being realised, it is likely to be mild or minor Hydrogeology - The Scheme is unlikely to affect the integrity of the water environment Hydrology – Negligible decrease in water quality
No change	No observable effect either adversely or beneficially
Negligible beneficial	The Scheme may resolve slight impact from existing land or water contamination
Minor beneficial	The Scheme may resolve minor impact from existing land or water contamination
Moderate beneficial	The Scheme may resolve moderate impact arising from existing land or water contamination
Major beneficial	The Scheme may resolve major impact arising from existing land or water contamination

13.3.12 The determination of significance of the impact is a factor of the value / sensitivity of the feature/resource (receptor) and the magnitude of the impact (change) as described above. Table 13-4 shows how the significance of effect is derived.

Table 13-4: Geology and Contaminated Land – Determination of the Significance of Impacts (DMRB Volume 11, Section 2, Part 5 HA 205/08 ‘Assessment and Management of Environmental Effects’)

Magnitude of Impact (Change)	Value/sensitivity of Receptor / Resource				
	Very high	High	Medium	Low	Negligible
Major	Very large	Large / very large	Moderate / large	Moderate	Slight
Moderate	Large / very large	Moderate / large	Moderate	Slight	Neutral
Minor	Moderate / large	Moderate	Slight	Neutral	Neutral
Negligible (beneficial / adverse)	Slight	Slight	Neutral	Neutral	Neutral
No change	Neutral	Neutral	Neutral	Neutral	Neutral

- 13.3.13 Effects which are Very Large, Large or Large / Moderate are considered to be significant for the purposes of EIA. Effects which are considered to be Moderate, Slight or Neutral are considered to be non-significant.

Assumptions and Limitations

- 13.3.14 The ground investigation was undertaken (as detailed in sections below) along the proposed new road alignment and not the wider Scheme area. Ground conditions in areas not investigated are uncertain.
- 13.3.15 This Chapter assumes that the borrowpits would be used as this represents worst case (excavating the borrowpits could lead to the spreading and mobilisation of contaminants (if present). If they are not used there would be no risk.

13.4 Study Area

- 13.4.1 The study area comprises a 50m corridor either side of the Scheme extending to 1km for EA registered waste sites, ground water abstraction points and geological features.
- 13.4.2 A 50m buffer zone was selected because the geology along the Scheme comprises glacial till and tidal flat deposits (predominantly clay and silt) underlain by mudstone bedrock. These soils and rocks tend to have a low permeability, which means that groundwater does not easily or rapidly flow through them. Similarly, contamination is unlikely to move easily or very far in low permeability soils and rocks.
- 13.4.3 The study area for waste sites, abstraction points and geological features comprises a larger 1km buffer. With regards to waste sites, landfill gases have the potential to migrate over a larger distance and groundwater abstractions can influence migration patterns over larger distances, therefore sites further from the Scheme are considered.

13.4.4 Study areas are presented on Figure 13.1.

13.4.5 With regards to abstraction points, dewatering may be involved in the construction of the Scheme and this activity could cause groundwater (potentially contaminated) to be drawn into the Scheme area. The groundwater drawdown could also have an impact on abstraction points. These potential construction phase impacts are considered in Chapter 12: Road Drainage and the Water Environment (document reference TR010035/APP/6.12).

13.5 Existing and Future Baseline

Existing Baseline

Published Geology

13.5.1 The Preliminary Sources Study Report (PSSR) has been reviewed to obtain information on the geological setting of the application site.

13.5.2 In preparation of the PSSR, the British Geological Survey (BGS) 1:50,000 scale geological map, Sheet 66 Blackpool (solid and drift), 1975 has been reviewed together with the accompanying geological memoir: 'The Geology of the country around Blackpool'.

13.5.3 The generalised geological succession of the area under study is presented below in Table 13-5 with the distribution of drift and solid deposits shown on the Figure 13.1.

Table 13-5: Geology and Contaminated Land – Geological Sequence

Geological Formation		Group	Age
Tidal Flat Deposits ¹			Quaternary (Flandrian)
Peat			Quaternary (Flandrian)
Glaciofluvial Deposits			Quaternary (Devensian)
Glacial Till			Quaternary (Devensian)
Singleton Mudstone (Sidmouth Mudstone Formation) ²	Mercia Mudstone Group		Triassic

13.5.4 The published geology mapping indicates that the bedrock geology is the Sidmouth Mudstone Formation which is part of the Mercia Mudstone Group.

13.5.5 Superficial deposits are present above the mudstone formation across the Scheme. Descriptions are detailed in Table 13-6.

¹ Previously known as River Alluvium

² Previous nomenclature includes the Kirkham, Singleton and Hambleton Mudstones as described in the PSSR

Table 13-6: Geology and Contaminated Land – Geological Descriptions

Geological Formation	Description
Tidal Flats Deposits	Normally consolidated soft silty clay, with layers of sand, gravel and peat. Characteristically low relief; from the tidal zone.
Peat	Organic rich-clay humic deposits.
Glaciofluvial Deposits	Sand and gravel, locally with lenses of silt, clay or organic material; of glaciofluvial origin.
Till	Glacial Till is the extremely heterogeneous sediment of a glacier; till is the part of glacial drift deposited directly by the glacier. Its content may vary from clays to mixtures of clay, sand, gravel, and boulders.
Sidmouth Mudstone Formation ³	This formation consists of dominantly mudstone and siltstone, red-brown with common grey-green patches and spots.

Encountered Geology

- 13.5.6 An intrusive ground investigation was undertaken in 2018 to investigate the ground conditions along the proposed alignment. A Ground Investigation Report (GIR) (Highways England, 2018) (document reference TR010035/APP/7.6) has been prepared which provides details of the ground conditions encountered. Full details can be found in the GIR with a summary provided below.
- 13.5.7 The geology encountered during the recent investigation is generally consistent with the anticipated mapped geology. The application site is characterised by undulating landform typical of Glacial terrain.
- 13.5.8 Table 13-7 provides a summary of the different strata encountered during the intrusive works. Geological cross sections are included with the GIR.

Table 13-7: Geology and Contaminated Land - Summary of Geology encountered during the Ground Investigation

Geological Formation	Description
Topsoil	Topsoil was encountered across the whole proposed route of depths ranging between 0.1m and 1.1m, but generally was approximately 0.3m thick
Made Ground	Made Ground of significant thickness was generally not encountered. The maximum thickness was 5.4m which was near Skippool junction. This was described as gravelly clay with brick, mudstone, quartz and glass. The majority of the granular Made Ground is associated with previous road construction

³ Previous nomenclature includes the Kirkham, Singleton and Hambleton Mudstones as described in the PSSR.

Geological Formation	Description
Alluvium	Alluvium was only encountered in 1 location where a stream flows under the existing A585 close to where the new Scheme ties in. This was to a depth of 3.9m
Tidal Flat Deposits	<p>Tidal flat deposits were encountered between Skippool junction and Skippool Bridge, and along the Skippool Channel with depths generally between 5m to 6m. Shallower depths were recorded at either end of the area of channel which the route crosses. The depth and thicknesses of tidal flat deposits is otherwise fairly consistent</p> <p>The deposits are highly variable in composition with a sandy or silty clay occasionally with organic (peaty) content at the ground surface. At depth, it is often interbedded with bands or laminations of silt and sand, and often progresses to a silty sand</p>
Peat	Peat was encountered in 3 general locations; along Skippool Channel in the vicinity of Poulton junction, the valley south east of Poulton junction and at A585 New Garstang Road. Typically the peat is described as a dark brown clayey peat
Glacial Till	This deposit was encountered throughout the route. On the valley sides and high ground, it was formed of a thin mantle of between 3m and 5m thickness overlying Glaciofluvial Deposits. A greater thickness of up to 25m was apparent in some places. The Till is generally described as a reddish brown slightly sandy, slightly gravelly, occasionally silty clay
Glaciofluvial Deposits	Glaciofluvial Deposits were encountered at Skippool Bridge, along Skippool Channel continuing through Lodge Lane up to A585 New Garstang Road. The cohesive Glaciofluvial Deposits are generally described as a brown sandy, gravelly, occasionally silty clay, or as a brown sandy, gravelly, occasionally clayey silt. The granular Glaciofluvial Deposits are generally described as a brown gravelly, occasionally silty, occasionally clayey sand
Sidmouth Mudstone Formation ⁴ (Singleton Mudstone)	<p>Singleton Mudstone had been encountered at various locations along the proposed route. From Skippool junction to Skippool Bridge, the Mudstone was encountered between 11m to 12m below ground level. Generally, up to 15m depth below ground level, the Mudstone is weathered and recovered as a brown greyish sandy gravelly clay. Below this depth, the Mudstone is generally described as an extremely weak to weak reddish brown and grey Mudstone with discontinuities</p> <p>At Lodge Lane, the Mudstone is encountered at 27m to 28m below ground level and is generally described as extremely</p>

⁴ Previous nomenclature includes the Kirkham, Singleton and Hambleton Mudstones as described in the PSSR.

Geological Formation	Description
	weak to very weak reddish brown and grey mottled mudstone with discontinuities and gypsum veins

Geodiversity

- 13.5.9 A review of the Joint Nature Conservation Committee (JNCC) Geological Conservation Review, MAGIC website and GeoLancashire website indicates that there are no recorded geodiversity heritage sites, Regionally Important Geology Sites (RIGS) or geological SSSI within 1km of the Scheme. This has been confirmed by responses from Flyde Borough Council (Appendix 13.1: Consultation (document reference TR010035/APP/6.13.1)) and The Lancashire Group of the Geologists Association, whose response is included in Appendix 13.1: Consultation (document reference TR010035/APP/6.13.1).

Mining

- 13.5.10 From the PSSR, based on a review of the Coal Authority's online Interactive Map viewer, there are no historical areas of coal mining in the study area. A review of the British Geological Society (BGS) online interactive map viewer records no obvious historical mine workings in the study area.

Mineral Safeguarding Areas and Mineral Deposits

- 13.5.11 The Scheme crosses a number of small areas which are designated as 'Mineral Safeguarding Areas'. These areas are illustrated on Figure 13.2. These appear to relate to the Glaciofluvial Deposits (Sand and Gravel) mapped in these areas. In consultation with Lancashire County Council (see Appendix 13.1: Consultation (document reference TR010035/APP/6.13.1)), the mineral safeguarding areas are not considered to be an environmental impact that needs to be considered within the ES. It is considered to be a planning policy matter and addressed in the Planning Statement and National Policy Statement Accordance (document reference TR010035/APP/7.1).
- 13.5.12 The operation of sand and gravel extraction was potentially undertaken adjacent to the A585 285m east of Skippool.
- 13.5.13 Excavation for clay for local brickworks was undertaken at Poulton-le-Fylde. Within the area numerous small pits typically 1.0m to 1.5m deep were excavated for the purpose of agricultural soil improvement, a process called marling. The numerous ponds present are thought to be pooled rainwater or possibly groundwater standing within these excavations.

Hydrogeology and Hydrology

- 13.5.14 As discussed above, hydrogeology and hydrology are detailed in Chapter 12: Road Drainage and the Water Environment (document reference TR010035/APP/6.12). However, to give context on how these receptors and their potential to provide migration pathways relate to contaminated land, brief details are provided below.
- 13.5.15 The superficial deposits are designated as a Secondary (undifferentiated)⁵ Aquifer.

⁵ Secondary (undifferentiated) Aquifer is a designation assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

The bedrock geology Singleton Mudstone Member is designated as a Secondary B aquifer⁶.

- 13.5.16 There is 1 medium sized groundwater abstraction at Partingtons Holiday Centre / Bankfield Farm, approximately 275m north of the far eastern end of the Scheme. The abstraction is for the purposes of 'domestic, commercial, industrial and public services' with the following details:
- Licence Number: NW/072/0417/002, Licence Expiry Date: 31/03/2018
 - Use: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial / Public Services
 - Max. Daily Abstraction: 109m³ Max. Annual Abstraction: 28,162m³
- 13.5.17 There are no published SPZs identified on the EA website within the study area. However, as the abstraction detailed above is used for drinking water, a default SPZ2 of 250m radius is usually applied by the EA, and hence the northern end of the Scheme would interface with this default SPZ2.
- 13.5.18 Wyre Council (Appendix 13.1: Consultation (document reference TR010035/APP/6.13.1) is not aware of any private water supplies within the study area.
- 13.5.19 The River Wyre is located between 500m – 1500m north of the Scheme, flowing in a westerly direction. Skippool Creek that flows into the River Wyre, is located at the far north western end of the Scheme.
- 13.5.20 The Main Dyke (stream) flows alongside the Scheme in a north westerly direction for approximately 1.5km. The dyke is located approximately 80m to 239m south of the Scheme and flows in a northerly direction towards the Skippool Creek. The Main Dyke is stated to be of moderate ecological quality.
- 13.5.21 At the western end of the Scheme the Main Dyke is crossed by the Skippool Bridge. The proposed route also crosses over Skippool Creek at the far western roundabout.
- 13.5.22 At the eastern end of the Scheme there is a man-made channel flowing alongside the Scheme (within 80m) for approximately 1km in a westerly direction into the Main Dyke. There are several small channels / drainage ditches which cross the central part of the Scheme which appear to be draining water from several small ponds to the north of the route into the Main Dyke. There are several small ponds surrounding the route, the nearest of which is approximately 15m from the Scheme. These features would suggest a shallow groundwater level. It is likely that this resides within, or is perched within, the Glacial Till.

Pollution Incidents

- 13.5.23 The EA provided details of pollution incidents that have occurred within the study area. Their full response is included in Appendix 13.1: Consultation (document reference TR010035/APP/6.13.1). There are 54 incidents recorded between 2001 and 2018. The majority of these are considered to be category 3 (minor)⁷ or category

⁶ Secondary B Aquifer are defined as being predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.

⁷ Pollution incidents categories are defined as

Category 1 – major, serious, persistent and / or extensive impact or effect on the environment, people and / or property

Category 2 – significant impact or effect on the environment, people and / or property

Category 3 – minor or minimal impact or effect on the environment, people and / or property

Category 4 – substantial incident with no impact

4 (no impact). There are 3 category 2 (significant) incidents in relation to land pollution recorded which relate to unauthorised activities at waste management facilities. There are also 5 category 2 (significant) incidents in relation to water pollution which relate to oil and fuel pollutants.

- 13.5.24 Flyde Borough Council (Appendix 13.1: Consultation (document reference TR010035/APP/6.13.1) were not aware of any pollution incidents in the study area. Wyre Council (Appendix 13.1: Consultation (document reference TR010035/APP/6.13.1) were not able to provide specific information regarding pollution incidents or records of complaints. Wyre did note that their notice register shows that there are no outstanding abatement notices, for the study area.

Historical Development

- 13.5.25 The existing A585 and study area are set within a largely agricultural landscape of open relatively flat, improved pasture. Houses and small agricultural concerns have developed over time along the existing A585. The villages of Skippool and Singleton have also expanded over time.
- 13.5.26 Skippool developed as a port through the 1600s dealing in mahogany and Flax with the Baltic ports and coastal trade with farm produce to Liverpool, wider Lancashire and Cumbria.
- 13.5.27 The HER (Historic Environment Record) entry for the Main Dyke notes it was constructed in 1731 as a drainage ditch for Marton Mere to Skippool.
- 13.5.28 The railway from Preston to Fleetwood through Poulton-le-Fylde was constructed in 1840 which lies to the west of the Scheme.
- 13.5.29 Early maps show the presence of numerous ponds within the study area some of which appear to have been infilled in later editions.
- 13.5.30 Available historical maps show the gradual development along the edge of the A585 throughout the 20th century. Many of these are noted as being gardening nurseries. A small sand and gravel quarry is noted adjacent to the A585 at Skippool on the 1847 OS map. A limekiln is shown on the 1848 map to the north of Skippool adjacent to an area indicated as liable to flooding. The 1892 map shows the location of 3 small sand and clay pit to the south of Carr Wood.
- 13.5.31 At Bankfield Farm to the eastern end of the Scheme, there appears to be 2 large fish ponds. By 1891 1 of these appears to have been infilled. The remaining pond reduces in size over time to its current size.
- 13.5.32 The Garstang New Road from Little Poulton across the Main Dyke to Windy Harbour was built sometime in the early 20th century (circa 1930). Either side of Skippool former marshland have been reclaimed (1955 and 1969).
- 13.5.33 There is a significant number of ponds that are located in the agricultural land southwest of the A585. Some of the ponds are located within the 50m buffer. Based on the information that is currently available it is unclear whether the pond formations are as a result of excavation for purpose of livestock watering or marl pit excavation. Marl pits were excavated generally at a depth no greater than 1.5m and it is likely that the many of the ponds would be about this depth within the study area. Deeper ponds may occur if the underlying calcareous till was also exploited.
- 13.5.34 There is an historic tank recorded at the western end of the Scheme. A petrol station associated with the Skippool Service Station is also currently indicated in this area.

A workshop is understood to be in this area.

- 13.5.35 There is an area of mapped artificial ground (Made Ground) at the western end of the Scheme.
- 13.5.36 From a review of Google maps (online, 2018), a timber yard is present off Shard Road in a small industrial estate at the western end of the Scheme. At the eastern end of the Scheme there appears to be some earthworks / reprocessing taking place on the northern side of Garstang New Road, to the south of Bankfield Manor.

Landfill sites / Waste Management sites

- 13.5.37 Table 13-8 details the landfill sites within the 1km study area which are shown on the Geology and Contaminated Land Features Figure 13.1. The EA provided additional information which is included in the table below and their full response is in Appendix 13.1: Consultation (document reference TR010035/APP/6.13.1).

Table 13-8: Geology and Contaminated Land - Landfill Sites

Landfill	Dates	Type of Waste	Distance from Scheme
Skippool Marsh (Location: SD3581540800)	1929-1972	Commercial	115m north of western end
Skippool Creek (Location: SD3581540800)	1929-1972	Household Leachate Control measures taken place	120m north of western end
Poulton Railway Cutting	Until 1989	Inert	750m south west
Fylde Skip Hire	Unknown	Unknown	675m southwest of the central section
Poulton Industrial Estate Kingscourt Development (Location: SD3625838799)	Issue date – 1992 to unknown	Inert (The permit allows the following wastes in solid form; soil, clay, natural sand, rock, glass, slate, concrete, brick and ceramics) Non-Biodegradeable	900m south west of the central
Windy Harbour Holiday Centre (Location: SD3876340174)	Until 1989	Inert / Special	750m north of the eastern end
Larbreck Hill Farm	1978	Inert	700m to the east of the end
Larbeck Gardens	1955-1963	Industrial / commercial and Household	750m east of the end

- 13.5.38 The landfill sites detailed above are within the 1km study area. Generally, these are all some distance from the Scheme, however the 2 landfills at the western end of the

Scheme are within 250m and therefore could be a potential source of ground gas. It is noted that all the landfills have been present for many years, i.e. should be significantly degraded, which reduces the potential risk. It is considered unlikely that these would have an impact of significance to the design of the Scheme.

- 13.5.39 The EA provided details of a waste management facility at Windy Harbour landfill site (Location: SD3899239705). The permit authorised the construction of a golf course as a deposit for recovery operation using suitable material. Waste engineering fill was historically imported for use in construction under and exemption. The imported waste would consist mainly of uncontaminated soil and demolition waste such as bricks and concrete. The permit was surrendered in February 2018.
- 13.5.40 Flyde Borough Council (Appendix 13.1: Consultation (document reference TR010035/APP/6.13.1)) was not aware of any pre-licensed landfill sites.
- 13.5.41 Wyre Council provided the following information for their element of the study area. Historical information held shows there are a number of areas of unknown fill falling within the study area. The areas of unknown fill shown on the plan (Appendix 13.1: Consultation (document reference TR010035/APP/6.13.1)) are former ponds (represented as red-brown circles on the maps) and former streams (represented as a blue line on the maps), all of which have been historically backfilled. Wyre also stated that *'There are also areas of potential contamination relating to areas of past historical / industrial use. On map 1 the area highlighted as a blue circle was an area associated with cement, lime and plaster products lime plaster manufacture 1846 – 1848. On map 2 the area highlighted as a blue circle was an area associated with quarrying of sand and clay operation of sand / gravel pits 1930 – 1933. There is an area highlighted on the map as a pink polygon, this represents a waste transfer station. The final area highlighted as a green polygon represents an area associated with factory / works 1993. This area still forms part of Poulton-le-Fylde industrial estate'* (maps provided in Appendix 13.1: Consultation (document reference TR010035/APP/6.13.1)).

Unexploded Ordnance (UXO)

- 13.5.42 A preliminary desk study was undertaken by Zetica (UXO specialists) for the Scheme which concluded that no readily available records have been found to indicate bombs fell within the study area, which was in a region with very low bombing density during World War II. Additionally, no evidence of any significant military activity likely to provide a source of UXO hazard has been identified. It is considered that the application site is likely to have a low UXO hazard level. The desk study is included in Appendix 13.2 (document reference TR010035/APP/6.13.2).

Additional Information from Local Authorities

- 13.5.43 As detailed above the local authorities were contacted to gain local knowledge about contaminated land across the Scheme. Some of their responses have been included in the sections above, additional information is summarised below and included in Appendix 13.1: Consultation (document reference TR010035/APP/6.13.1).
- 13.5.44 Fylde Borough Council was not aware of the following in their part of the study area:
- Any sites on the Part 2A register / sites prioritised for inspection / known details of past contaminative land uses

- Any contaminated land site investigations / any areas of reclaimed or remediated land
- No known information on storage, disposal or leakage of any hazardous / dangerous substances
- There is 1 Part B activity listed under the Environmental Permitting Regulations relating to a Shell Garage

13.5.45 Fylde Borough Council did note that there were a number of septic tanks operated by residents prior to work on the sewer system and that there may be run off pipework in the ground within the study area.

13.5.46 Additional information provided by Wyre Council included:

- The study area is not currently listed on the Council's contaminated land register under Part 2A of the Environmental Protection Act 1990 and has not been identified as 'contaminated land' under Part 2A
- There are 7 Part B permitted sites within their part of the study area, which relate to batching of mixed concrete and vehicle respraying
- They are not aware of:
 - Any previous contaminated land site investigations / site risk assessments within the study area, unless submitted as part of the planning process
 - Of any known environmental land reclamation schemes that would affect the study area. However, the EA may have further information
 - Any known storage, disposal or leakage of any hazardous/dangerous substance within the study area
- Environmental Protection do not hold information regarding flammable storage within the study area

Ground Investigation Chemical Data

13.5.47 Soil samples from the recent ground investigation were analysed for a suite of contaminants such as metals, non-metals, asbestos and hydrocarbons. The results have been compared to generic assessment criteria (GAC) such as LQM / CIEH S4UL values to establish the contamination status across the Scheme. It is noted that the investigation was along the proposed alignment and did not cover a wider area. Full assessment details are included within the GIR (document reference TR010035/APP/7.6). Testing targeted Made Ground (where encountered), near surface samples including topsoil and soils in proposed burrow pit areas.

13.5.48 The chemical results record generally low presence of contamination, with all the concentrations being recorded below the GAC values for a public open space (residential) land use scenario. No asbestos fibres were detected (above laboratory detection) in samples analysed.

13.5.49 Soil leachate and groundwater analysis was undertaken to assess the risk to the water environment. The soil leachate testing indicated that heavy metals (e.g. zinc, copper, lead) were leachable above water quality standards in several boreholes towards the western extent in Skippool and the eastern section within the proposed burrow pits. It is however noted that the comparison of leachate values against water quality standards is a conservative approach and minor exceedances recorded are

not thought to be significant.

- 13.5.50 Nine groundwater samples were analysed for a suite of contaminants similar to the soil samples. Exceedances above the water quality standards of chromium (III), copper, lead and zinc were recorded along the entire route. Based on all the analysis undertaken, it is considered that the minor exceedances may be from a natural source.
- 13.5.51 An assessment of available ground gas data from the recent investigation for the A585 and the Key Worker Homes site (Keyworker Homes, 2015) is included in the GIR. The Key Worker Homes site is located between the Scheme at Skippool Junction and the historic landfill to the north. From the limited data, the potential risk from ground gas is considered to be low. However, given the potential Made Ground and peat deposits present along the Scheme which could be ground gas sources, appropriate risk assessment should be sought if access to below ground structures or confined space is necessary.

Other Investigations within the Study Area

- 13.5.52 The EA provided details of 2 other investigations within the study area; Poulton Wastewater Treatment Works (WwTW) Old Main Lane (United Utilities, 2012) and Skippool Landfill Pipeline (MWH, 2009) both to the north west of the proposed Scheme. Relevant details from these reports are provided below.
- 13.5.53 The Poulton WwTW report relates to a site to the north of Skippool Bridge. The ground conditions encountered are consistent with mapped and encountered geology.
- 13.5.54 Soils and groundwater analysis was undertaken as part of this work. Contaminants were encountered which would need to be considered for the development on the site. Gas monitoring was undertaken which indicated low concentrations of methane (<0.1%v/v) and carbon dioxide concentrations ranging from 1.4% v/v and 22.2%v/v. When the low flow rates were considered an overall low risk from ground gases was concluded. This corresponds with the findings of the recent investigation and the work on the Key Workers Home site as detailed above.
- 13.5.55 The Skippool Landfill pipeline report is for a new outfall pipeline into the River Wyre which would partially run through a former landfill site. This assessment is for an area some distance from the proposed route and the conditions (i.e. in a landfill site) are not considered to represent the general ground conditions or land quality of the Scheme. No gas monitoring was undertaken which would have indicated if the landfill site was still generating ground gases.

Contaminated Land

- 13.5.56 Based on the baseline information presented above, there does not appear to be a high probability of significant sources of contaminated land being present within the study area. The Scheme is generally in a rural setting with the majority of the new road being constructed through agricultural fields.
- 13.5.57 Light industry has historically been located along the existing A585 (Mains Lane) such as nurseries, poultry houses, timber yard and small industrial units. Many of these uses still remain. These features are unlikely to present a significant contamination risk to the Scheme and are not near to the new road.

- 13.5.58 Infilling due to reclamation may have some contamination but is unlikely to be considered to be significant.

Future Baseline

- 13.5.59 The existing baseline conditions are unlikely to change significantly between now and the construction of the road in 2020. Contamination is generally due to historic land uses as operations / procedures of current works / industry are more tightly controlled. Therefore, the existing baseline conditions are considered likely to represent the future baseline conditions for the Scheme.
- 13.5.60 It is not possible to predict future changes to regulatory policy and frameworks so the future baseline assumes no significant change from current methodology. We do not envisage that future minor changes or refinements would materially affect the assessments made herein.

Receptors Potentially Affected (including value / sensitivity)

- 13.5.61 Based on the information presented above, Table 13-9 details the receptors identified and their associated value / sensitivity.

Table 13-9: Geology and Contaminated Land – Receptors Potentially Affected

Receptor	Value / Sensitivity
<i>Human Health</i>	
Construction Workers	High
Local residents near to Scheme	High
Hydrogeology (Groundwater)	High - In area of SPZ2 Low - Secondary Aquifer
Hydrology (Surface Water)	Medium

13.6 Mitigation and Enhancement Measures

- 13.6.1 An intrusive ground investigation has taken place across the Scheme to establish the ground conditions for construction of the new road (document reference TR010035/APP/7.6). This has included assessing the land quality in the areas investigated to determine the baseline and implications for the Scheme. The data has been assessed using the source-pathway-receptor principles and a Conceptual Site Model for the Scheme has been created. Further intrusive investigations may be undertaken prior to construction in areas of concern highlighted by this and for detailed design of the Scheme.
- 13.6.2 The available chemical data indicates that no significant contamination is present along the alignment, however, if during further works, unacceptable risks are identified due to the concentrations of contaminants found, remedial action would be proposed to reduce the risk to receptors. This could include removal of contaminated materials or remediation by appropriate *in-situ* or *ex-situ* techniques.
- 13.6.3 The available gas monitoring results indicates a low risk from ground gases, however, this is based on limited data. During further investigations that may be undertaken, additional monitoring would be undertaken in areas of concern, such as peat deposits, near to landfill sites to confirm this risk. If a higher risk is determined, appropriate gas mitigation measures would be included within the design of enclosed

spaces within the Scheme.

- 13.6.4 The construction works would include the removal of vegetation, stripping of topsoil and significant excavation (cutting and borrowpits) and localised earth movements. These activities could cause the spreading and mobilisation of contaminants (if present) into the water environment in these areas. During these works a watching brief protocol would be adopted as detailed in the Record of Environmental Actions and Commitments (REAC) (document reference TR010035/APP/7.3) which is an appendix of the Outline Construction Environmental Management Plan (CEMP) (document reference TR010035/APP/7.2), with site workers remaining vigilant such that visual or olfactory signs of contamination are noted and that contaminated soil is kept separate from other materials. Suspected contaminated material would be analysed to determine if it is suitable for re-use on the site or requires disposal off-site to an appropriate soil recycling or disposal facility.
- 13.6.5 In line with best practice and as detailed in the REAC (document reference TR010035/APP/7.3), prior to any construction compound area being prepared, a baseline survey would be undertaken to determine the current land quality across the compound area. This would highlight localised contamination present above risk based suitable for use criteria. If appropriate such areas would be remediated prior to, or as part of, the soil stripping / enabling works or other measures such as the use of an appropriate cover system / barrier to reduce the risk of exposure to site workers.
- 13.6.6 Within the construction site compounds, specific areas would be designated for the storage of chemicals, waste oils and fuel and refuelling activities. These areas would be bunded and placed on hardstanding to prevent downward migration of contaminants. Any transfer of fuel or other potentially contaminated liquids would only take place within a designated fuel transfer area. Drip trays would be provided to reduce the risk of spillages. These areas would be designed with appropriate drainage to ensure any spillages can be isolated these measures would be outlined in the Pollution Control Plan (as required by the REAC (document reference TR010035/APP/7.3) – a draft which can be found in the Outline CEMP (document reference TR010035/APP/7.2).
- 13.6.7 An Emergency Spillage Response Plan would be produced by the Contractor as required by the REAC (document reference TR010035/APP/7.3). Appropriate equipment (e.g. spill kits, absorption mats) would be made easily accessible on-site and personnel would be trained in using them. Clear protocols and communication channels would be provided to ensure that any spillages are dealt with immediately and adequately. This would prevent large areas of soil / geology potentially becoming contaminated and in turn protect surface water quality.
- 13.6.8 During the construction phase, localised contamination may occur within the compound areas through spillages / leakages of fuel and therefore a repeat baseline survey would be undertaken once the construction has finished and the compound dismantled to demonstrate the area has been returned to its previous state. If contamination has occurred during the lifetime of the compounds, remediation would be undertaken to return the land to its previous land quality state as detailed in the REAC (document reference TR010035/APP/7.3).
- 13.6.9 Mitigation measures to prevent pollution incidents to receptors during the construction phase would be provided in the Pollution Control Plan as required by

the REAC (document reference TR010035/APP/7.3). This would be developed further by the Contractor to ensure best practice is utilised and the receptors are protected. The Contractor would prepare detailed method statements and appropriate controls to protect receptors. The plan would include best practice pollution prevention guidelines for activities such as excavation and dewatering, storage of fuels, chemicals and oils, vehicle washing, pollution control and emergency contingency.

- 13.6.10 During the construction of the Scheme, excavated soils would be appropriately stored to ensure that if dust is generated in dry weather periods, it is not directed towards existing properties. Other best practice measures such as damping down areas, vehicle wheel washing, covering stockpiles and lorries containing soils would be utilised to reduce the impacts from dust. Further information is presented in Chapter 6: Air Quality (document reference TR010035/APP/6.13).
- 13.6.11 To reduce the spread of contaminants, contaminated soils (identified by the intrusive investigation) within areas to be excavated would be removed prior to the main works as detailed in a remedial method statement. Materials would be treated so they can be reused within the Scheme e.g. embankments or if this is not possible materials would be disposed of at an appropriate waste facility.
- 13.6.12 Embankments and structures such as bridges and culverts are proposed within the Scheme design. Geotechnical techniques such as band drains in the case of the embankments and piling for the foundations of the structures would be used to construct these features. Such techniques can introduce pathways for contaminants in pore water to migrate into underlying groundwater. Appropriate techniques would be reviewed and appropriate design would be included to safeguard the underlying groundwater regime to ensure that groundwater quality is not compromised.
- 13.6.13 Materials used to create the embankments (site won or imported) would be chemically analysed to ensure that they are suitably chemical quality as detailed in the earthworks specification.
- 13.6.14 During the construction of the Scheme and especially in the area of the deep cutting, dewatering would be required. If groundwater in this area is found to be contaminated, the groundwater would be disposed of appropriately and with the necessary agreements in place. During the dewatering activities, consideration would be given to soil contamination in the locality to ensure that contaminants do not become mobilised and enter the water environment.
- 13.6.15 To reduce the risk to surface water, excavated materials would be appropriately stored to ensure that water runoff from stockpiles does not the water environment via drains and nearby watercourses. If necessary, stockpiles would be covered. Pollution prevention best practice protocols would be adopted to ensure contamination do not enter surface water as detailed in the Pollution Control Plan (as required by the REAC (document reference TR010035/APP/7.3)).
- 13.6.16 A Site Waste Management Plan (SWMP) and a Materials Management Plan (MMP) (that form appendices to the Outline CEMP document reference TR010035/APP/7.2) have been developed in draft. These documents would be developed further by the Contractor and follow protocols within the CL:AIRE Definition of Waste: Development Industry Code of Practice to ensure that excavated material are re-used appropriately, sustainably and remain outside the waste hierarchy.

- 13.6.17 During the construction phase, construction / site workers would be exposed via accidental ingestion, inhalation or dermal contact with soil and any contamination present. To mitigate any risks from contaminated soils / materials all persons engaged in site construction works would be made aware of the findings of the intrusive investigations and the hazards associated with handling potentially contaminated materials via the CEMP and Health and Safety Plan. All works would be conducted in accordance with the Health and Safety Executive publication entitled Protection of Workers and the General Public during the Development of Contaminated Land (HSE, 1991) and follow Construction (Design and Management) Regulations (2015). Suitable Personal Protective Equipment (PPE) including Respiratory Protective Equipment (RPE) (if necessary) would be available to all site workers as detailed in the Health and Safety. Appropriate site hygiene protocols would be adopted during the construction phase. Further detail is outlined in the REAC (document reference TR010035/APP/7.3).
- 13.6.18 Where any hazardous chemicals are used in the construction works, risk assessments would be made under The Control of Substances Hazardous to Health Regulations (as amended) and detailed in the REAC (document reference TR010035/APP/7.3).

13.7 Residual Effects

- 13.7.1 Construction workers and residents are considered to be of **high** value and assuming the appropriate mitigation is adopted, the magnitude of impact is considered to be **negligible adverse**. The significance of effects is assessed as **Slight**. This effect is likely to be short term when significant earthwork movements are taking place.
- 13.7.2 Groundwater in the area of the SPZ2 is considered to be of **high** value and assuming the appropriate environmental design measures and mitigation are adopted, the magnitude of impact is considered to be **negligible adverse**. The significance of effects is assessed as **Slight**. This effect is likely to be short term when significant earthwork movements are taking place.
- 13.7.3 Groundwater in the areas outside the SPZ2 is considered to be of **low** value and assuming the appropriate mitigation measures are adopted, the magnitude of impact is considered to be **negligible adverse**. The significance of effects is assessed as **Neutral**. This effect is likely to be short term when significant earthwork movements are taking place.
- 13.7.4 Surface water is considered to be of **medium** value and assuming the appropriate environmental design measures and mitigation are adopted, the magnitude of impact is considered to be **negligible adverse**. The significance of effects is assessed as **Neutral**. This effect is likely to be short term when significant earthwork movements are taking place.
- 13.7.5 All the effects are considered to be **not significant for the purpose of EIA**.

Human Health Assessment

- 13.7.6 As all effects reported within Section 13: Geology and Soils are predicted to be of no significance, it is therefore predicted that no significant effects would occur on local human health as a result of the Scheme.

13.8 Monitoring

- 13.8.1 No monitoring with regards to geology and contaminated land is required.

13.9 Summary

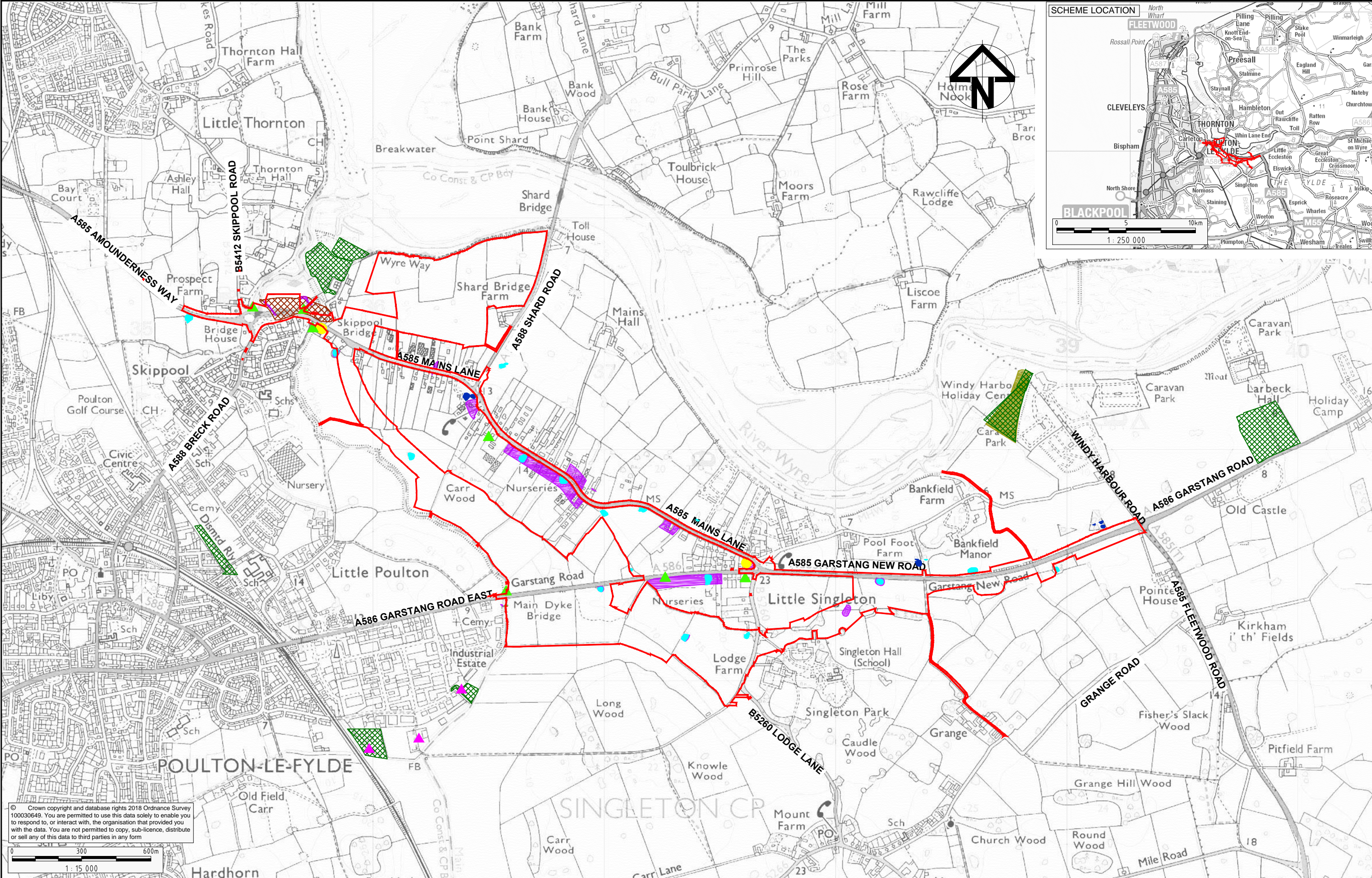
- 13.9.1 An assessment has been undertaken of the effects of the Scheme on Contaminated Land during the Construction phase. Geology has been scoped out.
- 13.9.2 Baseline conditions have been included to provide context to the environmental setting of the Scheme in relation to contaminated land. The Scheme is in a rural setting with light industry (garden nurseries, poultry houses and timber yard) being identified along the existing road. These are some distance from the proposed new alignment and therefore the contamination is not considered to be significant.
- 13.9.3 Mitigation measures have been proposed for the Scheme during the construction phase only to minimise effects on receptors. During the operational phase of the Scheme, no significant effects on receptors have been identified and therefore this phase has been scoped out.
- 13.9.4 An intrusive investigation has been undertaken to ensure that the land quality is known and unacceptable risks can be mitigated prior to main works commencing.
- 13.9.5 Sources of potentially contaminating materials include the storage and use of fuels, oils and chemicals and the use of cement-based products would be controlled by application of pollution prevention measures. These measures would aim to prevent the deterioration of the underlying soils through spillages / leakages.
- 13.9.6 Stripped and excavated soils / arisings would be appropriately stored on site to ensure that they are suitable for re-use within the Scheme or by others.
- 13.9.7 Activities during construction would involve the stripping of soils across the Scheme. The impacts on construction workers include potential damage via dermal, ingestion and inhalation exposure to contamination, if present would be controlled through the use of appropriate PPE and the application of dust suppression measures. Dust suppression measures would also minimise the potential for dust to be created during dry weather which could affect local residents as well as site workers.
- 13.9.8 Human Health receptors are considered to have a **high** value and once the appropriate mitigation is in place, the magnitude of impact is considered to be **negligible adverse**. The significance of effects is assessed as a **Slight**.
- 13.9.9 Groundwater in the area of the SPZ2 is considered to be of **high** value, whilst outside this area it is considered to be of **low** value. Assuming the appropriate mitigation is adopted, the magnitude of impact is considered to be **negligible adverse**. The significance of effects is assessed as **Slight** or **Neutral**.
- 13.9.10 Surface water is considered to be of **medium** value and assuming the appropriate mitigation is adopted, the magnitude of impact is considered to be **negligible adverse**. The significance of effects is assessed as **Neutral**.
- 13.9.11 All the effects are considered to be short term when significant earthwork movements are taking place. **These are non-significant for the purpose of EIA.**

13.10 References

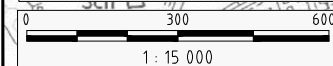
- Arcadis Consulting (UK) Limited (2016), *Preliminary Sources Study Report A585 Windy Harbour to Skippool (HE548643-ARC-EGT-A585-RP-GE-2007) (HA GDMS No: 29168)*
- CIRIA (2007) *Assessing risks posed by hazardous ground gases to buildings (C665); and*
- CIRIA (2001) *Contaminated land risk assessment. A guide to good practice (C552)*
- CL:AIRE (2011) *The Definition of Waste: Development Industry Code of Practice;*
- Defra (2009) *Code of Practice for the Sustainable Management of Soils on Construction Sites*
- Defra (2012) *Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance*
- Department for Communities and Local Government (2018) *National Planning Policy Framework*
- Environment Agency (2010) *Guiding Principles for Land Contamination*
- Environment Agency (2004) *Model Practices for the Management of Land Contamination, CLR 11*
- Environment Agency website
<https://www.gov.uk/government/organisations/environment-agency>
- Fylde Council, (2018) *Fylde Local Plan to 2032* [Online] Available at: <http://www.fylde.gov.uk/council/planning-policy--local-plan-/local-development-framework/www-fylde-gov-uk-submission/> [last accessed August 2018].
- Fylde Council (2005) *Fylde Local Plan 1996-2006* (as altered 2005)
- GeoLancashire website <http://geolancashire.org.uk/>
- Highways Agency (2009) *Design Manual for Roads and Bridges (DMRB) Volume 11*
- Highways England (2018) *A585 Windy Harbour to Skippool, Ground Investigation Report (HE548643-ARC-VGT-A585-RP-G-3131-Version 1.0)*
- Joint Nature Conservation Committee (JNCC) The Geological Conservation Review
<http://jncc.defra.gov.uk/page-2947>
- Keyworker Homes (NW) Limited (2015), Geo-Environmental Site Investigation, Mains Lane, Poulton-Le-Fylde, FY6 7LA, (REC reference: 45741P1R1)
- LQM / CIEH (2015) *The LQM / CIEH S4ULs for Human Health Risk Assessment*
- MAGIC <http://www.magic.gov.uk/>
- MWH (2009) *Wyre Estuary UID, Land Quality Risk Assessment 900119130*
- The Coal Authority <http://mapapps2.bgs.ac.uk/coalauthority/home.html>
- United Utilities (2012) *Land Condition Report and Conceptual Site Model, Wyre UID (Project No. 80029831)*
- Wyre Council (2018) *Wyre Local Plan to 2031* [Online] Available at: http://www.wyre.gov.uk/info/200319/wyres_emerging_new_local_plan (last accessed August 2018).

Wyre Council (1999) *Wyre Local Plan*

13.11 **Figures**



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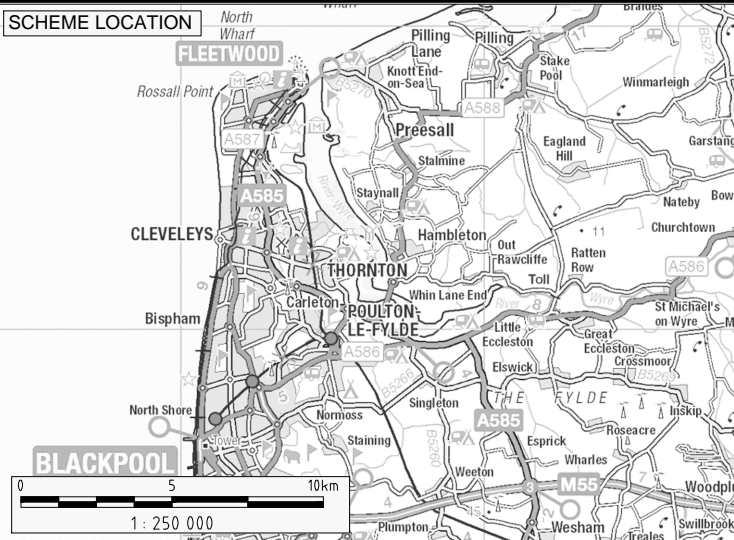
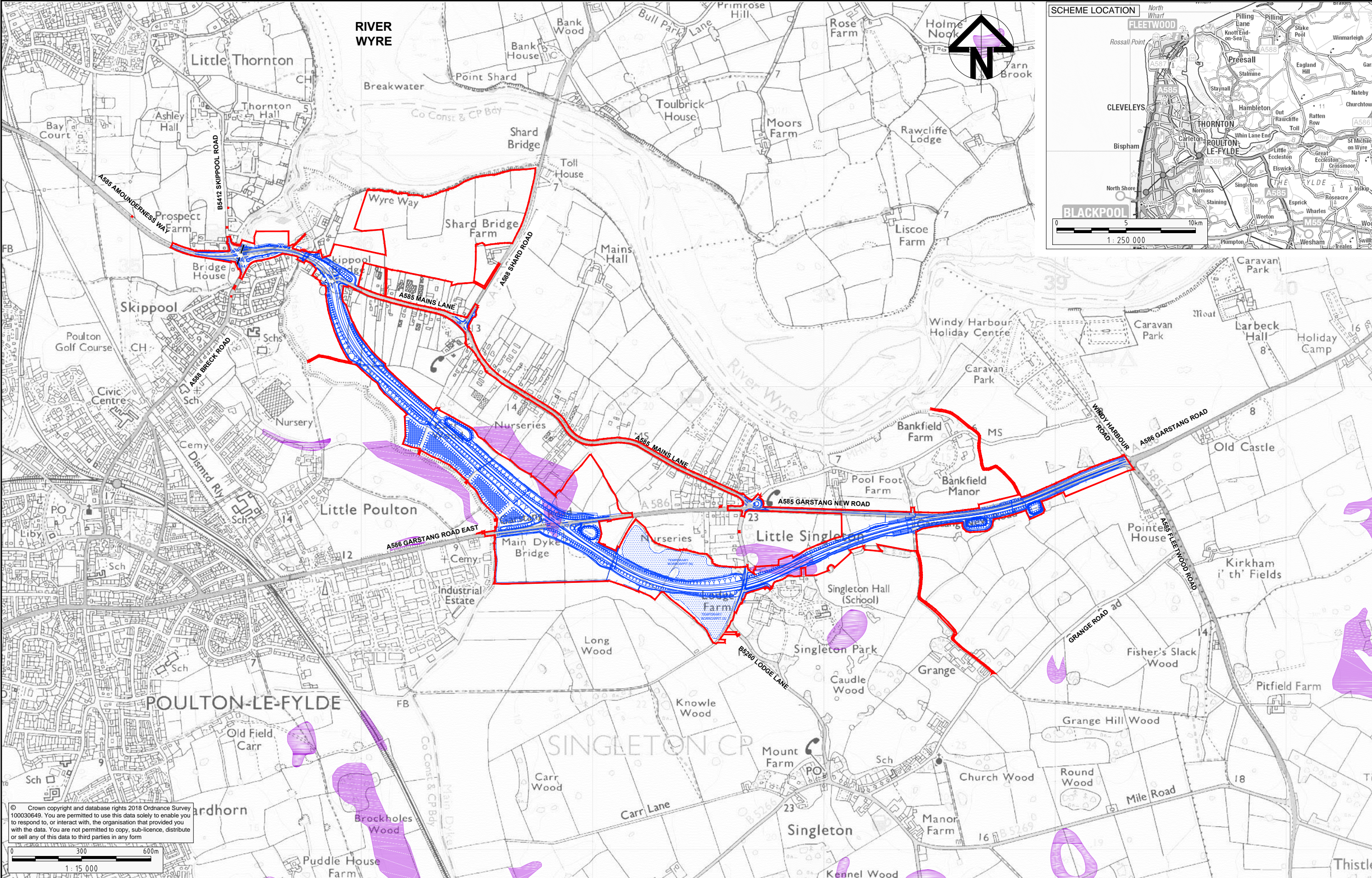
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	Draft Order Limits		Potentially Contaminative Land Use		Historic Tank Locations		Unknown Filled Ground & Mapped Artificial Made Ground
	500m Study Area		Infilled Ponds		Authorised Landfill Site (approx)		Historic Landfill Site
			Ponds		Authorised Landfill Site		
			Discharge Consent				

0	S8	OCT18	S8 - DCO SUBMISSION	JN	KB	NH
Rev	Status	Rev. Date	Purpose of revision	Drawn	Checked	Approved

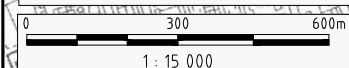


Project	A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME
Drawing Title	ENVIRONMENTAL STATEMENT REGULATION 5(2)(a) GEOLOGY AND CONTAMINATED LAND: GEOLOGY AND CONTAMINATED LAND FEATURES

Status	S8 - DCO SUBMISSION	Revision	0
Scale	1:15 000 @ A3	Date	OCT 2018
Drawn By	J.NORMAN		
Checked By	K.BURROWS		
Approved By	N.HENDERSON		
PINS No.	TR010035	FIGURE 13.1	
Drawing number	HE548643-ARC-EGN-SZ_ZZ_000-DR-LE-3079		



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KEY:

- Draft Order Limits
- The Scheme
- Mineral Safeguarding Areas

Rev	Status	Rev. Date	Purpose of revision	Drawn	Check'd	Appr'd
0	S8	OCT18	S8 - DCO SUBMISSION	JN	KB	NH

Client



Project

A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing Title

ENVIRONMENTAL STATEMENT
REGULATION 5(2)(a)
GEOLOGY AND CONTAMINATED LAND:
MINERAL SAFEGUARDING AREAS

Status

S8 - DCO SUBMISSION

Revision

0

Scale

1:15 000 @ A3

Date

OCT 2018

Drawn By

J.NORMAN

Checked By

K.BURROWS

Approved By

N.HENDERSON

PINS No.

TR010035

FIGURE 13.2

Drawing number

HE548643-ARC-EGN-SZ_ZZ_000-DR-LE-3080