

Ascerta

Landscape, Arboricultural & Ecological Solutions
for the Built Environment

Habitat Regulations

Assessment (HRA)

Castleton Sidings,

Rochdale

Ref: P.1733.22

August 2023

(see revision dates below)

Rev	Date	Details
A	19 th October 2023	General updates
B	2 nd November 2023	General updates
C	27 th November 2023	General updates

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P.1733.22

Habitats Regulation Assessment (HRA)

Of

Castleton Sidings, Rochdale

For

Kellen Homes

14 August 2023

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Appendix 1	European Site Conservation Objectives: Supplementary advice on conserving and restoring site features Rochdale Canal Special Area of Conservation (SAC)
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	Kellen Homes Report <i>Construction Environmental Management and Transport Plan Castleton Sidings, Heywood Rd, Rochdale, OL11 3AU, May 2023</i>
	E3P report reference 14-768-R1-1 <i>phase I and II Geoenvironmental Site Assessment, Castleton Sidings, May 2021</i>)
Appendix 2	Drawing SK01 Drainage Appraisal
	Drawing KH003-A-100 Site Layout

1.0 Introduction

Ascerta has been instructed by Kellen Homes to produce a Habitats Regulation Assessment (HRA) in compliance with the requirements of the Conservation of Habitats and Species Regulations 2017 (as amended); hereafter referred to as the 'Habitats Regulations' for the Castleton Sidings, Rochdale (hereafter referred to as the site). The site OS grid reference is SD 876 101 and the What3Words reference is plan.tips.worry.

Our client proposes the construction of 191 residential dwellings with associated access roads, landscaping and public open space provision. together with the erection of a substation and foul water pump station. A hybrid application has been submitted to the council with the residential element sought in full, with an outline application (all matters reserved) for operational works to facilitate the East Lancashire Railway (ELR) extension.

This document has been prepared to detail any significant impacts caused by the proposals on Rochdale Canal Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC), as required by Regulation 63 of the Habitats Regulations. The Council's Local Validation Checklist and the emerging Places for Everyone Joint Development Plan (PFE) Policy JP Allocation 20: Castleton Sidings both require a HRA to be undertaken considering the impacts on the Rochdale SAC.

The draft PFE Policy wording (Main Modifications draft, August 2023) states:

"The Rochdale Canal Special Area of Conservation (SAC) lies adjacent to the site. Protected habitats in the canal can be affected by changes in light, shading, leaf fall and water quality. As such, a project specific Habitats Regulation Assessment will be required for planning applications involving 50 or more residential units.to ensure that development close to the canal is designed sensitively to the protected habitat".

Under the requirements of the Habitats Regulations, this assessment considers whether the project will have a significant effect on areas of natural conservation importance which are designated under the Habitats Regulations.

Following completion of Stage 1: Screening, should Likely Significant Effects (LSE) be identified the HRA must proceed to Stage 2: an Appropriate Assessment against all impact pathways identified. The HRA Stage 1: Screening considered the following:

- Recreation
- Habitat Fragmentation/Loss
- Air quality
- Water quality
- Urbanisation effects
- Contaminated grounds

However only Air Quality and Water Quality were scoped into stage 2.

At Stage 2: Appropriate Assessment, it was concluded that the Project will have no residual adverse effects and as such, the HRA does not proceed to Stages 3 and 4.

1.1 The HRA Process

Regulation 63 of the Habitats Regulations requires a competent authority to make an 'Appropriate Assessment' of the implications of the plan or project for that site in view of its Conservation Objectives, before deciding to undertake or give consent for a plan or project which (a) is likely to have a significant effect on a European Site (either alone or in-combination with other plans or project), and (b) is not directly connected with or necessary to the management of that site. In light of the conclusions of the assessment, the competent authority may proceed with or consent to the plan or project only after having ascertained that it will not adversely affect the integrity of the European Site.

All plans and projects should identify any possible effects early in the process and then either alter the plan or project to avoid them or introduce mitigation measures to the point where no adverse effects remain. The 'competent authority' shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned, and if appropriate, having obtained the opinion of the general public.

The assessment of a project under the Habitats Regulations can be split into four stages as shown in Table 1.

Table 1: Stages of HRA

Stage	Description
Screening (Stage 1)	Assessment of the likelihood of a plan or project, alone or in-combination, having a significant effect on a European Site or its features. If a significant effect is likely, an Appropriate Assessment is required as set out in Regulation 63.
Appropriate Assessment (Stage 2)	A detailed consideration of the potential effects of the plan or project in relation to the Conservation Objectives for the European Site(s) to determine if there is likely to be an adverse effect on the integrity of the site (i.e. an effect that would compromise the site meeting its Conservation Objectives). If it can be demonstrated that with appropriate mitigation measures the plan or project would not give rise to an adverse effect on the integrity of a European Site, the plan or project can proceed.
Assessment of Alternative Solutions (Stage 3)	Where it cannot be demonstrated that there is no adverse effect, or there is uncertainty, the assessment would then need to consider if there were any other alternatives to the plan or project that would not give rise to adverse effects on the integrity of the European Site.
Assessment where no alternative solutions exist and where adverse impacts remain (Stage 4)	If adverse effects are still likely, then the competent authority would then consider if there are any Imperative Reasons of Overriding Public Interest (IROPI), only at this stage can Compensatory Measures be considered. It is very unusual for plans or projects to be considered in Stages 3 or 4.

2.0 Guidance and policy when assessing the potential effects of a plan or project

The following guidance and policy must be followed when assessing the potential effects of the plan or project:

- The Habitats Regulations Assessment Handbook, DTA Publications Ltd; which includes analysis of relevant recent caselaw; and
- Gov.uk website

Professional advice should be sought when required in order to ensure a thorough and scientific assessment of the plan or project and its potential effects on a European Site.

In addition to the guidance noted above, a number of websites has been used in February 2023 to gather information on the European Sites in order to inform the assessment:

- Natural England (NE) website;
- MAGIC (Multi-Agency Geographic Information for the Countryside) website; and
- Joint Nature Conservation Committee (JNCC) website.

3.0 Project Location

3.1 Desk Study

The site was visited on 16th March 2023 by Lizzie Atkinson MSc CIEEM and Liz Kenyon BSc (Hons), when a Preliminary Ecological Appraisal and Baseline Habitat Condition Assessment of the site was carried out.

The site comprises a disused railway siding with areas of hard standing and bare ground that have been encroached with grassland species, strands of ruderal/ephemeral vegetation and scrub throughout. Semi natural broadleaved woodland, species poor hedgerow and a wet ditch borders the northern site boundary and scattered trees are present throughout. Castle Hawk Golf Course lies immediately north of the site and Rochdale Canal SSSI/SAC approximately 150m east. The wider landscape is predominately agricultural land and residential.

A previous Preliminary Ecological Appraisal of the site was carried out in 2021 by E3P (E3P Report 80-464-R2-1 Preliminary Ecological Appraisal, Castleton, Rochdale). Previous surveys for breeding birds (E3P report, 80-464-R6-1 Breeding Bird Survey Report, reptiles (E3P report, 80-464-R4-1 Reptile Survey Report, Castleton, Rochdale) and Great Crested Newt eDNA surveys (E3P report, Great Crested Newt Surveys, Castleton Sidings, Rochdale) were also carried out in 2021 by E3P.

Bat activity transect surveys were carried out in 2021 by Rachel Hacking (Rachel Hacking report, Bat Transect Surveys, Castleton Sidings, Castleton, Rochdale, June 2021).

The following survey work has commenced and will be submitted to the Local Planning Authority (LPA):

- Reptiles survey
- Amphibian survey
- Survey of notable plant species

The current masterplan of the site (drawing KH003-A-100 Site Layout) is shown in Appendix 2. An aerial view is provided below at Figure 3.1, showing the residential element outlined in red and the ELR outline element in blue.

Figure 3.1 Aerial View of the site with the residential (red) and ELR (blue) development parcels identified.

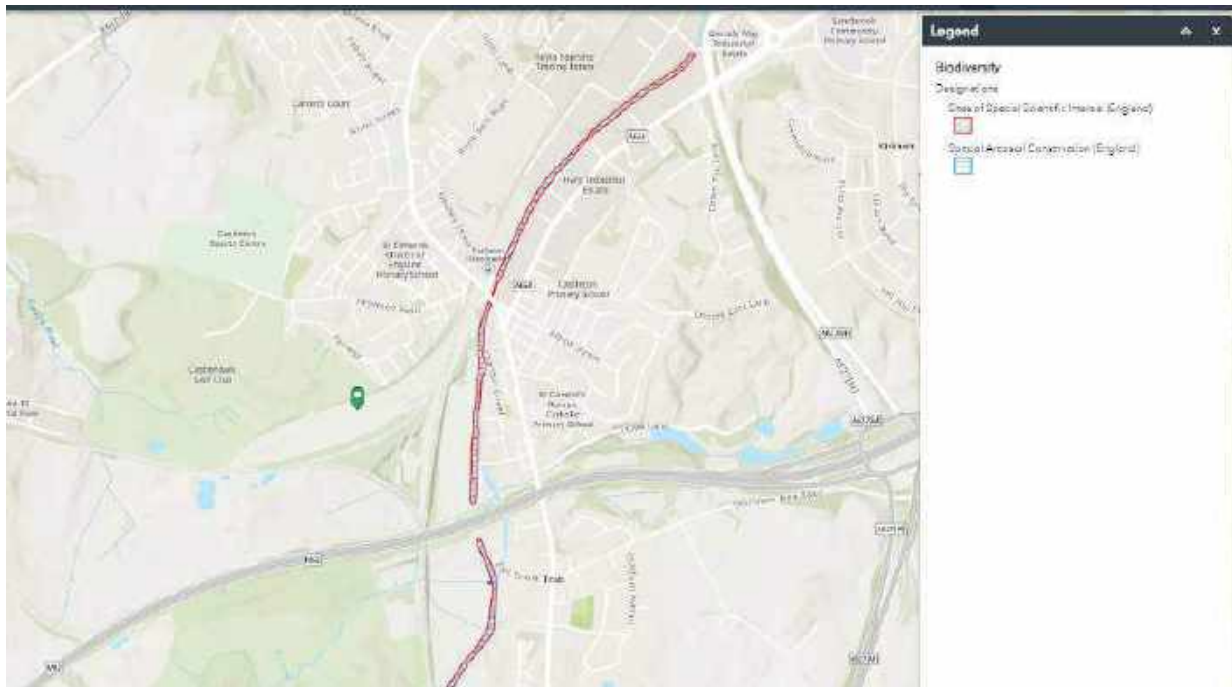


Rochdale Canal SSSI/SAC

Using the resources listed in Section 2.0, a 5km search radius was used. Within this radius, the only designated site was the Rochdale Canal SSSI/SAC. Therefore, the only site taken forward in this assessment is the Rochdale Canal SSSI/SAC, due to its designation for the qualifying feature, as detailed within section 4.0 and proximity to the proposed development.

The location of the Rochdale Canal SSSI/SAC is included within Figure 3.2 below.

Figure 3.2 showing the Rochdale Canal SSSI/SAC in relation to the Project Site.



The Rochdale Canal SSSI/SAC is of particular priority for biodiversity and geodiversity (Rochdale Core Strategy Policy G7 – Increasing the value of biodiversity and geodiversity, Rochdale Local Plan). The policy states:

“The Rochdale Canal - our focus is to ensure that the Rochdale Canal Special Area of Conservation and the wider biodiversity interest of the canal is given full and appropriate protection and ensure that development which delivers the economic and recreational value of the Rochdale Canal and its wider corridor supports and does not harm its biodiversity value”.

The Council’s Local Validation Checklist and the emerging Places for Everyone Joint Development Plan (PfE) Policy JP Allocation 20: Castleton Sidings both require a HRA to be undertaken considering the impacts on the Rochdale SAC.

The draft PfE Policy wording (Main Modifications draft, August 2023) states:

“The Rochdale Canal Special Area of Conservation (SAC) lies adjacent to the site. Protected habitats in the canal can be affected by changes in light, shading, leaf fall and water quality. As such, a project specific Habitats Regulation Assessment will be required for planning applications involving 50 or more residential units to ensure that development close to the canal is designed sensitively to the protected habitat”.

The current masterplan of the site (drawing KH003-A-100 Site Layout) is shown in Appendix 2.

4.0 European Site conservation objectives and qualifying features

The site lies at its closest point, approximately 150m east of Rochdale Canal SAC/SSSI and is bound from the site by an existing operation rail line. The features and the conservation objectives of the Rochdale Canal SAC/SSSI and the potential vulnerability of the features to any effects that might arise from the plan or project are as follows;

*“Situated within the Greater Manchester area, the Rochdale Canal contains important habitats for submerged aquatic plants and emergent vegetation, including extensive colonies of the nationally scarce floating water-plantain *Luronium natans*. The site also supports a diverse assemblage of aquatic flora, in particular nine species of pondweed *Potamogeton* spp. The plant communities found in the Rochdale Canal are characteristic of mesotrophic water bodies, i.e. those which are moderately nutrient-rich.*

“Opened in 1804, the Rochdale Canal became the first of Manchester’s three trans-Pennine canals and principal cargoes included coal, agricultural produce and materials for the textiles industry (Canal & River Trust, ND).

“The canal is situated within the Manchester conurbation National Character Area (NCA) which is a predominantly urban area, bringing together a number of large settlements. The Manchester Pennine Fringe NCA wraps around the conurbation to the east and to the north. The Mersey Valley NCA lies to the west of the area, while the Shropshire, Cheshire and Staffordshire Plain NCA extends to the south. The high-rise buildings of Manchester city centre serve as a visual orientation point within the surrounding urban context, and can be seen from many viewpoints in the conurbation and in surrounding NCAs”

S o u r c e : (Natural England’s European Site Conservation Objectives: Supplementary advice on conserving and restoring site features Rochdale Canal Special Area of Conservation (SAC), Appendix 1, January 2019)

Qualifying Features

The Rochdale Canal SAC/SSSI is designated for the following feature (with European site features code);

- S1831 Floating water-plantain, *Luronium natans*

*"Floating water-plantain *Luronium natans* occurs in a range of freshwater situations, including nutrient poor lakes in the uplands, slowly-flowing lowland rivers, pools, ditches and canals that are moderately nutrient-rich. The floating water-plantain is an aquatic plant endemic to Europe. It has a complex life history and ecology and is notoriously difficult to identify. Rochdale Canal supports a significant population of floating water-plantain *Luronium natans* in a botanically diverse water-plant community. This population of *Luronium* is representative of the formerly more widespread canal populations of north-west England.*

*“*Luronium natans* occurs as two forms: in shallow water with floating oval leaves, and in deep water with submerged rosettes of narrow leaves. The plant thrives best in open situations with a moderate degree of disturbance, where the growth of emergent vegetation is held in check. Populations fluctuate greatly in size, often increasing when water levels drop to expose the bottom of the water body. Populations fluctuate from year to year, and at many sites records of *L. natans* have been infrequent, suggesting that only small populations occur, in some cases possibly as transitory colonists of the habitat. Populations tend to be more stable at natural sites than artificial ones, but approximately half of recent (post-1980) records are from canals and similar artificial habitats. Its habitat in rivers has been greatly reduced by channel-straightening, dredging and pollution, especially in lowland situations.”*

(Source: European Site Conservation Objectives: Supplementary advice on conserving and restoring site features Rochdale Canal Special Area of Conservation (SAC), Appendix 1).

Conservation Objectives for Rochdale Canal SAC

With regards to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed previously), and subject to natural change;

"Ensure the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of the habitats of qualifying species
- The structure and function of the habitats of qualifying species
- *The supporting processes on which the habitats of qualifying species rely*
- *The populations of the qualifying species; and*
- *The distribution of the qualifying species within the site".*

Source: Natural England European Site Conservation Objectives for Rochdale Canal Special Area of Conservation (2017)

Air Quality

The Supplementary Advice on conserving and restoring site features sets out the following objective:

"Restore as necessary the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).

"The supporting habitat of this feature is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition (including food-plants) and reducing supporting habitat quality and population viability of this feature".

5.0 Stage 1 - Screening for likely significant effects

5.1 Likelihood of Significant Effects

Stage 1 of the HRA, the screening, is a test of Likely Significant Effect (LSE) to determine whether an Appropriate Assessment is required against all impact pathways identified. The screening is done considering the proposal in isolation and therefore not in-combination with any other plans or projects. It is also done in the absence of avoidance or other mitigation measures. Note that the assessment is made with awareness of the conservation objectives for the features of the European Site, however the actual assessment of the plan or project against the conservation objectives is not required until the Appropriate Assessment (Stage 2).

5.2 Potential Impacts

Recreation

European sites can be adversely affected by recreational activities such as dog walking which can cause harassment of local wildlife, damage to sensitive habitats as well as impacts to soil nutrients from potential dog fouling. Other activities such as walking, running and biking can lead to soil compaction and erosion.

Habitat Fragmentation/Loss

Habitat fragmentation can occur directly or indirectly in close proximity to European sites, with development result in either direct or indirect habitat loss as a consequence of the development. Loss of off-site, functional habitat outside of European site boundary can lead to habitat fragmentation/loss of connectivity. Species mortality can increase due to potential collision risks due to habitat fragmentation.

Air quality

Air pollution, particularly associated with increased vehicular traffic, has been identified as a direct threat to biodiversity. Pollution created during construction can significantly contribute to air pollution and can carry for large distances. Oxides of Nitrogen (NOx) emissions are predominately related to vehicular exhaust and NOx has been found to have a directly toxic effect upon vegetation. Natural England has previously advised the effects of vehicular atmospheric emissions should be considered if roads are within 200m of a European site.

A full air quality assessment has been undertaken for the site and report Air Quality Assessment, Castleton Sidings, Rochdale, Redmore Environmental, April 2023 should be read in conjunction with this report.

Water quality

An increase in development can result in reduced water quality of rivers and surrounding habitats. Sewage and industrial effluent discharges can contribute to nutrient changes within European sites, leading to unfavourable conditions. Additionally, a loss of permeable surfaces, due to development, can lead to an increase in surface run off and flooding, which can lead to contamination of watercourse links and reduced water quality.

A Flood Risk Assessment (FRA) and Drainage Report has been undertaken for the site by Townsend Water Engineering Limited and should be read in conjunction with this report.

Urbanisation effects

Urbanisation impacts are closely linked with recreational impacts but anti-social impacts such as vandalism, littering and fly tipping can cause damaging impacts to European Sites. Additionally, an increase in residents will often lead to an increase in domestic animals such as cats and dogs, that may disturb and predate on wildlife. Other urbanisation effects include light and noise pollution, which adversely effects bat and bird species.

Contaminated grounds

Historical use of a site, particularly manufacturing and mining works, can contribute to ground contamination. These include heavy metals such as arsenic, lead, mercury as well as asbestos. Construction works within a site can lead to further soil contamination if site works are not carried out appropriately.

A phase I and II Geoenvironmental Site Assessment was undertaken by E3P (E3P report reference 14-768-R1-1 *phase I and II Geoenvironmental Site Assessment, Castleton Sidings, May 2021, Appendix 1*) and should be read in conjunction with this report.

5.3 Likely Significant Effects

Recreation

The proposals are for the development of residential dwellings and engineering works to facilitate the ELR expansion. The ELR expansion works are considered to have a negligible impact with regards to recreation. The residential element will indirectly impact Rochdale Canal SSSI/SAC through an increase in recreational pressure and disturbance from new residents. Likely recreational impacts are detailed in section 5.2 and also include a potential increase in water sports and boat moorings, which may also lead to displacement and spread of invasive species. New residents will likely frequent Rochdale Canal SSSI/SAC due to proximity

A footpath is present adjacent to the eastern bank of Rochdale Canal SSSI/SAC, this will reduce the impacts such as soil compression/erosion relating to recreational activity such as running/walking and biking that will likely increase due to the proposals.

The masterplan includes areas of public open space (POS) to be provided within the proposals (see drawing KH003-A-100 Site Layout, Appendix 2). A significant area of POS (circa 3.29ha), over and above the policy requirement, is provided including an Eco Park, 1.3km of new circulation routes and a LEAP. New walking routes connect to existing pedestrian footpaths that will provide permeability to the Green Belt and beyond. Taking into account the open space and links to Green Belt, the increased footfall from the development would not be at a scale that it would result in significant adverse effects on the canal.

Other local sites such as Hopwood Woodlands Local Nature Reserve (LNR), approximately 1.3km south, Meadow By Heywood Cemetery Site of Biological Importance (SBI), 1.8km north-west, Glade & Oaken Bank Woods SBI, 1.6km south, Hopwood Clough SBI, 1.3km south, Lords Wood SBI, 1.7km south; and A627M By Tandle Hill SBI, 1.5km east lie within the vicinity of the proposals and are also likely to share the increased recreational impact that the proposals will produce.

No likely significant effects.

Habitat Fragmentation/Loss

The proposals will not result in a loss of land within the designated site as the proposals lie 150m east of the site (drawing KH003-A-100 Site Layout, Appendix 2). There will be a loss of habitats to accommodate the proposals, however, it is considered that the loss of habitats within the site will not adversely impact the qualifying feature of Rochdale Canal SSSI/SAC, Floating water-plantain *Luronium natans*, as it provides limited habitat for the species within the site.

No likely significant effects.

Air quality

The Rochdale Canal SSSI/SAC lies within 150m of the site, therefore without mitigation, the proposals of the construction of residential dwellings could potentially impact the air quality due to an increase in vehicular pollution. NO_x has been found to have a directly toxic effect upon vegetation, which may adversely impact species and habitats within Rochdale Canal SSSI/SAC including, Floating water-plantain *Luronium natans*, which is particularly sensitive to pollution.

No likely significant effects identified in relation to the ELR works during the construction and operational phases. However, air quality is considered further at Stage 2 in relation to the residential development.

Water quality

The Rochdale Canal SSSI/SAC is not hydrologically linked to the site as no running water courses are present, with only a seasonally wet ditch to the north of the site.

The existing brownfield site drains via a culvert into Trub Brook, located south of the site. The residential drainage strategy proposes the surface water will drain into the existing culverted watercourse and outfall into Trub Brook (see drawing SK01 Drainage Appraisal, Appendix 2). This will likely result in an increase in nutrient loading within the hydrological catchment of the SAC/SSSI, through the production of wastewater during construction or operation, potentially leading to degradation of habitat or changes in water quality.

The site is located in Flood Zone 1 which has a very low risk of surface water flooding. As set out within the accompanying Flood Risk Assessment, on-site attenuation is proposed up to the 1 in 100-year event plus climate change. The FRA concludes that development will not result in an increase in surface water flooding as an appropriate drainage scheme is proposed. The proposed development could result in species mortalities and injuries e.g. through pollution incidents during wet weather to the adjacent watercourses, such as the offsite pond to the south west of the site. The increased input could lead to eutrophication of the watercourse and connected waterbodies during construction or operation; however, this is limited as the water body is separated from the proposed development site by an operational train line.

Surface water will be discharged into Trub Brook at 90l/s, reducing the existing brownfield run off by 30%, as agreed with Rochdale County Council. Therefore, it is unlikely that the development would have a significant adverse impact on the SAC.

No likely significant impacts are identified for the outline ELR development.

Urbanisation effects

Urbanisation impacts are closely linked with recreational impacts but anti-social impacts such as vandalism, littering and fly tipping can cause damaging impacts to European Sites. Additionally, an increase in residents will often lead to an increase in domestic animals such as cats and dogs, that may predate on wildlife. Other urbanisation effects include light and noise pollution, which adversely affect bat and bird species.

The Rochdale Canal SSSI/SAC contains vitally important habitats for submerged aquatic plants and emergent vegetation, including extensive colonies of the nationally scarce Floating water-plantain *Luronium natans*, which Rochdale Canal SSSI/SAC designated for, as well as Water violet *Hottonia palustris*, and a diverse assemblage of pond weeds *Potamogeton spp.* Urbanisation impacts such as littering, fly tipping and vandalism can adversely impact these species, particularly Floating water-plantain *Luronium natans*, as it particularly sensitive to pollution.

Urbanisation effects are associated with the number of people visiting the SSSI/SAC. As set out above, the overprovision of POS will reduce the potential footfall on the canal, which will in turn limit urbanization effects such as littering and dog walking. Taking into account the open space and links to Green Belt, the increased footfall from the development would not be at a scale that it would result in significant adverse effects on the canal.

Contaminated grounds

Historical railway works, manufacturing and mining works have taken place in the vicinity of the site which may be attributed to ground contamination and the site has predominately been left undisturbed for a number of years. Construction works within a site can lead to further soil contamination if soils are not handled appropriately.

A phase I and II Geoenvironmental Site Assessment was undertaken by E3P (E3P report reference 14-768-R1-1 *phase I and II Geoenvironmental Site Assessment, Castleton Sidings, May 2021, Appendix 1*) and should be read in conjunction with this report. Full results and recommendations are detailed within the report and the assessment of contaminated grounds will not be discussed at stage 2.

A Construction Environmental Management and Transport Plan report has been prepared by Kellen Homes (Kellen Homes Report *Castleton Sidings, Heywood Rd, Rochdale, OL11 3AU, Construction Environmental Management and Transport Plan May 2023, Appendix 1*) which should be read in conjunction with this report.

6.0 Stage 2 - Appropriate Assessment

6.1 Assessment of potentially adverse effects without additional mitigation measures

Air quality

The site lies within 150m of The Rochdale Canal SSSI/SAC, as a result of road vehicle exhaust emissions associated with the development, the proposal has the potential to adversely impact the SSSI/SAC.

An Ecological Air Quality Assessment has been prepared by Redmore (Ref: 6299-1r1) to assess the potential impacts.

The Stage 1 assessment concluded that "likely significant effects from the development alone can be ruled out". The Stage 2 assessment identified that in-combination effects with other plans and developments could not be screened as not significant, and so dispersion modelling was undertaken to quantify potential impacts on annual mean NO_x, NH₃ concentrations and annual nitrogen deposition.

An Air Quality Assessment (AQA) has been prepared by Redmore (report reference 6299-1r1, Ecological Air Quality Assessment, appendix 1) concludes within section 7 that it is considered unlikely the receptors would represent locations of suitable habitat for the qualifying feature. As such, any predicted increase in nitrogen deposition at these positions is not considered likely to affect the integrity of the designation and likely significant effects associated with the development both alone and in-combination can therefore be ruled out.

Water quality

When considered alone, without suitable mitigation, the proposed development cannot be determined to have no adverse impact on the integrity of the Rochdale Canal SSSI/SAC. However, future drainage networks are to be linked to the existing adopted combined sewer within the site, and therefore will not be discharged into the Rochdale Canal SSSI/SAC. Additionally, there will be a 30% reduction in surface water run-off.

Any nutrient changes and pollution that will be produced by the proposals could cause degradation and changes to the water quality of Rochdale Canal SSSI/SAC, which may adversely impact vitally important habitats for submerged aquatic plants and emergent vegetation, including extensive colonies of the nationally scarce Floating water-plantain *Luronium natans*, which Rochdale Canal SSSI/SAC designated for, as well as Water violet *Hottonia palustris*, and a diverse assemblage of pond weeds *Potamogeton spp.* However, as set out above, the surface water run-off will be managed on site, and the existing run-off rate reduced by 30% to 90l/s. As such, it is unlikely that the development would have a significant adverse impact on the Rochdale Canal SAC with regards to water pollution in respect of the residential development and the outline works sought for the ELR expansion.

6.2 Assessment of potentially adverse effects with additional mitigation measures

Air quality

Dust emissions during the construction phase will be kept to a minimum during the construction phase with the implementation of a Construction Ecology Management Plan (CEMP).

A Construction Environmental Management and Transport Plan report has been prepared by Kellen Homes (Kellen Homes Report *Castleton Sidings, Heywood Rd, Rochdale, OL11 3AU, Construction Environmental Management and Transport Plan May 2023*, Appendix 1) which should be read in conjunction with this report.

An Air Quality Assessment (AQA) has been prepared by Redmore (report reference 6299-1r1, Ecological Air Quality Assessment, appendix 1) which concludes that any predicted increase in nitrogen deposition at these positions is not considered likely to affect the integrity of the designation. Likely significant effects associated with the development both alone and in-combination can therefore be ruled out.

Water quality

Future drainage networks are to be linked to the existing adopted combined sewer within the site, and therefore will not be discharged into the Rochdale Canal SSSI/SAC.

The surface water run-off will be managed on site, and the existing run-off rate reduced by 30% to 90l/s. As such, it is unlikely that the development would have a significant adverse impact on the Rochdale Canal SAC with regards to water pollution in respect of the residential development and the outline works sought for the ELR expansion.

7.0 Conclusions on site integrity

The screening assessment identified a number of key impacts that would likely arise as a consequence of the proposals and adversely impact the integrity of the Rochdale Canal SSSI/SAC and its conservation objectives described in section 4.0. Based on the information gathered from the screening process, an assessment of the likely significant adverse effects that have been identified. Dispersion modelling has been undertaken to consider vehicle movements from the committed developments. The results indicate that likely significant effects associated with the development in-combination can be ruled out for oxides of nitrogen, ammonia and nitrogen deposition (Section 6.0, Redmore AQA report) and will not adversely affect the integrity of the site, then the integrity of the European Site will be maintained.

This assessment has considered the likely significant effects of development on the Rochdale Canal SAC, which included:

- Recreation
- Habitat Fragmentation/Loss
- Air quality
- Water quality
- Urbanisation effects

Only Air Quality and Water Quality were scoped into Appropriate Assessment (Stage 2).

The Appropriate Assessment (Stage 2) concludes that the proposed development is unlikely to have a significant adverse effect on the Rochdale Canal SAC.

8.0 References

<https://www.gov.uk/guidance/habitats-regulations-assessments-protecting-a-european-site>

Ministry of Housing, Communities and Local Government (2021), *National Planning Policy Framework (NPPF)*

Multi Agency Geographic Information for the Countryside (MAGIC) [online]

Natural England Access to Evidence <http://publications.naturalengland.org.uk>

Natural England *European Site Conservation Objectives: Supplementary advice on conserving and restoring site features Rochdale Canal Special Area of Conservation (SAC)* [Accessed 20/02/2023]

South East Wales Strategic Planning Group Habitat Regulations Assessment (HRA): A toolkit to support HRA Screening and Appropriate Assessment Of Plans, [online, assessed 20.02.2023]

Tyldesley, D. and Chapman, C. (2013) *The Habitats Regulations Assessment Handbook*. Nov 2019 edition. UK, DTA Publications Ltd <https://www.dtapublications.co.uk/>

Appendix 1

European Site Conservation Objectives for Rochdale Canal Special Area of Conservation

Site code: UK0030266



With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of the habitats of qualifying species
- The structure and function of the habitats of qualifying species
- The supporting processes on which the habitats of qualifying species rely
- The populations of the qualifying species, and,
- The distribution of the qualifying species within the site.

This document should be read in conjunction with the accompanying *Supplementary Advice* document, which provides more detailed advice and information to enable the application and achievement of the Objectives set out above.

Qualifying Features:

S1831. *Luronium natans*; Floating water-plantain

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 as amended from time to time (the “Habitats Regulations”). They must be considered when a competent authority is required to make a ‘Habitats Regulations Assessment’, including an Appropriate Assessment, under the relevant parts of this legislation.

These Conservation Objectives and the accompanying Supplementary Advice (where available) will also provide a framework to inform the measures needed to conserve or restore the European Site and the prevention of deterioration or significant disturbance of its qualifying features.

These Conservation Objectives are set for each habitat or species of a [Special Area of Conservation \(SAC\)](#). Where the objectives are met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving Favourable Conservation Status for that species or habitat type at a UK level. The term ‘favourable conservation status’ is defined in regulation 3 of the Habitats Regulations.

Publication date: 27 November 2018 (version 3). This document updates and replaces an earlier version dated 30 June 2014 to reflect the consolidation of the Habitats Regulations in 2017.



European Site Conservation Objectives: Supplementary advice on conserving and restoring site features

**Rochdale Canal Special Area of Conservation (SAC)
UK0030266**



Image taken from Canal and Rivers Trust

Date of Publication: 25 January 2019

About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to Rochdale Canal SAC. This advice should therefore be read together with the SAC Conservation Objectives available [here](#).

You should use the Conservation Objectives, this Supplementary Advice and any case-specific advice given by Natural England when developing, proposing or assessing an activity, plan or project that may affect this site'

This Supplementary Advice to the Conservation Objectives presents attributes which are ecological characteristics of the designated species and habitats within a site. The listed attributes are considered to be those that best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the Conservation Objectives. Each attribute has a target which is either quantified or qualitative depending on the available evidence. The target identifies as far as possible the desired state to be achieved for the attribute.

The tables provided below bring together the findings of the best available scientific evidence relating to the site's qualifying features, which may be updated or supplemented in further publications from Natural England and other sources. The local evidence used in preparing this supplementary advice has been cited. The references to the national evidence used are available on request. Where evidence and references have not been indicated, Natural England has applied ecological knowledge and expert judgement. You may decide to use other additional sources of information.

In many cases, the attribute targets shown in the tables indicate whether the current objective is to 'maintain' or 'restore' the attribute. This is based on the best available information, including that gathered during monitoring of the feature's current condition. As new information on feature condition becomes available, this will be added so that the advice remains up to date.

The targets given for each attribute do not represent thresholds to assess the significance of any given impact in Habitats Regulations Assessments. You will need to assess this on a case-by-case basis using the most current information available.

Some, but not all, of these attributes can also be used for regular monitoring of the actual condition of the designated features. The attributes selected for monitoring the features, and the standards used to assess their condition, are listed in separate monitoring documents, which will be available from Natural England.

These tables do not give advice about SSSI features or other legally protected species which may also be present within the European Site.

If you have any comments or queries about this Supplementary Advice document please contact your local Natural England adviser or email

HDIRConservationObjectivesNE@naturalengland.org.uk

About this site

European Site information

Name of European Site	Rochdale Canal Special Area of Conservation (SAC)
Location	Greater Manchester
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	1 st April 2005
Qualifying Features	See section below
Designation Area	25.55ha
Designation Changes	N/A
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	<i>Rochdale Canal SSSI</i>
Relationship with other European or International Site designations	N/A

Site background and geography

Situated within the Greater Manchester area, the Rochdale Canal contains important habitats for submerged aquatic plants and emergent vegetation, including extensive colonies of the nationally scarce floating water-plantain *Luronium natans*. The site also supports a diverse assemblage of aquatic flora, in particular nine species of pondweed *Potamogeton* spp. The plant communities found in the Rochdale Canal are characteristic of mesotrophic water bodies, i.e. those which are moderately nutrient-rich.

Opened in 1804, the Rochdale Canal became the first of Manchester's three trans-Pennine canals and principal cargoes included coal, agricultural produce and materials for the textiles industry (Canal & River Trust, ND).

The canal is situated within the Manchester conurbation National Character Area (NCA) which is a predominantly urban area, bringing together a number of large settlements. The Manchester Pennine Fringe NCA wraps around the conurbation to the east and to the north. The Mersey Valley NCA lies to the west of the area, while the Shropshire, Cheshire and Staffordshire Plain NCA extends to the south. The high-rise buildings of Manchester city centre serve as a visual orientation point within the surrounding urban context, and can be seen from many viewpoints in the conurbation and in surrounding NCAs. Further information on this NCA can be found [here](#)

About the qualifying features of the SAC

The following section gives you additional, site-specific information about this SAC's qualifying features. These are the natural habitats and/or species for which this SAC has been designated.

Qualifying Species:

- **S1831 Floating water-plantain *Luronium natans***

Floating water-plantain *Luronium natans* occurs in a range of freshwater situations, including nutrient-poor lakes in the uplands, slowly-flowing lowland rivers, pools, ditches and canals that are moderately nutrient-rich. The floating water-plantain is an aquatic plant endemic to Europe. It has a complex life history and ecology and is notoriously difficult to identify. Rochdale Canal supports a significant population of floating water-plantain *Luronium natans* in a botanically diverse water-plant community. This population of *Luronium* is representative of the formerly more widespread canal populations of north-west England.

Luronium natans occurs as two forms: in shallow water with floating oval leaves, and in deep water with submerged rosettes of narrow leaves. The plant thrives best in open situations with a moderate degree of disturbance, where the growth of emergent vegetation is held in check. Populations fluctuate greatly in size, often increasing when water levels drop to expose the bottom of the water body. Populations fluctuate from year to year, and at many sites records of *L. natans* have been infrequent, suggesting that only small populations occur, in some cases possibly as transitory colonists of the habitat. Populations tend to be more stable at natural sites than artificial ones, but approximately half of recent (post-1980) records are from canals and similar artificial habitats. Its habitat in rivers has been greatly reduced by channel-straightening, dredging and pollution, especially in lowland situations.

Table 1: Supplementary Advice for Qualifying Features: S1831. *Luronium natans*; Floating water-plantain

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Population (of the feature)	Population abundance	Maintain the abundance of the population where there is no decline >50 % in cover of <i>Luronium natans</i> within an occupied habitat area and within occupied habitat areas >2/3 of site open water cover provided by <i>Luronium natans</i> , whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	This will ensure there is a viable population of the feature which is being maintained at or increased to a level that contributes as appropriate to its Favourable Conservation Status across its natural range in the UK. Due to the dynamic nature of population change, the target-value given for the population size or presence of this feature is considered to be the minimum standard for conservation/restoration measures to achieve. This minimum-value may be revised where there is evidence to show that a population's size or presence has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period (generally at least 10 years). The values given here may also be updated in future to reflect any strategic objectives which may be set at a national level for this feature. Given the likely fluctuations in numbers over time, any impact-assessments should focus on the current size of the site's population, as derived from the latest known or estimated level established using the best available data. This advice accords with the obligation to avoid deterioration of the site or significant disturbance of the species for which the site is designated, and seeks to avoid plans or projects that may affect the site giving rise to the risk of deterioration. Similarly, where there is evidence to show that a feature has historically been more abundant than the stated minimum target and its current level, the ongoing capacity of the site to accommodate the feature at such higher levels in future should also be taken into account in any assessment. Unless otherwise stated, the population size or presence will be that measured using standard methods, such as peak mean counts or breeding surveys. This value is also provided recognising there will be inherent variability as a result of natural fluctuations and margins of error during data collection. Whilst we will endeavour to keep these values as up to date as possible, local Natural England staff can advise that the figures	Natural England (2012) Definition of Favourable Condition – Rochdale Canal SSSI (Available on request from Natural England)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			stated are the best available. Many annual species undergo significant population fluctuations, unless there are fewer than 100 individuals (when an individual count is generally possible) counting is not going to be simple, partly as it is difficult to define functional individuals with a stoloniferous plant producing many plantlets. Discrete populations of <i>L. natans</i> must be greater than 50 m apart. Many habitats where <i>L. natans</i> is present may be subject to periodic major disturbance events and these may be important in enabling populations to persist at a site. Thus, there may naturally be considerable fluctuations in population size at a given site between monitoring visits and so only major fluctuations should be noted.	
Supporting habitat: extent and distribution	Distribution of supporting habitat	Maintain the distribution and continuity of the feature and its supporting habitat, including where applicable its component vegetation types and associated transitional vegetation types, across the site	A contraction in the range, or geographic spread, of the feature (and its component vegetation) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. Contraction may also reduce and break up the continuity of a habitat within a site and how well the species feature is able to occupy and use habitat within the site. Such fragmentation may have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for this feature and this may affect its viability.	
Supporting habitat: extent and distribution	Extent of supporting habitat	Maintain] the total extent of the habitats which support the feature to: 25.7ha of canal	In order to contribute towards the objective of achieving an overall favourable conservation status of the feature at a UK level, it is important to maintain or if appropriate restore the extent of supporting habitats and their range within this SAC. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending on the nature, age and accuracy of data collection, and may be subject to periodic review in light of improvements in data.	Natural England (2012) Definition of Favourable Condition – Rochdale Canal SSSI (Available on request from Natural England)
Supporting habitat: structure/	Habitat structure	Ensure the supporting water bodies are sufficiently free of other competing vegetation to	Luronium is intolerant of competition and occurs in a range of freshwater habitats – oligotrophic and mesotrophic lakes, slow flowing rivers and associated floodplain pools and small pools	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
function		allow space for this early successional species to thrive.	in heathland. There are also large populations in a number of disused or recently restored canals.	
Supporting habitat: structure/function	Substrate	Maintain a habitat substrate characterised by cohesive sediments which are not too coarse In areas of <i>L. natans</i>: Sediments cohesive and not coarser than 50/50 silt/sand.	Fine unconsolidated sediments are an unsuitable rooting medium and plants may be subject to uprooting. Conversely, where sediment is too coarse and mineral there may be scouring and poor root anchorage. Soft mineral sediments may support diverse vegetation provided boat traffic is low or absent. When boat traffic increases, fine unconsolidated sediments are an unsuitable rooting medium and plants may be subject to uprooting. Furthermore, under high boat traffic levels fine sediments are readily re-suspended leading to high turbidity levels and smothering of plant surfaces. Large quantities of leaf litter may lead to highly anoxic conditions unsuitable for plants and other organisms. Actual sediments are dependent on input of suspended solids in canal water supply, erosion within the canal and navigational requirements.	Natural England (2012) Definition of Favourable Condition – Rochdale Canal SSSI (Available on request from Natural England)
Supporting habitat: structure/function	Vegetation composition: invasive non-native species	Ensure the following invasive non-native species are absent from the site or being contained at a level which does not significantly affect the feature; <i>Crassula helmsii</i> , <i>Hydrocotyle ranunculoides</i> , <i>Myriophyllum aquaticum</i> , <i>Azolla filiculoides</i> ,	These alien plant species are highly competitive and will impact negatively on <i>Luronium</i>, which is not competitive. Other introduced species may have effects on ecosystem functioning through the food web or via direct effects on the plant community, e.g. artificially large waterfowl populations or non-native crayfish species. <i>Luronium natans</i> is particularly sensitive to competition from other species. Whilst competitive interactions are very difficult to measure, a simple judgement on the height of associated vegetation can give an indication of the likelihood of competitive exclusion. Other introduced species may have effects on ecosystem functioning through the food web or via direct effects on the plant community, e.g. large waterfowl populations or non-native crayfish species. Further negative indicators which should cause concern if present are bottom-feeding fish.	Natural England (2012), Rochdale Canal Favourable Condition Table. Data may be available from Natural England upon request Lansdown & Wade (2003)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat: structure/ function	Vegetation structure	Ensure supporting habitat is free of shade or competitive vegetation; taller species associated with <i>Luronium</i> patches should be no more than occasional.	Excessive overhanging vegetation both results in shading of aquatic vegetation and large inputs of organic matter in the form of leaf litter. Over-shading and leaf drop from developing bank-side trees denies opportunity for Floating water plantain to establish on large and growing sections of the canal. Bankside tree removal is often required to reduce shading effects and leaf litter input.	Natural England (2014), Site Improvement Plan
Supporting habitat: structure/ function	Water clarity	Maintain a high degree of water clarity, typically the canal bed should be clearly visible in water 1m deep in summer (where depth of canal allows).	Elevated turbidity levels as a result of, for example, high boat traffic densities, high phytoplankton densities, or the presence of benthic-feeding fish will have adverse impacts on submerged plant communities. Although <i>Luronium</i> may occur in naturally dystrophic waters with humic staining, this may be exacerbated by acidification, reducing water clarity further.	Natural England (2012) Definition of Favourable Condition – Rochdale Canal SSSI (Available on request from Natural England)
Supporting habitat: structure/ function	Water levels/ hydrology	Maintain water levels which are sufficient to maintain or restore populations; in shallow pools natural fluctuations in water level should be allowed to occur. There should be no drop in overall depth of more than 10% throughout the canal and water level fluctuations minimised during April to October	In shallow pools and similar sites plants often flower and fruit on draw-down zones as summer water levels recede. These processes should not be artificially interrupted, but will vary greatly from year to year depending on weather. Canals have small flows of water due to leakage and boat movements through locks. These flows can be essential elements in maintaining good water quality. Consistently low water levels may stress emergent and aquatic vegetation. High levels of lock usage on navigated canals can result in large fluctuations in water levels and associated scouring of bed sediments and aquatic vegetation.	Natural England (2012) Definition of Favourable Condition – Rochdale Canal SSSI (Available on request from Natural England)
Supporting habitat: structure/ function	Water quality/ quantity	Maintain water quality and quantity to a standard which provides the necessary conditions to support the feature	For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year during key stages of their life cycle. Poor water quality and inadequate quantities of water can adversely affect the availability and suitability of breeding, rearing and feeding habitats. Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Directive (WFD 2000/60/EC) will also be sufficient to support the SAC Conservation Objectives but in some cases more stringent standards may be needed to support the SAC feature. Further site-specific investigations may be required to establish appropriate standards for the SAC. L.uronium populations are present across a wide range of habitats with a corresponding range of water chemistry. This suggests that its tolerances to most water chemistry parameters are not especially demanding although links between presence/persistence and water quality are not yet understood. As such the water quality targets set out for freshwater habitats should be sufficient to protect populations from adverse impacts.	
Supporting processes (on which the feature and/or its supporting habitat relies)	Adaptation and resilience	Restore the feature's ability, and that of its supporting habitat, to adapt or evolve to wider environmental change, either within or external to the site	The overall vulnerability of this SAC to climate change has been assessed by Natural England (2015) as being high, taking into account the sensitivity, fragmentation, topography and management of this habitat. This means that this site is considered to be the most vulnerable sites overall and are likely to require the most adaptation action, most urgently. A site based assessment should be carried out as a priority. This means that action to address specific issues is likely. Individual species may be more or less vulnerable than their habitat itself. In many cases, change will be inevitable so appropriate monitoring would be advisable.	NATURAL ENGLAND, 2015. Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England [Available at http://publications.naturalengland.org.uk/publication/4954594591375360].
Supporting processes (on which the feature and/or its supporting habitat relies)	Air quality	Restore as necessary the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	The supporting habitat of this feature is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition (including food-plants) and reducing supporting habitat quality and population viability of this feature. Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH3), oxides of nitrogen (NOx) and sulphur dioxide (SO2), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk). Natural England (2014), Site Improvement Plan

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.	
Supporting processes (on which the feature and/or its supporting habitat relies)	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature and/or its supporting habitats.	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, site management strategies or plans, the Views about Management Statement for the underpinning SSSI and/or management agreements.	English Nature (2004), Views About Management Natural England (2014), Site Improvement Plan
Supporting processes (on which the feature and/or its supporting habitat relies)	Disturbance from human activity	The duration, intensity and/or frequency of disturbance events should not affect the environmental conditions necessary to support the feature	The loss or reduction in the disturbance regime (for example, grazing, water-level fluctuations, flood scouring, dredging and boat traffic) that would normally arrest succession is particularly significant.	
Supporting processes (on which the feature and/or its supporting habitat relies)	Regeneration	Maintain the regenerative ability of the population, indicated by a range of different plant sizes being present.	This implies effective ageing and recruitment of plants.	
Supporting processes (on which the feature and/or its supporting habitat relies)	Regeneration (sexual)	Ensure that, in shallow pools, there is a sufficient number of flowering and seeding plants each year	An increase in the presence of perennial vegetative plants may be associated with prolonged wetness or site permanence. In the case of populations of annual plants in shallow pools it is important to obtain evidence of sexual reproduction. The mere presence of plants only confirms the quality of seed set from previous generations. However, the degree of seed dormancy in <i>L. natans</i> is unknown and repeated recruitment from the seedbank without effective replenishment will reduce the long-term stability of the population.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting processes (on which the feature and/or its supporting habitat relies)	Regeneration (vegetative)	Maintain sufficient areas of shallow and still water for the development of ascending stolons bearing chains of plantlets, and for the production of floating leaves.	Canal populations are sterile clones that only reproduce vegetatively. Floating water-plantain has a number of apparently discrete reproductive strategies, annual flowering, perennial flowering, and perennial vegetative. It also occurs in dynamic metapopulations that contain different populations with different reproductive strategies. Any monitoring or conservation programme that does not take account of the dynamics of metapopulations and the requirements of the different reproductive strategies will not adequately represent the requirements of the species. Monitoring will provide a means by which data can be fed back into the system to refine conservation action. Further research is needed to explain the ecological requirements of some populations.	Lansdown & Wade (2003)
Supporting processes (on which the feature and/or its supporting habitat relies)	Water quantity/ quality	Where the feature or its supporting habitat is dependent on surface water and/or groundwater, maintain water quality and quantity to a standard which provides the necessary conditions to support the feature	For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type. Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the achievement of SAC Conservation Objectives but in some cases more stringent standards may be needed to reflect the ecological needs of the species feature. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC.	
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: Attribute relating to soils and nutrients have been removed as not considered relative to this feature.				

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Ecological Air Quality Assessment
Castle Sidings, Rochdale

Client: Kellen Homes Limited

Reference: 6299-1r1

Date: 20th September 2023



Report Issue

Report Title: Ecological Air Quality Assessment - Castle Sidings, Rochdale

Report Reference: 6299-1

Field	Report Version			
	1	2	3	4
Authored by	Emily Macey			
Position	Senior Air Quality Consultant			
Reviewed by	Jethro Redmore			
Position	Director			
Date of Issue	20 th September 2023			
Comment	-			

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1.0 INTRODUCTION

1.1 Background

1.1.1 Redmore Environmental Ltd was commissioned by Kellen Homes Limited to undertake an Ecological Air Quality Assessment in support of a residential development on land at Castle Sidings, Rochdale.

1.1.2 The proposals have the potential to cause changes in pollution levels at sensitive ecological locations as a result of road vehicle exhaust emissions associated with the development. An Ecological Air Quality Assessment was therefore undertaken in order to determine baseline conditions and assess potential impacts associated with the scheme.

1.2 Site Location and Context

1.2.1 The site is located on land at Castle Sidings, Rochdale, at approximate National Grid Reference (NGR): 387942, 410156. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The proposals comprise a hybrid planning application consisting of:

- Full planning application for residential development, including access, car parking, landscaping, open space and associated engineering and infrastructure including an electric substation and foul water pump station; and,
- Outline planning permission with all matters reserved for the principle of development to facilitate the East Lancashire Railway (ELR) extension.

1.2.3 A Habitats Regulations Assessment (HRA) is being produced in order to document and establish whether the proposed works may have likely significant effects on the Rochdale Canal Special Area of Conservation (SAC). An Ecological Air Quality Assessment was therefore required in order to inform the HRA by considering the potential for changes in atmospheric pollution levels to impact the SAC. This is detailed in the following report.

1.2.4 It should be noted that this report only considers potential air quality impacts at ecological designations. Reference should be made to the Air Quality Assessment

produced by Redmore Environmental (reference: 6299r3) for assessment of potential air quality impacts at human receptors.

2.0 ASSESSMENT STAGES

2.1.1 Natural England (NE) has produced 'Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations'¹ which describes how competent authorities and others will assess plans and projects likely to generate road traffic emissions and subsequently affect European sites. This provides a staged assessment methodology to provide consideration of potential air quality impacts from a development both alone and in-combination. The approach can be summarised as follows:

- Stage 1 - Determine the predicted change in Annual Average Daily Traffic (AADT) flow on road links within the vicinity of the ecological designation as a result of the development alone. If this is above 1,000 then there is a risk of a significant effect on air quality as a result of the development alone. As such, an Appropriate Assessment is required and dispersion modelling should be undertaken to quantify changes in pollution levels within the vicinity of the affected road links. If the change is below 1,000 then the assessment should proceed to Stage 2; and,
- Stage 2 - If the change is below 1,000 then there is a risk of an appreciable effect on air quality but is unlikely to be significant alone. As such, screening for in-combination effects should be undertaken. This requires the predicted change in AADT flow on road links within the vicinity of the ecological designation as a result of the development and any other relevant plans or projects to be determined. If this is below 1,000 then a likely significant effect can be ruled out and an Appropriate Assessment is not required. If the change is greater than 1,000 then an Appropriate Assessment is necessary and dispersion modelling should be undertaken to quantify changes in pollution levels within the vicinity of the affected road links. The results can then be analysed by the Project Ecologist to determine the potential for a likely significant effect.

2.1.2 The assessment results are summarised in the following Sections.

¹ Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations, NE, 2018.

3.0 STAGE 1 ASSESSMENT

- 3.1.1 Predicted vehicle trip generation from the proposed development on road links within 200m of the Rochdale Canal SAC was provided by Eddisons, the Transport Consultants for the project. This is summarised in Table 1.

Table 1 Predicted Development Vehicle Trip Generation

Link	Predicted Change in AADT Flow as a Result of the Development Alone
Durban Street/ Hannover Street	432
Heywood Road, east of Hannover Street	449
Heywood Road, west of Hannover Street	881
Manchester Road	666

- 3.1.2 As shown in Table 1, the Stage 1 Assessment indicated that the proposed development is not predicted to increase the AADT flow on any road link in the vicinity of the SAC by more than 1,000. As such, likely significant effects from the development alone can be ruled out and a Stage 2 Assessment was necessary.

4.0 **STAGE 2 ASSESSMENT**

- 4.1.1 Predicted changes in AADT flows in the assessment year of 2025 as a result of the proposed development and other in-combination plans developments, as well as predicted growth from the base year of 2019, on road links in the vicinity of the Rochdale Canal SAC was provided by Eddisons. This is summarised in Table 2.

Table 2 Predicted 2025 In-Combination Change in AADT Flows

Link	Predicted Change in AADT Flow as a Result of the Development Alone	Predicted 2025 In-Combination Change in AADT Flow
Durban Street/ Hannover Street	432	547
Heywood Road, east of Hannover Street	449	542
Heywood Road, west of Hannover Street	881	990
Manchester Road	666	2,425

- 4.1.2 As shown in Table 2, the proposed development, in-combination with other plans and projects, is predicted to increase AADT flows on Manchester Road by more than 1,000 over 2019 levels by 2025. As such, in-combination effects cannot be screened as not significant. Dispersion modelling was therefore undertaken in order to quantify changes in pollution levels at discrete receptor locations and provide data to support the HRA.

5.0 DISPERSION MODELLING METHODOLOGY

5.1 Introduction

5.1.1 The assessment included the following stages:

- Identification of discrete receptor locations;
- Dispersion modelling of oxides of nitrogen (NO_x) and ammonia (NH₃) emissions from the relevant road sources;
- Post processing of model outputs to produce predictions of pollution levels both with and without the development in place; and,
- Comparison of modelling results with the relevant criteria.

5.1.2 The following Sections outline the methodology and inputs used for the assessment.

5.1.3 Reference was made to the following documents throughout the assessment:

- NE 'Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations'²; and,
- Institute of Air Quality Management (IAQM) 'A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites'³.

5.1.4 It should be noted that the dispersion model produced by Redmore Environmental for the Air Quality Assessment (reference: 6299r3) was used in order to ensure continuity within the project. As such, reference should be made to the original report for details of the following input parameters:

- Meteorological data;
- Land use characteristics;
- NO_x emission factors; and,
- Model verification procedure.

² Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations, NE, 2018.

³ A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites v1.1, IAQM, 2020.

5.1.5 Any amendments to the original model are noted in the following Sections.

5.2 **Modelled Receptors**

5.2.1 Discrete receptor locations were included in the model to quantify changes in pollution levels throughout the Rochdale Canal SAC. Transects were included at each location in order to provide analysis of pollution reduction with distance from source. The following format was utilised for receptor identification:

- EX-0 - Closest boundary of the SAC to the roadside;
- EX-1 - 10m from the closest boundary of the SAC to the roadside;
- EX-2 - 20m from the closest boundary of the SAC to the roadside; and,
- EX-3 - 30m from the closest boundary of the SAC to the roadside.

5.2.2 Receptor locations are summarised in Table 3.

Table 3 Discrete Receptor Locations

Receptor		NGR (m)		Distance from Roadside (m)
		X	Y	
E1-0	Rochdale Canal SAC	388341.4	410534.7	0
E1-1	Rochdale Canal SAC	388344.8	410544.2	10
E1-2	Rochdale Canal SAC	388348.3	410553.6	20
E1-3	Rochdale Canal SAC	388351.7	410563.0	30
E2-0	Rochdale Canal SAC	388333.4	410508.9	0
E2-1	Rochdale Canal SAC	388329.7	410499.5	10
E2-2	Rochdale Canal SAC	388326.3	410490.2	20
E2-3	Rochdale Canal SAC	388322.8	410480.8	30

5.2.3 Reference should be made to Figure 2 for a map of the discrete receptor locations.

5.3 Modelling Scenarios

5.3.1 Potential impacts have been defined by predicting NO_x and NH₃ concentrations and nitrogen deposition rates using dispersion modelling for the following scenarios:

- 2019 baseline - predicted pollution levels without committed developments or the proposed development;
- 2025 Do-Minimum (DM) - predicted pollution levels inclusive of committed developments but without the proposed development; and,
- 2025 Do-Something (DS) - predicted pollution levels with committed developments and the proposed development.

5.3.2 The change in pollution level as a result of the development has been described as the Process Contribution (PC) throughout this report.

5.3.3 The DM scenario (i.e. without development) included anticipated baseline traffic data, inclusive of anticipated growth, for the relevant assessment year. The DS scenario (i.e. with development) included anticipated baseline traffic data, inclusive of anticipated growth, for the relevant assessment year, in addition to predicted vehicle trips associated with the operation of the development.

5.4 Environmental Quality Standards

5.4.1 A critical load is defined by the Air Pollution Information Service (APIS) website⁴ as

"A quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge."

5.4.2 A critical level is defined as:

"Concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge."

⁴ www.apis.ac.uk.

- 5.4.3 A critical load refers to deposition of a pollutant, while a critical level refers to pollutant concentrations in the atmosphere (which usually have direct effects on vegetation or human health).
- 5.4.4 When pollutant loads (or concentrations) exceed the critical load or level it is considered that there is a risk of harmful effects. The excess over the critical load or level is termed the 'exceedence'. A larger exceedence is often considered to represent a greater risk of damage.
- 5.4.5 Maps of critical loads and levels and their exceedences have been used to show the potential extent of pollution damage and aid in developing strategies for reducing pollution. Decreasing deposition below the critical load is seen as a means for avoiding the risk of damage. However, even a decrease in an exceedence may infer that less damage will occur.
- 5.4.6 Table 4, presents the critical levels for the protection of vegetation for pollutants considered within this assessment.

Table 4 Critical Levels for the Protection of Vegetation

Pollutant	Critical Level	
	Concentration ($\mu\text{g}/\text{m}^3$)	Averaging Period
NO _x	30	Annual mean
NH ₃	1 ^(a)	Annual mean
	3 ^(b)	Annual mean

Note: (a) Specified for the protection of lichens and bryophytes.

(b) Specified for the protection of higher plants.

- 5.4.7 Review of the APIS website⁵ indicated that lichens and bryophytes are not present within the Rochdale Canal SAC. As such, an annual mean NH₃ critical level of 3 $\mu\text{g}/\text{m}^3$ was used throughout the assessment.

⁵ www.apis.ac.uk.

5.4.8 Nitrogen deposition critical loads were obtained from the APIS website⁶. These are presented in Table 5.

Table 5 Critical Loads for Nitrogen Deposition

Feature	Broad Habitat	Relevant Nitrogen Critical Load Class	Nitrogen Critical Load (kgN/ha/yr)	
			Low	High
Luronium natans - Floating water-plantain (S1831)	Standing open water and canals	Permanent oligotrophic waters: Softwater lakes	3	10

5.4.9 In relation to the critical loads shown in Table 5, APIS states:

"The critical load only applies if the interest feature is associated with softwater oligotrophic or dystrophic lakes at the site. If the feature is not depending on these lake types, there is no comparable critical load available."

5.4.10 The Rochdale Canal SAC is not a softwater oligotrophic or dystrophic lake and therefore there is no comparable critical load for the site. As such, the change in nitrogen deposition has been predicted and considered in the context of baseline levels, the affected areas and potential sensitivity of the designated feature.

5.5 Traffic Data

5.5.1 Traffic data for use in the assessment was taken from the Air Quality Assessment (reference 6299r3). However, the modelled area was simplified in order to reduce model run times. A summary of the traffic flows used in the Ecological Air Quality Assessment is provided in Table 6.

⁶ www.apis.ac.uk.

Table 6 Traffic Data

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		2019	2025 DM	2025 DS			
L1	A664, Manchester Road, North of Partington Street	16,082	17,103	17,678	1.50	8.7	45
L2	A664, Manchester Road, Northbound (NB), South of A58, Slow Phase (SP)	5,355	5,695	5,839	2.88	6.9	30
L3	A664, Manchester Road, NB, Intersection with A58, SP	5,355	5,695	5,839	2.88	8.5	30
L4	A664, Manchester Road, NB, North of A58, SP	15,926	16,937	17,081	2.98	8.8	30
L5	A58, Manchester Road, Eastbound (EB), Intersection with A664/B6452, SP	15,926	16,937	17,009	2.98	11.3	30
L6	A58, Manchester Road, EB, East of A664 Edinburgh Way, SP	17,889	19,025	19,097	3.71	11.5	30
L7	A58, Manchester Road, EB, West of Kemp Avenue	17,889	19,025	19,097	3.71	6.8	40
L8	A58, Manchester Road, EB, East of Kemp Avenue	17,889	19,025	19,097	3.71	6.9	55
L9	A58, Manchester Road, Westbound (WB), East of Kemp Avenue	18,933	20,135	20,207	3.22	6.8	55
L10	A58, Manchester Road, WB, West of Kemp Avenue	18,933	20,135	20,207	3.22	7.2	40
L11	A58, Manchester Road, WB, East of A664 Edinburgh Way, SP	18,933	20,135	20,207	3.22	10.2	30
L12	A58, Manchester Road, WB, Intersection with A664/B6452, SP	14,973	15,924	16,067	3.35	6.4	30
L13	A58, Manchester Road, WB, West of A664 Edinburgh Way, SP	14,973	15,924	16,067	3.35	7.5	30
L14	A58, Manchester Road, WB, North of A58, Bolton Road	14,973	15,924	16,067	3.35	7.0	45
L15	A664, Manchester Road, Southbound (SB), South of A58, SP	5,355	5,695	5,839	2.88	4.5	30
L16	A664, Manchester Road, NB Slip onto A58, Bolton Road, SP	5,355	5,695	5,983	2.88	5.8	30

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		2019	2025 DM	2025 DS			
L17	A58, Bolton Road, West of A664/A58, Manchester Road	17,136	18,224	18,511	3.16	11.7	45
L18	A58, Bolton Road, EB, West of A664, SP	5,706	6,069	6,212	4.28	3.4	30
L19	A58, Bolton Road, EB, East of A664, SP	5,706	6,069	6,212	9.48	5.6	30
L20	A58, Bolton Road, WB, East of A664, SP	5,706	6,069	6,069	9.48	10.1	30
L21	A58, Bolton Road, WB, West of A664, SP	5,706	6,069	6,212	9.48	6.0	30
L22	A58, Bolton Road, EB Slip onto A58, Manchester Road, SP	5,706	6,069	6,069	9.48	6.2	30
L23	A58, Manchester Road, EB, North of A58, Bolton Road	15,926	16,937	17,081	2.98	9.9	45
L24	B6452, Roch Valley Way, North of Roch Mills Crescent	9,997	10,632	10,775	2.34	7.3	60
L25	B6452, Roch Valley Way, South of Roch Mills Crescent	9,997	10,632	10,775	2.34	11.2	40
L26	B6452, Roch Valley Way, SB Slip onto A58, Manchester Road, SP	3,329	3,540	3,540	7.03	5.8	30
L27	B6452, Roch Valley Way, SB, North of A58, Manchester Road, SP	3,329	3,540	3,612	7.03	12.4	30
L28	B6452, Roch Valley Way, NB, North of A58, Manchester Road, SP	3,329	3,540	3,612	7.03	5.1	30
L29	A664, Manchester Road, EB, Slip from A58, Manchester Road, SP	8,731	9,285	9,285	5.68	7.6	30
L30	A664, Manchester Road, EB, South of A58, Manchester Road	8,731	9,285	9,285	5.68	7.6	30
L31	A664, Manchester Road, WB, South of A58, Manchester Road	9,296	9,886	9,886	5.83	12.1	30
L32	A664, Manchester Road, WB, Slip to A58, Manchester Road, SP	9,296	9,886	9,886	5.83	7.8	30
L33	A664, Manchester Road, WB, Intersection with A58, SP	9,296	9,886	9,886	5.83	9.1	30

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		2019	2025 DM	2025 DS			
L34	A664, Manchester Road, EB, Intersection with A58, SP	17,461	18,570	18,570	2.84	8.2	30
L35	A664, Manchester Road, EB, West of A627(M)	17,461	18,570	18,570	2.84	7.5	55
L36	A664, Manchester Road, EB, West of A627(M)	18,591	19,772	19,772	2.92	7.3	55
L37	Royle Barn Road SP	3,914	4,163	4,228	0.00	9.8	30
L38	A664, Manchester Road between Royle Barn Road and Durban Street	19,012	20,219	20,867	1.50	9.5	45
L39	A664, Manchester Road between Durban Street and Heywood Road	18,355	19,521	19,737	1.50	9.3	45
L40	A664, Manchester Road north of A664 Queensway	18,902	20,103	20,768	1.50	7.3	45
L41	A664, Manchester Road at A664 Queensway junction SP	18,902	20,103	20,435	1.50	7.3	30
L42	A664, Manchester Road south of A664 Queensway	18,902	20,103	20,435	1.50	7.9	45
L43	A664, Manchester Road Queensway	12,076	12,843	13,176	1.50	6.9	45
L44	Heywood Road SP	1,361	1,448	1,466	0.00	6.6	30
L45	Hanover Street/Durban Street	1,690	1,797	2,229	0.00	6.2	30
L46	Heywood Road east of Heape Street	1,361	1,448	1,897	2.89	6.9	35
L47	Heywood Rod west of Heape Street	745	792	792	2.89	6.2	35
L48	Heywood Road west of Partington Street	745	792	1,217	2.89	6.5	35
L49	Fairway west of site access	1,608	1,710	2,134	0.00	6.9	35
L50	Fairway east of site access	1,608	1,710	2,591	0.00	6.8	35
L51	Partington Street	1,203	1,280	1,704	0.00	5.1	35

5.5.2 Reference should be made to Figure 2 for a graphical representation of the road link locations.

5.6 **Baseline Pollution Levels**

5.6.1 Baseline annual mean nitrogen dioxide (NO₂) and NO_x concentrations were obtained from the Department for Environment, Food and Rural Affairs (DEFRA) website⁷ for each discrete receptor location. Baseline annual mean NH₃ concentrations and nitrogen deposition rates were obtained from the APIS website⁸. The relevant values are summarised in Table 7 for 2019.

Table 7 Baseline Pollution Levels - 2019

Receptor		Annual Mean Concentration (µg/m ³)			Annual Nitrogen Deposition Rate (kgN/ha/yr)
		NO _x	NO ₂	NH ₃	
E1-0	Rochdale Canal SAC	24.46	17.48	2.14	25.3
E1-1	Rochdale Canal SAC	24.46	17.48	2.14	25.3
E1-2	Rochdale Canal SAC	24.46	17.48	2.14	25.3
E1-3	Rochdale Canal SAC	24.46	17.48	2.14	25.3
E2-0	Rochdale Canal SAC	24.46	17.48	2.14	25.3
E2-1	Rochdale Canal SAC	24.46	17.48	2.14	25.3
E2-2	Rochdale Canal SAC	24.46	17.48	2.14	25.3
E2-3	Rochdale Canal SAC	24.46	17.48	2.14	25.3

5.6.2 The baseline levels for 2025 are summarised in Table 8.

⁷ <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>.

⁸ UK Air Pollution Information System, www.apis.ac.uk.

Table 8 Baseline Pollution Levels - 2025

Receptor		Annual Mean Concentration ($\mu\text{g}/\text{m}^3$)			Annual Nitrogen Deposition Rate ($\text{kgN}/\text{ha}/\text{yr}$)
		NO_x	NO_2	NH_3	
E1-0	Rochdale Canal SAC	18.35	13.53	2.14	25.3
E1-1	Rochdale Canal SAC	18.35	13.53	2.14	25.3
E1-2	Rochdale Canal SAC	18.35	13.53	2.14	25.3
E1-3	Rochdale Canal SAC	18.35	13.53	2.14	25.3
E2-0	Rochdale Canal SAC	18.35	13.53	2.14	25.3
E2-1	Rochdale Canal SAC	18.35	13.53	2.14	25.3
E2-2	Rochdale Canal SAC	18.35	13.53	2.14	25.3
E2-3	Rochdale Canal SAC	18.35	13.53	2.14	25.3

5.7 Emission Factors

5.7.1 Emission factors of NH_3 for each link were calculated using the relevant traffic flows and the Calculator for Road Emissions of Ammonia (CREAM) workbook released by Air Quality Consultants Ltd (AQC) in 2020. Reference should be made to the accompanying report⁹ for details of the calculation methodology.

5.8 NO_x to NO_2 Conversion

5.8.1 Predicted annual mean NO_x concentrations were converted to NO_2 concentrations using the spreadsheet (version 8.1) provided by DEFRA. This is the method detailed within DEFRA guidance¹⁰.

5.9 Nitrogen Deposition

5.9.1 Nitrogen deposition rates were calculated using the conversion factors provided within the IAQM document 'A guide to the assessment of air quality impacts on designated

⁹ Ammonia Emissions from Roads for Assessing Impacts on Nitrogen-sensitive Habitats, AQC, 2020.

¹⁰ Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

nature conservation sites¹¹. Predicted pollutant concentrations were multiplied by the relevant deposition velocity and conversion factor to calculate the speciated dry deposition flux. The conversion factors used for the determination of nitrogen deposition are presented within Table 9.

Table 9 Conversion Factors to Determine Dry Deposition Flux for Nitrogen Deposition

Pollutant	Deposition Velocity (m/s)		Conversion Factor ($\mu\text{g}/\text{m}^2/\text{s}$ to $\text{kg}/\text{ha}/\text{yr}$ of pollutant species)
	Grassland	Forest	
NO ₂	0.0015	0.003	95.9
NH ₃	0.020	0.030	260

5.9.2 The relevant deposition velocity for forest habitat were selected from Table 9 and used throughout the assessment based on the vegetation type at the discrete receptor locations.

5.10 Significance

5.10.1 The IAQM guidance¹² states that if likely significant effects cannot be screened out by the air quality practitioner, then suitable data should be provided to the Project Ecologist to assist with the determination of the effect significance. A requirement for the stated approach is provided in Section 6.0, where necessary.

¹¹ A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites v1.1., IAQM, 2020.

¹² A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites v1.1., IAQM, 2020.

6.0 DISPERSION MODELLING RESULTS

6.1 Introduction

6.1.1 Dispersion modelling was undertaken with the inputs described in Section 5.0. The results are summarised in the following Sections.

6.2 Oxides of Nitrogen

6.2.1 Annual mean NO_x concentrations were predicted at the sensitive receptor locations for the 2019 baseline, 2025 DM and 2025 DS scenarios. These are summarised in Table 10.

Table 10 Predicted Annual Mean NO_x Concentrations

Receptor		Predicted Annual Mean NO _x Concentration (µg/m ³)					Change Between DM and DS (PC) as Prop. Of CL (%) ^(a)	Change Between Baseline and DS (PC) as Prop. Of CL (%) ^(b)
		2019 Baseline	2025 DM	2025 DS	Change Between DM and DS (PC) ^(a)	Change Between Baseline and DS (PC) ^(b)		
E1-0	Rochdale Canal SAC	30.6	24.9	25.1	0.2	-5.5	0.7	-18.4
E1-1	Rochdale Canal SAC	29.7	23.9	24.1	0.2	-5.6	0.6	-18.7
E1-2	Rochdale Canal SAC	28.9	23.1	23.2	0.1	-5.7	0.5	-18.9
E1-3	Rochdale Canal SAC	28.3	22.4	22.6	0.1	-5.7	0.4	-19.1
E2-0	Rochdale Canal SAC	28.9	23.0	23.2	0.1	-5.7	0.5	-18.9
E2-1	Rochdale Canal SAC	28.1	22.2	22.4	0.1	-5.8	0.4	-19.2
E2-2	Rochdale Canal SAC	27.6	21.7	21.8	0.1	-5.8	0.4	-19.3

Receptor		Predicted Annual Mean NO _x Concentration (µg/m ³)					Change Between DM and DS (PC) as Prop. Of CL (%) ^(a)	Change Between Baseline and DS (PC) as Prop. Of CL (%) ^(b)
		2019 Baseline	2025 DM	2025 DS	Change Between DM and DS (PC) ^(a)	Change Between Baseline and DS (PC) ^(b)		
E2-3	Rochdale Canal SAC	27.2	21.2	21.3	0.1	-5.8	0.3	-19.5

NOTE: (a) Development alone.

(b) Development in-combination.

- 6.2.2 As indicated in Table 10, predicted annual mean NO_x concentrations were below the relevant critical level of 30µg/m³ for the 2025 DM and 2025 DS scenarios. This indicates compliance with the relevant criteria following changes in pollution levels associated with the development both alone and in-combination. Critical levels are defined on the APIS website¹³ as follows:

"concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge."

- 6.2.3 As such, in accordance with the above definition, direct adverse effects are not predicted at any receptor and likely significant effects can be ruled out.

6.3 Ammonia

- 6.3.1 Annual mean NH₃ concentrations were predicted at the sensitive receptor locations for the 2019 baseline, 2025 DM and 2025 DS scenarios. These are summarised in Table 11.

¹³ http://www.apis.ac.uk/critical-loads-and-critical-levels-guide-data-provided-apis#_Toc279788050.

Table 11 Predicted Annual Mean NH₃ Concentrations

Receptor		Predicted Annual Mean NH ₃ Concentration (µg/m ³)					Change Between DM and DS (PC) as Prop. Of CL (%) ^(a)	Change Between Baseline and DS (PC) as Prop. Of CL (%) ^(b)
		2019 Baseline	2025 DM	2025 DS	Change Between DM and DS (PC) ^(a)	Change Between Baseline and DS (PC) ^(b)		
E1-0	Rochdale Canal SAC	2.85	2.90	2.92	0.02	0.07	0.8	2.3
E1-1	Rochdale Canal SAC	2.74	2.78	2.80	0.02	0.06	0.7	1.9
E1-2	Rochdale Canal SAC	2.65	2.68	2.70	0.02	0.05	0.6	1.6
E1-3	Rochdale Canal SAC	2.58	2.61	2.62	0.01	0.04	0.5	1.4
E2-0	Rochdale Canal SAC	2.64	2.68	2.69	0.02	0.05	0.6	1.6
E2-1	Rochdale Canal SAC	2.56	2.58	2.60	0.01	0.04	0.5	1.4
E2-2	Rochdale Canal SAC	2.49	2.52	2.53	0.01	0.03	0.4	1.2
E2-3	Rochdale Canal SAC	2.45	2.47	2.48	0.01	0.03	0.3	1.0

NOTE: (a) Development alone.

(b) Development in-combination.

6.3.2 As indicated in Table 11, predicted annual mean NH₃ concentrations were below the relevant critical level of 3µg/m³ at all receptors for all scenarios. As such, in accordance with the above definition, direct adverse effects are not predicted and likely significant effects can be ruled out.

6.3.3 It is noted that annual mean NH₃ concentrations are predicted to increase between 2019 and 2025. This is due to controls on exhaust NO_x emissions and the anticipated shift in fleet towards vehicles requiring abatement with associated potential for NH₃ slip.

6.3.4 No improvement in background NH₃ concentrations has been assumed up to 2025. This is likely to overestimate total pollution levels as government policies, including those outlined in the 'Clean Air Strategy 2019'¹⁴, are designed to reduce NH₃ emissions. Measures aimed at the agricultural sector, which caused 88% of UK NH₃ emissions during 2016, are predicted to reduce overall emissions by 9% against a 2016 baseline by 2020 and 23% by 2030¹⁵. As such, the future year predictions should be viewed with caution.

6.4 Nitrogen Deposition

6.4.1 Annual nitrogen deposition was predicted at the sensitive receptor locations for the 2019 baseline, 2025 DM and 2025 DS scenarios. These are summarised in Table 12.

Table 12 Predicted Annual Nitrogen Deposition

Receptor		Predicted Annual Nitrogen Deposition (kgN/ha/yr)					Change Between DM and DS (PC) as Prop. Of CL (%) ^(a)	Change Between Baseline and DS (PC) as Prop. Of CL (%) ^(b)
		2019 Baseline	2025 DM	2025 DS	Change Between DM and DS (PC) ^(a)	Change Between Baseline and DS (PC) ^(b)		
E1-0	Rochdale Canal SAC	29.48	29.74	29.88	0.14	0.40	0.48	1.36
E1-1	Rochdale Canal SAC	28.85	29.07	29.19	0.12	0.34	0.42	1.19
E1-2	Rochdale Canal SAC	28.29	28.48	28.58	0.10	0.29	0.35	1.02
E1-3	Rochdale Canal SAC	27.89	28.05	28.14	0.09	0.25	0.31	0.89
E2-0	Rochdale Canal SAC	28.26	28.45	28.55	0.10	0.29	0.35	1.02
E2-1	Rochdale Canal SAC	27.75	27.91	27.99	0.08	0.24	0.30	0.86

¹⁴ Clean Air Strategy 2019, DEFRA, 2019.

¹⁵ Clean Air Strategy 2019, DEFRA, 2019.

Receptor		Predicted Annual Nitrogen Deposition (kgN/ha/yr)					Change Between DM and DS (PC) as Prop. Of CL (%) ^(a)	Change Between Baseline and DS (PC) as Prop. Of CL (%) ^(b)
		2019 Baseline	2025 DM	2025 DS	Change Between DM and DS (PC) ^(a)	Change Between Baseline and DS (PC) ^(b)		
E2-2	Rochdale Canal SAC	27.38	27.52	27.59	0.07	0.20	0.26	0.74
E2-3	Rochdale Canal SAC	27.11	27.22	27.28	0.06	0.18	0.22	0.65

NOTE: (a) Development alone.

(b) Development in-combination.

6.4.2 As stated previously, there is no comparable critical load for nitrogen deposition for the Rochdale Canal SAC. However, as shown in Table 12, the predicted increase as a result of the development alone is very small and does not exceed 1% of the baseline value at any receptor. The IAQM guidance¹⁶ states the following in relation to the use of a 1% impact criterion:

"A change of such magnitude, i.e. two orders below the criterion for harm to occur, is challenging to measure (even by the most precise air quality instrument) and difficult to distinguish from natural fluctuations in measured data (due to other variables such as variations in emissions and weather). For this reason, and others, it has been used as a precautionary screening criterion.

The 1% threshold has become widely used throughout the air quality assessment profession to define a reasonable quantum of long term pollution which is not likely to be discernible from fluctuations in background/measurements. For example, for many habitats, 1% of the critical load for nitrogen deposition equates to a very small change of less than 0.1kgN/ha/yr, well within the expected normal variation in deposition."

6.4.3 Based on the above, likely significant effects associated with the development alone can be ruled out.

¹⁶ A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites v1.1., IAQM, 2020.

6.4.4 As shown in Table 12, the predicted increase in nitrogen deposition as a result of the development in-combination is slightly above 1% at receptors E1-0 to E1-2 and E2-0. These represent locations to the north of Manchester Road which are occupied by Lock 51 of the Rochdale Canal. Due to mechanical aggravation of the water and substrate associated with the operation of the lock and associated vessel movements, it is considered unlikely the receptors would represent locations of suitable habitat for the qualifying feature. As such, any predicted increase at these positions is not considered likely to affect the integrity of the designation. Likely significant effects associated with the development both alone and in-combination can therefore be ruled out.

7.0 CONCLUSION

- 7.1.1 Redmore Environmental Ltd was commissioned by Kellen Homes Limited to undertake an Ecological Air Quality Assessment in support of a residential development on land at Castle Sidings, Rochdale.
- 7.1.2 A HRA is being produced in order to document and establish whether the proposed works may have likely significant effects on the Rochdale Canal SAC. An Ecological Air Quality Assessment was therefore required in order to inform the HRA by considering the potential for changes in pollution levels to impact the SAC.
- 7.1.3 Screening of anticipated increases in traffic flows as a result of the development indicated the potential for changes in baseline pollution levels at ecological designations. Dispersion modelling was therefore undertaken in order to quantify potential impacts on annual mean NO_x, NH₃ concentrations and annual nitrogen deposition.
- 7.1.4 The results of the dispersion modelling assessment indicated that predicted annual mean concentrations of NO_x and NH₃ were below the relevant critical levels at all receptors for the future year scenarios. As such, likely significant effects can be ruled out.
- 7.1.5 There is no comparable critical load for nitrogen deposition for the Rochdale Canal SAC. However, the predicted increase as a result of the development alone was very small and does not exceed 1% of the baseline value at any receptor. The predicted increase as a result of the development in-combination was slightly above 1% at receptors E1-0 to E1-2 and E2-0. These represent locations occupied by Lock 51 of the Rochdale Canal. Due to mechanical aggravation of the water and substrate associated with operation of the lock and associated vessel movements, it is considered unlikely the receptors would represent locations of suitable habitat for the qualifying feature. As such, any predicted increase in nitrogen deposition at these positions is not considered likely to affect the integrity of the designation. Likely significant effects associated with the development both alone and in-combination can therefore be ruled out.

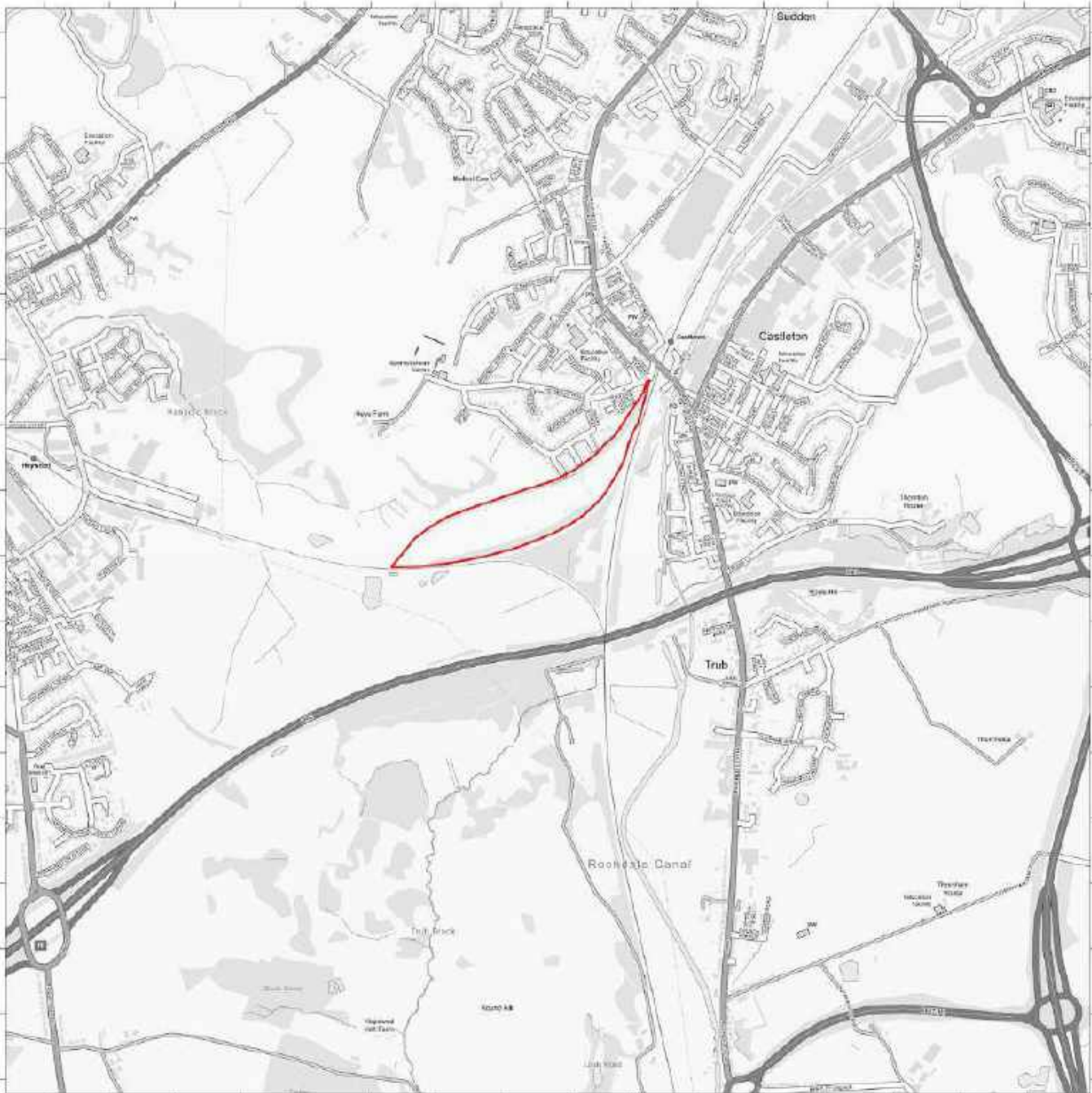
8.0 **ABBREVIATIONS**

AADT	Annual Average Daily Traffic
APIS	Air Pollution Information System
AQC	Air Quality Consultants Ltd
CREAM	Calculator for Road Emissions of Ammonia
DEFRA	Department for Environment, Food and Rural Affairs
DM	Do Minimum
DS	Do Something
HRA	Habitats Regulations Assessment
IAQM	Institute of Air Quality Management
NE	Natural England
NH ₃	Ammonia
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen
PC	Process Contribution
SAC	Special Area of Conservation

Figures



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Legend



Site Boundary

Title

Figure 1 - Site Location Plan

Project

Ecological Air Quality Assessment
Castle Sidings, Rochdale

Project Reference

6299-1

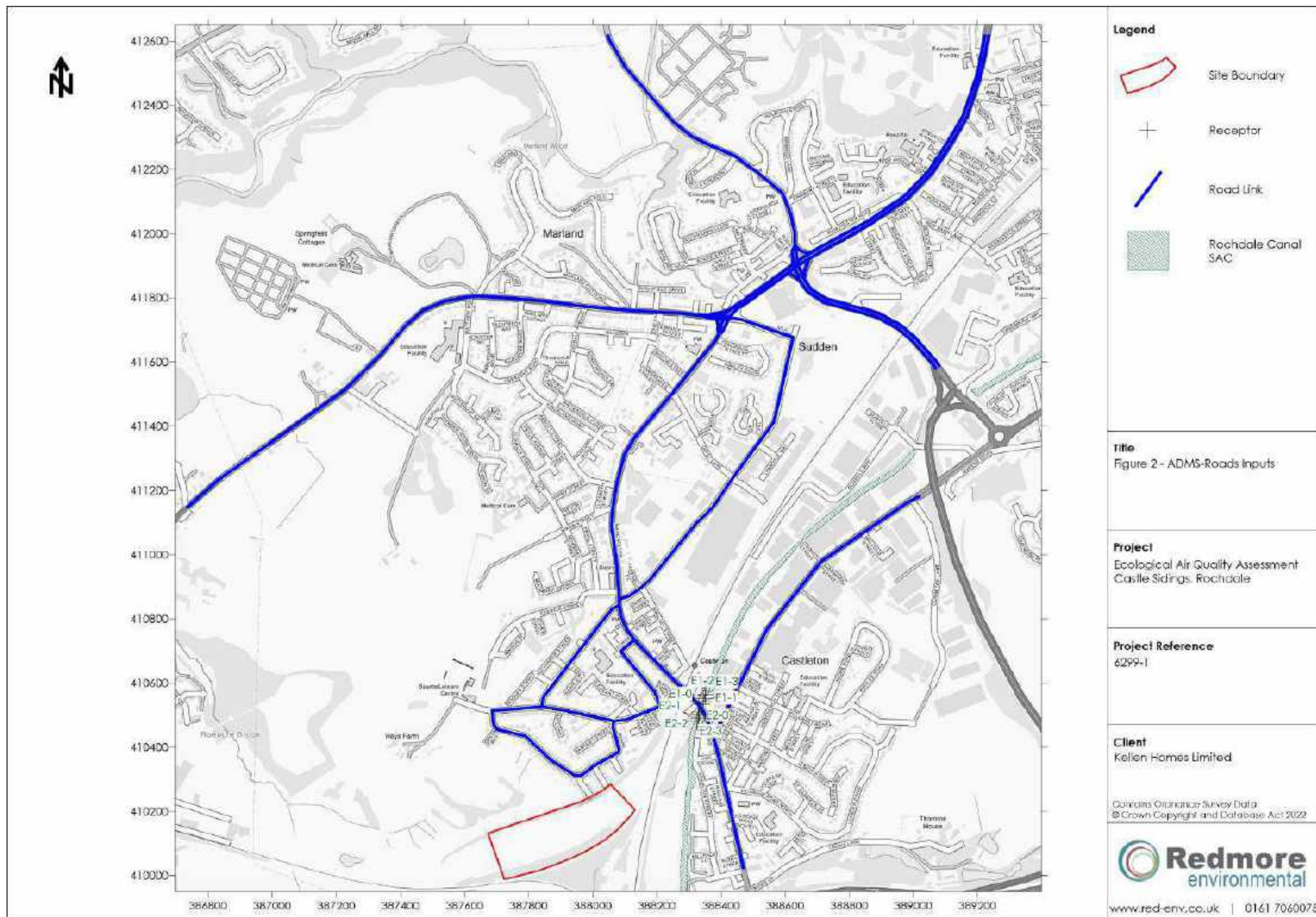
Client

Kellen Homes Limited

Contains Ordnance Survey Data
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KELLEN
HOMES

Castleton Sidings, Heywood Rd, Rochdale, OL11 3AU

Construction Environmental Management and Transport Plan

May 2023

Site Location



Contents

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3.0	Ecology & Bio-diversity (i) Identification of Bio-diversity protection zones (ii) Practical Measures (iii) Location & Time sensitive work to avoid harm to Bio-diversity features (iv) Times During Construction when Ecologist may be required (v) Responsible Persons (vi) Use of protective fences, exclusion zones/barriers & warning signs
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Appendix 1 Build Route

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Appendix 4 Example of damping Down on site to prevent dust

Appendix 5, Silt Fence & Areas cordoned off for tree felling

1.0 Introduction

Background

- 1.1 This Construction Environmental Management Plan [CEMP] has been prepared by Kellen Homes Ltd.
- 1.2 The management of construction activities that can have significant environmental impacts will be required as part of the proposed development. The CEMP provides a framework for planning and implementing remediation, construction and service utility activities in a way which prevents, minimises, and controls their potential environmental impacts.
- 1.3 The document also highlights responsibility and accountability for the management of the Plan.

Proposed Development

Planning permission pending for the *“construction of 191 no. 2 & 2½ storey detached, semi & mews dwellings with associated car parking, boundary treatments and landscaping, the creation of new roads and access points off The Fairways*



Objectives of this CEMP:

- 1.4 This CEMP provides the details of the measures that will be implemented to minimise and mitigate the construction impacts on the environment at the development site and the surrounding area. The primary objective of the CEMP is to ensure that the relevant provisions set out by Rochdale Council are met and the amenities of neighbouring occupiers are protected during the works.
- 1.5 Kellen Homes Limited is committed to ensuring measures are in place to minimise and mitigate any potential impacts on the environment during the construction phase of development.
- 1.6 The CEMP has been developed considering the overall environmental objectives of Kellen Homes set out in existing company Environmental Policies and will comply

with relevant legislation. Copies of the Kellen Homes' Environmental Policies can be provided on request.

Health and Safety Management

1.7 Kellen Homes is committed to promoting a positive safety culture. The enforcing authority for health and safety on construction sites is the Health and Safety Executive who will be notified of all construction works prior to their commencement on site.

1.8 The main contractor will maintain a register of accidents, incidents, near misses and complaints. Contractors failing to maintain the required safety standards may be excluded from the approved tender list for future work.

1.9 All works will be legally compliant and all Codes of Practice and site rules relating to the works will be observed.

2.0 Construction Environmental Management Plan

2.1 This section of the report addresses the key elements relating to construction management protection measures.

(i) Timing of construction activities

2.2 All construction activities at the site will be limited to the following hours;

- Monday to Friday between the hours of 07.00 and 18.00 hours;
- Saturday between 08.00 and 16.00 hours;
- No deliveries or piling works to take place outside the hours of 07.00 and 18.00 hours Monday to Friday;
- No working on Sundays or Bank Holidays

2.3 There may be limited occasions where working is required outside of the above hours however this will only take place with formal prior agreement from the LPA. All local residents would be informed of any changes by way of a letter drop in accordance with the community engagement strategy.

2.4 Quieter activities which are carried out inside buildings such as electrical works, plumbing and plastering may take place outside of the agreed working times so long as they do not result in significant disturbance to neighbouring occupiers.

(ii) Compound Location and Delivery Route

2.5 A copy of the site compound, parking and build direction plan is provided at Appendix 1

2.6 The main construction compound is situated within the site

- 2.7 Construction Site entrances will be provided from Heywood Road
- 2.8 Car parking will be situated on site.
- 2.9 Operatives will not be permitted to park within the adjoining residential developments.
- 2.10 All site delivery vehicles will access the site from Heywood Rd This will also be used for vehicles egress.
- 2.11 Residential access will be via Fairway
- 2.12 All HGV Delivery vehicles will use normal adopted travel routes from delivery origin. In most cases there will be no requirement for abnormal loads only specifically for large piling rigs or similar large machines for which there will be a very low requirement, in which case official movement orders and traffic escort vehicles will be required and specific travel times will be issued. Due to the fact that the site will be constructed from timber frame and this product will originate from one delivery address.
- 2.13 Safe pedestrian crossing points will be provided across the site entrances at the Fairways
- 2.14 All vehicles must be brought into site in a forward gear and leave in a forward gear where possible. If a vehicle has to reverse into or out of the site, banksmen will be used to marshal vehicles in or out.
- 2.15 As required, the Banksman will be in communications with the haulage contractors regarding deliveries (e.g. Brick/Block) to ensure there is no back-log of deliveries along Don Street/Oldham Road and internally within the site.
- 2.16 Bulk material storage is to be provided within the compound area. The fuel storage tank is to be located adjacent to the bulk material storage areas and will be double bunded and drip tray to stop leaks complete with spill kits. No materials to be stored on container roofs at any time.
- 2.17 All lifting operations will be carried out under the supervision of certified Slinger/Banks man (CITB Construction Skills CPCS). They must be provided by the appointed sub-contractor. Abnormal loads and deliveries should be made in advance with the site management.

(iv) Erection and maintenance of site hoardings and display of contact details.

- 2.18 The site will be enclosed by standard, hard wearing Heras fencing with a Mona flex covering along all road frontages. An example of the type of fencing to be used is shown in Appendix 2 of this document.
- 2.19 The extent and condition of the fencing will be checked on a daily basis by the site manager/construction team on site with any broken or missing panels being replaced and made good prior to the end of the corresponding day.
- 2.20 The site will have out of hour's security. This will reduce any threat of crime and damage.

- 2.21 Emergency contact details will be placed at the site entrance should a member of the public require assistance or to notify Kellen Homes of any issues.

(v) Measures to prevent dirt on the highway.

- 2.22 All vehicles leaving site will have visual inspection prior to leaving the site.
- 2.23 Any vehicles which are found to be holding excessive dirt will have their wheels cleaned and the dirt removed using a jet wash, once the vehicle is deemed suitably cleaned it will be allowed to leave site.
- 2.24 All deliveries to site and construction traffic are to utilise hard-standing areas. This will negate any material being tracked throughout existing roads.
- 2.25 Road sweeps are to be booked as and when required.
- 2.26 Vehicles transporting dirt / material from site to be fitted with covers.

(vi) Measures to control dirt and dust.

- 2.27 Dust monitoring stations will be set up and the inclusion of a Mona flex netting on the fencing will reduce the potential for dust leaving the site. During dry spells care will be taken to dampen down parts of the site and stockpiles of material by way of a water reservoir fitted to a forklift truck within the site, examples of which are provided in Appendix 1.
- 2.28 In addition to the above, the following measures are also to be implemented:
- Wetting down of cutting processes
 - Enclosure of skips and or chutes
 - Covering of wagons with sheets leaving the site when necessary

(vii) A scheme for recycling / disposing of waste

- 2.29 Sub-contractors are responsible for removal of their own waste from site, this is to be discussed at procurement/pre-start.
- 2.30 Waste Disposal Policy Regeneration North
- ❖ All timber is to be placed in a timber only skip provided by Kellen.
 - ❖ All Plasterboard is to be placed in plaster only skip provided by Kellen.
 - ❖ All Brick / Rubble etc. is to be stockpiled on site until a sufficient amount can be brought to a crusher to generate 6F2, or to be moved by wagon to an adjacent site that has a crusher.
 - ❖ A pallet collection scheme is operating with Scott Pallets
 - ❖ All metal will be collected by Prestige Metal Fabrication

(viii) Measures to prevent noise & disturbance

- 2.31 Operational hours generating noise and vibration will be restricted to:
- Monday - Friday 07.00 - 18.00
 - Saturday 08:00 - 16.00
- 2.32 No deliveries or piling will take place outside the hours of 07.00 to 18.00 Monday to Friday or 08.00 to 16.00 on a Saturday.
- 2.33 Quieter activities which are carried out inside buildings such as electrical works, plumbing and plastering may take place outside of the agreed working times so long as they do not result in significant disturbance to neighbouring occupiers.
- 2.34 Monitors will be installed whilst the piling works are carried out. If the trigger levels are hit, work would be stopped until further notice.
- 2.35 Off-site works such as drainage and utility connections will be undertaken by responsible sub-contractors with the correct 'Road Opening Notices' in place, alongside the associated Method Statements.
- 2.36 The drainage connections will be undertaken within Don Street, which will be closed under a temporary road closure for a duration of the construction works. Similarly, utility connections (gas / electric / water) will be undertaken within the existing footpaths adjacent to the proposed development.
- 2.37 Stockpiles of materials on site to be damped down to prevent dust.
- 2.38 It is proposed to use self-charging generators on the site to prevent noise being generated through the night by being able to switch from diesel to stored electric power.
- 2.39 The use of floodlights during winter months will be regulated, and floodlights will be pointed away from residential properties, and into the site to prevent disturbance.
- 2.40 All public rights of way will be maintained as directed by local authority with temporary stopping up orders and diversions. Public rights of way will be segregated from construction traffic by fencing. Private Vehicle rights of way will be maintained via diversions agreed by public rights of way officer. In areas where construction activity coincide with public rights of way, this will be managed by gatemen and temporary diversions in access routes.

(ix) Measures to prevent the pollution of watercourses;

- 2.41 Plant will be refuelled in designated areas on an impermeable surface approved by site management.
- 2.42 Refuelling will occur in designated areas on an impermeable surface away from any drains or watercourses.
- 2.43 A spill kit will be available in the event of an accident and will be kept in the refueling area.

2.44 In the event of any unauthorised spill or discharge, works are to cease area contained and a environmental consultant to attend site and agree strategy and validate any works.

(x) Community Engagement Strategy

2.45 Any complaints will be logged in a dedicated file and will be actioned by the Site Manager. If not resolved by the Site Manager then the complaint will be escalated to the Construction Director then the Managing Director.

2.46 Prior to the commencement of the development a letter drop will take place to all local residents, nearby businesses, outlining the following;

- Proposed start date for construction and anticipated duration of build
- Proposed hours of construction
- Contact details (Name/Position/Contact number or email where appropriate) for any issues or complaints to be logged and for in the event of emergencies.

2.47 During the course of the development, letter drops will occur at key milestones, for example when piling activity is taking place.

2.48 The areas to be covered by the letter drop are to be confirmed.

Conclusion

The overall objective of this Construction Environmental Management Plan has been developed to ensure that throughout the construction process, the following fundamental goals are all met so far as practicable: exemplary environmental practice; protection of the interests of local residents, amenity; and efficient, economic and timely construction practice.

Appendix1– BuildRoute



Appendix 3 - Example of perimeter hoarding



Appendix 4, Damping Down to prevent dust



Appendix 5, Silt Fence & Area cordoned off for tree felling









e3p

Phase I & II Geoenvironmental Site Assessment
Castleton Sidings
Rochdale

Reference:14-768-R1-1
Date: May 2021



PHASE I & II GEOENVIRONMENTAL SITE ASSESSMENT

Land to the South of Heywood Road
Castleton Sidings
Rochdale
OL11 3AU

Prepared for:
Kellen Homes



Report Ref: 14-768-R1-1
Date Issued: May 2021

Castleton Sidings, Rochdale

Phase II Geoenvironmental Site Assessment

May 2021

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Registered in England.

CRN: 807255262

QUALITY ASSURANCE

PROJECT NUMBER	14-768-R1		
VERSION	Version 1		
REMARKS	Final		
DATE	5 th May 2021		
PREPARED BY	E Fearn		
QUALIFICATIONS	BSc (Hons), MSc, FGS		
SIGNATURE			
CHECKED BY	J Sheridan		
QUALIFICATIONS	MeSci (Hons), FGS		
SIGNATURE			
AUTHORISED BY	M. Dyer		
QUALIFICATIONS	BSc (Hons), FGS, AIEMA, MIEnvSc, CEnv		
SIGNATURE			



Cert No 18860

ISO 9001 (2015)
ISO 14001 (2015)
ISO 45001 (2018)



EXECUTIVE SUMMARY

Site Address	Castleton Sidings, Heywood Road, Rochdale OL113AU
Grid Reference	E 387930, N 410140
Site Area	Approximately 6.0 Ha.
Proposed Development	E3P understands that Kellen Homes are considering the proposed acquisition and future redevelopment of the site for circa 183 low rise dwellings in the central sector of the site, with an area of informal Public Open Space (POS) in the west and an area retained as Network Rail land in the east. It is understood that the eastern sector may ultimately be developed as a historic train visitors attraction.
Current Site Use	The site is a roughly semi-circular shaped parcel of land to the south of Heywood Road In Rochdale and to the west of Castleton railway station. Live railway lines are present along the eastern site boundary and the site itself forms derelict railway sidings open to the adjacent active railway. The southwestern quarter of the site falls within a designated area of greenbelt and the north eastern quarter falls within an area of network rail operated land. All former structures except for an active signal box have now been removed; however, track sidings, ballast, and relict hardstanding and concrete slabs remain. Self-seeded vegetation and young trees have now grown across the site and along the periphery. A raised area of concrete hardstanding is present in the southern sector, with demolition rubble stockpiled creating a steep ramp. A void is evident beneath this raised area on the very southern boundary, which appears to be associated with a large, voided area just off the south-western boundary.
Site History	A review of the pertinent Ordnance Survey mapping dating from circa 1850 to the present day confirmed the following land use:  Earliest historical mapping (1851) shows the site to comprise agricultural land with the railway shown to be present along the southern boundary and brick kiln/clay pits immediately to the northwest.  By 1893, the site was in use as railway sidings with an engineering stores and sawmills located to the west. Ancillary structures encroached the western sector together with wetlands/possible marshes encroaching the central northern sector.  A tank and small reservoir are later shown in the centre north and north east respectively, together with an earth working/embankment along the northern boundary.  By 1956 the engineering works had been removed and by 1970s a welding shop, travelling crane, engineering shed, electricity substation and tanks are indicated to be present in the central sector of the site.  Aerial imagery between 2000-2005 shows the site to be covered by hardstanding/ballast, tracks, sheds and various structures. The site appears to have been dismantled/demolished sometime between 2005 and 2013.



Environmental Setting	Drift Geology	Glacio-fluvial sand and gravel deposits across the majority of the site
	Bedrock Geology	Lacustrine (clays) along the south western border.
	Faults	A geological fault is located through the northern sector of the site, orientated north west to south east.
	Hydrogeology	Unproductive and Secondary A strata (drift) overlying Secondary A aquifer (solid). No groundwater abstractions have been identified within a 1 km radius.
	Hydrology	There are no surface water courses within influencing distance of the site.
	Flood Risk	Unaffected by flooding from rivers.
Previous Reports	There are no previous reports available to E3P relating to the subject site.	
Utility Locations	A full ground penetrating radar (GPR) survey has not been undertaken. However, the following services have been identified:  A 6 kV electricity cable is shown to enter the site from the north and run along the northern boundary and loop back in the centre of the site.  Overhead pylons electricity cables are located off-site to the south, in close proximity of the far south western extent of the site.  Overhead BT cables also enter from the housing estate to the north and follow the northern boundary, diverting south in the approximate centre of the site.  A live railway is present along the east and south of the site.	
Landfill Sites and Ground Gases	Historical landfill located c. 475 m north west of site: Land South of Chadwick Lane, Heywood, Rochdale Received Inert, Industrial, Commercial, Household and Special Waste between 31/12/1984 and 31/12/1986. Given the time passed since last deposit and distance to the site, the risk from migrating ground gas from this source is reduced.	
Radon	Unaffected – no special precautions required.	
Coal Mining/Land Stability	The site is located within a coal mining reporting area, and the Arley Coal seam is indicated to subcrop beneath the eastern half of the site. A narrow development high risk zone associated with this seam is mapped on the western side of the conjectured crop. Surrounding BGS boreholes indicate the thickness of overlying drift deposits to be in excess of 80 m bgl, thus significantly reducing the risk of any workings/void propagating upwards and resulting in subsidence at the surface. Verbal consultation with the Coal Authority indicated that, due to the depth of the seam, they don't not consider it likely that the seam has been worked. The risk from coal mining related hazards is therefore considered low. However, precautionary drilling in the location of the seam and development high risk zone was conducted to confirm the anticipated ground conditions.	



Brine Workings	The site is not located within an area deemed to be at risk from ground instability arising from historic brine pumping activities and/or salt extraction.
Hazardous Installations	Given the history of the site as railway sidings and recorded tanks, electrical substations and engine sheds, it is considered likely that hazardous waste streams may have been generated.

GROUND INVESTIGATION

Ground Investigation Works	E3P has completed an intrusive ground investigation comprising:  24 x mechanically excavated trial pits,  14 x window sample boreholes,  2 x cable percussive boreholes,  2 x Rotary open holes and  Construction of environmental monitoring installations.
Ground Conditions	Made Ground – 0.00 m bgl to >4.20 m bgl Made Ground deposits were encountered within all of the exploratory hole locations from ground level to depths in excess of 4.20 m bgl. Across much of the site, the full depth of Made Ground could not be proven in the trial pits, and was only proven in a select number of window sampler and deeper boreholes. The material generally comprises a black slightly clayey gravelly medium sand, with gravel of mudstone, brick, ash, shale, timber, glass and wood. A concrete slab was encountered at TP103 between 0.60 m and 0.70 m, the trial pit in this location was terminated due to utility infrastructure being present in this area. PEAT – 3.10 m bgl to 5.70 m bgl At four locations in the centre/east of the site, blackish brown PEAT was encountered. The peat was encountered at the base of WS106b (4.50 – >5.45m bgl), WS108 (4.40 – >5.45m bgl) and WS114B (4.60 – >5.45 m bgl) , and the full depth was not proven due to reaching the limit of the drilling rig. Where proven, in CP102 (3.10 – 5.70 m bgl) , the full thickness was recorded to be 2.60 m. Additional investigation will be required to better determine the vertical and lateral extent of PEAT deposits across the site. DRIFT – 0.70 m bgl to 59.00 m bgl Drift deposits were encountered within 13 of the 44 the exploratory locations. Within the 28 other locations, the full depth of Made Ground could not be proven. The drift deposits are varied across the site, generally comprising of CLAY and SAND. The SAND was generally a light brown clayey SAND at seven locations between the depths of 0.70 m and 11.70 m bgl. The CLAY was encountered at four locations as a stiff to very stiff medium to high strength sandy CLAY between the depths of 1.40 m to 15.00 m bgl.



	At one location (CP101) a soft very low strength brown sandy CLAY was encountered between the depths of 4.20 m to 6.30 m bgl (possible alluvium-type deposits). Rotary boreholes (RB101 and RB102) were terminated in drift deposits at depths of 60.50 m and 59.00 m bgl respectively. Alternating CLAY and SAND were encountered throughout, indicating drift deposits to extend to significant depth.
	SOLID The solid geology was not encountered within the deeper cable holes or rotary open holes across the site. A nearby BGS borehole indicates rockhead at circa 81.00 m bgl.
	GROUNDWATER – Groundwater strikes were generally encountered as slight/seepages between 1.20 m and 4.80 m bgl. During the first two subsequent monitoring visits, groundwater levels were recorded between 1.71 m (WS101) and 4.33 m bgl (WS107), with several wells recorded to be dry on both occasions.

CONTAMINATED LAND ASSESSMENT

Human Health	The Tier I assessment identified exceedances for heavy metals, non-volatile PAHs, naphthalene, elemental mercury, Aromatic TPH C10-C21 and chrysotile. The risk to chronic human health associated with the elevated concentrations on inorganic heavy metals and non-volatile PAH compounds can be mitigated through the installation of a suitable cover system. Given the widespread distribution of the contamination, the cover system would be required in all proposed private gardens, landscaping, and public open space to remove any potential for direct exposure to impacted soils. The specific design and installation process for the appropriate cover systems will be clearly defined within the site remediation and enabling works strategy. Asbestos in the form of chrysotile (<0.005%wt/wt) has also been identified within a localised area at TP112 in shallow Made Ground. No visual signs of ACM were encountered during the ground investigation; it is therefore likely that only trace fibres are present. In this instance, the risks can be mitigated by placing the impacted soil from TP112 beneath a 600 mm clean cover system in garden/landscaped areas or placed beneath roadways or at 1.0 m beneath plots. VOC contamination (elemental mercury, naphthalene and aromatic hydrocarbon fractions C10-C16) has been encountered at various locations across the site in Made Ground at depths of between 0.50 m and 4.90 m bgl. It is noted that four samples containing elevated concentrations of total mercury were not speciated, however, give the spread and depth of encounter of other identified VOCs, it is considered that the contamination is widespread and it would be impractical and costly to delineate and excavate. It is recommended that a Tier 2 DQRA is undertaken to model the actual vapour emission risk from residue within the anthropogenic material in order to determine whether specialist VOC resistant membranes will be required to the dwellings.
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	It is considered that chemical analysis of the natural clay drift deposits will identify these soils to be acceptable for use as subsoil within the proposed garden areas subject to further chemical validation; however, given the depth of Made Ground on-site, it is unlikely that subsoils will be excavated. There are no suitable sources of topsoil available on the site.
Controlled Waters	The underlying Secondary A Aquifer and nearby surface water courses have been identified as potential receptors. Mobile contamination has been identified. Leachate and water analysis indicated heavy metal, PAH and TPH concentrations that exceed the DWS/EQS values. The site is underlain by a mixed geology, generally cohesive clay in the northeast of the site and generally granular sand and gravel in the southwest, with thick bands of clay beyond 10.0 m bgl. The clay deposits will afford for the protection of the underlying bedrock aquifer. Given the extensive thickness of drift (>60.0 m) and absence of a nearby water abstraction borehole, the risk to the underlying bedrock aquifer is considered to be significantly reduced. However, high concentrations of naphthalene and aromatic hydrocarbon fractions have been recorded in the groundwater sample taken from WS105 in the centre of the site potentially representative of a plume. The site sits at an approximate elevation of 130-135 m. The land to the north west and Roeacre Brook (circa 150 m to the north west) is noted to be at a lower elevation (~125 m AOD) and thus down hydraulic gradient of the site. Although this is considered outside of typical influencing distance, there is potential for this watercourse to be fed by watercourses/drains closer to the site that may be impacted by laterally migrating contamination. The risk to surface water courses is therefore considered moderate and further sampling at the location of WS105 will be required, together with installation of further monitoring wells in the vicinity to ascertain whether the identified impact is an isolated occurrence or a plume.
Ground Gas	Characteristic Situation 1/Green (pending completion of gas monitoring). VOC resistant membranes may be required, subject to a Tier 2 Vapour Risk Assessment.
Potable Water Infrastructure	Barrier pipes likely to be required. This will need to be confirmed following the completion of a UKWIR risk assessment. Post-remediation and enabling works ground conditions may be different from those identified during this site investigation.

COAL MINING ASSESSMENT

Coal Mining	The Arley Coal seam is conjectured to subcrop beneath the north east of the site. However, a nearby BGS borehole indicates drift deposits to extend to circa 80 m bgl. Verbal consultation with the Coal Authority indicated that, due to the depth of the seam, they do not consider it likely that the seam has been worked. The risk from coal mining related hazards was therefore concluded to be low but it was considered prudent to carry out intrusive investigation to confirm the assessment. Two ~60.0 m deep rotary boreholes have therefore been advanced within the narrow development high risk area associated with the Arley Coal seam, in accordance with Coal Authority Permission ref: 21608.
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	Ground conditions were found to comprise alternating bands of cohesive and granular drift to depths in excess of 60.5 m bgl. Rockhead was not proven due to extensive drift and difficulties drilling at depth leading to termination of the boreholes at circa 60.0 m bgl in granular drift. No evidence of shallow coal seams or historic shallow coal workings was recorded. Based on the confirmed ground conditions, it is likely that any coal seams will be at significant depth and thus highly unlikely to have been worked at this location. Even if the seam has been worked, it is considered that the overlying thickness of drift would be sufficient to mitigate the risk of subsidence at the surface. No further investigation is proposed.
--	--

GEOTECHNICAL ASSESSMENT

Underground Obstructions	Obstructions were encountered at three locations: TP103 (Concrete slab with probable services beneath at 0.70 m bgl), WS106a (double concrete slab at 0.50 m bgl and WS114a (ballast/cobble obstruction at 0.70 m bgl). During a phase of cut-and-fill enabling works to create a developable platform, all below-ground obstructions will require grubbing out to the base of the Made Ground to enable the construction of proposed plots.
Allowable Bearing Pressure	The underlying natural clay drift deposits have been assessed as being firm low strength to very stiff very high strength with a net allowable bearing pressure (ABP) in the order of 85–313 kN/m² at circa 1.00 – 5.00 m bgl increasing to 173–256 kN/m² at circa 9.50 – 14.50 m bgl. Soft sandy CLAY was identified in CP101 at 4.00 m bgl, with an ABP of 26 kN/m². Granular drift deposits are loose to medium dense with a net ABP in the order of 75–113 kN/m² at circa 3.00 – 5.00 m bgl increasing to 130–294 kN/m² at circa 6.50 – 11.00 m bgl.
Foundation Options	Made Ground is not considered suitable in its current form for founding and as such an engineered foundation solution will be required in the majority of plots comprising: ✚ Ground improvement using Vibro Stone Columns to support a reinforced strip foundation (Further assessment of the thickness of the Made Ground will be required in order to devise if full depth treatment will be possible). VSC will not be possible where the thickness of peat exceeds 0.25 m; and/or, ✚ Pile foundations (CFA/bored), particularly in proximity of the adjacent railway to minimise effects of vibration and where peat is confirmed to be present. The natural deposits have generally been assessed as firm/stiff or medium dense with anticipated ABP >100 kN/m². Natural deposits were encountered at shallow depth (<2.50 m bgl) in WS104, TP104 and TP109 in the north west of the development area. In this part of the site, ground conditions may allow the adoption of deep trench foundations. It should however be noted that soft CLAY and PEAT were encountered in the deeper cable percussive boreholes, at depths between circa 3.0 – 6.0 m bgl.



	Where VSC and piled foundations are adopted, controlled waters and associated generation of pollutant pathways will need to be adequately assessed. Consideration must be given to the settlement characteristic of the recently deposited Made Ground and will require modelling when a detailed layout with levels becomes available.
Building Floor Slabs	Ground-bearing floor slabs will not be viable given the depths of reworked Made Ground > 600 mm.
Heave Precautions	Given that the underlying clay is of low volume change potential, heave precautions will not be required to the internal face of a foundation less than 1.5 m in depth. Heave precautions will be required to the underside of floor slabs (where there is no 200 mm void) and pile ground beams are required within the modelled influencing distance of trees.
Soakaway Drainage	Due to the lateral and vertical extent of Made Ground across the site, together with the observed inorganic and hydrocarbon impact, soakaway drainage will not be a suitable method of surface water disposal for the subject site.
Sulphate Assessment	Concrete classification will be DS1 AC1s.
CBR Design %	Granular soils can be re-engineered to ensure 5% within the subgrade during favourable climatic conditions. Natural clay soils will provide a CBR in the order of 3–5% during drier climatic periods. However, if water is allowed to shed onto the formation, the CBR will reduce to < 2%, which will require specialist engineering of the subgrade.
Cut/Fill	Development levels unknown at this time; however, significant cut-and-fill works will be required to prepare the development platform.
Civil Engineering Excavations	The E3P Intrusive Ground Investigation has identified loose/collapsible deep Made Ground. Allowances should be made for battering back excavations and provisions of supports for open trenches.
Development Platform	The presence of deep Made Ground overlying a what is presumed to be historical relict vegetation that is identified as a 'peat material' in the central sector of the site. This material is identified as potentially degradable which may represent a risk associated with future consolidation induced by earthworks surcharge loading, temporary works and infrastructure loading. Further intrusive ground investigation is required to assess the extent of degradable organic material to inform a suitably robust settlement model to ensure design stability for the development platform.
Waste Characterisation	Any material that is to be disposed off-site should undergo assessment using Technical Guidance WM3: <i>Waste Classification – Guidance on the classification and assessment of waste</i>. Based on concentrations of TPH identified to date, the material is likely to comprise a mixture of Non-Hazardous and Hazardous waste. Allowances for disposal of Hazardous waste should be made. A well designed and managed Materials Management Plan should ensure the retention of materials is a safe and legislatively compliant manner.



RECOMMENDATIONS

Based on the findings of the geoenvironmental site assessment, the following additional works are recommended to be completed in due course:

-  Completion of ground gas monitoring.
-  Tier 2 vapour risk assessment.
-  Additional cable percussive boreholes to confirm deeper ground conditions to determine suitability of VSC treatment and inform piling.
-  Further investigation to assess the extent of peat and potentially infilled reservoir.
-  Further groundwater sampling at the location of WS105, together with installation of further monitoring wells in the vicinity to ascertain whether the identified impact is an isolated occurrence or a plume.
-  Plot-specific foundation schedule (upon receipt of the final development levels).
-  Arboricultural survey.
-  Geotechnical earthworks strategy (infrastructure).
-  Remediation and enabling works strategy.



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DRAWING LIST

14-768-R1-001 - Site Location Plan
14-768-R1-002 - Proposed Development Plan
14-768-R1-003 - Historical Features Plan
14-768-R1-004 - Site Features Plan
14-768-R1-005 - Exploratory Hole Location Plan
14-768-R1-006 - Depth of Made Ground Plan
14-768-R1-007 - Depth & Thickness of Peat Plan
14-768-R1-008 - Depth to Founding Strata Plan
14-768-R1-009 - Concept Foundation Zoning Plan
14-768-R1-010 - Conceptual Site Model
14-768-R1-015 - Development Constraints Plan
14-768-R1-018 - Contamination Issues Plan



1. INTRODUCTION

1.1. BACKGROUND

E3P has been commissioned by Kellen Homes to undertake a detailed Phase I and II Geoenvironmental Site Assessment for a parcel of land to the south of Heywood Road, Rochdale also known as Castleton Sidings.

This report is required to determine potential contaminated land liabilities, remediation requirements and geotechnical engineering works that will be required as part of the proposed development for a proposed low-rise residential development.

1.2. PROPOSED DEVELOPMENT

E3P understands that Kellen Homes are considering the proposed acquisition and future redevelopment of a parcel of land known as Castleton Sidings in Rochdale, Greater Manchester for low rise residential housing with associated adopted estate roads and utility infrastructure.

The APD sketch development layout plan indicates the proposed construction of circa 183 low rise dwellings in the central sector of the site, with an area of informal Public Open Space (POS) in the west and an area retained as Network Rail land in the east. It is understood that the eastern sector may ultimately be developed as a historic train visitors attraction.

A snapshot of the proposed development layout is indicated in Figure 1.1.

FIGURE 1.1 **SNAPSHOT OF PROPOSED DEVELOPMENT**



1.3. OBJECTIVES

The objectives of the geoenvironmental assessment are as follows:

-  Undertake a preliminary stage of sampling and analysis to provide an overview of environmental issues identified.
-  Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors.
-  Assess the geotechnical information and provide preliminary recommendations in relation to foundations, pavement construction and floor slabs.
-  Provide recommendations regarding future works required.

1.4. SCOPE OF WORKS

The scope of work includes the following elements:

-  Detailed desk study;
-  Design of suitable intrusive ground investigation;
-  14 no. Window sample probeholes with, and construction of, environmental monitoring installations;
-  2 no. Deep cable percussive boreholes with groundwater monitoring installations;
-  2 no. Deep rotary boreholes;
-  24 no. Mechanically excavated trial pits;
-  In-situ geotechnical testing;
-  Chemical and geotechnical laboratory analysis;
-  Groundwater monitoring and sampling;
-  Ground gas monitoring;
-  Contamination risk assessment and conceptual site model;
-  Geotechnical assessment and interpretation; and
-  Factual and interpretive reporting.

1.5. LIMITATIONS

The limitations of this report are presented in Appendix I.

1.6. CONFIDENTIALITY

E3P has prepared this report solely for the use of the client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from E3P; a charge may be levied against such approval.



2. SITE SETTING

2.1. SITE DETAILS

Site Address	Land south of Heywood Road, Castleton, Rochdale, OL11 3AU
National Grid Reference	E 387930 N 410140.
Site Area	95.27 Ha.

All acronyms used within this report are defined in the Glossary presented in Appendix II.

A site location map is presented in Appendix III as Drawing 14-768-001.

2.2. CURRENT SITE USE

E3P has undertaken a site walkover of the entire site and a description of the key findings is summarised in Table 2.1.

TABLE 2.1 SITE DESCRIPTION

Occupancy/Use	The site is a roughly semi-circular shaped parcel of land to the south of Heywood Road in Rochdale and to the west of Castleton railway station. Live railway lines are present along the eastern site boundary and the site itself forms derelict railway sidings open to the adjacent active railway. The southwestern quarter of the site falls within a designated area of greenbelt and the north eastern quarter falls within an area of Network Rail operated land. All former structures except for an active signal box have now been removed; however, track sidings, ballast, and relict hardstanding and concrete slabs remain.	
Surface Cover (%)	Buildings	0%
	Hardstand	40%
	Soft Cover	60%
Structures	There are several historical train platform structures present across the site. All historical building structures have been removed. There are also several areas of concrete hardstanding in the western sector of the site. A raised area of concrete hardstanding is present in the southern sector, with demolition rubble stockpiled creating a steep ramp. A void is evident beneath this raised area on the very southern boundary, which appears to be associated with a large, voided area just off the south-western boundary.	
Access	Vehicular access can be gained via a double gate from Heywood Road in the northern sector of the site. Pedestrian access is restricted due to the active railway lines to the north of the site.	
Slope	The site is split across a plateau in the centre of the site, with the north and eastern sector of the site being the highest elevation.	
Retaining Structures	There are no retaining wall structures identified within the site boundary.	



Vegetation/Ecology	Rough scrub vegetation is present throughout the site with significant vegetation present on the site boundary. The northern boundary of the site is comprised of mature trees. There are also numerous areas of semi-mature and mature trees within the site boundary. A habitat survey will be required to support planning applications.
Hazardous Material Storage	No above-ground storage tanks (ASTs) or underground storage tanks (USTs) were observed at the site during the preliminary site walkover. However, historical mapping has identified tanks on-site and due to the previously developed railway sidings nature of the site, it is likely that unrecorded hazardous materials storage will have occurred on the site.
Asbestos-Containing Material (ACM)	ACM was identified within stockpiles of rubble materials in the centre of the site.
Polychlorinated Biphenyls (PCBs)	There is no equipment identified that may contain PCBs within the site boundary. However, historically equipment containing PCBs may have been present.
Waste Storage	Potentially hazardous waste streams are likely to be generated at the site, however, none were observed during the preliminary site inspection.
Drainage / Utilities	A formal drainage survey has not been completed; however, a review of online records held by United Utilities does not indicate the presence of any drainage infrastructure within the site boundary. Other services identified on-site include:  A 6 kV electricity cable enters the site from the north and runs along the northern boundary and loops back in the centre of the site.  Overhead pylons electricity cables are located off-site to the south, in close proximity of the far south western extent of the site.  Overhead BT cables also enter from the housing estate to the north and follow the northern boundary, diverting south in the approximate centre of the site. A second loop is also present in the north eastern third of the site.

2.3. SURROUNDING AREA

The surrounding area land uses are summarised in Table 2.2.

TABLE 2.2 SURROUNDING LAND USES

DIRECTION	LAND USE
North	Residential dwellings and farmland.
East	Active railway line and farmland beyond.
South	Open farmland.
West	Open farmland.

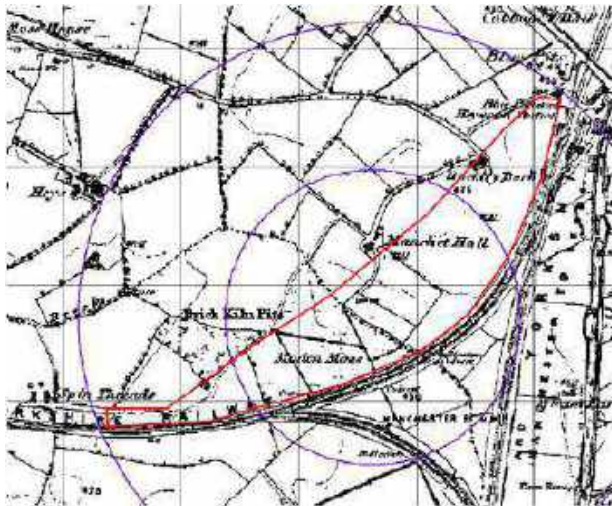
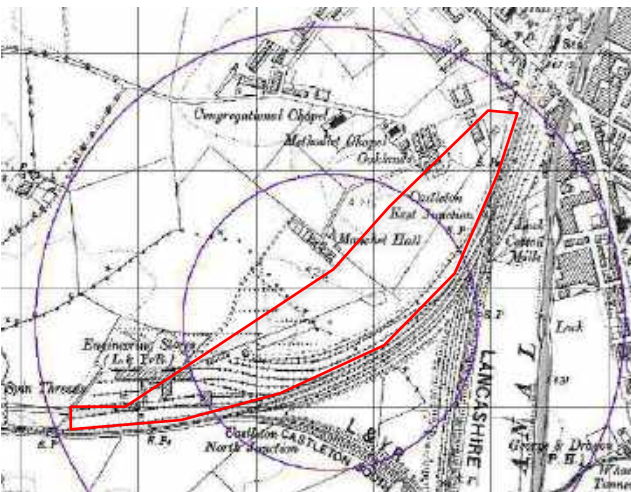


3. SITE HISTORY

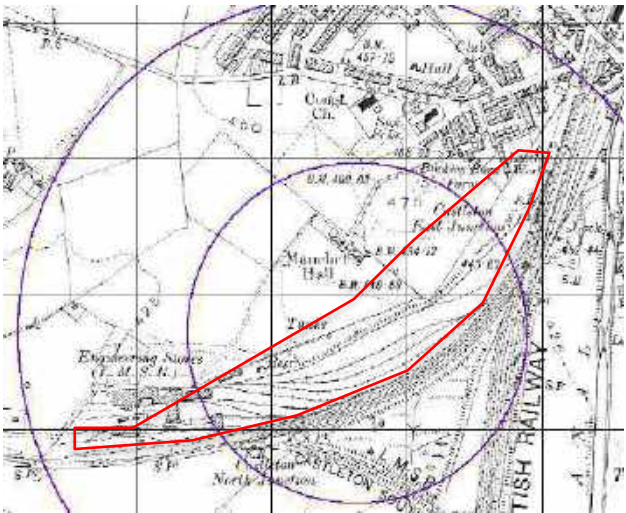
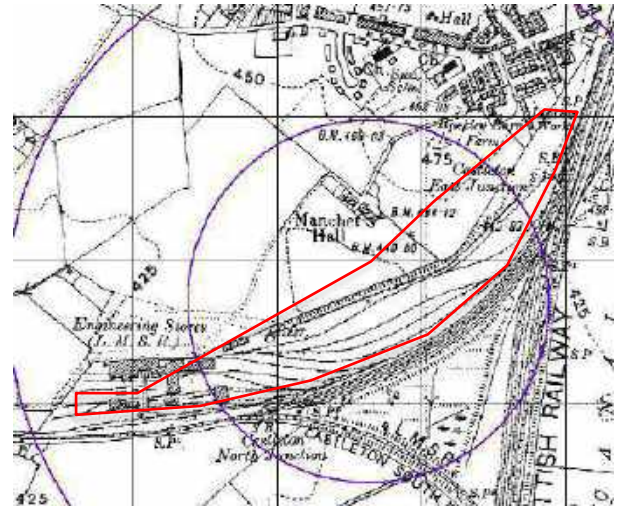
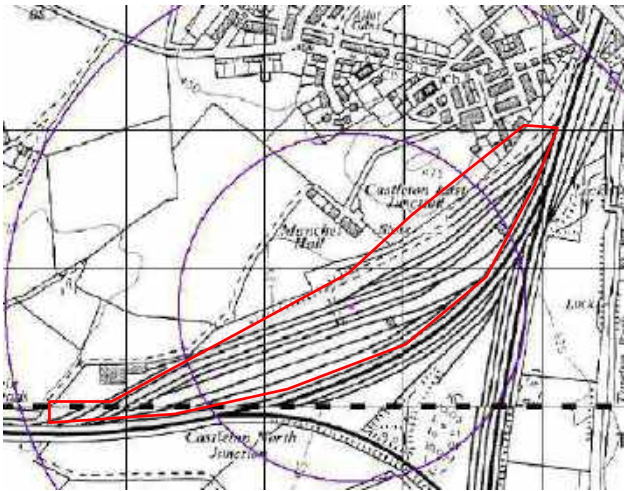
3.1. ON-SITE HISTORICAL DEVELOPMENT

A review of historical mapping and historical aerial imagery pertinent to the site is summarised in Table 3.1. In addition, historical site features are presented on Drawing No. 14-768-003 in Appendix III.

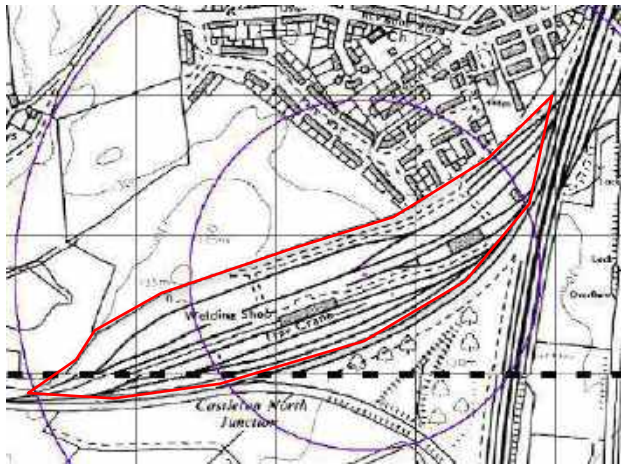
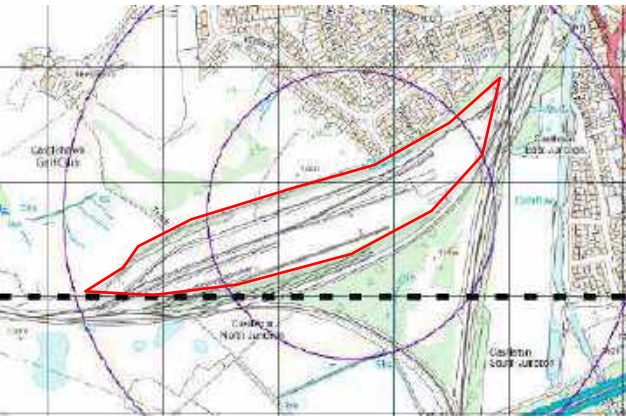
TABLE 3.1 HISTORICAL DEVELOPMENT

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1851 1:10,560	Heywood Station is located in the northern sector of the site, with a barn located in the north western sector. A Brick Kiln Works is also present in the south western sector of the site.	
1898 1:10,560	The barn in the north western sector of the site is no longer recorded. The brick works is also no longer recorded. However, the pits associated with the brickworks were still present. Marshes appear to encroach the central sector from the north. Train tracks are now present covering the southern third of the site. L&YR Engineering stores are also present in the south western sector of the site.	



MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1932 1:10,560	The marshy land is no longer shown. Tanks are recorded in the centre-north of the site. These tanks could possibly be re-watering tanks for steam engines. A leather works is also now present in the northern sector of the site.	
1938 1:10,560	The tanks in the centre north s are no longer recorded.	
1965-1968 1:10,000	The leather works and engineering stores are no longer recorded as present and the site is entirely occupied by tracks (sidings).	



MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1977 1:10,000	A welding shop and travelling crane are now recorded in the central sector of the site. Two unreferenced structures are also present in the north east.	
2020 1:10,000	The travelling crane is no longer recorded and previous structures now appear to have been removed. The track coverage has also been reduced.	
2021 Google Earth	The sidings now appear disused and becoming overgrown with self-seeded vegetation.	

3.2. OFF-SITE HISTORICAL DEVELOPMENT

A review of potentially contaminative uses identified on historical Ordnance Survey maps within a 250 m radius of the site is summarised in Table 3.2.

TABLE 3.2 SURROUNDING HISTORICAL DEVELOPMENT

SURROUNDING FEATURE	DISTANCE	DATES	DIRECTION
Lancashire and Yorkshire Railway	5 m	Pre 1851 – Present	East
Lock Cotton Mills Then... named as Mill. Then...named as Works. Then...no longer recorded	100 m	Pre 1894 – Pre 1910 Pre 1910 – Pre 1965 Pre 1965 – Pre 2020 Pre 2020 – Present	East
Heywood Station Then...no longer recorded	250 m	Pre 1851 – Pre 1894 Pre 1984 – Present	North East

3.3. PLANNING HISTORY

E3P has undertaken a review of online planning records held by Rochdale Metropolitan Borough Council and the following applications have been reviewed:

- 85/D17701 March 1985 – Alteration and Extension of Rail Welding Depot – Grant subject to conditions. No further details provided.
- 94/D30267 January 1994 – Construction of Concrete Hardstanding for Railway Crossing Assembly and Two Mobile Cranes – Grant subject to conditions. No further details provided.
- 16/00209/SO Feb 2016 – Screening opinion in respect of proposed residential development for up to 150 dwellings, means of access, on-site infrastructure, potential to deliver a rail platform for East Lancashire Railway and landscaping - EIA Not Required. No further details provided.

3.4. PREVIOUS REPORTS

There are no previous reports available to E3P relating to the subject site.

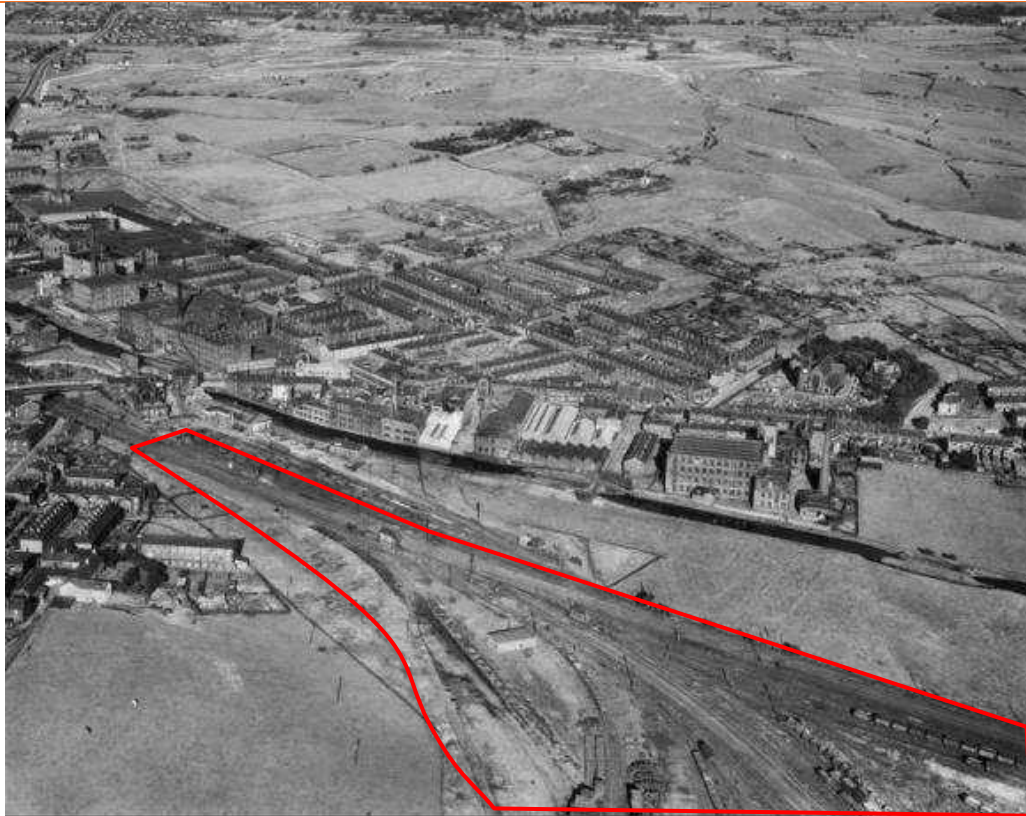
3.5. ANECDOTAL INFORMATION

Available online information details that the site forms part of the Greater Manchester Spatial Framework and the site is allocated for circa 125 new homes, alongside improvements to open space around Castleton railway station. The western half of site will be redeveloped as an area of open space or a nature conservation area and kept within the green belt. Land has also been earmarked as part of this scheme to enable the extension of the East Lancs Railway into Castleton.

Historical aerial photography for the site is also available from <https://www.britainfromabove.org.uk/> as shown in Figure 1.2. Goods sheds and signal boxes are visible, together with areas of storage.



FIGURE 1.2 SNAPSHOT OF THE NORTHERN SECTOR OF THE RAILWAY SIDINGS (1947)



www.britainfromabove.org.uk/image/EAW010792

© Historic England



4. ENVIRONMENTAL SETTING

4.1. GEOLOGY AND HYDROGEOLOGY

The British Geological Survey (BGS) map (Sheet 85) for the site, (1:50,000, Solid and Drift editions) and online records indicate the site is underlain by the geological sequence presented in Table 4.1.

TABLE 4.1 SUMMARY OF UNDERLYING GEOLOGY

GEOLOGICAL UNIT	CLASSIFICATION	DESCRIPTION	AQUIFER CLASSIFICATION
Drift (North)	Glaciofluvial Deposits	SAND and GRAVEL	Secondary A Aquifer
Drift (South)	Glacial Till – Diamicton	SAND, CLAY and GRAVEL	Secondary Undifferentiated Aquifer
Solid	Pennine Lower Coal Measures Formation	MUDSTONE, SILTSTONE, SANDSTONE	Secondary A Aquifer

TABLE 4.2 SUMMARY OF BGS BOREHOLE RECORDS

LOCATION	DEPTH	MADE GROUND	DRIFT	SOLID
180 m E (Ref: SD81SE9)	150 m	-	SAND and MARL 0.0 – 81.38 m	SHALE 81.38 - > 150.27 M
280 m S (Ref: SD80NE300)	2.10 m	0.30 m	SAND 0.30 - > 2.10 m	Not encountered
290 m N (Ref: SD81SE573)	20.00 m	0.30 m	SAND and CLAY 0.30 - > 20.0 m	Not encountered
295 m SE (Ref: SD80NE120)	4.30 m	0.60 m	SAND 0.30 - > 4.30 m	Not encountered

A geological fault is located through the northern sector of the site, orientated north west to south east.

4.2. NATURAL LANDFORM AND GEOMORPHOLOGY

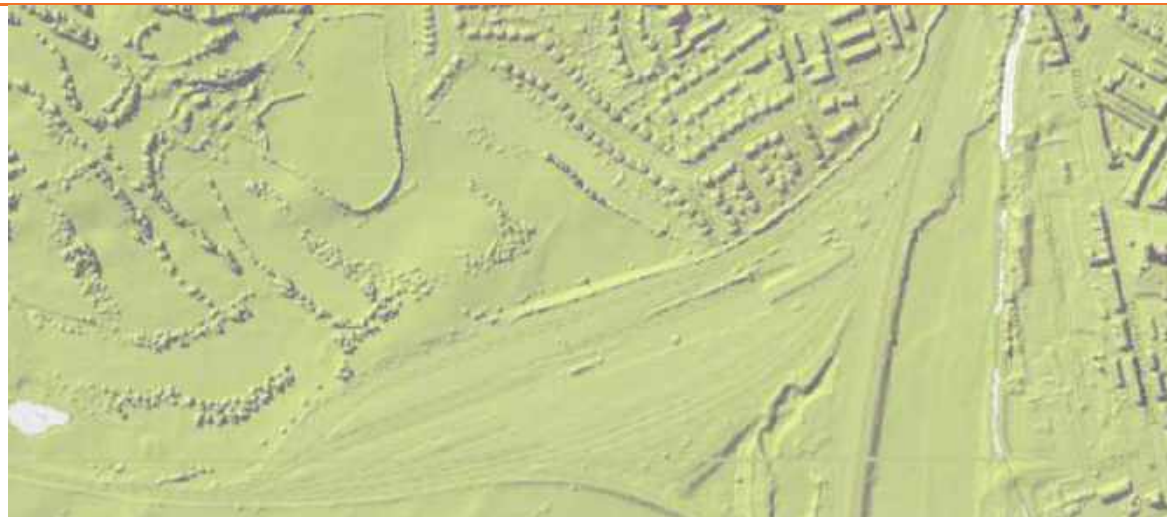
Based on the initial geological assessment, a review of available topographic data and pertinent mapping, E3P has undertaken a preliminary geomorphological assessment of the landform and its possible mechanism for formation.

Lidar data indicates the site to be at a slightly higher elevation and more evenly level in comparison to the land directly north and south, suggesting artificial raising/levelling of the site to accommodate former structures and railway sidings.

The canal to the east of the site is evident by an incision, however, this will also have been artificially constructed and as such the surrounding levels may not be reflective of the natural geomorphology.



FIGURE 4.1 SURFACE LIDAR DATA OF THE SITE AND SURROUNDING AREA



4.3. GEOTECHNICAL DATA

Geotechnical data presented within a commercially available environmental database is summarised in Table 4.3.

TABLE 4.3 SUMMARY OF GEOTECHNICAL DATA

HAZARD	DESIGNATION
Shrink-Swell Clay	Very low risk
Landslides	Very low risk
Ground Dissolution	No hazard
Compressible Ground	Moderate risk (South)
Collapsible Deposits	Very low risk
Running Sand	Very low risk

4.4. COAL MINING

The Envirocheck report states the site is in an area that may be affected by coal mining.

A CA mining report was obtained (Ref: 51002404759001) dated 16th March 2021.

The CA operates a risk-based approach to the assessment of potential instability issues associated with future development of land located within the predefined CA consultation areas. This risk-based approach subdivides the potential risk into “low” and “high” risk categories.

The risk categories can be defined as:

Low-Risk Sites – Deemed to be land where coal mining has taken place, however it was at such depth not to pose a risk to new development, and it therefore contains no known recorded risks and as such no further assessment is required.

For low-risk sites, the CA categorically states:



If your proposed development is within the Development Low Risk Area, there is no need for you to submit any coal mining information with your planning application and The Coal Authority will not be consulted by the LPA. The LPA will include our Standing Advice as an informative note within the decision notice.

High-Risk Sites – Deemed to be landholdings located within an area known to contain legacy risks that include:

-  Mine entries (shaft or adit);
-  Shallow coal workings (recorded and probable);
-  Workable coal seam outcrops;
-  Mine gas sites and areas;
-  Recorded coal-mining-related hazards;
-  Geological features (fissures and break lines); and
-  Former surface mining sites (sometimes using historic opencast extraction methods).

4.5. COAL MINING INFORMATION

Prior to the enactment of the Coal Mines Regulation Act (1872), which came into force on the 1st January 1883, there was no statutory requirement to record the extent of abandoned mine workings and as such the CA has no knowledge of extensive workings throughout the UK Coal Fields where shallow workings are present at a depth that could result in a subsidence event in the future (through successive cavitation) associated with failure of support mechanism.

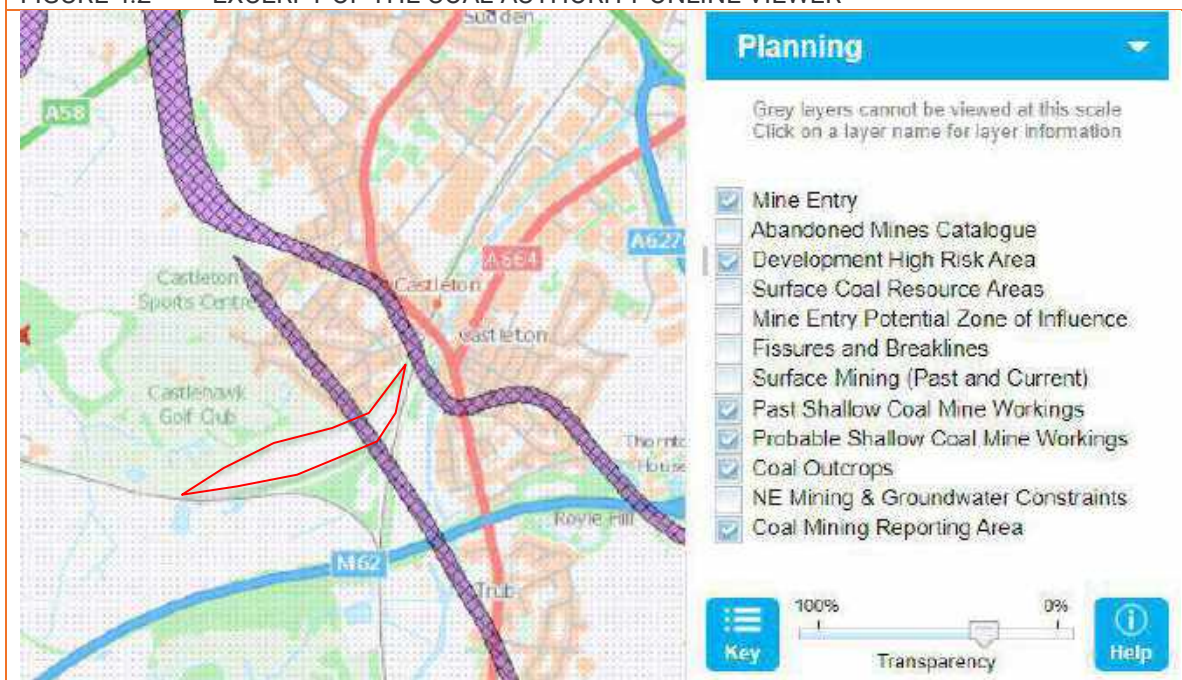
To determine if a site may have unrecorded or recorded coal mine workings requires the consideration of a wide range of information and E3P has completed a review of relevant information in relation to potential coal mining activities.

In the first instance, E3P has reviewed the Coal Authority Online Viewer and an excerpt of this is presented as Figure 4.2.

This map shows that a section of the site lies within a development high risk area, which corresponds with the conjectures subcrop of a coal seam.



FIGURE 4.2 EXCERPT OF THE COAL AUTHORITY ONLINE VIEWER



As the site is within an area affected by Coal Mining E3P have consulted with the Coal Authority who have provided a Consultant Coal Mining Report for the site (ref: 51002404759001).

Table 4.4 provides a summary of pertinent coal mining information with this report.

TABLE 4.4 COAL MINING INFORMATION

SOURCES OF INFORMATION	SUMMARY
Known Past Underground Mining	No past mining recorded.
Probable Unrecorded workings	None.
Spine Roadways at Shallow Depth	No spine roadway recorded at shallow depth.
Mine Entries within 100m of the site	None recorded within 100 metres of the site boundary.
Mine Abandonment plans	16820 – intersects with some, or all of the site boundary.
Known outcrops	Arley – Workable: Yes.
Faults / Fissures	A geological fault is located through the northern sector of the site, orientated north west to south east.
Opencast mines	None recorded within 500 metres of the site boundary.
Coal Authority Managed Tips	None recorded within 500 metres of the site boundary.
Remediated Sites	None recorded within 50 metres of the site boundary.

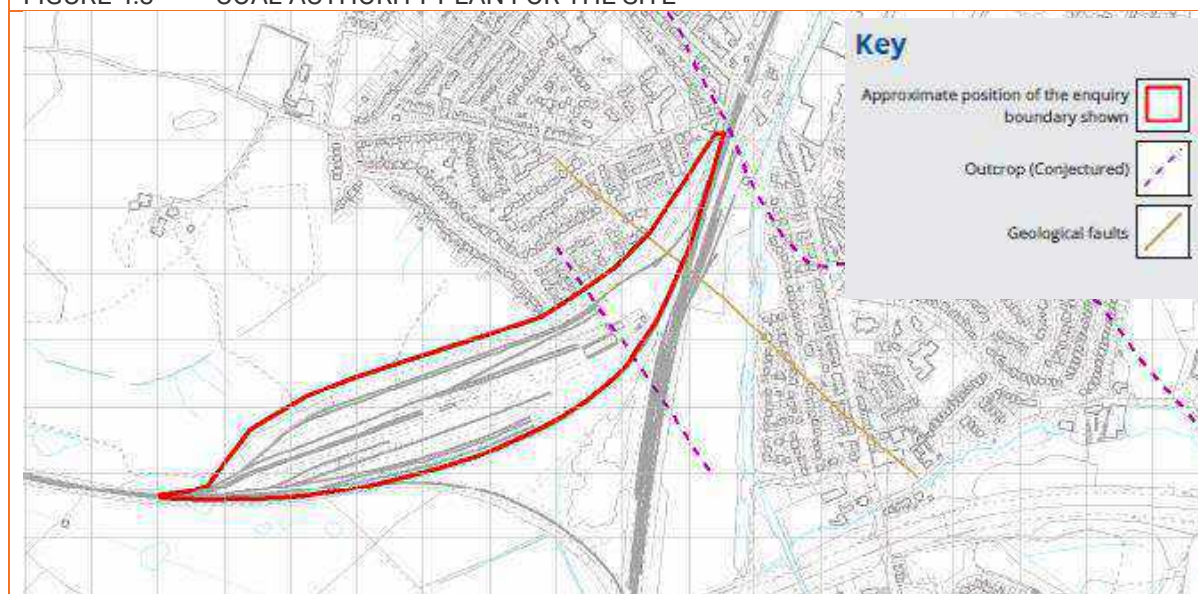


SOURCES OF INFORMATION	SUMMARY
Coal Mining Subsidence	The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994. There is no current Stop Notice delaying the start of remedial works or repairs to the property. The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.
Mine Gas	None recorded within 500 metres of the site boundary.
Mine Water	None recorded within 500 metres of the site boundary.
Future Underground Mining	None recorded.
Coal Authority Development Advice	None recorded.
British Geological Survey Mapping	The 1:10,000 geological mapping for the area does not indicate any coal outcrops or mine shafts are located within the site boundary.
Historical Ordnance Survey Mapping	A review of the 1:10,000 Ordnance Survey mapping from circa 1850, does not have any records of mine workings that predate the Mining & Regulation Act of 1872.
Historical Site Investigations	E3P has not been provided with any historic site investigation reports.

4.5.1. COAL AUTHORITY PLAN

The Coal Authority plan referenced: MR-LARGE-PLOT-510024047559001-1615909131879 shows the conjectured coal seams beneath the site along within the fault through the site.

FIGURE 4.3 COAL AUTHORITY PLAN FOR THE SITE



4.5.2. COAL MINING GEOLOGY

Figure 4.4 is a photograph of the 1:10,000 plan for the site which shows a fault trending north west to south east through the north of the site, with the downthrow to the north east. The site is also shown to be covered by artificial ground.

The coal seam is also indicated crossing the north eastern sector, concurring with the CA mining report mapped position.

FIGURE 4.4 PHOTOGRAPH OF THE 1:10,000 PLAN FOR THE SITE



4.6. COAL MINING RISK ASSESSMENT

This risk assessment comprises a desk-based review of all available information on coal mining issues that are relevant to the application site deemed to be located within a high-risk area. This includes:

- ✚ Interpretation of information to identify and assess the risks to the proposed development from coal mining legacy, including the cumulative impact of issues;
- ✚ Setting out appropriate mitigation measures to address the coal mining legacy issues affecting the site, including any necessary remedial works and/or demonstrate how coal mining issues have influenced the proposed development; and
- ✚ Demonstrating to the local planning authority that the application site is, or can be made, safe and stable to meet the requirements of national planning policy with regard to development on unstable land.

The coal mining risk assessment is summarised in Table 4.5.



TABLE 4.5 SUMMARY OF COAL MINING RISK ASSESSMENT

COAL MINING RISK ASSESSMENT	YES/NO	RISK ASSESSMENT
Recorded Underground Coal Mining at Shallow Depth (< 30 m)	No	Low
Recorded Underground Coal Mining at Shallow Depth (> 30 m)	No	Low
Evidence of Unrecorded Surface Extraction of Coal Outcrop	No	Low
Unrecorded Underground Coal Mining at Shallow Depth (< 30 m)	No	Low
Mine Entries (Shaft/Adits)	No	Low
Coal Mining Geology – Fractures/Fissures	Yes (Fault)	Moderate
Recorded Gas Emissions	No	Low
Recorded Mining Surface Hazard	No	Low
Surface Mining (Opencast)	No	Low

The site is located within a coal mining reporting area, and the Arley Coal seam is indicated to subcrop beneath the north eastern sector. A narrow development high risk zone associated with this seam is mapped on the western side of the conjectured crop.

Surrounding BGS boreholes indicate the thickness of overlying drift deposits to be in excess of 80 m bgl, thus significantly reducing the risk of any workings/void propagating upwards and resulting in subsidence at the surface.

Verbal consultation with the Coal Authority indicated that, due to the depth of the seam, they do not consider it likely that the seam has been worked.

The risk from coal mining related hazards is therefore considered low.

However, it would be considered prudent to undertake precautionary drilling in the location of the seam and development high risk zone to confirm the anticipated ground condition and conclusions of this assessment.

4.7. BRINE WORKINGS

The site is not situated within the Cheshire Salt Field; therefore, a brine workings risk assessment is not required.

4.8. RADON RISK POTENTIAL

The Envirocheck report indicates the site is situated in an area where less than 1% of homes are above the "Action Level" and that the BGS reports that full radon protective measures are not necessary in the construction of new dwellings or extensions.

4.9. PRELIMINARY GEOTECHNICAL ASSESSMENT

Based on the desk-study information, the following geotechnical assessment has been made:



-  Given the extensive development history of the site, it is likely there will be significant Made Ground fill deposits and obstructions across the site. Existing structures will require demolition, with all relict foundations grubbing out, prior to the construction of the proposed development.
-  In addition to potential depths of Made Ground, peat/organic deposits may be present beneath the site, in infilled areas (brick pit/reservoir) or those historically indicated to be marshland. Investigation will be required in order to assess these and undertake in-situ geotechnical testing to determine the likely foundation solution for plots in these areas.
-  The site is undulating with a split plateau across the centre of the site. In order to construct low-rise residential development, significant earthworks will be required to create a level developable platform.

4.10. HYDROLOGY

The Envirocheck report indicates that the site is not located within a groundwater source protection zone. Furthermore, there are no groundwater/potable abstractions within 500 m of the site boundary. The closest groundwater abstraction point is located 593 m north east of the site, operated by Sonoco Industrial Packaging for cooling, however the license was revoked.

A second abstraction point is located 656m south of the site, operated by the Manchester Golf Club Ltd for spray irrigation.

Surface water features within 250 m of the subject site are summarised in Table 4.6.

TABLE 4.6 SURFACE WATER FEATURES

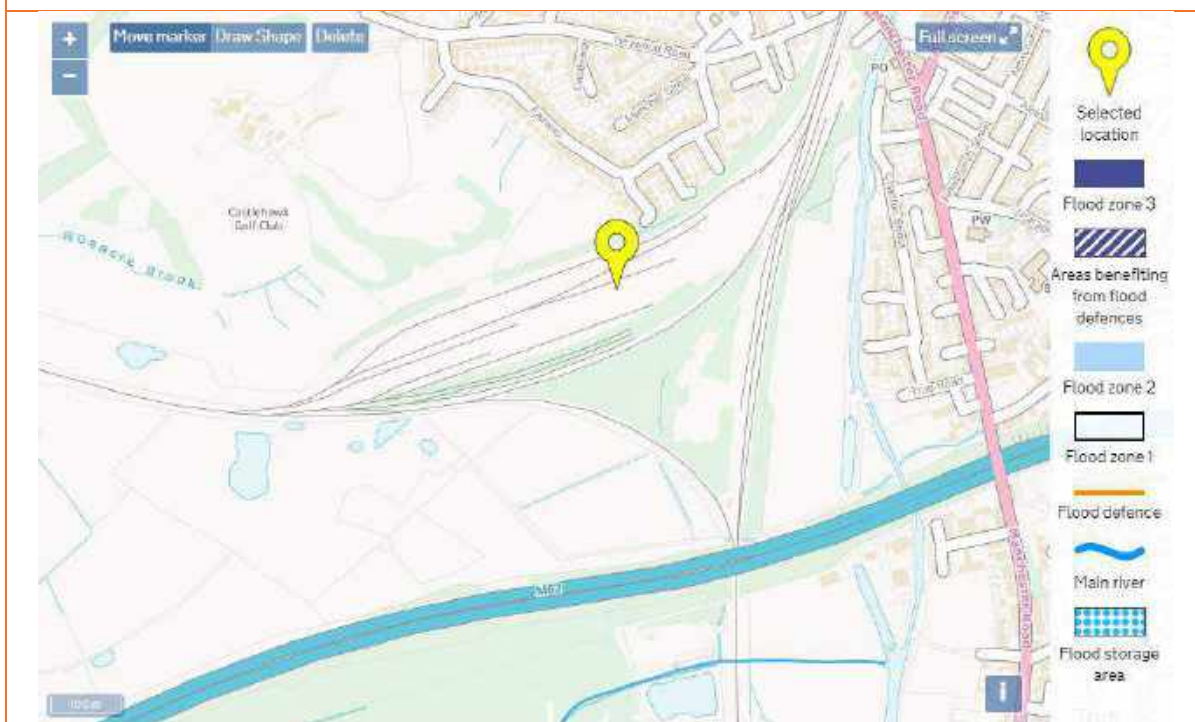
SURFACE WATER FEATURE	QUALITY	DISTANCE (m)	DIRECTION
Inland River	–	10 m	North
Roeacre Brook	–	150 m	North West
Rochdale Canal	B – Good	100 m	East

The Rochdale Canal and adjacent unnamed inland river are at a similar elevation to the site itself, however, the Roeacre Brook appears to be at a lower elevation and therefore down perceived hydraulic gradient of the site.

The site is predominantly located within a currently defined “Flood Risk Zone 1”; defined as land assessed as having less than 1 in 1,000 annual probability of river or sea flooding (< 0.1%), and as such is considered to be unaffected by river flooding. In addition, the Envirocheck report states there is a limited potential for groundwater flooding to occur at the site. The Environment Agency (EA) Flood Risk Map for the site is presented as Figure 4.5.



FIGURE 4.5 EA FLOOD RISK MAP



Source - <https://flood-map-for-planning.service.gov.uk/>

4.11. INDUSTRIAL LAND USES

There are no active entries within the trade directory for industrial land uses within 250 m of the site.

4.12. SENSITIVE LAND USES

The closest residential properties are located adjacent to the northern boundary of the site. The site is also situated within a nitrate vulnerable zone of the River Irk. An area of adopted green belt land is also present in the western sector of the site.

No other environmentally sensitive land uses have been identified within close proximity to the site.

4.13. SITE SENSITIVITY ASSESSMENT

The site is assessed to be located within a "Moderate" sensitivity setting as discussed within Table 4.7.



TABLE 4.7 SITE SENSITIVITY ASSESSMENT

SENSITIVITY PROFILE	DISCUSSION	RATING
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not situated within a Groundwater Source Protection Zone.	Low
Distance to the Closest Groundwater Abstraction Point	The closest groundwater abstraction point is located roughly 260 m north east of the site, operated by Sonoco Industrial Packaging for cooling, however the license was revoked. A second abstraction point is located circa 600 m south of the site, operated by the Manchester Golf Club Ltd for spray irrigation.	Low
Aquifer Classification in Superficial Drift Deposits	The glaciofluvial drift deposits in the north comprise a Secondary A Aquifer. The underlying deposits in the north of the site may comprise of moderate/high permeability sands and gravels, thus allowing downward and lateral migration.	High
Aquifer Classification in Bedrock	Secondary A Aquifer.	High
Is the Site Underlain by Low-Permeability Drift to Depths in Excess of 10 m?	The underlying superficial deposits are likely to comprise gravelly sands in the north of the site and low-permeability clay soils in the south of the site. A nearby BGS borehole indicates drift deposits extending to c. 81 m bgl. Given the anticipated granular nature of the drift, there is therefore a potential for mobile phase contaminants to migrate downwards and laterally to surrounding watercourses.	High
Is the Site Located Within 50 m of a Surface Watercourse?	An inland river is present along the northern site boundary, together with the Roeacre Brook 150 m to the north of the site. the Roeacre Brook appears to be at a lower elevation and therefore down perceived hydraulic gradient of the site. The Rochdale Canal is located 100 m east is at a similar elevation to the site and likely to be lined and therefore not in hydraulic continuity with the site.	Moderate
Sensitive Land Uses	The closest residential properties are located adjacent to the northern boundary of the site. The site is also situated within a nitrate vulnerable zone of the River Irk. An area of adopted green belt land is also present to the west of the site.	Moderate
OVERALL SITE ENVIRONMENTAL SENSITIVITY		Moderate



5. CONSULTATIONS

5.1. CONTAMINATED LAND OFFICER

Upon receipt of the search information, E3P will issue any pertinent information and/or use the information to inform the development of any intrusive investigation proposals.

5.2. LANDFILL SITES AND WASTE TREATMENT SITES

A historical landfill site is located circa 550 m west of the site, at land south of Chadwick Lane, which received inert, industrial, commercial, household and special waste from December 1984 until December 1986. The licence was held by Wilderness Quarries Limited. Given the distance from the site, this landfill is not considered to be within influencing distance of the site.

5.3. REGULATORY DATABASE

The information summarised in Table 5.1 has been obtained from a commercially available environmental database. The summary table only includes records from within 250 m of the subject site and not otherwise detailed in the report.

TABLE 5.1 SUMMARY OF ENVIRONMENTAL DATA

RECORD	ENTRIES WITHIN 250 m	DETAILS
Contaminated Land Register Entries and Notices	0	None Identified (N/A).
Authorised Industrial Processes (IPC/IPPC/LAPPC)	0	None Identified (N/A).
Fuel Stations Entries	0	None Identified (N/A).
Licensed Radioactive Substances	0	None Identified (N/A).
Enforcements, Prohibitions or Prosecutions	0	None Identified (N/A).
Discharge Consents	0	None Identified (N/A).
Pollution Incidents	0	None Identified (N/A).
Consents Issued Under the Planning (Hazardous Substances) Act 1990	0	None Identified (N/A).
Control of Major Accident Hazard (COMAH) Sites	0	None Identified (N/A).

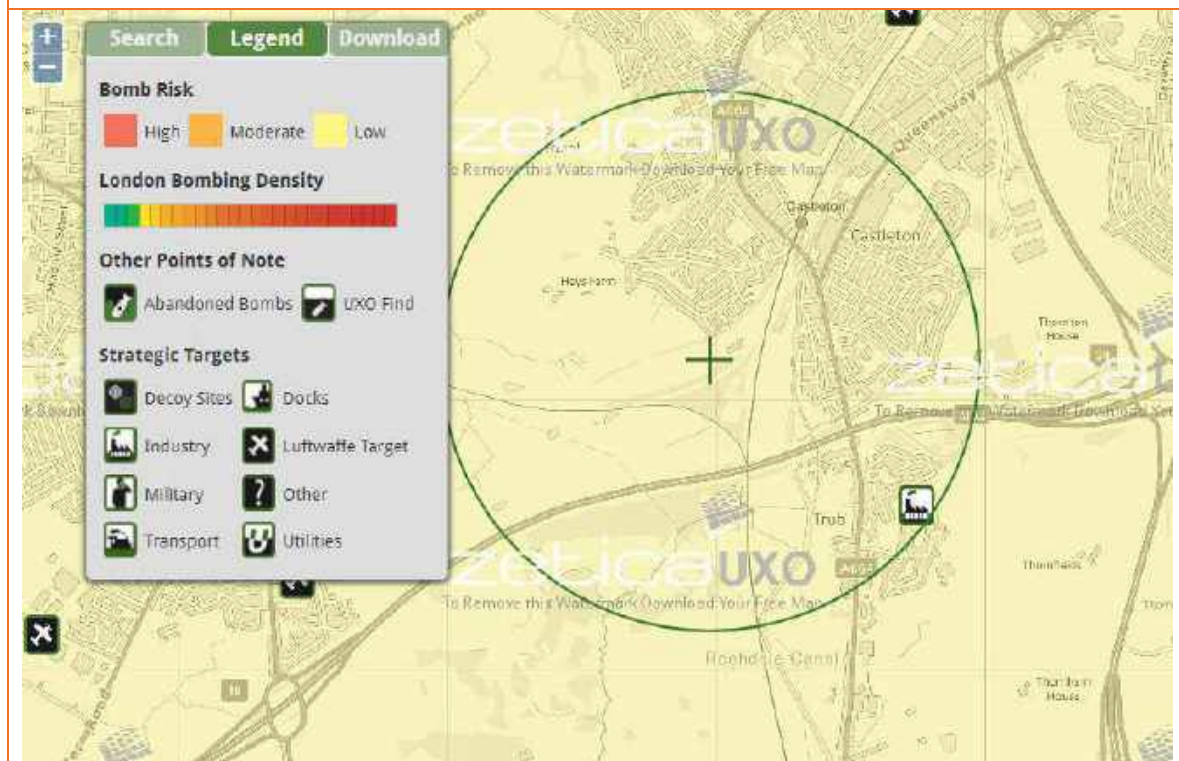


5.4. UNEXPLODED ORDNANCE

The regional unexploded bomb risk map from Zetica (2014) indicates that the site is in an area at low risk from possible unexploded ordnance (UXO) resulting from the Second World War.

The Zetica UXO Risk Map is presented as Figure 5.1.

FIGURE 5.1 ZETICA UXO RISK MAP



Source - <https://zeticauxo.com/downloads-and-resources/risk-maps/>



6. INITIAL CONCEPTUAL SITE MODEL

In accordance with EA LCRM (2019) and BSI 10175 (Code of Practice for Investigation of Potentially Contaminated Land), E3P has developed an initial conceptual site model (CSM) to identify potential contamination sources, migration pathways and receptors within the study area. This is summarised within Table 6.1.

ON-SITE SOURCES OF CONTAMINATION

The following potential on-site sources of contamination have been identified:

Made Ground potentially containing PAHs, TPHs, SVOCs, VOCs, heavy metals and asbestos due to the historical presence of the following:

-  Railway Sidings;
-  Brick Kiln Works with pits;
-  L&YR Engineering Works;
-  Tanks;
-  Welding Shop;
-  Travelling Crane; and
-  Leather Works.

PCBs may also be present within the associated Railway Sidings present on site.

OFF-SITE SOURCES OF CONTAMINATION

The following potential off-site sources of contamination have been identified:

-  Lancashire and Yorkshire Railway – Made Ground may be present containing SVOCs, VOCs, TPHs and PCBs.
-  Lock Cotton Mills – reservoirs and infilled ground are likely to be present within the vicinity of the Mill.



TABLE 6.1 INITIAL CONCEPTUAL SITE MODEL

SOURCE	PATHWAY	RECEPTOR
Human Health		
Heavy Metals, PAHs and PCBs Associated with Made Ground and Historical Site Use as Railway Sidings and Industrial Uses	Dermal Contact and Ingestion. Consumption of Homegrown Produce.	Construction Workers. Residential End Users.
Discussion: Made Ground is likely to be present on site, derived from the previous site uses as Railway Sidings, Brick Kiln Works, Engineering Works, Leather Works and a Travelling Crane. Made Ground may contain anthropogenic material and as such may be impacted by heavy metals, hydrocarbons and polycyclic aromatic hydrocarbons (PAH) derived from fuel and coal storage and combustion processes. PCBs may also be present within the vicinity of the railway sidings in the centre of the site and former substations associated with transformer oils utilised pre 2000. If present, heavy metals and non-volatile PAHs may pose a short-term risk to construction workers who may come into contact with impacted soils during earthworks. However, this risk can be mitigated through the use of appropriate Personal Protective Equipment (PPE) and the provision of adequate welfare facilities.		
Volatile Hydrocarbon Compounds Associated with Historical Site Use of Railway Sidings	Volatilisation/Accumulation. Vapour Inhalation.	Construction Workers. Residential End Users.
Discussion: Historical developments on site including railway sidings and engineering works and underlying Made Ground on site may be a source of volatile contaminants such as PAHs, TPH and BTEX compounds (common fuel derivatives). There is potential for spillages and leakages to have occurred over time and the presence of railway sidings also increases the risk of diesel spillages. Multiple tanks have been identified within the site which may have leaked and have been mobilised beneath the site. Volatile compounds may pose a risk to construction workers if they come into contact with impacted soils during further earthworks, however appropriate PPE/ Respiratory Protective Equipment (RPE) will ensure they are at no unacceptable risk. Future end users may come into contact with impacted soils in garden and landscaped areas, though the main pathway of volatile compounds is considered to be vapour inhalation indoors. If identified, it is likely that additional remediation of impacted soils and/or perched groundwater will be required to mitigate the risk to future residential end users.		
Asbestos-Containing Materials (ACMs) within Made Ground	Fibre/Dust Inhalation.	Construction Workers. Residential End Users. Third-Party Property.
Discussion: The presence of ACM being present within Made Ground underlying the site from former structures and activities on the site is considered likely given its insulating and fire resistant properties. Asbestos may be present in the Made Ground associated with historic developments, earth mounds, infilling and demolition activities. ACM poses a risk through fibre and dust inhalation and if present may pose a risk to construction workers during any future earthworks / demolition and to adjacent third-party property should dust be generated during those works.		



Hazardous Ground Gases		
Methane and Carbon Dioxide Associated with Possible On-Site Fill Material, Organic Soils	Inhalation. Accumulation.	Construction Workers. Residential End Users.
Discussion: Potentially infilled features (brick pits) and deep Made Ground on site and within 250 m of the site present a moderate ground gas risk. Dependent on the materials used to infilling, there is a possibility for the generation of hazardous ground gases within any of these features which may migrate along preferential pathways to the proposed building. This poses a risk of inhalation of gas to future site users and explosion in confined spaces.		
Controlled Waters		
Hydrocarbon Compounds Associated Within Vehicle Repair Facilities	Vertical/Lateral Migration.	Secondary A Aquifers. Roeacre Brook.
Discussion: Potentially mobile sources of contamination have been identified with the historic uses on site. It is likely that chemicals will have been stored/present on site in the past and spillages of mobile contamination are considered possible. The underlying granular drift, particularly in the north of the site, is unlikely to reduce downward or lateral migration, however where any low-permeability clay deposits are encountered in the south of the site, will afford some protection to the underlying aquifer. The closest groundwater abstraction is located 593 m to the north east of the site, thus reducing the sensitivity of the receptor.		
Buildings and Infrastructure		
pH and Sulphate	Corrosion of Concrete.	Foundations/Concrete.
Discussion: Presence of high pH and sulphate within Made Ground deposits may result in corrosion of buried concrete within the proposed development. Assessment must be undertaken to confirm the levels of pH and sulphate within the underlying strata and in particular any Made Ground deposits so that a concrete classification can be determine.		
Ecology		
Phytotoxic Contaminants	Plant Uptake	On-site flora and fauna.
Discussion: Made Ground on site is likely to contain levels of contamination which may inhibit plant growth. Further investigation is required to confirm the presence/absence of phytotoxic contaminants on site will be required.		



7. GROUND INVESTIGATION

7.1. GENERAL OVERVIEW

A ground investigation has been designed based on the findings of the desk study, with exploratory holes advanced to target specific potential contaminant sources summarised in Table 6.1. The investigation has also been used to collect geotechnical information to assist in the design and construction of the proposed development.

Exploratory fieldwork was completed between 4th March 2021 and 18th March 2021. The works are summarised in Table 7.1.

7.2. LIMITATIONS

The following limitations constrained the extent and coverage of intrusive investigation:

-  The north eastern third of the site is currently Network Rail retained land. Access to the area for intrusive work was therefore not permitted. Passage through the land was agreed prior to the works commencing (Figure 7.1).
-  The south western third of the site is designated greenbelt land currently heavily vegetated/wooded. Clearance works were not permitted (Figure 7.1).
-  A live railway forms the southern boundary of the site. A 15 m easement was applied to prevent any disturbance/vibration to infrastructure.
-  Ponds are located off-site in the wider area. Ecological constraints (potential for Great Crested Newts) dictated that no intrusive works could be undertaken within 50 m of the ponds, and any works within 250 m were to be supervised by an ecologist. (Refer to Figure 7.2).



FIGURE 7.1 GREENBELT LAND (GREEN) AND NETWORK RAIL RETAINED LAND (BLUE)

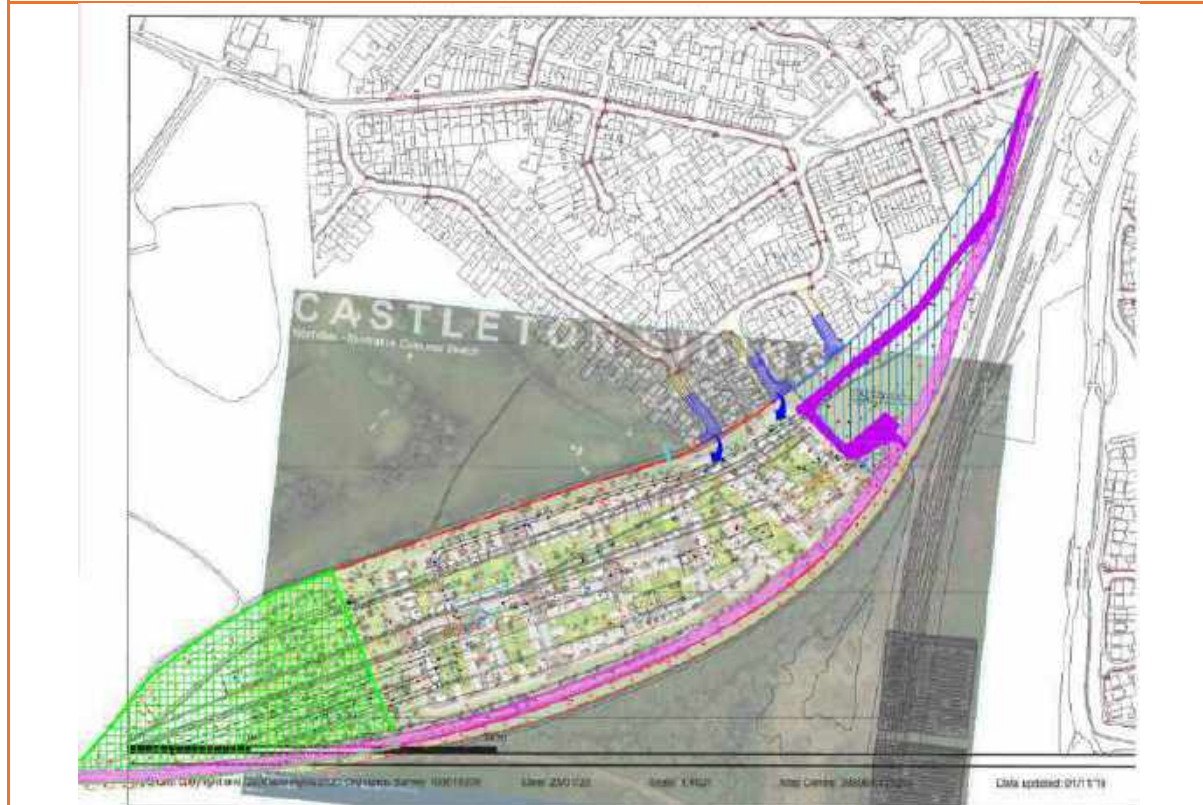


FIGURE 7.2 ECOLOGICAL CONSTRAINTS PLAN



7.3. SCOPE OF INVESTIGATION

TABLE 7.1 SUMMARY OF FIELDWORK

POTENTIAL SOURCE/RATIONALE	LOCATION HOLE	TYPE	MAXIMUM DEPTH (m bgl)	MONITORING WELLS RESPONSE ZONE (m bgl)
Investigation of the Old Brick/Clay Pit	WS101	Window Sample Probehole	4.45	1.00–3.50
General Ground Conditions Including the Presence/Nature of Obstructions within the Railway Sidings	WS102		3.45	N/A
	WS103		5.45	1.00–3.00
	WS104		5.45	1.00–3.00
	WS105		5.45	1.00–3.00
	WS106a		0.50	N/A
	WS106b		5.45	1.00–3.20
Investigation Beneath the Former Travelling Crane	WS107		5.45	1.00–4.50
	WS108		5.45	1.00–4.50
General Ground Conditions Including the Presence/Nature of Obstructions within the Railway Sidings	WS109		5.00	1.00–4.00
	WS110		5.45	2.00–5.00
	WS111		5.45	2.00–5.00
	WS112		5.45	2.00–5.00
Investigation Beneath the Former Travelling Crane	WS113		5.45	2.00–3.00
	WS114a		0.70	N/A
	WS114b		5.45	1.00–4.00
General Ground Conditions Including the Presence/Nature of Obstructions within the Railway Sidings	TP101–TP124	Mechanically Excavated Trial Pit	2.80	N/A
Investigation of Deeper Soil Horizons	CP101–CP102	Cable Percussive Borehole	15.00	N/A
Investigation of Conjectured Coal Outcrop	RB101–RB102	Rotary Borehole	60.50	N/A

Mechanically excavated trial pits were advanced to investigate ground conditions and to retrieve environmental samples, spatially distributed to offer the maximum site coverage whilst also being advanced to target specific contaminant sources.

Window sample probeholes were advanced to undertake in-situ detailed geotechnical testing, obtain environmental samples and install groundwater and ground gas monitoring wells.

The deep cable percussive boreholes were advanced to investigate the deeper soil horizons and to undertake in-situ detailed geotechnical testing.

The series of rotary boreholes were advanced to investigate the potential presence of a conjectured coal outcrop in the north of the site. These boreholes were drilled in accordance with the CA permissions process and industry best practice.



The sampling locations are illustrated in Drawing 14-768-005 (Appendix III). The ground conditions encountered are indicated on the logs, which are provided in Appendix V.

Return visits were made to monitor installations for groundwater level and gas concentrations. In addition, selected wells were purged, and samples of groundwater recovered for chemical analysis.

7.4. IN-SITU STANDARD PENETRATION TESTING (SPT)

In-situ geotechnical testing was conducted using the standard penetration test (SPT) and, where the ground is granular, a 60° cone (SPT(C)) was used instead of the sampling tube. The results are shown in the probehole logs in Appendix V and presented in Table 8.7 and discussed in Section 11.

7.5. LABORATORY ANALYSIS

Selected soil samples were submitted for a range of chemical analysis comprising:

-  Metals.
-  pH, total sulphate, water-soluble sulphate (2:1 extract).
-  Sulphide.
-  Cyanide.
-  Phenols.
-  Total and speciated polycyclic aromatic hydrocarbons (PAHs).
-  Semi Volatile Organic Compounds (SVOC).
-  Volatile Organic Compounds (VOC).
-  Speciated and banded total petroleum hydrocarbon (TPH).
-  BTEX Compounds.
-  Asbestos identification and quantification.

I2 Analytical undertook the analytical work and the testing results are included in Appendix VI and discussed in Section 9.

Selected samples were submitted to PSL Laboratory where the following geotechnical tests were undertaken:

-  Atterberg limits determinations;
-  Particle Size Distribution Tests;
-  Dry Density / Optimum Moisture Content Testing;
-  One Dimensional Consolidation Test; and
-  Single stage triaxial tests.

Laboratory analysis sheets are included in Appendix VIII and are summarised in Section 8.



8. GROUND AND GROUNDWATER CONDITIONS

8.1. SUMMARY OF GROUND CONDITIONS

The ground investigation generally confirms the published geology and identifies the strata set out in Table 8.1.

TABLE 8.1 SUMMARY OF STRATA

HOLE	DEPTH TO STRATUM (m bgl)					
	MADE GROUND	SOFT CLAY	PEAT	STIFF CLAY	SAND	GRAVEL
TP101	0.00–2.70	–	–	–	–	–
TP102	0.00–3.00	–	–	–	–	–
TP103	0.00–0.70	–	–	–	–	–
TP104	0.00–1.50	–	–	–	–	1.50–2.40
TP105	0.00–2.50	–	–	–	–	–
TP106	0.00–2.20	–	–	–	–	–
TP107	0.00–2.20	–	–	–	–	2.20–2.80
TP108	0.00–2.60	–	–	–	–	–
TP109	0.00–0.70	–	–	–	0.70–2.80	–
TP110	0.00–1.80	–	–	–	–	–
TP111	0.00–2.30	–	–	–	–	–
TP112	0.00–2.70	–	–	–	–	–
TP113	0.00–2.60	–	–	–	–	–
TP114	0.00–2.20	–	–	–	–	–
TP115	0.00–2.00	–	–	–	–	–
TP116	0.00–2.40	–	–	–	–	–
TP117	0.00–2.00	–	–	–	–	–
TP118	0.00–2.10	–	–	–	–	–
TP119	0.00–2.10	–	–	–	–	–
TP120	0.00–2.30	–	–	–	–	–
TP121	0.00–2.40	–	–	–	–	–
TP122	0.00–2.60	–	–	–	–	–
TP123	0.00–2.80	–	–	–	–	–
TP124	0.00–2.40	–	–	–	–	–
WS101	0.00–1.40	–	–	1.40–4.45	–	–
WS102	0.00–3.45	–	–	–	–	–
WS103	0.00–4.50	–	–	–	4.50–5.45	–
WS104	0.00–4.20	–	–	–	4.20–5.45	–
WS105	0.00–4.80	–	–	–	4.80–5.45	–
WS106a	0.00–0.50	–	–	–	–	–



HOLE	DEPTH TO STRATUM (m bgl)					
	MADE GROUND	SOFT CLAY	PEAT	STIFF CLAY	SAND	GRAVEL
WS106b	0.00–4.50	–	4.50–5.45	–	–	–
WS107	0.00–5.45	–	–	–	–	–
WS108	0.00–4.40	–	4.40–5.45	–	–	–
WS109	0.00–3.30	–	–	3.30–5.00	–	–
WS110	0.00–2.60	–	–	–	2.60–5.45	–
WS111	0.00–5.45	–	–	–	–	–
WS112	0.00–5.45	–	–	–	–	–
WS113	0.00–3.00	–	–	–	–	–
WS114a	0.00–0.70	–	–	–	–	–
WS114b	0.00–4.60	–	4.60–5.45	–	–	–
CP101	0.00–4.20	4.20–6.30	–	11.70–14.95	6.30–11.70	–
CP102	0.00–3.10	–	3.10–5.70	9.00–15.00	5.70–9.00	–
RB101	0.00–3.90	–	–	12.20–31.20 33.20–35.60 40.80–60.50	3.90–12.20 31.20–33.20 35.60–40.80	–
RB102	0.00–4.10	–	–	10.20–24.10 28.20–32.10 39.60–59.00	4.10–10.20 24.10–28.20 32.10–39.60	–

8.2. MADE GROUND

Made Ground deposits were encountered within all of the exploratory hole locations from ground level to depths in excess of 4.20 m bgl. In 28 locations, the full depth of Made Ground could not be proven in the trial pits and was only proven in a select number of window sampler and deeper boreholes.

The material generally comprises a black slightly clayey gravelly medium sand, with gravel of mudstone, brick, ash, shale, timber, glass and wood.

A concrete slab was encountered at TP103 between 0.60 m and 0.70 m, the trial pit in this location was terminated due to utility infrastructure being present in this area.

A Depth of Made Ground Plan is presented as Drawing 14-768-006 in Appendix III.

8.3. PEAT

At four locations in the centre/east of the site, blackish brown pseudo fibrous PEAT was encountered. The peat was encountered at the base of WS106b, WS108 and WS114b, and the full depth was not proven due to reaching the limit of the drilling rig. Where proven, in CP102, the full thickness was recorded to be 2.60 m.



TABLE 8.2 DEPTH AND THICKNESS OF PEAT

LOCATION	DEPTH (m)	THICKNESS (mm)
WS106b	4.50 – >5.45	950
WS108	4.40 – >5.45	1050
WS114b	4.60 – >5.45	850
CP102	3.10 – 5.70	2600

In each location the peat was encountered at the base of the Made Ground, it is therefore likely to be associated with relict vegetation/organic material that was overfilled to create the sidings plateau. Given that the base of the Made Ground was not proven in a number of locations, it is therefore considered possible that the peat may be more extensive across the site.

8.4. DRIFT DEPOSITS

Drift deposits were encountered within 13 of the 44 the exploratory locations. Within the 28 other locations, the full depth of Made Ground could not be proven due to the limitation of the excavator/drilling rig depth.

The drift deposits are varied across the site, generally comprising of CLAY and SAND. The SAND was generally a light brown clayey SAND at seven locations between the depths of 0.70 m and 11.70 m bgl.

The CLAY was encountered at four locations as a stiff to very stiff medium to high strength sandy CLAY between the depths of 1.40 m to 15.00 m bgl.

At one location (CP101) a soft very low strength brown sandy CLAY was encountered between the depths of 4.20 m to 6.30 m bgl (possible alluvium-type deposits).

Rotary boreholes (RB101 and RB102) were terminated in drift deposits at depths of 60.5 and 59.0 m bgl respectively. Alternating CLAY and SAND were encountered throughout, indicating drift deposits to extend to significant depth.

8.5. SOLID GEOLOGY

The solid geology was not encountered within the deeper cable holes or rotary open holes across the site. A nearby BGS borehole indicates rockhead at circa 81.00 m bgl.

8.6. GROUNDWATER

Groundwater strikes were encountered as slight/seepages. The depth of the seepages are shown on the exploratory hole records in Appendix V and are summarised in Table 8.3.

TABLE 8.3 SUMMARY GROUNDWATER STRIKES

LOCATION	DEPTH TO STRIKE (m)	NOTES
TP104	1.50	Slight strike
TP105	1.20	Slight strike
TP109	2.70	Slight strike
TP110	1.60	Significant strike



LOCATION	DEPTH TO STRIKE (m)	NOTES
TP113	2.20	Slight strike
WS110	4.80	Slight strike
CP102	1.50	Slight strike

Water strikes were not recorded in the natural strata and it is therefore inferred that the strikes represent perched water in the Made Ground.

Monitoring was undertaken using an electronic dip meter and interface probe to record the depth to groundwater and the thickness of any free-phase hydrocarbon product, if present. These results are summarised in Table 9.8.

8.7. VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

Visual and olfactory evidence of potential contamination has been identified during the site investigation and these are summarised in Table 8.4.

TABLE 8.4 SUMMARY VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

LOCATION	DEPTH (m)	STRATUM	NOTES
TP105	0.50–2.50	Made Ground	Hydrocarbon impact
TP106	1.40–2.20	Made Ground	Strong hydrocarbon odour
TP107	1.40–2.20	Made Ground	Strong hydrocarbon odour
TP113	2.00	Made Ground	Hydrocarbon odour
WS104	3.20–4.20	Made Ground	Hydrocarbon impact and strong odour
WS105	2.00–5.45	Made Ground	Hydrocarbon impact and strong odour
WS106b	4.00–4.45	Made Ground	Hydrocarbon impact and strong odour
WS108	4.00–4.45	Made Ground	Hydrocarbon impact and strong odour
CP102	0.60–3.10	Made Ground	Hydrocarbon impact and strong odour

8.8. SOIL CONSISTENCY

Undrained shear strength values were measured using both field hand shear vane tests and laboratory undrained triaxial tests. Results of the tests are presented in Table 8.5 and Table 8.6, which indicate the clay soils to be stiff. Strength test data is generally consistent with the field descriptions of the aforementioned soils.

TABLE 8.5 SUMMARY OF HAND SHEAR VANE TESTS

LOCATION	DEPTH	SHEAR STRENGTH (kPa)	CALCULATED ALLOWABLE BEARING PRESSURE (kN/m ²)
TP106	1.60	90	212

Notes

ABP Calculated using Stroud and Butler et al 1974.

Results of the standard penetration tests, including undrained shear strengths derived from SPTs are included in Table 8.7.



TABLE 8.6 SUMMARY OF UNDRAINED SHEAR STRENGTH TEST RESULTS

LOCATION	SAMPLE DEPTH (m)	LAB DESCRIPTION	UNDRAINED SHEAR STRENGTH (kN/m ²)	CONSISTENCY
WS101	1.50–2.00	Stiff brown slightly gravelly slightly sandy CLAY	133	Stiff

8.9. SIDE STABILITY AND EASE OF EXCAVATION

The sides of the trial pit excavations were generally unstable within the Made Ground during excavation, with frequent sidewall collapse observed.

The presence of brick and concrete cobbles within the Made Ground deposits meant that in certain places, excavation was slow through the Made Ground and in some places, Made Ground could not be fully penetrated.

The natural strata was excavated with relative ease.



TABLE 8.7 STANDARD/CONE PENETRATION TEST RESULTS

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE (N ₁) ₆₀	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m ²)	ALLOWABLE BEARING PRESSURE (kN/m ²)*
WS101	1.00	MG: Gravelly sand	20	20.16	Medium Dense	N/A	N/A	N/A	201.63
WS101	2.00	Sandy CLAY	15	13.70	N/A	Medium strength	Stiff	68.52	140.87
WS101	3.00	Sandy CLAY	9	7.83	N/A	Low strength	Firm	39.13	80.46
WS101	4.00	Sandy CLAY	14	11.83	N/A	Medium strength	Stiff	59.14	121.59
WS102	1.00	MG: Sandy gravel	22	22.18	Medium Dense	N/A	N/A	N/A	221.79
WS102	2.00	MG: Sandy gravel	13	11.88	Medium Dense	N/A	N/A	N/A	118.76
WS103	1.00	MG: Sandy gravel	16	16.13	Medium Dense	N/A	N/A	N/A	161.30
WS103	2.00	MG: Sandy gravel	17	15.53	Medium Dense	N/A	N/A	N/A	155.30
WS103	3.00	MG: Sandy gravel	21	18.26	Medium Dense	N/A	N/A	N/A	182.63
WS103	4.00	MG: Sandy gravel	13	10.98	Medium Dense	N/A	N/A	N/A	109.83
WS103	5.00	MG: Sandy gravel	12	9.96	Loose	N/A	N/A	N/A	99.55



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WS104	1.00	MG: Sandy gravel	21	21.17	Medium Dense	N/A	N/A	N/A	211.71
WS104	2.00	MG: Sandy gravel	11	10.05	Medium Dense	N/A	N/A	N/A	100.49
WS104	3.00	MG: Sandy gravel	7	6.09	Loose	N/A	N/A	N/A	60.88
WS104	4.00	MG: Sandy gravel	15	12.67	Medium Dense	N/A	N/A	N/A	126.73
WS104	5.00	MG: Sandy gravel	6	4.98	Loose	N/A	N/A	N/A	49.78
WS105	1.00	MG: Sandy gravel	23	23.19	Medium Dense	N/A	N/A	N/A	231.87
WS105	2.00	MG: Sandy gravel	15	13.70	Medium Dense	N/A	N/A	N/A	137.03
WS105	3.00	MG: Sandy gravel	10	8.70	Loose	N/A	N/A	N/A	86.97
WS105	4.00	MG: Sandy gravel	17	14.36	Medium Dense	N/A	N/A	N/A	143.62
WS105	5.00	MG: Sandy gravel	26	21.57	Medium Dense	N/A	N/A	N/A	215.70
WS106b	1.00	MG: Sandy gravel	20	20.16	Medium Dense	N/A	N/A	N/A	201.63
WS106b	2.00	MG: Sandy gravel	12	10.96	Medium Dense	N/A	N/A	N/A	109.62
WS106b	3.00	MG: Sandy gravel	10	8.70	Loose	N/A	N/A	N/A	86.97



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WS106b	4.00	MG: Sandy gravel	8	6.76	Loose	N/A	N/A	N/A	67.59
WS106b	5.00	PEAT	16	13.27	N/A	Medium strength	Stiff	66.37	136.46
WS107	1.00	MG: Sandy gravel	11	11.09	Medium Dense	N/A	N/A	N/A	110.90
WS107	2.00	MG: Sandy gravel	11	10.05	Medium Dense	N/A	N/A	N/A	100.49
WS107	3.00	MG: Sandy gravel	7	6.09	Loose	N/A	N/A	N/A	60.88
WS107	4.00	MG: Sandy gravel	14	11.83	Medium Dense	N/A	N/A	N/A	118.28
WS107	5.00	MG: Sandy gravel	21	17.42	Medium Dense	N/A	N/A	N/A	174.22
WS108	1.00	MG: Sandy gravel	17	17.14	Medium Dense	N/A	N/A	N/A	171.39
WS108	2.00	MG: Sandy gravel	10	9.14	Loose	N/A	N/A	N/A	91.35
WS108	3.00	MG: Sandy gravel	6	5.22	Loose	N/A	N/A	N/A	52.18
WS108	4.00	MG: Sandy gravel	4	3.38	Very Loose	N/A	N/A	N/A	33.79
WS108	5.00	PEAT	15	12.44	N/A	Medium strength	Stiff	62.22	127.93
WS109	1.00	MG: Gravelly sand	7	7.06	Loose	N/A	N/A	N/A	70.57
WS109	2.00	MG: Gravelly sand	1	0.91	Very Loose	N/A	N/A	N/A	9.13



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WS109	3.00	MG: Gravelly sand	1	0.87	Very Loose	N/A	N/A	N/A	8.70
WS109	4.00	Gravelly CLAY	10	8.45	N/A	Medium strength	Stiff	42.24	86.85
WS109	5.00	Gravelly CLAY	10	8.30	N/A	Medium strength	Stiff	41.48	85.29
WS110	1.00	MG: Gravelly sand	5	5.04	Loose	N/A	N/A	N/A	50.41
WS110	2.00	MG: Gravelly sand	3	2.74	Very Loose	N/A	N/A	N/A	27.41
WS110	3.00	Clayey SAND	13	11.31	Medium Dense	N/A	N/A	N/A	113.05
WS110	4.00	Clayey SAND	11	9.29	Loose	N/A	N/A	N/A	92.93
WS110	5.00	Clayey SAND	9	7.47	Loose	N/A	N/A	N/A	74.67
WS111	1.00	MG: Gravelly sand	13	13.11	Medium Dense	N/A	N/A	N/A	131.06
WS111	2.00	MG: Gravelly sand	2	1.83	Very Loose	N/A	N/A	N/A	18.27
WS111	3.00	MG: Gravelly sand	3	2.61	Very Loose	N/A	N/A	N/A	26.09
WS111	4.00	MG: Gravelly sand	2	1.69	Very Loose	N/A	N/A	N/A	16.90
WS111	5.00	MG: Gravelly sand	3	2.49	Very Loose	N/A	N/A	N/A	24.89
WS112	1.00	MG: Gravelly sand	16	16.13	Medium Dense	N/A	N/A	N/A	161.30
WS112	2.00	MG: Gravelly sand	5	4.57	Loose	N/A	N/A	N/A	45.68



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WS112	3.00	MG: Gravelly sand	4	3.48	Very Loose	N/A	N/A	N/A	34.79
WS112	4.00	MG: Gravelly sand	4	3.38	Very Loose	N/A	N/A	N/A	33.79
WS112	5.00	MG: Gravelly sand	4	3.32	Very Loose	N/A	N/A	N/A	33.18
WS113	1.00	MG: Gravelly sand	15	15.12	Medium Dense	N/A	N/A	N/A	151.22
WS113	2.00	MG: Gravelly sand	4	3.65	Very Loose	N/A	N/A	N/A	36.54
WS113	3.00	No return	1	0.87	Very Loose	N/A	N/A	N/A	8.70
WS113	4.00	No return	1	0.84	Very Loose	N/A	N/A	N/A	8.45
WS113	5.00	No return	4	3.32	Very Loose	N/A	N/A	N/A	33.18
WS114b	1.00	MG: Gravelly sand	5	5.04	Loose	N/A	N/A	N/A	50.41
WS114b	2.00	MG: Gravelly sand	0	0.00	Very Loose	N/A	N/A	N/A	0
WS114b	3.00	MG: Gravelly sand	0	0.00	Very Loose	N/A	N/A	N/A	0
WS114b	4.00	MG: Gravelly sand	2	1.69	Very Loose	N/A	N/A	N/A	16.90
WS114b	5.00	MG: Gravelly sand	10	8.30	Loose	N/A	N/A	N/A	82.96
CP101	1.00	MG: Sandy gravel	7	7.06	Loose	N/A	N/A	N/A	70.57
CP101	2.00	MG: Sandy gravel	4	3.65	Very Loose	N/A	N/A	N/A	36.54
CP101	3.00	MG: Sandy gravel	3	2.61	Very Loose	N/A	N/A	N/A	26.09
CP101	4.00	Sandy CLAY	3	2.53	N/A	Very low strength	Soft	12.67	26.06



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CP101	5.00	Sandy CLAY	15	12.44	N/A	Medium strength	Stiff	62.22	127.93
CP101	6.50	SAND	17	13.88	Medium Dense	N/A	N/A	N/A	138.79
CP101	8.00	SAND	16	12.95	Medium Dense	N/A	N/A	N/A	129.51
CP101	9.50	SAND	18	14.51	Medium Dense	N/A	N/A	N/A	145.07
CP101	11.00	SAND	19	14.69	Medium Dense	N/A	N/A	N/A	146.94
CP101	12.5	Sandy CLAY	23	16.80	N/A	High strength	Very Stiff	84.02	172.75
CP101	14.5	Sandy CLAY	28	19.07	N/A	High strength	Very Stiff	95.34	196.01
CP102	1.00	MG: Gravelly sand	5	5.04	Loose	N/A	N/A	N/A	50.41
CP102	2.00	MG: Gravelly sand	4	3.65	Very Loose	N/A	N/A	N/A	36.54
CP102	3.00	PEAT	3	2.61	N/A	Very low strength	Soft	13.04	26.82
CP102	4.00	PEAT	4	3.38	N/A	Very low strength	Soft	16.90	34.74
CP102	5.00	PEAT	5	4.15	N/A	Low strength	Firm	20.74	42.64
CP102	6.50	Gravelly SAND	36	29.39	Medium Dense	N/A	N/A	N/A	293.90



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CP102	8.00	Gravelly SAND	39	31.57	Dense	N/A	N/A	N/A	315.69
CP102	9.50	Sandy CLAY	27	21.76	N/A	High strength	Very Stiff	108.80	223.70
CP102	11.00	Sandy CLAY	26	20.11	N/A	High strength	Very Stiff	100.54	206.70
CP102	12.50	Sandy CLAY	26	19.00	N/A	High strength	Very Stiff	94.98	195.28
CP102	14.00	Sandy CLAY	36	24.94	N/A	High strength	Very Stiff	124.69	256.36

Notes

* The Allowable Bearing Pressure (ABP) should be considered indicative.

The interpretation of in situ mass undrained shear strength (cu) data from SPT Blow Count (N) results and the influence of the Plasticity Index (PI) was reported in Standard Penetration Test in Insensitive Clays and Soft Rocks. Stroud (1974). The standard penetration test and the engineering properties of glacial materials subsequently. Stroud and Butler (1975) and (1989). Allowable bearing pressure on sands. Soil Mechanics in Engineering Practice Terzaghi, K. & Peck, R.B. 1996.



8.10. CONSOLIDATION

An undisturbed sample of Glacial Till was submitted for oedometer analysis. The results are provided in Table 8.8.

TABLE 8.8 OEDOMETER CONSOLIDATION RESULTS

LOCATION	DEPTH (m)	SAMPLE TYPE	MOISTURE CONTENT (%)	OEDOMETER CONSOLIDATION		
				PRESSURE RANGE (kPa)	M _v (m ² /MN)	C _v (m ² /year)
WS101	1.50-2.00	U100	19	0-35	0.254	14.760
				35-70	0.190	12.498
				70-140	0.155	10.218
				140-280	0.113	10.133
				280-35	0.040	10.861

When considered at over-burden pressure with an additional load of 110 kPa the coefficient of volume compressibility (M_v) was 0.155 m²/MN. The material is considered to be very low to medium compressibility.

The rate at which settlement is likely to occur is determined by the coefficient of consolidation (C_v). As shown in Table 8.8, the coefficient ranges from 10.133 m²/yr to 14.760 m²/yr. The rate at which settlement will occur is increased by the presence of sand within the Glacial Till and it is likely that settlement will occur over a period of months to years.

8.11. SOIL DENSITY/MOISTURE CONTENT RELATIONSHIP

Dry density / moisture content relationship analysis has been conducted on Made Ground soils using via utilising proctor compaction tests utilising a 2.5 kg rammer, in order to show the reengineering properties of the material.

The results of the tests have been summarised in Table 8.9. The full test results can be found in Appendix VIII.

TABLE 8.9 SUMMARY DRY DENSITY AND MOISTURE CONTENT

LOCATION	LABORATORY DESCRIPTION	TOP DEPTH (m)	METHOD OF COMPACTION	INITIAL MOISTURE CONTENT (%)	OPTIMUM MOISTURE CONTENT (%)	MATERIAL RETAINED ON 37.5 mm SIEVE (%)	MAX DRY DENSITY (mg/m ³)	MATERIAL RETAINED ON 20.0 mm TEST SIEVE (%)
TP105	Class 1A (MADE GROUND)	1.00	2.5 kg	19	19	0	1.60	33
TP111	Class 1A (MADE GROUND)	1.00	2.5 kg	20	20	7	1.54	24

The proctor compaction tests have indicated that the materials on site are at the optimum moisture content.



8.12. SOIL PLASTICITY

The liquid and plastic limits of samples of natural in-situ clay are determined using the cone penetrometer method and the rolling thread test. These tests enable determination of an average plasticity index (PI) for each “type” of clay, although judgement is applied where variable results are reported.

PI can be related to shrinkability (low, medium or high) and then to minimum founding depth.

E3P typically only consider a soil to be shrinkable if the proportion finer than 63 µm is > 35%.

PI results are compared against guidance given in the NHBC standards, Chapter 4.2 (revised January 2014), which advocates the use of modified plasticity index (I_p), defined as:

$$I'_p = I_p \times (\% < 425 \mu\text{m} / 100)$$

In other words, if PI is 30%, but the soil contains 80% < 425 µm, then I_p = 30 × 80/100 = 24%.

It should be noted that in accordance with the requirements of BS 1377, the % passing the 425 µm sieve is routinely reported by testing labs.

E3P apply engineering judgement where PI results are spread over a range of classifications. Consideration is given to the average values for each particular soil type (differentiate between residual soil and alluvium), the number of results in each class and the actual values.

The Atterberg limits determinations, summarised in Table 8.10, show the clay to be of low plasticity.

TABLE 8.10 SUMMARY OF PLASTICITY INDEX TEST RESULTS

LOCATION	DEPTH (m)	NATURAL MOISTURE CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	PASSING 425 µm SIEVE (%)	MODIFIED PLASTICITY INDEX	NHBC VOLUME CHANGE POTENTIAL
WS101	3.00	19	15	27	12	96	11.52	Low
WS109	4.00	21	NP	–	–	–	–	–
WS110	3.00	11	NP	–	–	–	–	–
CP101	4.00	19	15	26	11	97	10.67	Low
CP102 (PEAT)	3.00	198	73	303	230	88	202.4	Very High
CP102	9.50	18	19	38	19	96	18.24	Low

The results of the Atterberg limits testing confirmed that the soils would generally be “Low Volume Change Potential” in accordance with the classification system utilised by the LABC/NHBC industry guidance.

The sample of peat analysed was confirmed to have a high liquid limit and plasticity index, resulting in a very high volume change potential due to the highly compressible nature of the material.



8.13. pH AND SULPHATE

Chemical analyses for pH and soluble sulphate content contained in Appendix VI (summarised in Table 8.11), shows that the soils at the site generally meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE *Special Digest 1* (2005).

TABLE 8.11 SUMMARY OF pH AND SULPHATE DATA

LOCATION	DEPTH (m)	SO ₄ IN 2:1 WATER/SOIL (g/l)	pH VALUE	CLASSIFICATION
TP108	1.00	0.081	7.1	DS-1, AC-1s
TP112	1.30	0.240	7.6	DS-1, AC-1s
TP115	1.00	0.088	7.6	DS-1, AC-1s
TP117	1.00	0.150	7.1	DS-1, AC-1s
WS104	3.20	0.320	7.5	DS-1, AC-1s
WS104	4.30	0.029	7.6	DS-1, AC-1s
WS109	2.20	0.110	7.9	DS-1, AC-1s
WS110	2.80	0.021	8.5	DS-1, AC-1s
WS111	1.60	0.066	6.7	DS-1, AC-1s
WS112	1.00	0.027	7.3	DS-1, AC-1s
WS113	2.20	0.082	7.9	DS-1, AC-1s
WS114b	1.70	0.170	7.9	DS-1, AC-1s



9. TIER I QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT

E3P has undertaken a Tier 1 qualitative risk assessment to determine if any potential contaminants within the underlying soils and groundwater pose an unacceptable level of risk to the identified receptors.

9.1. DEVIATING SAMPLES

There were no deviating samples identified within any of the samples submitted for chemical analysis.

9.2. HUMAN HEALTH RISK ASSESSMENT

At Tier 1 stage, the long term (chronic) human health toxicity of the soil has been assessed by comparing the on-site concentrations of organic and inorganic compounds with reference values published in LQM/CIEH S4UL (S4UL3267) relevant to Residential End Use with Plant Uptake based on 1% Soil Organic Matter (SOM).

The results of this comparison have been summarised within Table 9.1.

Where Tier 1 screening values are not provided by LQM, other screening values have been used (ATRISK and US EPA) as referenced in Table 9.1.



TABLE 9.1 SUMMARY OF INORGANIC AND HYDROCARBON TOXICITY ASSESSMENT FOR A RESIDENTIAL END USE

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH -WAY	ASSESSMENT
Arsenic	mg/kg	37	20	290	TP106 1.60m TP108 1.00m TP112 1.30m TP115 1.00m TP116 1.20m TP121 1.00m WS104 3.20m WS109 2.20m WS111 1.60m WS112 1.00m WS114b 1.70m	1	Further Action
Cadmium	mg/kg	17	20	2.5	N/A	1	No Further Action
Chromium (VI)	mg/kg	6.1	19	<4.0	N/A	1	No Further Action
Lead	mg/kg	200	20	1900	TP106 1.60m TP108 1.00m TP112 1.30m TP115 1.00m TP116 1.20m TP121 1.00m WS104 3.20m WS109 2.20m WS112 1.00m WS113 2.20m WS114b 1.70m	1	Further Action
Total Mercury	mg/kg	1.2	20	3.60	TP115 1.00m TP116 1.20m TP121 1.00m WS112 1.00m WS113 2.20m WS114b 1.70m	3	Further Action
Nickel	mg/kg	180	20	79	N/A	1	No Further Action
Selenium	mg/kg	250	20	<1.0	N/A	1	No Further Action
Copper	mg/kg	2400	20	1300	N/A	1	No Further Action
Zinc	mg/kg	3700	20	2000	N/A	1	No Further Action
Cyanide – Total	mg/kg	791	19	270	N/A	1	No Further Action
Phenols – Total	mg/kg	210	12	4.1	N/A	1	No Further Action
Asbestos	Fibres	NFD	17	<0.001	TP112 1.30m	3	Further Action
Naphthalene	mg/kg	2.3	20	220	TP115 1.00m TP116 1.20m WS101 0.50m WS104 3.20m WS105 4.90m WS106a 4.60m WS107 2.10m WS109 2.20m	4	Further Action
Acenaphthylene	mg/kg	170	20	14	N/A	2	No Further Action



DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH -WAY	ASSESSMENT
Acenaphthene	mg/kg	210	20	530	WS104 3.20m WS105 4.90m	1	Further Action
Fluorene	mg/kg	170	20	830	WS104 3.20m WS105 4.90m	1	Further Action
Phenanthrene	mg/kg	95	20	85	WS104 3.20m WS105 4.90m WS106a 4.60m	2	Further Action
Anthracene	mg/kg	2400	20	310	N/A	2	No Further Action
Fluoranthene	mg/kg	280	20	490	WS104 3.20m	2	Further Action
Pyrene	mg/kg	620	20	350	N/A	2	No Further Action
Benzo(a)Anthracene	mg/kg	7.2	20	69	TP115 1.00m TP116 1.20m TP121 1.00m WS104 3.20m WS105 4.90m WS107 2.10m WS113 2.20m	2	Further Action
Chrysene	mg/kg	15	20	35	TP115 1.00m TP116 1.20m WS104 3.20m WS105 4.90m WS107 2.10m WS113 2.20m	2	Further Action
Benzo(b)Fluoranthene	mg/kg	2.6	20	32	TP108 1.00m TP115 1.00m TP116 1.20m TP121 1.00m WS101 0.50m WS104 3.20m WS105 4.90m WS106a 4.60m WS107 2.10m WS109 2.20m WS112 1.00m WS113 2.20m WS114b 1.70m	2	Further Action
Benzo(k)Fluoranthene	mg/kg	77	20	20	N/A	2	No Further Action
Benzo(a)Pyrene	mg/kg	2.2	20	34	TP108 1.00m TP115 1.00m TP116 1.20m TP117 1.00m TP121 1.00m WS101 0.50m WS104 3.20m WS105 4.90m WS107 2.10m WS109 2.20m WS112 1.00m WS113 2.20m	2	Further Action



DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH -WAY	ASSESSMENT
Benzo(a)Pyrene	mg/kg	2.2	20	34	WS114b 1.70m	2	Further Action
Indeno(123-cd)Pyrene	mg/kg	27	20	14	N/A	2	No Further Action
Dibenzo(a,h)Anthracene	mg/kg	0.24	20	3.9	TP115 1.00m TP116 1.20m TP121 1.00m WS101 0.50m WS107 2.10m WS109 2.20m WS112 1.00m WS113 2.20m WS114b 1.70m	2	Further Action
Benzo(ghi)Perylene	mg/kg	320	20	17	N/A	2	No Further Action
TPH C5-C6 (aliphatic)*	mg/kg	42	19	<1.0	N/A	4	No Further Action
TPH C6-C8 (aliphatic)*	mg/kg	100	19	5.7	N/A	4	No Further Action
TPH C8-C10 (aliphatic)*	mg/kg	27	19	12	N/A	4	No Further Action
TPH C10-C12 (aromatic)*	mg/kg	74	19	480	WS104 3.20m WS105 4.90m	4	Further Action
TPH C12-C16 (aromatic)*	mg/kg	140	19	1700	WS104 3.20m WS105 4.90m	4	Further Action
TPH C16-C21 (aromatic)*	mg/kg	260	19	2700	WS104 3.20m WS105 4.90m WS106a 4.60m	1	Further Action
TPH C21-C35 (aromatic)*	mg/kg	1100	19	360	N/A	1	No Further Action
Benzene	ug/kg	0.087	3	<0.1	N/A	4	No Further Action
Toluene	ug/kg	130	3	11	N/A	4	No Further Action
Ethylbenzene	ug/kg	47	3	39	N/A	4	No Further Action
p & m-Xylene	ug/kg	56	3	55	N/A	4	No Further Action
o-Xylene	ug/kg	60	3	49	N/A	4	No Further Action
Isopropylbenzene**	ug/kg	46900	3	10	N/A	4	No Further Action
1,3,5-Trimethylbenzene***	ug/kg	810	3	120	N/A	4	No Further Action
1,2,4-Trimethylbenzene**	ug/kg	1170	3	160	N/A	4	No Further Action
2-Methylnaphthalene***	ug/kg	720	3	2.4	N/A	4	No Further Action

Notes

PL1 = soil ingestion, PL2 = dermal contact and ingestion, PL3 = dust inhalation; PL4 = Vapour/Gas Inhalation; PL5 = Vertical / Lateral Migration; PL6 = Corrosion of concrete; PL7=Tainting of water supply; PL8 = Uptake by plants

Abbreviations: GAC = general assessment criteria, n = number of samples, MC = maximum concentration; Loc of Ex = location of exceedance; NFD = no fibres detected.

* The Tier 1 GAC for the hydrocarbon fraction is derived from the CIEH assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. E3P has utilised the Tier 1 values for aliphatic compounds for the volatile and semi volatile fractions (C5-C12) and the Tier 1 values for aromatic compound for the non-volatile fractions (C12-C35). The comparison of a total (aliphatic/aromatic) compounds to an individual fraction is considered to be a conservative approach and satisfactory for the protection of human health.

** Atkins ATRISK

*** USEPA Risk Management Levels

Referring to Table 9.1, the result of this direct comparison indicates that the data exceeds the screening criteria for a residential end use for the following contaminants:



 Heavy Metals:

- Arsenic;
- Lead; and,
- Mercury (potentially volatile).

 Non-Volatile PAH:

- Acenaphthene;
- Fluorene;
- Phenanthrene;
- Fluoranthene;
- Benzo(a)Anthracene;
- Chrysene;
- Benzo(b)Fluoranthene;
- Benzo(a)Pyrene;
- Dibenzo(a,h)Anthracene;

 Aromatic Hydrocarbon Fractions C10-C21 (potentially volatile)

 SVOC – Naphthalene.

 Asbestos – Loose chrysotile <0.001% wt/wt.

The locations of contaminant exceedances are shown on Drawing no. 14-768-018 in Appendix III.

Three samples taken from TP101, TP113 and TP124 were tested for PCBs due to the historical presence of railway sidings and substations on the site. Concentrations were found to be below the limit of detection (LOD) in each of the samples.

Concentrations of Isopropylbenzene, p-isopropyltoluene, 1,3,5-Trimethylbenzene, 1,2,4-Trimethylbenzene, and 2-Methylnaphthalene (VOCs) were found above the LOD in the Made Ground in WS104 at 1.40 m and 3.20 m bgl. No screening criteria is available for p-isopropyltoluene, however, comparison of the other identified VOCs to available GAC values indicates no exceedances in respect of human health. The identified VOCs are typical derivatives of oil and petroleum products. WS104 is located in the centre west of the site, in the location of the former welding shop and travelling crane and it is thus inferred that localised fuel storage/spillage may have occurred here.

Mercury comes in three different forms; elemental mercury, inorganic mercury and organic mercury (or methyl mercury), each with a specific GAV value. Elemental mercury is volatile (vapour inhalation risk) and therefore has the most conservative GAC value of 1.2 mg/kg. Where the total mercury concentration exceeds 1.2 mg/kg, speciation should be undertaken to determine the volatile risk.

In this instance, six samples were found to contain concentrations of total mercury in exceedance of 1.2 mg/kg. Speciation was therefore carried out on an initial two samples TP115 at 1.00 m located in the centre-west of the site, and TP121 at 1.00 m located in the north east, to determine the volatile risk.



This speciation indicated that both samples were predominantly inorganic, with elevated elemental mercury in TP121. The results are summarised in Table 9.2.

TABLE 9.2 MERCURY SPECIATION

LOCATION	DEPTH (m)	INORGANIC MERCURY (mg/kg)	ORGANO-MERCURY SPECIES (mg/kg)	ELEMENTAL MERCURY (mg/kg)
TP115	1.00	1.283	0.042	0.398
TP121	1.00	1.693	0.168	1.608

In relation to these exceedances, the following can therefore be determined:

 The main exposure pathways based on the Tier I exceedances are:

- Soil ingestion;
- Vapour inhalation (indoor);
- Dermal contact and ingestion;
- Consumption of homegrown vegetables; and,
- Fibre/dust inhalation.

HUMAN HEALTH RISK ASSESSMENT AND MITIGATION

All of the identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion of soils, inhalation of particulate and consumption of homegrown vegetables. The risk to chronic human health associated with the elevated concentrations on inorganic heavy metals and non-volatile PAH compounds can be mitigated through the installation of a suitable cover system. Given the widespread distribution of the contamination, the cover system would be required in all proposed private gardens, landscaping, and public open space to remove any potential for direct exposure to impacted soils.

The specific design and installation process for the appropriate cover systems will be clearly defined within the site remediation and enabling works strategy.

Asbestos in the form of chrysotile has also been identified within a localised area at TP112 in shallow Made Ground. Asbestos quantification was undertaken to further assess where these soils may be placed, this indicated a level detected at <0.001%. No visual signs of ACM were encountered in the area of identified ACM during the ground investigation; it is therefore likely that only trace fibres are present. Impacted soils should be managed according to the asbestos risk mitigation conceptual site model shown in Figure 9.1. In this instance, the risks can be mitigated by placing the impacted soil from TP112 beneath a 600 mm clean cover system in garden/landscaped areas or placed beneath roadways or at 1.0 m beneath plots.



FIGURE 9.1 ASBESTOS RISK MITIGATION CONCEPTUAL SITE MODEL



Notes

ND None Detected

0.001% Soils may contain $\leq 0.001\%$ asbestos using composite testing to ensure there is no potential risk to human health. This value is present within areas where there may be a short-term low-level exposure of soils containing trace asbestos fibres by construction workers where an appropriate level of asbestos management is employed (dust suppression)

0.1% Soils at a depth of $>1.00\text{m}$ bgl may contain $<0.1\%$ asbestos using composite testing where they will not be likely to be disturbed in the future and will therefore be in an area of low sensitivity. Risk assessment completed in accordance with Asbestos JIWG risk assessment tools.

Undefined- this will be dependent upon soils encountered during earthworks, which may be placed at these depths to ensure no potential risk to human health.

SVOC contamination (elemental mercury, naphthalene and aromatic hydrocarbon fractions C10-C16) has been encountered at various locations across the site in Made Ground at depths of between 0.50 m and 4.90 m bgl. It is noted that four samples containing elevated concentrations of total mercury were not speciated, however, give the spread and depth of encounter of other identified SVOCs, it is considered that the contamination is widespread and it would be impractical and costly to delineate and excavate.

VOC membranes may therefore be required in affected plots. However, it is recommended that a Tier 2 DQRA is undertaken to model the actual vapour emission risk from residue within the anthropogenic material in order to determine whether specialist hydrocarbon resistant membranes will be required to the dwellings.

It is considered that chemical analysis of the natural clay drift deposits will identify these soils to be acceptable for use as subsoil within the proposed garden areas subject to further chemical validation; however, given the depth of Made Ground on-site, it is unlikely that subsoils will be excavated.

There are no suitable sources of topsoil available on the site.



9.3. CONTROLLED WATERS RISK ASSESSMENT

E3P has undertaken a controlled waters risk assessment for the site based on the consideration of the conceptual site model and the sensitive receptors which are summarised in Table 9.2.

TABLE 9.3 CONTROLLED WATERS CONCEPTUAL MODEL AND SENSITIVITY PROFILE

DISCUSSION		SENSITIVITY RATING
Contaminant Source		
Made Ground Potentially leachable heavy metal, PAH and VOC contamination has been identified in the Made Ground.		High
Pathway		
Vertical Migration The site is underlain by Secondary A superficial and bedrock aquifers. Due to the site being underlain by moderate/high permeability granular drift deposits, vertical migration of contaminants may be facilitated. However, thick banks of glacial clay deposits have been identified at depths beyond circa 10.0 m bgl in RB101 and RB102, thus likely inhibiting downward and lateral flow.		Medium
Lateral migration Lateral migration of contaminants is considered possible due to the presence of granular drift deposits across the site.		Medium
Receptor		
Aquifer Classification in Superficial Drift Deposits	Secondary Undifferentiated / Secondary A Aquifer	Medium
Aquifer Classification in Bedrock	Secondary A Aquifer – overlain by circa 80 m of drift, thus reducing the sensitivity.	Low/Medium
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not situated with a Groundwater Source Protection Zone.	Low
Distance to the Closest Groundwater Abstraction Point	None identified within a 1 km radius.	Low
Is the Site Located Within 50 m of a Surface Watercourse?	The Rochdale Canal is located east of the site. However, it is not within influencing distance or in hydraulic continuity of the site.	Medium
The ICSM developed within the context of the site setting has viable pollutant pathway, which would be the lateral migration of potentially mobile phase-soluble contaminants towards nearby surface water courses including the adjacent inland river (northern boundary) Rochdale Canal and Roeacre Brook.		

To ensure a robust appraisal of the identified risk to controlled waters, E3P has identified the sources of potential contamination that represent a risk to controlled waters from the initial CSM, we have then assessed the availability of ground investigation data in the form of analysis of the solid phase (soil) and dissolved phase within the perched groundwater or aquifer. The results of this assessment are presented in Table 9.4.



TABLE 9.4 QUALITATIVE RISK TO CONTROLLED WATERS FROM SOIL ANALYTICAL RESULTS

CONTAMINANT	ASSESSMENT RATING	DISCUSSION
BTEX > 1 mg/kg	The soil data analysis has not identified any detectable concentrations of VOCs above 1 mg/kg.	None
Total VOC > 1 mg/kg		
Total SVOC > 1 mg/kg	SVOC analysis recorded concentrations below the laboratory LOD, however, PAH analysis has identified levels above 1 mg/kg LOD throughout the site.	Further discussion
C5-C10 > 5 mg/kg	All concentrations are below or slightly exceeding the laboratory LOD with the exception of WS105 at 4.90 m bgl of 12 mg/kg.	Further discussion
C10-C12 > 10 mg/kg	Concentrations of C10-C12 have been recorded above 10 mg/kg throughout the site and the maximum concentration was recorded in WS105 at 4.90 m bgl with a concentration 480 mg/kg.	Further discussion
C12-C16 > 50 mg/kg	Concentrations of C12-C16 have been recorded throughout the site and the maximum concentration was recorded within WS104 at 3.20 m bgl with a concentration 1700 mg/kg.	Further discussion
Phenols > 2 mg/kg	All concentrations are below the laboratory LOD with the exception of WS104 at 3.20 m bgl of 4.1 mg/kg.	Further discussion
Naphthalene > 2 mg/kg	Concentrations of naphthalene above 2 mg/kg have been recorded in several locations at depths between 0.50 m and 4.90 m bgl.	Further discussion
Total PAH > 10 mg/kg	Total concentrations of low-solubility PAH compounds greater than 10 mg/kg have been detected throughout the site, with a maximum concentration recorded in WS104 at 3.20 m bgl of 4510 mg/kg.	Further discussion
PCB > 1 mg/kg	PCB testing undertaken at three locations has not identified any concentrations exceeding the laboratory LOD.	None
Heavy metals > 500 mg/kg	Concentrations of heavy metals above 500 mg/kg have been recorded in several locations across the site.	Further discussion

The Tier I assessment has included a comparison of leachate analysis from samples of the Made Ground and groundwater samples to Environmental Quality Standards (EQS) in the first instance and Drinking Water Standards (DWS).

These are presented in Table 9.5.



TABLE 9.5 COMPARISON OF GROUNDWATER AND LEACHATE ANALYSIS WITH TIER 1 SCREENING LEVELS

DETERMINAND	UNIT	EQS ^{1, 2, 3}	DWS _{3,4,5}	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
		AA								
Arsenic	µg/l	50	10	3	19.2	WS105	3	82	WS105 4.90 m	Further Action
Cadmium	µg/l	0.08-0.25	5	3	0.07	N/A	3	<0.08	N/A	No Further Action
Chromium (VI)	µg/l	3.4	–	3	<5.0	N/A	3	<5.0	N/A	No Further Action
Chromium (III)	µg/l	4.7	50	3	4.7	N/A	3	1.7	N/A	No Further Action
Copper	µg/l	1	2000	3	5.9	N/A	3	11	N/A	No Further Action
Total Cyanide	µg/l	1	50	3	6.3	N/A	3	20	N/A	No Further Action
Lead	µg/l	1.2	10	3	1.0	N/A	3	<1.0	N/A	No Further Action
Mercury	µg/l	–	1.0	3	<0.05	N/A	3	<0.5	N/A	No Further Action
Nickel	µg/l	4	20	3	7.0	N/A	3	3.8	N/A	No Further Action
Selenium	µg/l	–	10	3	1.7	N/A	3	<4.0	N/A	No Further Action
Zinc	µg/l	10.9	–	3	13	WS101 WS105 WS110	3	34	WS105 4.90 m	Further Action
pH	6–9	–	–	3	7.4	N/A	3	7.8	N/A	No Further Action
Naphthalene	µg/l	2	10*	3	3300	WS105	3	980	WS105 4.90 m	Further Action
Anthracene	µg/l	0.1	10*	3	8.2	N/A	3	1.8	N/A	No Further Action
Benzo[b]fluoranthene	µg/l	0.00017*	10*	3	<0.01	N/A	3	<0.01	N/A	No Further Action
Benzo[k]fluoranthene	µg/l	0.00017*	10*	3	<0.01	N/A	3	<0.01	N/A	No Further Action
Benzo(a)pyrene	µg/l	0.00017*	10*	3	<0.01	N/A	3	<0.01	N/A	No Further Action
Indeno(123-cd)pyrene	µg/l	0.00017*	10*	3	<0.01	N/A	3	<0.01	N/A	No Further Action



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DETERMINAND	UNIT	EQS ^{1, 2, 3}	DWS _{3,4,5}	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
		AA								
Fluoranthene	µg/l	0.0063	10*	3	11	N/A	3	1.6	N/A	No Further Action
Benzo(ghi)perylene	µg/l	1.7–4	10*	3	<0.01	N/A	3	<0.01	N/A	No Further Action
TPH C5-C6 (benzene)	µg/l	10	1	3	11	WS105	3	<1.0	N/A	Further Action
TPH C6-C8 (toluene)	µg/l	74	700	3	44	N/A	3	<1.0	N/A	No Further Action
TPH C8-C10 (ethyl benzene)	µg/l	20	300	3	370	WS105	3	<1.0	N/A	Further Action
TPH C10-C12 (xylene)	µg/l	30	500	3	5800	WS105	3	<1.0	N/A	Further Action
TPH C12-C16	µg/l	2	90 ⁵	3	4300	WS105	3	<1.0	N/A	Further Action
TPH C16-C35	µg/l	50#	90 ⁵	3	2500	WS105	3	<10	N/A	Further Action
TPH C5-C6	µg/l	–	15000	3	<1.0	N/A	3	<1.0	N/A	No Further Action
TPH C6-C8	µg/l	–	15000	3	<1.0	N/A	3	<1.0	N/A	No Further Action
TPH C8-C10	µg/l	–	300	3	<1.0	N/A	3	<1.0	N/A	No Further Action
TPH C10-C12	µg/l	–	300	3	<10	N/A	3	<10	N/A	No Further Action
TPH C12-C16	µg/l	–	300	3	<10	N/A	3	<10	N/A	No Further Action
TPH C16-C21	µg/l	–	300**	3	<10	N/A	3	<10	N/A	No Further Action
TPH C21-C35	µg/l	–	300**	3	<10	N/A	3	<10	N/A	No Further Action
Tetrachloroethylene	µg/l	0.4	10	3	<1.0	N/A	–	–	–	–
Trichloroethylene	µg/l	10	10	3	<1.0	N/A	–	–	–	–
Trichlorobenzene	µg/l	0.4	–	3	<1.0	N/A	–	–	–	–
Trichloromethane	µg/l	2.5	–	3	<1.0	N/A	–	–	–	–
Dichloromethane	µg/l	20	200	3	<1.0	N/A	–	–	–	–



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DETERMINAND	UNIT	EQS ^{1, 2, 3}	DWS _{3,4,5}	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
		AA								
Carbon Tetrachloride	µg/l	12	3	3	<1.0	N/A	–	–	–	–
Vinyl Chloride	µg/l	–	0.3	3	<1.0	N/A	–	–	–	–

Notes

Solubility <0.01µg/l

AA – Annual Average

MAC- Maximum Admissible Concentration

* Polyaromatic hydrocarbons (PAH) - Benzo(a)pyrene (BaP), Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)-perylene and Indeno(1,2,3-cd)-pyrene. Benzo(a)pyrene can be considered as a marker for the other PAHs, hence only benzo(a)pyrene needs to be monitored for comparison with the biota EQS or the corresponding AA-EQS in water

** There are no WHO Guideline Values for aliphatic fractions C16-C21 and C21-C35, therefore the guideline value for aliphatic fractions inclusive of C8-C16 (300µg/l) has been applied.

1. The Water Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations (2015)
2. Directive establishing a framework for Community action in the field of water policy (Water Framework Directive)
3. Council Directive on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (Dangerous Substances Directive) - List II substances
4. Council Directive on the quality of water intended for human consumption (Drinking Water Directive)
5. WHO Guidelines for Drinking Water Quality. Third edition (2004)



9.3.1. CONTROLLED WATER RISK ASSESSMENT AND MITIGATION

This comparison indicates that the data exceeds the EQS values for the following in the groundwater sample taken from WS105:

-  Arsenic;
-  Zinc (also in exceedance in WS101 and WS110);
-  Naphthalene;
-  TPH C5–C6 (Benzene);
-  TPH C8-C10 (ethyl benzene);
-  TPH C10-C12 (xylene);
-  TPH C12-C16; and,
-  TPH C16-C35

Arsenic, Zinc and Naphthalene were also in exceedance of DWS values in the soil leachate sample taken from WS105 at 4.90 m bgl.

In relation to the remaining exceedances, Table 9.6 provides a summary.

TABLE 9.6 SUMMARY OF ELEVATED CONTAMINANTS IN GROUNDWATER

CONTAMINANT	WS101 (µg/l)	WS105 (µg/l)	WS110 (µg/l)
	Made Ground	Made Ground	Made Ground
Arsenic	–	19.2	–
Zinc	13	13	13
Naphthalene	–	3300	–
TPH C5–C6	–	11	–
TPH C8-C10	–	370	–
TPH C10-C12 (xylene);	–	5800	–
TPH C12-C16; and	–	4300	–
TPH C16-C35	–	2500	–

9.3.2. DISCUSSION OF CONTROLLED WATERS RISK ASSESSMENT

Historically, the site has been subjected to extensive industrial uses including railway sidings, engineering works and leather works. Widespread leachable heavy metal, PAH, TPH and SVOC contamination has been identified in the soils across the site, thus posing a risk to controlled waters.

The site is underlain by a mixed geology, generally cohesive clay in the northeast of the site and generally granular sand and gravel in the southwest, with thick bands of clay beyond 10.0 m bgl. The clay deposits will afford for the protection of the underlying bedrock aquifer. Given the extensive thickness of drift (>60.0 m) and absence of a nearby water abstraction borehole, the risk to the underlying bedrock aquifer is considered to be significantly reduced and therefore deemed to be at a low risk from on-site contamination.



However, high concentrations of naphthalene and aromatic hydrocarbon fractions have been recorded in the groundwater sample taken from WS105 in the centre of the site potentially representative of a plume.

The site sits at an approximate elevation of 130-135 m AOD and is inferred to slope very gently down to the southwest. The land to the north west and Roeacre Brook (circa 150 m to the north west) is noted to be at a lower elevation (~125 m AOD) and thus down hydraulic gradient of the site. Although this is considered outside of typical influencing distance, there is potential for this watercourse to be fed by watercourses/drains closer to the site that may be impacted by laterally migrating contamination. The risk to surface water courses is therefore considered moderate and further sampling at the location of WS105 will be required, together with installation of further monitoring wells in the vicinity to ascertain whether the identified impact is an isolated occurrence or a plume.

It should be noted that in the longer term, the proposed development will create increased hardstanding cover across the site, thus containing the Made Ground beneath the impermeable surface and reducing the amount of infiltration generated. This will in turn, reduce the amount of subsurface lateral flow and therefore the risk to adjacent surface water course.

9.4. GROUND GAS

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in CIRIA Report 665 – *Assessing risks posed by hazardous ground gases to buildings* (2007). However, it is recommended that the full ground gas assessment and recommended protection measures are agreed with the local authority prior to their adoption on site. Furthermore, all protection measures adopted should be validated by a suitably qualified engineer.

9.1. INVESTIGATION RATIONALE

The ICSM has identified that the underlying Made Ground, infilled features and potential peat may represent a potential source of ground gas generation. Based on the identification of these sources, E3P has determined that the site represents a low ground gas source generation potential.

Within the context of the proposed residential end use and ground gas generation potential, the gas assessment requires that 6 visits are required over three months, with at least two sets of readings at low or falling atmospheric pressure as set out within CIRIA 665 Tables 5.5a and 5.5b.

The spacing requirements for monitoring wells are detailed within CIRIA 665 Table 4.2, which indicates that for low gas hazard sites (Made Ground with limited degradable material, organic clay of limited thickness) and a high sensitivity development, nominal well spacing should be between 25 m and 50 m.

TABLE 9.6 GROUND GAS MONITORING LOCATION RATIONALE

LOCATION	GROUND GAS SOURCE	DEPTH OF MONITORING WELL (m)
WS101	Former Clay Pit – Natural Strata	1.00–3.50
WS103	Railway Sidings – Made Ground	1.00–3.00
WS104	Former Engineering Works / Travelling Crane – Made Ground	1.00–3.00
WS105	Railway Sidings – Made Ground	1.00–3.00
WS106b	Former Engineering Works – Made Ground	1.00–3.20
WS107	Travelling Crane – Made Ground	1.00–4.50



LOCATION	GROUND GAS SOURCE	DEPTH OF MONITORING WELL (m)
WS108	Travelling Crane – Made Ground	1.00–4.30
WS109	Railway Sidings – Made Ground	1.00–4.00
WS110	Railway Sidings – Natural Strata	2.00–5.00
WS111	Railway Sidings /Former Structures – Made Ground	2.00–5.00
WS112	Railway Sidings – Made Ground	2.00–5.00
WS113	Travelling Crane – Made Ground	2.00–3.00
WS114b	Travelling Crane – Made Ground	1.00–4.00

9.2. MONITORING METHODOLOGY

Concentrations of methane (CH₄), carbon dioxide (CO₂) and oxygen (O₂) were measured using a calibrated infra-red gas analyser (GFM435) with gas flow rates were measured using an integrated flow meter.

Gas measurements were recorded for a minimum of 60 seconds at each location, at which point the maximum concentration of CH₄ and CO₂, together with the lowest concentration of O₂ were recorded. The results of the ground gas monitoring are presented in Table 8.9.

CIRIA C665 and NHBC Report No 10627-R01 provide assessments for carbon dioxide and methane based upon gas screening values (GSVs) utilising flow rates and concentrations. The site based GSVs for steady state methane and carbon dioxide are based upon the following equation:

$$GSV = \frac{\text{concentration (by vol)}}{100} \times \text{flowrate (l / hr)}$$

The GSVs within CIRIA C665 are based upon all buildings other than standard residential houses. The NHBC GSVs are based upon standard residential houses with precast concrete floors (block and beam). The CIRIA 665 report author (Steve Wilson) since provided further clarification regarding which guidance should be adopted for residential houses that have suspended cast in-situ concrete floor slab: for the avoidance of doubt, it was confirmed that the GSVs within the CIRIA 665 guidance should be adopted. The thresholds for GSVs based upon NHBC and CIRIA guidance are provided within Table 9.7.

TABLE 9.7 RESIDENTIAL THRESHOLDS FOR GAS SCREENING VALUES (GSV) IN ACCORDANCE WITH CIRIA C665 AND NHBS REPORT NO 10627-R01 – RESIDENTIAL END USE

CIRIA – NO SUBFLOOR VOID		NHBC – SUBFLOOR VOID		
CLASSIFICATION	GSV (METHANE AND CARBON DIOXIDE)	CLASSIFICATION	GSV (METHANE)	GSV (CARBON DIOXIDE)
CS1	< 0.07	Green	< 0.13	< 0.76
CS2	< 0.70	Amber 1	< 0.63	< 1.60
CS3	< 3.5	Amber 2	< 1.60	< 3.10
CS4	< 15	Red	> 1.60	> 3.10
CS5	< 70	N/A	N/A	N/A



CS6	> 70	N/A	N/A	N/A
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9.2.1. SUMMARY OF MONITORING RESULTS

Table 9.8 presents of the ground gas and groundwater monitoring results to date.



TABLE 9.8 SUMMARY OF GROUND GAS MONITORING RESULTS

WELL	DATE	CH ₄ INITIAL (%V/V)	CH ₄ STEADY (%V/V)	CH ₄ GSV (l/hr)	CO ₂ INITIAL (%V/V)	CO ₂ STEADY (%V/V)	CO ₂ GSV (l/hr)	O ₂ (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
WS101	23/03/21	0.10	0.10	0.00052	0.30	0.30	0.00156	20.00	1003	Falling	0.52	1.00–3.50	3.24	1.71
	06/04/21	0.10	0.10	0.00013	0.40	0.40	0.00052	19.80	1009	Falling	0.13		3.25	1.80
WS103	23/03/21	0.10	0.10	0.00052	0.30	0.30	0.00156	20.10	1003	Falling	0.52	1.00–3.00	2.35	Dry
	06/04/21	0.10	0.10	0.00026	0.30	0.30	0.00078	20.00	1009	Falling	0.26		2.35	Dry
WS104	23/03/21	Monitoring well damaged – repaired for next visit.										1.00–3.00	2.63	2.33
	06/04/21	0.10	0.10	0.00026	0.20	0.20	0.00052	20.20	1009	Falling	0.26		2.62	2.40
WS105	23/03/21	0.10	0.10	0.00013	3.90	3.90	0.00507	16.20	1003	Falling	0.13	1.00–3.00	2.75	1.94
	06/04/21	0.10	0.10	0.00052	3.20	3.20	0.01664	17.30	1009	Falling	0.52		2.75	1.99
WS106b	23/03/21	0.10	0.10	0.00079	0.70	0.70	0.00553	19.30	1003	Falling	0.79	1.00–3.20	3.18	Dry
	06/04/21	0.10	0.10	0.00088	0.80	0.80	0.00704	19.10	1009	Falling	0.88		3.17	Dry
WS107	23/03/21	0.10	0.10	-0.00013	0.20	0.20	-0.00026	20.10	1003	Falling	-0.13	1.00–4.50	4.36	4.32
	06/04/21	0.10	0.10	0.00013	0.40	0.40	0.00052	19.90	1009	Falling	0.13		4.36	4.33
WS108	23/03/21	0.10	0.10	0.00013	0.80	0.80	0.00104	19.40	1003	Falling	0.13	1.00–4.30	4.24	4.18
	06/04/21	0.10	0.10	0.00052	0.70	0.70	0.00364	19.60	1009	Falling	0.52		4.23	4.20
WS109	23/03/21	Monitoring well damaged – repaired for next visit.										1.00–4.00	4.00	3.38
	06/04/21	0.10	0.10	0.00013	0.40	0.40	0.00052	20.10	1009	Falling	0.13		4.00	3.44
WS110	23/03/21	0.10	0.10	0.00026	1.60	1.60	0.00416	18.70	1003	Falling	0.26	2.00–5.00	3.54	3.19
	06/04/21	0.10	0.10	0.00052	1.20	1.20	0.00624	19.20	1009	Falling	0.52		3.53	3.24



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WELL	DATE	CH ₄ INITIAL (%V/V)	CH ₄ STEADY (%V/V)	CH ₄ GSV (l/hr)	CO ₂ INITIAL (%V/V)	CO ₂ STEADY (%V/V)	CO ₂ GSV (l/hr)	O ₂ (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
WS111	23/03/21	0.10	0.10	0.00053	0.70	0.70	0.003675	18.70	1003	Falling	0.53	2.00–5.00	5.07	Dry
	06/04/21	0.10	0.10	0.00124	0.80	0.80	0.00992	18.40	1009	Falling	1.24		5.06	Dry
WS112	23/03/21	0.10	0.10	0.00026	0.90	0.90	0.00234	18.60	1003	Falling	0.26	2.00–5.00	4.84	Dry
	06/04/21	0.10	0.10	0.00012	1.20	1.20	0.00144	18.40	1009	Falling	0.12		4.83	Dry
WS113	23/03/21	0.10	0.10	0.00079	3.50	3.50	0.02765	15.40	1003	Falling	0.79	2.00–3.00	2.96	Dry
	06/04/21	0.10	0.10	0.00129	3.10	3.10	0.03999	16.20	1009	Falling	1.29		2.95	Dry
WS114b	23/03/21	0.10	0.10	0.00052	0.10	0.10	0.00052	20.30	1003	Falling	0.52	1.00–4.00	3.38	Dry
	06/04/21	0.10	0.10	0.00013	0.10	0.10	0.00013	20.10	1009	Falling	0.13		3.39	Dry

Notes

NHBC Traffic Light System		Typical Max CH ₄ Concentration	GSV CH ₄	Typical Max CO ₂ Concentration	GSV CO ₂
	Amber 1	1	0.16-0.63	5	0.78-1.56
	Amber 2	5	0.63-1.56	10	1.56-3.13
	Red	20	1.56+	30	3.13+

Values in **BOLD** exceed Amber 1 Thresholds.

Values in **BLUE** denote water above monitoring well



9.2.2. SOURCES OF GROUND GAS

The Phase I report and subsequent ground investigation has identified the following potential sources of ground gas:

-  Made Ground deposits;
-  Infilled features;
-  Potential areas of peat.

9.2.3. GROUNDWATER

During the first two visits, groundwater levels were recorded between 1.71 m (WS101) and 4.33 m bgl (WS107), with several wells recorded to be dry on both occasions.

WS101 was set within a low-permeability clay stratum and the higher groundwater level recorded may be a result of surface water collecting in the well rather than a measure of true groundwater.

9.2.4. GAS FLOW

During the monitoring undertaken to date, a positive flow was noted in all monitoring wells, ranging from 0.12 to 1.29 l/hr. Given that both readings were taken during periods of falling pressure, it is considered that worst case scenario conditions have been captures.

Negative flows are indicative of back pressure from wind being greater than the active flow from the wells. Negative flows were recorded in WS107 on the initial ground gas monitoring visit.

9.2.5. GAS CONCENTRATIONS

No elevated concentrations of methane above 0.10% v/v were recorded within the monitoring wells to date.

Carbon dioxide concentrations were recorded within all the monitoring wells at concentrations ranging from 0.10% v/v to 3.90% v/v (WS105). The maximum carbon dioxide levels were also associated with low oxygen concentrations.

9.2.6. GAS ASSESSMENT

In accordance with the methodology outlined with the CIRIA publication C665, E3P have utilised the results of the ground gas monitoring surveys to calculate a tentative gas screening value (GSV). The GSVs for the monitoring positions are summarised in Table 9.9.

TABLE 9.9 GAS RISK PROFILE AND LOCATION

LOCATION	MAX CH ₄ (% v/v)	GSV (l/hr)	MAX CO ₂ (% v/v)	GSV (l/hr)	CLASSIFICATION
WS101	0.10	0.00520	0.40	0.00156	Green/CS1
WS103	0.10	0.00520	0.30	0.00156	Green/CS1
WS104	0.10	0.00026	0.20	0.00052	Green/CS1



LOCATION	MAX CH ₄ (% v/v)	GSV (l/hr)	MAX CO ₂ (% v/v)	GSV (l/hr)	CLASSIFICATION
WS105	0.10	0.00052	3.90	0.01664	Green/CS1
WS106b	0.10	0.00088	0.80	0.00704	Green/CS1
WS107	0.10	0.00013	0.40	0.00052	Green/CS1
WS108	0.10	0.00052	0.80	0.00364	Green/CS1
WS109	0.10	0.00013	0.40	0.00052	Green/CS1
WS110	0.10	0.00052	1.60	0.00624	Green/CS1
WS111	0.10	0.00124	0.80	0.00992	Green/CS1
WS112	0.10	0.00026	1.20	0.00234	Green/CS1
WS113	0.10	0.00129	3.50	0.03999	Green/CS1
WS114b	0.10	0.00052	0.10	0.00052	Green/CS1

The GSV has been compared to the criteria outlined with CIRIA C665 to determine the level of risk to the proposed development and to ensure the appropriate remedial options are incorporated into any future building design in this area.

Preliminary ground gas monitoring suggests that the site can be classified as CS1/Green. However, an allowance for CS2/Amber 1 should be made in accordance with British Standard BS8485 (2015)+A1(2019).

It should also be noted that VOC membranes may be required irrespective of the outcome of the completed gas monitoring regime.

9.3. RESIDENTIAL BUILDING GAS RISK MITIGATION

British Standard BS8485 (2015)+A1(2019) provides two types of residential property that require assessment. These building types are:

-  **Type A Building** – Private ownership with no building management controls on alterations to the internal structure, the use of rooms, the ventilation of rooms or the structural fabric of the building. Some small rooms are present. Probably conventional building construction (rather than civil engineering). Examples include private housing and some retail premises.
-  **Type B Building** – Private or commercial property with central building management control of any alterations to the building or its uses but limited or no central building management control of the maintenance of the building, including the gas protection measures. Multiple occupancy. Small- to medium-sized rooms with passive ventilation of rooms and other internal spaces throughout ground floor and basement areas. May be conventional building or civil engineering construction. Examples include managed apartments, multiple occupancy offices, some retail premises and parts of some public buildings (such as schools, hospitals, leisure centres) and parts of hotels.

Based on the ground gas risk assessment and the proposed Type A Building, it is envisaged that a point score of 3.5 will be required for any affected properties, as summarised in Table 9.10.



TABLE 9.10 BS 8485 (2015) POINTS REQUIRED FOR TYPE A AND TYPE B BUILDINGS

CHARACTERISTIC SITUATION	NHBC TRAFFIC LIGHT SYSTEM	MINIMUM GAS PROTECTION SCORE (POINTS)	
		HIGH SENSITIVITY	
		TYPE A BUILDING	TYPE B BUILDING
1	Green	0	0
2	Amber 1	3.5	3.5
3	Amber 2	4.5	4
4	Red	6.5	5.5
5	N/A	N/A	6.5
6	N/A	N/A	N/A

Residential buildings should not be built on CS4 or higher sites unless the type of construction or site circumstances allow additional levels of protection to be incorporated, for example, high-performance ventilation or pathway intervention measures, and an associated sustainable system of management of maintenance of the gas control system such as in institutional and/or fully serviced contractual situations.

The requisite 3.5 points must be achieved by installation of a suitable combination of measures detailed in Table 9.11.

TABLE 9.11 SUMMARY OF GROUND GAS MITIGATION MEASURES – BS8485 (2015)+A1(2019)

GAS PROTECTION SCORES FOR THE STRUCTURAL BARRIER		SCORE ^A
Floor and Substructure Design		
Precast Suspended Segmental Subfloor (Beam and Block)		0
Cast In-Situ Ground-Bearing Floor Slab (With Only Nominal Mesh Reinforcement)		0.5
Cast In-Situ Monolithic Reinforced Ground-Bearing Raft or Reinforced Cast In-Situ Suspended Floor Slab With Minimal Penetrations		1 or 1.5 ^B
Basement Floor and Walls Conforming to BS 8102:2009, Grade 2 Waterproofing^C		2
Basement Floor and Walls Conforming to BS 8102:2009, Grade 3 Waterproofing^C		2.5
^{A)} The scores are conditional on breaches of floor slabs, etc. being effectively sealed. ^{B)} To achieve a score of 1.5 the raft or suspended slab should be well reinforced to control cracking and have minimal penetrations cast in (see A.2.2.2). ^{C)} The score is conditional on the waterproofing not being based on the use of a geosynthetic clay liner waterproofing product (see C.3 , Note 4).		
PROTECTION ELEMENT SYSTEM	SCORE	COMMENTS
Gas protection scores for ventilation protection measures		
(a) Pressure Relief Pathway – Usually formed of low fines gravel or with a thin geocomposite blanket or strips terminating in a gravel trench external to the building.	0.5	Whenever possible a pressure relief pathway (as a minimum) should be installed in all gas protection measures systems. If the layer has a low permeability and/or is not terminated in a venting trench (or similar), then the score is 0.



(b) Passive Subfloor Dispersal Layer – Media used to provide the dispersal layer are:  Clear void;  Polystyrene void former blanket;  Geocomposite void former blanket;  No-fines gravel layer with gas drains; and  No-fines gravel layer.	Very good performance	2.5	The ventilation effectiveness of different media depends on a number of different factors including the transmissivity of the medium, the width of the building, the side ventilation spacing and type and the thickness of the layer. The selected score should be assigned taking into account the recommendations in Annex B of BS 8485 (2015). Passive ventilation should be designed to meet at least “good performance”.
	Good performance	1.5	
(c) Active Dispersal Layer – Usually comprising fans with active abstraction (suction) from a subfloor dilution layer with roof-level vents. The dilution layer may comprise a clear void or be formed of geocomposite or polystyrene void formers.		1.5 to 2.5	This system relies on continued serviceability of the pumps; therefore, alarm and response systems should be in place. There should be robust management systems in place to ensure the continued maintenance of the system, including pumps and vents. Active ventilation should always be designed to meet at least “good performance”.
(d) Active Positive Pressurisation – Provided by the creation of a blanket of external fresh air beneath the building floor slab by pumps supplying air to points across the central footprint of the building into a permeable layer, usually formed of a thin geocomposite blanket.		1.5 to 2.5	This system relies on continued operation of the pumps; therefore, alarm and response systems should be in place. The score assigned should be based on the efficient “coverage” of the building footprint and the redundancy of the system. Active ventilation should always be designed to meet at least “good performance”.
(e) Ventilated Car Park – Floor slab of occupied part of the building under consideration is underlain by a basement or undercroft car park.		4	Assumes that the car park is vented to deal with car exhaust fumes, designed to Buildings Regulations 2000, Approved Document F [9].
PROTECTION ELEMENT SYSTEM		SCORE	COMMENTS
Gas Protection Score for the Gas-Resistant Membrane			



Gas-resistant membrane meeting all of the following criteria: ☛ Sufficiently impervious to the gases with a methane gas transmission rate < 40.0 ml/day/m²/atm (average) for sheet and joints (tested in accordance with BS ISO 15105-1 manometric method); ☛ Sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions; ☛ Sufficiently strong to withstand in-service stresses (e.g., settlement if placed below a floor slab); ☛ Sufficiently strong to withstand the installation process and following trades until covered (e.g., penetration from steel fibres in fibre-reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools); ☛ Capable, after installation, of providing a complete barrier to the entry of the relevant gas; and ☛ Verified in accordance with CIRIA C735.	2	The performance of membranes is heavily dependent on the quality and design of the installation, resistance to damage after installation and integrity of joints. For example, a minimum 0.4 mm thickness (equivalent to 370 g/m² for polyethylene) reinforced membrane (virgin polymer) meets the performance criteria opposite. If a membrane is installed that does not meet all the criteria opposite, then the score is 0.
This table should be read in conjunction with the notes presented in BS 8485 (2015)+A1 (2019)		

9.4. POTABLE WATER SUPPLY

This section provides a summary of the site investigation data with reference to the selection of potable water supply pipework. The assessment is made with reference to the UK Water Industry Research (UKWIR) publication "Guidance on the selection of Water Supply Pipes to be used in Brownfield Sites".

TABLE 9.12 PIPELINE SELECTION PE THRESHOLD CONCENTRATIONS

Contaminant Group	PE-threshold (mg/kg)	Concentrations at <u>Current</u> pipeline depth (mg/kg)
Total VOC	0.5	<1.0
Total BTEX And MTBE	0.1	N/A
Total SVOCs (Excluding PAH and those substances marked with an *)	2	<1.0
EC5-EC10 Aliphatic and Aromatic Hydrocarbons	2	<1.2
EC10-EC16- Aliphatic and Aromatic Hydrocarbons	10	125
EC16-EC40 Aliphatic and Aromatic Hydrocarbons	500	533
Phenols (From SVOC Analysis)*	2	N/A
Cresols and Chlorinated Phenols (From SVOC Analysis)	2	N/A
Ethers*	0.5	N/A
Nitrobenzene*	0.5	N/A
Ketones*	0.5	N/A
Aldehydes*	0.5	N/A



Amines	Fail	N/A
Other Consideration		
Are there any exceedances of the PE threshold outside of the pipeline depth?	Yes, of EC10-16 and EC16-40 at WS104 at 3.20m, WS105 at 4.90m and WS107 at 2.10m.	
Is free product present in soil and groundwater?	None identified.	
Could hydrocarbon impact at greater depth than current pipeline depth be mobilised by rising groundwater levels?	Yes – hydrocarbon impact and low solubility PAH has been identified within Made Ground. Groundwater levels are generally significantly deeper than pipeline depth.	
Will soils impacted with above determinands likely be utilised elsewhere on site?	No.	
Will soils be imported to site as part of any future earth works	Currently unknown, however it is likely soils will be required to be imported to site. The importation of materials may affect the WIR Risk Assessment which should be updated after completion.	

Notes - Pipe line depth normally between 0.75m–1.35m

Based on the assessment of current site conditions it is likely that barrier pipe will be required at the proposed development.



9.5. CONCEPTUAL SITE MODEL

Following the completion of the intrusive site investigation, chemical analysis and risk assessment, the conceptual model shown in Table 9.13 has been prepared for the site.

TABLE 9.13 CONCEPTUAL MODEL

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL1 PL2	Heavy Metals, non-volatile PAH (Made Ground / Railway Sidings)	Dermal contact. Dermal contact and ingestion.	Future site users. Off-site receptors.	Likely	High	LOW
Discussion: Heavy metals (arsenic and lead) have been identified throughout Made Ground between depths of 1.00 m and 3.20 m bgl. Recommendation: Cover system to garden and landscaped areas will prevent exposure to future site users. Construction works completed with PPE and provision of welfare.						
PL3	ACM in Made Ground	Inhalation of dust.	Future site users. Buildings. Off-site land users.	Likely	High	LOW
Assessment: Asbestos in the form of loose Chrysotile fibres have been identified within Made Ground deposits at TP112 at 1.30 m bgl, these form a low percentage weight of the material (<0.001%) however, can still cause harm to site workers and appropriate PPE should be worn. Recommendation: Any impacted materials will require placement in accordance with the asbestos CSM (in this case beneath 600 mm clean cover system) to prevent exposure to future site users. Construction works completed with PPE and provision of welfare. If any visual signs of ACM are encountered elsewhere during the enabling works stage, further sampling and risk assessment should be undertaken.						



POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL4	Volatile Contaminants such as hydrocarbons and fuel derivatives (Made Ground / Railway Sidings)	Inhalation of vapours. Migration through permeable strata and preferential pathways.	Future site users. Off-site receptors.	Likely	Moderate	Low
Assessment: Volatile compounds (Naphthalene, TPH C10-C16 and elemental mercury) have been identified between 0.50 m bgl and 4.90 m bgl. Visual and olfactory evidence of hydrocarbon impact was also identified across site, as such appropriate PPE should be worn. Recommendation: Ordinarily, delineation and removal of volatile impacted material would be recommended. However, give the spread and depth of encounter, it is considered that the contamination is widespread and it would be impractical and costly to excavate. A Tier 2 DQRA will be required to model the actual vapour emission risk from residue within the anthropogenic material and determine whether specialist VOC resistant membranes will be required to the dwellings.						
PL4	Methane, carbon dioxide (Made Ground, peat and potentially infilled features on and within 250 m of the site)	Inhalation of gas. Migration through permeable strata and preferential pathways. Explosion in confined spaces.	Future site users. Buildings. Off-site land users.	Likely	Moderate	Low
Assessment: Initial gas monitoring on the site indicates the site can be classed as CS1/Green. Recommendation: Full gas monitoring to be completed however at this initial stage a precautionary CS2/Amber 1 classification for gas protection measures is suggested. It should also be noted that VOC membranes may be required irrespective of the outcome of the completed gas monitoring regime.						



POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL5	Mobile contaminants such as metals, PAHs, hydrocarbons, volatile compounds (Made Ground/ Railway Sidings)	Surface runoff. Migration through permeable strata and preferential pathways. Perched waters migration.	Adjacent inland river/drain, Roeacre Brook Groundwater (Secondary A Aquifer).	Likely	Moderate	TBC
Assessment: Mobile contamination has been identified. Leachate and water analysis indicated heavy metal, PAH and TPH concentrations that exceed the DWS/EQS values. The site is underlain by a mixed geology, generally cohesive clay in the northeast of the site and generally granular sand and gravel in the southwest, with thick bands of clay beyond 10.0 m bgl. The clay deposits will afford for the protection of the underlying bedrock aquifer. Given the extensive thickness of drift (>60.0 m) and absence of a nearby water abstraction borehole, the risk to the underlying bedrock aquifer is considered to be significantly reduced. However, high concentrations of naphthalene and aromatic hydrocarbon fractions have been recorded in the groundwater sample taken from WS105 in the centre of the site potentially representative of a plume. The site sits at an approximate elevation of 130-135 m. The land to the north west and Roeacre Brook (circa 150 m to the north west) is noted to be at a lower elevation (~125 m AOD) and thus down hydraulic gradient of the site. Although this is considered outside of typical influencing distance, there is potential for this watercourse to be fed by watercourses/drains closer to the site that may be impacted by laterally migrating contamination. The risk to surface water courses is therefore considered moderate and further sampling at the location of WS105 will be required, together with installation of further monitoring wells in the vicinity to ascertain whether the identified impact is an isolated occurrence or a plume.						
PL6	Sulphate (potential ash within Made Ground)	Sulphate attack on concrete.	Building structure.	Likely	Low	Low
Assessment: Chemical analysis suggests that the soils meet DS-1, AC-1s standards.						



POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL7	Organic contaminants such as hydrocarbons, solvents (Made Ground)	Ingestion of tainted water supply.	Future site users. Water pipes.	Likely	Moderate	Low
Assessment: Elevated concentrations of organic contaminants have been detected in the soils at current pipeline depth that might present a risk to water pipelines.						
Recommendation: Based on existing ground conditions, barrier pipes are likely to be required due to the nature of the site. However, site conditions may differ post remediation and enabling works and as such further testing will be required to confirm the requirements.						
PL8	Phytotoxic contaminants (Made Ground)	Direct Contact (plant uptake).	Flora.	Likely	Low	Low
Assessment: High concentrations of phytotoxic contaminants Zinc, Copper and Nickel which inhibit plant growth have been detected in the Made Ground soils across the site.						
Recommendation: Provision of a suitable clean cover system to provide a suitable growing medium and promote plant growth will be required in garden and landscaped areas.						

Notes:

Main exposure pathways: PL1 = Soil Ingestion; PL2 = Dermal Contact and Ingestion; PL3 = Dust Inhalation; PL4 = Vapour/Gas Inhalation; PL5 = Vertical/Lateral Migration; PL6 = Corrosion of Concrete; PL7=Tainting of Water Supply; PL8 = Uptake by plants.



10. COAL MINING

10.1. SCOPE OF INTRUSIVE GROUND INVESTIGATION

The Arley Coal Seam is conjectured to subcrop beneath the north east of the site. Surrounding BGS boreholes indicate the thickness of overlying drift deposits to be in excess of 80 m bgl, thus significantly reducing the risk of any workings/void propagating upwards and resulting in subsidence at the surface.

Verbal consultation with the Coal Authority indicated that, due to the depth of the seam, they do not consider it likely that the seam has been worked. The risk from coal mining related hazards was therefore concluded to be low.

However, it was considered prudent to undertake precautionary drilling in the location of the seam and development high risk zone to confirm the anticipated ground condition and conclusions of this assessment.

A series of rotary boreholes have therefore been advanced within the narrow development high risk area associated with this seam, in accordance with Coal Authority Permission ref: 21608, to assess the potential presence of shallow workings and the potential for ground instability to induce a future subsidence event within the proposed development.

10.2. SUMMARY OF GROUND INVESTIGATION WORKS

10.2.1. ROTARY BOREHOLES TO INVESTIGATE WORKINGS IN COAL

TABLE 10.1 ROTARY BOREHOLES

ROTARY BOREHOLE	DEPTH TO ROCKHEAD (m bgl)	DEPTH TO COAL (m bgl)	EVIDENCE OF MINING ACTIVITY/SEAM	REMARKS
RB101	> 60.50 m	N/A	N/A	Loss of flush in SAND strata between 35.60 m and 40.80 m bgl. Hard drilling in CLAY strata between 40.80 m and 60.50 m bgl.
RB102	> 59.00 m	N/A	N/A	Loss of flush in SAND strata between 32.10m and 39.60 m bgl. Hard drilling in CLAY strata between 39.60m and 59.00 m bgl.



10.3. SUMMARY OF COAL MINING ISSUES

E3P has reviewed the historical BGS geological mapping and CA information, in addition to completing two 60 m rotary boreholes to investigate the presence of a coal outcrop.

-  The intrusive ground investigations comprising two, deep, rotary boreholes did not identify any shallow coal seams or evidence of historic shallow coal workings to the base of the boreholes.
-  Rockhead was not proven due to extensive drift and difficulties drilling at depth leading to termination of the boreholes at circa 60.0 m bgl in granular drift.
-  Based on the confirmed ground conditions, it is likely that any coal seams will be at significant depth and thus highly unlikely to have been worked at this location. Even if the seam has been worked, the overlying thickness of drift would be sufficient to mitigate the risk of subsidence at the surface.



11. GEOTECHNICAL ASSESSMENT

11.1. PROPOSED DEVELOPMENT

E3P understands that Kellen Homes are considering the proposed acquisition and future redevelopment of a parcel of land known as Castleton Sidings in Rochdale, Greater Manchester for low rise residential housing with associated adopted estate roads and utility infrastructure.

The APD sketch development layout plan indicates the proposed construction of ~183 low rise dwellings with an area of POS in the west.

Drawing 14-768-002 (Appendix III) identifies the proposed development layout.

11.2. SUMMARY OF GROUND CONDITIONS

-  Made Ground deposits were encountered within all of the exploratory hole locations from ground level to depths in excess of 4.20 m bgl. Across much of the site, the full depth of Made Ground could not be proven in the trial pits and was only proven in a select number of window sampler and deeper boreholes. The material generally comprises a black slightly clayey gravelly medium sand, with gravel of mudstone, brick, ash, shale, timber, glass and wood. The majority of trial pits were terminated due to sidewall collapse within the granular Made Ground.
-  Obstructions were encountered at three locations: TP103 (Concrete slab with probable services beneath at 0.70 m bgl), WS106a (double concrete slab at 0.50 m bgl and WS114a (ballast/cobble obstruction at 0.70 m bgl).
-  At four locations in the centre/east of the site, blackish brown pseudo fibrous PEAT was encountered. The peat was encountered at the base of WS106b, WS108 and WS114b, and the full depth was not proven due to reaching the limit of the drilling rig. Where proven, in CP102, the full thickness was recorded to be 2.60 m. In each location the peat was encountered at the base of the Made Ground, it is therefore likely to be associated with relict vegetation/organic material that was overfilled to create the sidings plateau. Given that the base of the Made Ground was not proven in a number of locations, it is therefore considered possible that the peat may be more extensive across the site.
-  Drift deposits were encountered within 13 of the 44 the exploratory locations. Within the 28 other locations, the full depth of Made Ground could not be proven. The drift deposits are varied across the site, generally comprising of CLAY and SAND. The SAND was generally a light brown clayey SAND at seven locations between the depths of 0.70 m and 11.70 m bgl. The CLAY was encountered at four locations as a stiff to very stiff medium to high strength sandy CLAY between the depths of 1.40 m to 15.00 m bgl. At one location (CP101) a soft very low strength brown sandy CLAY was encountered between the depths of 4.20 m to 6.30 m bgl (possible alluvium-type deposits). Rotary boreholes (RB101 and RB102) were terminated in drift deposits at depths of 60.5 and 59.0 m bgl respectively. Alternating CLAY and SAND were encountered throughout, indicating drift deposits to extend to significant depth.
-  The solid geology was not encountered within the deeper cable holes or rotary open holes. A nearby BGS borehole indicates rockhead at circa 81.00 m bgl.



11.3. SITE PREPARATION

The site should be cleared and any vegetation below areas of proposed development stripped in accordance with Series 200 of the *Manual of Contract Documents for Highway Works (MCHW)*. This should include the following:

- ✚ Roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting void infilled with suitable compacted engineered fill.
- ✚ Removal of all concrete hardstanding and historical railway sidings.
- ✚ Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill.
- ✚ Buried structures and old foundations have been encountered on site. These should be excavated from below the proposed development footprint with the resulting void backfilled.
- ✚ A reservoir was identified on historical mapping, the location and extent of this feature has not been confirmed and further investigation/delineation will be required.

11.4. FOUNDATION CONDITIONS AND ASSESSMENT OF POTENTIAL BEARING CAPACITIES

In due consideration of the identified ground conditions, in-situ and laboratory geotechnical testing, E3P has undertaken an assessment of the net safe allowable bearing pressure (ABP) within the underlying natural stratum to assist in the detailed design of foundations and infrastructure and determine the target founding stratum. The results of this assessment are summarised in Table 11.1.

TABLE 11.1 SUMMARY OF ABP

GRANULAR SOILS			
Description	Depth (Range m bgl)	Relative Density	Allowable Bearing Pressure (kN/m ²)
Clayey SAND	3.00–5.00	Loose–Medium Dense	75–113
SAND	6.50–11.00	Medium Dense	130–294
COHESIVE SOILS			
Description	Depth (range m bgl)	Undrained Shear Strength (Cu) (kN/m ²)	Allowable Bearing Pressure (kN/m ²)
Soft sandy CLAY (CP101)	4.00	13	26
Firm to stiff sandy CLAY	1.50–5.00	41–133	85–313
Stiff to very stiff sandy CLAY	9.50–14.50	84–125	173–256



In the majority of exploratory holes the Made Ground remained unproven and generally exceeds 2.5 m across the site. Made Ground is not considered suitable in its current form for founding and as such an engineered foundation solution will be required in the majority of plots comprising:

- ✚ Ground improvement using Vibro Stone Columns to support a reinforced strip foundation (Further assessment of the thickness of the Made Ground will be required in order to devise if full depth treatment will be possible). VSC will not be possible where the thickness of peat exceeds 0.25 m; and/or
- ✚ Pile foundations (CFA/bored), particularly in proximity of the adjacent railway to minimise effects of vibration and where peat is confirmed to be present.

The natural deposits have generally been assessed as firm/stiff or medium dense with anticipated ABP >100 kN/m². Natural deposits were encountered at shallow depth (<2.50 m bgl) in WS104, TP104 and TP109 in the north west of the development area. In this part of the site, ground conditions may allow the adoption of deep trench foundations.

It should however be noted that soft CLAY and PEAT were encountered in the deeper cable percussive boreholes, at depths between circa 3.0 – 6.0 m bgl.

Where VSC and piled foundations are adopted, controlled waters and associated generation of pollutant pathways will need to be adequately assessed.

To determine if VSC is viable at the subject site, E3P has completed a Ground Improvement Design Risk Matrix that is summarised in Table 11.2.

TABLE 11.2 GROUND IMPROVEMENT DESIGN RISK MATRIX

RISK ITEM	COMMENT	PASS/FAIL
Soft clays with an undrained shear strength less than 30 kN/m²	CLAY soils are generally firm to stiff with $C_u > 80$ kN. Isolated areas of softer clay soils were encountered with $C_u \sim 30$ kN/m ² ; however, it is considered that affected plots will either be piled, or soft material excavated.	PASS
Ground with peat layers close to foundation level or the base of the stone column, or where intermediate layers of peat are thicker than 200 mm, either as a single layer or the sum of the thicknesses of individual layers throughout the length of the stone column	Soft CLAY and PEAT were encountered in the deeper cable percussive boreholes, to depths of circa 5.0 – 6.0 m bgl. It is therefore likely that plots overlying these areas will be piled.	Plots in peat areas will be piled or the peat will be excavated
Voided filled ground, e.g., old water tanks, pottery, glass bottles, concrete rubble or brick fill of unsuitable grading	Made Ground will require processing to render the site suitable for VSC. Substructures will also require excavation and processing into a graded aggregate suitable for vibro treatment.	PASS – on completion of enabling works



RISK ITEM	COMMENT	PASS/FAIL
Loose or non-engineered fill not previously subject to rising or fluctuating water levels saturation	None identified.	PASS
Filled ground still settling or expected to settle under its own weight or due to the effects of surcharging/upfilling where there is a high organic content or where decay is continuing	None identified.	PASS
Fill, containing degradable material where organic material forms more than 15% of fill by volume	None identified.	PASS
Clays with a plasticity index greater than 40%	None identified.	PASS
Highly sensitive soils liable to collapse or remoulding	None identified.	PASS
Cohesive soils with trees in influencing distance	Plots where tree influence has been modelled and will either be subject to a piled or mass trench-fill solution.	PASS
Overall Risk Rating and Suitability for Vibratory Ground Improvement		PASS

Consideration must be given to the settlement characteristic of the recently deposited Made Ground and will require modelling when a detailed layout with levels becomes available.

Trees are present in the west of the site (retained greenbelt) and along the site periphery. Their influence will need to be modelled to assess the implications to foundations in respect of heave.

A summary of anticipated foundations is presented in Table 11.3 and a concept foundation zoning plan is included as Drawing 14-768-010 in Appendix III.



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TABLE 11.3 ANTICIPATED FOUNDATIONS

LOCATION	ANTICIPATED FOUNDING STRATA DEPTH (m bgl)	GROUND WATER (m bgl)	TARGET STRATUM	TREES	COAL	FOUNDATION TYPE	TYPE OF CONCRETE
WS101	1.85	N	Stiff CLAY	Y	N	MT	–
WS102	>2.50	N	–	Y	N	VSC	–
WS103	>2.50	N	–	Y	N	VSC	–
WS104	>2.50	N	–	Y	N	VSC	DS-1, AC-1s
WS105	>2.50	N	–	Y	N	VSC	–
WS106a	>2.50	N	–	Y	N	VSC	–
WS106b	>2.50	N	–	Y	N	Pile/VSC	–
WS107	>2.50	N	–	Y	N	VSC	–
WS108	>2.50	N	–	Y	N	Pile/VSC	–
WS109	>2.50	N	–	Y	N	VSC	DS-1, AC-1s
WS110	>2.50	N	–	Y	N	VSC	DS-1, AC-1s
WS111	>2.50	N	–	Y	N	VSC	DS-1, AC-1s
WS112	>2.50	N	–	Y	N	VSC	DS-1, AC-1s
WS113	>2.50	N	–	Y	N	VSC	DS-1, AC-1s
WS114a	>2.50	N	–	Y	N	VSC	–
WS114b	>2.50	N	–	Y	N	Pile/VSC	DS-1, AC-1s
TP101	>2.50	N	–	Y	N	VSC	–
TP102	>2.50	N	–	Y	N	VSC	–
TP103	>2.50	N	–	Y	N	VSC	–
TP104	1.85	1.50	GRAVEL	Y	N	MT	–
TP105	>2.50	1.20	–	Y	N	VSC	–
TP106	>2.50	N	–	Y	N	VSC	–
TP107	2.55	N	GRAVEL	Y	N	VSC	–
TP108	>2.50	N	–	Y	N	VSC	DS-1, AC-1s
TP109	1.05	2.70	SAND	Y	N	MT	–
TP110	>2.50	1.60	–	Y	N	VSC	–
TP111	>2.50	N	–	Y	N	VSC	–
TP112	>2.50	N	–	Y	N	VSC	DS-1, AC-1s
TP113	>2.50	2.20	–	Y	N	VSC	–
TP114	>2.50	N	–	Y	N	VSC	–
TP115	>2.50	N	–	Y	N	VSC	DS-1, AC-1s
TP116	>2.50	N	–	Y	N	VSC	–



LOCATION	ANTICIPATED FOUNDING STRATA DEPTH (m bgl)	GROUND WATER (m bgl)	TARGET STRATUM	TREES	COAL	FOUNDATION TYPE	TYPE OF CONCRETE
TP117	>2.50	N	–	Y	N	VSC	DS-1, AC-1s
TP118	>2.50	N	–	Y	N	VSC	–
TP119	>2.50	N	–	Y	N	VSC	–
TP120	>2.50	N	–	Y	N	VSC	–
TP121	>2.50	N	–	Y	N	VSC	–
TP122	>2.50	N	–	Y	N	VSC	–
TP123	>2.50	N	–	Y	N	VSC	–
TP124	>2.50	N	–	Y	N	VSC	–
CP101	>2.50	N	–	Y	N	VSC	–
CP102	>2.50	1.50	–	Y	N	Pile/VSC	–
RB101	>2.50	N	–	Y	N	VSC	–
RB102	>2.50	N	–	Y	N	VSC	–

It is recommended that, at working drawing stage, a foundation schedule is prepared for the development taking account of the physical change of natural clay soils and the current/proposed locations of trees.

11.5. GROUND FLOOR SLABS

Current building control regulations require that where infilled ground is present to depths in excess of 600 mm, or where the substratum is variable in terms of the structure and settlement potential, or where clay soils are present within the influence of existing or proposed trees, a suspended floor slab is required.

In this instance, it is considered that for the majority of substructures, the underlying stratum would have in excess of 600 mm of infill and, as such, a suspended floor slab will be required.

Where a cast in-situ suspended slab is utilised with no subfloor void, appropriate compressible material (heave precautions) will be required in the construction of the substructure.

11.6. HEAVE PRECAUTIONS

The site has been proven to be underlain by clay soils, which are susceptible to volumetric instability due to fluctuations in moisture content, particularly within influencing distance of trees as per the NHBC/LABC conjectured zones of influence.

As the clay is deemed to be low plasticity, heave precautions are not required to the internal face of the external load-bearing walls (outside or within tree influence).

If a ground beam is to be constructed within the zone of tree influence, heave precautions are required to the underside of this and edge beams.



If the ground floor slab is to be constructed with a beam and block floor, a minimum subfloor void of 200 mm is required within any structures located in the zone of conjectured tree influence.

If the ground floor slab is constructed with a cast in-situ suspended floor slab, then heave precautions that can tolerate 50 mm of clay swelling are required within any part of the floor slab to be located within the zone of influence of a tree.

A summary of heave precautions is presented in Table 11.4.

TABLE 11.4 SUMMARY OF HEAVE PRECAUTIONS

		MINIMUM VOID DIMENSION FOR FOUNDATIONS, GROUND BEAMS AND SUSPENDED IN-SITU CONCRETE GROUND FLOORS		MINIMUM VOID DIMENSIONS UNDER PRECAST CONCRETE AND SUSPENDED TIMBER FLOORS
Plasticity Index of Soil	Required Foundation Depth (m)	Thickness of Void Former Against Side of Foundation or Ground Beam (mm)	Thickness of Void Former on Underside of Edge Beam and Floor Slab (mm)	Void Dimension (mm)
High Plasticity (> 40)	> 2.5	Engineer Design		Engineer Design
	2.0–2.5	35	150	300
	1.5–2.0	25	75	
Moderate Plasticity (20–40)	> 2.5	Engineer Design		Engineer Design
	2.0–2.5	25	100	250
	1.5–2.0	25	50	
Low Plasticity (< 20)	2.0–2.5	N/A	50	200
	> 2.0	No Special Precautions		

11.7. HIGHWAYS CONSTRUCTION

A programme of remediation and enabling works will be required to remediate the proposed road subgrade in accordance with the requirements of the Manual of Contract Documents for Highway Works Volume 1 Specification For Highway Works (Series 600-Earthworks) for a method compaction.

It is considered that the material can be re-engineered using method compaction to achieve a CBR in excess of 5% if works are completed in favourable climatic conditions.

11.8. DEVELOPMENT PLATFORM STABILITY

Deep Made Ground had been found overlying what is presumed to be historical relict vegetation that is identified as a 'peat material' in the central sector of the site. This material is identified as potentially degradable, which may represent a risk associated with future consolidation induced by earthworks surcharge loading, temporary works and infrastructure loading.



Further intrusive ground investigation is required to assess the extent of degradable organic material to inform a suitably robust settlement model to ensure design stability for the development platform.

11.9. DRAINAGE

Due to the lateral and vertical extent of Made Ground across the site, together with the observed inorganic and hydrocarbon impact, soakaway drainage will not be a suitable method of surface water disposal for the subject site.

If soakaway drainage is to be considered, full BRE 365 testing must be completed to inform the detailed design.

11.10. CONCRETE DURABILITY

Based upon the results of the chemical analyses it is considered that subsurface concrete can be designed in accordance with Design Sulphate Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with the recommendations provided in BRE *Special Digest 1* (2005).

11.11. EXCAVATIONS

Trial pits were generally unstable in the granular Made Ground, resulting in termination.

Site observations indicated that excavations should be feasible in the near surface with normal plant; however, obstructions were identified in the near surface, including former foundations and former floor slabs. It is anticipated that any obstructions will be grubbed out during the reduced-level dig for the substructure works.

However, due to the depth and variability of the Made Ground and likelihood of trench collapse, it is considered that all excavations are supported or battered back in accordance with guidance contained in CIRIA R97.

If local pumping of groundwater is required during the advancement of excavations for the proposed foundations, then consideration should be given to the potential for dewatering gravels in the surrounding areas that may cause structural damage to building substructures in close proximity to the site.

TABLE 11.5 CIVIL ENGINEERING EXCAVATION RISK MATRIX

RISK ITEM	PRESENT	COMMENT
Running Sands	No	No running sand has been identified.
Minor Water Ingress	Yes	Minor water ingress will require localised dewatering/sump pumping during the construction of site drainage infrastructure. Ingress of water into foundation excavation will potentially flood foundation excavations, limiting the viability of spread foundations to be constructed.
Shallow Bedrock	No	Shallow bedrock has not been identified within the site boundary.



11.12. CONSTRUCTION ACTIVITY AND INSPECTION

The following activities and inspections should be incorporated into the site works:

-  Due to the variability of the soils at the site, it is recommended that sufficient allowance is made for the inspection of formations and subformations to foundations and pavement construction.
-  Excavations where access is required should be subject to a risk assessment from a competent person and, where appropriate, mitigation measures such as benching back the sides or use of support systems in accordance with CIRIA R97 should be utilised.
-  It is considered that dewatering may be required, especially following periods of heavy rainfall. Removal of surface water and water within trenches should be possible with conventional sump pumping. Discharge of any water should be agreed with the relevant regulatory body and be undertaken under a trade effluent discharge, where required. Measures to remove silt and suspended solids may be required and consideration should be given to provision of space for settling tanks or an attenuation pond.
-  Where access to confined spaces is required, appropriate mitigation measures should be addressed within the construction stage health and safety plan. Particular account should be taken of the gas results.
-  The presence of potential contamination and mitigation measures should be addressed as part of the construction stage health and safety plan and should include measures to design out the risks, reduce their impact and, finally, to include the use of personnel protective equipment (PPE).



11.13. GEOTECHNICAL RISK REGISTER

POTENTIAL CONSTRAINT	ABNORMAL	LOCATION ON SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Remediation of contaminated soils		On site	TBC	Made Ground soils impacted by heavy metals, non-volatile PAH, and volatiles (TPH, naphthalene and elemental mercury) has been encountered sitewide. A clean cover system will be required in all garden areas to mitigate the risk to end users. A vapour risk assessment will also be required to determine whether VOC resistant membranes will be required.
Obstructions		All	100	Site has been subject to significant historical development. Above-ground structures have been removed however buried obstructions were encountered at three locations: TP103 (Concrete slab with probable services beneath at 0.70 m bgl), WS106a (double concrete slab at 0.50 m bgl and WS114a (ballast/cobble obstruction at 0.70 m bgl). Other obstructions should be anticipated at intervening locations.
Artificially levelled and filled platforms		All	100	The site appears to have been levelled and artificially backfilled.
Trench collapse		All	100	Made Ground present beneath the site is prone to collapse.
Infilled reservoir		North	5	The former infilled reservoir will need to be clearly identified and investigated to assess the nature of materials and extent of any organic or deleterious elements.
Mature trees		On site	100	Arboriculture survey required to determine areas of potential tree influence.
Volume change potential clay		On site	80	The clay is deemed to be low volume change potential, therefore heave precautions are not likely to be required. Peat is of very high plasticity.
Peat		Centre/East	25	Peat is identified at depths of between c. 3.0 – 6.0 m bgl, this is a highly compressible stratum that represents a risk in terms of consolidation inducing failure to structures and infrastructure.



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POTENTIAL CONSTRAINT	ABNORMAL	LOCATION ON SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Running sands		N/A	N/A	Data searches indicate low risk.
Ground dissolution		N/A	N/A	Data searches indicate no hazard.
Concrete design		On site	N/A	The soils meet class DS-1, AC-1s.
Low-permeability ground		On site	100	Soakaways not viable where low permeability cohesive deposits are present or where areas of potentially contaminated soil and groundwater are present.
Services/sensitive structures		On site	25	A review of online services has identified a number of services within the site boundary. A live railway is also present along the southern site boundary. Piling may not be possible within close proximity to any sensitive infrastructure. Plots adjacent the railway wall may require bored piles instead of VSC due to the potential to cause vibration and disturbance.
Abnormal foundation solutions		On site	100	Due to sitewide presence of deep Made Ground and peat at depths between 3.0 – 6.0 m bgl, an engineered foundation solution (VCS/Pile) is likely to be required in plots across the site.
Areas not investigated		On site	25	Additional investigation required adjacent the live railway along southern boundary subject to agreement and permit from Network Rail. Further deep borehole investigation is required to assess the full depth of Made Ground across the site and extent and distribution of peat.



11.14. FURTHER WORKS

Based on the findings of the intrusive site investigation, the following additional works are recommended to be completed in due course:

-  Completion of ground gas monitoring.
-  Tier 2 vapour risk assessment.
-  Additional cable percussive boreholes to confirm deeper ground conditions to determine suitability of VSC treatment and inform piling.
-  Further investigation to assess the extent of peat and potentially infilled reservoir.
-  Further groundwater sampling at the location of WS105, together with installation of further monitoring wells in the vicinity to ascertain whether the identified impact is an isolated occurrence or a plume.
-  Plot-specific foundation schedule (upon receipt of the final development levels).
-  Arboricultural survey.
-  Geotechnical earthworks strategy (infrastructure).
-  Remediation and enabling works strategy.



12. CONCLUSIONS AND RECOMMENDATIONS

12.1. CONTAMINATED LAND ASSESSMENT

Human Health	The Tier I assessment identified exceedances for heavy metals, non-volatile PAHs, naphthalene, elemental mercury, Aromatic TPH C10-C21 and chrysotile. The risk to chronic human health associated with the elevated concentrations on inorganic heavy metals and non-volatile PAH compounds can be mitigated through the installation of a suitable cover system. Given the widespread distribution of the contamination, the cover system would be required in all proposed private gardens, landscaping, and public open space to remove any potential for direct exposure to impacted soils. The specific design and installation process for the appropriate cover systems will be clearly defined within the site remediation and enabling works strategy. Asbestos in the form of chrysotile (<0.005%wt/wt) has also been identified within a localised area at TP112 in shallow Made Ground. No visual signs of ACM were encountered during the ground investigation; it is therefore likely that only trace fibres are present. In this instance, the risks can be mitigated by placing the impacted soil from TP112 beneath a 600 mm clean cover system in garden/landscaped areas or placed beneath roadways or at 1.0 m beneath plots. SVOC contamination (elemental mercury, naphthalene and aromatic hydrocarbon fractions C10-C16) has been encountered at various locations across the site in Made Ground at depths of between 0.50 m and 4.90 m bgl. It is noted that four samples containing elevated concentrations of total mercury were not speciated, however, given the spread and depth of encounter of other identified SVOCs, it is considered that the contamination is widespread and it would be impractical and costly to delineate and excavate. It is recommended that a Tier 2 DQRA is undertaken to model the actual vapour emission risk from residue within the anthropogenic material in order to determine whether specialist VOC resistant membranes will be required to the dwellings. It is considered that chemical analysis of the natural clay drift deposits will identify these soils to be acceptable for use as subsoil within the proposed garden areas subject to further chemical validation; however, given the depth of Made Ground on-site, it is unlikely that subsoils will be excavated. There are no suitable sources of topsoil available on the site.
Controlled Waters	The underlying Secondary A Aquifer and nearby surface water courses have been identified as potential receptors.



	Mobile contamination has been identified. Leachate and water analysis indicated heavy metal, PAH and TPH concentrations that exceed the DWS/EQS values. The site is underlain by a mixed geology, generally cohesive clay in the northeast of the site and generally granular sand and gravel in the southwest, with thick bands of clay beyond 10.0 m bgl. The clay deposits will afford for the protection of the underlying bedrock aquifer. Given the extensive thickness of drift (>60.0 m) and absence of a nearby water abstraction borehole, the risk to the underlying bedrock aquifer is considered to be significantly reduced. However, high concentrations of naphthalene and aromatic hydrocarbon fractions have been recorded in the groundwater sample taken from WS105 in the centre of the site potentially representative of a plume. The site sits at an approximate elevation of 130-135 m. The land to the north west and Roeacre Brook (circa 150 m to the north west) is noted to be at a lower elevation (~125 m AOD) and thus down hydraulic gradient of the site. Although this is considered outside of typical influencing distance, there is potential for this watercourse to be fed by watercourses/drains closer to the site that may be impacted by laterally migrating contamination. The risk to surface water courses is therefore considered moderate and further sampling at the location of WS105 will be required, together with installation of further monitoring wells in the vicinity to ascertain whether the identified impact is an isolated occurrence or a plume.
Ground Gas	Characteristic Situation 1/Green (pending completion of gas monitoring). VOC resistant membranes may be required, subject to a Tier 2 Vapour Risk Assessment.
Potable Water	Barrier pipes likely to be required. This will need to be confirmed following the completion of a UKWIR risk assessment. Post-remediation and enabling works ground conditions may be different from those identified during this site investigation.

12.2. COAL MINING

Coal Mining	The Arley Coal seam is conjectured to subcrop beneath the north east of the site. However, a nearby BGS borehole indicates drift deposits to extend to circa 80 m bgl. Verbal consultation with the Coal Authority indicated that, due to the depth of the seam, they do not consider it likely that the seam has been worked. The risk from coal mining related hazards was therefore concluded to be low but it was considered prudent to carry out intrusive investigation to confirm the assessment. Two ~60.0 m deep rotary boreholes have therefore been advanced within the narrow development high risk area associated with the Arley Coal seam, in accordance with Coal Authority Permission ref: 21608. Ground conditions were found to comprise alternating bands of cohesive and granular drift to depths in excess of 60.5 m bgl.
--------------------	---



Rockhead was not proven due to extensive drift and difficulties drilling at depth leading to termination of the boreholes at circa 60.0 m bgl in granular drift. No evidence of shallow coal seams or historic shallow coal workings was recorded.

Based on the confirmed ground conditions, it is likely that any coal seams will be at significant depth and thus highly unlikely to have been worked at this location. Even if the seam has been worked, it is considered that the overlying thickness of drift would be sufficient to mitigate the risk of subsidence at the surface.

12.3. GEOTECHNICAL ASSESSMENT

Obstructions were encountered at three locations: TP103 (Concrete slab with probable services beneath at 0.70 m bgl), WS106a (double concrete slab at 0.50 m bgl and WS114a (ballast/cobble obstruction at 0.70 m bgl).

Ground conditions were generally found to comprise >2.50 m Made Ground over light brown clayey SAND and stiff to very stiff medium to high strength sandy CLAY. Across much of the site, the full depth of Made Ground could not be proven.

At one location (CP101) a soft very low strength brown sandy CLAY was encountered between 4.20 m to 6.30 m bgl (possible alluvium-type deposits). Rotary boreholes (RB101 and RB102) were terminated in drift deposits at depths of 60.5 and 59.0 m bgl respectively, indicating drift deposits to extend to significant depth.

Obstructions were encountered at three locations: TP103 (Concrete slab with probable services beneath at 0.70 m bgl), WS106a (double concrete slab at 0.50 m bgl and WS114a (ballast/cobble obstruction at 0.70 m bgl).

At four locations in the centre/east of the site, blackish brown PEAT was encountered. The peat was encountered at the base of WS106b, WS108 and WS114b, and the full depth was not proven due to reaching the limit of the drilling rig. Where proven, in CP102, the full thickness was recorded to be 2.60 m. In each location the peat was encountered at the base of the Made Ground, it is therefore likely to be associated with relict vegetation/organic material that was overfilled to create the sidings plateau. Given that the base of the Made Ground was not proven in a number of locations, it is therefore considered possible that the peat may be more extensive across the site and further investigation will be necessary.

During a phase of cut-and-fill enabling works to create a developable platform, all below-ground obstructions will require grubbing out to the base of the Made Ground to enable the construction of proposed plots.

Made Ground is not considered suitable in its current form for founding and as such an engineered foundation solution will be required in the majority of plots comprising:



Ground improvement using Vibro Stone Columns to support a reinforced strip foundation (Further assessment of the thickness of the Made Ground will be required in order to devise if full depth treatment will be possible). VSC will not be possible where the thickness of peat exceeds 0.25 m; and/or'

Pile foundations (CFA/bored), particularly in proximity of the adjacent railway to minimise effects of vibration and where peat is confirmed to be present.

The natural deposits have generally been assessed as firm/stiff or medium dense with anticipated ABP >100 kN/m². Natural deposits were encountered at shallow depth (<2.50 m bgl) in WS104, TP104 and TP109 in the north west of the development area. In this part of the site, ground conditions may allow the adoption of deep trench foundations.

It should however be noted that soft CLAY and PEAT were encountered in the deeper cable percussive boreholes, at depths between circa 3.0 – 6.0 m bgl.

Where VSC and piled foundations are adopted, controlled waters and associated generation of pollutant pathways will need to be adequately assessed.

Consideration must be given to the settlement characteristic of the recently deposited Made Ground and will require modelling when a detailed layout with levels becomes available.

Given the presence of extensive (contaminated) Made Ground, soakaway drainage will not be suitable for adoption at the site.

END OF REPORT



APPENDIX I

LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between E3P and the client as indicated in Section 1.3.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information, it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover, reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover, no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials, this is for indicative purposes only and do not constitute or replace full and proper surveys.
8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
9. E3P cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by E3P is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by E3P in this connection without their explicit written agreement there to by E3P.
10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.



APPENDIX II

GLOSSARY

TERMS

ACM	Asbestos-containing material	MMP	Materials management plan
ADS	Acoustic design statement	ND	Not detected
AST	Above-ground storage tank	NDP	Nuclear density probe
BGS	British Geological Survey	NMP	Noise management plan
BSI	British Standards Institute	NPSE	Noise policy statement for England
BTEX	Benzene, toluene, ethylbenzene, xylenes	NR	Not recorded
CA	Coal Authority	PAH	Polycyclic aromatic hydrocarbon
CBR	California bearing ratio	PCB	Polychlorinated biphenyl
CIEH	Chartered Institute of Environmental Health	PI	Plasticity index
CIRIA	Construction Industry Research Association	PID	Photo ionisation detector
CLEA	Contaminated land exposure assessment	POS	Public open space
CML	Council of Mortgage Lenders	PPE	Personnel protective equipment
CoC	Contaminants of concern	ProPG	Professional practice guidance
CSM	Conceptual site model	QA	Quality assurance
DNAPL	Dense non-aqueous phase liquid (chlorinated solvents, PCB)	SGV	Soil guideline value
DWS	Drinking water standard	SPH	Separate-phase hydrocarbon
EA	Environment Agency	SPT	Standard penetration test
EQS	Environmental quality standard	SVOC	Semi-volatile organic compound
FFL	Finished floor level	TPH	Total and speciated petroleum hydrocarbon
GAC	General assessment criteria	TPH CWG	Total Petroleum Hydrocarbon (Criteria Working Group)
GL	Ground level	UKWIR	United Kingdom Water Infrastructure Risk
GSV	Gas screening value	UST	Underground storage tank
HCV	Health criteria value	VCC	Vibro-concrete column
ICSM	Initial conceptual site model	VOC	Volatile organic compound
LEL	Lower explosive limit	VRSC	Vibro-replacement stone columns
LMRL	Lower method reporting limit	VSC	Vibro-stone columns
LNAPL	Light non-aqueous phase liquid (petrol, diesel, kerosene)	WHO	World Health Organisation
MCV	Moisture condition value	WRAP	Waste and Resources Action Programme



Castleton Sidings, Heywood

Phase I & II Geoenvironmental Site Assessment

April 2021

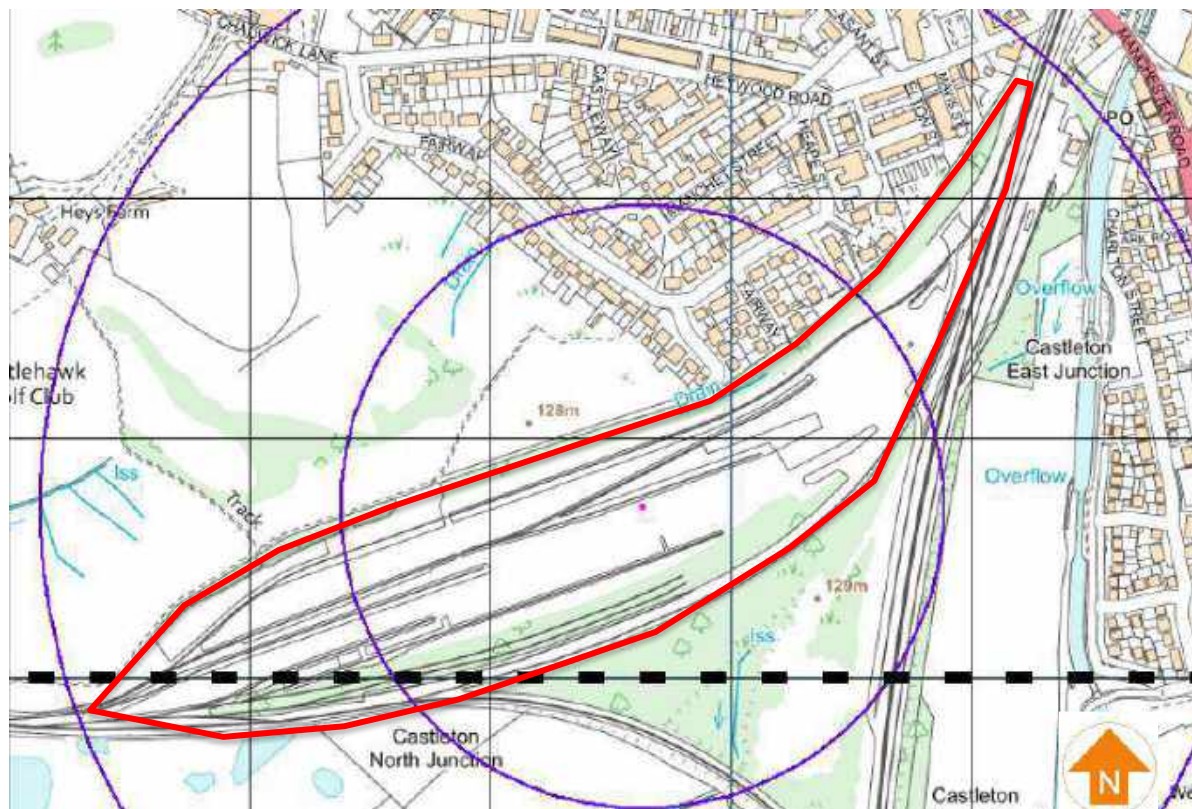
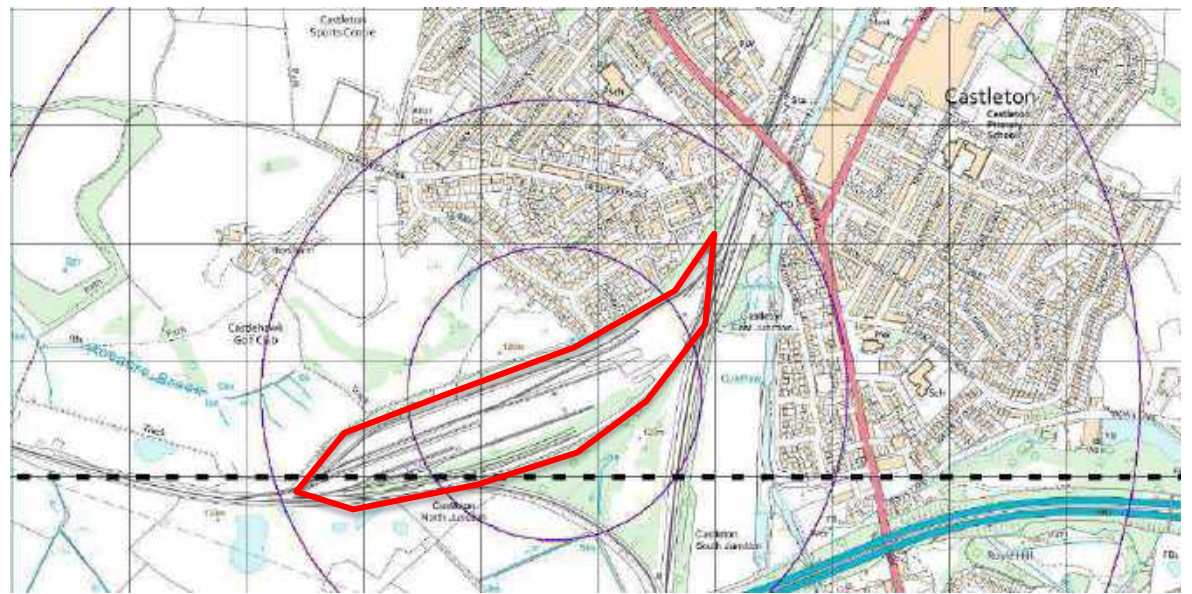
MIBK	Methyl isobutyl ketone	WTE	Water table elevation
m	Metres	ppm	Parts per million
km	Kilometres	mg/m³	Milligram per metre cubed
% v/v	Percent volume in air	m bgl	Metres below ground level
mb	Millibars (atmospheric pressure)	m bcl	Metre below cover level
l/hr	Litres per hour	mAOD	Metres above ordnance datum (sea level)
µg/l	Micrograms per litre (parts per billion)	kN/m²	Kilonewtons per metre squared
ppb	Parts per billion	µm	Micrometre
mg/kg	Milligrams per kilogram (parts per million)	SSRT	Site Specific Remediation Target
PSD	Particle Size Distribution	DD	Dry Density
CL:AIRE	Contaminated Land: Applications in Real Environments	Mc	Moisture Content
ρ	Bulk Density	GPR	Ground Penetrating Radar
NDP	Nuclear Density Probe	FFL	Finished Floor Level
LEL	Lower Explosive Limit	UKWIR	UK Water Industry Research
CIRIA	Construction Industry Research and Information Association	LOD	Limit of Detection

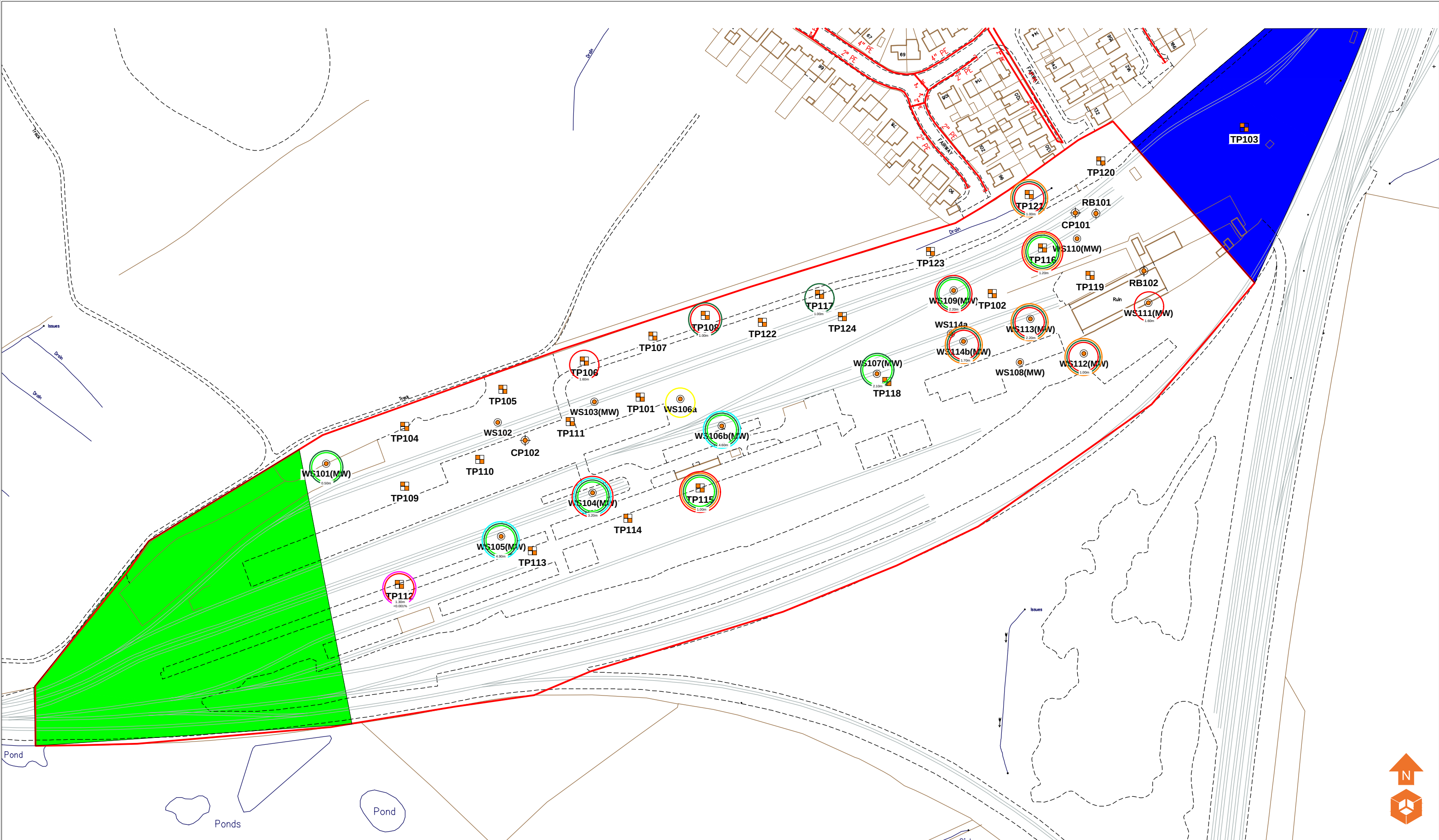


APPENDIX III

DRAWINGS

DRAWING 14-768-001 – SITE LOCATION PLAN





Location Symbols WS101 Approximate Window Sample Probehole Location WS101 Approximate Window Sample Probehole Location with Install	Contaminants Heavy metals Mercury (volatile) Asbestos (chrysotile <0.001% wt/wt) Napathalene (volatile) Non-volatile PAH TPH C10-C16 (volatile) TPH C16-C21 (non-volatile)	Notes: P1 P1 Phase REVB REVA Issue 30.04.2021 15.04.2021 Date EB EB Drawn EF EF Checked	Client: Kellen Homes Heywood Road, Castleton	Job No: 14-768 018 Drawing No: 018	Date: 30.04.2021 NTS @ A3 Scale: NTS @ A3	e3p Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: www.e3p.co.uk	Contamination Issues Plan The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.
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ECOLOGICAL
PARK



Notes:				
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Phase	Issue	Date	Drawn	Checked

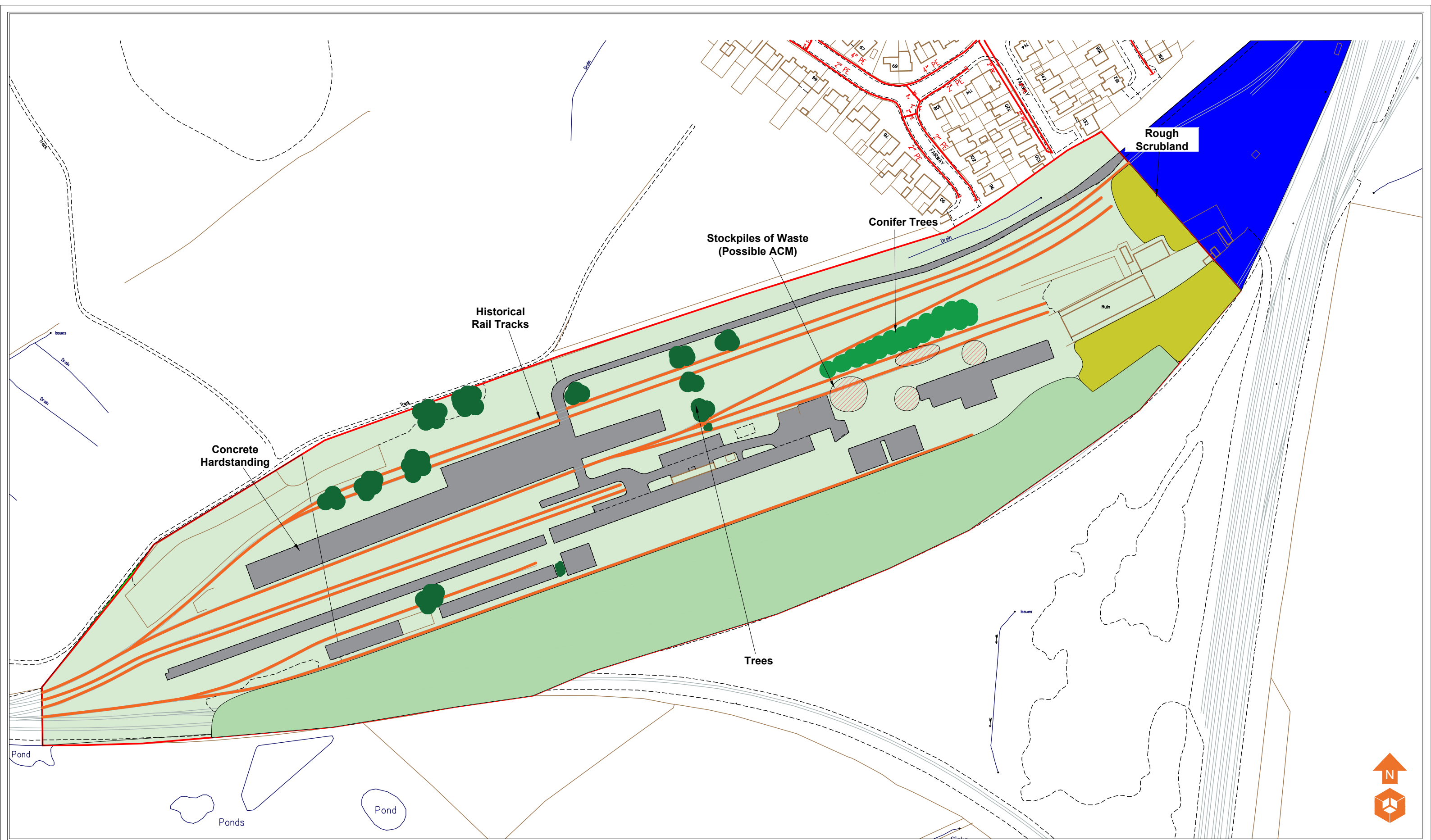
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Kellen Homes	
Job Title:	
Heywood Road, Castleton	

Job No:	14-768	Date:	15.04.2021
Drawing No:	002	Scale:	NTS @ A3
Drawing Title:		Proposed Development Plan	



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Historical Features

- Overgrown Trees
- Concrete Hardstanding
- Rough Vegetated Land / Grasses
- Stockpile of Waste (Possible ACM)
- Rough Scrubland
- Trees
- Historical Railway Tracks

Notes:

P1	REVA	15.04.2021	HM	EF
Phase	Issue	Date	Drawn	Checked

Client:

Kellen Homes

Job Title:

Heywood Road, Castleton

Job No:

14-768

Drawing No:

004

Date:

15.04.2021

Scale:

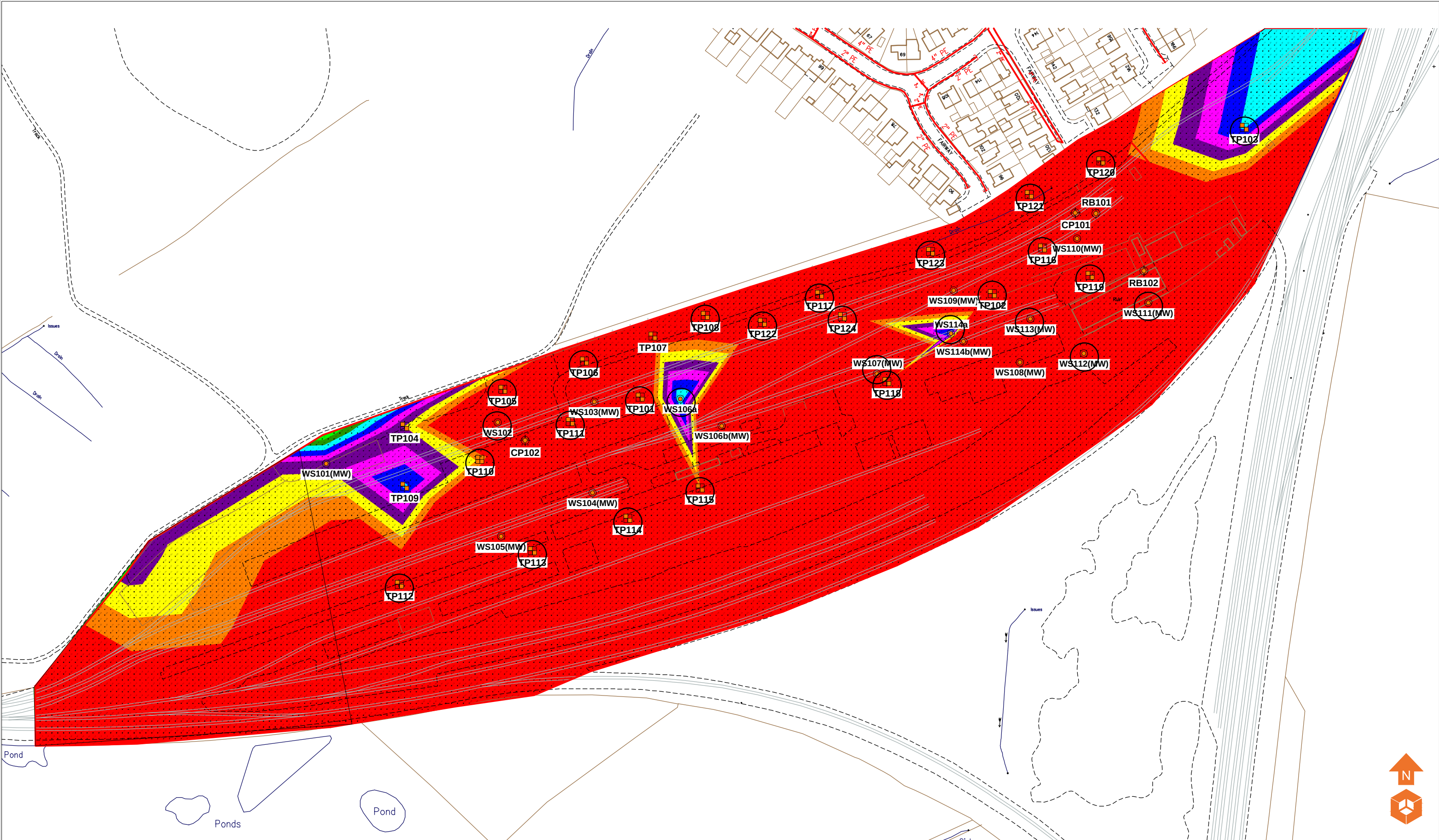
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Site Features Plan



Location Symbols

- Approximate Window Sample Probehole Location
- Approximate Window Sample Probehole Location with Install

Made Ground Depth (m)

- Depth of Made Ground 0.00 - 0.24m
- Depth of Made Ground 0.25 - 0.49m
- Depth of Made Ground 0.50 - 0.74m
- Depth of Made Ground 0.75 - 0.99m
- Depth of Made Ground 1.00 - 1.24m
- Depth of Made Ground 1.25 - 1.49m
- Depth of Made Ground 1.50 - 1.74m
- Depth of Made Ground 1.75 - 1.99m
- Depth of Made Ground >2.00m

Base of Made Ground Not Proven

Notes:

P1	REVB	07.05.2021	EB	JS
P1	REVA	31.03.2021	EB	EF
Phase	Issue	Date	Drawn	Checked

Client:

Kellen Homes

Job Title:

Heywood Road, Castleton

Job No:

14-768

Drawing No:

006

Date:

07.05.2021

Scale:

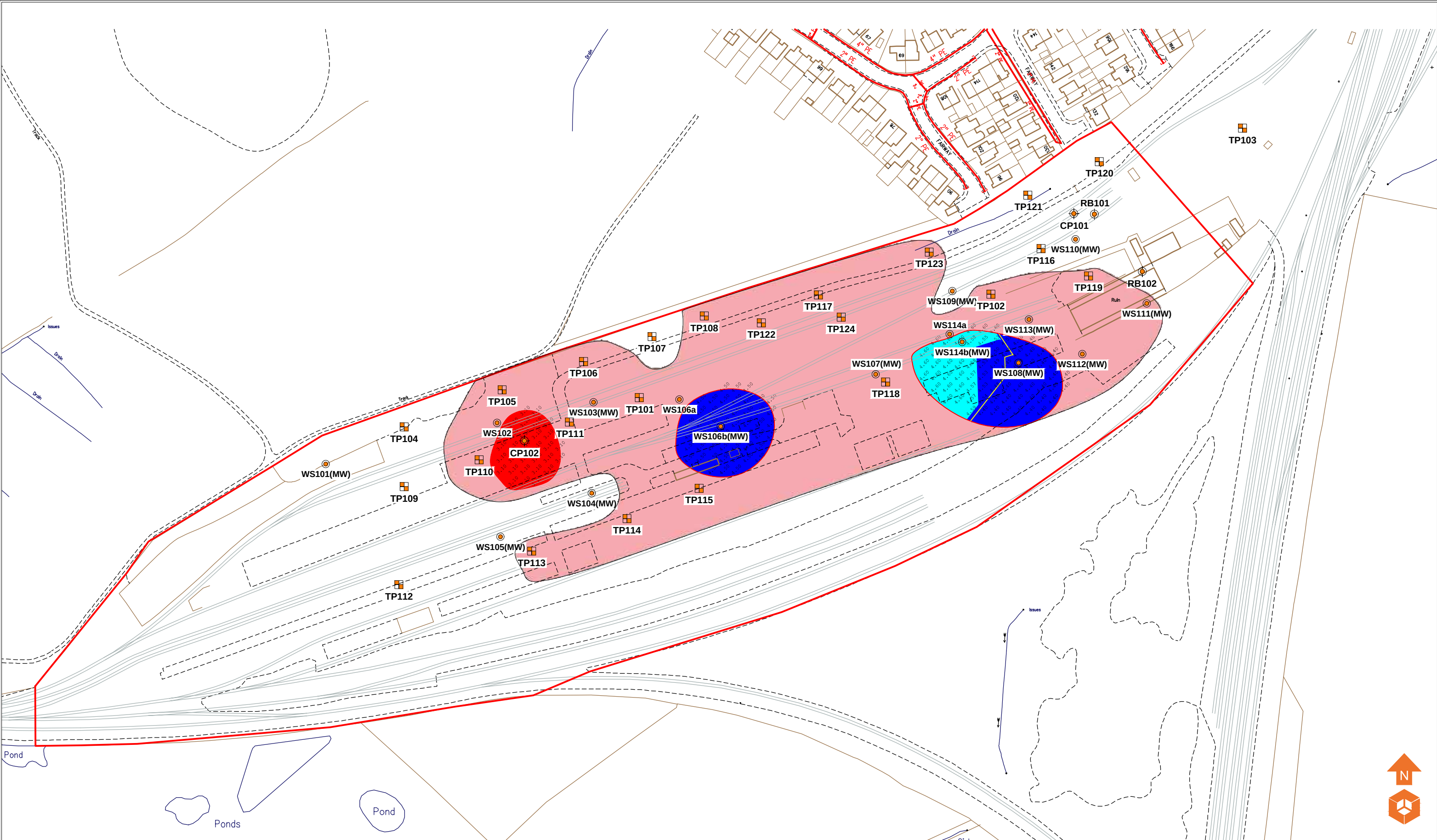
NTS @ A3

Drawing Title:

Depth Of Made Ground Plan

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Location Symbols

- Approximate Window Sample Probehole Location
- Approximate Window Sample Probehole Location with Install
- Approximate Trial Pit Location

Thickness of Peat (m)

- Thickness of Peat 0.00 - 0.29m
- Thickness of Peat 0.30 - 0.59m
- Thickness of Peat 0.60 - 0.89m
- Thickness of Peat 0.90 - 1.19m
- Thickness of Peat 1.20 - 1.49m
- Thickness of Peat 1.50 - 1.79m
- Thickness of Peat 1.80 - 2.09m
- Thickness of Peat 2.10 - 2.39m
- Thickness of Peat >2.40m

3.1.0 Recorded Depth to Peat (m BGL)

Inferred possible extent of peat - depth & thickness unknown.

Notes:

P1	REVB	07.05.2021	EB	JS
P1	REVA	01.04.2021	CB	MD
Phase	Issue	Date	Drawn	Checked

Client:

Kellen Homes

Job Title:

Heywood Road, Castleton

Job No:

14-768

Drawing No:

007

Date:

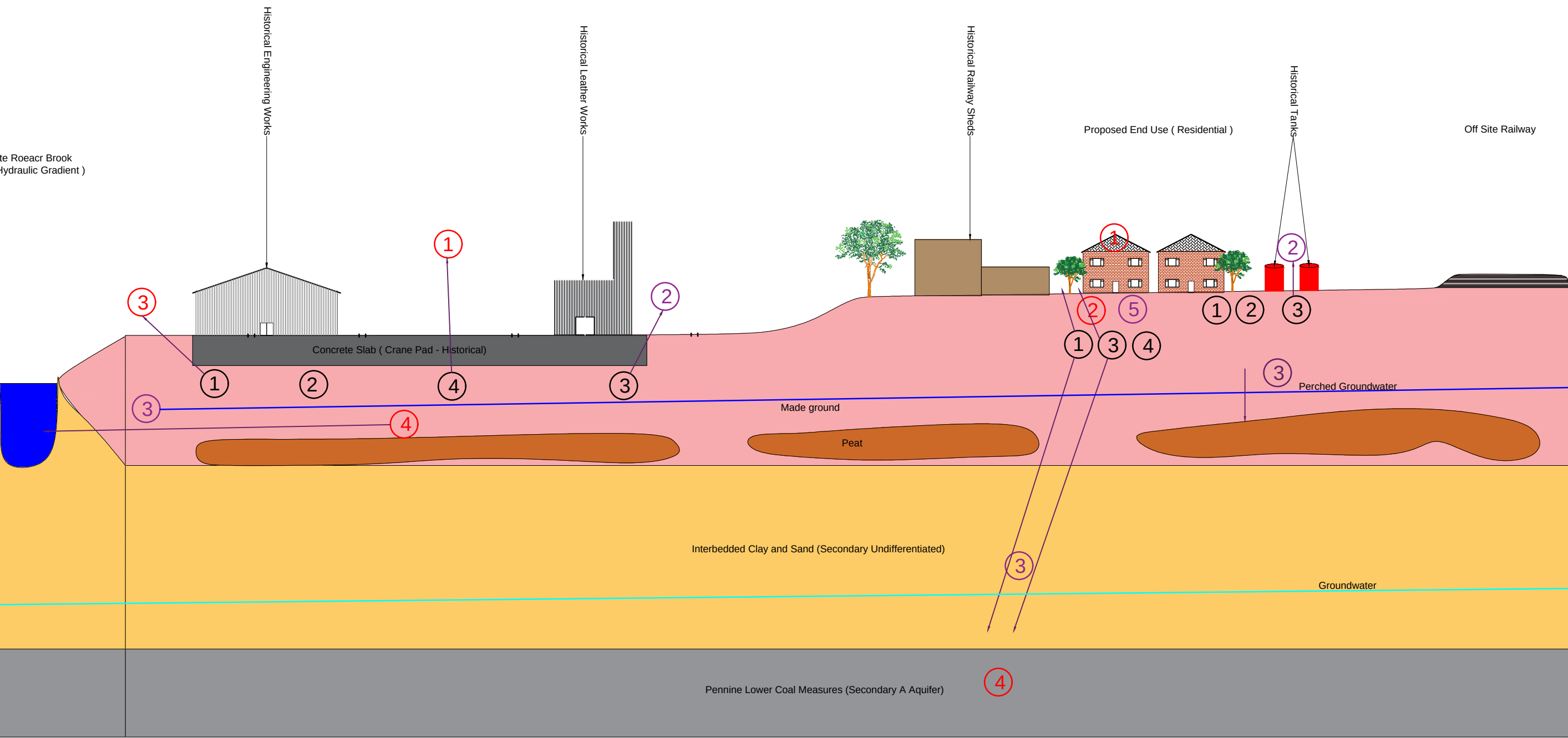
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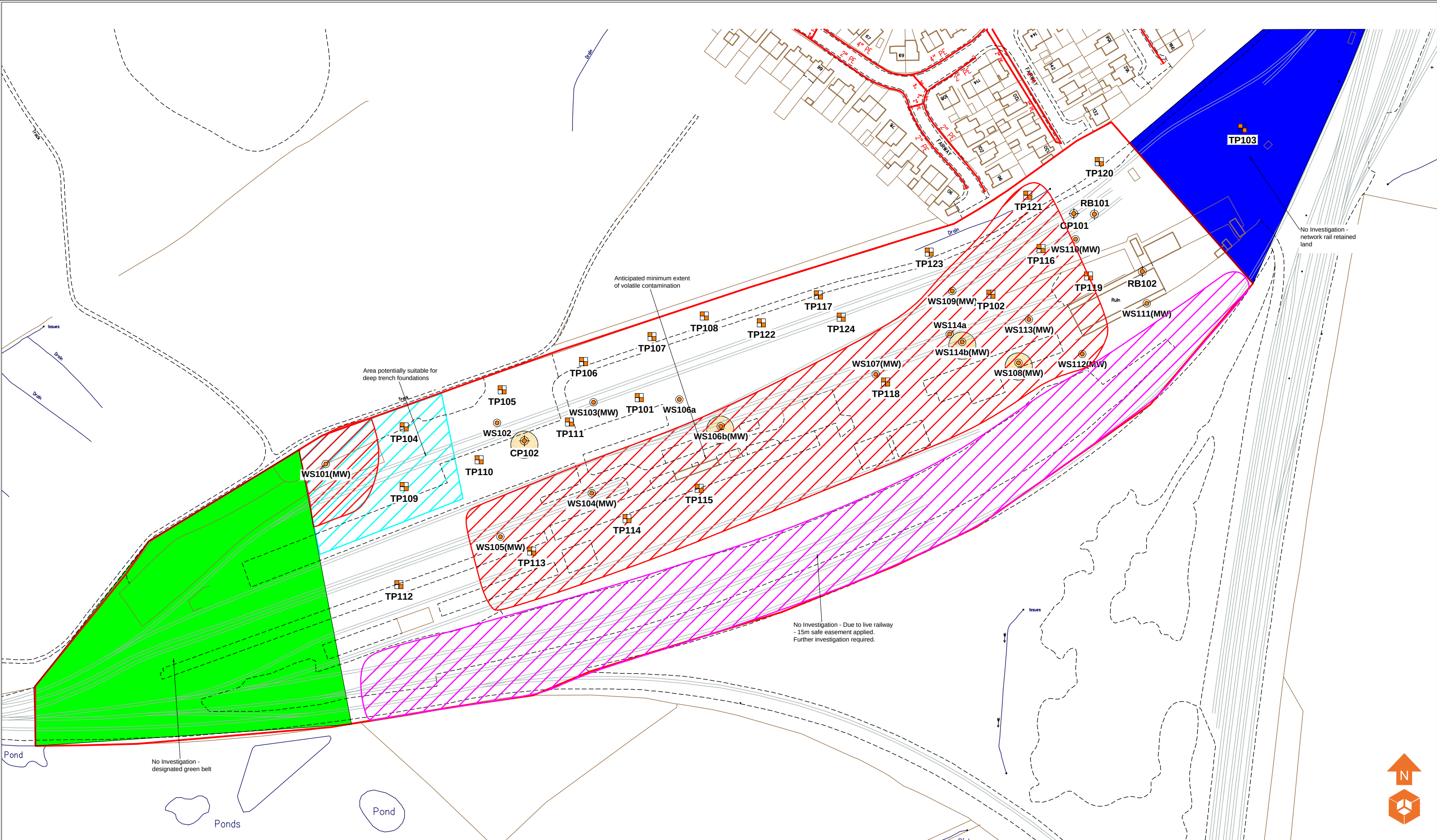
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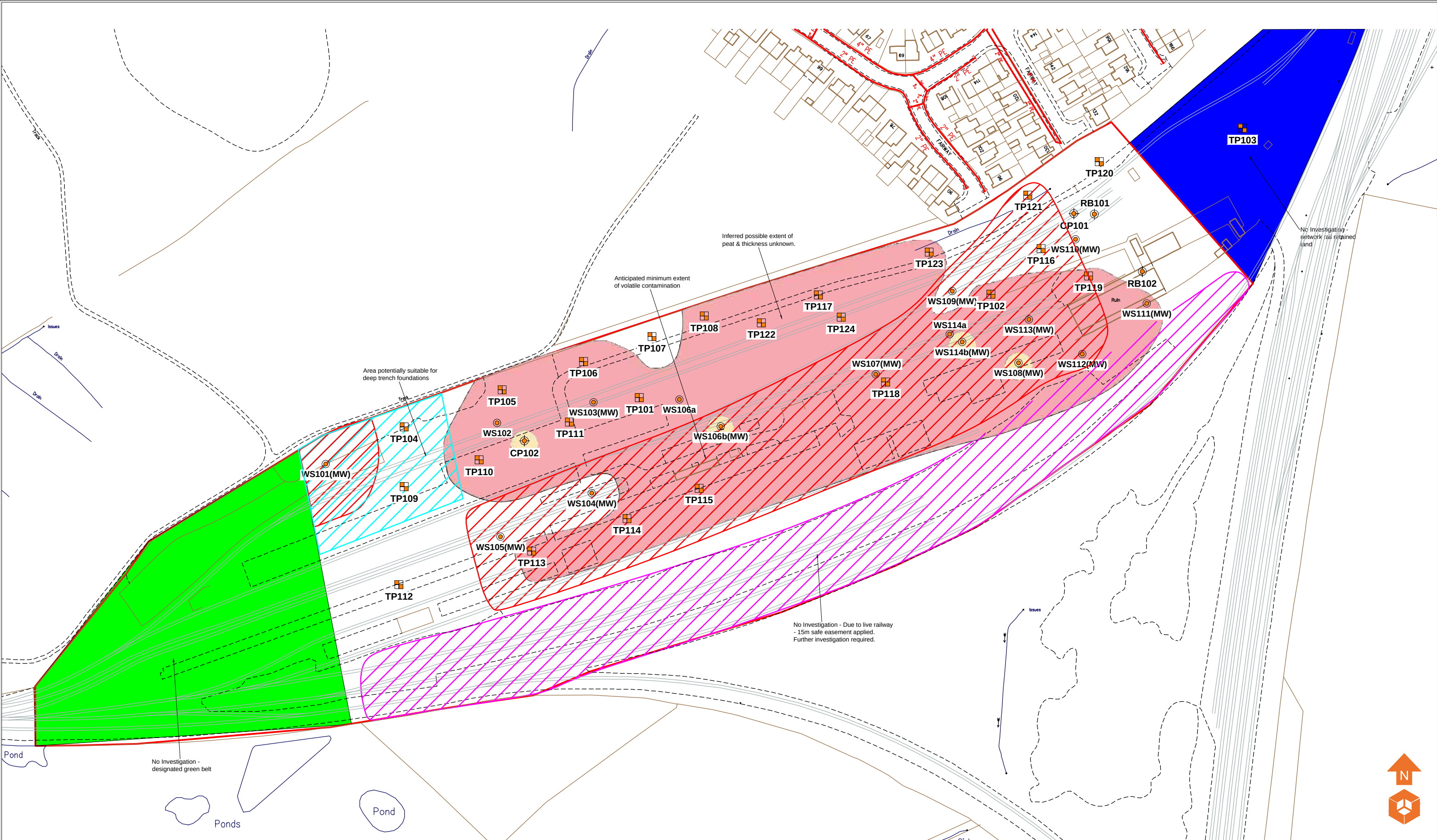
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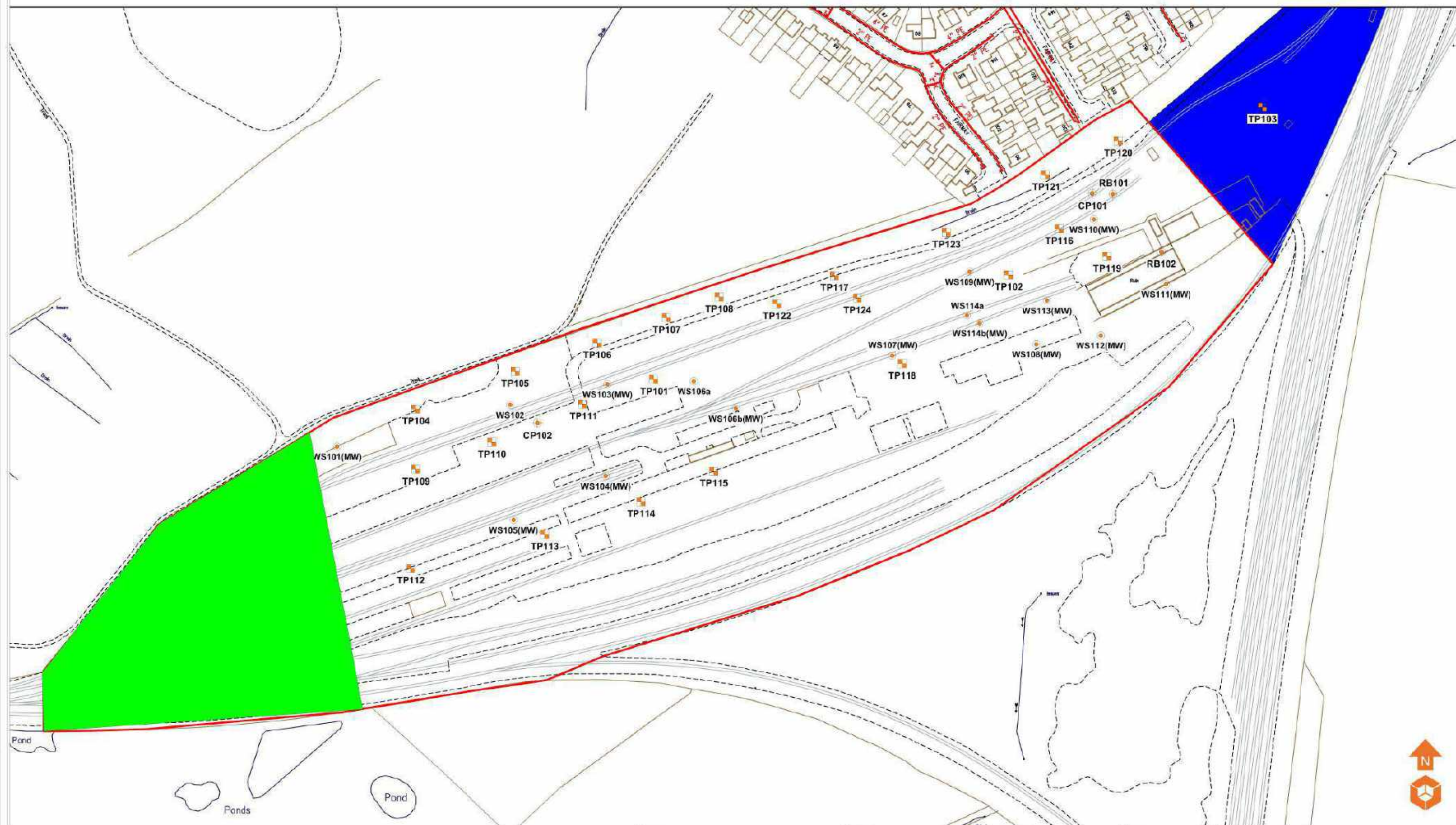
Geology Key Made Ground Interbedded Clay and Sand Pennine Lower Coal Measures Peat Railway Sidings	Sources 1 MG - Heavy Metals / Non Volatile PAH 2 MG - ACM 3 MG - Volatile Contaminant 4 Methane / CO2 5 MG - Sulphate's
--	--



Location Symbols WS101 Approximate Window Sample Probehole Location WS101(MW) Approximate Window Sample Probehole Location with Install		Development Constraints No Investigation - network rail retained land. No Investigation - designated green belt. Peat encountered at depths between 3.10-5.7m BGL No Investigation due to live railway - 15m safe easement applied. Further investigation required. Anticipated minimum extent of volatile contamination. Area potentially suitable for deep trench foundations.		Notes:		Client: Kellen Homes		Job No: 14-768		Date: 30.04.2021		e3p Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: www.e3p.co.uk	
				P1 REVA 30.04.2021 EB EF		Job Title: Heywood Road, Castleton		Drawing No: 015		Scale: NTS @ A3		e3p The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.	
				P1 Phase Issue Date Drawn Checked									



Location Symbols WS101 Approximate Window Sample Probehole Location WS101(MW) Approximate Window Sample Probehole Location with Install		Development Constraints No Investigation - network rail retained land. No Investigation - designated green belt. Peat encountered at depths between 3.10-5.7m BGL Inferred possible extent of peat - depth and thickness unknown. No Investigation due to live railway - 15m safe easement applied. Further investigation required. Anticipated minimum extent of volatile contamination. Area potentially suitable for deep trench foundations.		Notes:		Client: Kellen Homes		Job No: 14-768	Date: 07.05.2021	e3p Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: www.e3p.co.uk				
				P1 P1	REVB REVA	07.05.2021 30.04.2021	EB EB	JS EF	Job Title: Heywood Road, Castleton		Drawing No: 015	Scale: NTS @ A3		
				Phase	Issue	Date	Drawn	Checked	Job Title: Development Constraints Plan		Drawing Title: Development Constraints Plan		The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.	



Location Symbols
 * Approximate Window Sample Probehole Location
 * Approximate Window Sample Probehole Location with Install

Notes:				
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Phase	Issue	Date	Drawn	Checked

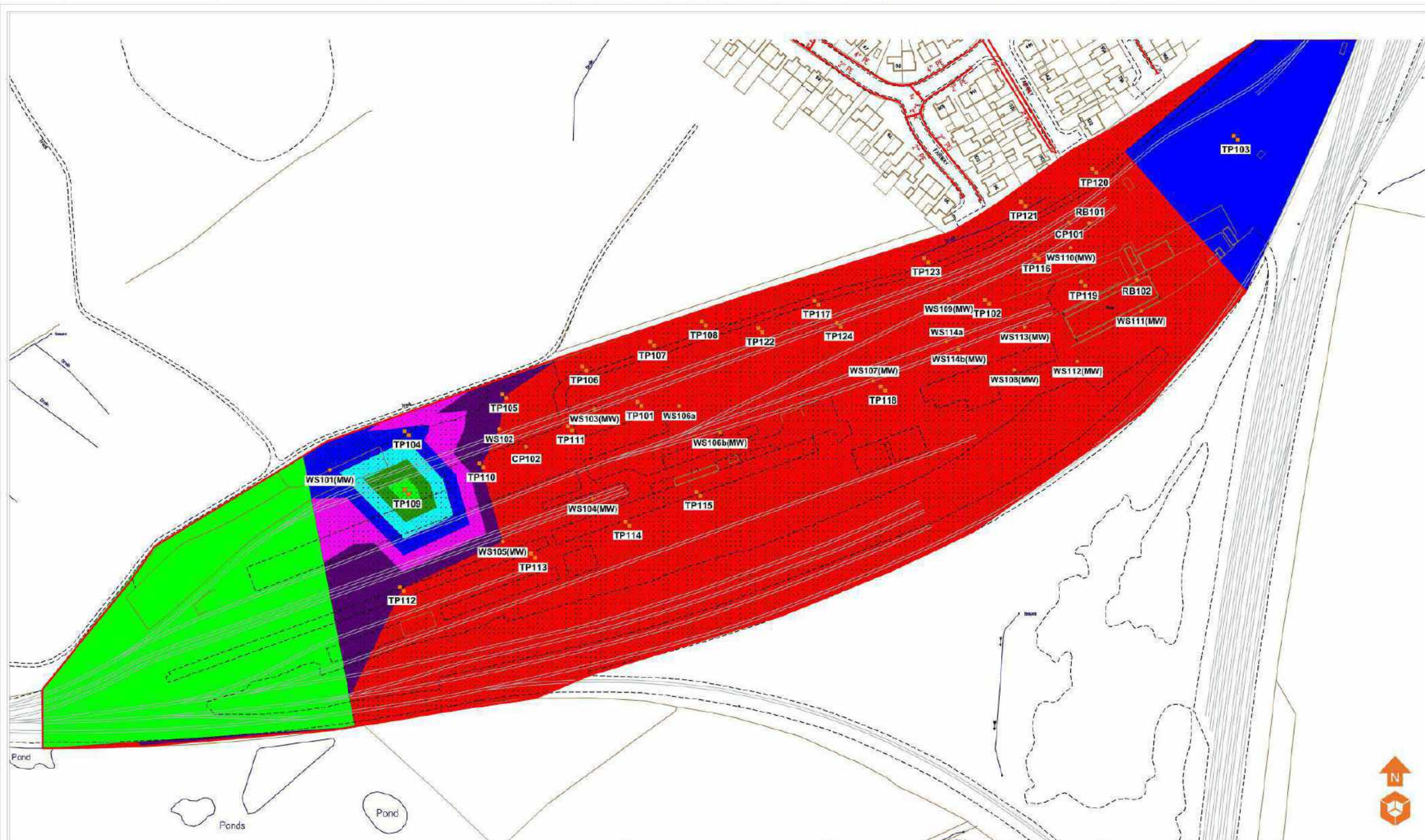
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Kellen Homes	
Job Title:	
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Job No:	14-768
Drawing No:	005
Date:	25.03.2021
Scale:	NTS @ A3
Drawing Title:	Exploratory Hole Location Plan



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Location Symbols

- Approximate Window Sample Probehole Location
- Approximate Window Sample Probehole Location with Install

Shallow Spread Footings

- Depth to Founding Strata 0.00 - 1.24m
 - Depth to Founding Strata 1.25 - 1.49m
- Mass Transfer FR Footings
- Depth to Founding Strata 1.50 - 1.74m
 - Depth to Founding Strata 1.75 - 1.99m
 - Depth to Founding Strata 2.00 - 2.24m

Engineered Footings

- Depth to Founding Strata 2.25 - 2.49m
- Depth to Founding Strata >2.50m

Notes:

P1	REVA	15.04.2021	EB	EF
Phase	Issue	Date	Drawn	Checked

Client:

Kellen Homes

Job Title:

Heywood Road,
Castleton

Job No:

14-768

Drawing No:

005

Date:

15.04.2021

Scale:

NTS @ A3

Drawing Title:

Depth Of Founding
Strata Plan



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Rochdale - Illustrative Coloured Sketch

LAW
-ER
RAT

: Survey of House Planning Requirements						
Contract/Design Proposal	Estimated Contract Duration	Minimum Construction Requirements, (2000 Edition of the Building Code of Australia)	Standard of Workmanship (2000 Edition of the Building Code of Australia)	Minimum Lot Size (Minimum of 1000 sqm)	Plot Ratio (%)	Plot Coverage (%)
1. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
	1 000 000					
	1 000 000					
2. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
	1 000 000					
	1 000 000					
3. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
	1 000 000					
	1 000 000					
4. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
	1 000 000					
	1 000 000					
5. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
	1 000 000					
	1 000 000					
6. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
	1 000 000					
	1 000 000					
7. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
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	1 000 000					
	1 000 000					
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	1 000 000					
	1 000 000					
9. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
	1 000 000					
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	1 000 000					
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11. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
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	1 000 000					
12. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
	1 000 000					
	1 000 000					
13. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
	1 000 000					
	1 000 000					
14. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
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	1 000 000					
15. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
	1 000 000					
	1 000 000					
16. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
	1 000 000					
	1 000 000					
17. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
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	1 000 000					
18. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
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	1 000 000					
19. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
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	1 000 000					
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	1 000 000					
	1 000 000					
	1 000 000					
21. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
	1 000 000					
	1 000 000					
22. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
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	1 000 000					
23. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
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	1 000 000					
	1 000 000					
24. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
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	1 000 000					
25. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
	1 000 000					
	1 000 000					
26. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
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	1 000 000					
	1 000 000					
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	1 000 000					
	1 000 000					
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	1 000 000					
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	1 000 000					
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	1 000 000					
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	1 000 000					
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	1 000 000					
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	1 000 000					
	1 000 000					
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50. Plot Area (Square Metres) (2000)	1000	No Structural Requirements	No Structural Requirements	1000	100	100
	1 000 000					
	1 000 000					
	1 000 000					

Houston 10					
Rank	City	Pop. of City	Area (sq. mi.)	Pop. Density (per sq. mi.)	Pop. Change (2000-2010)
1	Houston	2,304,580	646.85	3,562.7	+152,871
2	San Antonio	1,434,836	791.38	1,813.0	+100,000
3	Fort Worth	925,197	341.04	2,712.8	+100,000
4	San Diego	1,306,926	325.19	4,018.8	+100,000
5	Phoenix	1,445,839	517.87	2,791.7	+100,000
6	San Jose	1,013,241	176.49	5,746.8	+100,000
7	San Francisco	863,000	46.9	18,401.1	+100,000
8	San Jose	1,013,241	176.49	5,746.8	+100,000
9	San Francisco	863,000	46.9	18,401.1	+100,000
10	San Jose	1,013,241	176.49	5,746.8	+100,000

Hessays We					
Student Population					
	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11
1	100	100	100	100	100
2	100	100	100	100	100
3	100	100	100	100	100
4	100	100	100	100	100
5	100	100	100	100	100
6	100	100	100	100	100
7	100	100	100	100	100
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91	100	100	100	100	100
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93	100	100	100	100	100
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96	100	100	100	100	100
97	100	100	100	100	100
98	100	100	100	100	100
99	100	100	100	100	100
100	100	100	100	100	100



13	Terminal 117: Flashback Write up your final report on the Flashback attack.
14	How Trenches Fill Holes Write up your final report on the Trenches attack.
15	How the Blue Guard Came to Be Write up your final report on the Blue Guard attack.
16	PMU Holes Write up your final report on the PMU attack.
17	Red Holes Write up your final report on the Red Holes attack.
18	CONGRATULATIONS TO THE TEAM THAT WON THE CHALLENGE!

- Fieldings 1.75 - 0.00** Data
 (no data for 2004)
- Fieldings 1.50 - 1.25** Data
 (no data for 2004)
- Fieldings 1.25 - 1.00** Data
 (no data for 2004)
- Fieldings 1.00 - 0.75** Data
 (no data for 2004)
- Fieldings 0.75 - 0.50** Data
 (no data for 2004)
- Fieldings 0.50 - 0.25** Data
 (no data for 2004)
- Fieldings 0.25 - 0.00** Data
 (no data for 2004)

Franchise 500
Franchise 500® is the most authoritative ranking of franchises in the United States.

Value

Low Franchise Charge America's Choice
Franchise 500® is the most authoritative ranking of franchises in the United States.

Franchise 500
Franchise 500® is the most authoritative ranking of franchises in the United States.

Concept Foundation
Zoning Plan

PI	REVA	19-04-2021	EB	EF
Phase	Issue	Date	Group	Checker

Job Title: Heywood Road,
Castleton



Environmental Engineering
Parrs Brook, UK
Taylor Road, Trafford Park
Luton, Manchester, M41 7LD
Tel: 0161 707 5652
E-mail: info@a3p.co.uk
Web site: www.a3p.co.uk

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APPENDIX IV

PHOTOGRAPHS

PLATE 1 ACTIVE RAILWAY ON EASTERN BOUNDARY –FACING SOUTH



PLATE 2 VIEW OF SITE FACING NORTH THROUGH CENTRE OF SITE



PLATE 3 VIEW OF SITE FACING NORTH ALONG EASTERN BOUNDARY



PLATE 4 AREA OF ROUGH SCRUBLAND IN NORTHERN CENTRAL AREA OF SITE



PLATE 5 AREA OF TIPPED WASTE IN CENTRE OF SITE – POSSIBLE ACM



PLATE 6 AREA OF HARD STANDING IN SOUTH OF SITE



PLATE 7

AREA OF HARD STANDING THROUGH CENTRE OF SITE – FACING SOUTH



APPENDIX V

E3P EXPLORATORY HOLE

LOGS

Project Name: Castleton Sidings	Project No. 14768	Co-ords: 387825.00 - 410127.00 Level:	Date 04/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): 2.20 Depth 2.70	Scale 1:30
Client: Kellen Homes			Logged E. Fearn

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.00	ES		0.20			MADE GROUND: Black brown slightly clayey gravelly medium sand with rootlets. Gravel is fine to coarse angular to sub-rounded of mudstone. MADE GROUND: Black slightly clayey gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, brick and wood.	1
				2.70			End of Pit at 2.70m	2
								3
								4

Trial Pit Photographs



Trial Pit 101 Spoil



Trial Pit 101

Remarks: 1. Terminated due to side wall collapse within Made Ground.

Stability: Unstable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: 387980.00 - 410161.00 Level:	Date 04/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): 2.30 Depth 3.00	Scale 1:30
Client: Kellen Homes			Logged E. Fearn

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.20 1.20	B ES		0.30			MADE GROUND: Black brown slightly clayey gravelly medium sand with rootlets. Gravel is fine to coarse angular to sub-rounded of mudstone and limestone.	
							MADE GROUND: Black slightly clayey gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, brick, ash and slate.	1
								2
				3.00			End of Pit at 3.00m	3
								4

Trial Pit Photographs



Trial Pit 102



Trial Pit 102 Spoil

Remarks: 1. Terminated due to side wall collapse within Made Ground.

Stability: Unstable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: 388133.00 - 410267.00 Level:	Date 04/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): 1.80 Depth 0.70	Scale 1:30
Client: Kellen Homes			Logged E. Fearn

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.60 0.70			MADE GROUND: Light grey brown slightly clayey gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, brick and ash.
							MADE GROUND: Light grey concrete. End of Pit at 0.70m

Trial Pit Photographs



Trial Pit 103

Trial Pit 103 Spoil

Remarks: 1. Terminated due to concrete slab.

Stability: Stable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: 387709.00 - 410123.00 Level:	Date 04/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): 2.40 Depth 2.40	Scale 1:30
Client: Kellen Homes			Logged E. Fearn

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 1.50	0.30	ES		0.40			MADE GROUND: Black slightly clayey gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, brick and ash.	
							MADE GROUND: Yellow brown clayey medium sand.	1
	1.30	ES		1.50			Light brown sandy GRAVEL. Gravel is fine to coarse angular to rounded of mudstone and sandstone.	2
				2.40			End of Pit at 2.40m	3
								4

Trial Pit Photographs

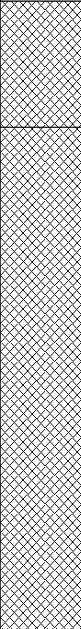


Trial Pit 104

Remarks: 1. Terminated due to side wall collapse within Made Ground. 2. Water strike encountered at 1.50m bgl.

Stability: Unstable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: 387758.00 - 410142.00 Level:	Date 04/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): 2.20 Depth 2.50	Scale 1:30 Logged E. Fearn
Client: Kellen Homes			

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 1.20	1.00	B ES		0.50			MADE GROUND: Black slightly clayey gravelly medium sand with rootlets. Gravel is fine to coarse angular to sub-rounded of mudstone, brick and ash.	
	1.00						MADE GROUND: Black gravelly medium sand with cobbles. Gravel is fine to coarse angular to sub-rounded of mudstone and brick. Cobbles are angular of brick.	1
				2.50			End of Pit at 2.50m	2 3 4

Trial Pit Photographs



Trial Pit 105



Trial Pit 105 Spoil

Remarks: 1. Terminated due to side wall collapse within Made Ground at 2.00m bgl. 2. Water strike encountered at 1.20m bgl. 3. Hydrocarbon impact identified in Made Ground encountered between 0.50m and 2.50m bgl.

Stability: Unstable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: 387803.00 - 410157.00 Level:	Date 04/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): 2.50 Depth 2.20	Scale 1:30
Client: Kellen Homes			Logged E. Fearn

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.00	ES					MADE GROUND: Black brown slightly clayey gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, limestone and brick.	1
	1.60 1.60	ES HVP	90	1.40 2.20			MADE GROUND: Light brown grey slightly sandy clay.	2
							End of Pit at 2.20m	3
								4

Trial Pit Photographs



Trial Pit 106



Trial Pit 106 Spoil

Remarks: 1. Complete. 2. Hydrocarbon odour encountered in Made Ground between 1.40m and 2.20m bgl.

Stability: Stable.

Project Name: Castleton Sidings

Project No.
14768

Co-ords: 387825.00 - 410159.00
Level:

Date
04/03/2021

Location: Heywood Road, Rochdale

Dimensions (m): 2.20

Scale
1:30

Client: Kellen Homes

Depth
2.80

Logged
E. Fearn

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.80 1.80	B ES					MADE GROUND: Black very gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, brick and ash.	1
				2.20				2
				2.80			Light brown grey sandy GRAVEL. Gravel is fine to coarse angular to sub-rounded of mudstone and sandstone.	
							End of Pit at 2.80m	3
								4

Trial Pit Photographs



Trial Pit 107



Trial Pit 107 Spoil

Remarks: 1. Complete. 2. Hydrocarbon odour encountered in Made Ground between 1.40m and 2.20m bgl.

Stability: Stable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: 387855.00 - 410171.00 Level:	Date 04/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): 2.00 Depth 2.60	Scale 1:30
Client: Kellen Homes			Logged E. Fearn

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.00	ES		1.20			MADE GROUND: Black slightly clayey gravelly medium sand with rootlets. Gravel is fine to coarse angular to rounded of mudstone and brick.	1
				2.60			MADE GROUND: Dark grey slightly clayey gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, brick and ash.	2
							End of Pit at 2.60m	3
								4

Trial Pit Photographs



Remarks: 1. Terminated due to side wall collapse within Made Ground.

Stability: Unstable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: 387723.00 - 410087.00 Level:	Date 04/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): 2.00 Depth 2.80	Scale 1:30
Client: Kellen Homes			Logged E. Fearn

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.30	ES		0.40			MADE GROUND: Black sandy gravel. Gravel is fine to coarse angular to sub-rounded of mudstone, brick and ash.	
				0.70			MADE GROUND: Light grey brown clayey medium sand.	
	0.80	ES					Yellow brown slightly clayey medium SAND.	
 2.70				2.80			End of Pit at 2.80m	

Trial Pit Photographs



Trial Pit 109

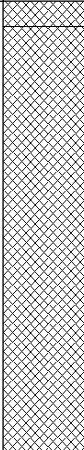


Trial Pit 109 Spoil

Remarks: 1. Terminated due to side wall collapse within Made Ground. 2. Water strike encountered at 2.70m bgl.

Stability: Unstable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: 387752.00 - 410101.00 Level:	Date 04/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): 2.20 Depth 1.80	Scale 1:30
Client: Kellen Homes			Logged E. Fearn

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 1.60	1.00	ES		0.10			MADE GROUND: Light grey concrete.	1
				1.80			MADE GROUND: Black clayey slightly gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, brick and ash.	
							End of Pit at 1.80m	2
								3
								4

Trial Pit Photographs



Trial Pit 110



Trial Pit 110 Spoil

Remarks: 1. Terminated due to significant water strike encountered at 1.60m bgl, causing side wall collapse.

Stability: Unstable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: 387805.00 - 410121.00 Level:	Date 04/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): 2.40 Depth 2.30	Scale 1:30
Client: Kellen Homes			Logged E. Fearn

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.10			MADE GROUND: Asphalt.	
	1.20 1.20	B ES					MADE GROUND: Dark grey brown slightly clayey gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, brick, ash and slate.	1
				2.30			End of Pit at 2.30m	2
								3
								4

Trial Pit Photographs



Trial Pit 111



Trial Pit 111 Spoil

Remarks: 1. Terminated due to side wall collapse within Made Ground.

Stability: Unstable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: 387727.00 - 410030.00 Level:	Date 04/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): 2.20 Depth 2.70	Scale 1:30
Client: Kellen Homes			Logged E. Fearn

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.30	ES		0.10			MADE GROUND: Light grey concrete. MADE GROUND: Dark grey slightly clayey gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, brick, timber and ash.	1
				2.70			End of Pit at 2.70m	2
								3
								4

Trial Pit Photographs



Trial Pit 112



Trial Pit 112 Spoil

Remarks: 1. Complete.

Stability: Stable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: 387801.00 - 410063.00 Level:	Date 04/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): 2.10 Depth 2.60	Scale 1:30
Client: Kellen Homes			Logged E. Fearn

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.10			MADE GROUND: Dark brown slightly clayey medium sand with rootlets (Topsoil) and occasional fragments of brick.	
				0.60			MADE GROUND: Grey gravel. Gravel is fine to coarse angular of mudstone.	
	0.80	ES						1
	2.10	ES						2
				2.60			End of Pit at 2.60m	3
								4

Trial Pit Photographs



Trial Pit 113



Trial Pit 113

Remarks: 1. Terminated due to side wall collapse at water strike. 2. Water strike encountered at 2.20m bgl. 3. Hydrocarbon odour encountered in Made Ground at 2.00m bgl.

Stability: Unstable.

Project Name: Castleton Sidings

Project No.
14768

Co-ords: 387842.00 - 410061.00
Level:

Date
04/03/2021

Location: Heywood Road, Rochdale

Dimensions (m): 2.00

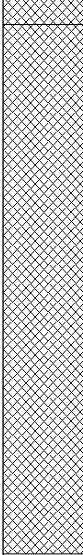
Scale
1:30

Client: Kellen Homes

Depth
2.20

0.60

Logged
E. Fearn

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	1.00 1.00	B ES		0.10			MADE GROUND: Black slightly clayey medium sand with rootlets. MADE GROUND: Black slightly clayey gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, brick, ash and glass.
				2.20			End of Pit at 2.20m

Trial Pit Photographs



Trial Pit 114



Trial Pit 114 Spoil

Remarks: 1. Terminated due to side wall collapse in Made Ground at 1.80m bgl.

Stability: Unstable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: 387866.00 - 410069.00 Level:	Date 04/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): 2.40 Depth 2.00	Scale 1:30
Client: Kellen Homes			Logged E. Fearn

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.00	ES		0.20			MADE GROUND: Black grey slightly clayey medium sand with rootlets.	
				2.00			MADE GROUND: Black slightly clayey gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, brick and timber.	
							End of Pit at 2.00m	

Trial Pit Photographs



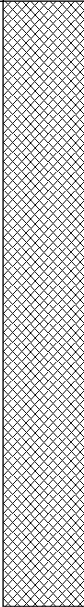
Trial Pit 115

Trial Pit 115 Spoil

Remarks: 1. Complete.

Stability: Stable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: - Level:	Date 05/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): 2.00	Scale 1:30
Client: Kellen Homes		Depth 2.40	Logged J. Craig

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.20	ES		2.40			MADE GROUND: Black slightly sandy gravel. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash.	1
							End of Pit at 2.40m	2
								3
								4

Trial Pit Photographs



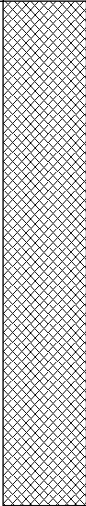
Trial Pit 116

Trial Pit 116 Spoil

Remarks: 1. Terminated due to side wall collapse in Made Ground.

Stability: Unstable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: - Level:	Date 05/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): Depth 2.00	Scale 1:30
Client: Kellen Homes		0.60	Logged J. Craig

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.00	ES		2.00			MADE GROUND: Black slightly sandy gravel. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash.	1
							End of Pit at 2.00m	2
								3
								4

Trial Pit Photographs



Trial Pit 117



Trial Pit 117 Spoil

Remarks: 1. Terminated due to side wall collapse in Made Ground at 1.80m bgl.

Stability: Unstable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: - Level:	Date 05/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): 2.10	Scale 1:30
Client: Kellen Homes		Depth 2.10	Logged J. Craig

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.00	ES		0.40			MADE GROUND: Light grey concrete.	1
							MADE GROUND: Black slightly sandy gravel. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash.	2
				2.10			End of Pit at 2.10m	3
								4

Trial Pit Photographs



Trial Pit 118

Trial Pit 118 Spoil

Remarks: 1. Terminated due to side wall collapse in Made Ground.

Stability: Unstable.



Trial Pit Log

TrialPit No
TP119
Sheet 1 of 1

Project Name: Castleton Sidings

Project No.
14768

Co-ords: -
Level:

Date
05/03/2021

Location: Heywood Road, Rochdale

Dimensions
(m):

2.20

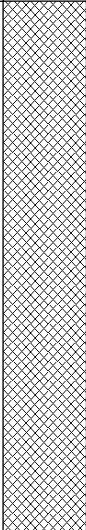
Depth
2.10

0.60

Scale
1:30

Logged
J. Craig

Client: Kellen Homes

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.00	ES		2.10			MADE GROUND: Black slightly sandy gravel. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash.	1
							End of Pit at 2.10m	2
								3
								4

Remarks: 1. Terminated due to side wall collapse in Made Ground.

Stability: Unstable.



Project Name: Castleton Sidings	Project No. 14768	Co-ords: - Level:	Date 05/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): 2.10	Scale 1:30
Client: Kellen Homes		Depth 2.30	Logged J. Craig

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.80	ES					MADE GROUND: Black slightly sandy gravel with occasional boulders. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash. Boulders are sub-angular of brick.	
	1.10	ES		1.00			MADE GROUND: Yellow brown gravelly clay. Gravel is fine to coarse angular to rounded of sandstone and mudstone.	1
				1.20			MADE GROUND: Black slightly sandy gravel with occasional boulders. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash. Boulders are sub-angular of brick.	2
				2.30			End of Pit at 2.30m	3
								4

Trial Pit Photographs



Trial Pit 120

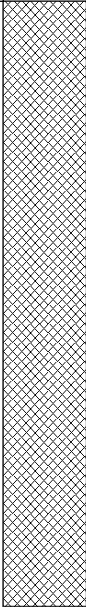


Trial Pit 120 Spoil

Remarks: 1. Terminated due to side wall collapse in Made Ground at 2.00m bgl.

Stability: Unstable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: - Level:	Date 05/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): Depth 2.40	Scale 1:30
Client: Kellen Homes		0.60	Logged J. Craig

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.00	ES		2.40			MADE GROUND: Black slightly sandy gravel. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash.	1
							End of Pit at 2.40m	2
								3
								4

Trial Pit Photographs



Trial Pit 121



Trial Pit 121 Spoil

Remarks: 1. Terminated due to side wall collapse in Made Ground.

Stability: Unstable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: - Level:	Date 05/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): Depth 2.60	Scale 1:30
Client: Kellen Homes		0.60	Logged J. Craig

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.00	ES					MADE GROUND: Black slightly sandy gravel. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash.	1
				2.60			End of Pit at 2.60m	2
								3
								4

Trial Pit Photographs



Trial Pit 122



Trial Pit 122

Remarks: 1. Terminated due to collapse in Made Ground.

Stability: Unstable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: - Level:	Date 05/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): 2.30	Scale 1:30
Client: Kellen Homes		Depth 2.80	Logged J. Craig

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.00	ES					MADE GROUND: Black slightly sandy gravel. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash.	1
				2.80			End of Pit at 2.80m	3
								4

Trial Pit Photographs



Trial Pit 123

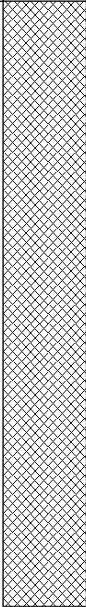


Trial Pit 123 Spoil

Remarks: 1. Terminated due to collapse in Made Ground.

Stability: Unstable.

Project Name: Castleton Sidings	Project No. 14768	Co-ords: - Level:	Date 05/03/2021
Location: Heywood Road, Rochdale		Dimensions (m): Depth 2.40	Scale 1:30 Logged J. Craig
Client: Kellen Homes			

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.00	ES		2.40			MADE GROUND: Black slightly sandy gravel. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash.	1
							End of Pit at 2.40m	2
								3
								4

Trial Pit Photographs



Trial Pit 124



Trial Pit 124 Spoil

Remarks: 1. Terminated due to side wall collapse in Made Ground at 2.00m bgl.

Stability: Unstable.

Borehole Log

Borehole No.

WS101

Sheet 1 of 1

Project Name: Castleton Sidings

Project No.
14768

Co-ords:

Hole Type
WS

Location: Heywood Road, Rochdale

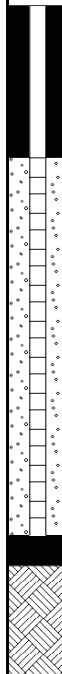
Level:

Scale
1:50

Client: Kellen Homes

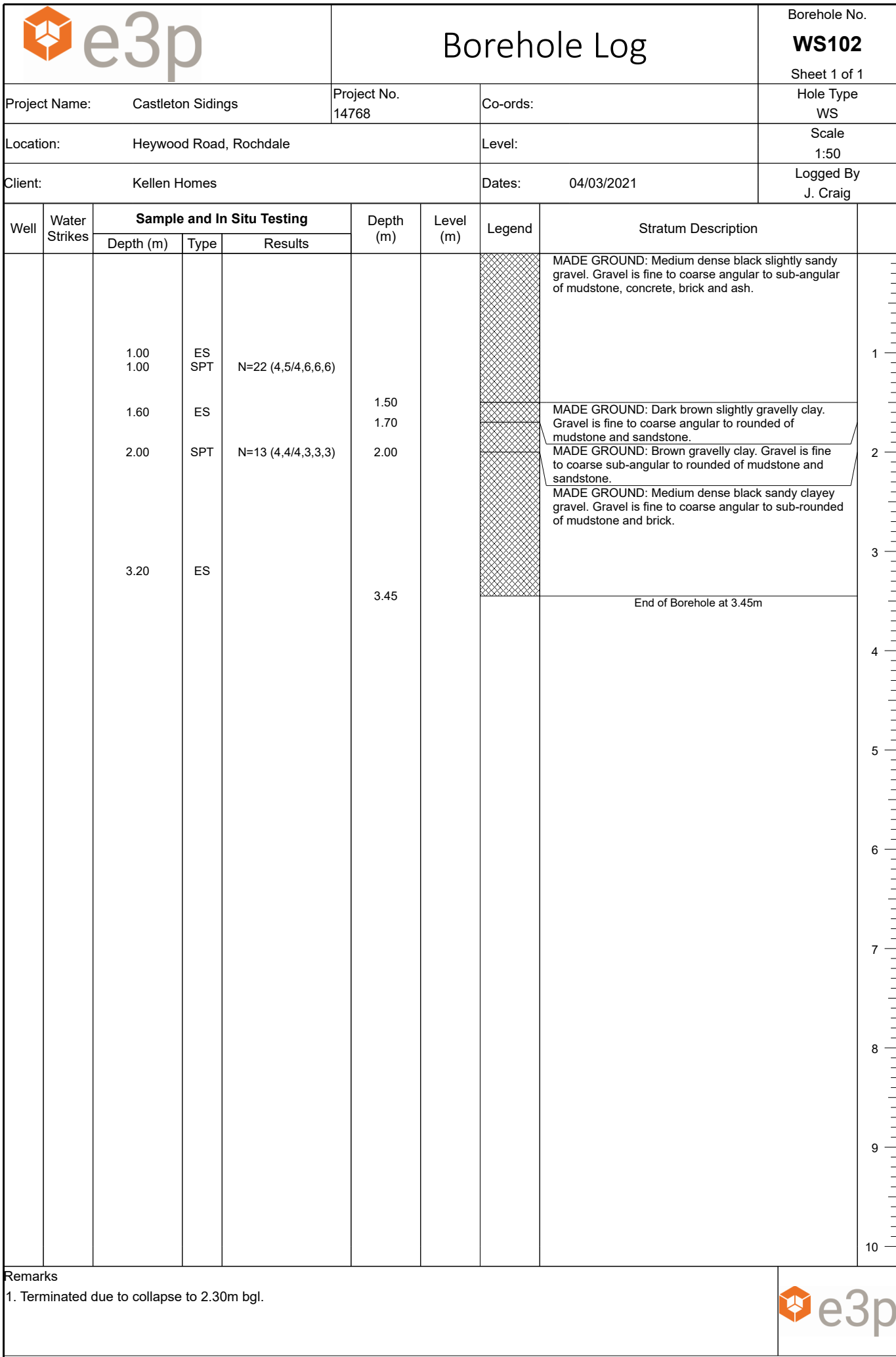
Dates: 04/03/2021

Logged By
J. Craig

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.50	ES		0.50			MADE GROUND: Black slightly sandy gravel. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash.	
		0.70	ES						
		1.00	SPT	N=20 (5,6/6,6,4,4)					1
		1.50 - 2.00	U		1.40				
		1.60	PP	25.00					
		1.90	PP	49.00					
		2.00	SPT	N=15 (3,2/3,3,4,5)					2
		2.10	PP	25.00					
		2.90	PP	25.00					3
		3.00	SPT	N=9 (1,2/2,2,2,3)					
		3.10	PP	25.00					
		3.70	PP	25.00					4
		4.00	SPT	N=14 (3,3/3,4,3,4)					
					4.45				
								End of Borehole at 4.45m	5
									6
									7
									8
									9
									10

Remarks

1. Terminated due to collapse from 4.00m bgl. 2. Monitoring well installed.





Borehole Log

Borehole No.

WS103

Sheet 1 of 1

Project Name: Castleton Sidings

Project No.
14768

Co-ords:

Hole Type
WS

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 04/03/2021

Logged By
J. Craig

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		1.00	SPT	N=16 (4,4/5,3,4,4)				MADE GROUND: Medium dense black slightly sandy gravel. Gravel is fine to coarse angular to sub-angular of mudstone, concrete, brick and ash.	1
		2.00	SPT	N=17 (4,2/3,4,4,6)					2
		3.00 3.00	ES SPT	N=21 (5,5/5,6,5,5)					3
		4.00	SPT	N=13 (4,5/3,2,4,4)					4
		4.90 5.00	ES SPT	N=12 (3,3/4,3,3,2)	4.50			Medium dense grey slightly silty SAND.	5
					5.45			End of Borehole at 5.45m	6
									7
									8
									9
									10

Remarks

1. Complete. 2. Monitoring well installed.





Borehole Log

Borehole No.

WS104

Sheet 1 of 1

Project Name: Castleton Sidings

Project No.
14768

Co-ords:

Hole Type
WS

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 04/03/2021

Logged By
J. Craig

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.15			MADE GROUND: Light grey concrete. MADE GROUND: Medium dense black slightly sandy gravel. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash.	
		1.00 1.20	SPT ES	N=21 (3,4/5,5,5,6)					1
		2.00	SPT	N=11 (5,5/3,3,3,2)					2
		3.00 3.20	SPT ES	N=7 (2,2/1,2,2,2)					3
		4.00 4.30	SPT ES	N=15 (2,2/3,3,4,5)	4.20			Medium dense grey slightly clayey SAND.	4
		5.00	SPT	N=6 (4,3/2,1,1,2)					5
					5.45			End of Borehole at 5.45m	6
									7
									8
									9
									10

Remarks

1. Complete. 2. Significant hydrocarbon odour and impact encountered 3.20m to 4.20m bgl. 3. Monitoring well installed.





Borehole Log

Borehole No.

WS105

Sheet 1 of 1

Project Name: Castleton Sidings

Project No.
14768

Co-ords:

Hole Type
WS

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 04/03/2021

Logged By
J. Craig

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		1.00	SPT	N=23 (3,5/7,6,5,5)				MADE GROUND: Medium dense black slightly sandy gravel. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash.	1
		1.30	ES		1.40				
		1.90	ES					MADE GROUND: Grey clayey gravel. Gravel is fine to coarse angular to sub-angular of mudstone.	
		2.00	SPT	N=15 (2,2/3,4,5,3)	2.00			MADE GROUND: Medium dense black slightly clayey gravel. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash.	2
		3.00	ES						3
		3.00	SPT	N=10 (1,2/3,3,2,2)					
		4.00	SPT	N=17 (4,4/5,4,4,4)					4
		4.90	ES		4.80				
		5.00	SPT	N=26 (5,5/6,8,6,6)				Grey slightly clayey SAND.	5
					5.45			End of Borehole at 5.45m	6
									7
									8
									9
									10

Remarks

1. Complete. 2. Significant hydrocarbon odour and impact encountered 2.00m to 5.45m bgl. 3. Monitoring well installed.



					Borehole Log			Borehole No. WS106a Sheet 1 of 1	
Project Name: Castleton Sidings					Project No. 14768		Co-ords:		Hole Type WS
Location: Heywood Road, Rochdale					Level:		Scale 1:50		
Client: Kellen Homes					Dates: 05/03/2021		Logged By J. Craig		
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.50			MADE GROUND: Light grey concrete.	
								End of Borehole at 0.50m	
									1
									2
									3
									4
									5
									6
									7
									8
									9
									10
Remarks 1. Terminated and location moved due to double concrete slab.									

Borehole Log

Borehole No.

WS106b

Sheet 1 of 1

Project Name: Castleton Sidings

Project No.
14768

Co-ords:

Hole Type
WS

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 05/03/2021

Logged By
J. Craig

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		1.00	ES					MADE GROUND: Medium dense black slightly clayey gravel. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash. Becoming loose from circa. 3.00m bgl.	1
		1.00	SPT	N=20 (2,2/4,5,6,5)					
		2.00	SPT	N=12 (4,4/3,4,3,2)					2
		3.00	SPT	N=10 (2,2/2,2,3,3)					3
		4.00	SPT	N=8 (2,1/1,2,2,3)					4
		4.60	ES		4.50			Stiff medium strength black brown PEAT.	
		5.00	SPT	N=16 (2,3/3,4,4,5)					5
		5.20	ES		5.45			End of Borehole at 5.45m	
									6
									7
									8
									9
									10

Remarks

1. Complete. 2. Significant hydrocarbon odour and impact encountered between 4.00m and 4.45m bgl. 3. Monitoring well installed.



Borehole Log

Borehole No.

WS107

Sheet 1 of 1

Project Name: Castleton Sidings

Project No.
14768

Co-ords:

Hole Type
WS

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 05/03/2021

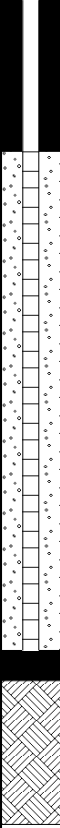
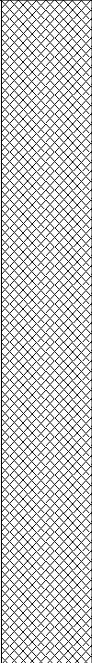
Logged By
J. Craig

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.90 1.00	ES SPT	N=11 (3,3/4,3,2,2)				MADE GROUND: Medium dense black slightly clayey gravel. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash.	1
		2.00 2.10	SPT ES	N=11 (2,4/4,3,2,2)					2
		3.00	SPT	N=7 (3,2/2,1,2,2)					3
		4.00	SPT	N=14 (2,2/3,4,4,3)					4
		5.00	SPT	N=21 (4,4/5,5,6,5)					5
					5.45			End of Borehole at 5.45m	6
									7
									8
									9
									10

Remarks

1. Complete. 2. Monitoring well installed.



				Borehole Log				Borehole No. WS108 Sheet 1 of 1	
Project Name: Castleton Sidings				Project No. 14768		Co-ords:		Hole Type WS	
Location: Heywood Road, Rochdale						Level:		Scale 1:50	
Client: Kellen Homes						Dates: 05/03/2021		Logged By J. Craig	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		1.00	SPT	N=17 (3,4/4,6,4,3)				MADE GROUND: Medium dense black slightly clayey gravel. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash. Becoming loose from circa. 2.00m bgl.	1
		2.00 2.10	SPT ES	N=10 (2,2/2,3,2,3)					2
		3.00	SPT	N=6 (2,1/1,1,2,2)					3
		4.00	SPT	N=4 (1,2/1,1,1,1)					4
		4.60	ES		4.40			Stiff medium strength black brown PEAT.	5
	5.00	SPT	N=15 (2,3/5,4,3,3)	5.45		End of Borehole at 5.45m			6
									7
									8
									9
									10
Remarks 1. Complete. 2. Significant hydrocarbon odour and impact encountered at 4.00m to 4.45m bgl. 3. Monitoring well installed.									

Borehole Log

Borehole No.

WS109

Sheet 1 of 1

Project Name: Castleton Sidings

Project No.
14768

Co-ords: 387963E - 410193N

Hole Type
WS

Location: Heywood Road, Rochdale

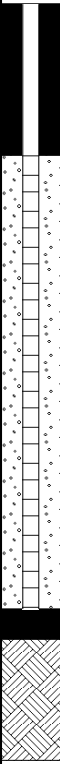
Level:

Scale
1:50

Client: Kellen Homes

Dates: 18/03/2021

Logged By
E. Fearn

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30			0.30			MADE GROUND: Brown slightly clayey gravelly medium sand with rootlets. Gravel is fine to coarse angular to sub-rounded of mudstone and brick.	1
		0.80	ES					MADE GROUND: Loose black brown clayey very gravelly medium sand. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash.	
		1.00	SPT	N=7 (2,1/2,2,2,1)					
					1.80				
		2.00	SPT	1 (,1,,)				MADE GROUND: Red gravel. Gravel is coarse angular of brick.	2
		2.20	ES		2.10			MADE GROUND: Very loose black clayey gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of brick and ash.	
		3.00	SPT	N=7 (1,1/2,1,2,2)					3
					3.30				
		4.00 - 4.45	D					Stiff medium strength brown grey sandy gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded of mudstone.	4
		4.00	SPT	N=10 (3,3/2,2,3,3)					
		5.00	SPT	N=10 (3,3/3,2,2,3)	5.00			End of Borehole at 5.00m	5
									6
									7
									8
									9
									10

Remarks

1. Collapsed before 5.00m to 5.45m SPT could be completed. 2. Redrilled due to collapse. 3. Monitoring well installed.

Borehole Log

Borehole No.

WS110

Sheet 1 of 1

Project Name: Castleton Sidings

Project No.
14768

Co-ords: 388046E - 410225N

Hole Type
WS

Location: Heywood Road, Rochdale

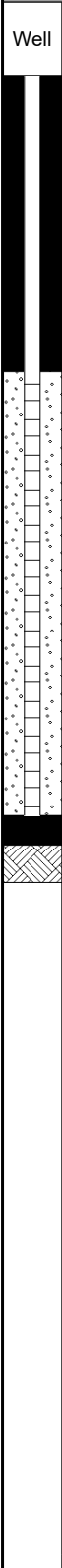
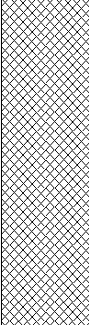
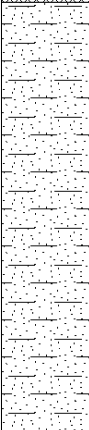
Level:

Scale
1:50

Client: Kellen Homes

Dates: 18/03/2021

Logged By
E. Fearn

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		1.00 1.20	SPT ES	N=5 (2,2/1,1,1,2)	2.20 2.60 5.45			MADE GROUND: Very loose black brown slightly clayey gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, brick and ash.	1
		2.00	SPT	3 (2,1/1,,1,1)				MADE GROUND: Brown grey sandy gravelly clay. Gravel is fine to coarse angular to sub-rounded of mudstone and brick.	2
		2.80 3.00 - 3.45 3.00	ES D SPT	N=13 (2,2/3,4,3,3)				Medium dense light yellow brown clayey medium SAND. Becoming loose from circa. 4.00m bgl.	3
		4.00 - 4.45 4.00	D SPT	N=11 (3,3/2,2,4,3)				4	
		5.00 - 5.45 5.00	D SPT	N=9 (3,3/2,2,2,3)				5	
		End of Borehole at 5.45m						6	
								7	
								8	
								9	
								10	

Remarks

1. Water strike encountered at 4.80m bgl. 2. Complete. 3. Monitoring well installed.



Borehole Log

Borehole No.

WS111

Sheet 1 of 1

Project Name: Castleton Sidings

Project No.
14768

Co-ords: 388071E - 410168N

Hole Type
WS

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 18/03/2021

Logged By
E. Fearn

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			MADE GROUND: Brown slightly clayey gravelly medium sand with rootlets. Gravel is fine to coarse angular to sub-rounded of mudstone and brick.	
		1.00	SPT	N=13 (2,2/3,3,3,4)				MADE GROUND: Medium dense black slightly clayey gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, brick and ash. Becoming very loose from circa. 2.00m bgl.	1
		1.60	ES						
		2.00	SPT	2 (2,1/1,,1)					2
		3.00	SPT	3 (2,/1,1,1,)					3
		4.00	SPT	2 (1,1/,1,1)					4
		5.00	SPT	3 (1,1/,1,1,1)					5
					5.45			End of Borehole at 5.45m	6
									7
									8
									9
									10

Remarks

1. Complete. 2. Monitoring well installed.



Project Name: Castleton Sidings

Project No.
14768

Co-ords: 388027E - 410145N

Hole Type
WS

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 18/03/2021

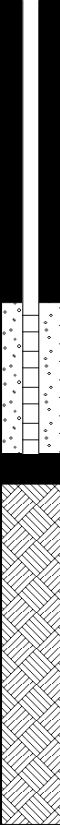
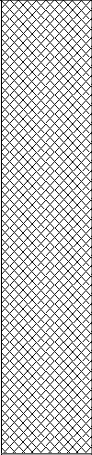
Logged By
E. Fearn

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20			MADE GROUND: Brown slightly clayey gravelly medium sand with rootlets. Gravel is fine to coarse angular to sub-rounded of mudstone and brick.	
		1.00	ES					MADE GROUND: Medium dense black slightly clayey gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, brick and ash. Becoming loose from circa. 2.00m bgl. Then becoming very loose from circa. 3.00m bgl.	1
		1.00	SPT	N=16 (3,3/4,3,5,4)					
		2.00	SPT	5 (3,3/2,2,1,)					2
		3.00	SPT	N=4 (./1,1,1,1)					3
		4.00	SPT	4 (1,1/1,2,1)					4
		5.00	SPT	N=4 (1,1/1,1,1,1)					5
					5.45			End of Borehole at 5.45m	6
									7
									8
									9
									10

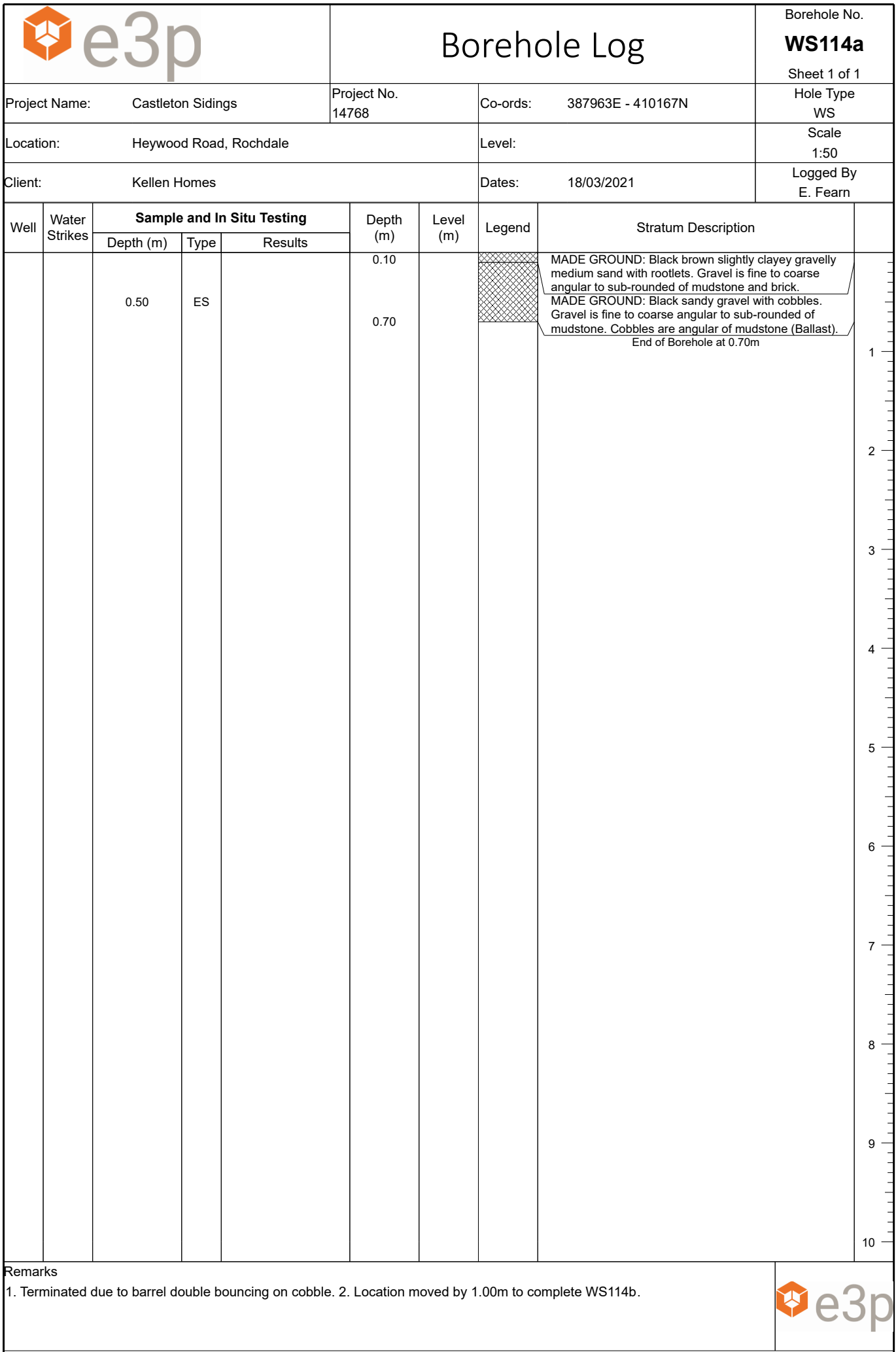
Remarks

1. Complete. 2. Monitoring well installed.

				Borehole Log				Borehole No. WS113 Sheet 1 of 1	
Project Name: Castleton Sidings				Project No. 14768		Co-ords: 388018E - 410170N		Hole Type WS	
Location: Heywood Road, Rochdale						Level:		Scale 1:50	
Client: Kellen Homes						Dates: 18/03/2021		Logged By E. Fearn	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.80	ES	N=15 (3,5/4,6,3,2)	3.00			MADE GROUND: Medium dense black slightly clayey gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, brick and ash. Becoming very loose from circa. 2.00m bgl.	1
	1.00	SPT							
	2.00	SPT	4 (3,2/2,1,,1)					2	
	2.20	ES							
	3.00	SPT	1 (,1/1,,)						
		4.00	SPT	1 (1,1/1,,)					4
		5.00	SPT	N=4 (1,/1,1,1,1)	5.45				5
		End of Borehole at 5.45m							6
									7
									8
									9
									10

Remarks 1. Complete. 2. Monitoring well installed.								
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Project Name: Castleton Sidings

Project No.
14768

Co-ords: 387964E - 410166N

Hole Type
WS

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 18/03/2021

Logged By
E. Fearn

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10			MADE GROUND: Black brown slightly clayey gravelly medium sand with rootlets. Gravel is fine to coarse angular to sub-rounded of mudstone and brick.	
					0.40			MADE GROUND: Black sandy gravel with cobbles. Gravel is fine to coarse angular to sub-rounded of mudstone. Cobbles are angular of mudstone (Ballast).	
		1.00	SPT	N=5 (1,1/2,1,1,1)				MADE GROUND: Loose black slightly clayey gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, brick and ash.	1
		1.70	ES						
		2.00	SPT	0 (1,/,,,)					2
		3.00	SPT	0 (/,,,)					3
		4.00	SPT	2 (2,2/,1,1)					4
					4.60			Stiff medium strength black brown PEAT.	5
		5.00	SPT	N=10 (3,2/2,2,3,3)					
					5.45			End of Borehole at 5.45m	6
									7
									8
									9
									10

Remarks

1. Complete. 2. Redrilled due to collapse. 3. Monitoring well installed.





Borehole Log

Borehole No.

CP101

Sheet 2 of 2

Project Name: Castleton Sidings

Project No.
14768

Co-ords: 388022E - 410219N

Hole Type
CP

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 04/03/2021

Logged By
E. Fearn

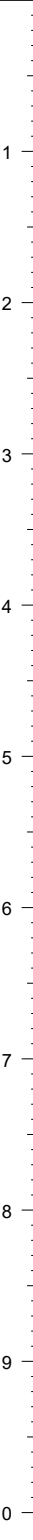
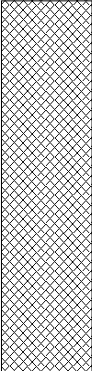
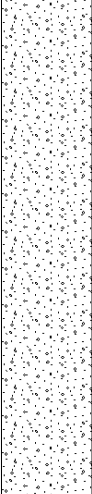
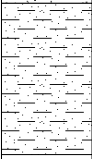
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		11.00 - 11.45 11.00	D SPT	N=19 (2,3/4,4,5,6)	11.70			Medium dense brown SAND with clay bands and occasional gravel. Gravel is fine to coarse angular to rounded of sandstone.	11
		11.70	D					Very stiff high strength light brown sandy CLAY.	12
		12.50 - 12.95 12.50	D SPT	N=23 (3,4/4,6,6,7)					13
		14.50 - 14.95 14.50	D SPT	N=28 (4,5/6,6,7,9)					14
					14.95			End of Borehole at 14.95m	15
									16
									17
									18
									19
									20

Remarks

1. Complete. 2. Water strikes encountered at 5.30m bgl and 14.10m bgl.



					Borehole Log			Borehole No. CP102 Sheet 1 of 2		
Project Name: Castleton Sidings					Project No. 14768		Co-ords: 387766E - 410115N		Hole Type CP	
Location: Heywood Road, Rochdale					Level:			Scale 1:50		
Client: Kellen Homes					Dates: 19/03/2021			Logged By E. Fearn		

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
	 1.50				0.10			MADE GROUND: Black asphalt.		
					0.60			MADE GROUND: Light grey sandy gravel. Gravel is fine to coarse angular of limestone and concrete.		
		1.00 - 1.45 1.00	D SPT	2 (2,1,,1,1)				MADE GROUND: Black slightly clayey gravelly medium sand. Gravel is fine to coarse angular to sub-angular of mudstone, brick and ash.		
		2.00 - 2.45 2.00	D SPT	3 (1,/1,,1,1)						
		3.00 - 3.45 3.00	D SPT	2 (1,/1,,1,1)	3.10					
										Soft very low strength brown PEAT. Becoming firm low strength from circa. 5.00m bgl.
		4.00 - 4.45 4.00	D SPT	3 (1,/1,1,1,1)						
		5.00 - 5.45 5.00	D SPT	3 (1,1/1,,1,1)						
					5.70					
										Medium dense light brown very gravelly medium to coarse SAND. Gravel is fine to coarse angular to sub-rounded of mudstone and sandstone. Becoming dense from circa. 8.00m bgl.
6.50 - 6.95 6.50	D SPT	N=24 (6,6/7,6,5,6)								
8.00 - 8.45 8.00	D SPT	N=26 (6,7/7,6,7,6)								
								Very stiff high strength brown slightly sandy CLAY.		
9.50 - 9.95 9.50	D SPT	N=18 (5,4/4,5,5,4)	9.00							
									10	

Remarks 1. Water strike encountered at 1.50m bgl. 2. Significant hydrocarbon impact, odour and impact identified between 0.60m and 3.10m bgl. 3. Complete.		
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Borehole Log

Borehole No.

CP102

Sheet 2 of 2

Project Name: Castleton Sidings

Project No.
14768

Co-ords: 387766E - 410115N

Hole Type
CP

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 19/03/2021

Logged By
E. Fearn

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		11.00 - 11.45 11.00	D SPT	N=17 (5,4/4,4,4,5)				Very stiff high strength brown slightly sandy CLAY.	11
		12.50 - 12.95 12.50	D SPT	N=17 (4,5/5,4,4,4)					12
		14.00 - 14.45 14.00	D SPT	N=25 (5,6/6,7,6,6)					13
					15.00				14
								End of Borehole at 15.00m	15
									16
									17
									18
									19
									20

Remarks

1. Water strike encountered at 1.50m bgl. 2. Significant hydrocarbon impact, odour and impact identified between 0.60m and 3.10m bgl. 3. Complete.

Borehole Log

Borehole No.

RB101

Sheet 1 of 7

Project Name: Castleton Sidings

Project No.
14768

Co-ords: 388055E - 410220N

Hole Type
BH

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 19/03/2021

Logged By
E. Fearn

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.60			MADE GROUND: Light grey gravel. Gravel is fine to coarse angular to rounded of mudstone (Ballast).	1
								MADE GROUND: Black slightly silty gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, ash and brick.	2
									3
					3.90			Brown medium SAND.	4
									5
									6
									7
									8
									9
									10

Remarks

1. Loss of flush between 35.60m and 40.80m bgl. 2. Hard drilling between 40.80m and 60.50m bgl. 3. Complete.



Borehole Log

Borehole No.

RB101

Sheet 2 of 7

Project Name: Castleton Sidings

Project No.
14768

Co-ords: 388055E - 410220N

Hole Type
BH

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 19/03/2021

Logged By
E. Fearn

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					11.10			Brown medium SAND.	11
					12.20			Brown gravelly SAND. Gravel is fine to coarse angular of sandstone.	12
								Brown CLAY with sand bands.	13
									14
									15
									16
									17
									18
									19
									20

Remarks

1. Loss of flush between 35.60m and 40.80m bgl. 2. Hard drilling between 40.80m and 60.50m bgl. 3. Complete.





Borehole Log

Borehole No.

RB101

Sheet 3 of 7

Project Name: Castleton Sidings

Project No.
14768

Co-ords: 388055E - 410220N

Hole Type
BH

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 19/03/2021

Logged By
E. Fearn

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								Brown CLAY with sand bands.	21
									22
									23
									24
									25
					26.00				26
					26.30			Grey brown boulder. Boulder is angular of mudstone.	26
								Brown CLAY.	27
									28
									29
									30

Remarks

1. Loss of flush between 35.60m and 40.80m bgl. 2. Hard drilling between 40.80m and 60.50m bgl. 3. Complete.



Borehole Log

Borehole No.

RB101

Sheet 4 of 7

Project Name: Castleton Sidings

Project No.
14768

Co-ords: 388055E - 410220N

Hole Type
BH

Location: Heywood Road, Rochdale

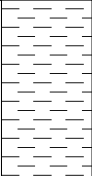
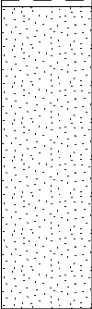
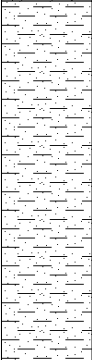
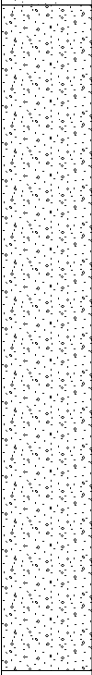
Level:

Scale
1:50

Client: Kellen Homes

Dates: 19/03/2021

Logged By
E. Fearn

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					31.20			Brown CLAY.	31
					33.20			Brown medium SAND.	32
					35.60			Brown grey sandy CLAY.	33
								Brown gravelly SAND. Gravel is fine to coarse angular of sandstone. Loss of flush.	34
									35
									36
									37
									38
									39
									40

Remarks

1. Loss of flush between 35.60m and 40.80m bgl. 2. Hard drilling between 40.80m and 60.50m bgl. 3. Complete.

Borehole Log

Borehole No.

RB101

Sheet 5 of 7

Project Name: Castleton Sidings

Project No.
14768

Co-ords: 388055E - 410220N

Hole Type
BH

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 19/03/2021

Logged By
E. Fearn

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					40.80			Brown gravelly SAND. Gravel is fine to coarse angular of sandstone. Loss of flush.	
								Brown grey sandy CLAY. Hard drilling.	41
									42
									43
									44
									45
									46
									47
									48
									49
									50

Remarks

1. Loss of flush between 35.60m and 40.80m bgl. 2. Hard drilling between 40.80m and 60.50m bgl. 3. Complete.

Borehole Log

Borehole No.

RB101

Sheet 6 of 7

Project Name: Castleton Sidings

Project No.
14768

Co-ords: 388055E - 410220N

Hole Type
BH

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

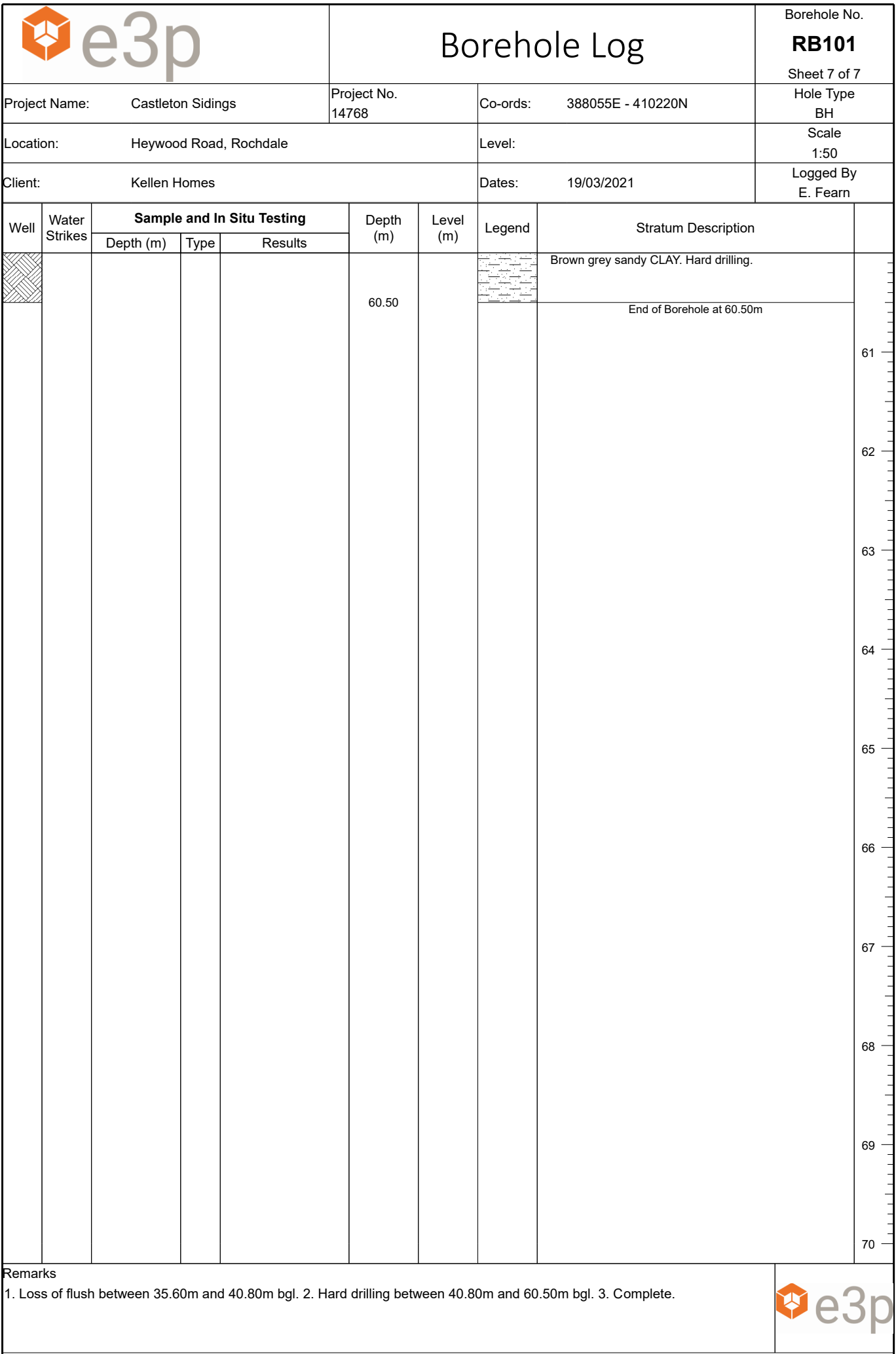
Dates: 19/03/2021

Logged By
E. Fearn

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								Brown grey sandy CLAY. Hard drilling.	
									51
									52
									53
									54
									55
									56
									57
									58
									59
									60

Remarks

1. Loss of flush between 35.60m and 40.80m bgl. 2. Hard drilling between 40.80m and 60.50m bgl. 3. Complete.



Borehole Log

Borehole No.

RB102

Sheet 1 of 6

Project Name: Castleton Sidings

Project No.
14768

Co-ords: 388055E - 410168N

Hole Type
BH

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 19/03/2021

Logged By
E. Fearn

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.50			MADE GROUND: Light grey gravel. Gravel is fine to coarse angular to rounded of mudstone (Ballast).	
								MADE GROUND: Black slightly clayey gravelly medium sand. Gravel is fine to coarse angular to sub-rounded of mudstone, ash and brick.	1
									2
									3
					4.10			Brown medium SAND.	4
									5
									6
									7
									8
									9
									10

Remarks

1. Loss of flush between 32.10m and 39.60m bgl. 2. Hard drilling between 39.60m and 52.80m bgl. 3. Complete.



Borehole Log

Borehole No.

RB102

Sheet 2 of 6

Project Name: Castleton Sidings

Project No.
14768

Co-ords: 388055E - 410168N

Hole Type
BH

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 19/03/2021

Logged By
E. Fearn

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					10.20			Brown medium SAND.	
								Brown CLAY with sand bands.	
									11
									12
									13
									14
									15
									16
									17
									18
									19
									20

Remarks

1. Loss of flush between 32.10m and 39.60m bgl. 2. Hard drilling between 39.60m and 52.80m bgl. 3. Complete.



Borehole Log

Borehole No.

RB102

Sheet 3 of 6

Project Name: Castleton Sidings

Project No.
14768

Co-ords: 388055E - 410168N

Hole Type
BH

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 19/03/2021

Logged By
E. Fearn

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								Brown CLAY with sand bands.	21
									22
									23
					24.10				24
								Brown gravelly SAND. Gravel is fine to coarse angular of sandstone.	25
									26
									27
					28.20				28
								Brown sandy CLAY.	29
									30

Remarks

1. Loss of flush between 32.10m and 39.60m bgl. 2. Hard drilling between 39.60m and 52.80m bgl. 3. Complete.

Borehole Log

Borehole No.

RB102

Sheet 4 of 6

Project Name: Castleton Sidings

Project No.
14768

Co-ords: 388055E - 410168N

Hole Type
BH

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 19/03/2021

Logged By
E. Fearn

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					32.10			Brown sandy CLAY.	31
								Brown gravelly SAND. Gravel is fine to coarse angular of sandstone. Loss of flush.	32
									33
									34
									35
									36
									37
									38
									39
					39.60			Brown CLAY. Hard drilling.	40

Remarks

1. Loss of flush between 32.10m and 39.60m bgl. 2. Hard drilling between 39.60m and 52.80m bgl. 3. Complete.

					Borehole Log			Borehole No. RB102 Sheet 5 of 6	
Project Name: Castleton Sidings					Project No. 14768		Co-ords: 388055E - 410168N		Hole Type BH
Location: Heywood Road, Rochdale					Level:			Scale 1:50	
Client: Kellen Homes					Dates: 19/03/2021			Logged By E. Fearn	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								Brown CLAY. Hard drilling.	41
									42
									43
									44
									45
									46
									47
									48
									49
									50
Remarks 1. Loss of flush between 32.10m and 39.60m bgl. 2. Hard drilling between 39.60m and 52.80m bgl. 3. Complete.									



Borehole Log

Borehole No.

RB102

Sheet 6 of 6

Project Name: Castleton Sidings

Project No.
14768

Co-ords: 388055E - 410168N

Hole Type
BH

Location: Heywood Road, Rochdale

Level:

Scale
1:50

Client: Kellen Homes

Dates: 19/03/2021

Logged By
E. Fearn

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								Brown CLAY. Hard drilling.	
									51
									52
									53
									54
									55
									56
									57
									58
					59.00			End of Borehole at 59.00m	59
									60

Remarks

1. Loss of flush between 32.10m and 39.60m bgl. 2. Hard drilling between 39.60m and 52.80m bgl. 3. Complete.



APPENDIX VI

CHEMICAL TESTING

RESULTS



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Analytical Report Number : 21-61519

Project / Site name:	Castleton Sidings	Samples received on:	08/03/2021
Your job number:	14-768	Samples instructed on/ Analysis started on:	08/03/2021
Your order number:	14768-EF-F	Analysis completed by:	24/03/2021
Report Issue Number:	1	Report issued on:	25/03/2021
Samples Analysed:	3 leachate samples - 12 soil samples		

Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-61519
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-F

Lab Sample Number				1797155	1797156	1797157	1797158	1797159
Sample Reference				TP105	TP106	TP112	TP115	TP117
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	1.60	1.30	1.00	1.00
Date Sampled				04/02/2021	04/02/2021	04/02/2021	04/02/2021	04/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	9.5	11	13	14	15
Total mass of sample received	kg	0.001	NONE	0.50	0.40	0.50	1.0	0.50

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	Chrysotile	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	Detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	< 0.001	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	< 0.001	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	-	7.6	7.6	7.1
Total Cyanide	mg/kg	1	MCERTS	-	< 1.0	< 1.0	1.4	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	-	2500	2500	1200
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	-	-	0.24	0.088	0.15
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	-	-	470	180	310
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	-	-	237	88.0	153
Sulphide	mg/kg	1	MCERTS	-	-	3.3	30	1.4
Total Sulphur	mg/kg	50	MCERTS	-	-	2800	2400	1000

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	1.5	15	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	0.54	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	0.54	0.24	5.2	0.23
Fluorene	mg/kg	0.05	MCERTS	-	0.47	0.29	4.0	0.17
Phenanthrene	mg/kg	0.05	MCERTS	-	2.9	2.1	32	2.2
Anthracene	mg/kg	0.05	MCERTS	-	0.78	0.32	6.5	0.49
Fluoranthene	mg/kg	0.05	MCERTS	-	4.5	1.9	36	3.8
Pyrene	mg/kg	0.05	MCERTS	-	3.9	1.9	33	3.4
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	2.4	1.4	18	2.7
Chrysene	mg/kg	0.05	MCERTS	-	1.9	0.97	16	2.5
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	2.1	1.0	11	2.5
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	1.0	0.65	6.0	1.2
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	2.1	1.1	9.5	2.7
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	0.74	0.45	4.5	1.3
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	1.7	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	0.92	0.61	5.4	1.7

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	24.2	14.4	204	24.7
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Analytical Report Number: 21-61519
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-F

Lab Sample Number				1797155	1797156	1797157	1797158	1797159
Sample Reference				TP105	TP106	TP112	TP115	TP117
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	1.60	1.30	1.00	1.00
Date Sampled				04/02/2021	04/02/2021	04/02/2021	04/02/2021	04/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	50	51	54	36
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-	230	-	-	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	1.7	-	-	-
Boron (water soluble)	mg/kg	0.2	MCERTS	-	1.1	-	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	-	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	43	22	19
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	230	250	240	190
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	320	220	370	130
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	0.7	0.7	1.8	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	38	42	45	59
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	49	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	280	140	250	130

Speciated Mercury (Dry Weight)

Inorganic Mercury	mg/kg	0.005	NONE	-	-	-	1.283	-
Organo-Mercury Species (including Methyl Hg)	mg/kg	0.005	NONE	-	-	-	0.042	-
Elemental Mercury	mg/kg	0.005	NONE	-	-	-	0.398	-

Speciated Mercury (Dry Weight)

F1 - Water soluble	mg/kg	0.005	NONE	-	-	-	0.010	-
F2 - Weak acid	mg/kg	0.005	NONE	-	-	-	0.006	-
F3 - Organo- complexed	mg/kg	0.005	NONE	-	-	-	0.042	-
F4 - Strongly complexed	mg/kg	0.005	NONE	-	-	-	0.398	-
F5 - Mineral bound	mg/kg	0.005	NONE	-	-	-	1.266	-

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	-	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	-	< 2.0	< 2.0	27	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	-	< 4.0	< 4.0	33	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	-	10	8.0	120	11
TPH (C21 - C35)	mg/kg	1	MCERTS	-	21	15	120	63
TPH (C35 - C40)	mg/kg	10	MCERTS	-	< 10	< 10	< 10	18
TPH Total C5 - C40	mg/kg	10	MCERTS	-	33	25	330	94

VOCs

Chloromethane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Chloroethane	µg/kg	1	NONE	< 1.0	-	-	-	-
Bromomethane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Vinyl Chloride	µg/kg	1	NONE	< 1.0	-	-	-	-
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	-	-	-	-
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	-	-	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Trichloromethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-

Analytical Report Number: 21-61519
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-F

Lab Sample Number				1797155	1797156	1797157	1797158	1797159
Sample Reference				TP105	TP106	TP112	TP115	TP117
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	1.60	1.30	1.00	1.00
Date Sampled				04/02/2021	04/02/2021	04/02/2021	04/02/2021	04/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	-	-	-	-
Benzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Trichloroethene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Dibromomethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Tetrachloroethene	µg/kg	1	NONE	< 1.0	-	-	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Styrene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Tribromomethane	µg/kg	1	NONE	< 1.0	-	-	-	-
o-Xylene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Bromobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-

SVOCs

Aniline	mg/kg	0.1	NONE	< 0.1	-	-	-	-
Phenol	mg/kg	0.2	ISO 17025	< 0.2	-	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-

Analytical Report Number: 21-61519
 Project / Site name: Castleton Sidings
 Your Order No: 14768-EF-F

Lab Sample Number				1797155	1797156	1797157	1797158	1797159
Sample Reference				TP105	TP106	TP112	TP115	TP117
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	1.60	1.30	1.00	1.00
Date Sampled				04/02/2021	04/02/2021	04/02/2021	04/02/2021	04/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	-	-	-	-
Isophorone	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	2.9	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	2.0	-	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	1.2	-	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	0.9	-	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3	-	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
Fluorene	mg/kg	0.05	MCERTS	1.1	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	7.8	-	-	-	-
Anthracene	mg/kg	0.05	MCERTS	2.2	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	0.8	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	0.5	-	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	8.2	-	-	-	-
Pyrene	mg/kg	0.05	MCERTS	7.0	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	-	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	3.6	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	2.8	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.2	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.87	-	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.5	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.72	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.87	-	-	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-61519
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-F

Lab Sample Number				1797160	1797161	1797162	1797163	1797164
Sample Reference				TP121	WS101	WS103	WS104	WS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.50	4.90	3.20	4.90
Date Sampled				04/02/2021	04/02/2021	04/02/2021	04/02/2021	04/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	12	10	18	25	14
Total mass of sample received	kg	0.001	NONE	0.50	1.0	0.50	1.0	0.50

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	-	Not-detected	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	-	-	7.5	-
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	13	3.6
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	-	-	6300	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	-	-	-	0.32	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	-	-	-	630	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	-	-	-	317	-
Sulphide	mg/kg	1	MCERTS	-	-	-	630	-
Total Sulphur	mg/kg	50	MCERTS	-	-	-	28000	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-	-	4.1	-
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	1.2	6.5	0.77	220	130
Acenaphthylene	mg/kg	0.05	MCERTS	0.21	0.29	< 0.05	14	3.5
Acenaphthene	mg/kg	0.05	MCERTS	3.1	2.8	1.8	530	250
Fluorene	mg/kg	0.05	MCERTS	2.2	1.9	2.2	830	210
Phenanthrene	mg/kg	0.05	MCERTS	20	8.2	7.2	1600	640
Anthracene	mg/kg	0.05	MCERTS	5.2	2.9	1.7	310	120
Fluoranthene	mg/kg	0.05	MCERTS	30	7.4	2.1	490	170
Pyrene	mg/kg	0.05	MCERTS	27	6.8	1.5	350	120
Benzo(a)anthracene	mg/kg	0.05	MCERTS	19	4.5	0.32	69	23
Chrysene	mg/kg	0.05	MCERTS	14	4.0	0.26	35	16
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	17	3.9	< 0.05	18	4.7
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	9.1	1.6	< 0.05	13	3.9
Benzo(a)pyrene	mg/kg	0.05	MCERTS	18	2.6	< 0.05	20	4.5
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	7.4	1.7	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	1.9	0.62	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	9.3	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	184	55.6	17.7	4510	1690
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Analytical Report Number: 21-61519
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-F

Lab Sample Number				1797160	1797161	1797162	1797163	1797164
Sample Reference				TP121	WS101	WS103	WS104	WS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.50	4.90	3.20	4.90
Date Sampled				04/02/2021	04/02/2021	04/02/2021	04/02/2021	04/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	53	34	1.4	290	5.9
Barium (aqua regia extractable)	mg/kg	1	MCERTS	470	180	9.5	-	15
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	2.4	1.6	0.13	-	0.26
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	0.3	< 0.2	-	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	2.5	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	21	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	340	170	15	91	18
Lead (aqua regia extractable)	mg/kg	1	MCERTS	720	100	4.2	900	8.6
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	3.6	< 0.3	< 0.3	0.7	0.5
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	79	42	3.0	53	6.9
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	66	38	4.5	-	6.7
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	310	230	22	2000	37

Speciated Mercury (Dry Weight)

Inorganic Mercury	mg/kg	0.005	NONE	1.693	-	-	-	-
Organo-Mercury Species (including Methyl Hg)	mg/kg	0.005	NONE	0.168	-	-	-	-
Elemental Mercury	mg/kg	0.005	NONE	1.608	-	-	-	-

Speciated Mercury (Dry Weight)

F1 - Water soluble	mg/kg	0.005	NONE	0.117	-	-	-	-
F2 - Weak acid	mg/kg	0.005	NONE	0.545	-	-	-	-
F3 - Organo- complexed	mg/kg	0.005	NONE	0.168	-	-	-	-
F4 - Strongly complexed	mg/kg	0.005	NONE	1.608	-	-	-	-
F5 - Mineral bound	mg/kg	0.005	NONE	1.031	-	-	-	-

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.2	5.7
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.3	12
TPH (C10 - C12)	mg/kg	2	MCERTS	4.8	11	22	250	480
TPH (C12 - C16)	mg/kg	4	MCERTS	11	18	30	1700	1200
TPH (C16 - C21)	mg/kg	1	MCERTS	100	37	27	2700	1200
TPH (C21 - C35)	mg/kg	1	MCERTS	180	80	11	360	260
TPH (C35 - C40)	mg/kg	10	MCERTS	30	< 10	< 10	19	35
TPH Total C5 - C40	mg/kg	10	MCERTS	330	160	110	5200	3700

VOCs

Chloromethane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Chloroethane	µg/kg	1	NONE	-	-	-	< 1.0	-
Bromomethane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Vinyl Chloride	µg/kg	1	NONE	-	-	-	< 1.0	-
Trichlorofluoromethane	µg/kg	1	NONE	-	-	-	< 1.0	-
1,1-Dichloroethene	µg/kg	1	NONE	-	-	-	< 1.0	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Trichloromethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-

Analytical Report Number: 21-61519
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-F

Lab Sample Number				1797160	1797161	1797162	1797163	1797164
Sample Reference				TP121	WS101	WS103	WS104	WS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.50	4.90	3.20	4.90
Date Sampled				04/02/2021	04/02/2021	04/02/2021	04/02/2021	04/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	-	< 1.0	-
Benzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Tetrachloromethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Trichloroethene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Dibromomethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Bromodichloromethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	-	-	-	11	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Tetrachloroethene	µg/kg	1	NONE	-	-	-	< 1.0	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	39	-
p & m-Xylene	µg/kg	1	MCERTS	-	-	-	55	-
Styrene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Tribromomethane	µg/kg	1	NONE	-	-	-	< 1.0	-
o-Xylene	µg/kg	1	MCERTS	-	-	-	49	-
1,1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Isopropylbenzene	µg/kg	1	MCERTS	-	-	-	10	-
Bromobenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	120	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	160	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	-	41	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Butylbenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	-	< 1.0	-

SVOCs

Aniline	mg/kg	0.1	NONE	-	-	-	< 0.1	-
Phenol	mg/kg	0.2	ISO 17025	-	-	-	< 0.2	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	-	< 0.1	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	-	< 0.1	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	-	< 0.1	-

Analytical Report Number: 21-61519
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-F

Lab Sample Number				1797160	1797161	1797162	1797163	1797164
Sample Reference				TP121	WS101	WS103	WS104	WS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.50	4.90	3.20	4.90
Date Sampled				04/02/2021	04/02/2021	04/02/2021	04/02/2021	04/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
4-Methylphenol	mg/kg	0.2	NONE	-	-	-	< 0.2	-
Isophorone	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
Naphthalene	mg/kg	0.05	MCERTS	-	-	-	220	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-	-	< 0.1	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	-	< 0.1	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	-	< 0.1	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	-	< 0.1	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	-	42	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	-	< 0.1	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	-	< 0.1	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	-	< 0.1	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	14	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	530	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	-	480	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	-	< 0.3	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
Fluorene	mg/kg	0.05	MCERTS	-	-	-	830	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	1600	-
Anthracene	mg/kg	0.05	MCERTS	-	-	-	310	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	290	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	490	-
Pyrene	mg/kg	0.05	MCERTS	-	-	-	350	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	< 0.3	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-	69	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	35	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	18	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	13	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-	20	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-61519
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-F

Lab Sample Number				1797165	1797166
Sample Reference				WS106A	WS107
Sample Number				None Supplied	None Supplied
Depth (m)				4.60	2.10
Date Sampled				04/02/2021	04/02/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	13	11
Total mass of sample received	kg	0.001	NONE	1.0	0.30

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	-
Total Cyanide	mg/kg	1	MCERTS	2.5	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	-	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	-	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	-	-
Sulphide	mg/kg	1	MCERTS	-	-
Total Sulphur	mg/kg	50	MCERTS	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	46	5.1
Acenaphthylene	mg/kg	0.05	MCERTS	1.4	0.44
Acenaphthene	mg/kg	0.05	MCERTS	50	9.2
Fluorene	mg/kg	0.05	MCERTS	58	6.1
Phenanthrene	mg/kg	0.05	MCERTS	180	60
Anthracene	mg/kg	0.05	MCERTS	39	13
Fluoranthene	mg/kg	0.05	MCERTS	48	74
Pyrene	mg/kg	0.05	MCERTS	35	68
Benzo(a)anthracene	mg/kg	0.05	MCERTS	6.8	36
Chrysene	mg/kg	0.05	MCERTS	6.4	34
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.8	31
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.4	20
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.2	34
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	14
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	3.9
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	17

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	474	426
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Analytical Report Number: 21-61519
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-F

Lab Sample Number				1797165	1797166
Sample Reference				WS106A	WS107
Sample Number				None Supplied	None Supplied
Depth (m)				4.60	2.10
Date Sampled				04/02/2021	04/02/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Heavy Metals / Metalloids					
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	26	31
Barium (aqua regia extractable)	mg/kg	1	MCERTS	190	310
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	2.2	1.5
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	0.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	160	180
Lead (aqua regia extractable)	mg/kg	1	MCERTS	87	120
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	49	39
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	53	54
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	160	110

Speciated Mercury (Dry Weight)

Inorganic Mercury	mg/kg	0.005	NONE	-	-
Organo-Mercury Species (including Methyl Hg)	mg/kg	0.005	NONE	-	-
Elemental Mercury	mg/kg	0.005	NONE	-	-

Speciated Mercury (Dry Weight)

F1 - Water soluble	mg/kg	0.005	NONE	-	-
F2 - Weak acid	mg/kg	0.005	NONE	-	-
F3 - Organo- complexed	mg/kg	0.005	NONE	-	-
F4 - Strongly complexed	mg/kg	0.005	NONE	-	-
F5 - Mineral bound	mg/kg	0.005	NONE	-	-

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	2.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	48	5.5
TPH (C12 - C16)	mg/kg	4	MCERTS	130	48
TPH (C16 - C21)	mg/kg	1	MCERTS	310	260
TPH (C21 - C35)	mg/kg	1	MCERTS	61	240
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	53
TPH Total C5 - C40	mg/kg	10	MCERTS	600	620

VOCs

Chloromethane	µg/kg	1	ISO 17025	-	-
Chloroethane	µg/kg	1	NONE	-	-
Bromomethane	µg/kg	1	ISO 17025	-	-
Vinyl Chloride	µg/kg	1	NONE	-	-
Trichlorofluoromethane	µg/kg	1	NONE	-	-
1,1-Dichloroethene	µg/kg	1	NONE	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-
Trichloromethane	µg/kg	1	MCERTS	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-

Analytical Report Number: 21-61519
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-F

Lab Sample Number				1797165	1797166
Sample Reference				WS106A	WS107
Sample Number				None Supplied	None Supplied
Depth (m)				4.60	2.10
Date Sampled				04/02/2021	04/02/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-
Benzene	µg/kg	1	MCERTS	-	-
Tetrachloromethane	µg/kg	1	MCERTS	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-
Trichloroethene	µg/kg	1	MCERTS	-	-
Dibromomethane	µg/kg	1	MCERTS	-	-
Bromodichloromethane	µg/kg	1	MCERTS	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-
Toluene	µg/kg	1	MCERTS	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	-
Tetrachloroethene	µg/kg	1	NONE	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-
p & m-Xylene	µg/kg	1	MCERTS	-	-
Styrene	µg/kg	1	MCERTS	-	-
Tribromomethane	µg/kg	1	NONE	-	-
o-Xylene	µg/kg	1	MCERTS	-	-
1,1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-
Isopropylbenzene	µg/kg	1	MCERTS	-	-
Bromobenzene	µg/kg	1	MCERTS	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-
Butylbenzene	µg/kg	1	MCERTS	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-

SVOCs

Aniline	mg/kg	0.1	NONE	-	-
Phenol	mg/kg	0.2	ISO 17025	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-

Analytical Report Number: 21-61519
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-F

Lab Sample Number				1797165	1797166
Sample Reference				WS106A	WS107
Sample Number				None Supplied	None Supplied
Depth (m)				4.60	2.10
Date Sampled				04/02/2021	04/02/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
2-Methylphenol	mg/kg	0.3	MCERTS	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	-
Isophorone	mg/kg	0.2	MCERTS	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number: 21-61519
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-F

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006-PL based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1797157	TP112	1.30	123	Loose Fibres	Chrysotile	< 0.001	< 0.001

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.



Analytical Report Number: 21-61519
Project / Site name: Castleton Sidings

Your Order No: 14768-EF-F

Lab Sample Number				1797167	1797168	1797169
Sample Reference				TP105	TP123	WS105
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				1.00	1.00	4.90
Date Sampled				04/02/2021	04/02/2021	04/02/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status			

General Inorganics

pH	pH Units	N/A	ISO 17025	7.8	7.7	7.1
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	2.8	2.3	20

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	3.4	4.8	160
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	980
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	1.5
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	41
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	15
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	14
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	1.8
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	1.6
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	0.93
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2	1100
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1	ISO 17025	3.1	1.5	82
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4	0.8	1.7
Copper (dissolved)	µg/l	0.7	ISO 17025	11	6.9	11
Lead (dissolved)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	3.0	3.8	3.0
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	5.1	9.2	34

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10	< 10



Analytical Report Number: 21-61519
Project / Site name: Castleton Sidings

Your Order No: 14768-EF-F

Lab Sample Number				1797167	1797168	1797169
Sample Reference				TP105	TP123	WS105
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				1.00	1.00	4.90
Date Sampled				04/02/2021	04/02/2021	04/02/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status			

Petroleum Hydrocarbons

TPH1 (C10 - C40)	µg/l	10	NONE	< 10	< 10	4900
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TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	2500
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	1500
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	900
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	4900

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 21-61519
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* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1797155	TP105	None Supplied	1	Brown loam with gravel.
1797156	TP106	None Supplied	1.6	Brown loam and clay with vegetation.
1797157	TP112	None Supplied	1.3	Black loam and sand with gravel and vegetation.
1797158	TP115	None Supplied	1	Black loam and sand with gravel and vegetation.
1797159	TP117	None Supplied	1	Brown gravelly loam.
1797160	TP121	None Supplied	1	Brown gravelly loam.
1797161	WS101	None Supplied	0.5	Brown loam with gravel and vegetation.
1797162	WS103	None Supplied	4.9	Brown sand.
1797163	WS104	None Supplied	3.2	Brown silt.**
1797164	WS105	None Supplied	4.9	Brown sand with vegetation.
1797165	WS106A	None Supplied	4.6	Brown sandy loam with vegetation.
1797166	WS107	None Supplied	2.1	Brown sandy loam.

**Non MCERTS Matrix

Analytical Report Number : 21-61519
Project / Site name: Castleton Sidings

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in leachate - LOW LEVEL 1 ug/l	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In house method.	L005-PL	W	ISO 17025
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS

Analytical Report Number : 21-61519
Project / Site name: Castleton Sidings

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Speciated Mercury in soil by Millennium Merlin Ana	Determination of Speciated Mercury in soil by Millennium Merlin Analyzer	In-house method	L085-PL	Dry	NONE
Total cyanide in leachate - 1µg/l	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Sample Deviation Report



Analytical Report Number : 21-61519
Project / Site name: Castleton Sidings

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
TP105	None Supplied	S	1797155	c	Semi-volatile organic compounds in soil	L064-PL	c
TP105	None Supplied	S	1797155	c	Volatile organic compounds in soil	L073B-PL	c
TP106	None Supplied	S	1797156	c	Hexavalent chromium in soil	L080-PL	c
TP106	None Supplied	S	1797156	c	Speciated EPA-16 PAHs in soil	L064-PL	c
TP106	None Supplied	S	1797156	c	TPH in (Soil)	L076-PL	c
TP106	None Supplied	S	1797156	c	Total cyanide in soil	L080-PL	c
TP112	None Supplied	S	1797157	c	Hexavalent chromium in soil	L080-PL	c
TP112	None Supplied	S	1797157	c	Monohydric phenols in soil	L080-PL	c
TP112	None Supplied	S	1797157	c	Speciated EPA-16 PAHs in soil	L064-PL	c
TP112	None Supplied	S	1797157	c	Sulphide in soil	L010-PL	c
TP112	None Supplied	S	1797157	c	TPH in (Soil)	L076-PL	c
TP112	None Supplied	S	1797157	c	Total cyanide in soil	L080-PL	c
TP112	None Supplied	S	1797157	c	pH in soil (automated)	L099-PL	c
TP115	None Supplied	S	1797158	c	Hexavalent chromium in soil	L080-PL	c
TP115	None Supplied	S	1797158	c	Monohydric phenols in soil	L080-PL	c
TP115	None Supplied	S	1797158	c	Speciated EPA-16 PAHs in soil	L064-PL	c
TP115	None Supplied	S	1797158	c	Sulphide in soil	L010-PL	c
TP115	None Supplied	S	1797158	c	TPH in (Soil)	L076-PL	c
TP115	None Supplied	S	1797158	c	Total cyanide in soil	L080-PL	c
TP115	None Supplied	S	1797158	c	pH in soil (automated)	L099-PL	c
TP117	None Supplied	S	1797159	c	Hexavalent chromium in soil	L080-PL	c
TP117	None Supplied	S	1797159	c	Monohydric phenols in soil	L080-PL	c
TP117	None Supplied	S	1797159	c	Speciated EPA-16 PAHs in soil	L064-PL	c
TP117	None Supplied	S	1797159	c	Sulphide in soil	L010-PL	c
TP117	None Supplied	S	1797159	c	TPH in (Soil)	L076-PL	c
TP117	None Supplied	S	1797159	c	Total cyanide in soil	L080-PL	c
TP117	None Supplied	S	1797159	c	pH in soil (automated)	L099-PL	c
TP121	None Supplied	S	1797160	c	Hexavalent chromium in soil	L080-PL	c
TP121	None Supplied	S	1797160	c	Speciated EPA-16 PAHs in soil	L064-PL	c
TP121	None Supplied	S	1797160	c	TPH in (Soil)	L076-PL	c
TP121	None Supplied	S	1797160	c	Total cyanide in soil	L080-PL	c
WS101	None Supplied	S	1797161	c	Hexavalent chromium in soil	L080-PL	c
WS101	None Supplied	S	1797161	c	Speciated EPA-16 PAHs in soil	L064-PL	c
WS101	None Supplied	S	1797161	c	TPH in (Soil)	L076-PL	c
WS101	None Supplied	S	1797161	c	Total cyanide in soil	L080-PL	c
WS103	None Supplied	S	1797162	c	Hexavalent chromium in soil	L080-PL	c
WS103	None Supplied	S	1797162	c	Speciated EPA-16 PAHs in soil	L064-PL	c
WS103	None Supplied	S	1797162	c	TPH in (Soil)	L076-PL	c
WS103	None Supplied	S	1797162	c	Total cyanide in soil	L080-PL	c
WS104	None Supplied	S	1797163	c	Hexavalent chromium in soil	L080-PL	c
WS104	None Supplied	S	1797163	c	Monohydric phenols in soil	L080-PL	c
WS104	None Supplied	S	1797163	c	Semi-volatile organic compounds in soil	L064-PL	c
WS104	None Supplied	S	1797163	c	Speciated EPA-16 PAHs in soil	L064-PL	c
WS104	None Supplied	S	1797163	c	Sulphide in soil	L010-PL	c
WS104	None Supplied	S	1797163	c	TPH in (Soil)	L076-PL	c
WS104	None Supplied	S	1797163	c	Total cyanide in soil	L080-PL	c
WS104	None Supplied	S	1797163	c	Volatile organic compounds in soil	L073B-PL	c
WS104	None Supplied	S	1797163	c	pH in soil (automated)	L099-PL	c
WS105	None Supplied	S	1797164	c	Hexavalent chromium in soil	L080-PL	c
WS105	None Supplied	S	1797164	c	Speciated EPA-16 PAHs in soil	L064-PL	c
WS105	None Supplied	S	1797164	c	TPH in (Soil)	L076-PL	c
WS105	None Supplied	S	1797164	c	Total cyanide in soil	L080-PL	c
WS106A	None Supplied	S	1797165	c	Hexavalent chromium in soil	L080-PL	c
WS106A	None Supplied	S	1797165	c	Speciated EPA-16 PAHs in soil	L064-PL	c
WS106A	None Supplied	S	1797165	c	TPH in (Soil)	L076-PL	c
WS106A	None Supplied	S	1797165	c	Total cyanide in soil	L080-PL	c
WS107	None Supplied	S	1797166	c	Hexavalent chromium in soil	L080-PL	c
WS107	None Supplied	S	1797166	c	Speciated EPA-16 PAHs in soil	L064-PL	c
WS107	None Supplied	S	1797166	c	TPH in (Soil)	L076-PL	c

Key: **a** - No sampling date **b** - Incorrect container
c - Holding time **d** - Headspace **e** - Temperature

Sample Deviation Report



Analytical Report Number : 21-61519

Project / Site name: Castleton Sidings

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
TP105	None Supplied	S	1797155	c	Semi-volatile organic compounds in soil	L064-PL	c
WS107	None Supplied	S	1797166	c	Total cyanide in soil	L080-PL	c



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Analytical Report Number : 21-61756

Project / Site name:	Castleton Sidings	Samples received on:	08/03/2021
Your job number:	14-768	Samples instructed on/ Analysis started on:	11/03/2021
Your order number:	14768-EF-F	Analysis completed by:	18/03/2021
Report Issue Number:	1	Report issued on:	18/03/2021
Samples Analysed:	3 soil samples		

Signed: 

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-61756
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-F

Lab Sample Number				1798422	1798423	1798424
Sample Reference				TP108	TP116	WS104
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				1.00	1.20	4.30
Date Sampled				04/02/2021	05/02/2021	05/02/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	14	20	15
Total mass of sample received	kg	0.001	NONE	0.50	0.50	0.50

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.1	-	7.6
Total Cyanide	mg/kg	1	MCERTS	< 1.0	-	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	1300	-	190
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.081	-	0.029
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	160	-	58
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	81.4	-	28.8
Sulphide	mg/kg	1	MCERTS	18	-	12
Total Sulphur	mg/kg	50	MCERTS	890	-	490

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	1.2	13	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.30	0.49	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.57	14	0.45
Fluorene	mg/kg	0.05	MCERTS	0.42	9.8	0.70
Phenanthrene	mg/kg	0.05	MCERTS	4.6	85	0.98
Anthracene	mg/kg	0.05	MCERTS	1.3	13	0.13
Fluoranthene	mg/kg	0.05	MCERTS	8.0	75	0.41
Pyrene	mg/kg	0.05	MCERTS	7.7	77	0.33
Benzo(a)anthracene	mg/kg	0.05	MCERTS	4.9	32	< 0.05
Chrysene	mg/kg	0.05	MCERTS	4.0	32	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	5.4	32	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	2.3	11	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	4.4	27	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.3	11	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	2.8	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	3.6	15	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	50.8	451	3.00
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Analytical Report Number: 21-61756
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-F

Lab Sample Number				1798422	1798423	1798424
Sample Reference				TP108	TP116	WS104
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				1.00	1.20	4.30
Date Sampled				04/02/2021	05/02/2021	05/02/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	52	42	3.8
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-	220	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	2.1	-
Boron (water soluble)	mg/kg	0.2	MCERTS	-	0.4	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	35	29	10
Copper (aqua regia extractable)	mg/kg	1	MCERTS	500	280	17
Lead (aqua regia extractable)	mg/kg	1	MCERTS	340	730	6.6
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	2.8	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	66	51	12
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	94	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	610	310	38

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	6.3	25	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	18	100	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	51	230	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	280	270	< 1.0
TPH (C35 - C40)	mg/kg	10	MCERTS	84	33	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	450	690	< 10

VOCs

Chloromethane	µg/kg	1	ISO 17025	-	-	< 1.0
Chloroethane	µg/kg	1	NONE	-	-	< 1.0
Bromomethane	µg/kg	1	ISO 17025	-	-	< 1.0
Vinyl Chloride	µg/kg	1	NONE	-	-	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	-	-	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	-	-	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	< 1.0
Trichloromethane	µg/kg	1	MCERTS	-	-	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	< 1.0
Benzene	µg/kg	1	MCERTS	-	-	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	-	-	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	< 1.0
Trichloroethene	µg/kg	1	MCERTS	-	-	< 1.0
Dibromomethane	µg/kg	1	MCERTS	-	-	< 1.0
Bromodichloromethane	µg/kg	1	MCERTS	-	-	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	-	< 1.0

Analytical Report Number: 21-61756
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-F

Lab Sample Number				1798422	1798423	1798424
Sample Reference				TP108	TP116	WS104
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				1.00	1.20	4.30
Date Sampled				04/02/2021	05/02/2021	05/02/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	< 1.0
Tetrachloroethene	µg/kg	1	NONE	-	-	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	-	-	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	-	< 1.0
p & m-Xylene	µg/kg	1	MCERTS	-	-	< 1.0
Styrene	µg/kg	1	MCERTS	-	-	< 1.0
Tribromomethane	µg/kg	1	NONE	-	-	< 1.0
o-Xylene	µg/kg	1	MCERTS	-	-	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	-	-	< 1.0
Bromobenzene	µg/kg	1	MCERTS	-	-	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	< 1.0
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	< 1.0
Butylbenzene	µg/kg	1	MCERTS	-	-	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	< 1.0

SVOCs

Aniline	mg/kg	0.1	NONE	-	-	< 0.1
Phenol	mg/kg	0.2	ISO 17025	-	-	< 0.2
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	< 0.1
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	< 0.1
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	< 0.3
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	< 0.05
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	-	-	< 0.2
Isophorone	mg/kg	0.2	MCERTS	-	-	< 0.2
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	< 0.3
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3
Naphthalene	mg/kg	0.05	MCERTS	-	-	< 0.05
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	-	-	< 0.1

Analytical Report Number: 21-61756
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-F

Lab Sample Number				1798422	1798423	1798424
Sample Reference				TP108	TP116	WS104
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				1.00	1.20	4.30
Date Sampled				04/02/2021	05/02/2021	05/02/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	2.4
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	< 0.1
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	< 0.1
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	-	0.45
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	< 0.2
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	< 0.2
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	< 0.2
Fluorene	mg/kg	0.05	MCERTS	-	-	0.70
Azobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	< 0.2
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3
Phenanthrene	mg/kg	0.05	MCERTS	-	-	0.98
Anthracene	mg/kg	0.05	MCERTS	-	-	0.13
Carbazole	mg/kg	0.3	MCERTS	-	-	< 0.3
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	< 0.2
Anthraquinone	mg/kg	0.3	MCERTS	-	-	< 0.3
Fluoranthene	mg/kg	0.05	MCERTS	-	-	0.41
Pyrene	mg/kg	0.05	MCERTS	-	-	0.33
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	< 0.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05
Chrysene	mg/kg	0.05	MCERTS	-	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	< 0.05

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 21-61756
Project / Site name: Castleton Sidings

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1798422	TP108	None Supplied	1	Brown loam and clay with gravel.
1798423	TP116	None Supplied	1.2	Brown loam and clay with gravel.
1798424	WS104	None Supplied	4.3	Brown sandy loam with gravel.

Analytical Report Number : 21-61756
Project / Site name: Castleton Sidings

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS

Analytical Report Number : 21-61756
Project / Site name: Castleton Sidings

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Sample Deviation Report



Analytical Report Number : 21-61756
Project / Site name: Castleton Sidings

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
TP108	None Supplied	S	1798422	c	Hexavalent chromium in soil	L080-PL	c
TP108	None Supplied	S	1798422	c	Monohydric phenols in soil	L080-PL	c
TP108	None Supplied	S	1798422	c	Speciated EPA-16 PAHs in soil	L064-PL	c
TP108	None Supplied	S	1798422	c	Sulphide in soil	L010-PL	c
TP108	None Supplied	S	1798422	c	TPH in (Soil)	L076-PL	c
TP108	None Supplied	S	1798422	c	Total cyanide in soil	L080-PL	c
TP108	None Supplied	S	1798422	c	pH in soil (automated)	L099-PL	c
TP116	None Supplied	S	1798423	c	Speciated EPA-16 PAHs in soil	L064-PL	c
TP116	None Supplied	S	1798423	c	TPH in (Soil)	L076-PL	c
WS104	None Supplied	S	1798424	c	Hexavalent chromium in soil	L080-PL	c
WS104	None Supplied	S	1798424	c	Monohydric phenols in soil	L080-PL	c
WS104	None Supplied	S	1798424	c	Semi-volatile organic compounds in soil	L064-PL	c
WS104	None Supplied	S	1798424	c	Speciated EPA-16 PAHs in soil	L064-PL	c
WS104	None Supplied	S	1798424	c	Sulphide in soil	L010-PL	c
WS104	None Supplied	S	1798424	c	TPH in (Soil)	L076-PL	c
WS104	None Supplied	S	1798424	c	Total cyanide in soil	L080-PL	c
WS104	None Supplied	S	1798424	c	Volatile organic compounds in soil	L073B-PL	c
WS104	None Supplied	S	1798424	c	pH in soil (automated)	L099-PL	c



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Analytical Report Number : 21-63848

Project / Site name:	Castleton Sidings	Samples received on:	19/03/2021
Your job number:	14-768	Samples instructed on/ Analysis started on:	19/03/2021
Your order number:	14768-EF-J	Analysis completed by:	26/03/2021
Report Issue Number:	1	Report issued on:	26/03/2021
Samples Analysed:	6 soil samples		

Signed:

Rachel Bradley
Deputy Quality Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-63848
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-J

Lab Sample Number				1810045	1810046	1810047	1810048	1810049
Sample Reference				WS109	WS110	WS111	WS112	WS113
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.20	2.80	1.60	1.00	2.20
Date Sampled				18/03/2021	18/03/2021	18/03/2021	18/03/2021	18/03/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	22	15	21	19	23
Total mass of sample received	kg	0.001	NONE	0.40	0.40	0.40	0.40	0.40

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	8.5	6.7	7.3	7.9
Total Cyanide	mg/kg	1	MCERTS	270	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	5100	130	3300	1400	970
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.11	0.021	0.066	0.027	0.082
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	220	42	130	53	160
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	108	21.1	65.5	26.5	81.7
Sulphide	mg/kg	1	MCERTS	16	< 1.0	9.5	5.7	15
Total Sulphur	mg/kg	50	MCERTS	3000	90	13000	1200	1200

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	3.2	< 0.05	1.9	1.1	2.0
Acenaphthylene	mg/kg	0.05	MCERTS	0.29	< 0.05	< 0.05	0.21	0.35
Acenaphthene	mg/kg	0.05	MCERTS	1.7	< 0.05	1.4	0.85	10
Fluorene	mg/kg	0.05	MCERTS	1.2	< 0.05	0.83	0.67	6.8
Phenanthrene	mg/kg	0.05	MCERTS	11	< 0.05	8.8	7.5	53
Anthracene	mg/kg	0.05	MCERTS	2.4	< 0.05	1.3	1.2	7.6
Fluoranthene	mg/kg	0.05	MCERTS	13	< 0.05	6.6	9.8	46
Pyrene	mg/kg	0.05	MCERTS	12	< 0.05	6.8	9.6	44
Benzo(a)anthracene	mg/kg	0.05	MCERTS	6.8	< 0.05	3.2	6.4	21
Chrysene	mg/kg	0.05	MCERTS	5.8	< 0.05	3.1	4.5	19
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	6.6	< 0.05	2.2	6.1	18
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	2.5	< 0.05	1.3	2.0	8.4
Benzo(a)pyrene	mg/kg	0.05	MCERTS	4.4	< 0.05	1.8	4.1	16
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.3	< 0.05	0.90	2.1	7.0
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.63	< 0.05	< 0.05	0.56	2.1
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.7	< 0.05	1.5	2.6	9.5

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	77.2	< 0.80	41.6	59.3	273
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Analytical Report Number: 21-63848
 Project / Site name: Castleton Sidings
 Your Order No: 14768-EF-J

Lab Sample Number	1810045	1810046	1810047	1810048	1810049
Sample Reference	WS109	WS110	WS111	WS112	WS113
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	2.20	2.80	1.60	1.00	2.20
Date Sampled	18/03/2021	18/03/2021	18/03/2021	18/03/2021	18/03/2021
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	44	2.2	75	56	26
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	26	9.1	7.4	27	20
Copper (aqua regia extractable)	mg/kg	1	MCERTS	200	8.5	91	300	180
Lead (aqua regia extractable)	mg/kg	1	MCERTS	320	5.5	130	690	360
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	2.3	2.4
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	32	7.9	27	67	46
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	110	21	64	210	140

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	11	< 2.0	20	14	35
TPH (C12 - C16)	mg/kg	4	MCERTS	27	< 4.0	23	15	74
TPH (C16 - C21)	mg/kg	1	MCERTS	63	< 1.0	31	35	170
TPH (C21 - C35)	mg/kg	1	MCERTS	200	< 1.0	56	93	250
TPH (C35 - C40)	mg/kg	10	MCERTS	39	< 10	< 10	< 10	54
TPH Total C5 - C40	mg/kg	10	MCERTS	350	< 10	150	170	610

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-63848
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-J

Lab Sample Number				1810050
Sample Reference				WS114b
Sample Number				None Supplied
Depth (m)				1.70
Date Sampled				18/03/2021
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	17
Total mass of sample received	kg	0.001	NONE	0.40

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9
Total Cyanide	mg/kg	1	MCERTS	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	2200
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.17
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	340
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	170
Sulphide	mg/kg	1	MCERTS	9.3
Total Sulphur	mg/kg	50	MCERTS	1500

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	1.9
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.62
Fluorene	mg/kg	0.05	MCERTS	0.41
Phenanthrene	mg/kg	0.05	MCERTS	7.6
Anthracene	mg/kg	0.05	MCERTS	1.1
Fluoranthene	mg/kg	0.05	MCERTS	9.3
Pyrene	mg/kg	0.05	MCERTS	9.0
Benzo(a)anthracene	mg/kg	0.05	MCERTS	4.5
Chrysene	mg/kg	0.05	MCERTS	4.0
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	4.1
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.6
Benzo(a)pyrene	mg/kg	0.05	MCERTS	3.0
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.4
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.38
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.8

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	50.5
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Analytical Report Number: 21-63848
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-J

Lab Sample Number				1810050
Sample Reference				WS114b
Sample Number				None Supplied
Depth (m)				1.70
Date Sampled				18/03/2021
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Heavy Metals / Metalloids				
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	48
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20
Copper (aqua regia extractable)	mg/kg	1	MCERTS	1300
Lead (aqua regia extractable)	mg/kg	1	MCERTS	1900
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	2.6
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	35
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	310

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	9.6
TPH (C12 - C16)	mg/kg	4	MCERTS	13
TPH (C16 - C21)	mg/kg	1	MCERTS	34
TPH (C21 - C35)	mg/kg	1	MCERTS	200
TPH (C35 - C40)	mg/kg	10	MCERTS	17
TPH Total C5 - C40	mg/kg	10	MCERTS	290

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 21-63848
Project / Site name: Castleton Sidings

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1810045	WS109	None Supplied	2.2	Brown loam and clay with brick and vegetation.
1810046	WS110	None Supplied	2.8	Light brown sand.
1810047	WS111	None Supplied	1.6	Brown loam and sand with gravel.
1810048	WS112	None Supplied	1	Brown loam and sand with gravel.
1810049	WS113	None Supplied	2.2	Brown loam and sand with gravel.
1810050	WS114b	None Supplied	1.7	Brown loam and sand with gravel.

Analytical Report Number : 21-63848
Project / Site name: Castleton Sidings

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS



Analytical Report Number : 21-63848
Project / Site name: Castleton Sidings

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

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Analytical Report Number : 21-64760

Project / Site name:	Castleton Sidings	Samples received on:	08/03/2021
Your job number:	14-268	Samples instructed on/ Analysis started on:	25/03/2021
Your order number:	14768-EF-M	Analysis completed by:	31/03/2021
Report Issue Number:	1	Report issued on:	31/03/2021
Samples Analysed:	2 soil samples		

Signed: 

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-64760
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-M

Lab Sample Number				1815248	1815249
Sample Reference				TP101	TP113
Sample Number				None Supplied	None Supplied
Depth (m)				1.00	0.80
Date Sampled				04/02/2021	04/02/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	95	21
Total mass of sample received	kg	0.001	NONE	0.90	0.40

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	< 0.001

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	< 0.007	< 0.007
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U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number : 21-64760
Project / Site name: Castleton Sidings

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1815248	TP101	None Supplied	1	Brown sandy clay with gravel.
1815249	TP113	None Supplied	0.8	Brown sandy clay with gravel.

Analytical Report Number : 21-64760
Project / Site name: Castleton Sidings

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Sample Deviation Report



Analytical Report Number : 21-64760

Project / Site name: Castleton Sidings

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
TP101	None Supplied	S	1815248	c	PCB's By GC-MS in soil	L027-PL	c
TP113	None Supplied	S	1815249	c	PCB's By GC-MS in soil	L027-PL	c

**Info**

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Analytical Report Number : 21-64864

Project / Site name:	Castleton	Samples received on:	24/03/2021
Your job number:	14768	Samples instructed on/ Analysis started on:	24/03/2021
Your order number:	14768 55 L	Analysis completed by:	31/03/2021
Report Issue Number:	1	Report issued on:	31/03/2021
Samples Analysed:	3 water samples		

Signed:

Rachel Bradley
Deputy Quality Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.



Analytical Report Number: 21-64864

Project / Site name: Castleton

Your Order No: 14768 55 L

Lab Sample Number				1815818	1815819	1815820
Sample Reference				WS101	WS105	WS110
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			

General Inorganics

pH	pH Units	N/A	ISO 17025	7.4	6.6	7.0
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	6.3	6.1
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	2.42	13.4	4.84

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	< 1.0	160	< 1.0
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Heavy Metals / Metalloids

Calcium (dissolved)	mg/l	0.012	ISO 17025	73	130	170
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0

Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.62	19.2	0.55
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.04	< 0.02	0.07
Chromium (dissolved)	µg/l	0.2	ISO 17025	4.7	2.7	2.7
Copper (dissolved)	µg/l	0.5	ISO 17025	3.0	1.0	5.9
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	1.0
Manganese (dissolved)	µg/l	0.05	ISO 17025	410	1700	230
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	3.0	7.0	4.2
Selenium (dissolved)	µg/l	0.6	ISO 17025	< 0.6	< 0.6	1.7
Zinc (dissolved)	µg/l	0.5	ISO 17025	13	13	13

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	11.3	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	43.7	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	73.3	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	143	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	53.8	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0



Analytical Report Number: 21-64864

Project / Site name: Castleton

Your Order No: 14768 55 L

Lab Sample Number				1815818	1815819	1815820
Sample Reference				WS101	WS105	WS110
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			

Petroleum Hydrocarbons

TPH1 (C10 - C40)	µg/l	10	NONE	< 10	13000	< 10
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TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	11	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	44	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	370	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	5800	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	4300	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	2500	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	13000	< 10

VOCs

Chloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Chloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Bromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Trichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Benzene	µg/l	1	ISO 17025	< 1.0	11.3	< 1.0
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Trichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Dibromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	43.7	< 1.0
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Chlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0



Analytical Report Number: 21-64864

Project / Site name: Castleton

Your Order No: 14768 55 L

Lab Sample Number				1815818	1815819	1815820
Sample Reference				WS101	WS105	WS110
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	73.3	< 1.0
p & m-Xylene	µg/l	1	ISO 17025	< 1.0	143	< 1.0
Styrene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Tribromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
o-Xylene	µg/l	1	ISO 17025	< 1.0	53.8	< 1.0
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0	4.8	< 1.0
Bromobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	32.9	< 1.0
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	59.1	< 1.0
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0	2.4	< 1.0
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0

SVOCs

Aniline	µg/l	0.05	NONE	< 0.05	14	< 0.05
Phenol	µg/l	0.05	NONE	< 0.05	2.8	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Hexachloroethane	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Nitrobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
4-Methylphenol	µg/l	0.05	NONE	< 0.05	20	< 0.05
Isophorone	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05	39	< 0.05
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Naphthalene	µg/l	0.01	ISO 17025	1.5	3300*	< 0.01
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
4-Chloroaniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
2-Methylnaphthalene	µg/l	0.05	NONE	< 0.05	500	< 0.05
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05



Analytical Report Number: 21-64864

Project / Site name: Castleton

Your Order No: 14768 55 L

Lab Sample Number				1815818	1815819	1815820
Sample Reference				WS101	WS105	WS110
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			
Dimethylphthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	2.7	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	0.26	280	< 0.01
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Dibenzofuran	µg/l	0.05	NONE	< 0.05	78	< 0.05
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Diethyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
4-Nitroaniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Fluorene	µg/l	0.01	ISO 17025	< 0.01	130	< 0.01
Azobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	130	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	8.2	< 0.01
Carbazole	µg/l	0.05	NONE	< 0.05	52	< 0.05
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Anthraquinone	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Fluoranthene	µg/l	0.01	ISO 17025	0.95	11	< 0.01
Pyrene	µg/l	0.01	ISO 17025	0.89	7.1	< 0.01
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	0.82	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	0.61	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
3&4-Methylphenol	µg/l	0.1	NONE	< 0.10	20	< 0.10

U/S = Unsuitable Sample I/S = Insufficient Sample

*Over range data, sample was diluted and results are estimated from an extrapolated calibration. Results should be interpreted with care



Analytical Report Number : 21-64864

Project / Site name: Castleton

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Monohydric phenols in water - LOW LEVEL 1 ug/l	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds in leachate by extraction in dichloromethane followed by GC-MS.	In-house method based on USEPA 8270	L102B-PL	W	NONE
TPH1 (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Sample Deviation Report



Analytical Report Number : 21-64864

Project / Site name: Castleton

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
WS101	None Supplied	W	1815818	a	None Supplied	None Supplied	None Supplied
WS105	None Supplied	W	1815819	a	None Supplied	None Supplied	None Supplied
WS110	None Supplied	W	1815820	a	None Supplied	None Supplied	None Supplied



Jessica Sheridan

e3p
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Manchester
M41 7JQ

e: jsheridan@e3p.co.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

Analytical Report Number : 21-65250

Project / Site name:	Castleton Sidings	Samples received on:	26/03/2021
Your job number:	14-268	Samples instructed on/ Analysis started on:	26/03/2021
Your order number:	14768-EF-M	Analysis completed by:	01/04/2021
Report Issue Number:	1	Report issued on:	01/04/2021
Samples Analysed:	1 soil sample		

Signed:

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-65250
Project / Site name: Castleton Sidings
Your Order No: 14768-EF-M

Lab Sample Number				1818055
Sample Reference				TP124
Sample Number				None Supplied
Depth (m)				1.00
Date Sampled				05/02/2021
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	11
Total mass of sample received	kg	0.001	NONE	0.40

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	< 0.007
------------	-------	-------	--------	---------

U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number : 21-65250
Project / Site name: Castleton Sidings

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1818055	TP124	None Supplied	1	Brown loam and sand with gravel and vegetation.

Analytical Report Number : 21-65250
Project / Site name: Castleton Sidings

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Sample Deviation Report



Analytical Report Number : 21-65250

Project / Site name: Castleton Sidings

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
TP124	None Supplied	S	1818055	c	PCB's By GC-MS in soil	L027-PL	c

APPENDIX VII

ORIGIN OF TIER I GENERIC ASSESSMENT CRITERIA

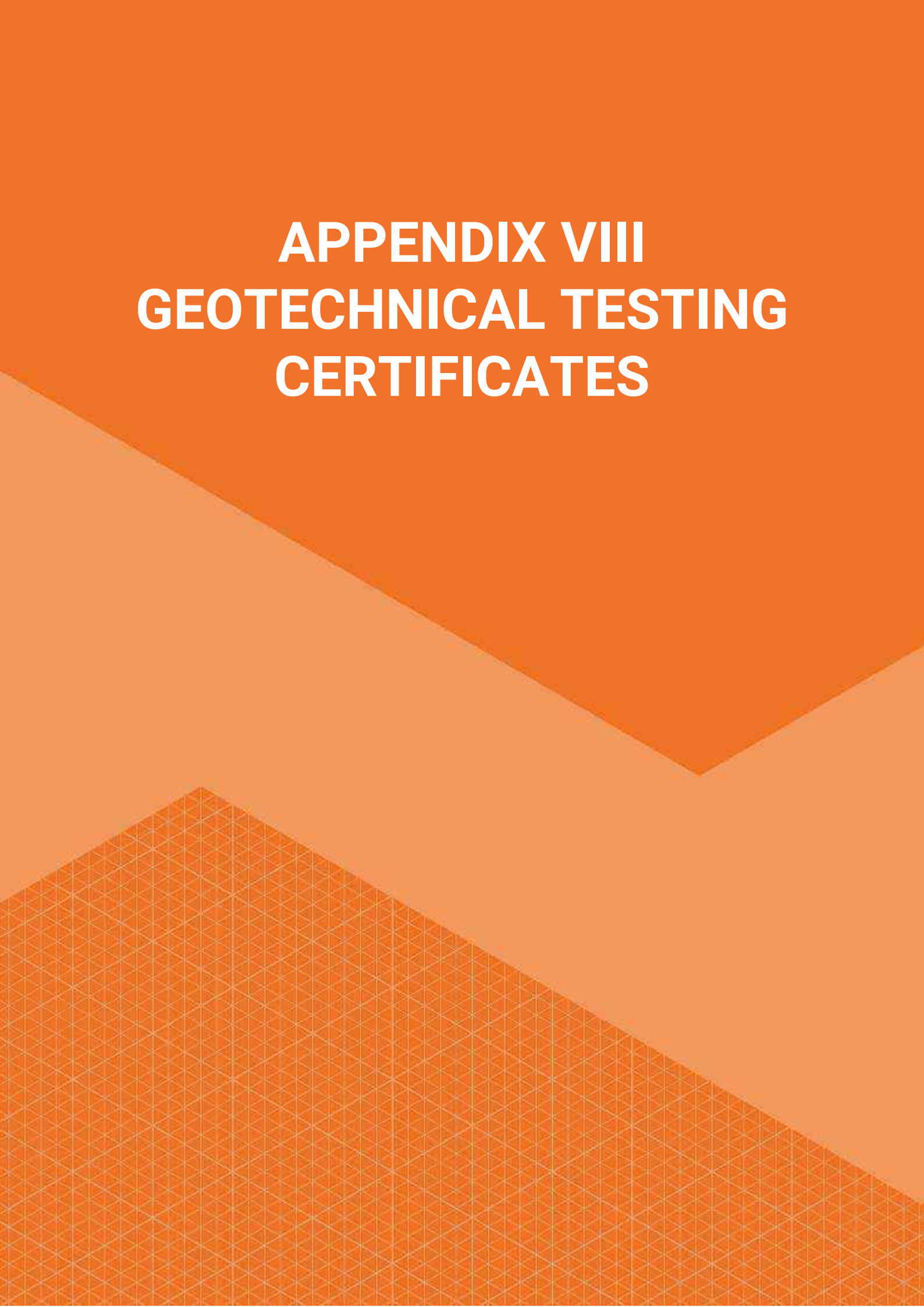
CONSTITUENT	ORIGIN OF RISK ASSESSMENT VALUE
Arsenic	2014 LQM/CIEH S4ULs
Cadmium	2014 LQM/CIEH S4ULs
Chromium	2014 LQM/CIEH S4ULs
Lead	2014 LQM/CIEH S4ULs
Mercury	2014 LQM/CIEH S4ULs – methylmercury
Nickel	2014 LQM/CIEH S4ULs
Selenium	2014 LQM/CIEH S4ULs
Copper	2014 LQM/CIEH S4ULs
Zinc	2014 LQM/CIEH S4ULs
Cyanide – Total	2014 LQM/CIEH S4ULs
Phenols – Total	2014 LQM/CIEH S4ULs
Naphthalene	General assessment criteria (GAC) developed by CIEH/LQM Suitable 4 Use Levels with supporting data from SR3, SR7 and existing Tox report where applicable. 1% SOM.
Acenaphthylene	
Acenaphthene	
Fluorene	
Phenanthrene	
Anthracene	
Fluoranthene	
Pyrene	
Benzo(a)Anthracene	
Chrysene	
Benzo(b/k)Fluoranthene ⁽ⁱⁱⁱ⁾	
Benzo(a)Pyrene	
Indeno(123-cd)Pyrene	
Dibenzo(a,h)Anthracene	
Benzo(ghi)Perylene	
TPH C ₅ -C ₆ (aliphatic)	
TPH C ₆ -C ₈ (aliphatic)	
TPH C ₈ -C ₁₀ (aliphatic)	
TPH C ₁₀ -C ₁₂ (aliphatic)	
TPH C ₁₂ -C ₁₆ (aromatic)	
TPH C ₁₆ -C ₂₁ (aromatic)	
TPH C ₂₁ -C ₃₅ (aromatic)	



APPENDIX VIII

GEOTECHNICAL TESTING

CERTIFICATES

The background of the page is composed of several geometric shapes. The top half is a solid orange trapezoid. Below it is a light orange trapezoid. The bottom half of the page is a large triangle with a fine, light-colored grid pattern, set against a light orange background.



LABORATORY REPORT



4043

Contract Number: PSL21/1969

Report Date: 20 April 2021

Client's Reference: 14-768

Client Name: E3P
Taylor Road
Urmston
Manchester
M41 7JQ

For the attention of: Elizabeth Fearn/Jamie Craig

Contract Title: Castleton Sidings/Rochdale

Date Received: 10/3/2021

Date Commenced: 10/3/2021

Date Completed: 20/4/2021

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Senior Technician)


S Eyre
(Senior Technician)

H Daniels
(Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rberriman@prosoils.co.uk
awatkins@prosoils.co.uk

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

4043

PSL
Professional Soils Laboratory

Castleton Sidings/Rochdale

Contract No:

PSL21/1969

Client Ref:

14-768

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



4043

PSL
Professional Soils Laboratory

Castleton Sidings/Rochdale

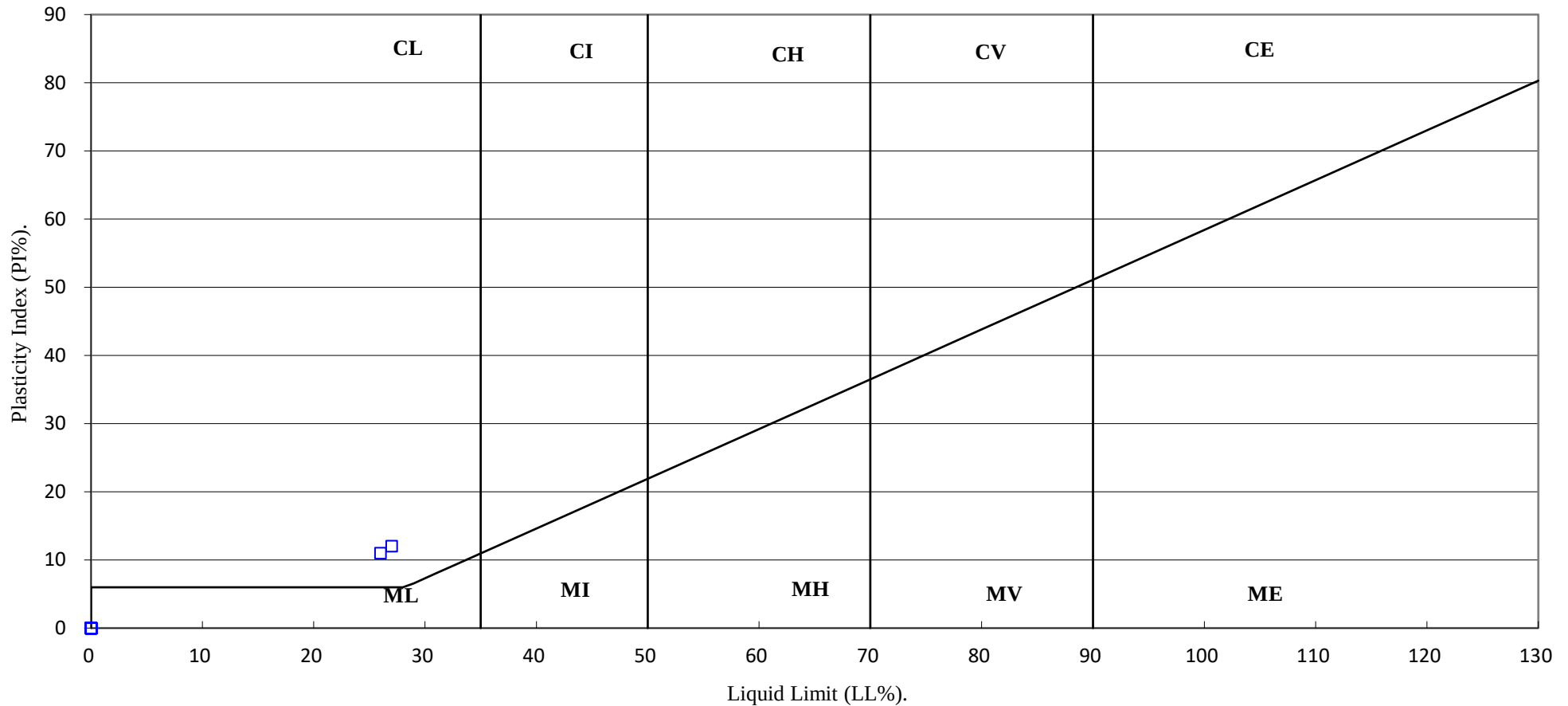
Contract No:

PSL21/1969

Client Ref:

14-768

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL
Professional Soils Laboratory

Castleton Sidings/Rochdale

Contract No:

PSL21/1969

Client Ref:

14-768

PARTICLE SIZE DISTRIBUTION TEST

BS1377:Part 2:1990

Wet Sieve: Clause 9.2

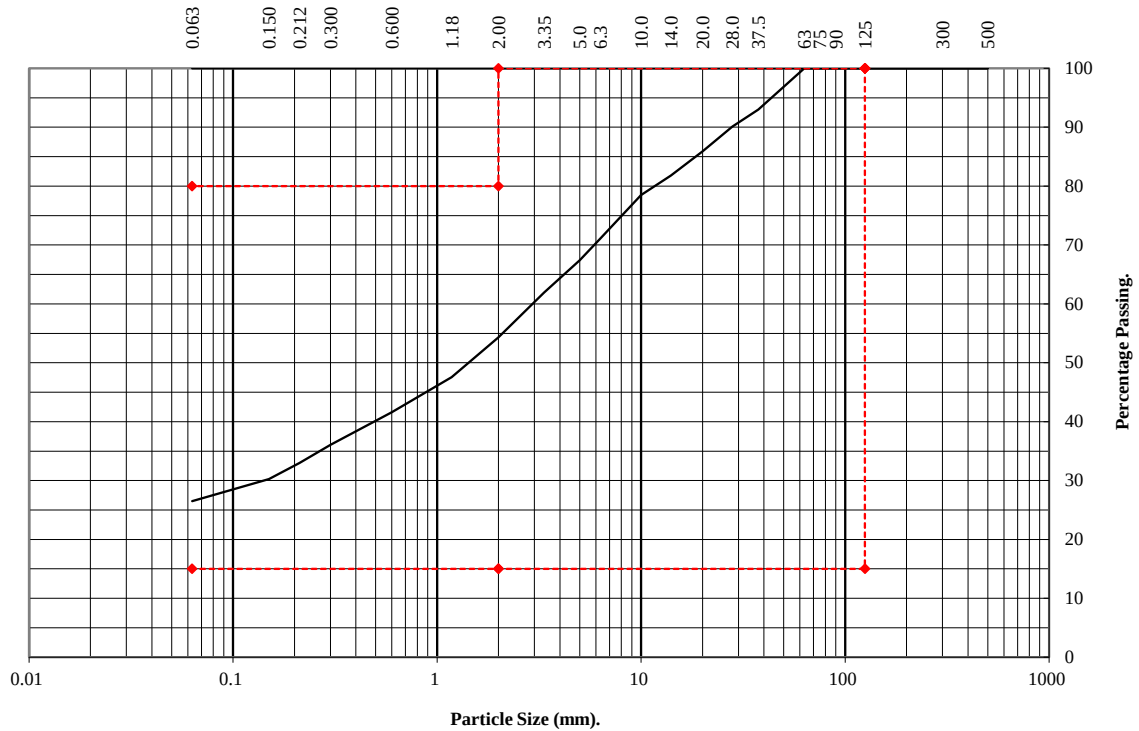
Classification for Acceptable Earthworks Materials

Sample Number:

TP102

Classification Type:

2C



BS Test Sieve mm	Percentage Passing %	Table 6/2 Grading Requirements	
		Lower	Upper
500	100	100	100
300	100		
125	100		
90	100		
75	100		
63	100		
37.5	93		
28	90		
20	86		
14	82		
10	78		
6.3	71	15	80
5	67		
3.35	62		
2	54		
1.18	48		
0.6	42		
0.3	36		
0.212	33		
0.15	30		
0.063	27		

Remarks:

SHW Series 600 Table 6/2 :
Class 2C



Castleton Sidings/Rochdale

Contract No.:

PSL21/1969

Client Ref:

14-768

PARTICLE SIZE DISTRIBUTION TEST

BS1377:Part 2:1990

Wet Sieve: Clause 9.2

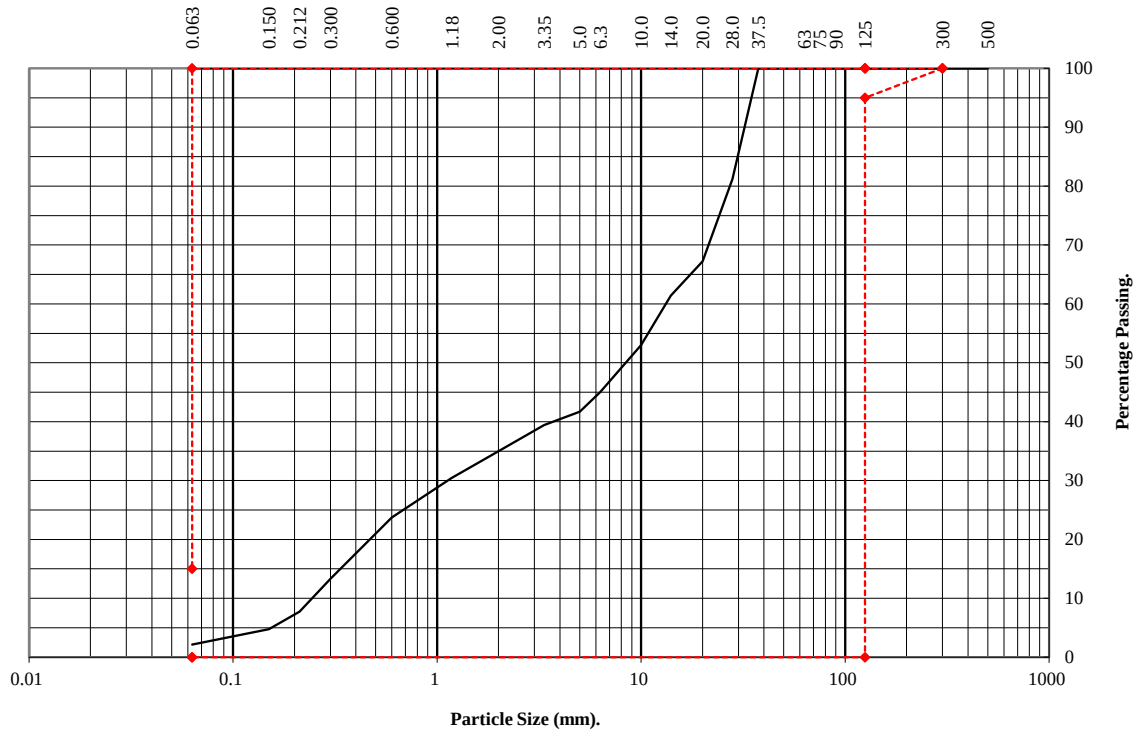
Classification for Acceptable Earthworks Materials

Sample Number:

TP105

Classification Type:

1A



BS Test Sieve mm	Percentage Passing %	Table 6/2 Grading Requirements	
		Lower	Upper
500	100		
300	100	100	100
125	100	95	100
90	100		
75	100		
63	100		
37.5	100		
28	81		
20	67		
14	61		
10	53		
6.3	45		
5	42		
3.35	39		
2	35		
1.18	30		
0.6	24		
0.3	13		
0.212	8		
0.15	5		
0.063	2	0	15

Remarks:

SHW Series 600 Table 6/2 :
Class 1A



Castleton Sidings/Rochdale

Contract No.:

PSL21/1969

Client Ref:

14-768

PARTICLE SIZE DISTRIBUTION TEST

BS1377:Part 2:1990

Wet Sieve: Clause 9.2

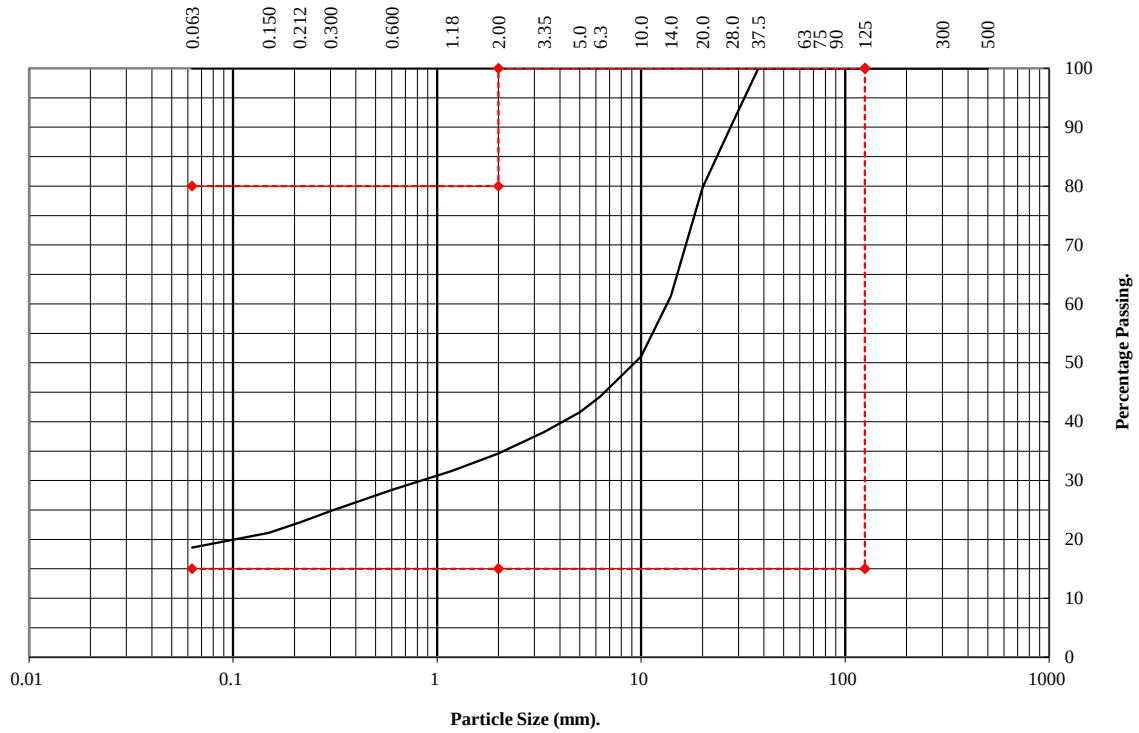
Classification for Acceptable Earthworks Materials

Sample Number:

TP107

Classification Type:

2C



BS Test Sieve mm	Percentage Passing %	Table 6/2 Grading Requirements	
		Lower	Upper
500	100	100	100
300	100		
125	100		
90	100		
75	100		
63	100		
37.5	100		
28	91		
20	80		
14	61		
10	51		
6.3	44	15	80
5	42		
3.35	38		
2	35		
1.18	32		
0.6	28	15	80
0.3	25		
0.212	23		
0.15	21		
0.063	19		

Remarks:

SHW Series 600 Table 6/2 :
Class 2C



Castleton Sidings/Rochdale

Contract No.:

PSL21/1969

Client Ref:

14-768

PARTICLE SIZE DISTRIBUTION TEST

BS1377:Part 2:1990

Wet Sieve: Clause 9.2

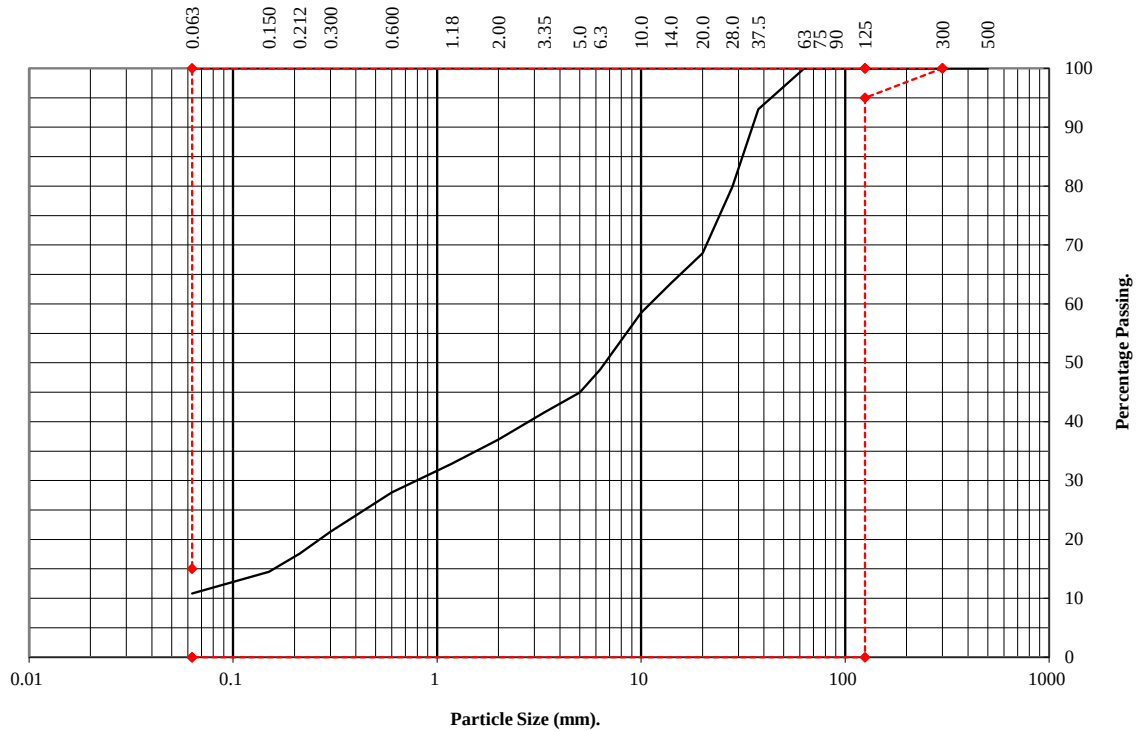
Classification for Acceptable Earthworks Materials

Sample Number:

TP111

Classification Type:

1A



BS Test Sieve mm	Percentage Passing %	Table 6/2 Grading Requirements	
		Lower	Upper
500	100		
300	100	100	100
125	100	95	100
90	100		
75	100		
63	100		
37.5	93		
28	80		
20	69		
14	64		
10	58		
6.3	49		
5	45		
3.35	42		
2	37		
1.18	33		
0.6	28		
0.3	21		
0.212	18		
0.15	15		
0.063	11	0	15

Remarks:

SHW Series 600 Table 6/2 :
Class 1A



Castleton Sidings/Rochdale

Contract No.:

PSL21/1969

Client Ref:

14-768

PARTICLE SIZE DISTRIBUTION TEST

BS1377:Part 2:1990

Wet Sieve: Clause 9.2

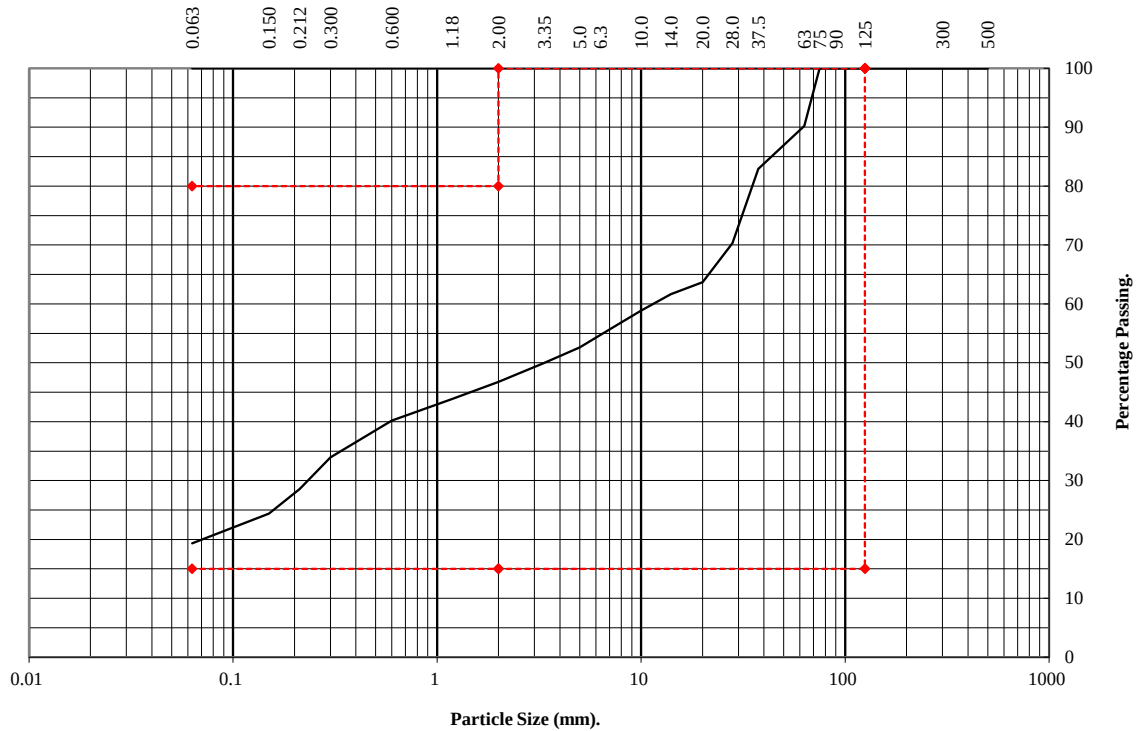
Classification for Acceptable Earthworks Materials

Sample Number:

TP114

Classification Type:

2C



BS Test Sieve mm	Percentage Passing %	Table 6/2 Grading Requirements	
		Lower	Upper
500	100	100	100
300	100		
125	100		
90	100		
75	100		
63	90		
37.5	83		
28	70		
20	64		
14	62		
10	59		
6.3	55	15	80
5	53		
3.35	50		
2	47		
1.18	44		
0.6	40		
0.3	34		
0.212	29		
0.15	24		
0.063	19		

Remarks:

SHW Series 600 Table 6/2 :
Class 2C



Castleton Sidings/Rochdale

Contract No.:

PSL21/1969

Client Ref:

14-768

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

Non compliance with BS 1377 : Part 4 : Clause 3.4 : 1990

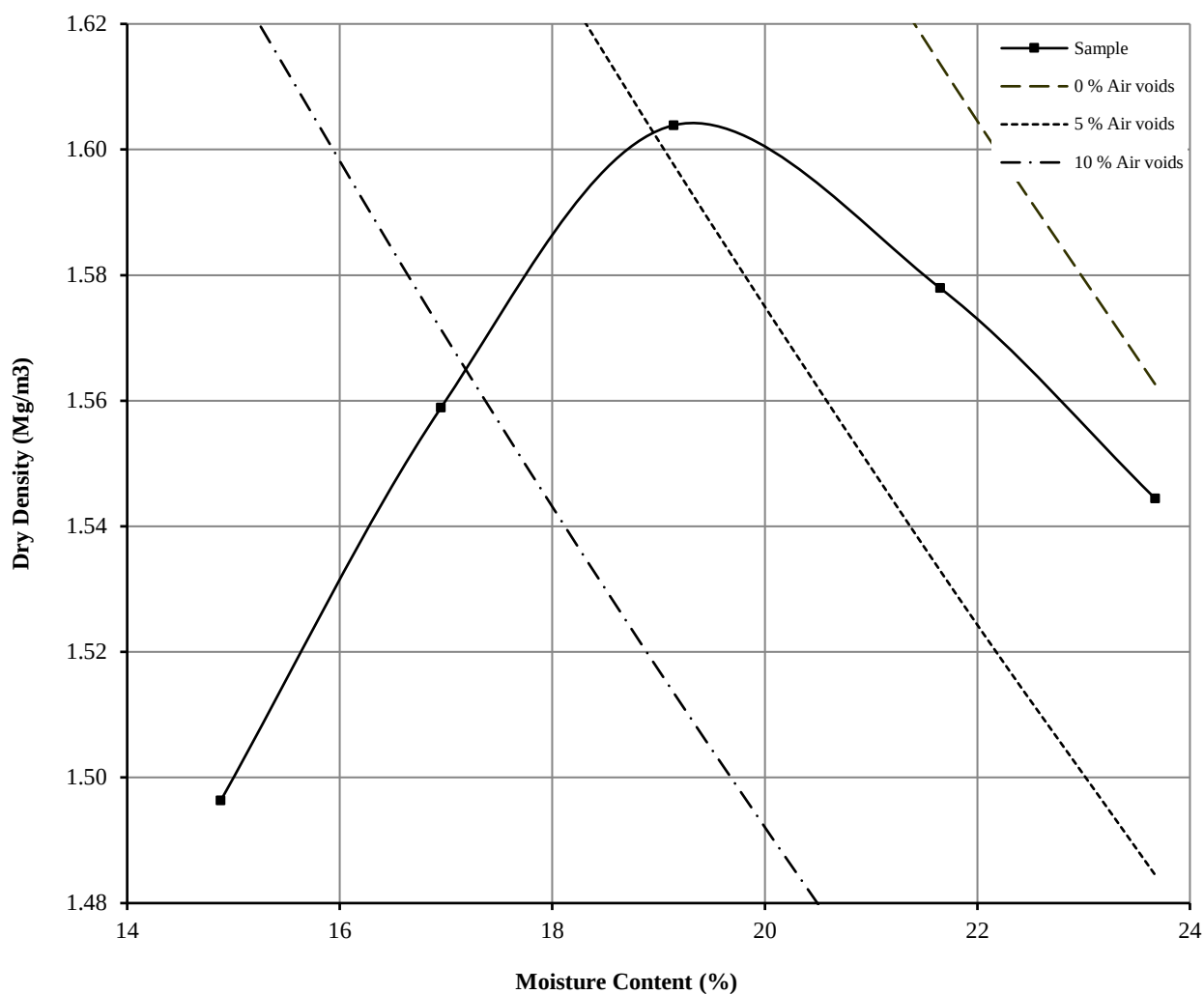
Hole Number: TP105

Top Depth (m) : 1.00

Sample Number:

Base Depth (m) :

Sample Type: BULK



Initial Moisture Content:	19	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.48	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (Mg/m3):	1.60		Material Retained on 20.0 mm Test Sieve (%):	33
Optimum Moisture Content (%):	19			
Remarks See summary of soil descriptions				



Castleton Sidings/Rochdale

Contract
PSL21/1969
Client Ref
14-768

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

Non compliance with BS 1377 : Part 4 : Clause 3.4 : 1990

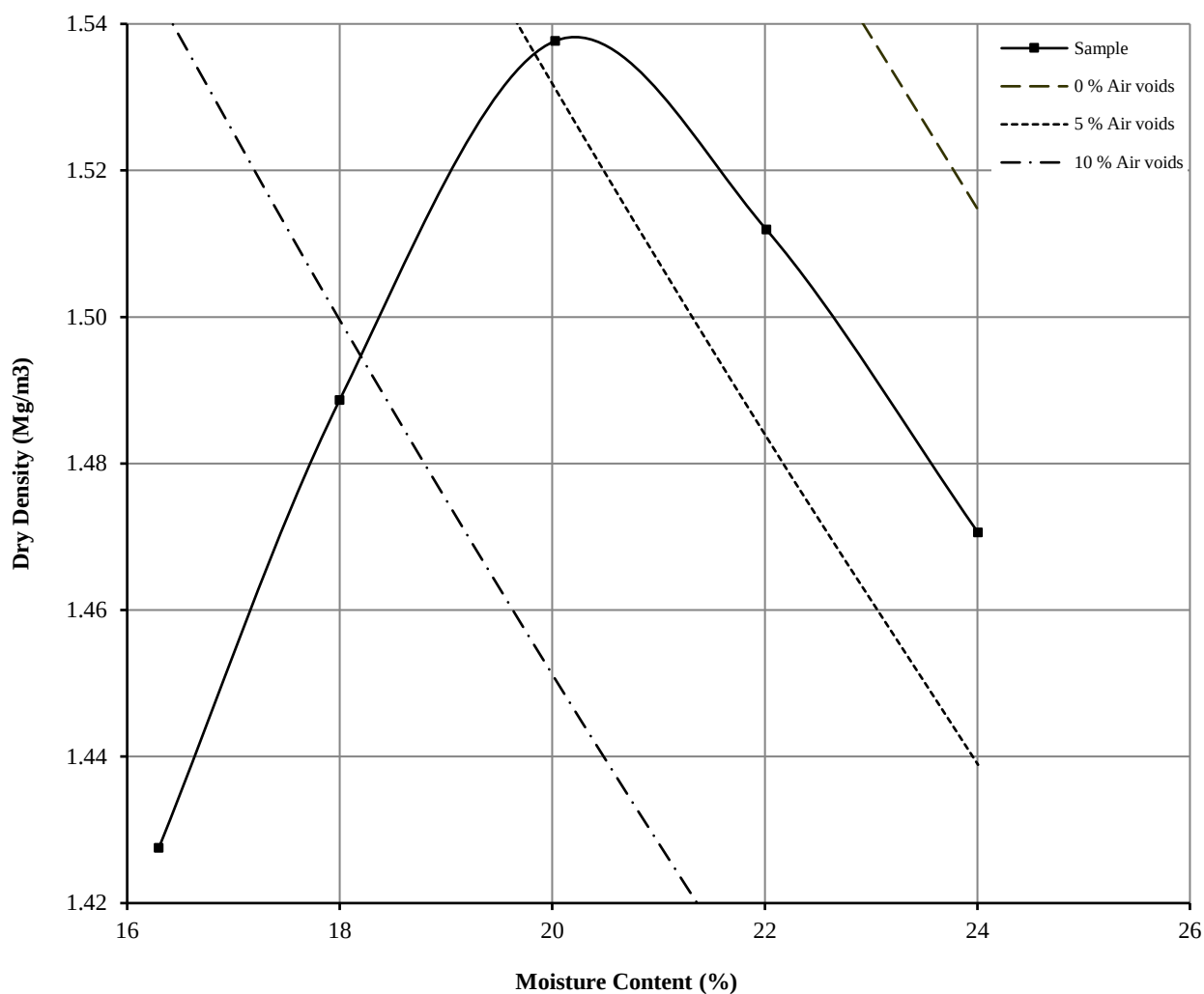
Hole Number: TP111

Top Depth (m) : 1.00

Sample Number:

Base Depth (m) :

Sample Type: BULK



Initial Moisture Content:	20	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.38	Assumed	Material Retained on 37.5 mm Test Sieve (%):	7
Maximum Dry Density (Mg/m3):	1.54		Material Retained on 20.0 mm Test Sieve (%):	24
Optimum Moisture Content (%):	20			
Remarks See summary of soil descriptions				



Castleton Sidings/Rochdale

Contract
PSL21/1969
Client Ref
14-768

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

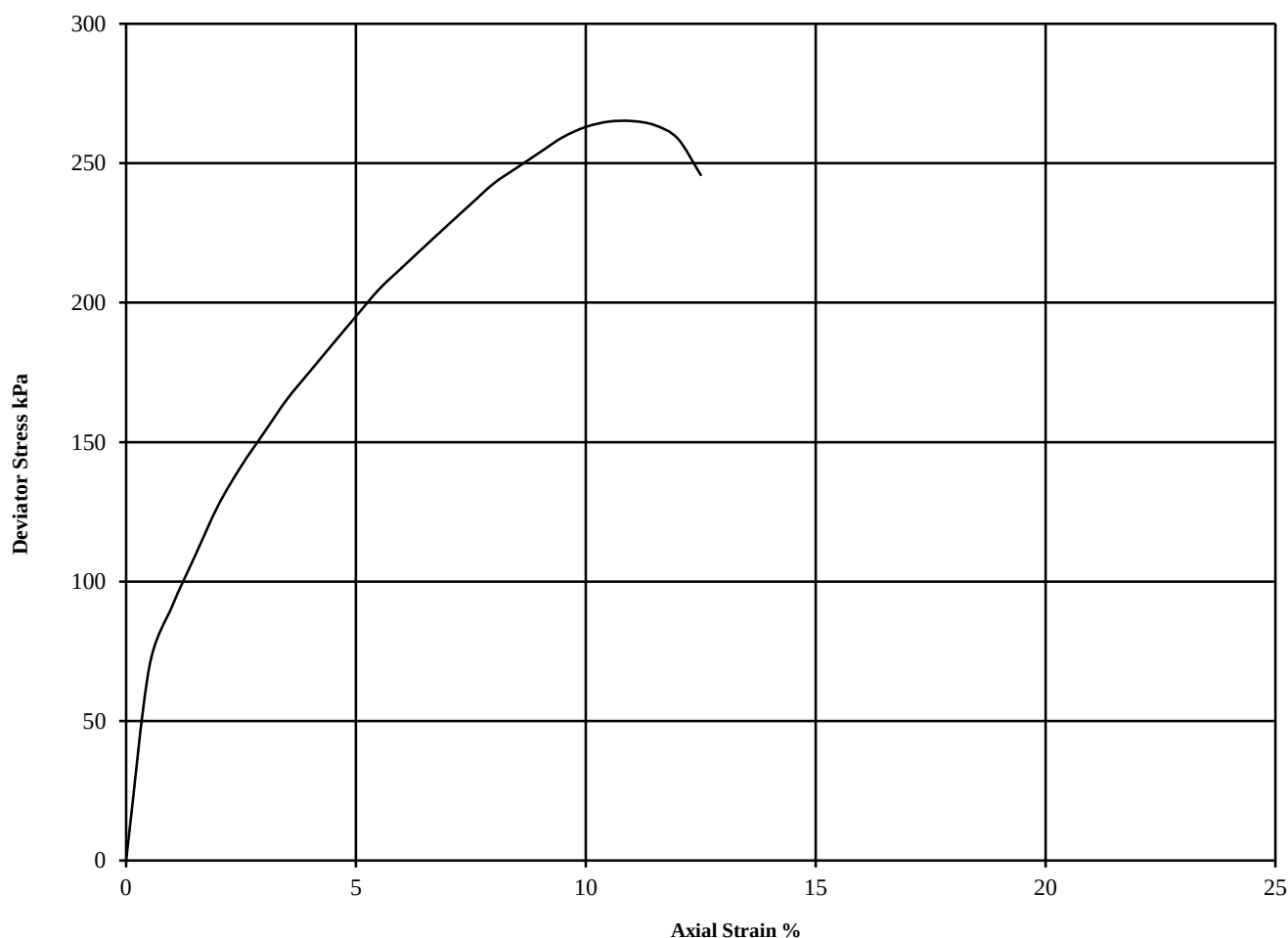
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: LINER Top Depth (m): 1.50

Sample Number: Base Depth (m): 2.00

Sample Type U



Diameter (mm):		75	Height (mm):		150	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.47 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	19	2.08	1.75	30	265	133	11.0	Brittle	



4043

PSL
Professional Soils Laboratory

Castleton Sidings/Rochdale

Contract No:

PSL21/1969

Client Ref:

14-768

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377: Part 5: 1990: Clause 3

Hole Number: WS101

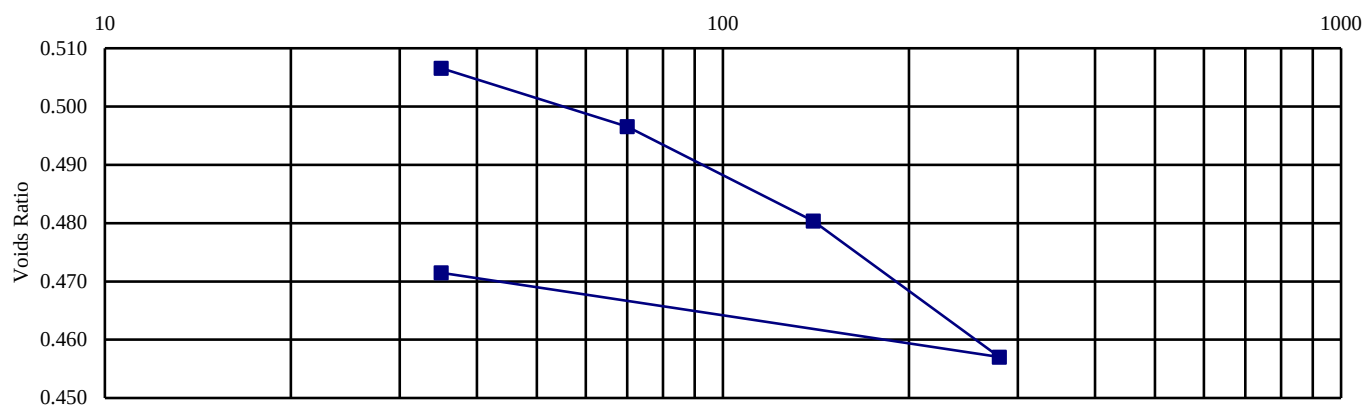
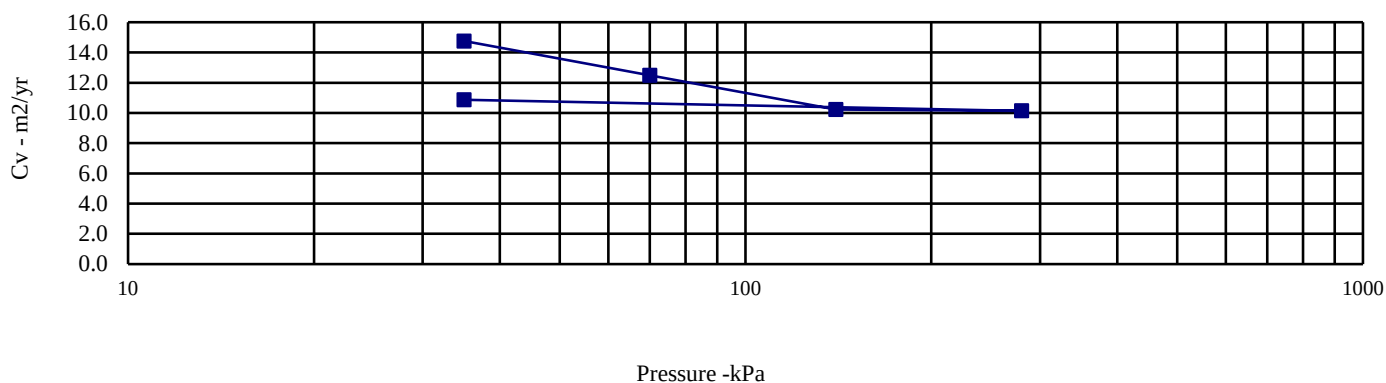
Top Depth (m): 1.50

Sample Number:

Base Depth (m) : 2.00

Sample Type: LINER

Initial Conditions		Pressure Range		Mv	Cv	Specimen location	
Moisture Content (%):	19	kPa		m2/MN	m2/yr	within tube:	Top
Bulk Density (Mg/m3):	2.08	0	35	0.254	14.760	Method used to	
Dry Density (Mg/m3):	1.74	35	70	0.190	12.498	determine CV:	T90
Voids Ratio:	0.520	70	140	0.155	10.218	Nominal temperature	
Degree of saturation:	97.4	140	280	0.113	10.133	during test ' C:	20
Height (mm):	20.002	280	35	0.040	10.861	Remarks:	
Diameter (mm)	50.013	See summary of soil descriptions					
Particle Density (Mg/m3):	2.65						
Assumed							



Castleton Sidings/Rochdale

Contract No:

PSL21/1969

Client Ref:

14-768



LABORATORY REPORT



4043

Contract Number: PSL21/2522

Report Date: 16 April 2021

Client's Reference: 14-768

Client Name: E3P
Taylor Road
Urmston
Manchester
M41 7JQ

For the attention of: Elizabeth Fearn

Contract Title: Castleton Sidings/Rochdale

Date Received: 25/3/2021

Date Commenced: 25/3/2021

Date Completed: 16/4/2021

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Senior Technician)

S Eyre
(Senior Technician)


T Watkins
(Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
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fax: +44 (0)844 815 6642
e-mail: awatkins@prosoils.co.uk
rberriman@prosoils.co.uk

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

4043

PSL
Professional Soils Laboratory

Castleton Sidings/Rochdale

Contract No:

PSL21/2522

Client Ref:

14-768

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



4043

PSL
Professional Soils Laboratory

Castleton Sidings/Rochdale

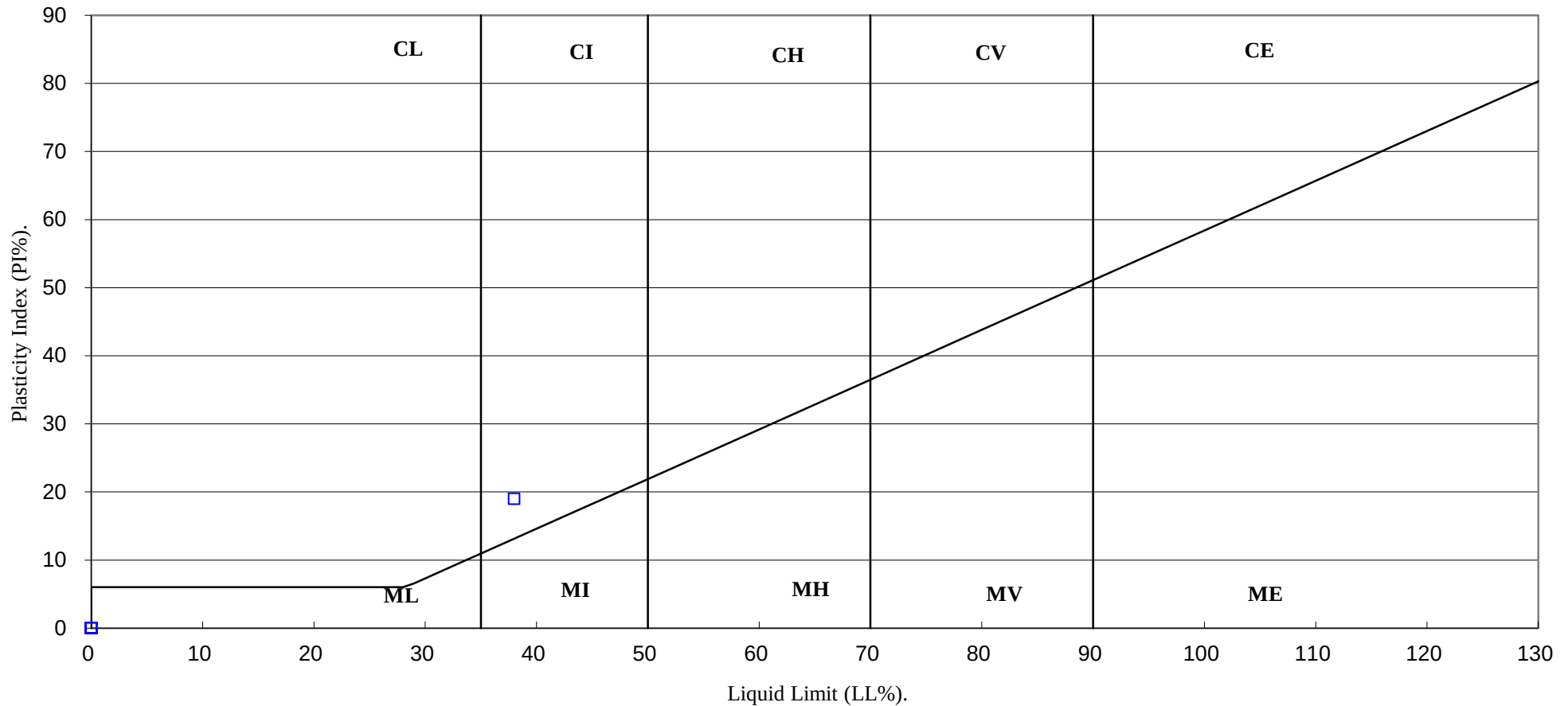
Contract No:

PSL21/2522

Client Ref:

14-768

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL
Professional Soils Laboratory

Castleton Sidings/Rochdale

Contract No:

PSL21/2522

Client Ref:

14-768

APPENDIX IX COAL AUTHORITY REPORT & PERMIT



The Coal
Authority

Consultants Coal Mining Report

2 Heywood Road
Rochdale
OL11 3AU

Date of enquiry:	16 March 2021
Date enquiry received:	16 March 2021
Issue date:	16 March 2021

Our reference:	51002404759001
Your reference:	14768-js-h



Consultants

Coal Mining Report

This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

E3P

Enquiry address

2 Heywood Road
Rochdale
OL11 3AU

How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

 @coalauthority

 /company/the-coal-authority

 /thecoalauthority

 /thecoalauthority



Approximate position of property



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Section 1 – Mining activity and geology

Past underground mining

No past mining recorded.

Probable unrecorded shallow workings

None.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

None recorded within 100 metres of the enquiry boundary.

Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

16820		
-------	--	--

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Outcrops

Seam name	Mineral	Seam workable	Distance to outcrop (m)	Direction to outcrop	Bearing of outcrop
ARLEY	Coal	Yes	Within	N/A	324
ARLEY	Coal	Yes	10.4	North-East	337

Geological faults, fissures and breaklines

Please refer to the 'Summary of findings' map (on separate sheet) for details of any geological faults, fissures or breaklines either within or intersecting the enquiry boundary.

Fault under or close to the property recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations

None recorded within 50 metres of the enquiry boundary.

Remediated sites

None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine gas

None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

Section 3 – Licensing and future mining activity

Future underground mining

None recorded.

Coal mining licensing

None recorded within 200 metres of the enquiry boundary.

Court orders

None recorded.

Section 46 notices

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

Withdrawal of support notices

The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

Payments to owners of former copyhold land

The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Section 4 – Further information

Based on the responses in this report, no further information has been highlighted.

Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk**.

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

Opencast mines

Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips

Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations

Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites

Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence

Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas

Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission.

Mine water treatment schemes

Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining

Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing

Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders

Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices

Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices

Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land

Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

- Approximate position of the enquiry boundary shown 
- Outcrop (Conjectured) 
- Geological faults 



How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)
www.groundstability.com



The Coal
Authority

Permit to Enter or Disturb Coal Authority Interests

Permit 21608

Name and Address of Permit Holder:

*Kellen Homes
103 Dalton Avenue
Birchwood Park
Warrington
WA3 6YE*

Site Location:

*Castleton Sidings
Heywood
Rochdale
OL11 3AU*

This certificate hereby grants the above named Permit Holder a Permit to carry out:-

Ground investigation by four boreholes to 40m to determine presence of shallow mine workings within the Authority's interests at the identified site location above as shown on the Grant Permit Boundary (overleaf) for the period of 12 months from the granted date shown below. *The granting of this Permit does not constitute advice given by the Authority in relation to the proposed operations. It is the Permit Holder's responsibility to obtain appropriate health, safety, environmental, technical and legal advice.*

Conditions:

- *Water flush*
- *Gas Monitoring CO, CH₄, CO₂, O₂, H₂S at borehole and rig*
- *Operators undertaking the work must be in possession of this certificate and the Permit boundary plan at the time of works*
- *Appropriate borehole sealing without delay and to withstand site level changes*

Signed: Kevin Waite Granted Date: 11th March 2021

For and on behalf of The Coal Authority

Nominated Representative: Kevin Waite, Permitting Manager;

The Coal Authority, Permitting Office, 200 Lichfield Lane, Mansfield, Notts, NG18 4RG

Tel: 01623 637450; E-Mail: permissions@coal.gov.uk

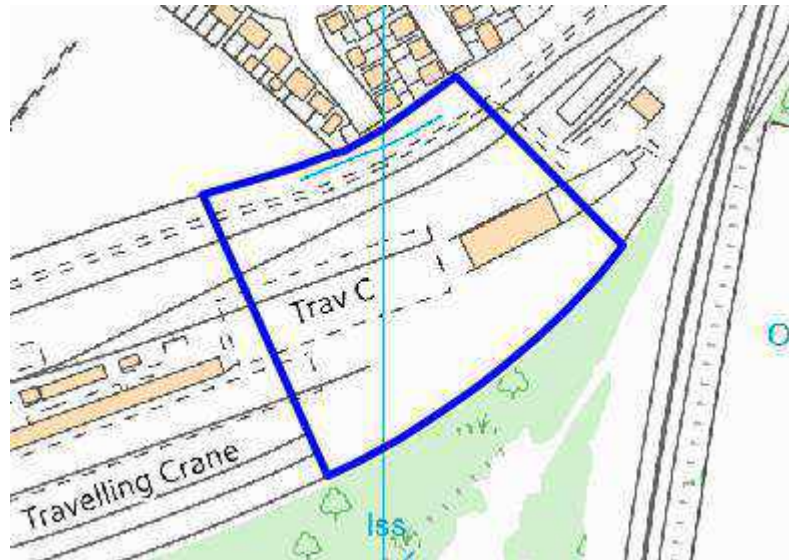


The Coal
Authority

Granted Permit Boundary

Permit Ref: 21608

Permit Boundary:



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Envirocheck[®] Report:

Datasheet

Order Details:

Order Number:

274207304_1_1

Customer Reference:

14-768 JC

National Grid Reference:

387930, 410140

Slice:

A

Site Area (Ha):

0.01

Search Buffer (m):

1000

Site Details:

Flat 2, The Directors

3

Heywood Road

ROCHDALE

OL11 3AU

Client Details:

Mr A Edgar

e3p

City Airport Business Park

Eccles

Manchester

M30 7RU

Report Section	Page Number
Summary	-
Agency & Hydrological	1
Waste	27
Hazardous Substances	-
Geological	29
Industrial Land Use	35
Sensitive Land Use	50
Data Currency	51
Data Suppliers	57
Useful Contacts	58

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination. For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency/Natural Resources Wales and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client. In this datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Report Version v53.0

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
BGS Groundwater Flooding Susceptibility	pg 1	Yes	Yes	Yes	n/a
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 2			7	10
Prosecutions Relating to Controlled Waters			n/a	n/a	n/a
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls	pg 6				5
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 7		Yes		
Pollution Incidents to Controlled Waters	pg 7			3	13
Prosecutions Relating to Authorised Processes					
Registered Radioactive Substances					
River Quality	pg 9			1	1
River Quality Biology Sampling Points	pg 10				1
River Quality Chemistry Sampling Points					
Substantiated Pollution Incident Register					
Water Abstractions	pg 10				2 (*14)
Water Industry Act Referrals	pg 14				2
Groundwater Vulnerability Map	pg 14	Yes	n/a	n/a	n/a
Groundwater Vulnerability - Soluble Rock Risk			n/a	n/a	n/a
Groundwater Vulnerability - Local Information			n/a	n/a	n/a
Bedrock Aquifer Designations	pg 15	Yes	n/a	n/a	n/a
Superficial Aquifer Designations	pg 15	Yes	n/a	n/a	n/a
Source Protection Zones					
Extreme Flooding from Rivers or Sea without Defences				n/a	n/a
Flooding from Rivers or Sea without Defences				n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
OS Water Network Lines	pg 15		7	37	57

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites	pg 27				1
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)	pg 27				1
Local Authority Landfill Coverage	pg 27	1	n/a	n/a	n/a
Local Authority Recorded Landfill Sites					
Potentially Infilled Land (Non-Water)	pg 27			1	8
Potentially Infilled Land (Water)	pg 28		1	4	5
Registered Landfill Sites					
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites					
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Geological					
BGS 1:625,000 Solid Geology	pg 29	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 29	Yes	Yes	Yes	Yes
BGS Recorded Mineral Sites	pg 31			1	5
BGS Urban Soil Chemistry					
BGS Urban Soil Chemistry Averages					
CBSCB Compensation District			n/a	n/a	n/a
Coal Mining Affected Areas	pg 32	Yes	n/a	n/a	n/a
Mining Instability	pg 33	Yes	n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain				n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 33	Yes	Yes	n/a	n/a
Potential for Compressible Ground Stability Hazards	pg 33		Yes	n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 33	Yes	Yes	n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 33	Yes	Yes	n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 33		Yes	n/a	n/a
Radon Potential - Radon Affected Areas			n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a
Industrial Land Use					
Contemporary Trade Directory Entries	pg 35		1	7	68
Fuel Station Entries	pg 41				2
Points of Interest - Commercial Services	pg 41			2	17
Points of Interest - Education and Health					
Points of Interest - Manufacturing and Production	pg 43			3	38
Points of Interest - Public Infrastructure	pg 46		1	5	21
Points of Interest - Recreational and Environmental	pg 49			3	1
Gas Pipelines					
Underground Electrical Cables					

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Sensitive Land Use					
Ancient Woodland					
Areas of Adopted Green Belt	pg 50	1			
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones	pg 50	1			
Ramsar Sites					
Sites of Special Scientific Interest	pg 50			1	
Special Areas of Conservation	pg 50			1	
Special Protection Areas					
World Heritage Sites					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NE (NE)	0	1	387927 410143
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NE (E)	24	1	387950 410143
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13SE (S)	93	1	387927 410050
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NE (NE)	130	1	388000 410250
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13SE (S)	143	1	387927 410000
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13SW (S)	146	1	387900 410000
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13SE (SE)	155	1	388050 410050
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A13SE (S)	193	1	387927 409950
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13SW (S)	208	1	387850 409950
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NW (N)	221	1	387850 410350
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13SE (SE)	225	1	388100 410000
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NE (NE)	234	1	388100 410300
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A13SE (SE)	242	1	388150 410050
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NE (N)	258	1	387927 410400
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13SE (SE)	260	1	388100 409950
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13SW (SW)	268	1	387700 410000
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NW (NW)	287	1	387800 410400
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13SW (SW)	298	1	387700 409950
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13SE (SE)	341	1	388100 409850
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A12NE (W)	377	1	387550 410143
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A18SE (N)	408	1	387950 410550
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A14NW (E)	437	1	388350 410250

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A8NE (S)	476	1	388100 409700
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A8NW (S)	494	1	387900 409650
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A8NW (S)	499	1	387850 409650
1	Discharge Consents Operator: United Utilities Water Limited Property Type: STORM TANK/CSO ON SEWERAGE NETWORK (WATER COMPANY) Location: Castleton South Junction Cso Adj To M62 Castleton (Trub Farm), Rochdale, .. Greater Manchester, OL11 1xh Authority: Environment Agency, North West Region Catchment Area: Not Supplied Reference: Eprqb3593ej Permit Version: 1 Effective Date: 15th April 2020 Issued Date: 15th April 2020 Revocation Date: Not Supplied Discharge Type: Public Sewage: Storm Sewage Overflow Discharge: Freshwater Stream/River Environment: Receiving Water: Trub Brook Status: Varied under EPR 2010 Positional Accuracy: Located by supplier to within 10m	A8NE (SE)	404	2	388136 409798
1	Discharge Consents Operator: United Utilities Water Limited Property Type: STORM TANK/CSO ON SEWERAGE NETWORK (WATER COMPANY) Location: Castleton Sso Alongside M62 Motorway, Castleton, Rochdale, Greater Manchester Authority: Environment Agency, North West Region Catchment Area: Not Given Reference: 016950400 Permit Version: 1 Effective Date: 28th February 1983 Issued Date: Not Supplied Revocation Date: Not Supplied Discharge Type: Public Sewage: Storm Sewage Overflow Discharge: Freshwater Stream/River Environment: Receiving Water: Trub Brook Status: Pre National Rivers Authority Legislation where issue date < 01/09/1989 Positional Accuracy: Located by supplier to within 10m	A8NE (SE)	421	2	388140 409780
1	Discharge Consents Operator: United Utilities Water Limited Property Type: STORM TANK/CSO ON SEWERAGE NETWORK (WATER COMPANY) Location: Castleton South Junction Cso Adj To M62 Castleton (Trub Farm), Rochdale, .. Greater Manchester, OL11 1xh Authority: Environment Agency, North West Region Catchment Area: Not Supplied Reference: 01roc0094 Permit Version: 1 Effective Date: 1st April 1991 Issued Date: Not Supplied Revocation Date: 31st December 1994 Discharge Type: Public Sewage: Storm Sewage Overflow Discharge: Not Supplied Environment: Receiving Water: Not Supplied Status: Authorisation revoked Positional Accuracy: Located by supplier to within 10m	A8NE (SE)	421	2	388140 409780

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	Discharge Consents Operator: United Utilities Water Limited Property Type: STORM TANK/CSO ON SEWERAGE NETWORK (WATER COMPANY) Location: Castleton South Junction Cso Adj To M62 Castleton (Trub Farm), Rochdale, .., Greater Manchester, OL11 1xh Authority: Environment Agency, North West Region Catchment Area: Not Given Reference: 01ROC0094 Permit Version: 2 Effective Date: 1st January 1995 Issued Date: Not Supplied Revocation Date: Not Supplied Discharge Type: Public Sewage: Storm Sewage Overflow Discharge: Freshwater Stream/River Environment: Receiving Water: Status: Post National Rivers Authority Legislation where issue date > 31/08/1989 Positional Accuracy: Located by supplier to within 100m	A8NE (SE)	426	2	388140 409775
2	Discharge Consents Operator: United Utilities Water Limited Property Type: PUMPING STATION ON SEWERAGE NETWORK (WATER COMPANY) Location: The Links Ps, Castleton, Rochdale, Greater Manchester Authority: Environment Agency, North West Region Catchment Area: Not Given Reference: 016982945 Permit Version: 2 Effective Date: 17th November 1995 Issued Date: Not Supplied Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Pumping Station - Water Company Discharge: Freshwater Stream/River Environment: Receiving Water: Roeacre Brook Status: Post National Rivers Authority Legislation where issue date > 31/08/1989 Positional Accuracy: Located by supplier to within 100m	A12NE (W)	449	2	387480 410180
2	Discharge Consents Operator: United Utilities Water Limited Property Type: PUMPING STATION ON SEWERAGE NETWORK (WATER COMPANY) Location: The Links Ps, Castleton, Rochdale, Greater Manchester Authority: Environment Agency, North West Region Catchment Area: Not Supplied Reference: 016982945 Permit Version: 1 Effective Date: 14th June 1995 Issued Date: Not Supplied Revocation Date: 16th November 1995 Discharge Type: Storm /emergency overflow Discharge: Freshwater Stream/River Environment: Receiving Water: Roeacre Brook Status: Authorisation revoked Positional Accuracy: Located by supplier to within 10m	A12NE (W)	449	2	387480 410180
3	Discharge Consents Operator: Network Rail Infrastructure Limited Property Type: LAND TRANSPORT + VIA PIPELINES/FREIGHT Location: Rochdale West Signal Box, Railway Brow, Castleton, Greater Manchester, OL11 2sp Authority: Environment Agency, North West Region Catchment Area: Not Supplied Reference: Eprlp3021gs Permit Version: 1 Effective Date: 1st August 2011 Issued Date: 1st August 2011 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Final/Treated Effluent - Not Water Company Discharge: Land/Soakaway Environment: Receiving Water: Groundwater Via Infiltration System Status: New issued under EPR 2010 Positional Accuracy: Located by supplier to within 10m	A14NW (NE)	456	2	388280 410431

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
4	Discharge Consents Operator: United Utilities Water Limited Property Type: WWTW/SEWAGE TREATMENT WORKS (WATER COMPANY) Location: Castleton Wwtw Cstlt Manchester Golf Club, Hopwood Cottage, Rochdale Road, Middleton, M24 6qp Authority: Environment Agency, North West Region Catchment Area: Not Supplied Reference: 016950034 Permit Version: 5 Effective Date: 17th September 2018 Issued Date: 17th September 2018 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge: Freshwater Stream/River Environment: Receiving Water: Trub Brook Trib River Irwell Status: Varied under EPR 2010 Positional Accuracy: Located by supplier to within 10m	A8NE (S)	573	2	388030 409580
4	Discharge Consents Operator: United Utilities Water Limited Property Type: WWTW/SEWAGE TREATMENT WORKS (WATER COMPANY) Location: Castleton Wwtw Cstlt Manchester Golf Club, Hopwood Cottage, Rochdale Road, Middleton, M24 6qp Authority: Environment Agency, North West Region Catchment Area: Not Supplied Reference: 016950034 Permit Version: 4 Effective Date: 1st January 2010 Issued Date: 24th September 2009 Revocation Date: 16th September 2018 Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge: Freshwater Stream/River Environment: Receiving Water: Trub Brook Status: Modified (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995) Positional Accuracy: Located by supplier to within 10m	A8NE (S)	573	2	388030 409580
4	Discharge Consents Operator: United Utilities Water Limited Property Type: WWTW/SEWAGE TREATMENT WORKS (WATER COMPANY) Location: Castleton Wwtw Cstlt Manchester Golf Club, Hopwood Cottage, Rochdale Road, Middleton, M24 6qp Authority: Environment Agency, North West Region Catchment Area: Not Supplied Reference: 016950034 Permit Version: 3 Effective Date: 31st December 2005 Issued Date: 21st December 2005 Revocation Date: 31st December 2009 Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge: Freshwater Stream/River Environment: Receiving Water: Trub Brook Status: Modified (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995) Positional Accuracy: Located by supplier to within 10m	A8NE (S)	573	2	388030 409580
4	Discharge Consents Operator: United Utilities Water Limited Property Type: WWTW/SEWAGE TREATMENT WORKS (WATER COMPANY) Location: Castleton Wwtw Cstlt Manchester Golf Club, Hopwood Cottage, Rochdale Road, Middleton, M24 6qp Authority: Environment Agency, North West Region Catchment Area: Irwell Reference: 016950034 Permit Version: 1 Effective Date: 12th January 1980 Issued Date: Not Supplied Revocation Date: 30th January 1985 Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge: Freshwater Stream/River Environment: Receiving Water: Trub Brook Status: Authorisation revoked Positional Accuracy: Located by supplier to within 100m	A8NE (S)	573	2	388030 409580

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
4	Discharge Consents Operator: United Utilities Water Limited Property Type: WWTW/SEWAGE TREATMENT WORKS (WATER COMPANY) Location: Castleton Wwtw Cstlt Manchester Golf Club, Hopwood Cottage, Rochdale Road, Middleton, M24 6qp Authority: Environment Agency, North West Region Catchment Area: Not Given Reference: 016950034 Permit Version: 2 Effective Date: 31st January 1985 Issued Date: 31st January 1985 Revocation Date: 30th December 2005 Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge: Freshwater Stream/River Environment: Receiving Water: Trub Brook Status: Consent revoked or revised: New Consent issued (Section 37(1)) Positional Accuracy: Located by supplier to within 100m	A8NE (S)	579	2	388035 409575
5	Discharge Consents Operator: United Utilities Water Limited Property Type: WWTW/SEWAGE TREATMENT WORKS (WATER COMPANY) Location: Castleton Wwtw Cstlt Manchester Golf Club, Hopwood Cottage, Rochdale Road, Middleton, M24 6qp Authority: Environment Agency, North West Region Catchment Area: Not Supplied Reference: 016950034 Permit Version: 5 Effective Date: 17th September 2018 Issued Date: 17th September 2018 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Final/Treated Effluent - Water Company Discharge: Freshwater Stream/River Environment: Receiving Water: Trub Brook Trib River Irwell Status: Varied under EPR 2010 Positional Accuracy: Located by supplier to within 10m	A8NW (S)	627	2	387860 409520
5	Discharge Consents Operator: United Utilities Water Limited Property Type: WWTW/SEWAGE TREATMENT WORKS (WATER COMPANY) Location: Castleton Wwtw Cstlt Manchester Golf Club, Hopwood Cottage, Rochdale Road, Middleton, M24 6qp Authority: Environment Agency, North West Region Catchment Area: Not Supplied Reference: 016950034 Permit Version: 4 Effective Date: 1st January 2010 Issued Date: 24th September 2009 Revocation Date: 16th September 2018 Discharge Type: Sewage Discharges - Final/Treated Effluent - Water Company Discharge: Freshwater Stream/River Environment: Receiving Water: Trub Brook Status: Modified (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995) Positional Accuracy: Located by supplier to within 10m	A8NW (S)	627	2	387860 409520
5	Discharge Consents Operator: United Utilities Water Limited Property Type: WWTW/SEWAGE TREATMENT WORKS (WATER COMPANY) Location: Castleton Wwtw Cstlt Manchester Golf Club, Hopwood Cottage, Rochdale Road, Middleton, M24 6qp Authority: Environment Agency, North West Region Catchment Area: Not Supplied Reference: 016950034 Permit Version: 3 Effective Date: 31st December 2005 Issued Date: 21st December 2005 Revocation Date: 31st December 2009 Discharge Type: Sewage Discharges - Final/Treated Effluent - Water Company Discharge: Freshwater Stream/River Environment: Receiving Water: Trub Brook Status: Modified (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995) Positional Accuracy: Located by supplier to within 10m	A8NW (S)	627	2	387860 409520

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
5	Discharge Consents Operator: United Utilities Water Limited Property Type: WWTW/SEWAGE TREATMENT WORKS (WATER COMPANY) Location: Castleton Wwtw Cstlt Manchester Golf Club, Hopwood Cottage, Rochdale Road, Middleton, M24 6qp Authority: Environment Agency, North West Region Catchment Area: Irwell Reference: 016950034 Permit Version: 2 Effective Date: 31st January 1985 Issued Date: 31st January 1985 Revocation Date: 30th December 2005 Discharge Type: Sewage Discharges - Final/Treated Effluent - Water Company Discharge: Freshwater Stream/River Environment: Receiving Water: Trub Brook Status: Consent revoked or revised: New Consent issued (Section 37(1)) Positional Accuracy: Located by supplier to within 100m	A8NW (S)	627	2	387860 409520
5	Discharge Consents Operator: United Utilities Water Limited Property Type: WWTW/SEWAGE TREATMENT WORKS (WATER COMPANY) Location: Castleton Wwtw Cstlt Manchester Golf Club, Hopwood Cottage, Rochdale Road, Middleton, M24 6qp Authority: Environment Agency, North West Region Catchment Area: Not Given Reference: 016950034 Permit Version: 1 Effective Date: 12th January 1980 Issued Date: Not Supplied Revocation Date: 30th January 1985 Discharge Type: Sewage Discharges - Final/Treated Effluent - Water Company Discharge: Freshwater Stream/River Environment: Receiving Water: Trub Brook Status: Authorisation revoked Positional Accuracy: Located by supplier to within 10m	A8NW (S)	627	2	387860 409520
6	Local Authority Pollution Prevention and Controls Name: Omc Ford Location: Manchester Road, Castleton, ROCHDALE, Lancashire, OL11 2TR Authority: Rochdale Metropolitan Borough Council, Environmental Health Department Permit Reference: 58/10 Dated: Not Supplied Process Type: Local Authority Air Pollution Control Description: PG6/34 Respraying of road vehicles Status: Authorised Positional Accuracy: Manually positioned to the address or location	A14SW (E)	586	3	388500 410026
7	Local Authority Pollution Prevention and Controls Name: Lew Diecasting Ltd Location: Trows Lane, Castleton, ROCHDALE, Lancashire, OL11 2UF Authority: Rochdale Metropolitan Borough Council, Environmental Health Department Permit Reference: 37/05 Dated: Not Supplied Process Type: Local Authority Air Pollution Control Description: PG2/4 Iron, steel and non-ferrous metal foundry processes Status: Authorised Positional Accuracy: Manually positioned to the address or location	A14SE (E)	914	3	388838 410073
7	Local Authority Pollution Prevention and Controls Name: Lew Diecasting Ltd Location: Trows Lane, Castleton, ROCHDALE, Lancashire, OL11 2UF Authority: Rochdale Metropolitan Borough Council, Environmental Health Department Permit Reference: 37/05 Dated: Not Supplied Process Type: Local Authority Air Pollution Control Description: PG2/3 Electrical and rotary furnaces Status: Authorised Positional Accuracy: Manually positioned to the address or location	A14SE (E)	914	3	388838 410073
7	Local Authority Pollution Prevention and Controls Name: Lew Diecastings Ltd Location: Trows Lane, Rochdale, Lancashire, OL11 2UF Authority: Rochdale Metropolitan Borough Council, Environmental Health Department Permit Reference: 37/05 Dated: Not Supplied Process Type: Local Authority Air Pollution Control Description: PG2/8 Copper and copper alloy processes Status: Permitted Positional Accuracy: Manually positioned to the address or location	A14SE (E)	914	3	388838 410073

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
8	Local Authority Pollution Prevention and Controls Name: Sudden Service Station Location: Manchester Road, Rochdale, OL11 3ad Authority: Rochdale Metropolitan Borough Council, Environmental Health Department Permit Reference: 92/09 Dated: Not Supplied Process Type: Local Authority Pollution Prevention and Control Description: PG1/14 Petrol filling station Status: Permitted Positional Accuracy: Manually positioned to the address or location	A18NE (N)	942	3	388093 411069
	Nearest Surface Water Feature	A13NE (N)	82	-	387957 410219
9	Pollution Incidents to Controlled Waters Property Type: Not Given Location: Location Description Not Available Authority: Environment Agency, North West Region Pollutant: Oils - Unknown Note: Not Supplied Incident Date: 8th June 1993 Incident Reference: 93611160 Catchment Area: Rochdale Canal Receiving Water: Not Given Cause of Incident: Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A14NW (E)	404	2	388300 410295
9	Pollution Incidents to Controlled Waters Property Type: Not Given Location: Location Description Not Available Authority: Environment Agency, North West Region Pollutant: Oils - Unknown Note: Not Supplied Incident Date: 3rd June 1993 Incident Reference: 93611117 Catchment Area: Rochdale Canal Receiving Water: Not Given Cause of Incident: Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A14NW (NE)	406	2	388300 410300
10	Pollution Incidents to Controlled Waters Property Type: Not Given Location: Greater Manchester Authority: Environment Agency, North West Region Pollutant: Oils - Unknown Note: Rochdale Canal; Oil Incident Date: 2nd October 1996 Incident Reference: 96622122 Catchment Area: Rochdale Canal Receiving Water: Not Given Cause of Incident: Other Incident/Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A14NW (NE)	454	2	388300 410400
11	Pollution Incidents to Controlled Waters Property Type: Not Given Location: Location Description Not Available Authority: Environment Agency, North West Region Pollutant: Oils - Unknown Note: Not Supplied Incident Date: 16th March 1994 Incident Reference: 94610489 Catchment Area: Rochdale Canal Receiving Water: Not Given Cause of Incident: Other Incident/Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A19SW (NE)	514	2	388300 410495
11	Pollution Incidents to Controlled Waters Property Type: Not Given Location: Location Description Not Available Authority: Environment Agency, North West Region Pollutant: Oils - Other Fuel Oil Note: Rochdale Canal; Crude Oil Incident Date: 13th July 1994 Incident Reference: 94621553 Catchment Area: Rochdale Canal Receiving Water: Not Given Cause of Incident: Leaking Underground Pipe Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A19SW (NE)	517	2	388300 410500

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
12	Pollution Incidents to Controlled Waters Property Type: Water Company Sewage: Sewage Treatment Works Location: Location Description Not Available Authority: Environment Agency, North West Region Pollutant: Miscellaneous - Unknown Note: Trub Brook Incident Date: 29th January 1992 Incident Reference: 92610159 Catchment Area: Irk Receiving Water: Not Given Cause of Incident: Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A8NE (S)	548	2	388000 409600
13	Pollution Incidents to Controlled Waters Property Type: Not Given Location: Greater Manchester Authority: Environment Agency, North West Region Pollutant: Oils - Unknown Note: Rochdale Canal; Oil Incident Date: 8th March 1996 Incident Reference: 96620471 Catchment Area: Rochdale Canal Receiving Water: Not Given Cause of Incident: Other Incident/Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A19SW (NE)	655	2	388400 410595
13	Pollution Incidents to Controlled Waters Property Type: Not Given Location: Oil Seeping Into Canal At , Manchester Road, Castleton , ROCHDALE Authority: Environment Agency, North West Region Pollutant: Oils - Unknown Note: Rochdale Canal; Oil Incident Date: 6th August 1997 Incident Reference: 97621423 Catchment Area: Rochdale Canal Receiving Water: Freshwater Stream/River Cause of Incident: Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A19SW (NE)	659	2	388405 410595
13	Pollution Incidents to Controlled Waters Property Type: Not Given Location: Location Description Not Available Authority: Environment Agency, North West Region Pollutant: Oils - Other Fuel Oil Note: Not Supplied Incident Date: 7th January 1995 Incident Reference: 95620024 Catchment Area: Rochdale Canal Receiving Water: Not Given Cause of Incident: Accidental Spillage/Leakage Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A19SW (NE)	659	2	388400 410600
13	Pollution Incidents to Controlled Waters Property Type: No Premises Identified Location: Rochdale Canal, CASTLETON Authority: Environment Agency, North West Region Pollutant: Organic Chemicals : Other Organic Wastes Note: Not Supplied Incident Date: 30th January 1999 Incident Reference: 634 Catchment Area: Rochdale Canal Receiving Water: Canal Cause of Incident: Other Cause Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 10m	A19SW (NE)	662	2	388405 410600
14	Pollution Incidents to Controlled Waters Property Type: Not Given Location: Greater Manchester Authority: Environment Agency, North West Region Pollutant: Unknown Note: None Affected; Contaminated Sprinkler Water Incident Date: 30th May 1996 Incident Reference: 96621157 Catchment Area: Rochdale Canal Receiving Water: Not Given Cause of Incident: Other Incident/Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A19SW (NE)	728	2	388400 410695

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
14	Pollution Incidents to Controlled Waters Property Type: Not Given Location: Greater Manchester Authority: Environment Agency, North West Region Pollutant: Oils - Diesel (Including Agricultural) Note: Rochdale Canal; Diesel Incident Date: 11th April 1996 Incident Reference: 96620734 Catchment Area: Rochdale Canal Receiving Water: Not Given Cause of Incident: Other Incident/Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A19SW (NE)	731	2	388405 410695
14	Pollution Incidents to Controlled Waters Property Type: Not Given Location: Location Description Not Available Authority: Environment Agency, North West Region Pollutant: Oils - Other Fuel Oil Note: Not Supplied Incident Date: 23rd January 1995 Incident Reference: 95620099 Catchment Area: Rochdale Canal Receiving Water: Not Given Cause of Incident: Other Incident/Unknown Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A19SW (NE)	732	2	388400 410700
15	Pollution Incidents to Controlled Waters Property Type: Pollution Found Source Not Determined Location: Greater Manchester Authority: Environment Agency, North West Region Pollutant: Oils - Unknown Note: Rochdale Canal; Thin Oil Film Incident Date: 14th April 1996 Incident Reference: 96620759 Catchment Area: Rochdale Canal Receiving Water: Not Given Cause of Incident: Other Incident/Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A19SW (NE)	800	2	388500 410700
16	Pollution Incidents to Controlled Waters Property Type: Not Given Location: Greater Manchester Authority: Environment Agency, North West Region Pollutant: Oils - Unknown Note: Rochdale Canal; Oil Incident Date: 11th February 1996 Incident Reference: 96620258 Catchment Area: Rochdale Canal Receiving Water: Not Given Cause of Incident: Other Incident/Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A19SW (NE)	873	2	388500 410800
17	Pollution Incidents to Controlled Waters Property Type: Private Sewage (Non-PLC): Sewerage Systems Location: Location Description Not Available Authority: Environment Agency, North West Region Pollutant: Unknown Sewage Note: Colne Water Incident Date: 27th August 1991 Incident Reference: 91330230 Catchment Area: Calder - Lancs Receiving Water: Not Given Cause of Incident: Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A7SE (SW)	972	2	387300 409400
	River Quality Name: Rochdale Canal GQA Grade: River Quality B Reach: Qsl At Summit To Empress Processing Estimated Distance (km): 27.6 Flow Rate: Flow greater than 80 cumecs Flow Type: Canal Year: 2000	A14SW (E)	416	2	388334 410059

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	River Quality Name: Whit (Trub) Bk GQA Grade: River Quality D Reach: Qsl At Castleton Stw To Irk Estimated Distance (km): 4.5 Flow Rate: Flow less than 0.31 cumecs Flow Type: River Year: 2000	A8NE (S)	545	2	387986 409602
18	River Quality Biology Sampling Points Name: Wince Beck Reach: Qsl At Castleton Sewage Treatment Works To Irk Estimated Distance: 4.50 Positional Accuracy: Located by supplier to within 100m Year: 1990 GQA Grade: River Quality Biology GQA Grade Not Supplied Year: 1995 GQA Grade: River Quality Biology GQA Grade E - Poor Year: 2000 GQA Grade: River Quality Biology GQA Grade E - Poor Year: 2002 GQA Grade: River Quality Biology GQA Grade E - Poor Year: 2003 GQA Grade: River Quality Biology GQA Grade E - Poor Year: 2004 GQA Grade: River Quality Biology GQA Grade E - Poor Year: 2005 GQA Grade: River Quality Biology GQA Grade E - Poor Year: 2006 GQA Grade: River Quality Biology GQA Grade E - Poor Year: 2007 GQA Grade: River Quality Biology GQA Grade E - Poor Year: 2008 GQA Grade: River Quality Biology GQA Grade E - Poor Year: 2009 GQA Grade: River Quality Biology GQA Grade E - Poor	A8NE (S)	548	2	388000 409600
19	Water Abstractions Operator: Sonoco Industrial Packaging Licence Number: 2569002024 Permit Version: Not Supplied Location: Rochdale Canal, Castleton, ROCHDALE, Lancashire Authority: Environment Agency, North West Region Abstraction: Cooling Abstraction Type: Not Supplied Source: Canal Daily Rate (m3): 123 Yearly Rate (m3): 30458 Details: Licence Status: Revoked Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A19SW (NE)	593	2	388400 410500
20	Water Abstractions Operator: The Manchester Golf Club Ltd Licence Number: 2569005053 Permit Version: 100 Location: Trub Brk At Rochdale Authority: Environment Agency, North West Region Abstraction: Golf Courses: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): 26 Yearly Rate (m3): 1473 Details: Manchester Golf Club Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st April 2008 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A8NW (S)	656	2	387800 409500

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: The Manchester Golf Club Ltd Licence Number: 2569005053 Permit Version: 100 Location: Trub Brk At Rochdale Authority: Environment Agency, North West Region Abstraction: Golf Courses: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): 0 Yearly Rate (m3): 0 Details: Manchester Golf Club Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st April 2008 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A3NW (S)	1093	2	387600 409100
	Water Abstractions Operator: Tarmac Topmix Ltd Licence Number: 2569002257 Permit Version: 100 Location: Borehole At Green Lane, Heywood Authority: Environment Agency, North West Region Abstraction: Construction: General Use (Medium Loss) Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): 35 Yearly Rate (m3): 10000 Details: Land & Prems-Green Lane, Heywood Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 28th June 1993 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A11NE (W)	1229	2	386700 410200
	Water Abstractions Operator: The Manchester Golf Club Ltd Licence Number: 2569005053 Permit Version: 100 Location: Trub Brk At Rochdale Authority: Environment Agency, North West Region Abstraction: Golf Courses: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): 0 Yearly Rate (m3): 0 Details: Manchester Golf Club Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st April 2008 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A3NW (S)	1286	2	387600 408900
	Water Abstractions Operator: Oak Brewing Company Ltd Licence Number: 2569002029 Permit Version: 100 Location: Borehole At Premises, Green Lane, Heywood Authority: Environment Agency, North West Region Abstraction: Food And Drink: General Cooling (Existing Licences Only) (Low Loss) Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): 218 Yearly Rate (m3): 79646 Details: Premises At Green Lane, Heywood Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 15th November 1990 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A11SW (W)	1428	2	386500 410100

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Mr M Gadhi And Mr A Raazaq Licence Number: 2569002074 Permit Version: Not Supplied Location: Rochdale Canal At Queensway, Castleton, ROCHDALE, Lancashire Authority: Environment Agency, North West Region Abstraction: Boiler Feed Abstraction Type: Not Supplied Source: Canal Daily Rate (m3): 114 Yearly Rate (m3): 36368 Details: Licence Status: Revoked Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A25SW (NE)	1507	2	389000 411200
	Water Abstractions Operator: M S Gadhi & A Raazaq Licence Number: 2569002026 Permit Version: Not Supplied Location: Borehole, Crest Mill, Queensway, ROCHDALE, Lancashire Authority: Environment Agency, North West Region Abstraction: Manufacturing Abstraction Type: Not Supplied Source: Groundwater Daily Rate (m3): 655 Yearly Rate (m3): 91829 Details: Licence Status: Revoked Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A25SW (NE)	1582	2	389005 411300
	Water Abstractions Operator: Roe Acre Dyeing & Finishing Co Ltd Licence Number: 2569002266 Permit Version: Not Supplied Location: Crimble Mill, Crimble Lane, HEYWOOD, Lancashire, OL10 4DJ Authority: Environment Agency, North West Region Abstraction: Industrial Abstraction Type: Not Supplied Source: Surface Daily Rate (m3): 455 Yearly Rate (m3): 118300 Details: Unnamed Tributary Of River Roch; Textiles; Type: Abstraction; Status: Current Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A21SE (NW)	1757	2	386700 411400
	Water Abstractions Operator: G. S. Cold Storage And Warehousing Ltd. Licence Number: 2569002082 Permit Version: 102 Location: Boreholes (2) At Premises, Roeacre Tannery, Heywood, L\$97 Authority: Environment Agency, North West Region Abstraction: Textiles And Leather: Process Water Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Premises, Roeacre Tannery, Heywood Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 22nd December 2000 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(W)	1787	2	386200 410600

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Litton Ltd Licence Number: 2569002082 Permit Version: 101 Location: Boreholes (2) At Premises, Roeacre Tannery, Heywood, L\$97 Authority: Environment Agency, North West Region Abstraction: Textiles And Leather: Process Water Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): 0 Yearly Rate (m3): 0 Details: Premises, Roeacre Tannery, Heywood Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 22nd June 2000 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	(W)	1787	2	386200 410600
	Water Abstractions Operator: Roe Acre Dyeing & Felting Co. Ltd. Licence Number: 2569002022 Permit Version: Not Supplied Location: Reservoir Fed By Roe Acre Brook, Roe Acre Dam, HEYWOOD Authority: Environment Agency, North West Region Abstraction: Boiler Feed & Manufacturing Abstraction Type: Not Supplied Source: River Daily Rate (m3): 2309 Yearly Rate (m3): 340950 Details: Additional Purpose: Boiler feed; Licence Status: Revoked Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	(W)	1813	2	386200 410695
	Water Abstractions Operator: G. S. Cold Storage And Warehousing Ltd. Licence Number: 2569002082 Permit Version: 102 Location: Boreholes (2) At Premises, Roeacre Tannery, Heywood Authority: Environment Agency, North West Region Abstraction: Textiles And Leather: Process Water Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Premises, Roeacre Tannery, Heywood Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 22nd December 2000 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(W)	1815	2	386200 410700
	Water Abstractions Operator: Litton Ltd Licence Number: 2569002082 Permit Version: 101 Location: Boreholes (2) At Premises, Roeacre Tannery, Heywood Authority: Environment Agency, North West Region Abstraction: Textiles And Leather: Process Water Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): 546 Yearly Rate (m3): 134016 Details: Premises, Roeacre Tannery, Heywood Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 22nd June 2000 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	(W)	1815	2	386200 410700

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Roe Acre Dyeing & Felting Co Ltd Licence Number: 2569002270 Permit Version: 100 Location: River Roch At Heywood Authority: Environment Agency, North West Region Abstraction: Other Industrial/Commercial/Public Services: Boiler Feed Abstraction Type: Water may be abstracted from a river or stream reach, or a row of wellpoints Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Land At Crimble Mill, Heywood Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 17th June 1999 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A21NE (NW)	1884	2	386620 411500
	Water Abstractions Operator: Roe Acre Dyeing & Felting Co Ltd Licence Number: 2569002270 Permit Version: 100 Location: River Roch At Heywood Authority: Environment Agency, North West Region Abstraction: Other Industrial/Commercial/Public Services: Process Water Abstraction Type: Water may be abstracted from a river or stream reach, or a row of wellpoints Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Land At Crimble Mill, Heywood Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 17th June 1999 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A21NE (NW)	1884	2	386620 411500
21	Water Industry Act Referrals Name: Whipp And Bourne Ltd Location: SWITCHGEAR WORKS, MANCHESTER ROAD, CASTLETON, ROCHDALE, LANCASHIRE, OL11 2SS Authority: Environment Agency, North West Region Permit Reference: BB4588 Dated: 12th June 1998 Process Type: Permissions or amendments to discharge under the Water Industry Act 1991 Description: Processes which result in the discharge of Special Category effluents under The Trade Effluents (Prescribed Processes and Substances) Regulations Status: Application received by the EA but is not yet authorised Positional Accuracy: Manually positioned to the road within the address or location	A14NW (NE)	524	2	388375 410413
21	Water Industry Act Referrals Name: Whipp And Bourne Ltd Location: SWITCHGEAR WORKS, MANCHESTER ROAD, CASTLETON, ROCHDALE, LANCASHIRE, OL11 2SS Authority: Environment Agency, North West Region Permit Reference: BB5193 Dated: 12th June 1998 Process Type: Permissions or amendments to discharge under the Water Industry Act 1991 Description: Processes which result in the discharge of Special Category effluents under The Trade Effluents (Prescribed Processes and Substances) Regulations Status: Application received by the EA but is not yet authorised Positional Accuracy: Manually positioned to the road within the address or location	A14NW (NE)	534	2	388376 410431
	Groundwater Vulnerability Map Combined Classification: Secondary Superficial Aquifer - High Vulnerability Combined Vulnerability: High Combined Aquifer: Productive Bedrock Aquifer, Productive Superficial Aquifer Pollutant Speed: High Bedrock Flow: Well Connected Fractures Dilution: >550 mm/year Baseflow Index: >70% Superficial Patchiness: >90% Superficial Thickness: >10m Superficial Recharge: High	A13NE (NE)	0	4	387927 410143
	Groundwater Vulnerability - Soluble Rock Risk None				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Bedrock Aquifer Designations Aquifer Designation: Secondary Aquifer - A	A13NE (NE)	0	4	387927 410143
	Superficial Aquifer Designations Aquifer Designation: Secondary Aquifer - A	A13NE (NE)	0	4	387927 410143
	Extreme Flooding from Rivers or Sea without Defences None				
	Flooding from Rivers or Sea without Defences None				
	Areas Benefiting from Flood Defences None				
	Flood Water Storage Areas None				
	Flood Defences None				
22	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 81.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A13NE (N)	82	5	387957 410219
23	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 93.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A13SE (SE)	150	5	388016 410023
24	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 15.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A13NW (NW)	212	5	387769 410284
25	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 1.6 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A13NW (NW)	223	5	387770 410300
26	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 75.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A13NW (NW)	224	5	387770 410301
27	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 42.9 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A13SE (S)	225	5	388007 409933

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
28	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 226.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A13SE (S)	248	5	387981 409901
29	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 99.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A13SE (S)	264	5	388003 409890
30	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 43.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A13NW (NW)	266	5	387760 410349
31	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 120.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A13NE (E)	310	5	388215 410255
32	OS Water Network Lines Watercourse Form: Transfer Watercourse Length: 44.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 2	A14SW (E)	354	5	388280 410124
33	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 56.9 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A8NE (S)	363	5	388047 409801
34	OS Water Network Lines Watercourse Form: Canal Watercourse Length: 159.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A14SW (E)	364	5	388290 410126
35	OS Water Network Lines Watercourse Form: Canal Watercourse Length: 109.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A14NW (E)	366	5	388292 410164
36	OS Water Network Lines Watercourse Form: Canal Watercourse Length: 152.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A14SW (E)	388	5	388285 409995

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
37	OS Water Network Lines Watercourse Form: Canal Watercourse Length: 5.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A14SW (E)	389	5	388289 410002
38	OS Water Network Lines Watercourse Form: Canal Watercourse Length: 349.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A14SW (E)	392	5	388294 410006
39	OS Water Network Lines Watercourse Form: Canal Watercourse Length: 23.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A14NW (E)	398	5	388302 410272
40	OS Water Network Lines Watercourse Form: Transfer Watercourse Length: 70.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A14NW (E)	398	5	388302 410272
41	OS Water Network Lines Watercourse Form: Lock or flight of locks Watercourse Length: 25.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A14NW (E)	404	5	388300 410295
42	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 98.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A8NE (SE)	405	5	388099 409777
43	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 44.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A8NE (SE)	405	5	388099 409777
44	OS Water Network Lines Watercourse Form: Canal Watercourse Length: 10.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A14NW (NE)	415	5	388301 410320
45	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 27.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A12SE (W)	416	5	387512 410133

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
46	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 26.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A12SE (W)	422	5	387506 410114
47	OS Water Network Lines Watercourse Form: Canal Watercourse Length: 219.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A14NW (NE)	422	5	388303 410332
48	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 147.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A8NE (SE)	425	5	388143 409777
49	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 1.7 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A12NE (W)	434	5	387493 410153
50	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 27.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A12NE (W)	435	5	387492 410154
51	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 2.3 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A12SE (W)	443	5	387485 410130
52	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 43.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A12SE (W)	445	5	387483 410132
53	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 10.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Roeacre Brook Catchment Name: Mersey Primacy: 1	A12NE (W)	449	5	387480 410177
54	OS Water Network Lines Watercourse Form: Canal Watercourse Length: 16.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A14SW (SE)	455	5	388276 409852

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
55	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 25.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Roeacre Brook Catchment Name: Mersey Primacy: 1	A12NE (W)	457	5	387471 410172
56	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 97.3 Watercourse Level: Underground Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A14SW (SE)	468	5	388278 409835
57	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 23.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A14SW (SE)	468	5	388278 409835
58	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 34.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A12SE (W)	470	5	387461 410084
59	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 27.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Roeacre Brook Catchment Name: Mersey Primacy: 1	A12NE (W)	478	5	387449 410159
60	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 48.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A14SW (SE)	479	5	388300 409844
61	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 1.8 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A12SE (W)	491	5	387437 410108
62	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 41.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A12SE (W)	491	5	387437 410109
63	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 77.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A8NE (S)	494	5	388095 409679

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
64	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 22.4 Watercourse Level: Underground Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A14SW (SE)	496	5	388341 409870
65	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 138.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A14SW (SE)	499	5	388355 409888
66	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 59.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Roeacre Brook Catchment Name: Mersey Primacy: 1	A12NE (W)	503	5	387424 410149
67	OS Water Network Lines Watercourse Form: Canal Watercourse Length: 152.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A9NW (SE)	545	5	388292 409739
68	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 15.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A8NE (S)	556	5	388025 409596
69	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 343.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Roeacre Brook Catchment Name: Mersey Primacy: 1	A12SE (W)	559	5	387369 410134
70	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 31.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A12SE (W)	561	5	387369 410087
71	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 4.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A8NE (S)	564	5	388090 409603
72	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 7.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A8NE (S)	564	5	388091 409604

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
73	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 33.9 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A8NE (S)	566	5	388097 409604
74	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 4.1 Watercourse Level: Underground Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A8NE (S)	569	5	388089 409599
75	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 58.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A8NE (S)	570	5	388072 409593
76	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 61.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A8NE (S)	571	5	388029 409581
77	OS Water Network Lines Watercourse Form: Lock or flight of locks Watercourse Length: 25.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A19SW (NE)	578	5	388345 410542
78	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 4.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A8NE (S)	578	5	388131 409602
79	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 3.4 Watercourse Level: Underground Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A8NE (S)	579	5	387970 409566
80	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 204.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A8NE (S)	580	5	387967 409565
81	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 26.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A8NE (S)	580	5	388135 409602

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
82	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 186.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 2	A8NE (S)	580	5	388135 409602
83	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 81.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A14SW (E)	588	5	388478 409939
84	OS Water Network Lines Watercourse Form: Canal Watercourse Length: 1199.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A19SW (NE)	601	5	388353 410566
85	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 54.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A8NE (S)	604	5	388134 409576
86	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 222.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A8NE (S)	604	5	388134 409576
87	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 149.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A14SW (E)	645	5	388550 409978
88	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 259.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A14SW (E)	645	5	388550 409978
89	OS Water Network Lines Watercourse Form: Lock or flight of locks Watercourse Length: 26.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A9NW (SE)	648	5	388377 409677
90	OS Water Network Lines Watercourse Form: Canal Watercourse Length: 56.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A9NW (SE)	663	5	388371 409651

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
91	OS Water Network Lines Watercourse Form: Transfer Watercourse Length: 27.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 2	A9NW (SE)	675	5	388322 409596
92	OS Water Network Lines Watercourse Form: Canal Watercourse Length: 4.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A9NW (SE)	689	5	388349 409600
93	OS Water Network Lines Watercourse Form: Canal Watercourse Length: 1216.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Rochdale Canal Catchment Name: Mersey Primacy: 2	A9NW (SE)	692	5	388349 409596
94	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 118.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A7NE (SW)	705	5	387573 409533
95	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 14.1 Watercourse Level: Underground Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A8SW (S)	717	5	387842 409431
96	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 262.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A8SW (S)	731	5	387835 409418
97	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 38.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A14SE (E)	788	5	388675 409896
98	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 98.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A8SW (S)	813	5	387643 409381
99	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 103.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A8SW (S)	818	5	387632 409381

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
100	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 176.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A14SE (E)	825	5	388706 409874
101	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 179.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A14SE (E)	825	5	388706 409874
102	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 249.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A7NW (SW)	833	5	387172 409791
103	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 77.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A14SE (E)	846	5	388769 410064
104	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 108.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A12SW (W)	860	5	387091 409940
105	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 113.4 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A12SW (W)	860	5	387067 410126
106	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 101.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A12NW (W)	860	5	387067 410145
107	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 322.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A7SE (SW)	868	5	387526 409373
108	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 1.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A12SW (W)	874	5	387063 410013

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
109	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 334.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A12SW (W)	878	5	387080 409912
110	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 42.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Roeacre Brook Catchment Name: Mersey Primacy: 1	A12NW (W)	882	5	387049 410223
111	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 8.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A8SW (S)	895	5	387666 409287
112	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 145.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A8SW (S)	903	5	387664 409280
113	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 5.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A12NW (W)	909	5	387026 410256
114	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 87.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Roeacre Brook Catchment Name: Mersey Primacy: 1	A12NW (W)	909	5	387026 410256
115	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 59.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A7NW (SW)	922	5	387107 409721
116	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 78.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A7NW (SW)	923	5	387105 409724
117	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 12.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A14SE (E)	923	5	388846 410061

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
118	OS Water Network Lines Watercourse Form: Reservoir Watercourse Length: 10.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Trub Brook Catchment Name: Mersey Primacy: 1	A14SE (E)	935	5	388858 410061
119	OS Water Network Lines Watercourse Form: Reservoir Watercourse Length: 198.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A14SE (E)	945	5	388868 410064
120	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 235.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Roeacre Brook Catchment Name: Mersey Primacy: 1	A12NW (W)	979	5	386959 410292
121	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 9.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A9NE (E)	996	5	388856 409787
122	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 123.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Mersey Primacy: 1	A9NE (E)	996	5	388856 409787

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
123	Historical Landfill Sites Licence Holder: Wilderness Quarries Limited Location: Heywood, Rochdale Name: Land South of Chadwick Lane Operator Location: Not Supplied Boundary Accuracy: As Supplied Provider Reference: EAHLD15792 First Input Date: 31st December 1984 Last Input Date: 31st December 1986 Specified Waste: Deposited Waste included Inert, Industrial, Commercial, Household and Type: Special Waste EA Waste Ref: 0 Regis Ref: Not Supplied WRC Ref: 4200/9067 BGS Ref: Not Supplied Other Ref: RD/LIC/350/84, D009, RD/LIC/265/83, 4200/9007	A12NW (W)	754	2	387200 410341
124	Licensed Waste Management Facilities (Locations) Licence Number: 50145 Location: Land At, Railway Approach, Castleton, Rochdale, Lancashire, OL11 3EE Operator Name: Britannia Import Export Ltd Operator Location: Not Supplied Authority: Environment Agency - North West Region, South Area Site Category: Metal Recycling Sites (Mixed) Licence Status: Expired Issued: 10th March 2003 Last Modified: Not Supplied Expires: Not Supplied Suspended: Not Supplied Revoked: Not Supplied Surrendered: Not Supplied IPPC Reference: Not Supplied Positional Accuracy: Located by supplier to within 10m	A19SW (NE)	694	2	388315 410717
	Local Authority Landfill Coverage Name: Rochdale Metropolitan Borough Council - Has no landfill data to supply		0	3	387927 410143
125	Potentially Infilled Land (Non-Water) Bearing Ref: W Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1993	A13SW (W)	294	-	387636 410104
126	Potentially Infilled Land (Non-Water) Bearing Ref: NW Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1993	A18SW (NW)	679	-	387645 410760
127	Potentially Infilled Land (Non-Water) Bearing Ref: NW Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1993	A17SE (NW)	689	-	387393 410577
128	Potentially Infilled Land (Non-Water) Bearing Ref: E Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1984	A14SE (E)	742	-	388627 409899
129	Potentially Infilled Land (Non-Water) Bearing Ref: E Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1993	A14NE (E)	879	-	388776 410367
130	Potentially Infilled Land (Non-Water) Bearing Ref: E Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1993	A14NE (E)	927	-	388822 410383
131	Potentially Infilled Land (Non-Water) Bearing Ref: SE Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1984	A9NE (SE)	932	-	388725 409663
132	Potentially Infilled Land (Non-Water) Bearing Ref: NE Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1993	A19SW (NE)	935	-	388587 410805
133	Potentially Infilled Land (Non-Water) Bearing Ref: E Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1993	A19SE (E)	989	-	388841 410519

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
134	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1851	A13SW (S)	56	-	387913 410089
135	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1851	A13SW (W)	307	-	387642 410027
136	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1956	A14SW (SE)	457	-	388273 409846
137	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1956	A8NE (S)	463	-	388044 409695
138	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1956	A8NE (SE)	472	-	388133 409719
139	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1851	A19SW (NE)	708	-	388324 410728
140	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1956	A18NW (N)	798	-	387801 410930
141	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1894	A19NW (NE)	895	-	388514 410818
142	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1956	A19NW (NE)	940	-	388300 411005
143	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1851	A9SE (SE)	990	-	388625 409441

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: Pennine Lower Coal Measures Formation And South Wales Lower Coal Measures Formation (Undifferentiated)	A13NE (NE)	0	1	387927 410143
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil and Sediment Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: 2.2 - 3.0 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: 100 - 200 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NE (NE)	0	1	387927 410143
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil and Sediment Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: 1.8 - 2.2 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: 100 - 200 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NE (E)	74	1	388000 410143
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil and Sediment Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: 3.0 - 6.0 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: 200 - 300 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13SE (S)	143	1	387927 410000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil and Sediment Arsenic Concentration: 25 - 35 mg/kg Cadmium Concentration: 2.2 - 3.0 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: 100 - 200 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13SE (SE)	161	1	388000 410000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil and Sediment Arsenic Concentration: <15 mg/kg Cadmium Concentration: 3.0 - 6.0 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: 200 - 300 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13SW (SW)	357	1	387600 410000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil and Sediment Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: 100 - 200 mg/kg Nickel Concentration: 15 - 30 mg/kg	A14NW (E)	574	1	388500 410143

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil and Sediment Arsenic 25 - 35 mg/kg Concentration: Cadmium 1.8 - 2.2 mg/kg Concentration: Chromium 60 - 90 mg/kg Concentration: Lead Concentration: 100 - 200 mg/kg Nickel 15 - 30 mg/kg Concentration:	A14SW (E)	591	1	388500 410000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil and Sediment Arsenic 15 - 25 mg/kg Concentration: Cadmium 3.0 - 6.0 mg/kg Concentration: Chromium 60 - 90 mg/kg Concentration: Lead Concentration: 300 - 600 mg/kg Nickel 15 - 30 mg/kg Concentration:	A8NE (S)	643	1	387927 409500
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil and Sediment Arsenic 25 - 35 mg/kg Concentration: Cadmium 3.0 - 6.0 mg/kg Concentration: Chromium 60 - 90 mg/kg Concentration: Lead Concentration: 200 - 300 mg/kg Nickel 15 - 30 mg/kg Concentration:	A8NE (S)	647	1	388000 409500
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic 15 - 25 mg/kg Concentration: Cadmium 2.2 - 3.0 mg/kg Concentration: Chromium 60 - 90 mg/kg Concentration: Lead Concentration: 100 - 200 mg/kg Nickel 15 - 30 mg/kg Concentration:	A18SW (N)	670	1	387793 410799
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil and Sediment Arsenic 15 - 25 mg/kg Concentration: Cadmium <1.8 mg/kg Concentration: Chromium 60 - 90 mg/kg Concentration: Lead Concentration: <100 mg/kg Nickel 15 - 30 mg/kg Concentration:	A19SW (NE)	676	1	388500 410500
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil and Sediment Arsenic 15 - 25 mg/kg Concentration: Cadmium 1.8 - 2.2 mg/kg Concentration: Chromium 60 - 90 mg/kg Concentration: Lead Concentration: 100 - 200 mg/kg Nickel 15 - 30 mg/kg Concentration:	A14SE (E)	776	1	388658 409884

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic 15 - 25 mg/kg Concentration: Cadmium 3.0 - 6.0 mg/kg Concentration: Chromium 60 - 90 mg/kg Concentration: Lead Concentration: 200 - 300 mg/kg Nickel 15 - 30 mg/kg Concentration:	A18NE (N)	858	1	387927 411000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil and Sediment Arsenic 25 - 35 mg/kg Concentration: Cadmium 2.2 - 3.0 mg/kg Concentration: Chromium 60 - 90 mg/kg Concentration: Lead Concentration: 100 - 200 mg/kg Nickel 15 - 30 mg/kg Concentration:	A9NW (SE)	862	1	388500 409500
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic 15 - 25 mg/kg Concentration: Cadmium 2.2 - 3.0 mg/kg Concentration: Chromium 60 - 90 mg/kg Concentration: Lead Concentration: 100 - 200 mg/kg Nickel 15 - 30 mg/kg Concentration:	A12NW (W)	927	1	387000 410143
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil and Sediment Arsenic 15 - 25 mg/kg Concentration: Cadmium 2.2 - 3.0 mg/kg Concentration: Chromium 60 - 90 mg/kg Concentration: Lead Concentration: 100 - 200 mg/kg Nickel 15 - 30 mg/kg Concentration:	A12SW (W)	938	1	387000 410000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic 15 - 25 mg/kg Concentration: Cadmium 2.2 - 3.0 mg/kg Concentration: Chromium 60 - 90 mg/kg Concentration: Lead Concentration: 100 - 200 mg/kg Nickel 15 - 30 mg/kg Concentration:	A17NE (NW)	958	1	387500 411000
144	BGS Recorded Mineral Sites Site Name: Castleton North Junction Location: Castleton, Rochdale, Lancashire Source: British Geological Survey, National Geoscience Information Service Reference: 96582 Type: Opencast Status: Ceased Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Carboniferous Geology: Pennine Lower Coal Measures Formation Commodity: Common Clay and Shale Positional Accuracy: Located by supplier to within 10m	A13SW (W)	311	1	387619 410102

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
145	BGS Recorded Mineral Sites Site Name: Castleton Gravel Pit Location: Castleton, Rochdale, Lancashire Source: British Geological Survey, National Geoscience Information Service Reference: 96578 Type: Opencast Status: Ceased Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Quaternary Geology: Glaciofluvial Deposits, Devensian Commodity: Sand and Gravel Positional Accuracy: Located by supplier to within 10m	A18SW (NW)	684	1	387645 410766
146	BGS Recorded Mineral Sites Site Name: Heys Sand Pit Location: Castleton, Rochdale, Lancashire Source: British Geological Survey, National Geoscience Information Service Reference: 243055 Type: Opencast Status: Ceased Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Quaternary Geology: Glaciofluvial Deposits, Devensian Commodity: Sand Positional Accuracy: Located by supplier to within 10m	A17SE (NW)	697	1	387387 410583
147	BGS Recorded Mineral Sites Site Name: Castleton Sand Pit Location: Castleton, Rochdale, Lancashire Source: British Geological Survey, National Geoscience Information Service Reference: 15321 Type: Opencast Status: Ceased Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Quaternary Geology: Glaciofluvial Deposits, Devensian Commodity: Sand Positional Accuracy: Located by supplier to within 10m	A14SE (E)	889	1	388760 409835
148	BGS Recorded Mineral Sites Site Name: Fox Hill Sand Pit Location: Castleton, Rochdale, Lancashire Source: British Geological Survey, National Geoscience Information Service Reference: 249184 Type: Opencast Status: Ceased Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Quaternary Geology: Glaciofluvial Deposits, Devensian Commodity: Sand Positional Accuracy: Located by supplier to within 10m	A9NE (SE)	909	1	388695 409658
149	BGS Recorded Mineral Sites Site Name: Windy Bank Sand Pit Location: Castleton, Rochdale, Lancashire Source: British Geological Survey, National Geoscience Information Service Reference: 96583 Type: Opencast Status: Ceased Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Quaternary Geology: Glaciofluvial Deposits, Devensian Commodity: Sand Positional Accuracy: Located by supplier to within 10m	A14NE (E)	918	1	388811 410387
	BGS Measured Urban Soil Chemistry No data available				
	BGS Urban Soil Chemistry Averages No data available				
	Coal Mining Affected Areas Description: In an area which may be affected by coal mining activity. It is recommended that a coal mining report is obtained from the Coal Authority. Contact details are included in the Useful Contacts section of this report.	A13NE (NE)	0	6	387927 410143

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Mining Instability Mining Evidence: Inconclusive Coal Mining Source: Ove Arup & Partners Boundary Quality: As Supplied	A13NE (NE)	0	-	387927 410143
	Non Coal Mining Areas of Great Britain No Hazard				
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	387927 410143
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	143	1	387927 410000
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	387927 410143
	Potential for Compressible Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13SE (SE)	45	1	387954 410107
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (S)	143	1	387920 410000
	Potential for Compressible Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	143	1	387927 410000
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	387927 410143
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	143	1	387927 410000
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	387927 410143
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	143	1	387927 410000
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	387927 410143
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SE (SE)	45	1	387954 410107
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	143	1	387927 410000
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (S)	143	1	387920 410000
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	387927 410143
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13SE (SE)	45	1	387954 410107
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (S)	118	1	387895 410030
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (S)	143	1	387920 410000
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	143	1	387927 410000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Radon Potential - Radon Affected Areas Affected Area: The property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level). Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	387927 410143
	Radon Potential - Radon Protection Measures Protection Measure: No radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	387927 410143

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
150	Contemporary Trade Directory Entries Name: Castleton Cosmetic Car Repairs Location: 144, Fairway, Rochdale, Lancashire, OL11 3BZ Classification: Alloys Status: Inactive Positional Accuracy: Automatically positioned to the address	A13NE (NE)	215	-	388024 410335
151	Contemporary Trade Directory Entries Name: Olivers Blinds Location: 136, Heywood Road, Rochdale, Lancashire, OL11 3BT Classification: Blinds, Awnings & Canopies Status: Inactive Positional Accuracy: Automatically positioned to the address	A18SE (N)	377	-	387955 410519
152	Contemporary Trade Directory Entries Name: F K I Logistex Ltd Location: Switchgear Works, Manchester Rd, Rochdale, Lancashire, OL11 2SS Classification: Crane Manufacturers Status: Inactive Positional Accuracy: Manually positioned to the address or location	A14NW (NE)	462	-	388345 410338
152	Contemporary Trade Directory Entries Name: Whipp & Bourne Location: Switchgear Works, Manchester Road, ROCHDALE, Lancashire, OL11 2SS Classification: Engineers - General Status: Inactive Positional Accuracy: Automatically positioned to the address	A14NW (NE)	463	-	388346 410338
153	Contemporary Trade Directory Entries Name: R Bibby Location: Minor Street, Rochdale, Lancashire, OL11 2TQ Classification: Car Body Repairs Status: Inactive Positional Accuracy: Automatically positioned to the address	A14NW (E)	465	-	388389 410180
153	Contemporary Trade Directory Entries Name: A & C Motor Spares Location: 956, Manchester Road, Rochdale, Lancashire, OL11 2TL Classification: Garage Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A14NW (E)	497	-	388423 410163
154	Contemporary Trade Directory Entries Name: Spotless 4u Solutions Ltd Location: 5, Tudor Hall Street, Rochdale, OL11 3BB Classification: Cleaning Services - Domestic Status: Active Positional Accuracy: Automatically positioned to the address	A18SE (NE)	470	-	388107 410576
155	Contemporary Trade Directory Entries Name: C & C Cars & Commercial Location: 914 Manchester Rd, Rochdale, Lancashire, OL11 2SR Classification: Car Dealers - Used Status: Inactive Positional Accuracy: Manually positioned to the address or location	A14NW (E)	489	-	388398 410270
156	Contemporary Trade Directory Entries Name: Chem Free Building Preservation Ltd Location: 885, Manchester Road, Rochdale, Lancashire, OL11 2ST Classification: Damp & Dry Rot Control Status: Inactive Positional Accuracy: Automatically positioned to the address	A14NW (NE)	528	-	388405 410366
156	Contemporary Trade Directory Entries Name: Red Rose Preservations Ltd Location: Newchurch Place, Manchester Road, Rochdale, Lancashire, OL11 2ST Classification: Damp & Dry Rot Control Status: Active Positional Accuracy: Automatically positioned to the address	A14NW (E)	548	-	388434 410350
157	Contemporary Trade Directory Entries Name: G R T Trading Location: 856, Manchester Road, Rochdale, Lancashire, OL11 2SP Classification: Distribution Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A19SW (NE)	536	-	388342 410481
157	Contemporary Trade Directory Entries Name: Bacon Barnies Ltd Location: 854, Manchester Road, Rochdale, Lancashire, OL11 2SP Classification: Bacon & Ham Curers & Merchants Status: Inactive Positional Accuracy: Automatically positioned to the address	A19SW (NE)	538	-	388341 410486

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
157	Contemporary Trade Directory Entries Name: Blu Bek Distribution Location: 858A Manchester Rd, Rochdale, Lancashire, OL11 2SP Classification: Distribution Services Status: Inactive Positional Accuracy: Manually positioned to the road within the address or location	A14NW (NE)	550	-	388360 410480
158	Contemporary Trade Directory Entries Name: Lomax Transport Services Location: Trub Farm, Manchester Road, Rochdale, Lancashire, OL11 2XG Classification: Road Haulage Services Status: Active Positional Accuracy: Automatically positioned to the address	A14SW (SE)	548	-	388431 409931
159	Contemporary Trade Directory Entries Name: Go Minibus Travel Location: 951, Manchester Road, Rochdale, Lancashire, OL11 2TR Classification: Disability Equipment - Manufacturers & Suppliers Status: Inactive Positional Accuracy: Automatically positioned to the address	A14SW (E)	563	-	388479 410037
159	Contemporary Trade Directory Entries Name: O M C Ford Location: Manchester Road, Rochdale, Lancashire, OL11 2TR Classification: Car Dealers Status: Active Positional Accuracy: Automatically positioned to the address	A14SW (E)	577	-	388492 410027
160	Contemporary Trade Directory Entries Name: Laurence Scott & Electromotors Location: Switchgear Works, Manchester Rd, Castleton, Rochdale, Lancashire, OL11 2SS Classification: Electric Motor Manufacturers Status: Inactive Positional Accuracy: Manually positioned to the road within the address or location	A18SE (NE)	568	-	388255 410606
160	Contemporary Trade Directory Entries Name: Globewide Services Location: 831, Manchester Road, Rochdale, Lancashire, OL11 3AH Classification: Distribution Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A18SE (NE)	587	-	388252 410631
160	Contemporary Trade Directory Entries Name: Electrowaste Location: Railway Approach, Rochdale, Lancashire, OL11 3EE Classification: Recycling Centres Status: Inactive Positional Accuracy: Manually positioned to the road within the address or location	A19SW (NE)	604	-	388272 410638
160	Contemporary Trade Directory Entries Name: Mobile Tyre Fitting Services Location: Railway Approach, Rochdale, Lancashire, OL11 3EE Classification: Tyre Dealers Status: Active Positional Accuracy: Manually positioned within the geographical locality	A19SW (NE)	607	-	388267 410645
161	Contemporary Trade Directory Entries Name: F Wainwright & Co Location: Manchester Road, ROCHDALE, Lancashire, OL11 2UY Classification: Asphalt & Coated Macadam Laying Contractors Status: Active Positional Accuracy: Automatically positioned to the address	A19SW (NE)	581	-	388320 410571
162	Contemporary Trade Directory Entries Name: D R Felstead Location: Leonard Street, Rochdale, Lancashire, OL11 2SX Classification: Car Dealers Status: Inactive Positional Accuracy: Automatically positioned to the address	A14NW (NE)	589	-	388441 410429
162	Contemporary Trade Directory Entries Name: A & D Cylinder Head Services Location: Scholes Street, Rochdale, Lancashire, OL11 2SY Classification: Engine Rebuilding & Reconditioning Status: Inactive Positional Accuracy: Automatically positioned to the address	A14NW (NE)	589	-	388441 410429

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
162	Contemporary Trade Directory Entries Name: Pak Kashmir Cargo Services Ltd Location: 25, Albion Street, Rochdale, Lancashire, OL11 2UT Classification: Cargo Handling Services Status: Active Positional Accuracy: Automatically positioned to the address	A14NW (NE)	638	-	388483 410454
163	Contemporary Trade Directory Entries Name: C L S Motor Co Location: 774 Manchester Rd, Rochdale, Lancashire, OL11 3AW Classification: Car Dealers Status: Inactive Positional Accuracy: Manually positioned to the address or location	A18SE (N)	594	-	388126 410702
163	Contemporary Trade Directory Entries Name: Crystal Clear Location: 774 Manchester Rd, Rochdale, Lancashire, OL11 3AA Classification: Car Dealers Status: Inactive Positional Accuracy: Manually positioned to the road within the address or location	A18SE (N)	614	-	388145 410716
163	Contemporary Trade Directory Entries Name: Classic Ironing Service Location: 772, Manchester Road, Rochdale, Lancashire, OL11 3AW Classification: Ironing & Home Laundry Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A18SE (N)	616	-	388111 410730
163	Contemporary Trade Directory Entries Name: Ceramic Images Location: 773, Manchester Road, Rochdale, Lancashire, OL11 3AH Classification: Photographic Processors Status: Inactive Positional Accuracy: Automatically positioned to the address	A18SE (N)	637	-	388144 410741
164	Contemporary Trade Directory Entries Name: Krm Trading Location: 801, Manchester Road, Rochdale, Lancashire, OL11 3AH Classification: Electrical Goods Sales, Manufacturers & Wholesalers Status: Inactive Positional Accuracy: Automatically positioned to the address	A18SE (NE)	613	-	388188 410696
165	Contemporary Trade Directory Entries Name: E Flynn & Sons Location: 12, Vicarage Road North, Rochdale, Lancashire, OL11 2TE Classification: Coal & Smokeless Fuel Merchants & Distributors Status: Inactive Positional Accuracy: Automatically positioned to the address	A14NW (E)	623	-	388544 410225
166	Contemporary Trade Directory Entries Name: P K Joinery Location: 54, Newchurch Street, Rochdale, Lancashire, OL11 2SZ Classification: Joinery Manufacturers Status: Inactive Positional Accuracy: Automatically positioned to the address	A14NW (NE)	632	-	388505 410397
167	Contemporary Trade Directory Entries Name: Discount Cars Of Rochdale Location: 1050, Manchester Road, Rochdale, Lancashire, OL11 2XJ Classification: Car Dealers Status: Inactive Positional Accuracy: Automatically positioned to the address	A14SW (SE)	635	-	388471 409817
167	Contemporary Trade Directory Entries Name: 24 Hour Recovery & Movement Location: 1050, Manchester Road, Rochdale, Lancashire, OL11 2XJ Classification: Breakdown and Recovery Status: Inactive Positional Accuracy: Automatically positioned to the address	A14SW (SE)	635	-	388471 409817
167	Contemporary Trade Directory Entries Name: Empire Tinting & Signs Location: 1050 Manchester Road, Rochdale, Lancashire, OL11 2XJ Classification: Window Tinting Status: Active Positional Accuracy: Automatically positioned to the address	A14SW (SE)	643	-	388482 409819
167	Contemporary Trade Directory Entries Name: D & W Cars Ltd Location: 1050, MANCHESTER ROAD, ROCHDALE, OL11 2XJ Classification: Car Dealers - Used Status: Active Positional Accuracy: Automatically positioned to the address	A14SW (SE)	643	-	388482 409819

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
167	Contemporary Trade Directory Entries Name: Castleton Van Sales Location: 1050, Manchester Road, Rochdale, Lancashire, OL11 2XJ Classification: Commercial Vehicle Dealers Status: Inactive Positional Accuracy: Automatically positioned to the address	A14SW (SE)	644	-	388483 409819
167	Contemporary Trade Directory Entries Name: Manchester Caravans Location: 1050, Manchester Road, Rochdale, Lancashire, OL11 2XJ Classification: Caravan Dealers & Manufacturers Status: Inactive Positional Accuracy: Automatically positioned to the address	A14SW (SE)	651	-	388492 409821
167	Contemporary Trade Directory Entries Name: Drive 4 Cars Location: 1050, Manchester Road, Rochdale, Lancashire, OL11 2XJ Classification: Car Dealers Status: Inactive Positional Accuracy: Manually positioned to the address or location	A14SW (SE)	651	-	388492 409821
167	Contemporary Trade Directory Entries Name: Empire Tinting Location: 1050 Manchester Rd, Rochdale, Lancashire, OL11 2XJ Classification: Window Tinting Status: Inactive Positional Accuracy: Manually positioned to the road within the address or location	A14SW (SE)	668	-	388511 409820
168	Contemporary Trade Directory Entries Name: C R Forwarding Ltd Location: 746a, Manchester Road, Rochdale, Lancashire, OL11 3AQ Classification: Freight Forwarders Status: Inactive Positional Accuracy: Automatically positioned to the address	A18SE (N)	663	-	388078 410788
169	Contemporary Trade Directory Entries Name: E & J Pearn Location: 17, Bates Close, Rochdale, Lancashire, OL11 2TU Classification: Road Haulage Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A14SE (E)	695	-	388618 410078
170	Contemporary Trade Directory Entries Name: C P D Property Services Ltd Location: Alpha Works, Smalley Street, Rochdale, Lancashire, OL11 3EB Classification: Commercial Cleaning Services Status: Active Positional Accuracy: Manually positioned within the geographical locality	A18SE (NE)	701	-	388238 410770
171	Contemporary Trade Directory Entries Name: Wrong Fuel Master Location: 38, Keswick Street, Rochdale, OL11 3AG Classification: Car Breakdown & Recovery Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A18NW (N)	701	-	387869 410841
172	Contemporary Trade Directory Entries Name: Easy Dent Ltd Location: Unit 4, Bluepits Mill, Queensway, Rochdale, Lancashire, OL11 2PG Classification: Car Body Repairs Status: Inactive Positional Accuracy: Manually positioned to the address or location	A19SW (NE)	772	-	388474 410686
172	Contemporary Trade Directory Entries Name: E P O S Group Location: Bluepits Mill, Queensway, Rochdale, Lancashire, OL11 2YW Classification: Cash Registers & Check-Out Equipment Status: Inactive Positional Accuracy: Automatically positioned to the address	A19SW (NE)	773	-	388475 410687
172	Contemporary Trade Directory Entries Name: Bodyworks Rochdale Ltd Location: Bluepits Mill, Queensway, Rochdale, OL11 2YW Classification: Car Body Repairs Status: Active Positional Accuracy: Automatically positioned to the address	A19SW (NE)	773	-	388475 410687
173	Contemporary Trade Directory Entries Name: Webuyanycar.Com Location: Nixon Street, Rochdale, Lancashire, OL11 3JW Classification: Car Dealers - Used Status: Inactive Positional Accuracy: Automatically positioned to the address	A18NW (N)	789	-	387712 410902

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
173	Contemporary Trade Directory Entries Name: Carcraft Of Rochdale Ltd Location: Nixon Street, Rochdale, Lancashire, OL11 3JW Classification: Car Dealers Status: Inactive Positional Accuracy: Automatically positioned to the address	A18NW (N)	789	-	387712 410902
173	Contemporary Trade Directory Entries Name: Carcraft Of Rochdale Location: Nixon Street, Rochdale, Lancashire, OL11 3JW Classification: Car Dealers - Used Status: Inactive Positional Accuracy: Automatically positioned to the address	A18NW (N)	789	-	387712 410902
173	Contemporary Trade Directory Entries Name: Carcraft Location: Nixon Street, Rochdale, Lancashire, OL11 3JW Classification: Car Dealers - Used Status: Inactive Positional Accuracy: Automatically positioned to the address	A18NW (N)	789	-	387712 410902
173	Contemporary Trade Directory Entries Name: Carcraft Location: Nixon Street, Rochdale, Lancashire, OL11 3JW Classification: Car Dealers Status: Inactive Positional Accuracy: Automatically positioned to the address	A18NW (N)	789	-	387712 410902
173	Contemporary Trade Directory Entries Name: Carcraft Of Rochdale Location: Nixon Street, Rochdale, Lancashire, OL11 3JW Classification: Car Dealers - Used Status: Inactive Positional Accuracy: Automatically positioned to the address	A18NW (N)	789	-	387712 410902
173	Contemporary Trade Directory Entries Name: We Buy Any Car Ltd Location: Nixon St, Rochdale, Lancashire, OL11 3JW Classification: Car Dealers - Used Status: Inactive Positional Accuracy: Manually positioned within the geographical locality	A18NW (N)	789	-	387712 410902
174	Contemporary Trade Directory Entries Name: A P E Scaffolding Location: Globe Works, Queensway, Rochdale, OL11 2QY Classification: Scaffolding & Work Platforms Status: Inactive Positional Accuracy: Automatically positioned to the address	A19SW (NE)	831	-	388512 410732
174	Contemporary Trade Directory Entries Name: Pjr Fabrications Location: Globe Works, Queensway, Rochdale, Lancashire, OL11 2QY Classification: Sheet Metal Work Status: Inactive Positional Accuracy: Automatically positioned to the address	A19SW (NE)	831	-	388512 410732
175	Contemporary Trade Directory Entries Name: Cooling Equipment Hire Ltd Location: 1144, Manchester Road, Rochdale, Lancashire, OL11 2XX Classification: Air Conditioning Equipment & Systems Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NW (SE)	850	-	388514 409529
176	Contemporary Trade Directory Entries Name: Palletways Location: Royle Barn Road, Rochdale, Lancashire, OL11 3DT Classification: Road Haulage Services Status: Active Positional Accuracy: Manually positioned to the address or location	A18NE (N)	873	-	388180 410978
176	Contemporary Trade Directory Entries Name: James Nuttall Transport Ltd Location: Royle Barn Road, Rochdale, Lancashire, OL11 3DT Classification: Road Haulage Services Status: Active Positional Accuracy: Automatically positioned to the address	A18NE (N)	876	-	388180 410981
176	Contemporary Trade Directory Entries Name: Unique Sauces Location: Royle Barn Road, Rochdale, Lancashire, OL11 3DT Classification: Distribution Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A18NE (N)	876	-	388180 410981

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
176	Contemporary Trade Directory Entries Name: Crystal Clear Logistics Location: 7 Royle Barn Rd, Rochdale, Lancashire, OL11 3DT Classification: Distribution Services Status: Inactive Positional Accuracy: Manually positioned to the road within the address or location	A18NE (N)	884	-	388223 410975
177	Contemporary Trade Directory Entries Name: Lancashire Casting Location: Trows Lane, Rochdale, Lancashire, OL11 2UF Classification: Die-Casting Equipment & Services Status: Active Positional Accuracy: Automatically positioned to the address	A14SE (E)	914	-	388838 410073
178	Contemporary Trade Directory Entries Name: M Howes Location: 594 Manchester Rd, Rochdale, Lancashire, OL11 3AF Classification: Garage Services Status: Inactive Positional Accuracy: Manually positioned to the address or location	A18NE (N)	919	-	388024 411056
178	Contemporary Trade Directory Entries Name: Jim Partington Location: 2, Knoll Street, Rochdale, Lancashire, OL11 3JJ Classification: Domestic Appliances - Servicing, Repairs & Parts Status: Inactive Positional Accuracy: Automatically positioned to the address	A18NE (N)	927	-	387967 411069
178	Contemporary Trade Directory Entries Name: Nixon Street Garage Location: 1, Nixon Street, Rochdale, OL11 3JL Classification: Garage Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A18NE (N)	928	-	388005 411067
179	Contemporary Trade Directory Entries Name: Uk Car Group Location: Nixon St, Rochdale, Lancashire, OL11 3JW Classification: Car Dealers Status: Inactive Positional Accuracy: Manually positioned to the road within the address or location	A18NW (N)	926	-	387892 411068
180	Contemporary Trade Directory Entries Name: Flog It 2 Us Location: The Tannery, Queensway, Rochdale, Lancashire, OL11 2YW Classification: Office Furniture & Equipment Status: Active Positional Accuracy: Automatically positioned to the address	A19NW (NE)	935	-	388535 410853
180	Contemporary Trade Directory Entries Name: Rochdale Recoveries Service Ltd Location: The Tannery, Queensway, ROCHDALE, Lancashire, OL11 2YW Classification: Breakdown and Recovery Status: Inactive Positional Accuracy: Automatically positioned to the address	A19NW (NE)	935	-	388535 410853
180	Contemporary Trade Directory Entries Name: John Mason Export Ltd Location: The Tannery, Queensway, Rochdale, OL11 2YW Classification: Leather Products - Manufacturers & Suppliers Status: Inactive Positional Accuracy: Automatically positioned to the address	A19NW (NE)	936	-	388535 410853
181	Contemporary Trade Directory Entries Name: Dale Car Sales Location: Castleton Service Station, Manchester Road, Rochdale, Lancashire, OL11 3AD Classification: Car Dealers - Used Status: Active Positional Accuracy: Automatically positioned to the address	A18NE (N)	941	-	388093 411069
182	Contemporary Trade Directory Entries Name: The Fireplace Factory Location: Marland Mill, Nixon Street, Rochdale, Lancashire, OL11 3JD Classification: Fireplaces & Mantelpieces Status: Inactive Positional Accuracy: Automatically positioned to the address	A18NW (N)	976	-	387838 411114

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
183	Contemporary Trade Directory Entries Name: A C G Distribution Location: Leander Drive, Rochdale, Lancashire, OL11 2XD Classification: Distribution Services Status: Inactive Positional Accuracy: Manually positioned within the geographical locality	A14NE (E)	984	-	388889 410346
184	Contemporary Trade Directory Entries Name: Centravac Location: Arrow Mill, Queensway, Rochdale, Lancashire, OL11 2YW Classification: Vacuum Cleaners - Sales & Service Status: Inactive Positional Accuracy: Automatically positioned to the address	A19NW (NE)	989	-	388586 410880
184	Contemporary Trade Directory Entries Name: Tate Fabrics Location: Arrow Mill, Queensway, Rochdale, Lancashire, OL11 2QN Classification: Textile Manufacturing Status: Inactive Positional Accuracy: Automatically positioned to the address	A19NW (NE)	989	-	388586 410880
184	Contemporary Trade Directory Entries Name: Connect Working Spaces Ltd Location: Arrow Mill, Queensway, Rochdale, Lancashire, OL11 2YW Classification: Office Furniture & Equipment Status: Active Positional Accuracy: Automatically positioned to the address	A19NW (NE)	990	-	388586 410880
185	Contemporary Trade Directory Entries Name: Queensway Tyres Location: Unit 1, Harp Industrial Estate, Queensway, Rochdale, OL11 2QQ Classification: Garage Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A19SE (NE)	990	-	388653 410815
186	Contemporary Trade Directory Entries Name: Innovative Solutions Location: Unit 28, Transpennine Trading Estate, Gorrels Way, Rochdale, Lancashire, OL11 2QR Classification: Pharmaceutical Manufacturers & Distributors Status: Inactive Positional Accuracy: Automatically positioned to the address	A19NW (NE)	995	-	388505 410952
187	Fuel Station Entries Name: Dale Car Centre Location: Manchester Road , , Rochdale, Greater Manchester, OL11 3AD Brand: Obsolete Premises Type: Not Applicable Status: Obsolete Positional Accuracy: Approximate location provided by supplier	A18NE (N)	818	-	388092 410943
188	Fuel Station Entries Name: Carcraft Location: Nixon Street , Castleton Moor , Rochdale, Greater Manchester, OL11 3JE Brand: Obsolete Premises Type: Not Applicable Status: Obsolete Positional Accuracy: Manually positioned to the road within the address or location	A18NE (N)	988	-	388011 411127
189	Points of Interest - Commercial Services Name: A & C Motor Spares Location: 956 Manchester Road, Rochdale, OL11 2TL Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A14NW (E)	497	7	388423 410163
189	Points of Interest - Commercial Services Name: A & C Motor Spares Location: 956 Manchester Road, Rochdale, OL11 2TL Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A14NW (E)	497	7	388423 410163
190	Points of Interest - Commercial Services Name: Lomax Transport Services Location: Trub Farm, Manchester Road, Rochdale, OL11 2XG Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A14SW (E)	520	7	388413 409961

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
190	Points of Interest - Commercial Services Name: Lomax Transport Services Location: Trub Farm, Manchester Road, Rochdale, OL11 2XG Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A14SW (SE)	548	7	388431 409931
191	Points of Interest - Commercial Services Name: A & D Cylinder Head Services Location: Scholes Street, Rochdale, OL11 2SY Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A14NW (NE)	589	7	388441 410429
191	Points of Interest - Commercial Services Name: Pak Kashmir Cargo Services Ltd Location: 25 Albion Street, Rochdale, OL11 2UT Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A14NW (NE)	638	7	388483 410454
192	Points of Interest - Commercial Services Name: Pearn E & J Transport Location: 17 Bates Close, Rochdale, OL11 2TU Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A14SE (E)	695	7	388618 410078
193	Points of Interest - Commercial Services Name: Bodyworks Rochdale Ltd Location: Bluepits Mill, Queensway, Rochdale, OL11 2YW Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A19SW (NE)	773	7	388475 410687
193	Points of Interest - Commercial Services Name: Easy Dent Ltd Location: Unit 4 Blue Pit Mill Queensway, Rochdale, OL11 2PG Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A19SW (NE)	777	7	388463 410705
193	Points of Interest - Commercial Services Name: Blue Pit Test Centre Location: Bluepits Mill, Queensway, Rochdale, OL11 2YW Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A19SW (NE)	778	7	388447 410721
193	Points of Interest - Commercial Services Name: Triad Fabrications Ltd Location: Globe Works, Queensway, Rochdale, OL11 2QY Category: Construction Services Class Code: Metalworkers Including Blacksmiths Positional Accuracy: Positioned to address or location	A19SW (NE)	831	7	388512 410732
194	Points of Interest - Commercial Services Name: A F Windscreens Location: 1138 Thorsby House, Manchester Road, Rochdale, OL11 2XX Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A9NW (SE)	829	7	388517 409561
195	Points of Interest - Commercial Services Name: James Nuttall Ltd Location: Royle Barn Road, Rochdale, OL11 3DT Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A18NE (N)	876	7	388180 410981
196	Points of Interest - Commercial Services Name: Partington Transport (Castleton) Location: 604 Manchester Road, Rochdale, OL11 3AF Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A18NE (N)	879	7	388047 411013
196	Points of Interest - Commercial Services Name: Nixon Street Garage Location: 1 Nixon Street, Rochdale, OL11 3JL Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A18NE (N)	928	7	388008 411067

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
196	Points of Interest - Commercial Services Name: Nixon Street Garage Ltd Location: 1 Nixon Street, Rochdale, OL11 3JL Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A18NE (N)	929	7	388008 411067
197	Points of Interest - Commercial Services Name: Queensway Commercials Ltd Location: Queensway, Rochdale, OL11 2QY Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A19NW (NE)	916	7	388531 410831
198	Points of Interest - Commercial Services Name: Castleton Location: Marland Mill, Nixon Street, Rochdale, OL11 3JD Category: Construction Services Class Code: Metalworkers Including Blacksmiths Positional Accuracy: Positioned to address or location	A18NW (N)	976	7	387838 411114
199	Points of Interest - Commercial Services Name: Silver Shield Windscreens Location: Unit 28 Transpennine Trading Estate, Gorrels Way, Rochdale, OL11 2QR Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A19NW (NE)	995	7	388505 410952
200	Points of Interest - Manufacturing and Production Name: Tank Location: OL11 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to an adjacent address or location	A14NW (E)	388	7	388309 410208
200	Points of Interest - Manufacturing and Production Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A14NW (E)	445	7	388353 410270
200	Points of Interest - Manufacturing and Production Name: Works Location: OL11 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A14NW (E)	450	7	388344 410311
201	Points of Interest - Manufacturing and Production Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A14NW (NE)	545	7	388428 410355
201	Points of Interest - Manufacturing and Production Name: Works Location: OL11 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A14NW (NE)	545	7	388428 410356
202	Points of Interest - Manufacturing and Production Name: Works Location: OL11 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to address or location	A19SW (NE)	581	7	388319 410571
203	Points of Interest - Manufacturing and Production Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A9NW (SE)	628	7	388450 409796
203	Points of Interest - Manufacturing and Production Name: Works Location: OL11 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A9NW (SE)	628	7	388450 409796

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
204	Points of Interest - Manufacturing and Production Name: Works Location: OL11 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A18SE (NE)	632	7	388250 410685
204	Points of Interest - Manufacturing and Production Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A18SE (NE)	633	7	388255 410684
205	Points of Interest - Manufacturing and Production Name: Works Location: OL10 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A8SE (S)	691	7	388049 409463
206	Points of Interest - Manufacturing and Production Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19SW (NE)	711	7	388372 410697
206	Points of Interest - Manufacturing and Production Name: Works Location: OL11 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19SW (NE)	714	7	388376 410697
206	Points of Interest - Manufacturing and Production Name: Tank Location: OL11 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A19SW (NE)	724	7	388385 410703
207	Points of Interest - Manufacturing and Production Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19SW (NE)	739	7	388532 410566
207	Points of Interest - Manufacturing and Production Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19SW (NE)	791	7	388538 410644
207	Points of Interest - Manufacturing and Production Name: Works Location: OL11 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19SW (NE)	792	7	388538 410645
208	Points of Interest - Manufacturing and Production Name: Works Location: OL11 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19SW (NE)	763	7	388494 410653
208	Points of Interest - Manufacturing and Production Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19SW (NE)	784	7	388513 410662
208	Points of Interest - Manufacturing and Production Name: Works Location: OL11 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19SW (NE)	784	7	388513 410662

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
208	Points of Interest - Manufacturing and Production Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19SW (NE)	865	7	388581 410708
208	Points of Interest - Manufacturing and Production Name: Works Location: OL11 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19SW (NE)	865	7	388581 410708
209	Points of Interest - Manufacturing and Production Name: Tank Location: OL11 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A19SW (NE)	849	7	388475 410790
209	Points of Interest - Manufacturing and Production Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19NW (NE)	899	7	388495 410839
209	Points of Interest - Manufacturing and Production Name: Works Location: OL11 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to address or location	A19NW (NE)	904	7	388497 410844
209	Points of Interest - Manufacturing and Production Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19NW (NE)	935	7	388544 410844
209	Points of Interest - Manufacturing and Production Name: Works Location: OL11 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19NW (NE)	935	7	388544 410844
210	Points of Interest - Manufacturing and Production Name: Works Location: OL11 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to address or location	A18NE (N)	871	7	388185 410974
210	Points of Interest - Manufacturing and Production Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A18NE (N)	872	7	388182 410976
211	Points of Interest - Manufacturing and Production Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A14SE (E)	915	7	388838 410070
211	Points of Interest - Manufacturing and Production Name: Works Location: OL11 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A14SE (E)	915	7	388838 410070
211	Points of Interest - Manufacturing and Production Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A14SE (E)	925	7	388850 410091

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
211	Points of Interest - Manufacturing and Production Name: Works Location: OL11 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A14SE (E)	925	7	388850 410091
212	Points of Interest - Manufacturing and Production Name: Sand Pit (Disused) Location: OL11 Category: Extractive Industries Class Code: Sand, Gravel and Clay Extraction and Merchants Positional Accuracy: Positioned to an adjacent address or location	A17SW (NW)	918	7	387114 410569
213	Points of Interest - Manufacturing and Production Name: Sand Pit (Disused) Location: OL10 Category: Extractive Industries Class Code: Sand, Gravel and Clay Extraction and Merchants Positional Accuracy: Positioned to an adjacent address or location	A12NW (W)	922	7	387059 410453
214	Points of Interest - Manufacturing and Production Name: Tank Location: OL11 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A19NW (N)	932	7	388278 411006
215	Points of Interest - Manufacturing and Production Name: Tank Location: OL11 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A19SE (NE)	948	7	388651 410753
215	Points of Interest - Manufacturing and Production Name: Tank Location: OL11 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A19SE (NE)	951	7	388652 410757
215	Points of Interest - Manufacturing and Production Name: Tanks Location: OL11 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to an adjacent address or location	A19SE (NE)	958	7	388665 410752
216	Points of Interest - Manufacturing and Production Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19NW (NE)	961	7	388486 410924
216	Points of Interest - Manufacturing and Production Name: Works Location: OL11 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19NW (NE)	990	7	388509 410943
217	Points of Interest - Public Infrastructure Name: Castleton North Junction Location: OL11 Category: Public Transport, Stations and Infrastructure Class Code: Railway Stations, Junctions and Halts Positional Accuracy: Positioned to an adjacent address or location	A13SW (SW)	243	7	387766 409961
218	Points of Interest - Public Infrastructure Name: Castleton East Junction Location: OL11 Category: Public Transport, Stations and Infrastructure Class Code: Railway Stations, Junctions and Halts Positional Accuracy: Positioned to an adjacent address or location	A13NE (NE)	357	7	388178 410395
219	Points of Interest - Public Infrastructure Name: Weir Location: OL11 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A14SW (E)	389	7	388289 410002

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
220	Points of Interest - Public Infrastructure Name: Weirs Location: OL10 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A8NE (SE)	408	7	388102 409775
220	Points of Interest - Public Infrastructure Name: Weirs Location: OL10 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A8NE (SE)	411	7	388103 409772
220	Points of Interest - Public Infrastructure Name: Castleton South Junction Location: OL11 Category: Public Transport, Stations and Infrastructure Class Code: Railway Stations, Junctions and Halts Positional Accuracy: Positioned to an adjacent address or location	A13SE (SE)	418	7	388176 409808
221	Points of Interest - Public Infrastructure Name: Weir Location: OL11 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A14SW (SE)	503	7	388359 409887
221	Points of Interest - Public Infrastructure Name: Weir Location: OL11 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A14SW (SE)	505	7	388362 409888
222	Points of Interest - Public Infrastructure Name: Sluices Location: OL10 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A8NE (S)	520	7	387979 409626
222	Points of Interest - Public Infrastructure Name: Sewage Works Location: OL10 Category: Infrastructure and Facilities Class Code: Waste Storage, Processing and Disposal Positional Accuracy: Positioned to an adjacent address or location	A8NE (S)	561	7	387939 409582
222	Points of Interest - Public Infrastructure Name: Sewage Works Location: OL10 Category: Infrastructure and Facilities Class Code: Waste Storage, Processing and Disposal Positional Accuracy: Positioned to an adjacent address or location	A8NE (S)	565	7	388001 409583
222	Points of Interest - Public Infrastructure Name: Sluice Location: OL10 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A8NE (S)	575	7	387979 409571
222	Points of Interest - Public Infrastructure Name: Sluices Location: OL10 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A8NE (S)	589	7	387973 409556
222	Points of Interest - Public Infrastructure Name: Sluices Location: OL10 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A8NE (S)	590	7	387993 409557
222	Points of Interest - Public Infrastructure Name: Sewage Works Location: OL10 Category: Infrastructure and Facilities Class Code: Waste Storage, Processing and Disposal Positional Accuracy: Positioned to address or location	A8NE (S)	661	7	388010 409488

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
222	Points of Interest - Public Infrastructure Name: Sluices Location: OL10 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A8NE (S)	662	7	388040 409491
223	Points of Interest - Public Infrastructure Name: Sewage Works Location: OL10 Category: Infrastructure and Facilities Class Code: Waste Storage, Processing and Disposal Positional Accuracy: Positioned to address or location	A8NE (S)	547	7	388082 409619
223	Points of Interest - Public Infrastructure Name: Sewage Works Location: OL10 Category: Infrastructure and Facilities Class Code: Waste Storage, Processing and Disposal Positional Accuracy: Positioned to address or location	A8NE (S)	548	7	388082 409618
224	Points of Interest - Public Infrastructure Name: Castleton (Manchester) Rail Station Location: Manchester Road, OL11 Category: Public Transport, Stations and Infrastructure Class Code: Railway Stations, Junctions and Halts Positional Accuracy: Positioned to address or location	A19SW (NE)	587	7	388282 410609
224	Points of Interest - Public Infrastructure Name: Castleton Station Location: Manchester Road, OL11 Category: Public Transport, Stations and Infrastructure Class Code: Railway Stations, Junctions and Halts Positional Accuracy: Positioned to address or location	A19SW (NE)	587	7	388282 410609
224	Points of Interest - Public Infrastructure Name: Weir Location: OL11 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A19SW (NE)	600	7	388348 410569
225	Points of Interest - Public Infrastructure Name: Weir Location: OL11 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A9NW (SE)	678	7	388325 409595
225	Points of Interest - Public Infrastructure Name: Weir Location: OL11 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A9NW (SE)	680	7	388327 409594
225	Points of Interest - Public Infrastructure Name: Sluice Location: OL11 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A9NW (SE)	688	7	388344 409596
226	Points of Interest - Public Infrastructure Name: Sewage Works Location: OL10 Category: Infrastructure and Facilities Class Code: Waste Storage, Processing and Disposal Positional Accuracy: Positioned to an adjacent address or location	A8SE (S)	688	7	388048 409466
227	Points of Interest - Public Infrastructure Name: Weir Location: OL11 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A14SE (E)	927	7	388849 410057
227	Points of Interest - Public Infrastructure Name: Weir Location: OL11 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A14SE (E)	928	7	388850 410056

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
228	Points of Interest - Recreational and Environmental Name: Playground Location: OL11 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A18SE (NE)	398	7	388091 410505
228	Points of Interest - Recreational and Environmental Name: Playground Location: Heywood Road, OL11 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to address or location	A18SE (NE)	400	7	388098 410504
228	Points of Interest - Recreational and Environmental Name: Playground Location: Not Supplied Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A18SE (NE)	401	7	388098 410505
229	Points of Interest - Recreational and Environmental Name: Play Area Location: OL11 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A9NE (SE)	968	7	388657 409508

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
230	Areas of Adopted Green Belt Authority: Rochdale Metropolitan Borough Council Plan Name: Rochdale Unitary Development Plan Status: Adopted Plan Date: 30th June 2006	A13NE (NE)	0	9	387927 410143
231	Nitrate Vulnerable Zones Name: River Irk (Moston Brook To River Irwell) Nvz Description: Surface Water Source: Environment Agency, Head Office	A13NE (NE)	0	4	387927 410143
232	Sites of Special Scientific Interest Name: Rochdale Canal Multiple Areas: Y Total Area (m2): 263678.3 Source: Natural England Reference: 2000430 Designation Details: Special Area Of Conservation Designation Date: 16th August 2000 Date Type: Notified Designation Details: Site Of Special Scientific Interest Designation Date: 16th August 2000 Date Type: Notified Designation Details: Water Framework Directive (WFD) Designation Date: 16th August 2000 Date Type: Notified	A14SW (E)	352	8	388277 410124
233	Special Areas of Conservation Name: Rochdale Canal Multiple Areas: Y Total Area (m2): 261103.36 Source: Natural England Reference: UK0030266 Status: Designated	A14SW (E)	352	8	388277 410124

Agency & Hydrological	Version	Update Cycle
Contaminated Land Register Entries and Notices Environment Agency - Head Office Rossendale Borough Council - Environmental Health Department Bury Metropolitan Borough Council - Environmental Health Department Rochdale Metropolitan Borough Council - Environmental Health Department Oldham Metropolitan Borough Council - Environmental Health Department Manchester City Council - Environmental Health Department	June 2020 November 2015 October 2013 October 2017 September 2013 September 2014	Annually Annual Rolling Update Annual Rolling Update Annually Annual Rolling Update Annual Rolling Update
Discharge Consents Environment Agency - North West Region	January 2021	Quarterly
Enforcement and Prohibition Notices Environment Agency - North West Region	March 2013	Annual Rolling Update
Integrated Pollution Controls Environment Agency - North West Region	October 2008	Variable
Integrated Pollution Prevention And Control Environment Agency - North West Region	January 2021	Quarterly
Local Authority Integrated Pollution Prevention And Control Bury Metropolitan Borough Council - Environmental Health Department Rochdale Metropolitan Borough Council - Environmental Health Department Oldham Metropolitan Borough Council - Environmental Health Department Rossendale Borough Council - Environmental Health Department Manchester City Council - Environmental Health Department	February 2015 July 2014 March 2015 May 2016 September 2014	Variable Variable Variable Variable Variable
Local Authority Pollution Prevention and Controls Bury Metropolitan Borough Council - Environmental Health Department Rochdale Metropolitan Borough Council - Environmental Health Department Oldham Metropolitan Borough Council - Environmental Health Department Rossendale Borough Council - Environmental Health Department Manchester City Council - Environmental Health Department	February 2015 July 2014 March 2015 May 2016 September 2014	Not Applicable Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update
Local Authority Pollution Prevention and Control Enforcements Bury Metropolitan Borough Council - Environmental Health Department Rochdale Metropolitan Borough Council - Environmental Health Department Rossendale Borough Council - Environmental Health Department Oldham Metropolitan Borough Council - Environmental Health Department Manchester City Council - Environmental Health Department	February 2015 July 2014 May 2016 September 2013 September 2014	Variable Variable Variable Variable Variable
Nearest Surface Water Feature Ordnance Survey	October 2020	
Pollution Incidents to Controlled Waters Environment Agency - North West Region	January 2000	Not Applicable
Prosecutions Relating to Authorised Processes Environment Agency - North West Region	March 2013	Annual Rolling Update
Prosecutions Relating to Controlled Waters Environment Agency - North West Region	March 2013	Annual Rolling Update
Registered Radioactive Substances Environment Agency - North West Region	June 2016	
River Quality Environment Agency - Head Office	November 2001	Not Applicable
River Quality Biology Sampling Points Environment Agency - Head Office	July 2012	Annually
River Quality Chemistry Sampling Points Environment Agency - Head Office	July 2012	Annually
Substantiated Pollution Incident Register Environment Agency - North West Region - Central Area Environment Agency - North West Region - North Area Environment Agency - North West Region - South Area	January 2021 January 2021 January 2021	Quarterly Quarterly Quarterly

Agency & Hydrological	Version	Update Cycle
Water Abstractions Environment Agency - North West Region	January 2021	Quarterly
Water Industry Act Referrals Environment Agency - North West Region	October 2017	Quarterly
Groundwater Vulnerability Map Environment Agency - Head Office	June 2018	As notified
Bedrock Aquifer Designations Environment Agency - Head Office	January 2018	Annually
Superficial Aquifer Designations Environment Agency - Head Office	January 2018	Annually
Source Protection Zones Environment Agency - Head Office	October 2019	Quarterly
Extreme Flooding from Rivers or Sea without Defences Environment Agency - Head Office	September 2020	Quarterly
Flooding from Rivers or Sea without Defences Environment Agency - Head Office	September 2020	Quarterly
Areas Benefiting from Flood Defences Environment Agency - Head Office	September 2020	Quarterly
Flood Water Storage Areas Environment Agency - Head Office	September 2020	Quarterly
Flood Defences Environment Agency - Head Office	September 2020	Quarterly
OS Water Network Lines Ordnance Survey	September 2020	Quarterly
Surface Water 1 in 30 year Flood Extent Environment Agency - Head Office	October 2013	Annually
Surface Water 1 in 100 year Flood Extent Environment Agency - Head Office	October 2013	Annually
Surface Water 1 in 1000 year Flood Extent Environment Agency - Head Office	October 2013	Annually
Surface Water Suitability Environment Agency - Head Office	October 2013	Annually
BGS Groundwater Flooding Susceptibility British Geological Survey - National Geoscience Information Service	May 2013	Annually

Waste	Version	Update Cycle
BGS Recorded Landfill Sites British Geological Survey - National Geoscience Information Service	June 1996	Not Applicable
Historical Landfill Sites Environment Agency - Head Office	October 2019	Quarterly
Integrated Pollution Control Registered Waste Sites Environment Agency - North West Region	October 2008	Not Applicable
Licensed Waste Management Facilities (Landfill Boundaries) Environment Agency - North West Region - Central Area Environment Agency - North West Region - North Area Environment Agency - North West Region - South Area	January 2021 January 2021 January 2021	Quarterly Quarterly Quarterly
Licensed Waste Management Facilities (Locations) Environment Agency - North West Region - Central Area Environment Agency - North West Region - North Area Environment Agency - North West Region - South Area	January 2021 January 2021 January 2021	Quarterly Quarterly Quarterly
Local Authority Landfill Coverage Bury Metropolitan Borough Council Lancashire County Council - Waste Management Group Manchester City Council - Planning Department Oldham Metropolitan Borough Council Rochdale Metropolitan Borough Council - Environmental Health Department Rossendale Borough Council - Environmental Health Department	May 2000 May 2000 May 2000 May 2000 May 2000 May 2000	Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable
Local Authority Recorded Landfill Sites Bury Metropolitan Borough Council Lancashire County Council - Waste Management Group Manchester City Council - Planning Department Oldham Metropolitan Borough Council Rochdale Metropolitan Borough Council - Environmental Health Department Rossendale Borough Council - Environmental Health Department	May 2000 May 2000 May 2000 May 2000 May 2000 May 2000	Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable
Potentially Infilled Land (Non-Water) Landmark Information Group Limited	December 1999	Not Applicable
Potentially Infilled Land (Water) Landmark Information Group Limited	December 1999	Not Applicable
Registered Landfill Sites Environment Agency - North West Region - Central Area Environment Agency - North West Region - North Area Environment Agency - North West Region - South Area	March 2003 March 2003 March 2003	Not Applicable Not Applicable Not Applicable
Registered Waste Transfer Sites Environment Agency - North West Region - Central Area Environment Agency - North West Region - North Area Environment Agency - North West Region - South Area	March 2003 March 2003 March 2003	Not Applicable Not Applicable Not Applicable
Registered Waste Treatment or Disposal Sites Environment Agency - North West Region - Central Area Environment Agency - North West Region - North Area Environment Agency - North West Region - South Area	March 2003 March 2003 March 2003	Not Applicable Not Applicable Not Applicable

Hazardous Substances	Version	Update Cycle
Control of Major Accident Hazards Sites (COMAH) Health and Safety Executive	April 2018	Bi-Annually
Explosive Sites Health and Safety Executive	March 2017	Annually
Notification of Installations Handling Hazardous Substances (NIHHS) Health and Safety Executive	November 2000	Not Applicable
Planning Hazardous Substance Enforcements Bury Metropolitan Borough Council Lancashire County Council Manchester City Council - Planning Department Oldham Metropolitan Borough Council Rochdale Metropolitan Borough Council Rossendale Borough Council - Planning Department	February 2016 February 2016 February 2016 February 2016 February 2016 February 2016	Variable Variable Variable Variable Variable Variable
Planning Hazardous Substance Consents Bury Metropolitan Borough Council Lancashire County Council Manchester City Council - Planning Department Oldham Metropolitan Borough Council Rochdale Metropolitan Borough Council Rossendale Borough Council - Planning Department	February 2016 February 2016 February 2016 February 2016 February 2016 February 2016	Variable Variable Variable Variable Variable Variable
Geological	Version	Update Cycle
BGS 1:625,000 Solid Geology British Geological Survey - National Geoscience Information Service	January 2009	Not Applicable
BGS Estimated Soil Chemistry British Geological Survey - National Geoscience Information Service	October 2015	Annually
BGS Recorded Mineral Sites British Geological Survey - National Geoscience Information Service	November 2020	Bi-Annually
CBSCB Compensation District Cheshire Brine Subsidence Compensation Board (CBSCB)	August 2011	Not Applicable
Coal Mining Affected Areas The Coal Authority - Property Searches	March 2014	Annual Rolling Update
Mining Instability Ove Arup & Partners	October 2000	Not Applicable
Non Coal Mining Areas of Great Britain British Geological Survey - National Geoscience Information Service	May 2015	Not Applicable
Potential for Collapsible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	April 2020	Annually
Potential for Compressible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Ground Dissolution Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Landslide Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Running Sand Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Radon Potential - Radon Affected Areas British Geological Survey - National Geoscience Information Service	July 2011	Annually
Radon Potential - Radon Protection Measures British Geological Survey - National Geoscience Information Service	July 2011	Annually

Industrial Land Use	Version	Update Cycle
Contemporary Trade Directory Entries Thomson Directories	January 2021	Quarterly
Fuel Station Entries Catalist Ltd - Experian	September 2020	Quarterly
Gas Pipelines National Grid	January 2021	
Points of Interest - Commercial Services PointX	March 2021	Quarterly
Points of Interest - Education and Health PointX	March 2021	Quarterly
Points of Interest - Manufacturing and Production PointX	March 2021	Quarterly
Points of Interest - Public Infrastructure PointX	March 2021	Quarterly
Points of Interest - Recreational and Environmental PointX	March 2021	Quarterly
Underground Electrical Cables National Grid	December 2020	

Sensitive Land Use	Version	Update Cycle
Ancient Woodland Natural England	February 2021	Bi-Annually
Areas of Adopted Green Belt Bury Metropolitan Borough Council Manchester City Council Oldham Metropolitan Borough Council Rochdale Metropolitan Borough Council Rossendale Borough Council - Planning Department	June 2020 June 2020 June 2020 June 2020 June 2020	As notified As notified As notified As notified As notified
Areas of Unadopted Green Belt Bury Metropolitan Borough Council Manchester City Council Oldham Metropolitan Borough Council Rochdale Metropolitan Borough Council Rossendale Borough Council - Planning Department	June 2020 June 2020 June 2020 June 2020 June 2020	As notified As notified As notified As notified As notified
Areas of Outstanding Natural Beauty Natural England	January 2021	Bi-Annually
Environmentally Sensitive Areas Natural England	January 2017	
Forest Parks Forestry Commission	April 1997	Not Applicable
Local Nature Reserves Natural England	February 2021	Bi-Annually
Marine Nature Reserves Natural England	July 2019	Bi-Annually
National Nature Reserves Natural England	January 2021	Bi-Annually
National Parks Natural England	April 2017	Bi-Annually
Nitrate Sensitive Areas Natural England	April 2016	Not Applicable
Nitrate Vulnerable Zones Environment Agency - Head Office Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	December 2017 October 2015	Bi-Annually
Ramsar Sites Natural England	August 2020	Bi-Annually
Sites of Special Scientific Interest Natural England	February 2021	Bi-Annually
Special Areas of Conservation Natural England	July 2020	Bi-Annually
Special Protection Areas Natural England	February 2021	Bi-Annually

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
Environment Agency	
Scottish Environment Protection Agency	
The Coal Authority	
British Geological Survey	
Centre for Ecology and Hydrology	
Natural Resources Wales	
Scottish Natural Heritage	
Natural England	
Public Health England	
Ove Arup	
Stantec UK Ltd	

Contact	Name and Address	Contact Details
1	British Geological Survey - Enquiry Service British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
2	Environment Agency - National Customer Contact Centre (NCCC) PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 03708 506 506 Email: enquiries@environment-agency.gov.uk
3	Rochdale Metropolitan Borough Council - Environmental Health Department P O Box 32, Telegraph House, Ballie Street, Rochdale, Greater Manchester, OL16 1JH	Telephone: 01706 864139 Fax: 01706 864185 Website: www.rochdale.gov.uk
4	Environment Agency - Head Office Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, Avon, BS32 4UD	Telephone: 01454 624400 Fax: 01454 624409
5	Ordnance Survey Adanac Drive, Southampton, Hampshire, SO16 0AS	Telephone: 03456 05 05 05 Email: customerservices@ordnancesurvey.co.uk Website: www.ordnancesurvey.gov.uk
6	The Coal Authority - Property Searches 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG	Telephone: 0345 762 6848 Fax: 01623 637 338 Email: groundstability@coal.gov.uk Website: www2.groundstability.com
7	PointX 7 Abbey Court, Eagle Way, Sowton, Exeter, Devon, EX2 7HY	Website: www.pointx.co.uk
8	Natural England County Hall, Spetchley Road, Worcester, WR5 2NP	Telephone: 0300 060 3900 Email: enquiries@naturalengland.org.uk Website: www.naturalengland.org.uk
9	Rochdale Metropolitan Borough Council PO Box 15, Town Hall, Rochdale, Greater Manchester, OL16 1AB	Telephone: 01706 647474 Fax: 01706 59475 Website: www.rochdale.gov.uk
10	Oldham Metropolitan Borough Council Civic Centre, P O Box 55, West Street, Oldham, Lancashire, OL1 1XN	Telephone: 0161 911 3000 Fax: 0161 678 4550 Website: www.oldham.gov.uk
-	Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org
-	Landmark Information Group Limited Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

Please note that the Environment Agency / Natural Resources Wales / SEPA have a charging policy in place for enquiries.

Historical Mapping Legends

Ordnance Survey County Series 1:10,560

	Gravel Pit		Sand Pit		Other Pits
	Quarry		Shingle		Orchard
	Osiers		Reeds		Marsh
	Mixed Wood		Deciduous		Brushwood
	Fir		Furze		Rough Pasture
	Arrow denotes flow of water		Trigonometrical Station		
	Site of Antiquities		Bench Mark		
	Pump, Guide Post, Signal Post		Well, Spring, Boundary Post		
	285 Surface Level				
	Sketched Contour		Instrumental Contour		
	Main Roads		Minor Roads		
	Sunken Road		Raised Road		
	Road over Railway		Railway over River		
	Railway over Road		Level Crossing		
	Road over River or Canal		Road over Stream		
	Road over Stream				
	County Boundary (Geographical)				
	County & Civil Parish Boundary				
	Administrative County & Civil Parish Boundary				
	County Borough Boundary (England)				
	County Burgh Boundary (Scotland)				
	Rural District Boundary				
	Civil Parish Boundary				

Ordnance Survey Plan 1:10,000

	Chalk Pit, Clay Pit or Quarry		Gravel Pit
	Sand Pit		Disused Pit or Quarry
	Refuse or Slag Heap		Lake, Loch or Pond
	Dunes		Boulders
	Coniferous Trees		Non-Coniferous Trees
	Orchard		Scrub
	Bracken		Heath
	Marsh		Reeds
	Building		Glasshouse
	Sloping Masonry		Pylon
	Cutting		Embankment
	Road Under		Road Over
	Level Crossing		Foot Bridge
	Siding, Tramway or Mineral Line		Narrow Gauge
	Geographical County		
	Administrative County, County Borough or County of City		
	Municipal Borough, Urban or Rural District, Burgh or District Council		
	Borough, Burgh or County Constituency		
	Civil Parish		
	Boundary Post or Stone		Police Station
	Church		Post Office
	Club House		Public Convenience
	Fire Engine Station		Public House
	Foot Bridge		Signal Box
	Fountain		Spring
	Guide Post		Telephone Call Box
	Mile Post		Telephone Call Post
	Mile Stone		Well

1:10,000 Raster Mapping

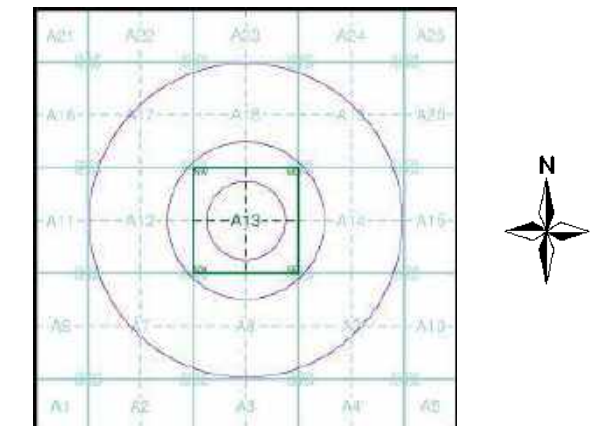
	Gravel Pit		Refuse tip or slag heap
	Rock		Rock (scattered)
	Boulders		Boulders (scattered)
	Shingle		Mud
	Sand		Sand Pit
	Slopes		Top of cliff
	General detail		Underground detail
	Overhead detail		Narrow gauge railway
	Multi-track railway		Single track railway
	County boundary (England only)		Civil, parish or community boundary
	District, Unitary, Metropolitan, London Borough boundary		Constituency boundary
	Area of wooded vegetation		Non-coniferous trees
	Non-coniferous trees (scattered)		Coniferous trees
	Coniferous trees (scattered)		Positioned tree
	Orchard		Coppice or Osiers
	Rough Grassland		Heath
	Scrub		Marsh, Salt Marsh or Reeds
	Water feature		Flow arrows
	Mean high water (springs)		Mean low water (springs)
	Telephone line (where shown)		Electricity transmission line (with poles)
	Bench mark (where shown)		Triangulation station
	Point feature (e.g. Guide Post or Mile Stone)		Pylon, flare stack or lighting tower
	Site of (antiquity)		Glasshouse
	General Building		Important Building



Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Lancashire And Furness	1:10,560	1851	3
Yorkshire	1:10,560	1854	4
Lancashire And Furness	1:10,560	1894	5
Lancashire And Furness	1:10,560	1910 - 1911	6
Lancashire And Furness	1:10,560	1932	7
Lancashire And Furness	1:10,560	1938	8
Ordnance Survey Plan	1:10,000	1956	9
Ordnance Survey Plan	1:10,000	1965 - 1968	10
Manchester	1:25,000	1975	11
Ordnance Survey Plan	1:10,000	1977	12
Ordnance Survey Plan	1:10,000	1984 - 1988	13
Ordnance Survey Plan	1:10,000	1993	14
10K Raster Mapping	1:10,000	1999	15
10K Raster Mapping	1:10,000	2006	16
VectorMap Local	1:10,000	2020	17

Historical Map - Slice A



Order Details

Order Number: 274207304_1_1
 Customer Ref: 14-768 JC
 National Grid Reference: 387930, 410140
 Slice: A
 Site Area (Ha): 0.01
 Search Buffer (m): 1000

Site Details

Flat 2, The Directors, 3, Heywood Road, ROCHDALE, OL11 3AU

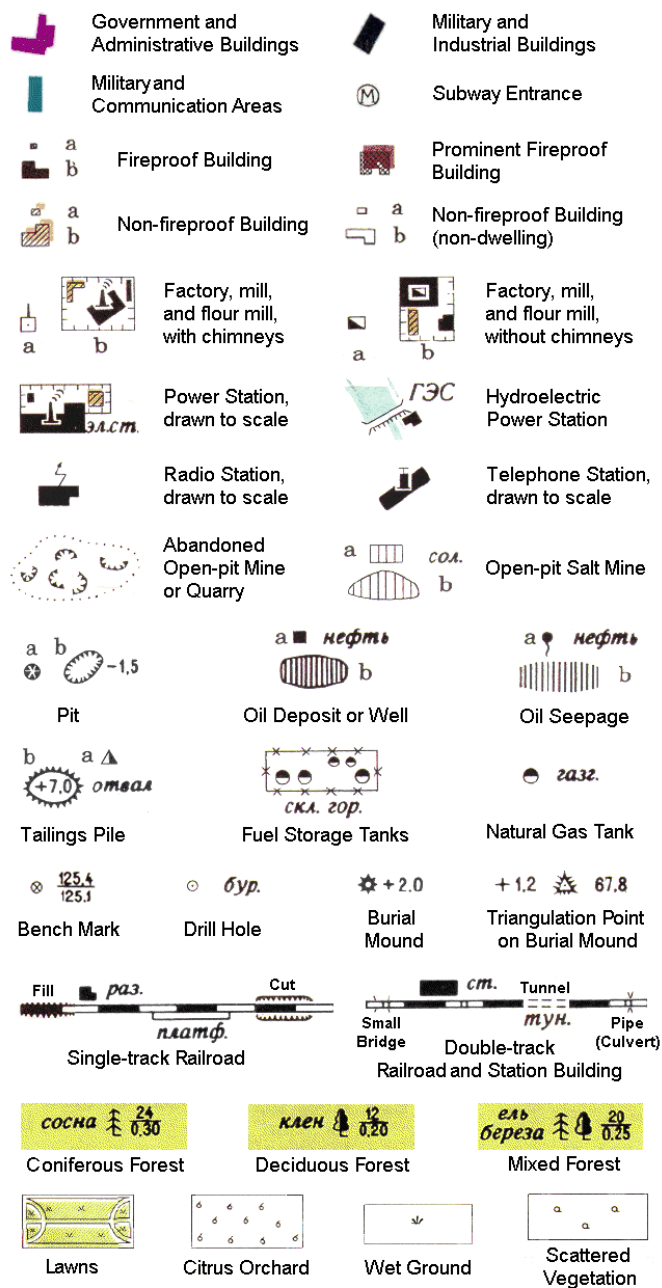


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Russian Military Mapping Legends

1:5,000 and 1:10,000 mapping

a. Not drawn to scale b. Drawn to scale



243.8 Values for prominent elevations

186.0 Numbers for spot elevations, depth soundings, contour lines, etc.

0.2 Velocity of the current, width of river bed, depth of river

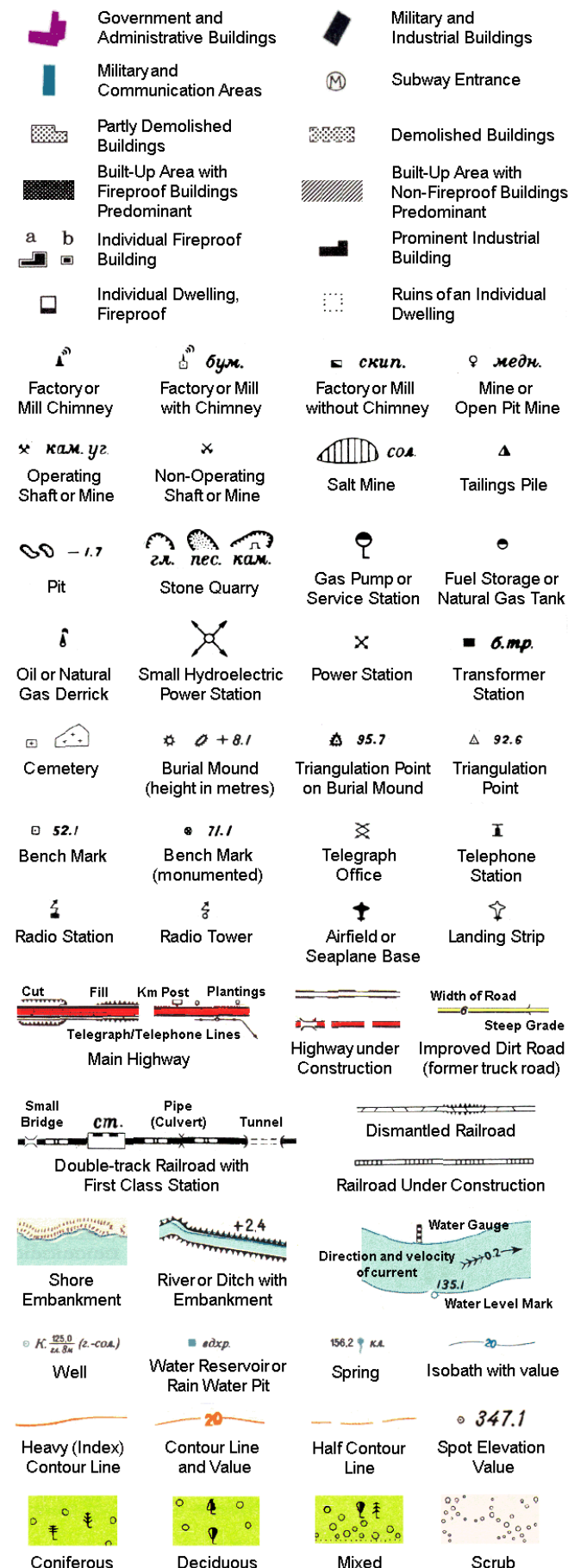
180/12 Fractional terms: length and capacity of bridges; depth of fords and condition of the river bottom; height of forest and the diameter of trees

Russian Alphabet (For reference and phonetic interpretation of map text)

А а (A)	З з (Z)	П п (P)	Ч ч (CH)
Б б (B)	И и (I)	Р р (R)	Ш ш (SH)
В в (V)	Й й (Y)	С с (S)	Щ щ (SHCH)
Г г (G)	К к (K)	Т т (T)	Ъ (-)
Д д (D)	Л л (L)	У у (U)	Ы (Y)
Е е (E)	М м (M)	Ф ф (F)	Ь (')
Ё ё (YO)	Н н (N)	Х х (KH)	Э э (E)
Ж ж (ZH)	О о (O)	Ц ц (TS)	Ю ю (YU or IU)
			Я я (YA or IA)

1:25,000 mapping

a. Not drawn to scale b. Drawn to scale



Key to Numbers on Mapping

SD81_Manchester

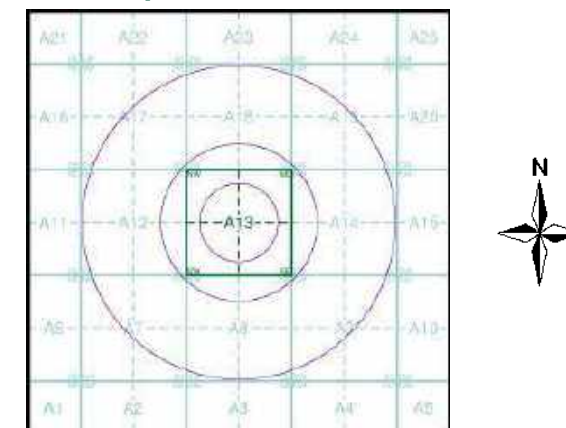
No.	Description
79	Factory (Machinery)
134	Foundry (Cast Iron)



Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Lancashire And Furness	1:10,560	1851	3
Yorkshire	1:10,560	1854	4
Lancashire And Furness	1:10,560	1894	5
Lancashire And Furness	1:10,560	1910 - 1911	6
Lancashire And Furness	1:10,560	1932	7
Lancashire And Furness	1:10,560	1938	8
Ordnance Survey Plan	1:10,000	1956	9
Ordnance Survey Plan	1:10,000	1965 - 1968	10
Manchester	1:25,000	1975	11
Ordnance Survey Plan	1:10,000	1977	12
Ordnance Survey Plan	1:10,000	1984 - 1988	13
Ordnance Survey Plan	1:10,000	1993	14
10K Raster Mapping	1:10,000	1999	15
10K Raster Mapping	1:10,000	2006	16
VectorMap Local	1:10,000	2020	17

Russian Map - Slice A



Order Details

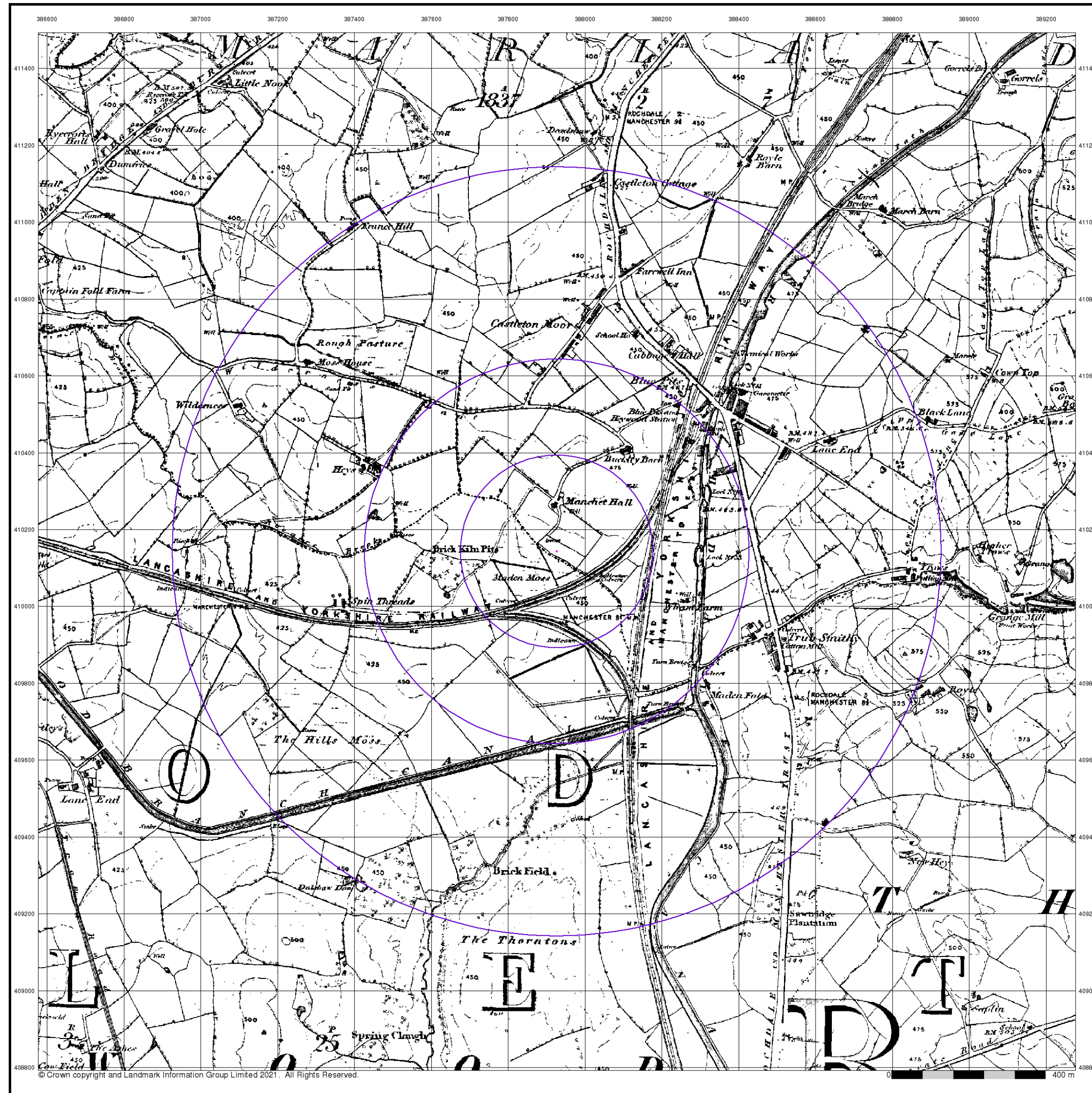
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 Customer Ref: 14-768 JC
 National Grid Reference: 387930, 410140
 Slice: A
 Site Area (Ha): 0.01
 Search Buffer (m): 1000

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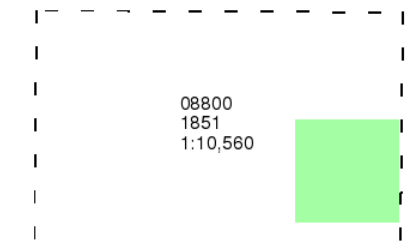
Lancashire And Furness

Published 1851

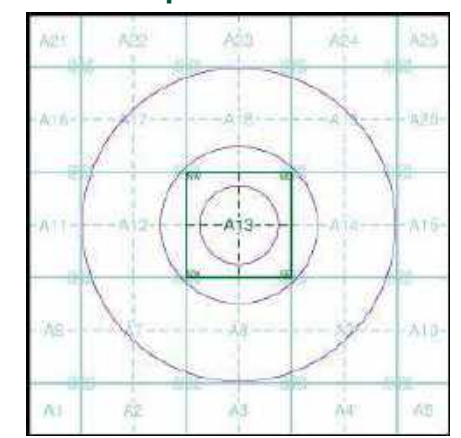
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

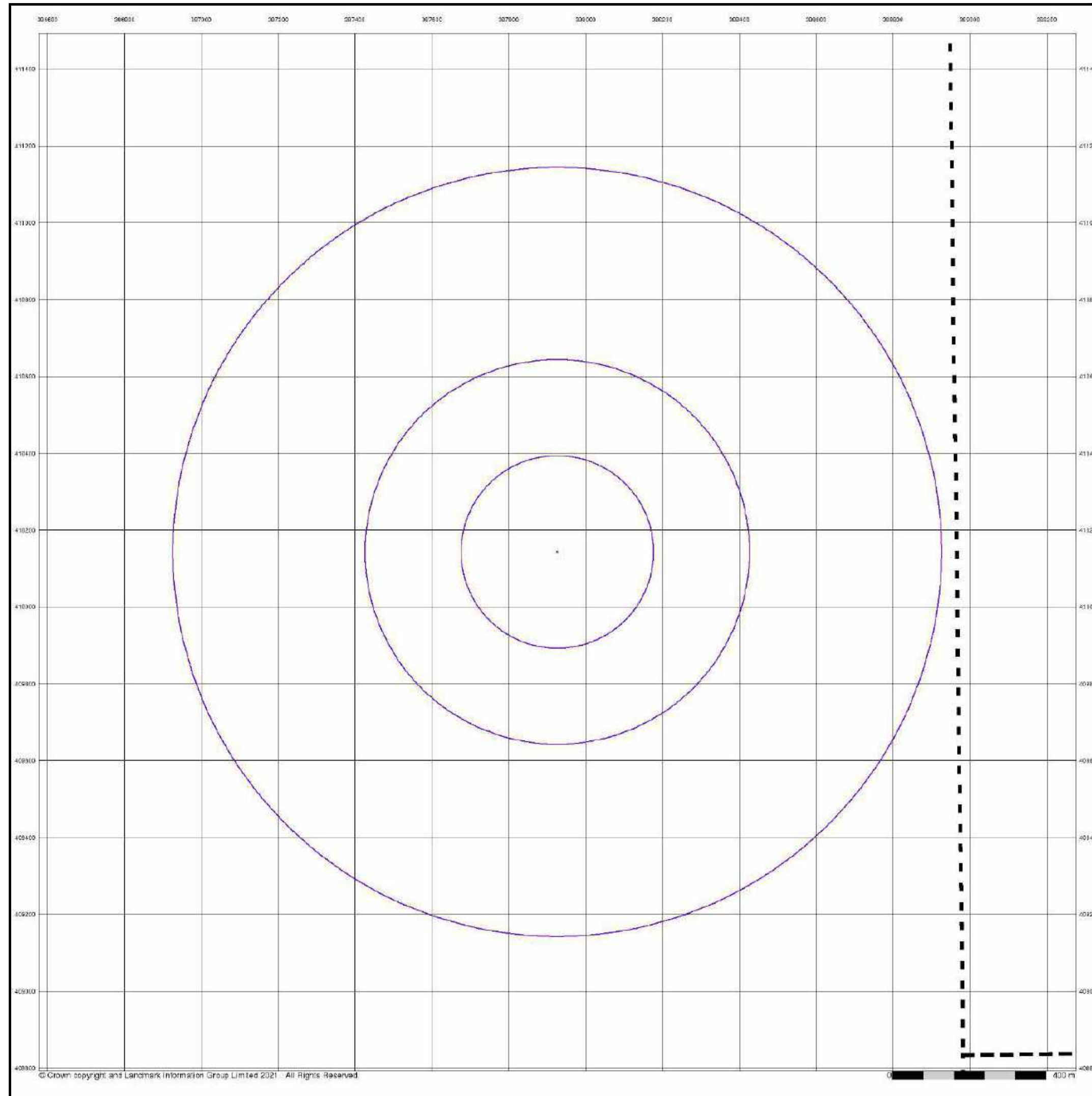
Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
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Search Buffer (m): 1000

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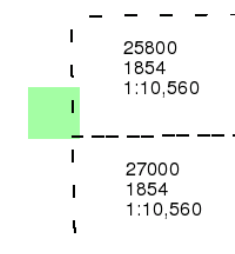
Yorkshire

Published 1854

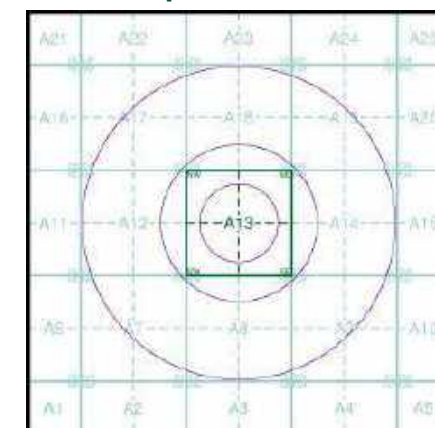
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
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Lancashire And Furness

Published 1894

Source map scale - 1:10,560

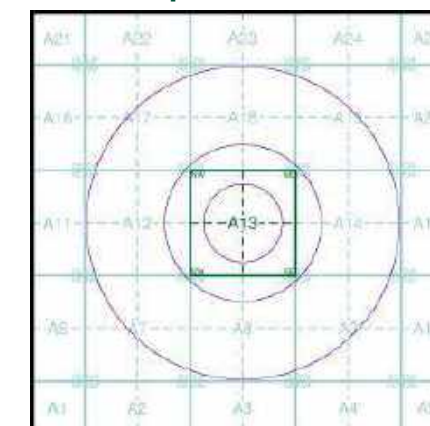
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

088NE
1894
1:10,560

088SE
1894
1:10,560

Historical Map - Slice A



Order Details

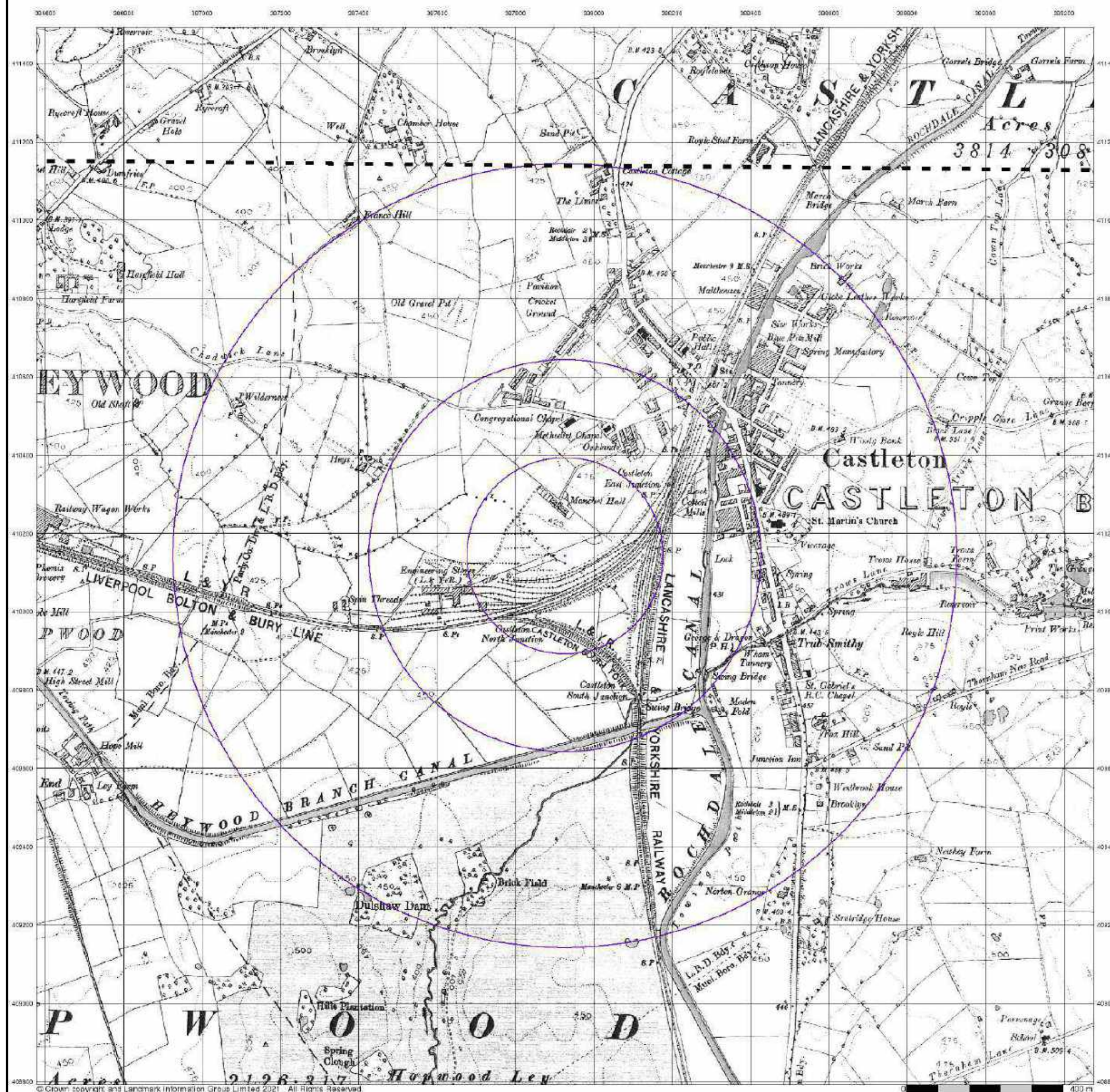
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Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
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Search Buffer (m): 1000

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Lancashire And Furness

Published 1910 - 1911

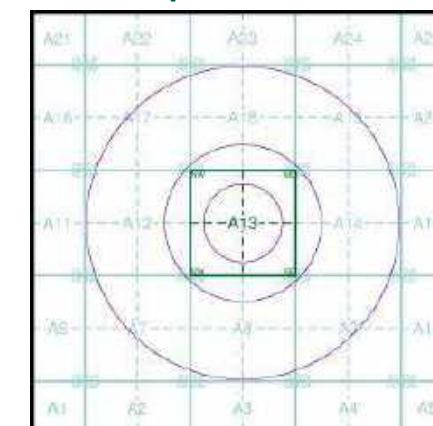
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

088NE
1911
1:10,560
088SE
1910
1:10,560

Historical Map - Slice A



Order Details

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Customer Ref: 14-768 JC
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Lancashire And Furness

Published 1932

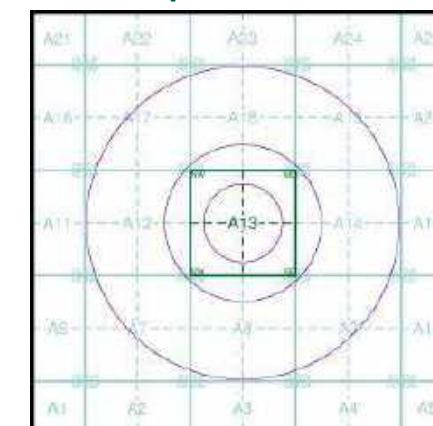
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

088NE
1932
1:10,560
088SE
1932
1:10,560

Historical Map - Slice A



Order Details

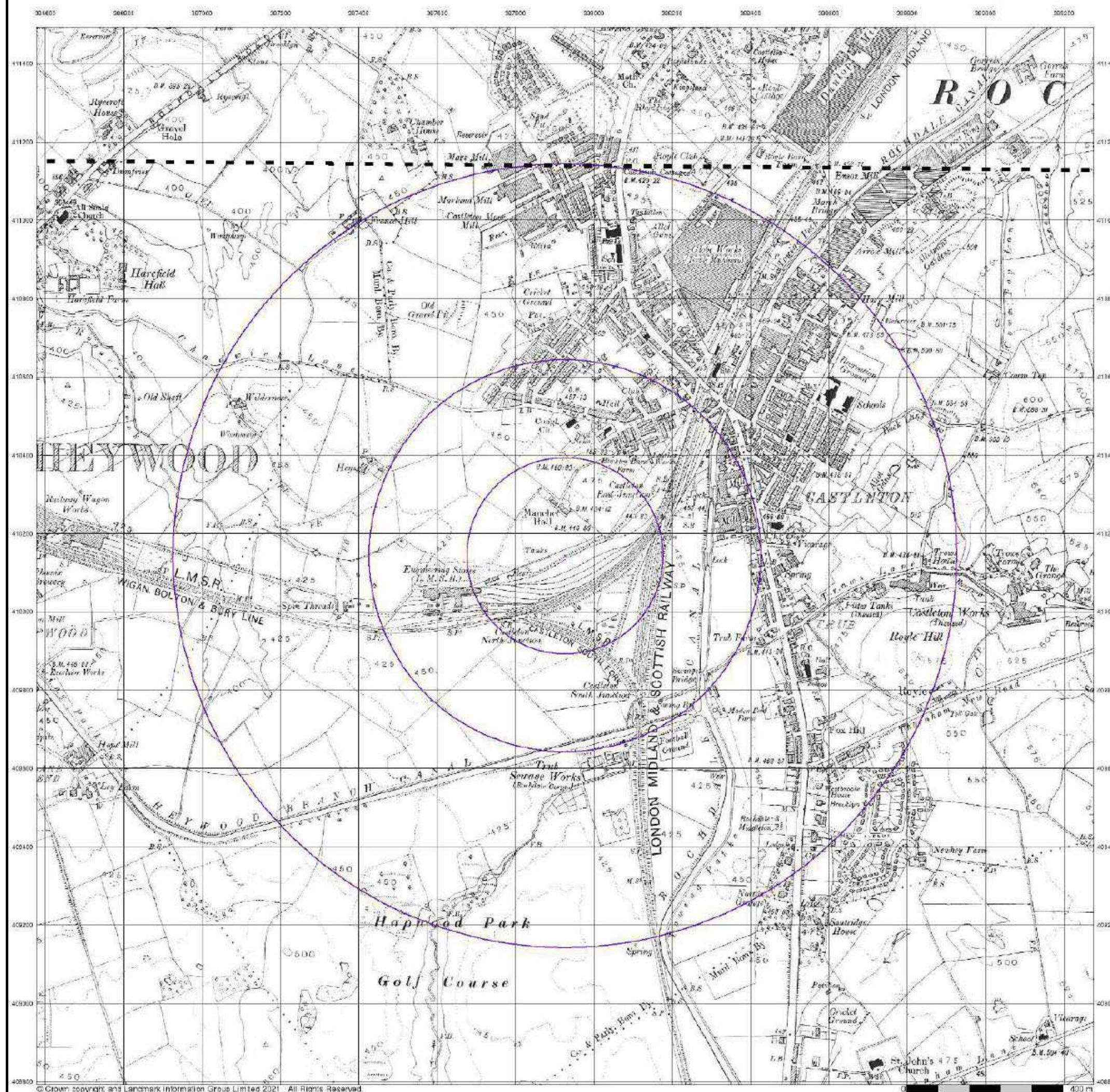
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Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
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Search Buffer (m): 1000

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Lancashire And Furness

Published 1938

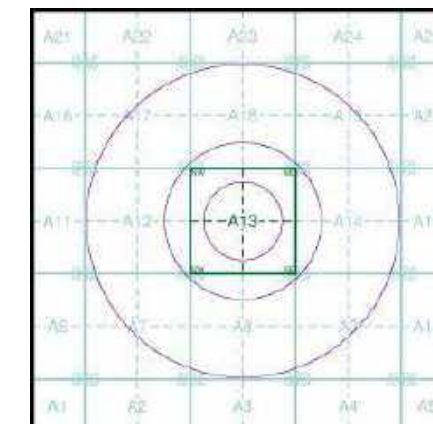
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

088NE
1938
1:10,560
088SE
1938
1:10,560

Historical Map - Slice A



Order Details

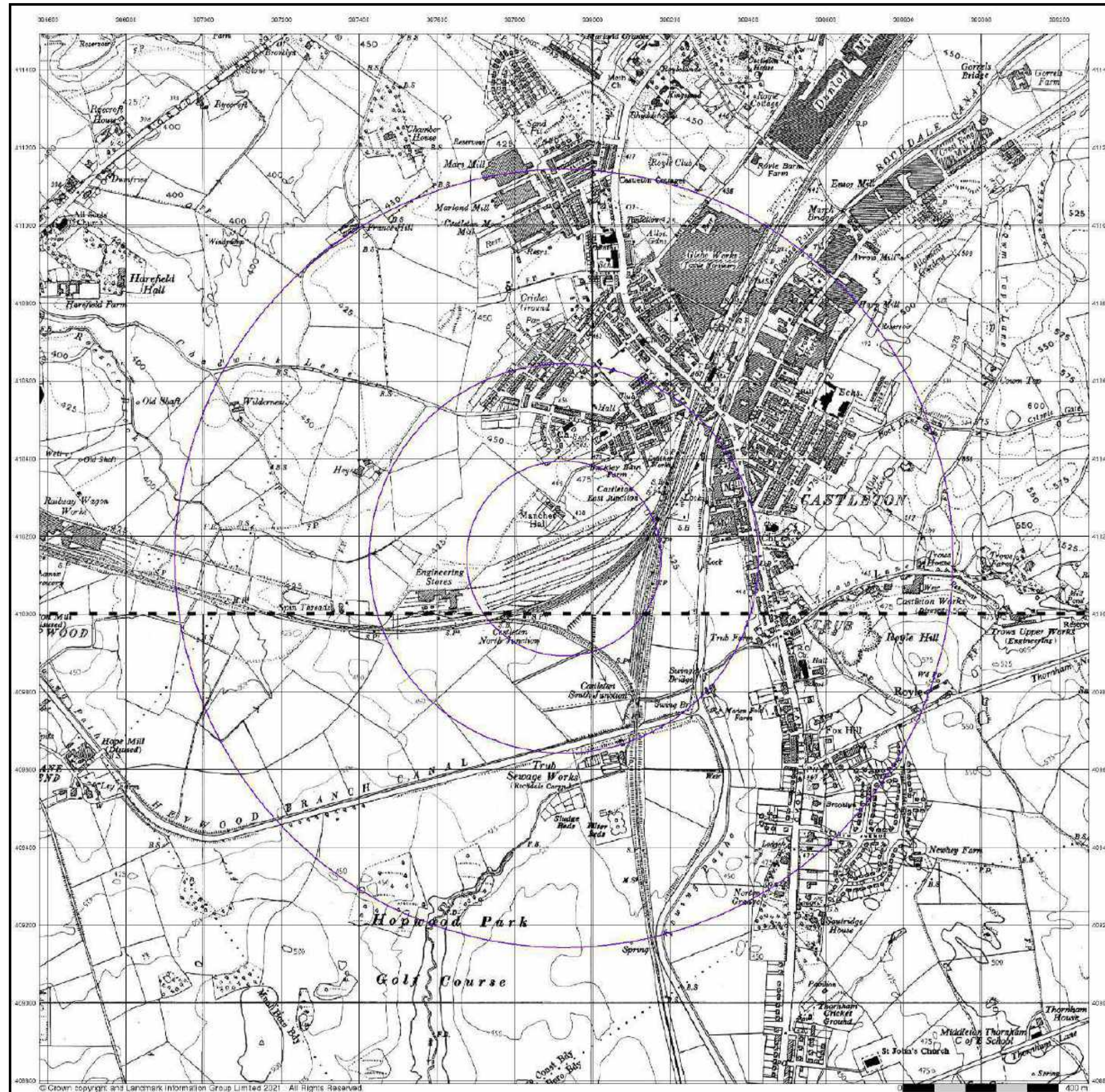
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Customer Ref: 14-768 JC
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Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

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Ordnance Survey Plan

Published 1956

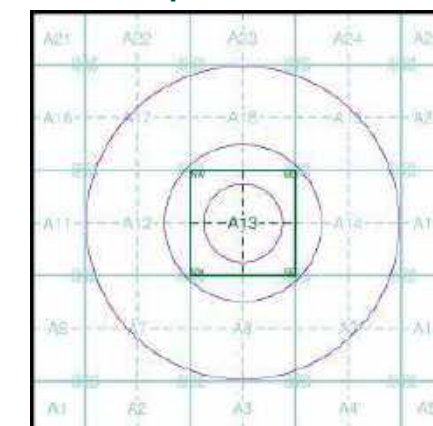
Source map scale - 1:10,000

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Map Name(s) and Date(s)

SD81SE	1956
1:10,560	
SD80NE	1956
1:10,560	

Historical Map - Slice A



Order Details

Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
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Search Buffer (m): 1000

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Ordnance Survey Plan

Published 1965 - 1968

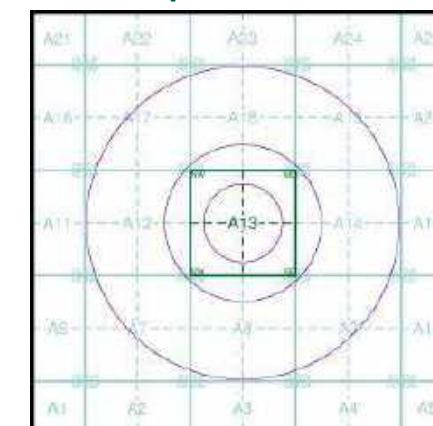
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

SD81SE	1968
1:10,560	
SD80NE	1965
1:10,560	

Historical Map - Slice A



Order Details

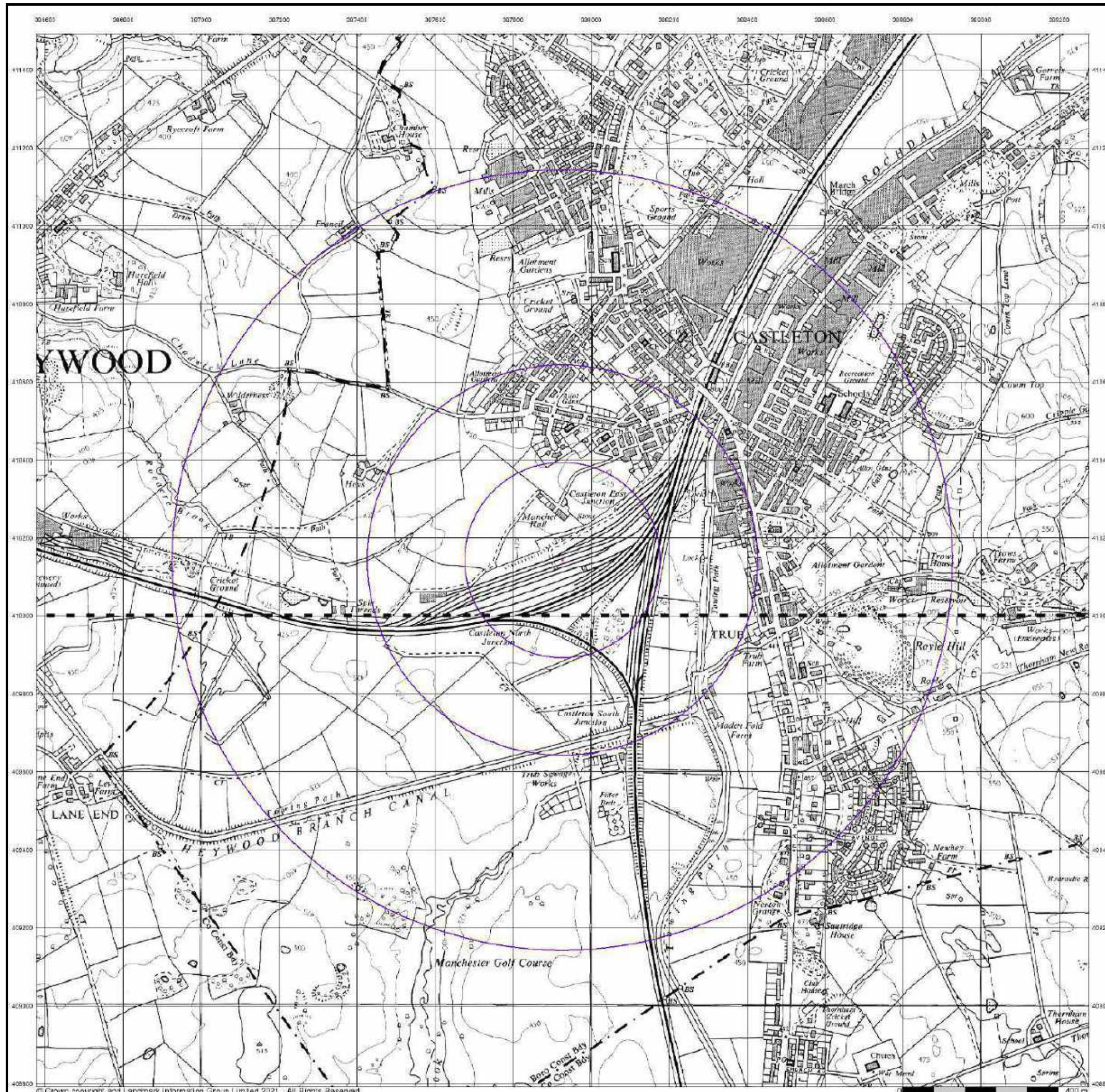
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Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

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Manchester

Published 1975

Source map scale - 1:25,000

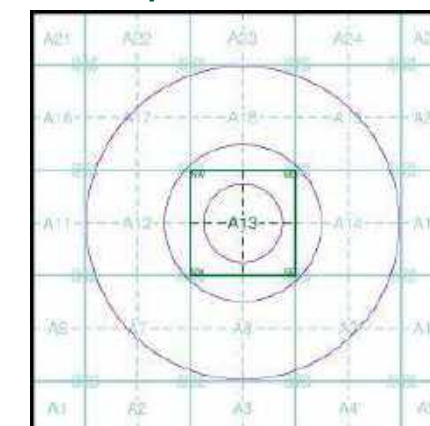
These maps were produced by the Russian military during the Cold War between 1950 and 1997, and cover 103 towns and cities throughout the U.K. The maps are produced at 1:25,000, 1:10,000 and 1:5,000 scale, and show detailed land use, with colour-coded areas for development, green areas, and non-developed areas. Buildings are coloured black and important building uses (such as hospitals, post offices, factories etc.) are numbered, with a numbered key describing their use.

They were produced by the Russians for the benefit of navigation, as well as strategic military sites and transport hubs, for use if they were to have invaded the U.K. The detailed information provided indicates that the areas were surveyed using land-based personnel, on the ground, in the cities that are mapped.

Map Name(s) and Date(s)

SD81
1975
1:25,000
SD80
1975
1:25,000

Russian Map - Slice A



Order Details

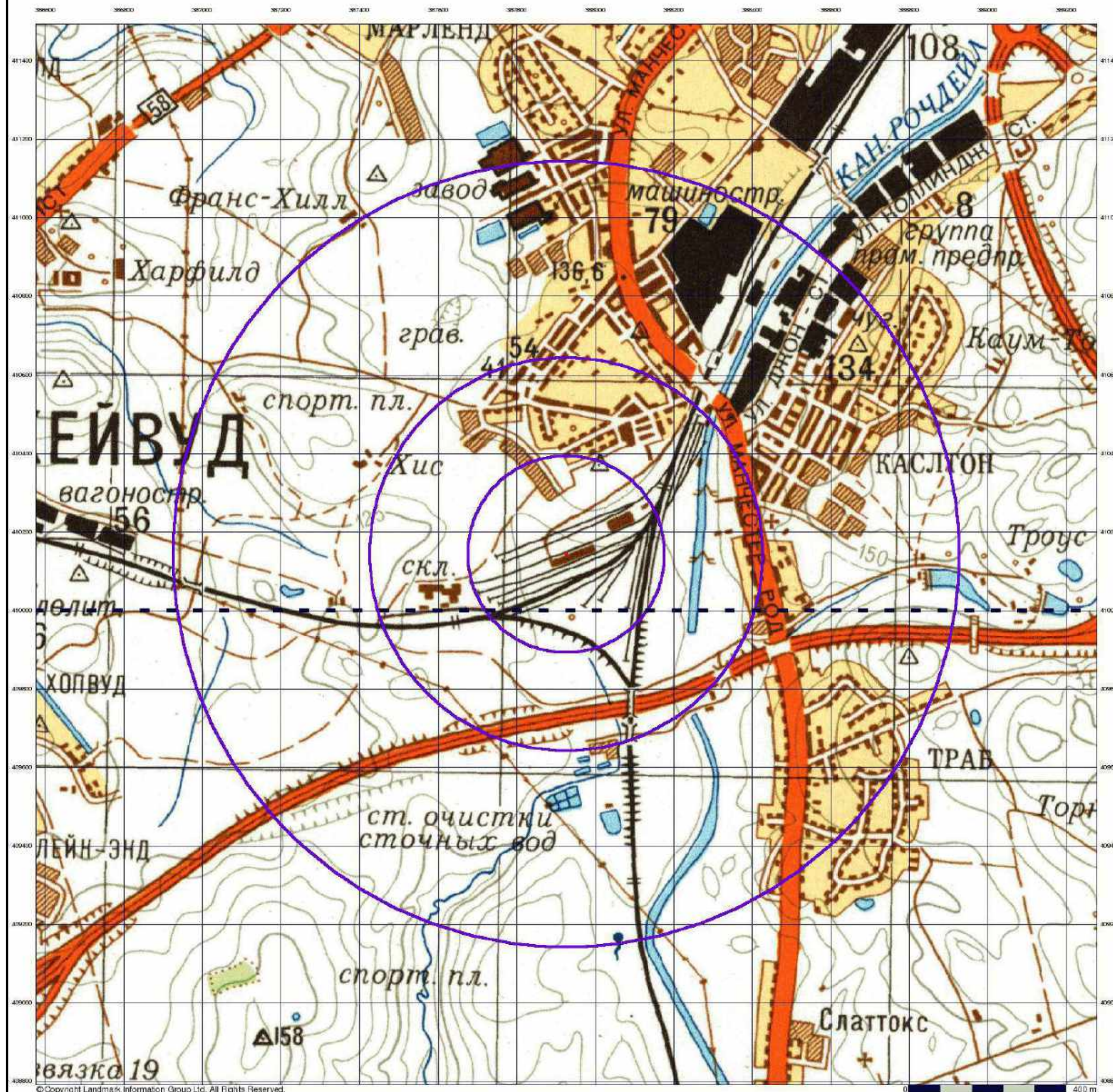
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Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

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Landmark
INFORMATION GROUP

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Ordnance Survey Plan

Published 1977

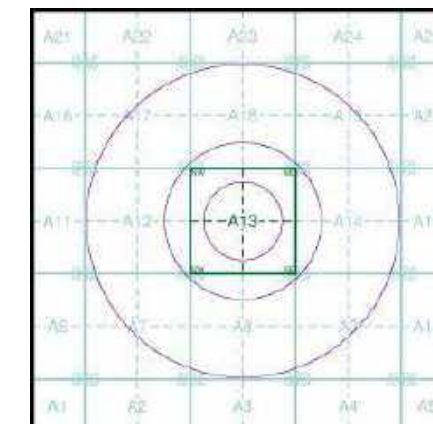
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

SD81SE
1977
1:10,000
SD80NE
1977
1:10,000

Historical Map - Slice A



Order Details

Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

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Ordnance Survey Plan

Published 1984 - 1988

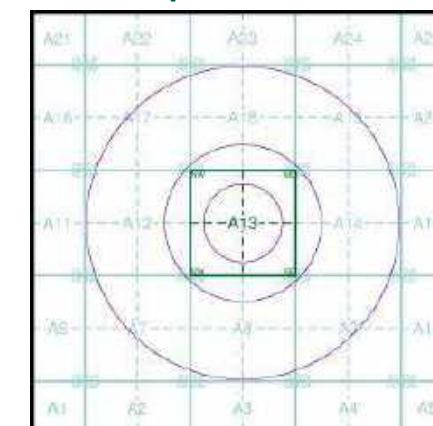
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

SD81SE
1988
1:10,000
SD80NE
1984
1:10,000

Historical Map - Slice A



Order Details

Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

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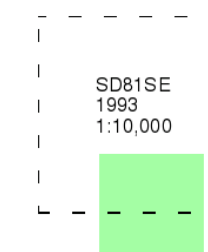
Ordnance Survey Plan

Published 1993

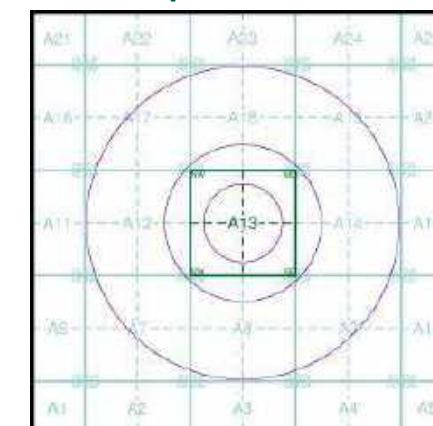
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

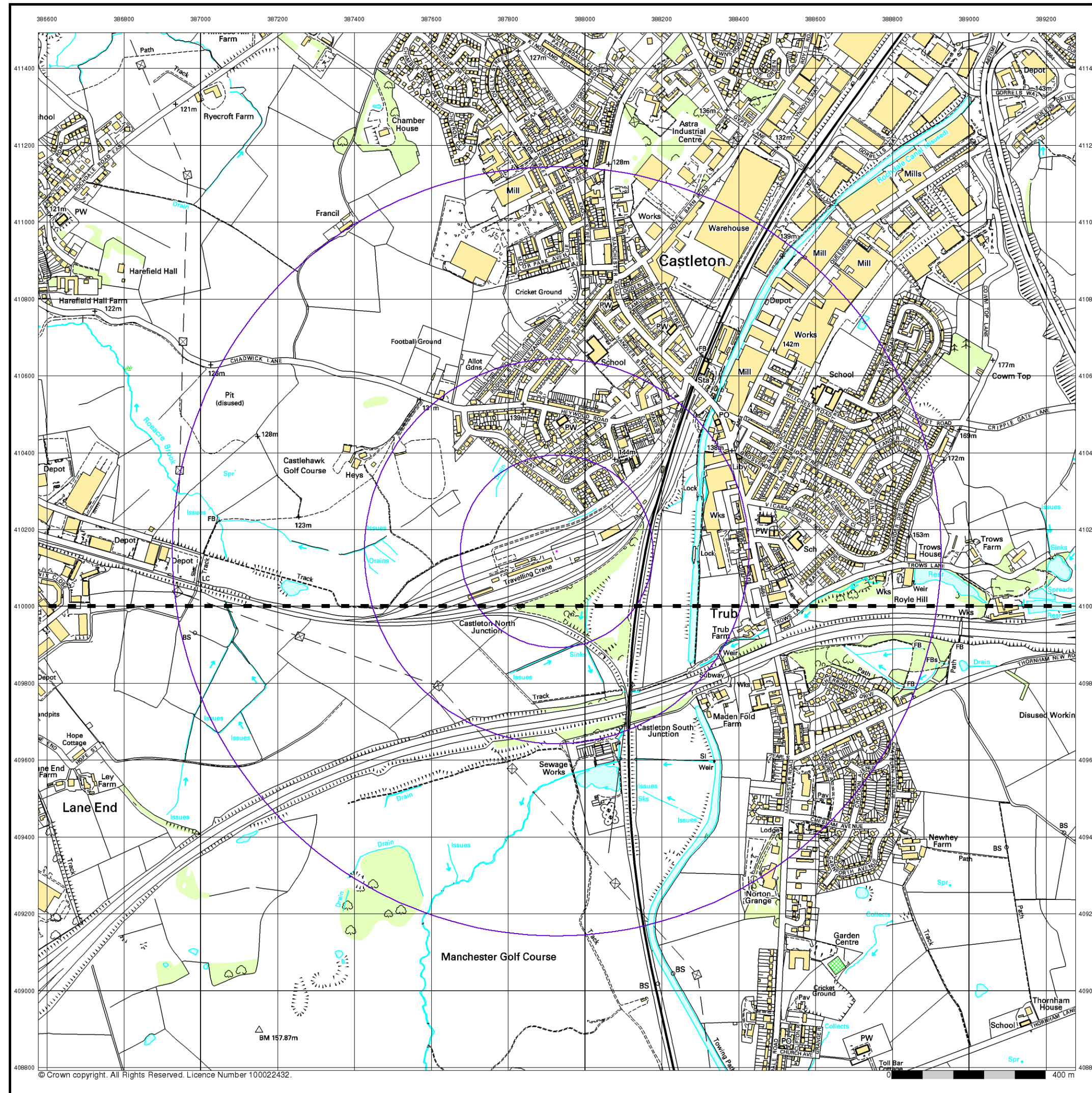
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Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

Site Details

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10k Raster Mapping

Published 1999

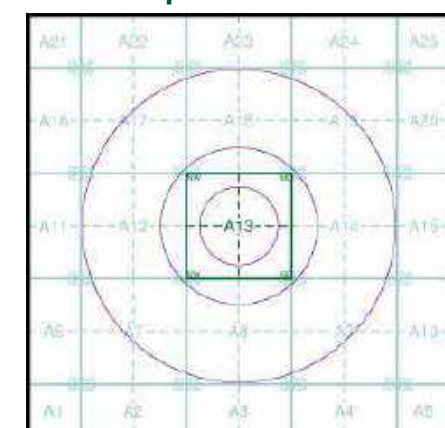
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)

SD81SE
1999
1:10,000
SD80NE
1999
1:10,000

Historical Map - Slice A



Order Details

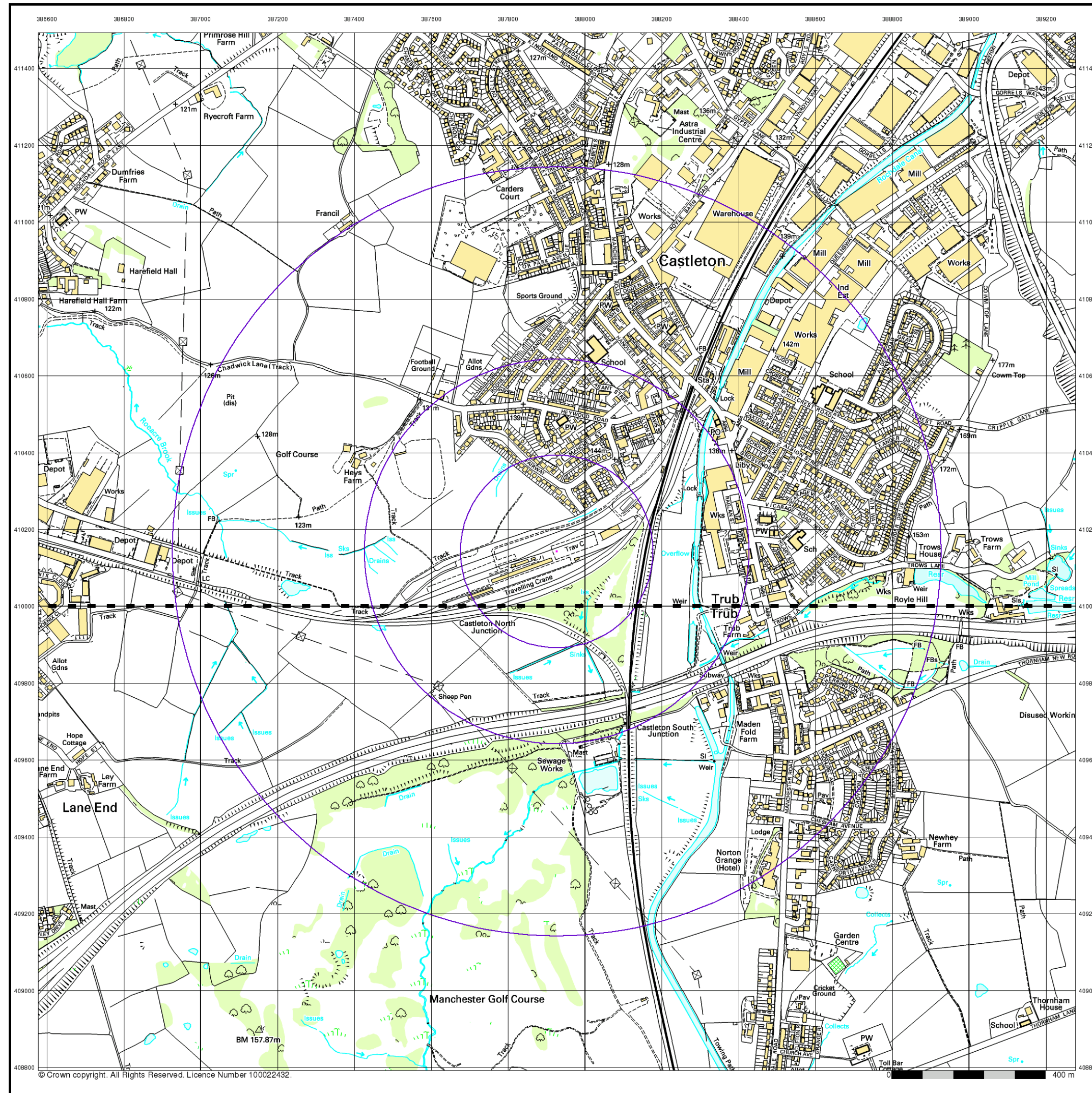
Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

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10k Raster Mapping

Published 2006

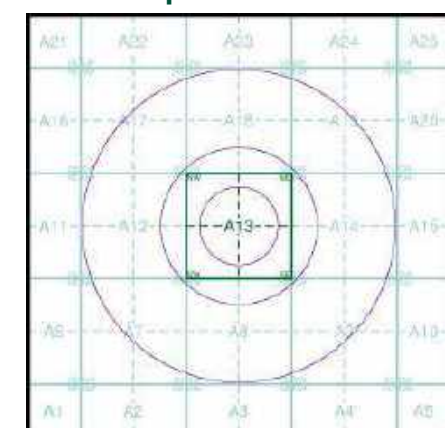
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)

SD81SE	2006	1:10,000
SD80NE	2006	1:10,000

Historical Map - Slice A



Order Details

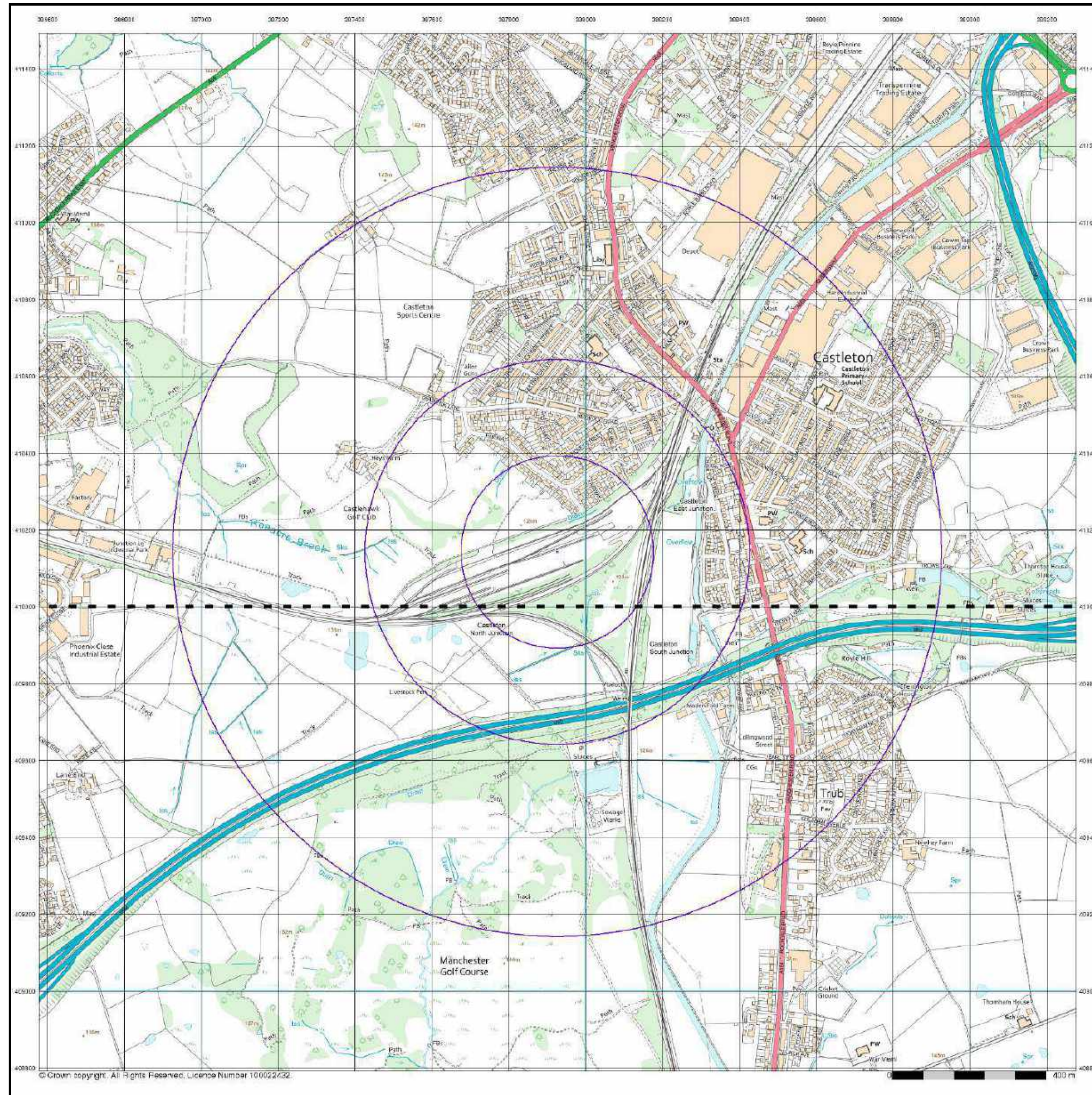
Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

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VectorMap Local

Published 2020

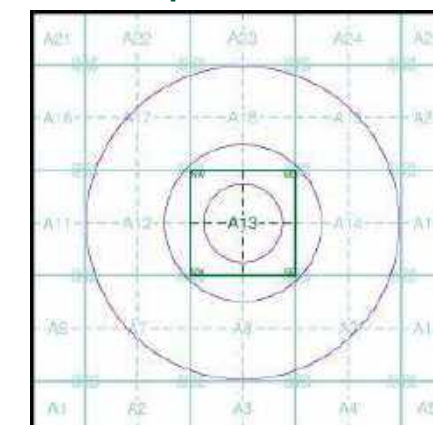
Source map scale - 1:10,000

VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap Local is derived from large-scale information surveyed at 1:1250 scale (covering major towns and cities), 1:2500 scale (smaller towns, villages and developed rural areas), and 1:10 000 scale (mountain, moorland and river estuary areas).

Map Name(s) and Date(s)

SD81SE
2020
Variable
SD80NE
2020
Variable

Historical Map - Slice A



Order Details

Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

Site Details

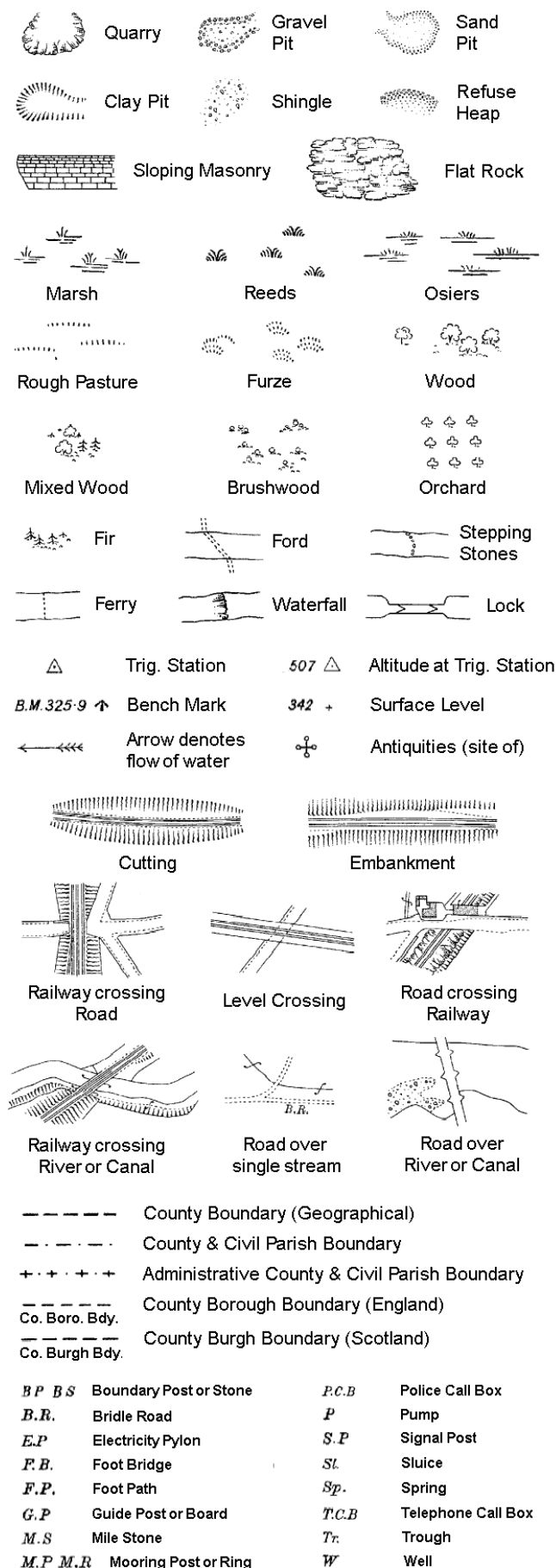
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Historical Mapping Legends

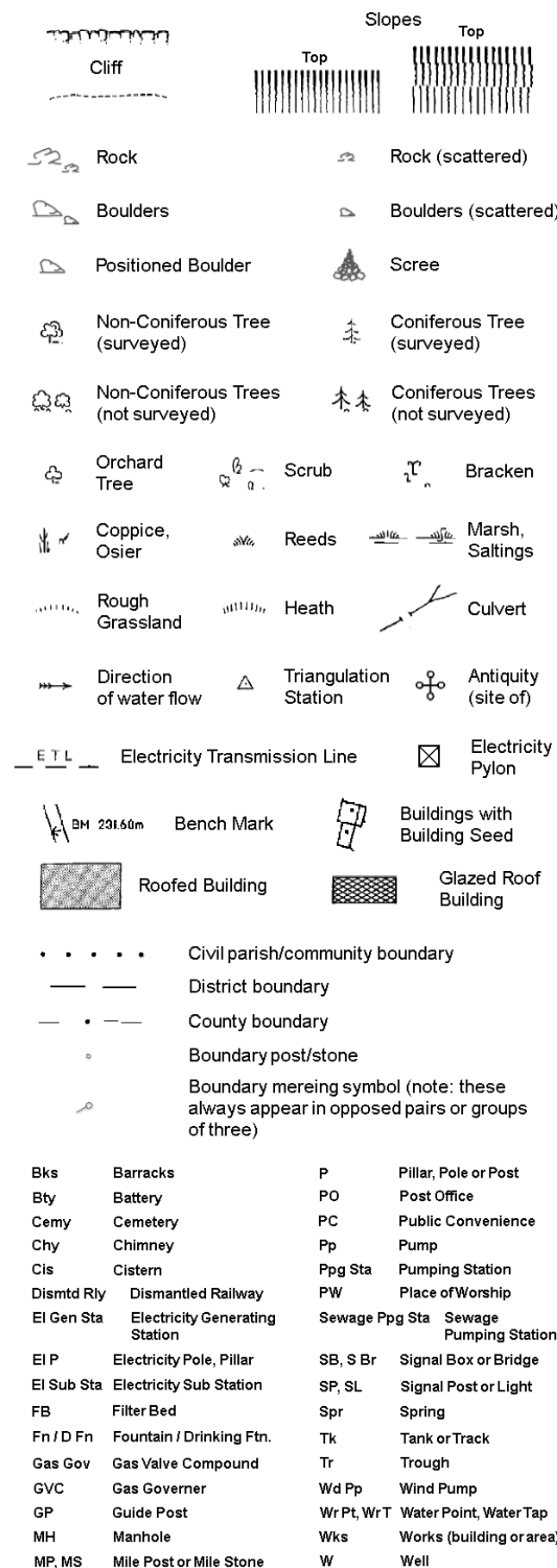
Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



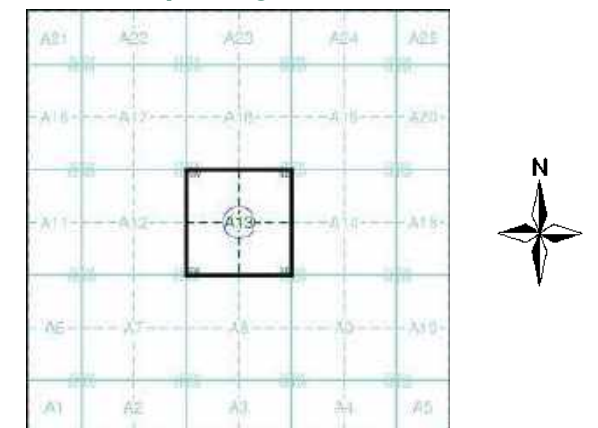
Large-Scale National Grid Data 1:2,500 and 1:1,250



Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Lancashire And Furness	1:2,500	1893	2
Lancashire And Furness	1:2,500	1910	3
Lancashire And Furness	1:2,500	1929	4
Lancashire And Furness	1:2,500	1937	5
Ordnance Survey Plan	1:1,250	1956	6
Ordnance Survey Plan	1:2,500	1956	7
Ordnance Survey Plan	1:2,500	1970 - 1977	8
Ordnance Survey Plan	1:1,250	1973 - 1977	9
Supply of Unpublished Survey Information	1:2,500	1975	10
Supply of Unpublished Survey Information	1:1,250	1975	11
Supply of Unpublished Survey Information	1:1,250	1975 - 1976	12
Supply of Unpublished Survey Information	1:1,250	1976	13
Additional SIMs	1:1,250	1990	14
Large-Scale National Grid Data	1:1,250	1992	15
Large-Scale National Grid Data	1:2,500	1992	16
Historical Aerial Photography	1:2,500	2000	17

Historical Map - Segment A13



Order Details

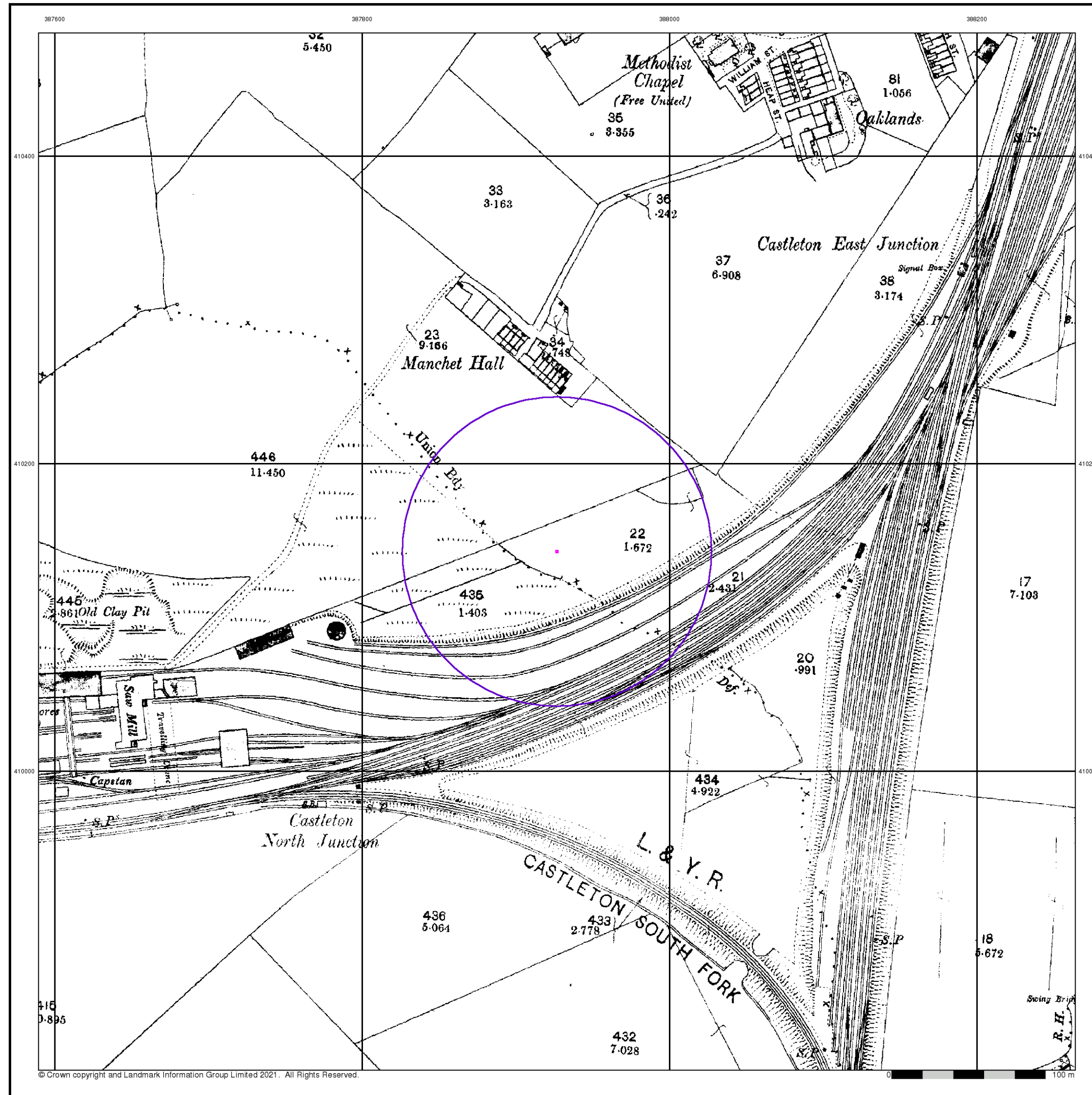
Order Number: 274207304_1_1
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National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

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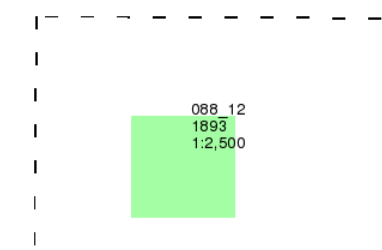
Lancashire And Furness

Published 1893

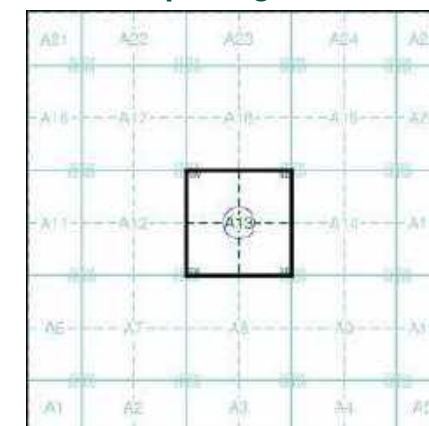
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

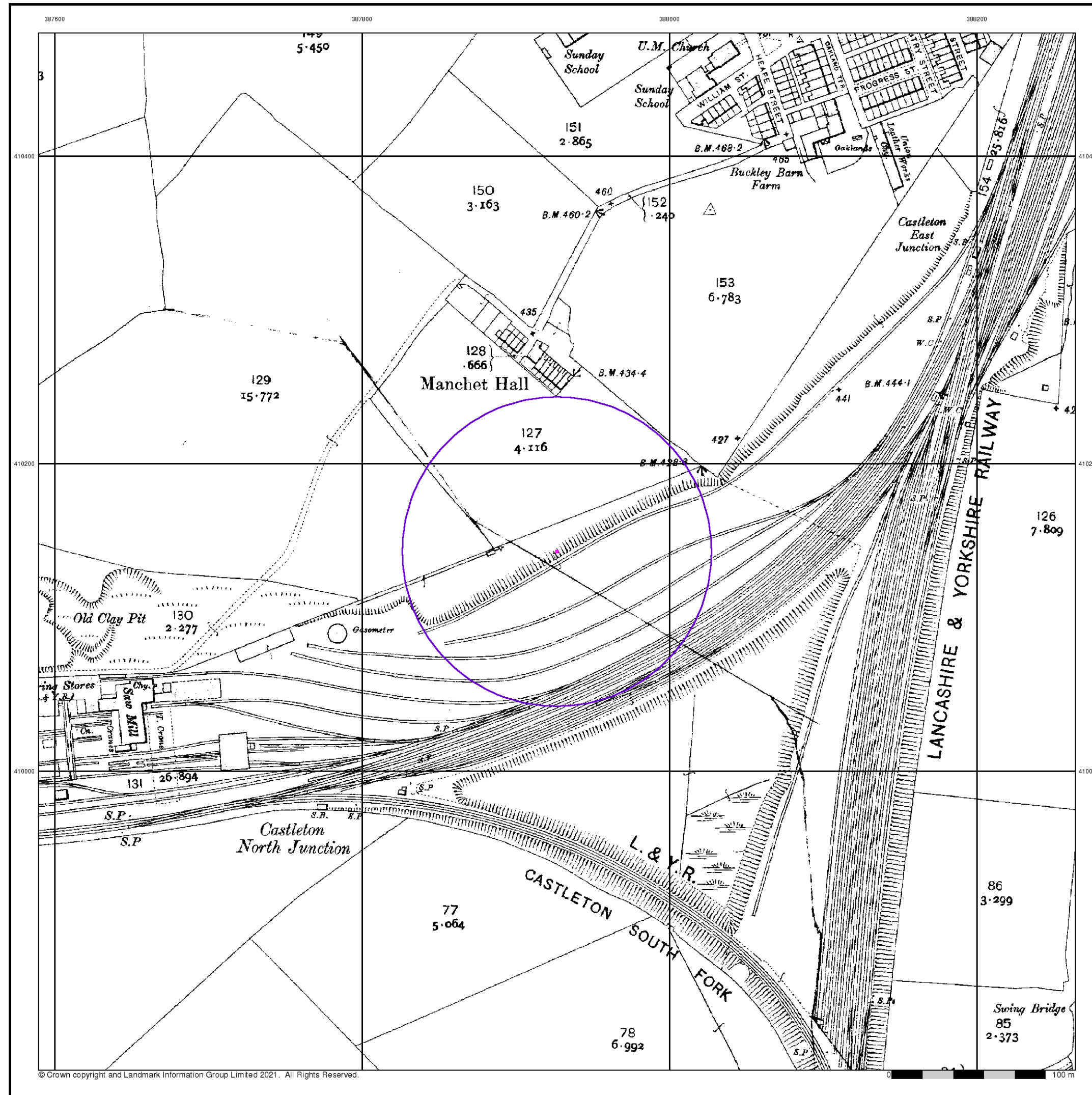
Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

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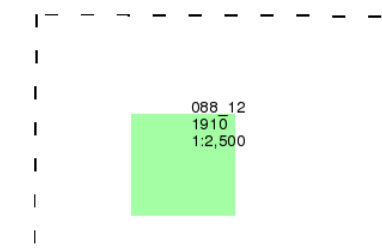
Lancashire And Furness

Published 1910

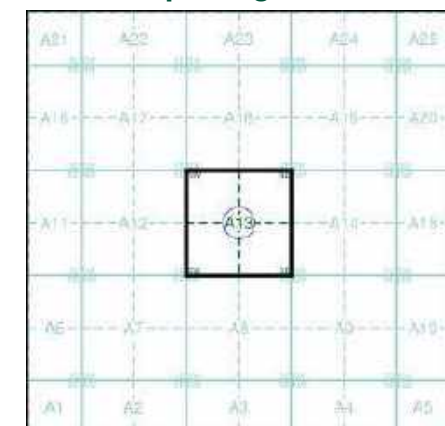
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

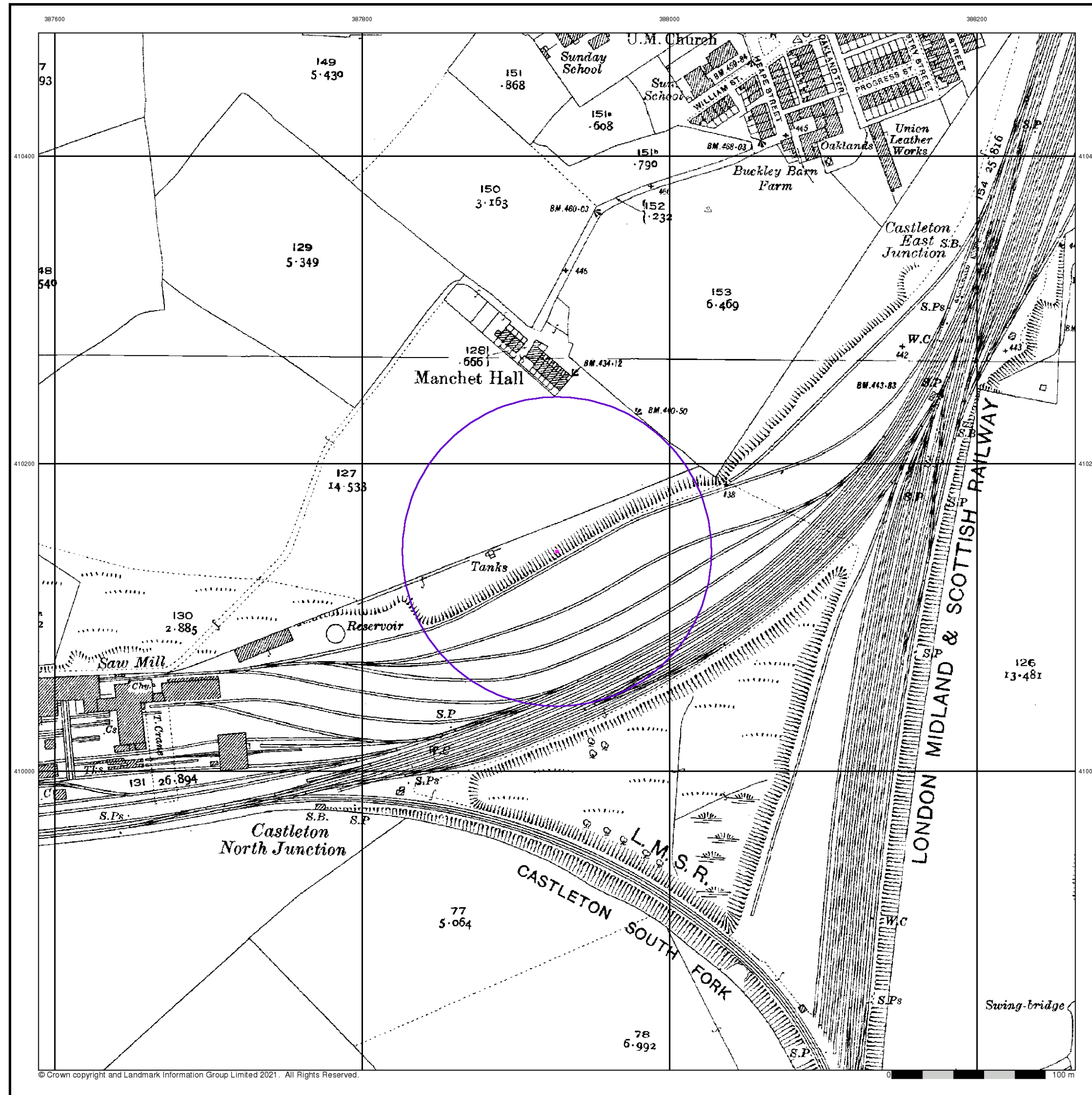
Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

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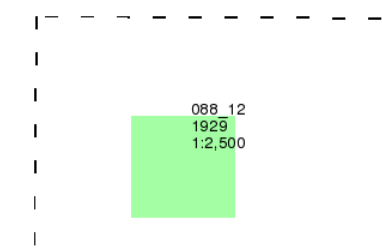
Lancashire And Furness

Published 1929

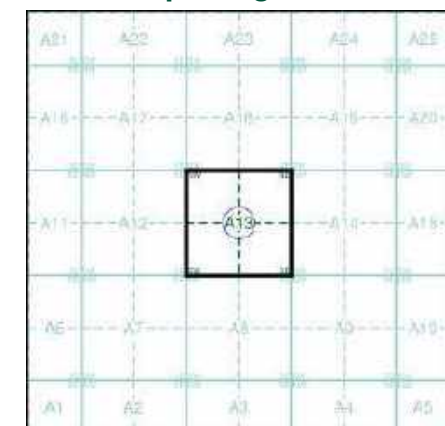
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
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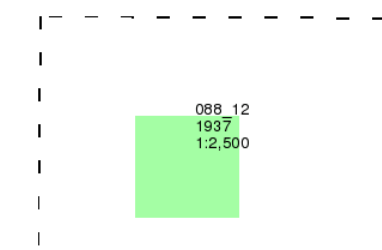
Lancashire And Furness

Published 1937

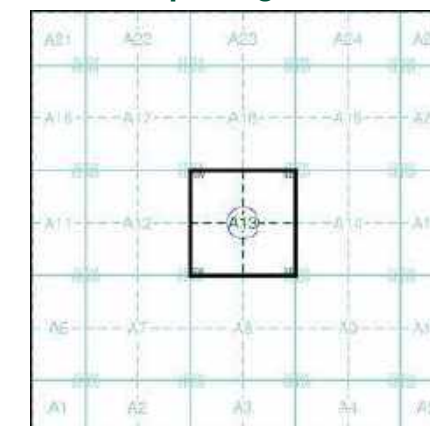
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

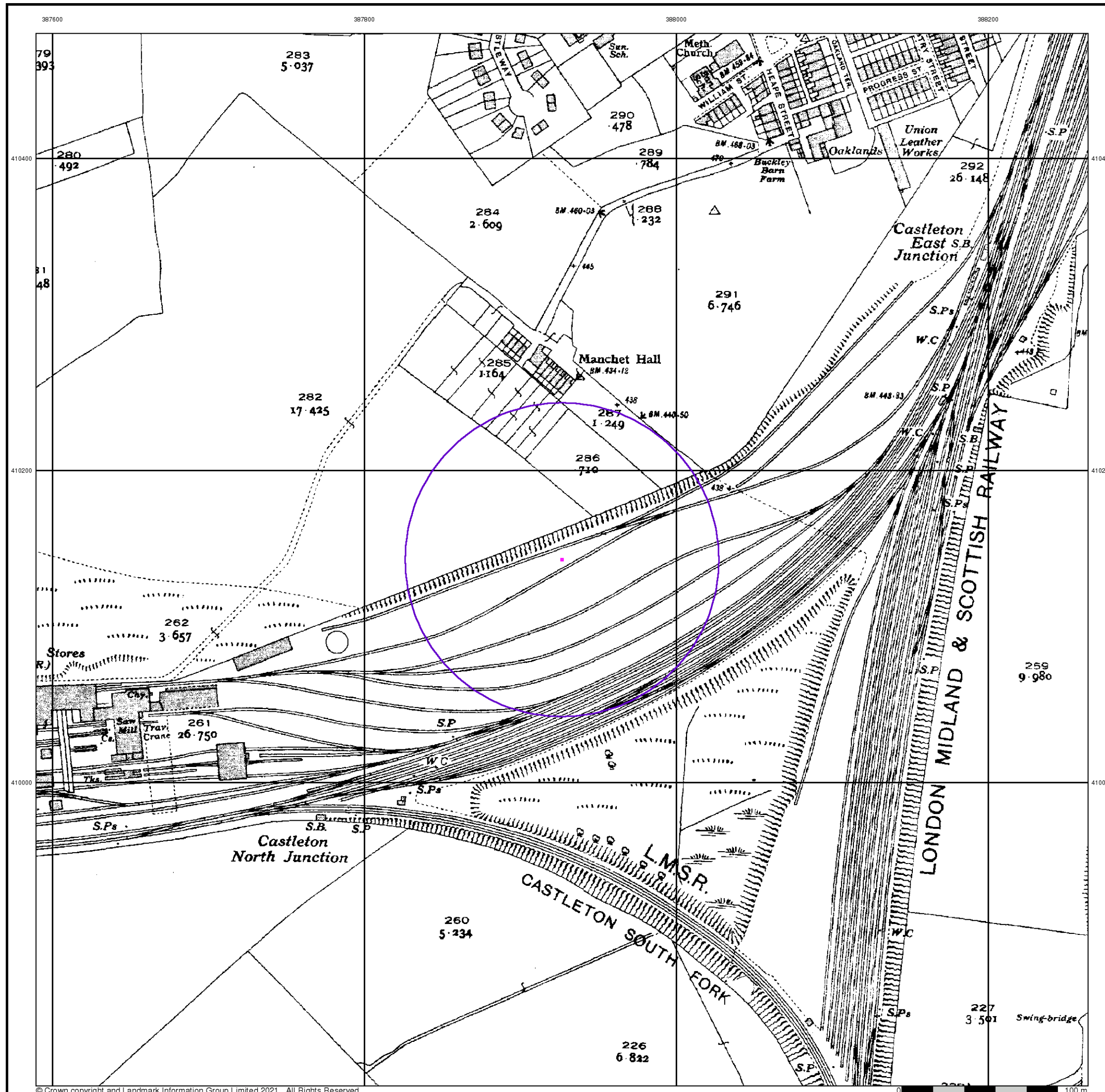
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Slice: A
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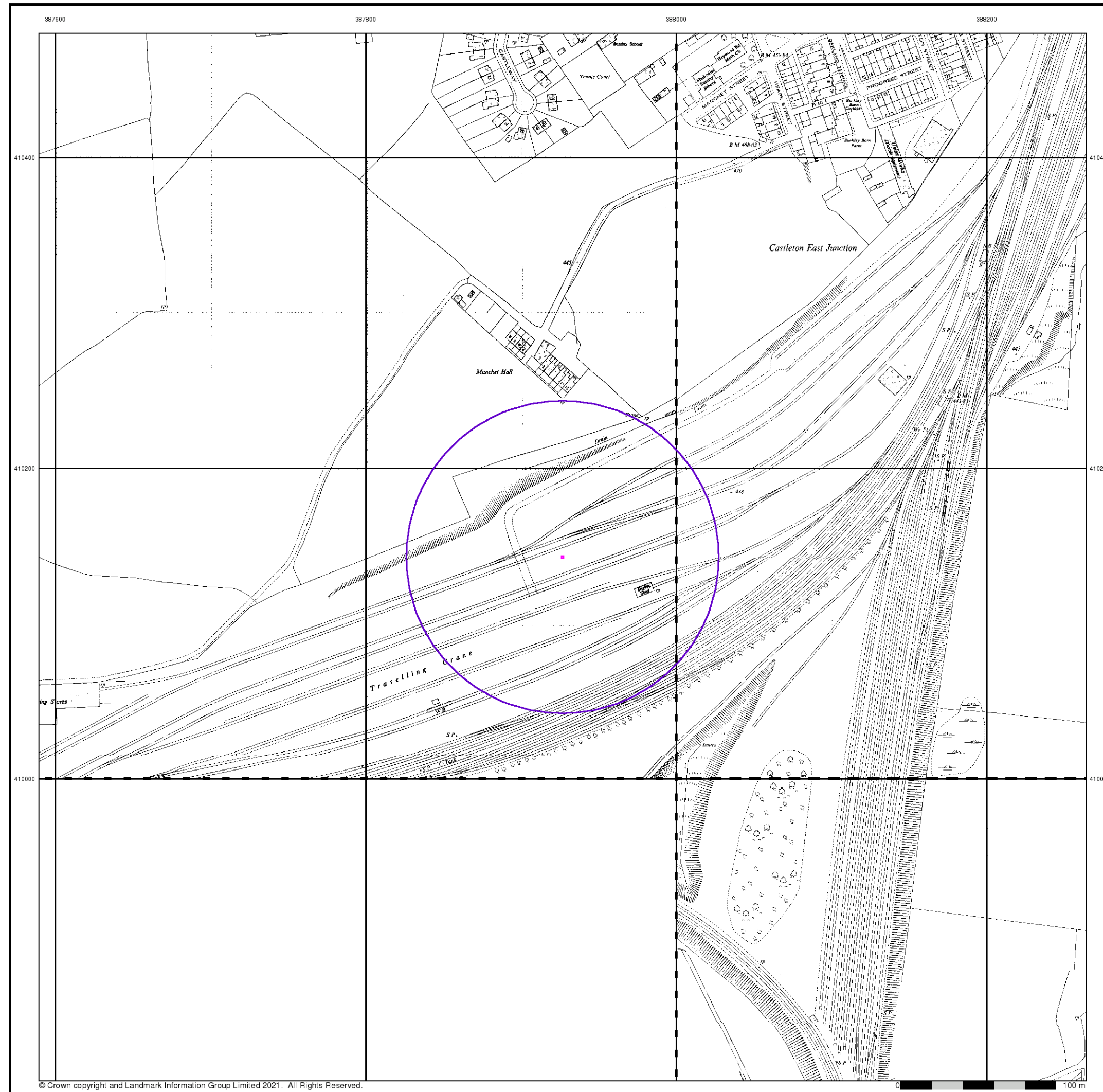
Site Details

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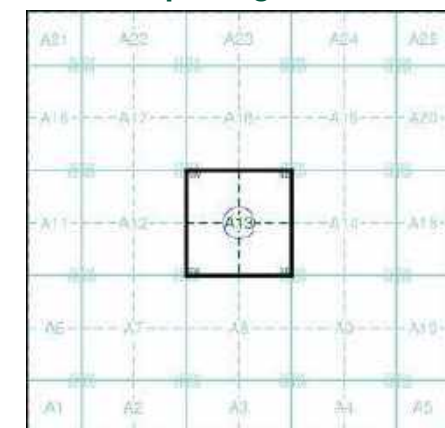
Ordnance Survey Plan
Published 1956
Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

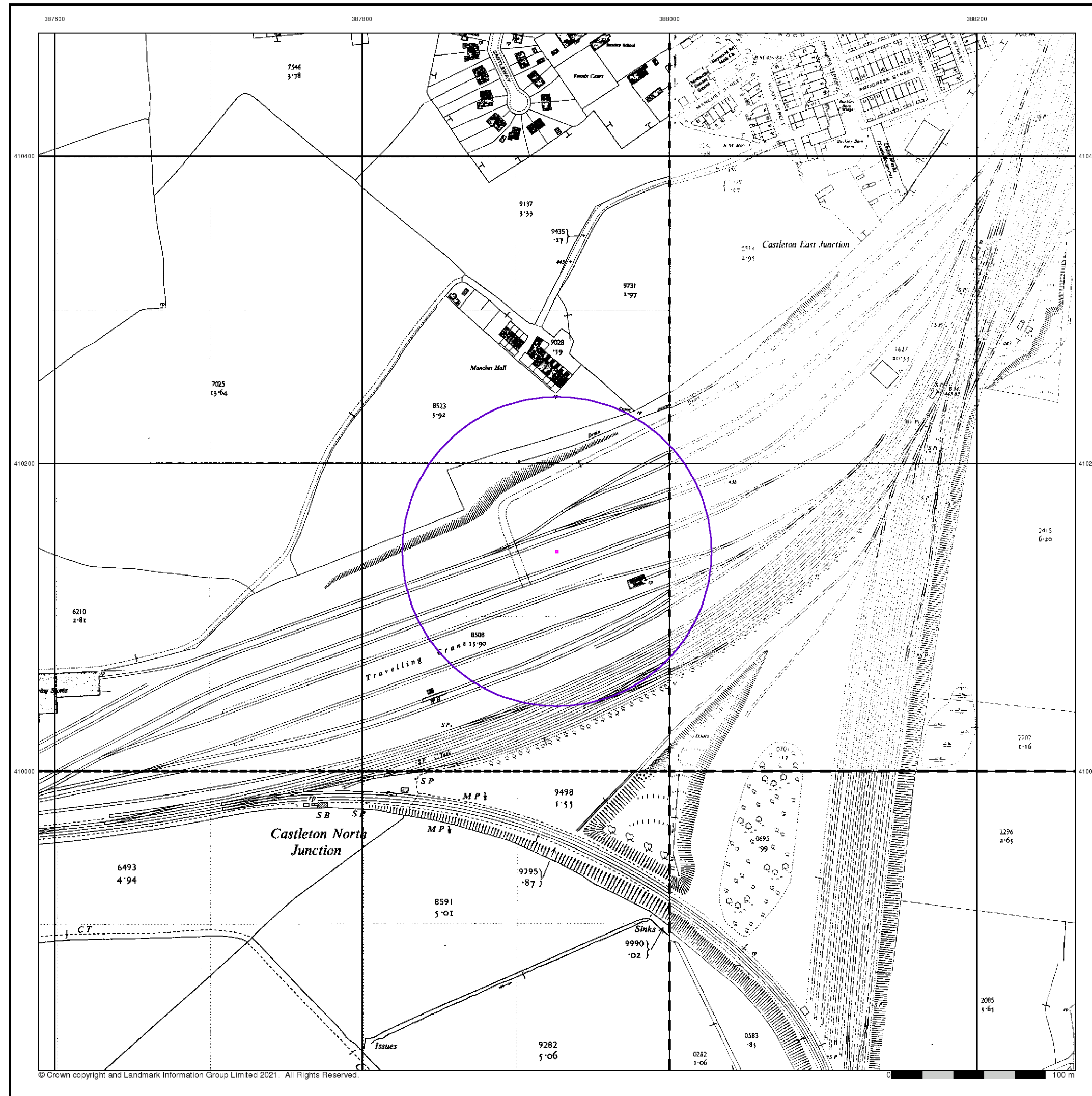
SD8710SE 1956 1:1,250	SD8810SW 1956 1:1,250
	SD8809NW 1956 1:1,250

Historical Map - Segment A13



Order Details
Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details
Flat 2, The Directors, 3, Heywood Road, ROCHDALE, OL11 3AU



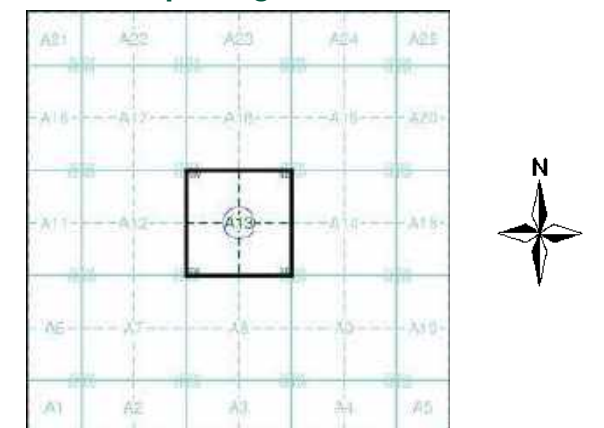
Ordnance Survey Plan
Published 1956
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

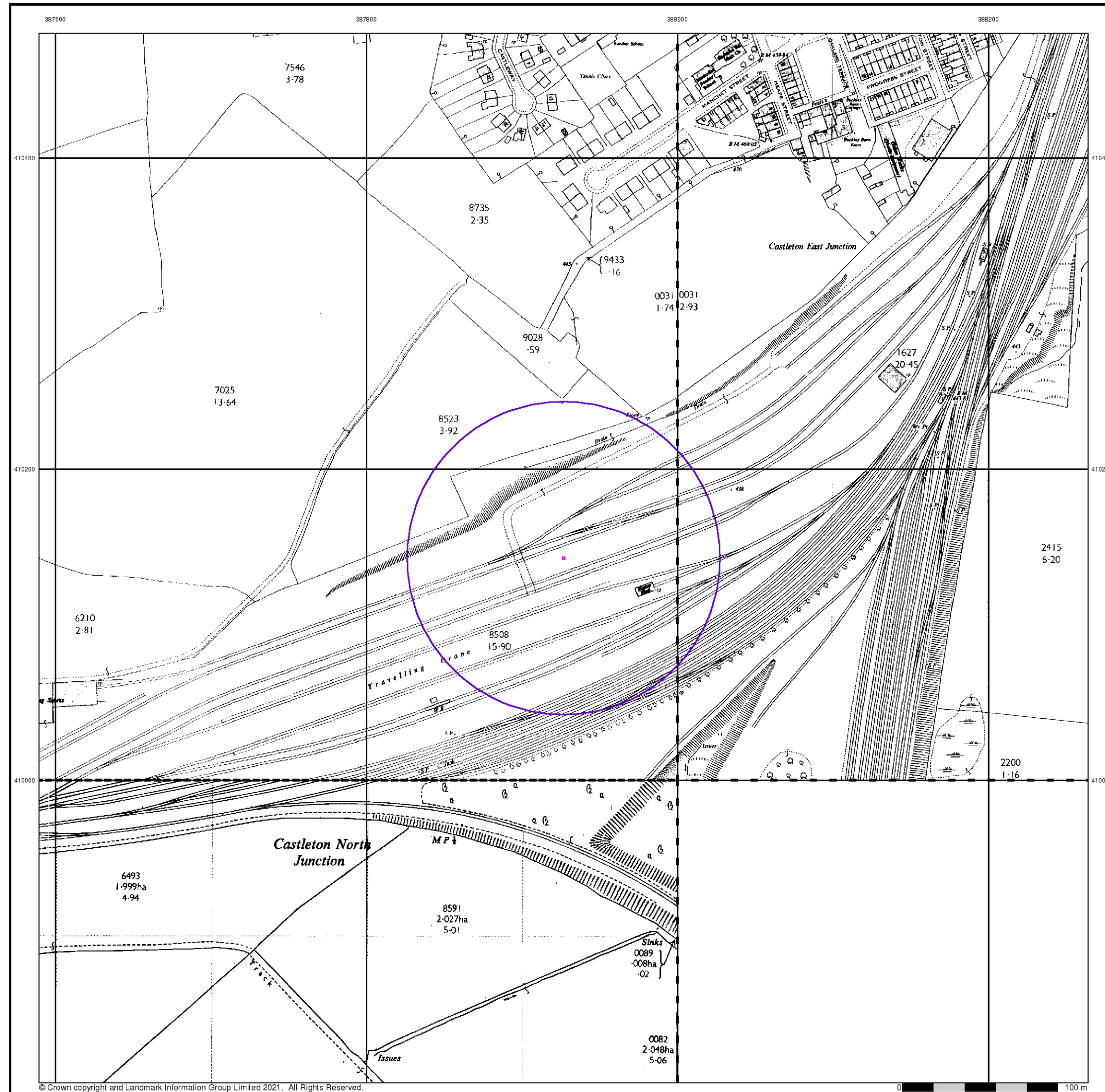
SD8710 1956 1:2,500	SD8810 1956 1:2,500
SD8709 1956 1:2,500	SD8809 1956 1:2,500

Historical Map - Segment A13



Order Details
Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

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Ordnance Survey Plan

Published 1970 - 1977

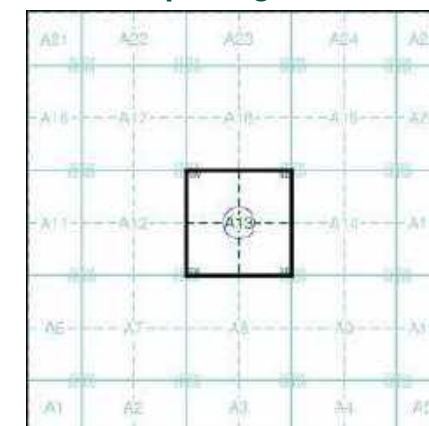
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

SD8710 1970 1:2,500	SD8810 1970 1:2,500
SD8709 1977 1:2,500	

Historical Map - Segment A13



Order Details

Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

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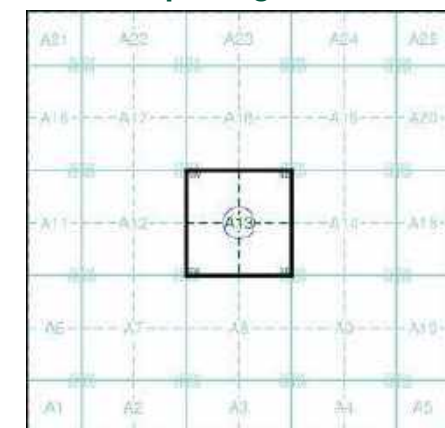
Ordnance Survey Plan
Published 1973 - 1977
Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

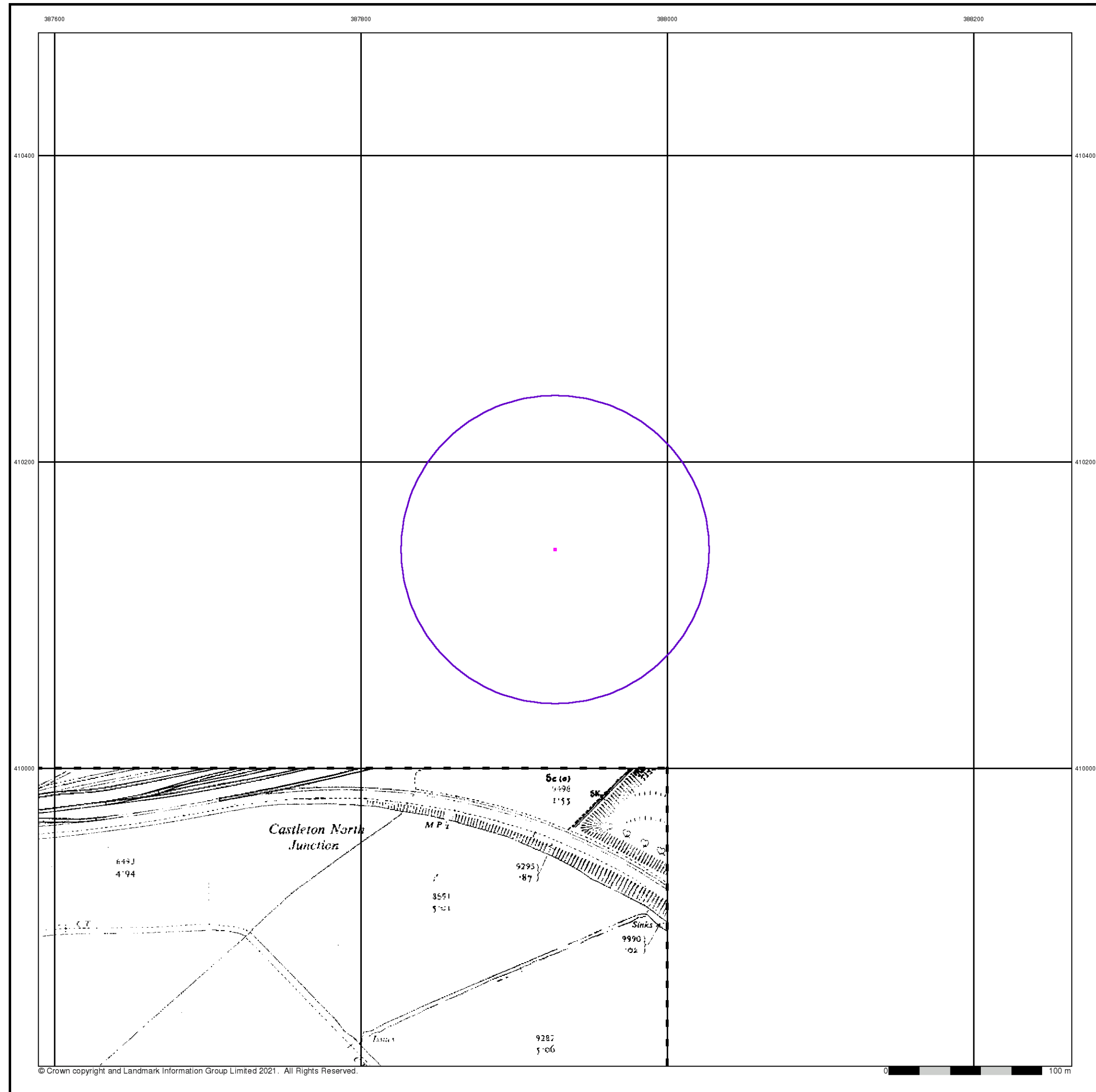
SD8710SE 1973 1:1,250	SD8810SW 1977 1:1,250
	SD8809NW 1977 1:1,250

Historical Map - Segment A13



Order Details
Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details
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Supply of Unpublished Survey Information

Published 1975

Source map scale - 1:2,500

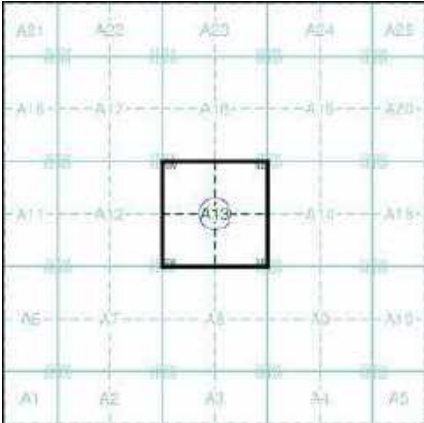
SUSI maps (Supply of Unpublished Survey Information) were produced between 1972 and 1977, mainly for internal use at Ordnance Survey. These were more of a 'work-in-progress' plan as they showed updates of individual areas on a map. These maps were unpublished, and they do not represent a single moment in time. They were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



SD8709
1975
1:2,500

Historical Map - Segment A13



Order Details

Order Number:	274207304_1_1
Customer Ref:	14-768 JC
National Grid Reference:	387930, 410140
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	100

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Supply of Unpublished Survey Information

Published 1975

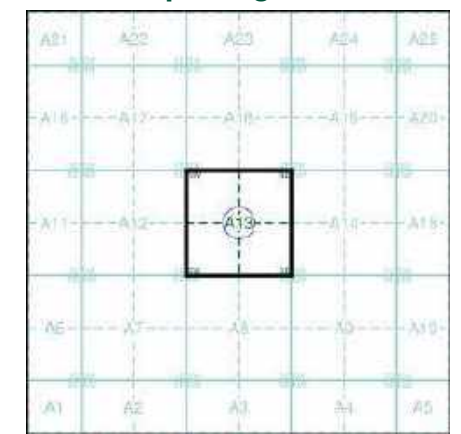
Source map scale - 1:1,250

SUSI maps (Supply of Unpublished Survey Information) were produced between 1972 and 1977, mainly for internal use at Ordnance Survey. These were more of a 'work-in-progress' plan as they showed updates of individual areas on a map. These maps were unpublished, and they do not represent a single moment in time. They were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SD8710SE	SD8810SW
1975	1975
1:1,250	1:1,250
	SD8809NW
	1975
	1:1,250

Historical Map - Segment A13



Order Details

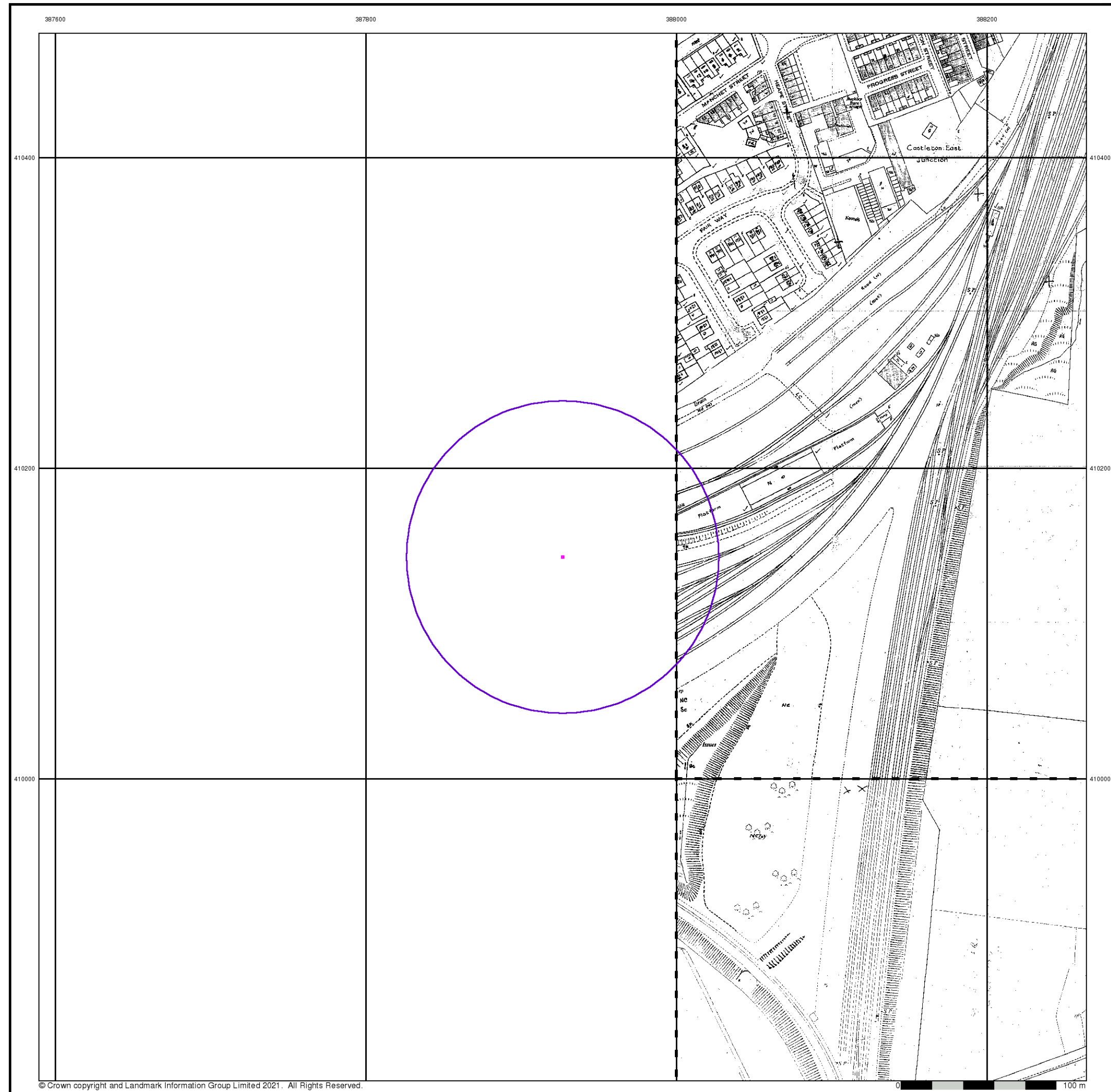
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National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

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Supply of Unpublished Survey Information

Published 1975 - 1976

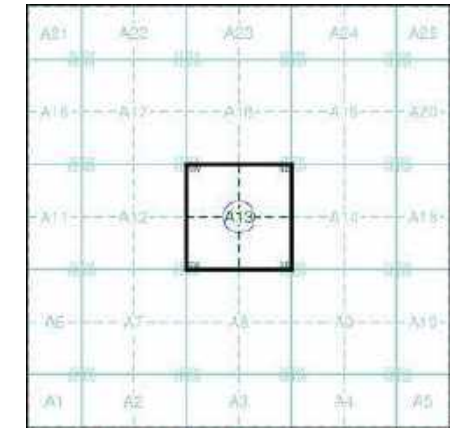
Source map scale - 1:1,250

SUSI maps (Supply of Unpublished Survey Information) were produced between 1972 and 1977, mainly for internal use at Ordnance Survey. These were more of a 'work-in-progress' plan as they showed updates of individual areas on a map. These maps were unpublished, and they do not represent a single moment in time. They were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SD8810SW
1976
1:1,250
SD8809NW
1975
1:1,250

Historical Map - Segment A13



Order Details

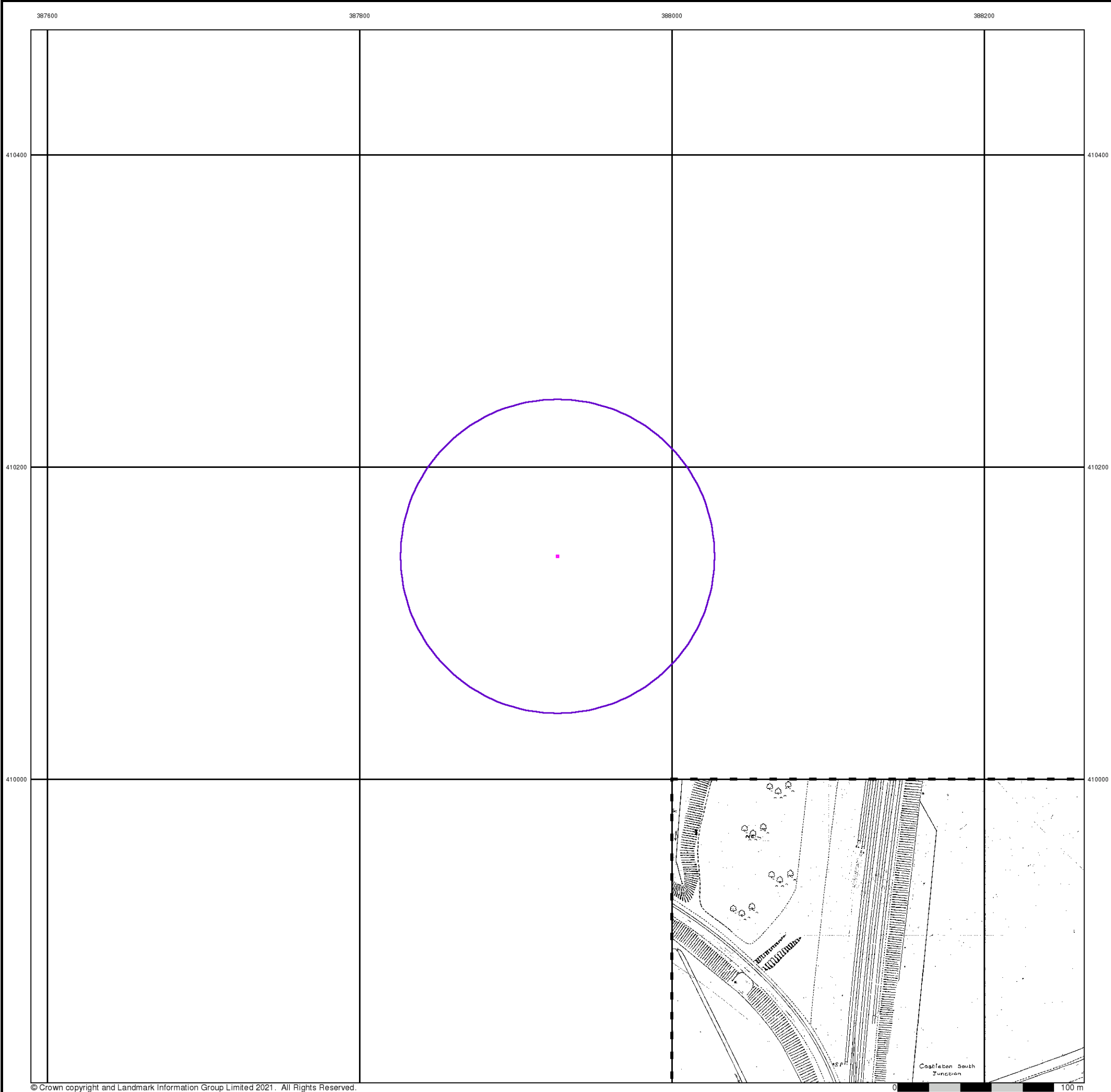
Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

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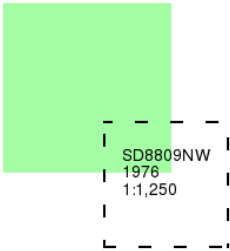
Supply of Unpublished Survey Information

Published 1976

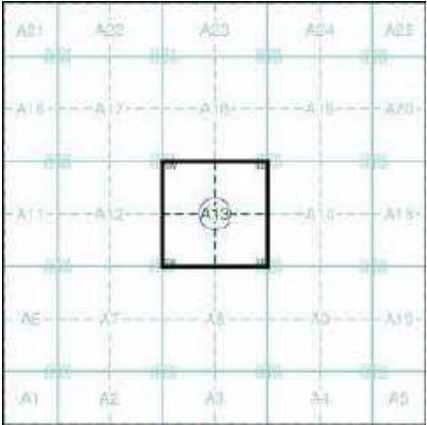
Source map scale - 1:1,250

SUSI maps (Supply of Unpublished Survey Information) were produced between 1972 and 1977, mainly for internal use at Ordnance Survey. These were more of a 'work-in-progress' plan as they showed updates of individual areas on a map. These maps were unpublished, and they do not represent a single moment in time. They were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

Flat 2, The Directors, 3, Heywood Road, ROCHDALE, OL11 3AU



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Additional SIMs

Published 1990

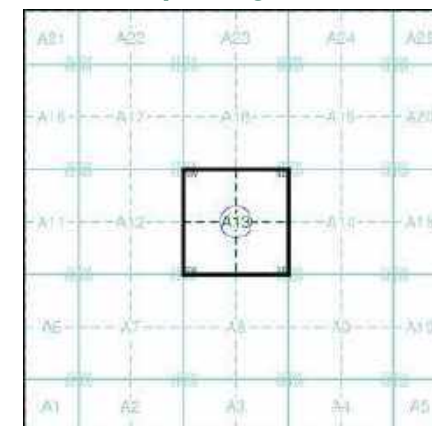
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SD8710SE 1990 1:1,250	SD8810SW 1990 1:1,250
-----------------------------	-----------------------------

Historical Map - Segment A13



Order Details

Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

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Large-Scale National Grid Data

Published 1992

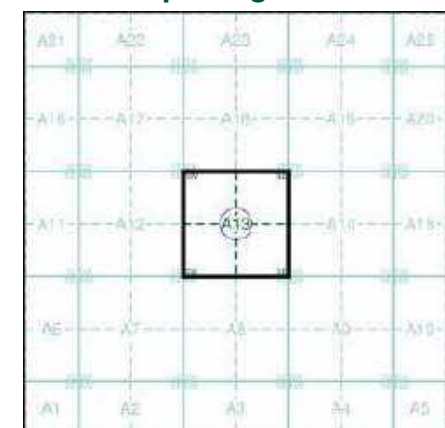
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SD8710SE	SD8810SW
1992	1992
1:1,250	1:1,250
	SD8809NW
	1992
	1:1,250

Historical Map - Segment A13



Order Details

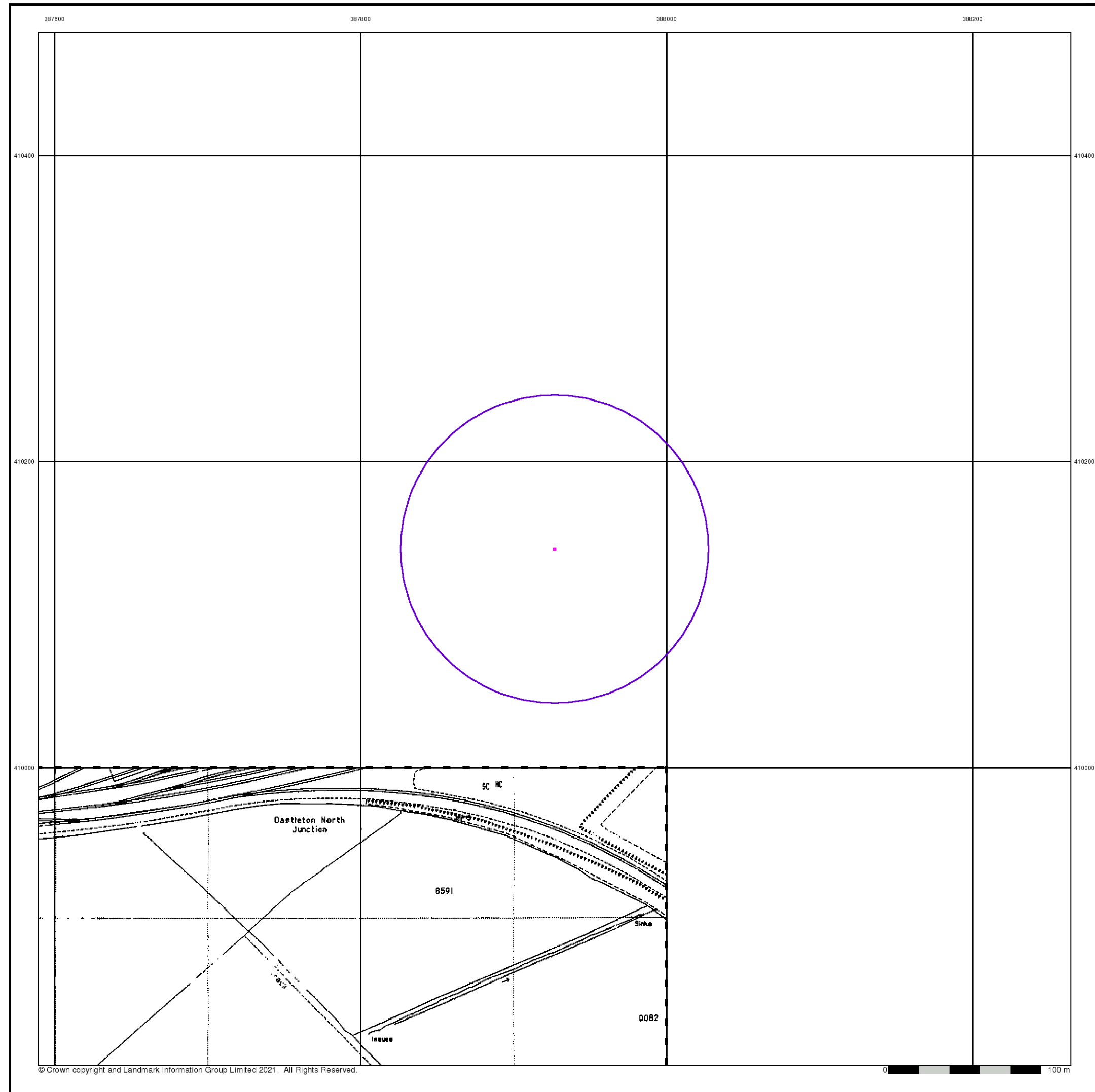
Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

Flat 2, The Directors, 3, Heywood Road, ROCHDALE, OL11 3AU



Tel: 0844 844 9952
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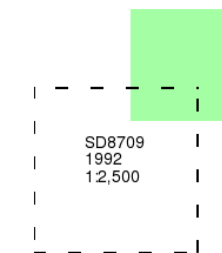
Large-Scale National Grid Data

Published 1992

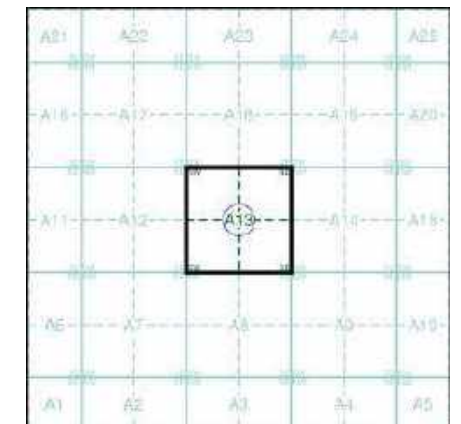
Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

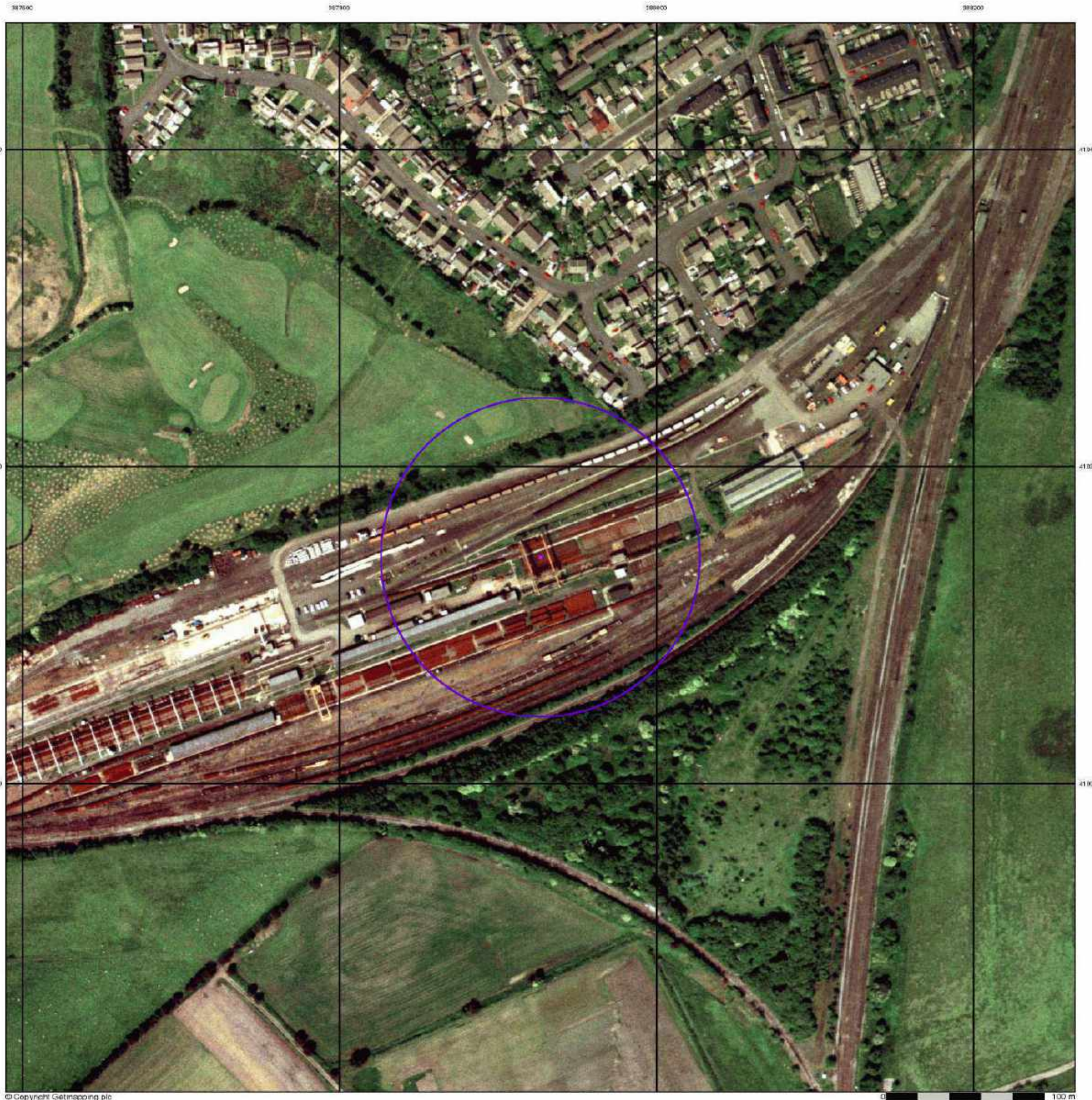
Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

Flat 2, The Directors, 3, Heywood Road, ROCHDALE, OL11 3AU



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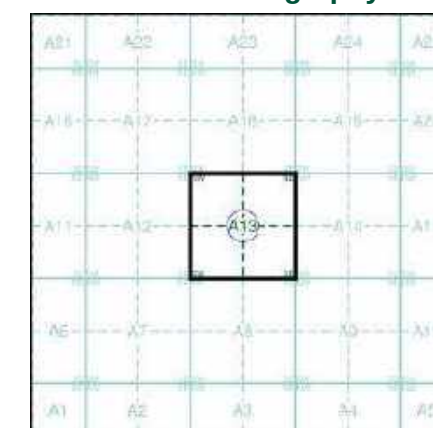


Historical Aerial Photography

Published 2000

This aerial photography was produced by Getmapping, these vertical aerial photographs provide a seamless, full colour survey of the whole of Great Britain

Historical Aerial Photography - Segment A13



Order Details

Order Number: 274207304_1_1
Customer Ref: 14-768 JC
National Grid Reference: 387930, 410140
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

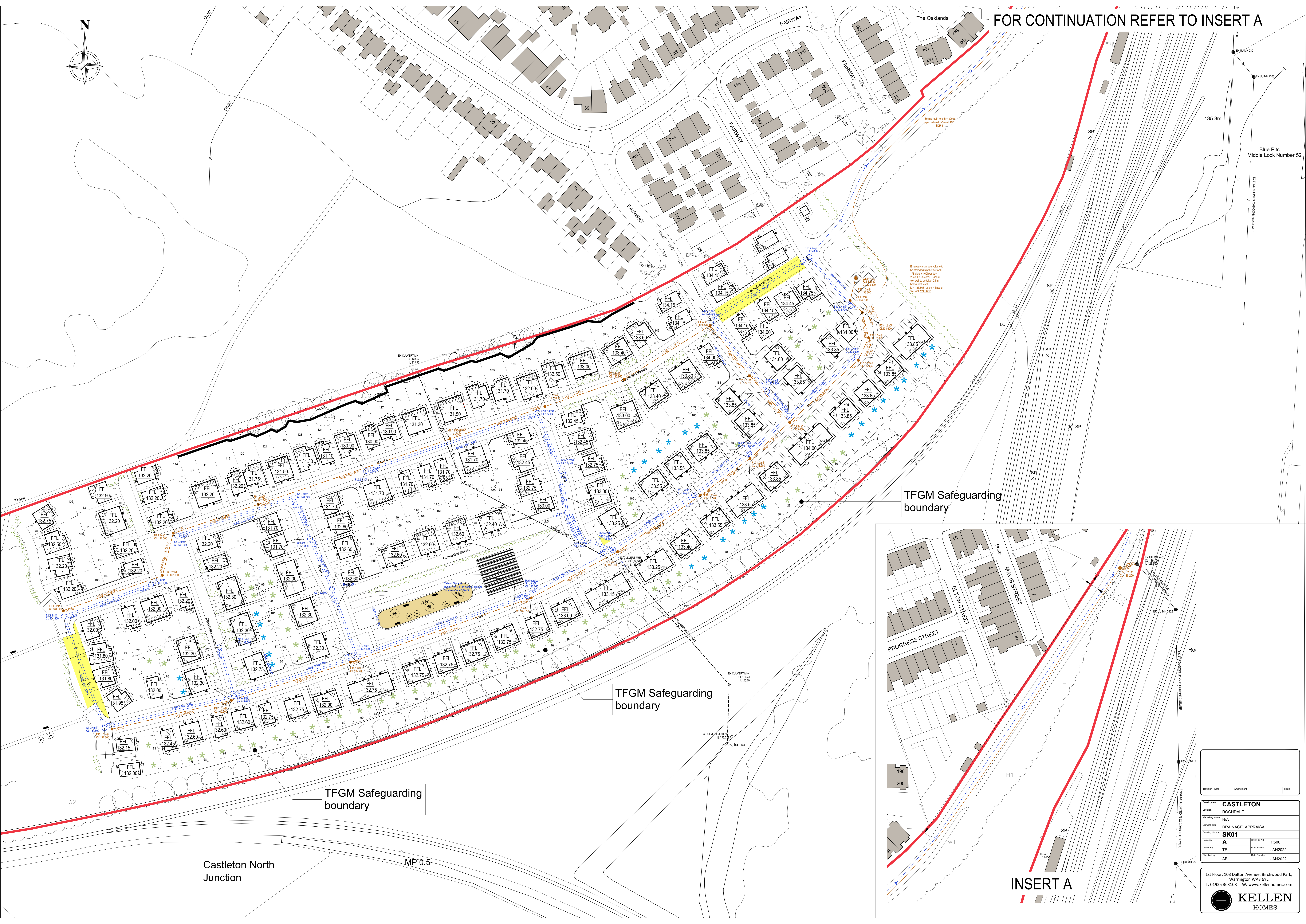
Flat 2, The Directors, 3, Heywood Road, ROCHDALE, OL11 3AU



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Appendix 2

FOR CONTINUATION REFER TO INSERT A



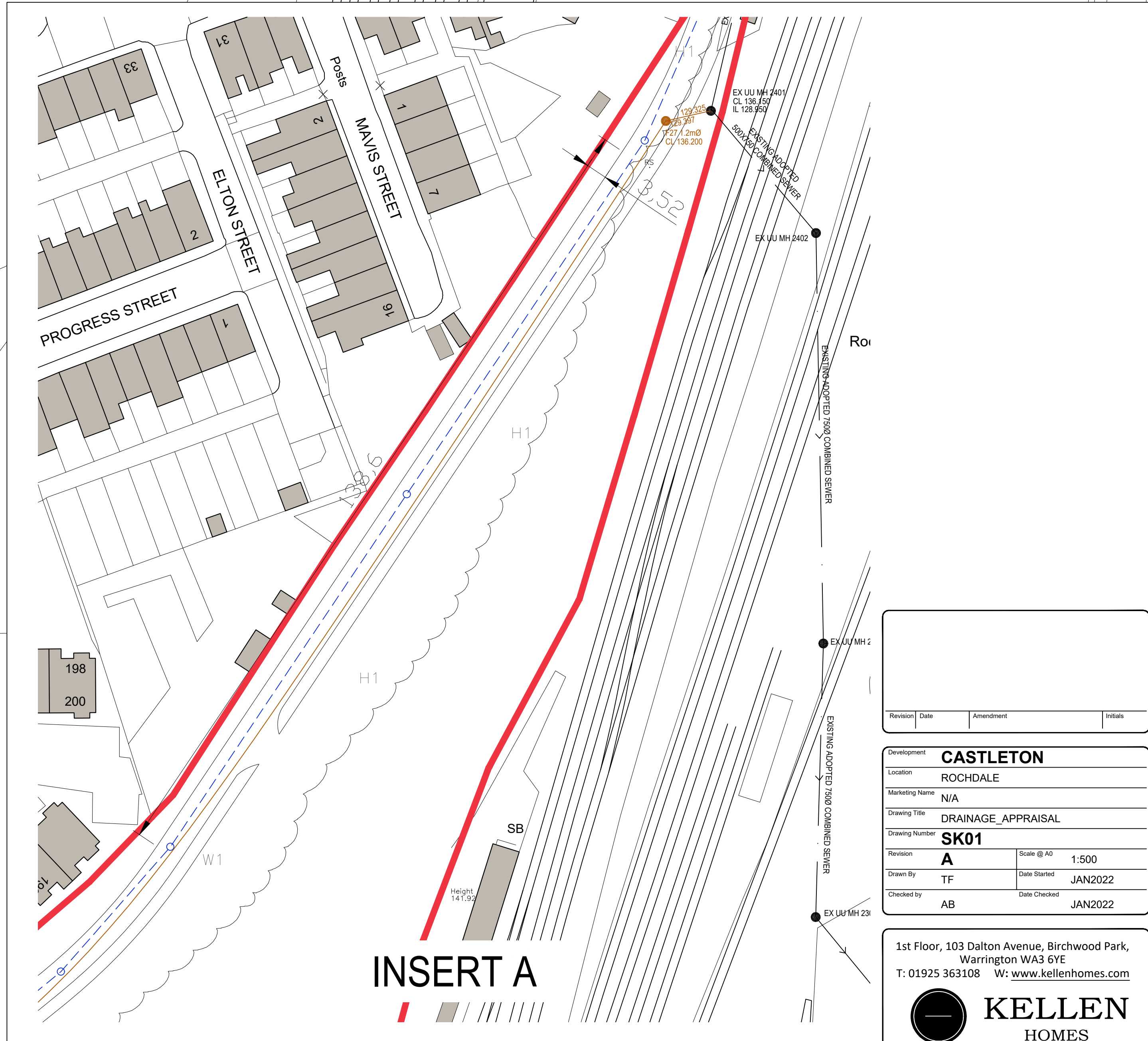
TFGM Safeguarding boundary

TFGM Safeguarding boundary

TFGM Safeguarding boundary

Castleton North Junction

MP 0.5



INSERT A

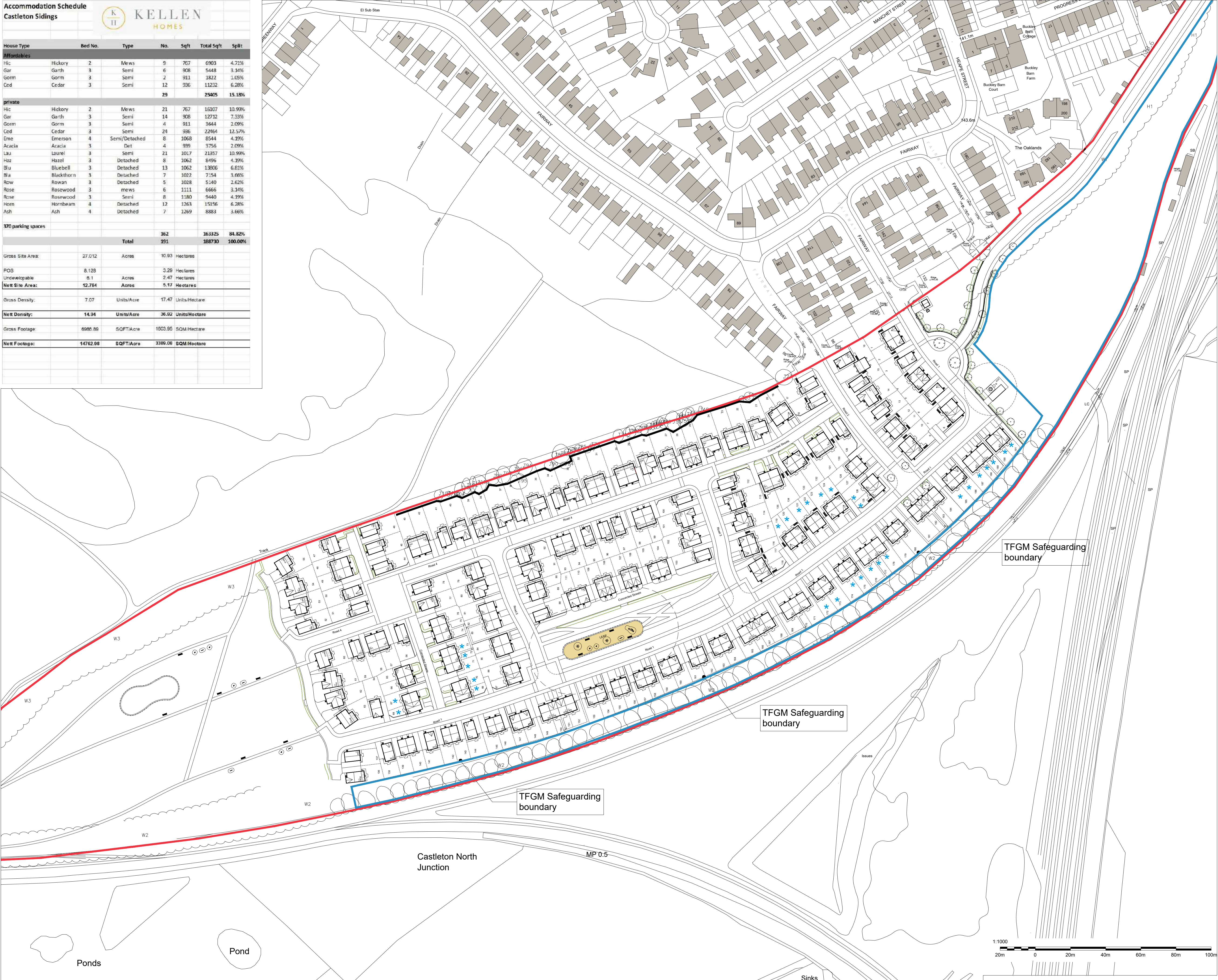
Revision	Date	Amendment	Index

Development		CASTLETON	
Location		ROCHDALE	
Marketing Name		N/A	
Drawing Title		DRAINAGE APPRAISAL	
Drawing Number		SK01	
Revision	Drawn By	Drawn At	Scale
A	TF	1:500	1:500
Drawn By	Date Drawn	JAN2022	
Checked By	Date Checked	JAN2022	
AB			

1st Floor, 103 Dalton Avenue, Birchwood Park, Warrington WA3 6YE
T: 01925 363108 W: www.kellenhomes.com

KELLEN HOMES

Accommodation Schedule						
Castleton Sidings						
K H KELLEN HOMES						
House Type	Bed No.	Type	No.	Sqft	Total Sqft	Split
Affordables						
Hic	Hickory	2	Mews	9	767	6903 4.71%
Gar	Garth	3	Semi	6	908	5448 3.14%
Gorm	Gorm	3	Semi	2	911	1822 1.05%
Ced	Cedar	3	Semi	12	936	11232 6.28%
			29		25405	15.18%
private						
Hic	Hickory	2	Mews	21	767	15107 10.99%
Gar	Garth	3	Semi	14	908	12712 7.33%
Gorm	Gorm	3	Semi	4	911	3644 2.09%
Ced	Cedar	3	Semi	24	936	22164 12.57%
Eme	Emerson	4	Semi/Detached	8	1068	6544 4.19%
Acacia	Acacia	3	Det	4	939	3756 2.09%
Lau	Laurel	3	Semi	21	1017	21357 10.99%
Haz	Hazel	3	Detached	8	1062	8496 4.19%
Blu	Bluebell	3	Detached	13	1062	13806 6.61%
Pla	Blackthorn	3	Detached	7	1022	7154 3.66%
Row	Rowan	3	Detached	5	1028	5140 2.62%
Rose	Rosewood	3	mews	6	1111	6666 3.34%
Rose	Rosewood	3	Semi	8	1180	9440 4.19%
Horn	Hornbeam	4	Detached	12	1263	15156 6.28%
Ash	Ash	4	Detached	7	1269	8883 3.66%
370 parking spaces						
			162		163325	84.82%
Total			191		188730	100.00%
Gross Site Area:	27.012	Acres	10.93	Hectares		
POS	8.128	Acres	3.29	Hectares		
Undevelopable	6.1	Acres	2.47	Hectares		
Net Site Area:	12.784	Acres	5.17	Hectares		
Gross Density:	7.07	Units/Acre	17.47	Units/Hectare		
Net Density:	14.94	Units/Acre	36.92	Units/Hectare		
Gross Footage:	6986.88	SQFT/Acre	1803.95	SQM/Hectare		
Net Footage:	14762.98	SQFT/Acre	3389.08	SQM/Hectare		



- Legend**
- Indicates 1.8m high feature fence
 - Indicates 1.8m high plot divisional screen fence
 - Indicates proposed tree planting subject to a landscape design and specification
 - Indicates bin collection points
 - Indicates principle entrance door to dwelling
 - Indicates secondary entrance door to dwelling
 - Indicates application site boundary
 - Indicates parcel of land allocated to East Lancashire Railway (Outline planning app boundary)
 - Indicates affordable units
 - Indicates substation
 - Indicates pumping station

Rev	Date	Amend	Initials

Development	
CASTLETON SIDINGS	
Location	
ROCHDALE	
Drawing Title	
CAD Site Layout	
Job Number	Drawing Number
KH003	KH003-A-100
Revision	Scale
-	1:1000 - A1
Drawn By	Date
BP	13.01.22
Checked by	Date Checked
RC	-

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Warrington WA3 6YE
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