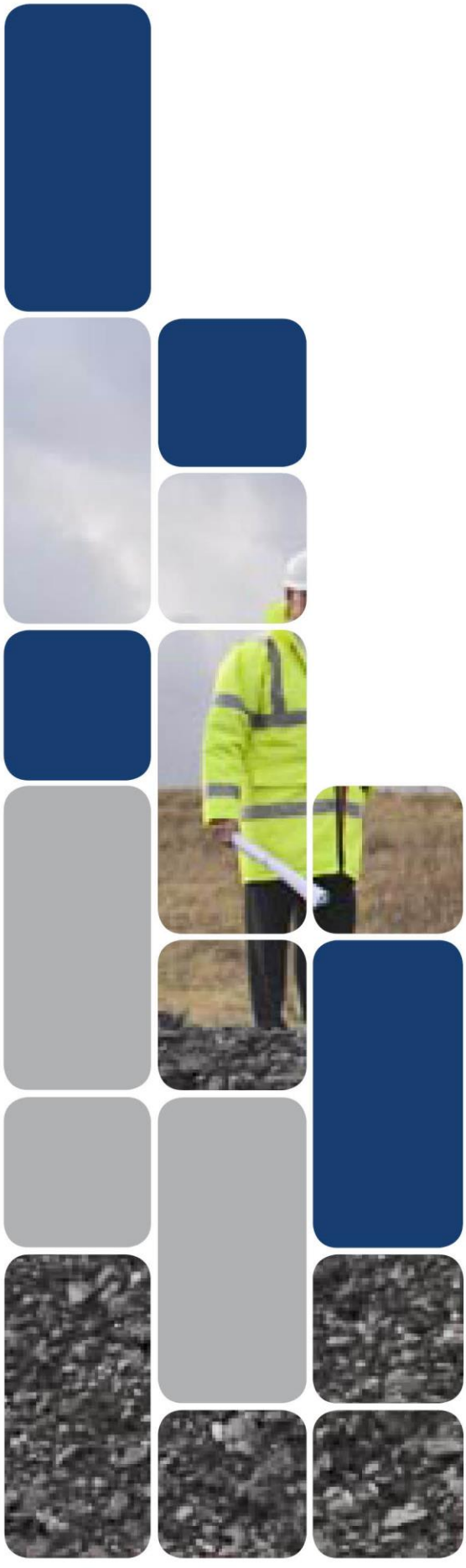


Rudloe Manor, Corsham

Desk Study and Ground Investigation Report

Final Report for

Inverness Terrace Ltd

June2016

Hydrock Ref: RUD – HYD -XX-XX-D-001

DOCUMENT CONTROL SHEET

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Client: **Inverness Terrace Ltd**

Project: **Rudloe, Corsham**

Title: **Desk Study and Ground Investigation Report**

Status: Final

Date: July 2015

Document Production Record

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Document Revision Record

Issue Number	**Date**	**Revision Details**
1	6th July 2016	Original issue.

Hydrock Consultants Limited has prepared this report in accordance with the instructions of the above named client for their sole and specific use. Any third parties who may use the information contained herein do so at their own risk.

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Executive Summary and Conceptual Site Model

SITE INFORMATION AND SETTING	
Report Purpose	Phase 1 and 2 desk study, ground investigation and risk assessment undertaken at Rudloe Manor, Rudloe, Corsham.
Client	Inverness Terrace Ltd.
Site Name and Location	Rudloe Manor, Rudloe, Corsham, Wiltshire, SN13 9GR.
Proposed Development	Hydrock Ltd have not been provided with a proposed site development plan at the time of writing this report, however it is understood that the proposed development is to comprise 180 residential houses with gardens.
PHASE 1 (DESK STUDY + WALK-OVER)	
Current Land Use and Description	The site is currently a disused military facility. An operational MoD fire station is located within the site, which is currently outside the proposed developable area. The site is underlain by: • Bath Stone Quarry mines; • MoD stores/bunker; and • Box Railway Tunnel.
Site History	One air shaft is shown on site on the earliest available historical plan. This feature is understood to have been constructed between 1836 and 1841 and is associated with the underlying Box Railway Tunnel. A further two airshafts are shown to have been sunk on the site before 1969 and are associated with the underlying Bath Stone Quarries and MoD stores/bunker. A small quarry feature was shown in the north western corner of the site and was shown to be infilled by 1900. A small reservoir was also shown to be located over this area of the site and is shown to be infilled by 1993. The site comprised fields and agricultural land until 1947 where it was developed into Royal Air Force (RAF) Rudloe Manor which was a strategic Royal Air Force command station during World War II (WWII). 15 structures had been demolished and eleven constructed prior to 1975. One further building was demolished before 1991 and three structures were recently constructed circa. 2016.
Unexploded Ordnance	A specialist UXO survey provided to Hydrock by the Client shows the site to low bomb risk. An indoor small arms firing range is known to be located over the far western area of the site, therefore posing a low UXO risk to the site.
Geology	British Geological Survey sheets for the area show the northern area of the site to be underlain by the Forest Marble Limestone formation. The remainder of the site is underlain by the Forest Marble Formation which comprises mudstone. The boundary between these two stratum is marked by a northwest – southeast trending normal fault. No superficial deposits are shown over the site.
Mining or Mineral Extraction	The majority of the site is underlain by disused Bath Stone Quarries, part of which forms active/disused MoD facilities. These features range from between 22m and 25m below the site. A geotechnical assessment of the mine roof and pillars undertaken by Parsons Brinckerhoff indicates that the quarry features currently present a low risk of mining related subsidence to the development site. Parsons Brinckerhoff assessment identified that that the capping of vertical shafts associated with the mines may pose a risk to future developments and have recommended that any structures be offset by 2.0m from the concrete lining of the shafts. In addition to the above comments, Hydrock visited the former underground limestone quarries and MoD stores/bunker with the NHBC to visually inspect the quality of the mine roof. The condition of the mine roof was deemed satisfactory.
Hydrogeology	The Forest Marble Limestone formation is classified by the Environment Agency as a Principal aquifer. The Forest Marble formation comprising mudstone is classified by the Environment Agency as a secondary A aquifer. The site is within a Zone 2 groundwater source protection zone.

Hydrology	The nearest surface water feature to site refers to a tertiary river located approximately 234m east of the site.
Flood Risk	The site is in Flood Zone 1 with a low probability of flooding.
Previous Site Data	Historical investigations have been undertaken by Entec UK Ltd and Parsons Brinkerhoff for the MoD Estates during 2011 and comprised: • A land Quality Assessment of the site by Entec UK; and • A geotechnical assessment into the Bath Stone Quarry mine pillar and roof condition by Parsons Brinkerhoff.
PHASE 2 – GROUND INVESTIGATION	
Hydrock Site Works	The Hydrock ground investigation comprised: • 31 mechanically excavated Trial Pits; • One hand excavated pit; • 8 Hand held dynamic cone penetrometer / Transport Road Research (DCP – TRL) probes; and • Three soakaway tests. Trial Pits were located in areas of potential contamination, identified in the LQM report assessment.
Ground Conditions Encountered (All Data)	• Made Ground – to between 0.30 and 2.10m below ground level (bgl), generally comprising clays with demolition rubble, ash, clinker locally with some cement bonded asbestos tile fragments; over • Destructured Forest Marble Limestone formation to between 1.25m and 1.60m bgl encountered in the north of the site, comprising sandy gravel and cobbles with lithorelict structure. This feature was underlain by a moderately weak to moderately strong partially weathered Limestone; and • Residual Forest Marble formation comprising mudstone to between 1.10m and 3.20m bgl encountered over the central and southern area of the site, comprising firm to stiff silty clay and occasional clayey sand deposits. This stratum was underlain by moderately weak to moderately strong partially weathered mudstone.
Groundwater Encountered	No natural groundwater was encountered during the Hydrock investigation. Groundwater associated with a suspected buried sceptical tank was encountered in the far eastern area of the site. Sporadic perched groundwater was recorded during the Entec UK Ltd investigation.
GEO-ENVIRONMENTAL ASSESSMENT AND CONCLUSIONS	
Conclusions of Contamination Generic Risk Assessment (Including Guidance on Gas Protection Measures)	**Human health:** • Asbestos has been encountered within Made Ground deposits across the site; • Elevated levels of benzo(a)pyrene were reported in an area of built up ground over the southern area of the site; and • Elevated levels of petroleum hydrocarbons are present adjacent to an historical boiler house in the central area of the site. **Plant growth:** • No significant risk to plant life has been identified. **Controlled Waters:** • No significant risk to controlled waters identified. **Radon:** • The site is not in a Radon Affected Area.
Proposed Mitigation Measures	Capping of Made Ground deposits across the site using 600mm of clean soil and an anti-dig layer is recommended in all areas of public open space and gardens. Alternatively, removal of contaminated soils can be undertaken following appropriate disposal path determination.
GEOTECHNICAL CONCLUSIONS	
Obstructions	Potential foundations and ground floor slabs were encountered during the investigation. Obstructions associated with the former and current development, including foundations, floor slabs and services, should be anticipated.
Groundworks and Earthworks	Excavation to proposed founding depth generally should be readily achievable with standard plant. Heavy duty excavation plant and breaking equipment may be required for excavations required to be undertaken into less weathered rock if required.

	Occasional excavation wall collapse was observed in Made Ground strata. Water seepages into excavations are unlikely based on encountered ground conditions, however localised areas of perched groundwater may be present locally. Excavated soils should be reusable as follows: • Made Ground – not suitable for re-use on site; • Destructured Forest Marble Limestone formation – reusable as landscaping material only. Further testing required for use as General Fill; and • Residual Forest Marble formation comprising mudstone – reusable as landscaping material only. Further testing required for use as General Fill.
Ground Settlement	Possible issue in localised areas of damp clayey sand sporadically encountered within the Forest Marble formation comprising mudstone.
Mine Workings	Bath Stone Quarries are located below the development site and are assessed by Parsons Brinkerhoff to have low risk of mining related subsidence to the development site. Capped vertical shafts have been identified to potentially pose a risk to the development site.
Foundations	An allowable net bearing pressure of 200kN/m^2 at a minimum depth of 0.90m bgl should be achievable for traditional strip or trench fill foundations within the destructured Forest Marble Limestone formation. An allowable net bearing pressure of 125kN/m^2 should be achievable for traditional strip or trench fill foundations within the residual Forest Marble formation comprising mudstone material. Founding depth for this material ranges from 0.90m to 2.0m, however deepening of foundations/heave protection is likely to be required in areas affected by the influence of trees.
Ground Floor Slabs	The use of ground bearing slabs over destructured Forest Marble Limestone formation deposits are considered to be suitable. Suspended ground bearing slabs are recommended for the remainder of the site due to excessively thick Made Ground and soils of a medium volume change potential.
Road Pavement Design (CBR)	2.5% on treated Made Ground over the site. 15% on destructured materials. 2.5% on natural residual materials.
Soakaways	Soakaway drainage is considered suitable within the destructured Forest Marble Limestone formation. Tests undertaken in the residual clays show that this material is not suitable for soakaways.
Buried Concrete	Design Sulfate Class - DS-1 and ACEC Class AC-1.
FUTURE CONSIDERATIONS	
Uncertainties and Limitations	The following uncertainties for the site remain: • Characteristics of the backfilled Quarry and reservoir over the northern area of site; and • Quantification of asbestos encountered within the Made Ground. The footprints of the buildings have not been investigated as most buildings are still in place, preventing intrusive ground investigation.
Further Work	The following further works will be required: • Undertake asbestos quantification; • Undertake further investigation to delineate the area of petroleum hydrocarbon impacted material around the old boiler house; • Investigate the small backfilled quarry and covered reservoir in the north of the site; • Prepare a remediation strategy; • Liaise with Network Rail to confirm building requirements over Box railway tunnel; • Obtain the inspection records for the mine from the MoD; • Carry out a demolition grade asbestos survey of the buildings; • Undertake a tree survey to BS5837:2012; • Remove all asbestos from structures prior to demolition and carry out demolition; • verify remediation; and • Prepare a remediation verification report.

This Executive Summary forms part of Hydrock Consultants Limited report number R/C161303/001 (Issue 1) and should not be used as a separate document.

1.0 INTRODUCTION

1.1 Terms of Reference

In April 2016, Hydrock Consultants Limited (Hydrock) was commissioned by Inverness Terrace Ltd (Hydrock proposal E14380/001) to undertake a desk study and initial ground investigation at the former Ministry of Defence (MoD) complex at Rudloe Manor, Corsham, Wiltshire.

The site covers approximately 8.46 ha and is currently disused, with the exception of an active MoD fire station located within the centre of the site. The fire station is currently excluded from the developable area and does not form part of the intrusive investigation.

Hydrock have not been provided with a proposed development plan for the site at the time of writing this is report. However, it is understood that the proposed development is to comprise 180 residential properties with gardens and associated infastructure.

A site location plan (Drawing RUB-HYD-XX-XX-D-001) is presented in Appendix A.

1.2 Objectives

Previous ground investigation works have been carried out on the proposed development site by third parties. The objectives of this investigation is to provide further information on the development site for ground and groundwater conditions. Utilising the existing and obtained data then provide initial geotechnical design recommendations and to update the risk assessment of potential chemical contaminants previously identified across the development site.

1.3 Scope

The scope of work for this commission comprises:

- a desk study and site walk-over reconnaissance to determine the nature of the site and its surroundings including current and former land uses, geology, hydrogeology, hydrology and geo-environmental data. A summary of previous investigations carried out at the site is also included;
- discussion with the Defence Infrastructure Organisation (DIO) and NHBC to confirm the current status of the underlying freestone mines and MoD stores/bunkers beneath the site;
- review of a British Geological Society (BGS) Radon report for the development site;
- an initial ground investigation including trial pitting, soakaway testing, Transport Road Research Laboratory / hand held Dynamic Cone Penetrometer) TRL DCP testing,
- laboratory chemical testing of soils;
- geotechnical testing of soils;
- A site walkover of the underground Bath Stone Quarries and MoD facilities located beneath the development site; and

- reporting on findings of the desk study, ground investigation, geo-environmental assessment of the site conditions and geotechnical interpretation of the ground and groundwater conditions.

See Appendix G for detailed reporting methodology.

1.4 Provided Information

The following has been provided to Hydrock by The Client for use in the preparation of this report:

- Defence Equipment and Support (DE) Rudloe Phase I Explosive Ordnance Risk Assessments, ESG (Report reference 10/026 Dated March 2016);
- Midland Survey Ltd Rudloe No 2 Topographic Plan (Drawing No 19880/2 dated June 2014);
- Entec Phase 2 Land Quality Assessment (report 0941 dated January 2011);
- Parsons Brinkerhoff (PB) Site Stability Study (report FSE3511078A dated June 2011);
- Defence Estates Corsham Mines Baseline Geological Condition Survey Report Extract, Parsons Brinckerhoff (Dated February 2010);
- Savills ground investigation specification; and
- Savills redline plan (drawing 21843/RUDLOW_DARFT dated February 2016).

The Entec Phase 2 report was undertaken to provide a land quality assessment for the development site. Hydrock have been granted reliance of this report and have therefore included environmental data from this assessment into statistical findings from this report. Hydrock has taken this data at face value and have not undertaken any assessment of the data quality.

PB's site stability study was undertaken to provide an assessment on the stability of the Bath Stone Quarry pillars and roofs and their impact on mining related subsidence to the development site.

Information within both reports listed above have been referenced within this report. The Rudloe No 2 topographical plan, provided to Hydrock by the Client, has been used as an exploratory hole plan for the development site.

1.5 Approach

The work has been carried out in general accordance with recognised best practice as detailed in guidance documents such as the CLR 11 M*odel Procedures* (Environment Agency 2004), the AGS (2006) *Good Practice Guidelines for Site Investigations*, BS 5930:2015 and BS 10175:2011+A1:2013. The technical details of the approach and the methodologies adopted are given in Appendix G.

A recognised phased approach has been followed, starting with a desk study and walk-over to produce a preliminary assessment of the site conditions and the important factors that require further investigation to reduce uncertainty.

Phase 2 comprises intrusive investigation work and testing. The factual data from Phases 1 and 2 are used to develop a conceptual site model (CSM). This comprises a ground model (of the

physical conditions) and an exposure model (of the possible contaminant linkages). The CSM forms the basis for a number of risk assessments in accordance with current guidelines. Professional judgement is then used to evaluate the findings of the risk assessments and to provide recommendations for the project.

By convention, the geo-environmental and the geotechnical aspects are discussed in separate sections, but in instances where interaction is required to produce a holistic design, this is discussed at the end of the geotechnical recommendations section.

Remaining uncertainties and recommendations for further work are listed at the end of the report.

2.0 PRELIMINARY INVESTIGATION (PHASE 1 STUDY)

A number of desk study sources have been used to assemble the following information, including a proprietary environmental data report which has been obtained for the site (dated 26 May 2016) and is presented in Appendix D.

2.1 Site Referencing

The site is referenced in Table 2.1.

Table 2.1: Site Referencing Information

Item	Brief Description
Site name	Rudloe Manor, Corsham.
Site location and grid reference	Off Westwells Road, Rudloe, Corsham, Wiltshire. The site postcode is SN13 9GR and the approximate National Grid Reference is Eastings 384780, Northings 169 170.

A site location plan and a site survey plan are provided in Appendix A (Drawings RUD-HYD-XX-XX-D-001 and RUD-HYD-XX-XX-D-002 respectively. The original CAD site survey plan was provided to Hydrock by The Client. The original drawing was compiled by Midland Survey Ltd and is dated June 2014.

2.2 Site Description and Walk-Over Survey

A walk-over survey was undertaken on 10th May 2016 to visually assess potential hazards and receptors. A further site walkover survey of the underlying disused mines and MoD facilities was undertaken on the 24th May 2016. A basic site description is presented in Table 2.2 and selected walk-over photographs are presented in Appendix B.

Table 2.2: Site Description

Item	Brief Description
Site access	Via the locked gate located on Westwells road and opposite Park Lane.
Site area	Approximately 8.46 ha.
Elevation, topography and any geomorphic features	The north western end of the site forms the topographic high point of approximately 146m Above Ordinance Datum (AoD). The lowest point of the site is located at south eastern end of the site at approximately 120m AoD. The site therefore slopes from the northwest to southeast with an approximate 1 in 19 gradient. Localised areas with a steeper slope are observed over the wooded area to the north of the site. No areas of instability were observed across the site.

Item	Brief Description
Present land use	With the exception of the MOD fire station, land within the current site boundary forms disused MoD land. Multiple disused MoD buildings are located across the site. Asbestos warning signs were observed on all disused buildings across the site. A disused church and three unclassified buildings are located adjacent to the site access. Previous uses for the existing buildings located in the centre of the site comprise incinerator, MT Garage & POL flammable stores, boiler houses, electrical sub-stations, workshops, MT service Bays and storage for drums in bunds and indoor shooting ranges. Structures understood to form the former barrack buildings and a boiler house are shown to be located in the south of the site. An access road and areas of car park hard standing are located across the site. A review of site utility plans and a site walkover survey have identified numerous manhole covers on site indicating the presence of multiple services underlying the site. One large diameter air shaft is located in the centre of the site adjacent to the main access point for the site. This is associated with Box railway tunnel which underlies the site. The air shaft is securely fenced and the fenced perimeter marks the site boundary between the development site and land belonging to Network Rail. There are three large diameter capped air shafts are known to be present on site. . These features are understood to service the disused mines and MoD facilities underlying the site. The fire station is located adjacent to the main site entrance point. The fire station and land immediately adjacent to the station falls outside the development boundary and forms land retained by the MoD. The observations from the site walkover survey are shown on drawing RUD-HYD-XX-XX-D-002 located in Appendix B.
Vegetation	An area of woodland is located adjacent to the northern site boundary with Westwells road. Additional areas of woodland are located on land to the south of the MoD fire station. A smaller area of woodland is located adjacent to the south eastern site boundary. Sporadic mature trees are located over the remainder of the site.
General site sensitivity	The site is indicated to be located on land classified as area of Adopted Green Belt by North Wiltshire District Council (now part of Wiltshire Council). The boundary of the Cotswolds Area of Outstanding Natural Beauty is located immediately west of the site boundary. A Special Area of Conservation, named Bath and Bradford on Avon Bats, is located within the Cotswolds area of Outstanding Natural Beauty immediately west of the site. It is understood that the mines beneath the site are an important habitat for bats. Box mine, underlying the site, has been classified as a Site of Specific Scientific Interest (SSSI). A review of the Environment Agency (Environment Agency, what's in your back yard) shows a Drinking Water Protected Area Safeguard Zone approximately 1.0km southwest of the site.
Site boundaries and surrounding land	The site is secure and bounded by an MoD palisade security fence. Westwells road and the B3109 are located beyond the northern and western site boundary. Grassed fields and mature woodland are located beyond the southern site boundary and current in use MoD facilities are located beyond the eastern site boundary.

2.3 Site History

A study of historical Ordnance Survey maps (Appendix C) has been undertaken to identify any former land uses at the site and surrounding areas which may have geotechnical or geo-environmental implications for the proposed development and is summarised in Table 2.3.

Note that it is common for military sites not to be shown on Ordnance Survey maps and so details of sites with military or security significance may not be picked up in this review.

Table 2.3: Key Features from Historical Mapping

Map Edition and Scale	Key Features on Site	Key Features off Site
1889: 1:2,500	The site is shown to be open fields with areas of woodland shown as 'The Tips Coverts'. Box railway tunnel shown to underlie site. An air shaft is shown within the site. A small quarry is shown in the north western corner of the site.	An air shaft is located approximately 10m north of northern site boundary. Two air shafts (likely to be associated with Box Tunnel) shown approximately 70m west of the western site boundary and 70m east of the eastern site boundary. Located to the north east of the site are two slope shaft with mineral railways serving an underground quarry. Spring Quarry is located to the east of the site. Air shafts are shown to the north and south of the site. 'Shaft Quarry' is shown to the west of the site.
1900: 1:2,500	Quarry feature located in the north east of the site has been infilled. An air shaft is shown to be present in the north of the site adjacent to West Wells Road. A small pond is shown in the north of the site. A footpath crosses the north eastern corner of the site.	Small ponds shown to the east of the site. One of the slope shafts to the north east of the site is now shown as 'Old Slope Shaft'.
1921: 1:2,500	Reservoir located adjacent to western site boundary.	Air shaft shown immediately to the north of the site. Further development around the slope shaft to the east of the site which is now shown as 'Seven Shaft Quarry' with additional mineral railway lines.
1947: 1:10,560 Aerial Photograph	Development of MoD buildings across the site.	Development of MoD buildings to the north, south and east of the site.
1960 – 1961: 1:10,000	This map lacks detail, however the site is shown to be developed with MoD buildings present. The covered reservoir is no longer shown.	Development of an area of earthworks to the south west of the site..

Map Edition and Scale	Key Features on Site	Key Features off Site
		Area of tanks located down gradient of the site, approximately 50m southwest of the southern site boundary.
1969: 1:2,500	The site is shown as 'Royal Air Force Rudloe Manor'. Tennis courts are shown in the west of the site. A circular feature is shown in the centre of the site, believed to be an access shaft to the MoD complex beneath the site. A further square air shaft is shown in the north of the site. The site is fully developed with many buildings present on site as we see today. St Peter Church is shown in the north of the site.	There are five shafts shown offsite to the east/south east of the site. Construction of two reservoirs approximately 40m and 80m west and northwest of the site respectively. The air shafts present to the north of the site boundary no longer shown.
1975 to 1976: 1:10,000	Demolition of 15 elongated onsite MoD buildings and construction of 11 new MoD buildings. A chimney is shown in the centre of the site. Capping of 1 No air shaft shown on the 1889 plan and 1 No air shaft shown on the 1969 plan. Both of these air shafts are suspected to be associated with the Box mine complex.	Redevelopment of buildings to the north of site boundary.
1999:10,560 Aerial Photograph	Demolition of one MoD building.	No significant developments.
2016: 1:2500	Development of three MoD buildings. Shafts present on site no longer labelled.	Large new MoD building to the north east of the site.

2.3.1 Anecdotal Historical information

Box railway tunnel began construction in 1836 and was completed in 1841 (Networkrail.co.uk). A number of associated vertical ventilation shafts servicing Box Railway Tunnel were constructed during this period.

Many of MoD buildings developed on Royal Air Force Rudloe Manor during World War II were converted into office blocks at the end of war (ESG, Report reference 10/026 Dated March 2016).

Spring Quarry which Rudloe forms was a part of was established in 1942 was built within the former Bath Stone Quarries. Post WWII the quarries were converted into a bunker for use as an emergency war headquarters known as 'Burlington'. Burlington was capable of housing 4,000 government personnel in the event of a nuclear strike. The bunker was accessed from a number of lifts and slope shafts from the surface at RAF Rudloe. The site was de-classified in late 2007. Since 2007 the bunker is no longer of strategic importance, but is maintained by the MOD.

2.4 Unexploded Ordnance/Bombs

2.4.1 ESG Explosive Ordnance Risk Assessment

A Phase I explosive Ordnance Risk Assessment Desk Study Report for the area was carried out by ESG for the Ministry of Defence in March 2010. This report identified that an underground factory was developed in the Bath Stone Quarry during 1942. The factory was closed in 1945 and converted into an emergency war headquarters (ESG, Report reference 10/026 Dated March 2016). This report categorised the site as 'low risk' when considering buried explosives.

The report identified a single recorded enemy attack southwest of the site during 1940. Post war there was no evidence of ordnance being stored on site. However, the report cannot rule out the potential for buried ordnances to be present on site due to the nature of its military land use. Ordnances were known to be stored in the Bath Stone Quarries during WWII.

2.4.2 Published Information

A review of the Zetica regional bomb risk map for Wiltshire shows the site to lie in an area of low bomb risk.

Since the non-specialist UXO assessment indicates a low bomb risk, no further consideration of UXO is required.

2.4.3 On-site Ordnance Usage

There is a building located in the west of the site that has been used as a small arms firing range.

2.5 Geology

The general geology of the site area is shown on the 1:50,000 geological map of Bath (Sheet No 265) and is summarised in Table 2.4.

Table 2.4: Geology

Location	Age	Stratigraphic Name	Description
North western area of site	Middle Jurassic	Forest Marble Limestone formation	Bioclastic Oolitic grainstone or less commonly packstone Limestone deposit formed in a shallow marine environment. Deposit typically weathers to gravel and cobbles (Online BGS Geoindex).
Remainder or site	Middle Jurassic	Forest Marble formation comprising mudstone	Variable calcareous silicate Mudstone with fine grained lenticular cross beds and channel infills. Material weathered to an over-consolidated Clay with traces of silt and sand deposits (Online BGS Geoindex).

The boundary between the Forest Marble Limestone formation and Forest Marble formation comprising mudstone is marked by the northeast – southwest Corsham Fault which forms a normal fault. The downthrow of the fault is shown to be located to the southeast of the fault.. Although not shown on the published BGS geology map PB identified an additional northeast – southwest trending fault crossing the extreme north western corner of the site.

The regional dip for the onsite solid geology is shown to dip by 4 degrees towards the southeast.

Given the shown structural geological conditions across the site, it is anticipated that the Forest Marble formation comprising mudstones, located over the central and eastern parts of the site, are anticipated to be underlain by the Forest Marble Limestone formation at depth.

Land immediately west of the site boundary is shown to comprise Infilled Ground (backfilled workings) (BGS Survey Sheet No 265, Bath). This area of land corresponds to "The Tips (Coverts)" which currently comprises an area of established woodland. This material is anecdotally thought to be soil from the excavation of Box railway tunnel.

Mine workings

2.5.1 MoD Bunker/Stores

The site is underlain by the MoD bunker/stores known as Burlington. The overall mine comprises Tunnel, Spring, Box, Clift, Browns, Groundstone, Sands, Copenacre and Pickwick quarries. The site is predominantly underlain by Spring quarry. Spring quarry is split into districts including SQ5, SQ1, SQ2 and parts of SQ3, SQ6, SQ8 and SQ9. The far west of the site is underlain by Groundstone quarry which was not converted by the War Office.

The Royal Engineers removed a significant quantity of quarry discards before strengthening the pillars and certain sections of roof to ensure overhead cover was sufficiently supported to resist aerial bombardment.

The bunker is located 17.7 to 25.6m below existing ground level. PB has underlain a site stability study of the mine pillars and roof in June 2011.

Pillars

The PB report states that no obvious signs of spalling, stress fracturing or significant weathering were evident. Pillar surfaces were generally dry and the condition of the whitewashed surface coating was good.

Mine Roof

The majority of the roof fractures were deemed satisfactory with occasional of locations deemed marginal located beneath the west of the site (district SQ2). Mortar has been applied to roof fractures. Overall the roof joint surfaces were in good condition.

With regard to Groundstone quarry rock condition was generally poorer that the re-engineered MoD part of the mine. 36 percent of all pillars were classified as marginal, however there was no obvious signs of rock quality deterioration.

Hydrock Site Visit

Hydrock visited the bunker on 24th May 2016 with the MoD mine manager and a representative of the NHBC. The purpose of the visit was to inspect the mine roof to determine if there had been any deterioration since the PB inspection in 2011. The quality of the rock in the mine roof has not reduced further since 2011. Furthermore, Hydrock were advised that the mine will be maintained by the MoD in perpetuity. PB have recommended to the MoD the following inspection strategy:

Table: 2.5 – Mine Inspection Frequency

Class	Condition	Inspection frequency	
		Sensitive Area	Rest of the Mine
1	Good	1 year	2 years
2	Satisfactory	6 months	1 year
3	Marginal	Monthly	6 Monthly
4	Critical	Weekly	Monthly
5	Failed	Weekly	Monthly

Copies of the regular inspection records should be requested from the MoD.

On the basis of the PB condition survey, ongoing inspection, MoD maintenance regime and the findings of the Hydrock inspection the mines are considered a low risk with regard to constructing residential houses above. Hydrock does not see a requirement for drilling boreholes to prove the cover above the mine.

A copy of this report should be provided to the NHBC for their consideration. It is understood that Inverness Terrance has engaged the NHBC to review this report and confirm if they would be willing to office NHBC Buildmark 10-year warranty to a house builder developing the site.

2.5.2 Shafts

PB has recommended that no development should be planned within 2 metres of the shaft caps / lining.

2.5.3 Box Railway Tunnel

Box railway tunnel lies 16 to 20m below the mine floor level, and an approximate minimum depth of 33m below the site. PB has suggested a precautionary development exclusion zone across the route of the tunnel. This recommendation appears quite onerous when the tunnel is located a significant depth. Certainly there are other structures located above the tunnel. Hydrock recommend contacting Network Rail to discuss this recommendation.

2.6 Ground Stability

2.6.1 Man Made Cavities

The environmental data report has identified 28 man-made cavity records within 500m of the site. The closest is indicated to be directly beneath the site and relates an underground Bath stone quarry and MoD complex located within the Great Oolite Group.

2.6.2 Natural Cavities

The risk from mining related subsidence to the site has been discussed above in Section 2.6 and is considered to pose a low risk to the site (PB Mine Stability Report No FSE3511078A).

The nearest recorded natural cavity to the site is located approximately 830m west of the site and refers to cavities formed in the Forest Marble limestone formation. These features relate to gulls/fissures due to cambering.

The environmental data report indicates:

- a very low risk of ground dissolution stability; and.
- a moderate potential for compressible soils.

2.7 Hydrogeology

The aquifer designations given in Table 2.6are based on the Environment Agency interactive aquifer designation map. Additional information on the hydraulic characteristics of the geological units has been abstracted from Allen et al (1997) and Jones et al (2000).

Table 2.6: Hydraulic Characteristics of Strata

Stratum	Aquifer Designation	Hydraulic Characteristics
Made Ground (Imported Fill)	N/A	Moderate to high porosity because of unconsolidated nature, but permeability likely to be constrained to low or low to moderate because of poor sorting and clay content.
Forest Marble Limestone formation	Principal aquifer	Stratum is likely to be dominated by fracture flow permeability meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. Known mine workings underlying the site would be expected to act as significantly high groundwater migration pathways, however a review of PB Stability Report states that groundwater is located between 40m to 90m below ground level within the Great Oolitic Limestone formation. Shallow perched groundwater is recorded overlying the mining complex.
Forest Marble formation (Mudstone)	Secondary A aquifer	Variable calcareous silicate Mudstone with fine grained lenticular cross beds and channel infills. Material weathered to an over-consolidated Clay with traces of silt and sand deposits Stratum is likely to be dominated by low permeability clay which is interbedded with moderate permeability layers of clayey sand. Overall, this unit is likely to be anisotropic in nature with horizontal permeability greater than vertical permeability.

Groundwater is anticipated to flow from northwest towards the southeast in line with the sites natural gradient. However, vertical groundwater migration is likely to be greater than horizontal flow within the Forest Marble Limestone formation.

The Forest Marble formation comprising mudstone is anticipated to form an aquiclude with poor permeability characteristics. Localised clayey sand lenses within the Forest Marble formation comprising mudstone in the centre and east of the site may however form moderate permeability pathways for localised groundwater to migrate across the site.

Reference to the Environment Agency web site shows the following groundwater bodies beneath the site and the current chemical status (Table 2.7).

One water well is shown approximately 500m northeast of the site boundary on the BGS survey sheet for the area.

Table 2.7: Groundwater Bodies

Category	Label or Status
Waterbody ID	GB49092G804800.
Waterbody name	Bristol Triassic.
River basin district	Severn.
Current quantitative quality	Good.
Current chemical quality	Poor.
Upward chemical trend	Yes.
2015 predicted quantitative quality	Good.
2015 predicted chemical quality	Poor.
Overall risk	At risk.
Protected area	Yes.

The site is within a Zone 2 (Outer) groundwater Source Protection Zone (SPZ). There are no licensed groundwater or surface water abstractions within 1,000m of the site.

The limestone located in the north of the site is understood to have a high leaching potential where readily transmitted liquid discharges because they are either shallow, or susceptible to rapid by-pass flow directly to rock, gravel or groundwater.

2.8 Hydrology and Flooding

The surface water features in the vicinity of the site are listed in Table 2.8 and, where appropriate, are marked on the Site Zonation Plan in Appendix A.

Table 2.8: Surface Water Features

Feature	Location Relative to Site
Pond	150m east
Pond	225meast
Tertiary River	234m east

The nearest watercourse is located 234m east of the site and refers to a Tertiary River which originates near Box tunnel..

There are no licensed surface water abstractions for within 1,000m of the site.

There are two surface water discharges located within 1,000m of the site. The closest is located 48m south of the site where final/treated effluent is discharged to and unnamed tributary of the Byde Mill Brook.

The desk study information indicates the proposed development is in Flood Zone 1 (with a low probability of flooding) and the area is greater than 1ha so consultation with the Environment Agency is required with a Flood Risk Assessment (FRA).

The environmental data report indicates a limited potential for groundwater flooding to occur.

No further consideration of flood risk is undertaken in this report. Specialist flood risk advice should be sought with regards to drainage and surface water flooding.

2.9 Waste Management and Hazardous Substances

There is one waste management site recorded within 250m of the site, as listed in

Table 2.9: Waste Management Sites

Site Name and Location	Details
HCI Waste Transfer Station, Unit P1, Fiveways Trading Estate, Westwells Road, Hawthorn, Rudloe, Wiltshire located 152m north of the site	Licence Status: Issued. Operational dates: Not provided Size: Not provided Wastes accepted: Not provided Prohibited wastes: Not provided

There are no records relating to the storage of radioactive materials within 1km of the site.

There are no recorded landfill sites located within 500m of the site.

There are no records of prosecutions relating to authorised processes in the vicinity of the site. There is one record of an explosive site located approximately 370m southeast of the site. This record refers to Leafield Engineering Ltd and is no longer registered as active.

There is no Local Authority Pollution Prevention and Controls, COMAH sites, NIHHS sites, or Planning Hazardous Substance consents or enforcements within 500m of the site.

There are eight records of potentially infilled land within 500m of the site and are listed in Table 2.10.

Table 2.10: Areas of potentially infilled land

Location	Details
16m northwest	Refers to a backfilled airshaft which was reinstated between 1921 to 1969.
98m southeast	Refers to a backfilled airshaft which was reinstated between 1921 to 1969.
125m south	Unknown filled ground (Pit, Quarry etc).
171m east	Unknown filled ground (Pit, Quarry etc).
232m south	Unknown filled ground (Pit, Quarry etc).
246m south	Unknown filled ground (Pit, Quarry etc).
282m northeast	Unknown filled ground (Pit, Quarry etc).
327m east	Unknown filled ground (Pit, Quarry etc).
382m southeast	Unknown filled ground (Pit, Quarry etc)

There are six active contemporary trade directories within 250m of the site these activities include; plastic injection moulding, manufacturing of ultrasonic equipment, commercial vehicle servicing and car body repairs. . It is considered that as long as the contemporary trade directory entries have been operated in accordance with any applicable licence then no impact on the site is envisaged.

2.10 Consultations

2.10.1 MoD Fire Station

Consultation with the MoD fire station duty officer, dated 16th May 2016, was undertaken to determine if aqueous film-forming foam (AFFF) potentially containing Perfluorooctanesulfonic acid (PFOS) or Perfluorooctanoic acid (PFOA) had been used on site. Feedback from the fire station duty officer indicated that there were no records of AFFF's being dispensed across the site.

2.10.2 MoD Mines Manager / NHBC

As previously discussed the site is underlain by MoD stores/bunker. Hydrock visited the mine with the mine manager and the NHBC to inspect the quality of the rock in the roof of the mine. A discussion on the findings of this inspection are presented in Section 8.4 of this report.

2.11 Previous Evidence of Known Contamination Events

The environmental data report has not identified at recorded pollution incidents with the vicinity of the site.

2.12 Natural Soil Chemistry

Information contained within the environmental data report (Appendix D) gives indicative natural concentration values (estimated) for the natural soils at the site for a selection of Contaminants of Potential Concern (CoPC). These have been reproduced in Table 2.1.

Table 2.11: Natural Soil Chemistry (mg/kg)

Element	Arsenic	Cadmium	Chromium	Lead	Nickel
Concentration (mg/kg)	15 - 25	<1.8	60 - 90	<100	15 - 30

2.13 Radon

The radon risk has been assessed in the environmental data report and in a BR 211 Radon Report obtained from the British Geological Survey.

This indicates that the site is not in a Radon Affected Area and no radon protection measures are required.

2.14 BGS Borehole Archive

The closest available exploratory hole logs from the BGS archive have been reviewed and indicates the following.

ST86NW/19a to ST86NW/19f, located approximately 90m west of the site (NGR 384 360, 169 350). Boreholes were drilled to 2.50m using a shell and augur drilling rig and were terminated on refusal. Ground conditions comprised Topsoil from ground level to 0.40m which was underlain by a moderately weak to moderately strong, moderately to partially weathered Oolitic Limestone.

A further three classified boreholes are shown to be located over the southern area of the site, however Hydrock does not have access to these logs.

2.15 Previous Reports

The following previous ground investigations and other associated works have been undertaken at the site and the main findings are summarised in Table 2.12.

Table 2.12: Summary of Previous Reports

Findings
Entec UK Limited, January 2011. Phase 2 Land Quality Assessment (LQA). Rep. 09418 **Ground conditions encountered:** Made Ground to a maximum proven depth of 1.0m bgl. Gravelly and / or sandy CLAY from depths of between 0.30m to 1.0m bgl. Base not proven. Groundwater was not encountered during the ground investigation works or during post field work monitoring visits. **Identified potential or actual contaminant linkages:** Made Ground predominately comprising building demolition rubble was encountered across the site. A hydrocarbon odour was encountered in one window sample position located to the south of the existing fire station. Contamination elevations in Chromium Hexavalent and Benzo(a)pyrene were recorded in Made Ground deposits during the during the investigation. Traces of asbestos were also encountered. **Conclusions:** Findings from the investigation identified that the site is considered to be suitable for redevelopment for a residential housing (with gardens) and commercial / industrial land use.
Parsons Brinkerhoff, June 2011. Rudloe No 2 Site Stability Study. Rep. FSE3511078A. **Project scope:** Project comprised a visual geotechnical survey of the condition of the below ground quarry pillars condition. **Conclusions:** Findings from the investigation showed that the quarry pillars were generally in a good condition and that the potential for mining related subsidence to impact the overlying development site is low.
Parsons Brinkerhoff, February 2010. Defence Estates Corsham Mines Baseline Geological Condition Survey Report Extract. **Project scope:** Project comprised a visual geotechnical survey of the condition of the below ground quarry roof condition. **Conclusions:** Findings from the investigation showed that the quarry roof was generally in a satisfactory, rarely marginal condition and that the potential for mining related subsidence to impact the overlying development site is low.

Data from the above have been taken into account during the preparation of this report where considered to be relevant or appropriate.

Hydrock have been provided with reliance on findings of the Entec UK LQM report. Chemical data from this report has therefore been included within this report.

3.0 PRELIMINARY CONCEPTUAL SITE MODEL

3.1 Physical Setting

The preliminary ground model of the site is the basis of the understanding of the ground conditions that will inform the geo-environmental exposure model and the geotechnical hazard assessment.

3.1.1 Location and Site History

The site is approximately 8.46 ha in size, irregular in shape and is located in Rudloe, Corsham, Wiltshire. Access to the site is via Westwells Road which marks the northern site boundary.

Box Railway tunnel, underlying the site, was constructed in 1841. The first major quarry in the area (Tunnel Quarry) commenced around 1844 and is partly operational to the present day (not beneath the study site). A vertical shaft which services Box railway tunnel is located on site.

Historical plans have shown a localised small quarry in the north east of the site which was infilled by 1900. A small reservoir was also shown in this area and was reinstated by the 1960's.

The development of MoD facilities commenced on site during WWII and formed a non-flying station for administrative and command & control purposes for the RAF. Part of the mine complexes underlying the site were converted to factory usage during the war where aircraft engines were manufactured. Ammunitions were also stored underground during WWII. Post WWII the mine was converted into a government bunker known as Burlington. This is now disused and maintained in perpetuity by the MoD.

Multiple vertical shafts were developed following the War to service the underlying mines and military installation.

Multiple elongated buildings were demolished onsite during the 1970's. Some of these buildings were replaced with new structures. Buildings over the central site area were shown to include incinerators, garages, flammable stores, boiler houses, electrical substations, workshops and bunded above ground storage areas. The majority of these buildings were over the central area of the site. The majority of the buildings over the southern area of the site are understood to comprise barracks / living quarters.

An MoD fire station, which is located outside the site boundary limits, was developed between 1989 and 1993 and is still operational today.

The site is now disused with the exception of the MoD fire station which lies outside of the site boundary.

3.1.2 Landscape and Topography

The north western area of the site forms the topographical high point for the site at an elevation of 146m AoD. The site slopes gently towards the southeast at a general 1 in 19 gradient to its low point of 120m AoD.

3.1.3 Geology

Ground conditions across site are generally anticipated to comprise a thin horizon of Made Ground, partly comprising demolition rubble from historical onsite structures which were demolished during the 1970's. It is likely that the foundations for these historical structures are still in-situ.

Ground conditions over the north western area of the site are anticipated to comprise weathered Oolitic Limestone overlying slightly to freshly weathered Oolitic Limestone from the Forest Marble Limestone formation.

The weathered materials are anticipated to comprise coarse grained limestone gravel and cobbles. The weathered horizon thickness is anticipated to be less than 2.5m thick based on findings from BGS borehole recorded and

Slightly to freshly weathered Oolitic Limestone is anticipated to be sub-horizontally bedded and moderately weak to moderately strong.

Ground conditions to the east of Corsham Fault, over the central and eastern part of the site, are anticipated to differ significantly. The geological material is anticipated to comprise Mudstone which is expected to be weathered to a firm over-consolidated sub-horizontally laminated Clay with occasional clayey sand lenses.

Records from the online BGS data source indicates that erosional channel infill deposits may be present within the geological unit and would likely comprise clayey sand bodies.

Engineering rockhead over the central and eastern parts of the site area anticipated to be at a greater depth in comparison to rockhead over the north western area of the site.

3.1.4 Hydrology and Drainage

Surface water drainage is anticipated to primarily flow over the tarmacadam hardstanding where it may drain into the existing road drainage network.

There is a potential for the existing drainage to become silted up and potentially blocked during site works if significant fine grain material is allowed to build up in the drainage network.

On site drainage measures are therefore anticipated to be necessary to prevent surface water from over spilling onto existing MoD land beyond the south eastern site boundary.

3.1.5 Hydrogeology

The Forest Marble Limestone formation has been classified as a Principal Aquifer by the Environment Agency. This unit is anticipated to have high permeability characteristics.

The Forest Marble formation, comprised of Mudstone, located to the south east of the Corsham fault, is classified as a Secondary A Aquifer. The Mudstone material is anticipated to form an aquiclude of low permeability characteristics.

One water well is shown approximately 500m northeast of the site boundary on the BGS survey sheet for the area.

A review of the PB site stability report indicates that groundwater is located between 40m to 90m bgl (PB Mine Stability Report No FSE3511078A). However, shallow perched groundwater may be present.

Groundwater migration across the site is anticipated to flow from northeast to southwest.

A Tertiary River originates near the eastern entrance of Box Railway Tunnel 234m east of the site boundary. This stream may form the source of groundwater migration through the Forest Marble Limestone formation.

3.2 Geo-environmental Exposure Model

The preliminary exposure model is used for geo-environmental hazard identification and establishing potential contaminant linkages based on the contaminant-pathway-receptor approach.

3.2.1 Potential Contaminants

For the purpose of this assessment the potential contaminants have been separated according to whether they are likely to have originated from on-site or off-site sources.

Potential On-Site Sources of Contamination

- Quarry backfill in the north west of the site possibly including metals, metalloids, asbestos, PAH and petroleum hydrocarbons;
- Hydrocarbon fuels, lubricant and chlorinated solvents associated with former boiler houses, hydrocarbon storage areas, workshops and electricity sub-station; and
- Made Ground possibly including metals, metalloids, asbestos, PAH and petroleum hydrocarbons.

Potential Off-Site Sources of Contamination

- An area Made Ground, located over an area of woodland called 'The Tips (Coverts)' adjacent to the eastern site boundary is shown on the BGS Survey Sheet No 265 for the area. This feature is located on an air shaft for Box Railway Tunnel and is anticipated to comprise excavated arisings for the air shaft. The risk of ground gas migration is anticipated to be low.

3.2.2 Potential Receptors

The following potential receptors have been identified:

- Humans (neighbours, site end users);
- Development end use (buildings, utilities and landscaping);
- Groundwater: Principal A Aquifer of the Forest Marble Limestone Formation; and
- Surface water: Tertiary watercourse located 150m southeast of the site;

It should be noted that health and safety risks to site contractors and maintenance workers have not been assessed during these works and will need to be considered separately.

3.2.3 Potential Pathways

The following potential pathways have been identified:

- Humans: ingestion, skin contact, inhalation of dust and outdoor air/vapours;
- Buildings: direct contact with substances deleterious to building materials from areas of historical hydrocarbon storage;
- Plant life: root uptake;

- Underlying groundwater: migration of contaminant via leachate dispersion through the unsaturated zone in the Forest Marble Limestone Formation Principal A Aquifer;
- Surface water: overland flow;
- Surface water: drainage discharge;

3.3 Geotechnical Hazard Identification

Potential geotechnical hazards based on the expected ground conditions are listed below.

- Uncontrolled Made Ground – excessive settlement (creep and inundation settlement or differential settlement of foundations and pavements for the development site;
- Buried building foundations associated with historical buildings present on site – delays to construction program due to requirement to break out historical foundations and requirement to remove material from site;
- Low strength, compressible ground – excessive settlement of foundations and pavements for the development site;
- Variable strength of natural ground conditions between Forest Marble Limestone and Mudstone deposits potentially leading to differential settlement of foundations and pavements for the development site;
- Attack of buried concrete by aggressive ground conditions – the development site may contain unknown Made Ground and potentially sulfate bearing soils;
- Shrinkage/swelling of clay – settlement/heave of foundations when located within the influence of trees; and

A review of PB's mine roof and pillar geotechnical reports indicate that mining related subsidence to the site from the underlying mines, MoD bunkers and Box railway tunnel is considered to pose a low risk to the site.

3.4 Unresolved Issues and Uncertainties

The Phase 1 investigation has highlighted a number of issues that require intrusive investigation and assessment to inform the design of the proposed development.

Areas of Made Ground have been identified across the site (Entec Phase 2 Land Quality Assessment). These areas of Made Ground are shown to comprise traces of brick fragments, clinker, ash, ceramics, glass and asbestos tiles. The lateral extent of Made Ground deposits across the site is unclear and requires further delineation. The Entec Phase II (Entec Phase 2 Land Quality Assessment) investigation identified areas of former hydrocarbon land uses across the site which would require further investigation. Asbestos fragments were also identified within the Made Ground.

The LQA assessment and Parsons Brinckerhoff Stability Report for the site has not provided a geotechnical assessment of shallow deposits across the site. The location of variable weathering horizons, rock head and shallow groundwater was not proven during the above assessments of the site.

The main details of the site and potential hazards are summarised on the Site Zonation Plan (Appendix A).

4.0 GROUND INVESTIGATION

4.1 Investigation Rationale

The ground investigation rationale based on the findings of the preliminary risk assessment is summarised in Table 4.1.

Table 4.1: Investigation Rationale

Exploratory Holes	Purpose
TP01-TP30	To assess ground conditions across the site and sampling for geotechnical and further geo-environmental samples across the site.
TP09, TP11 and TP12	Infiltration tests undertaken for soakaway design.
TP01, TP02, TP03, TP04, TP06, TP09, TP11 and TP04	TRL probes undertaken adjacent to Trial Pit locations to provide preliminary CBR values for pavement design.

4.2 Ground Gas Regime

It is judged from the available evidence that the gas generation potential at the site is low. This is on account of findings from provided in the Entec LQM ground investigation report.

4.3 Site Works

The fieldwork took place between 10th May 2016 and 13th May 2016 and are summarised in Table 4.2 and the approximate position of site investigation locations (positioned using a hand-held GPS) are shown on the Ground Investigation Plan in Appendix E.

The logs, including details of ground conditions, soil sampling, *in situ* testing and any installations, are presented in Appendix E.

The weather conditions during the fieldwork and for the previous week ranged from wet with heavy rainfall on the 10th and 11th of May, changing to sunny with broken cloud on 12th and 13th May 2016.

Table 4.2: Summary of Site Works

Activity	Method	No.	Max. or Range Depth	*In Situ* Tests	Notes (e.g. Installations)
Drilling, Pitting and Probing					
Trial Pits	Mechanical (JCB 360)	32	3.20m bgl	HSV	Trial Pit locations backfilled using arisings.
Hand Dug Pits	Hand digging tools	1	0.40	n/a	Located in area of woodland to allow geo-environmental samples to be collected.
Probes	TRL dynamic cone penetrometer	8	0.58 – 0.85	CBR	TRL probes undertaken immediately adjacent to 8 No Trial Pit locations.

4.4 Geo-Environmental Testing

4.4.1 Sampling Strategy and Protocols

Investigatory hole locations were determined by reference to the conditions identified in the preliminary risk assessment. Certain specific features such as areas of former and current hydrocarbon land use and areas of Made Ground or potential Fill materials were targeted for specific investigation, but a reasonably even spacing was used for the remainder of the site. No specific sampling statistics or grid were utilised in this instance.

Samples were taken stored and transported in general accordance with BS 10175:2011+A1:2013.

4.4.2 Geo-environmental Laboratory Analyses

Wherever possible, UKAS accredited procedures have been used and the chemical test certificates are provided in Appendix H. The geo-environmental analyses undertaken on soils are summarised in Table 4.3.

Table 4.3: Summary of Sample Numbers for Geo-environmental Analyses of Soils

Determinant Suite	Total	Made Ground	Forest Marble Limestone	Forest Marble formation comprising Mudstone
Hydrock default suite of determinants for solids	30	27	1	2
Volatile organic compounds (VOC target list plus TIC by GC-MS	2	3	-	-
Benzene, toluene, ethylbenzene and xylene (BTEX) by GC-MS)	1			
Semi-volatile organic compounds (SVOC target list plus TIC by GC-MS)	2	3	-	-
Total petroleum hydrocarbon-s by GC-FID/GC-MS (Hydrock Level 2 suite)	11	8	1	2
Polychlorinated biphenyls (PCB, total as Arolcors WHO 12 ICES 7)	1			
Explosives screening	1	1	-	-

The geo-environmental analyses undertaken on waters, leachates (eluates) or other liquids are summarised in Table 4.4.

Table 4.4: Summary of Sample Numbers for Geo-environmental Analyses of Waters, Soil Leachates or Other Liquids

Determinant Suite	Soil Leachates - Natural Ground	Soil Leachates – Made Ground	Ground-water
Hydrock default suite of determinants for waters	-	8	-

The results of the chemical testing carried out by PB has been added to the Hydrock dataset to increase the data population.

4.5 Geotechnical Testing

4.5.1 Geotechnical Laboratory Testing

Wherever possible, UKAS accredited procedures have been used and the geotechnical test certificates are provided in Appendix F. The tests undertaken are summarised in Table 4.5

Table 4.5: Summary of Sample Numbers for Geotechnical Tests

Test	Total	Made Ground	Forest Marble Limestone	Forest Marble formation comprising Mudstone
Natural moisture content	10	4	-	6
Atterberg limit determination	10	4	-	6
Particle size distribution (wet sieve analysis)	3	-	3	-
Sulfate and aggressive chemical environment classification for buried concrete classification (full BRE SD1 suite)	12	3	3	6

5.0 GROUND INVESTIGATION RECORDS AND DATA

5.1 Physical Ground Conditions

5.1.1 Summary of Strata Encountered

The following presents a summary of the properties of the ground and groundwater conditions encountered, based on field observations, interpretation of the field data and laboratory test results, taking into account Trial Pit excavations, TRL DCP testing and sampling methods, transport, handling and specimen preparation.

All relevant data from the Hydrock investigation detailed in Section 4 as well as any suitable previous investigations mentioned in Section 2 are used from this point forward. Derived[1] geotechnical parameters are also presented.

For the purposes of property designation, soils are divided into fine soils (clays and silts) and coarse soils (sands, gravels, cobbles and boulders) in accordance with BS:5930.

Soil plasticity class for fine soils is based on the classification system of BS:5930, adopting modified plasticity index values (based on percentage passing 425µm sieve). Volume change potential of fine soils on change of moisture content has been assessed using guidance provided in NHBC Standards.

Details are provided in the logs in Appendix E, a summary is presented in Table 5.1 and the individual strata are described in the sections below.

Table 5.1: Strata Encountered

Stratum	Brief Description	Depth to Top (m bgl)	Depth to Base (m bgl)	Thickness (m)
Topsoil	Grass over slightly sandy CLAY.	Ground level	0.10 – 0.25	0.10 – 0.25
Made Ground	Generally brown, slightly sandy, slightly gravelly CLAY with traces of brick fragments, clinker, ash and rare possible asbestos tiles. Gravel as sub-angular to sub-rounded, fine to medium limestone, mudstone and sandstone. Occasionally the Made Ground comprised GRAVEL and COBBLES with some ash across the central and southern parts of the site.	0.10 – 0.25	0.30 – 2.10	0.20 – 1.85
Destructured Forest Marble Limestone formation	Generally moderately packed orange brown, sandy, sub-angular, fine to coarse GRAVEL and COBBLES of Oolitic Limestone. Material is sub-horizontally thinly bedded stratum.	0.30 – 0.40	1.25 – 1.60	0.90 – 1.20

[1] **Derived values** of geotechnical parameters and/or coefficients are obtained from test results, by theory, correlation or empiricism in line with BS EN 1997-2:2007, Section 1.6.

Stratum	Brief Description	Depth to Top (m bgl)	Depth to Base (m bgl)	Thickness (m)
Residual Forest Marble formation (Mudstone)	Generally firm to stiff, orange brown and mottled grey, sub-horizontally thickly laminated, slightly sandy, slightly gravelly CLAY. Gravel is sub-rounded to sub-angular, medium mudstone. Stratum is locally a loosely packed reddish brown, thickly laminated, clayey, fine silty SAND.	0.30 – 2.10	1.10 – 3.20+	0.25 – 2.30
Forest Marble Limestone formation	Moderately strong, partially weathered, orange brown, sub-horizontally very thinly bedded LIMESTONE. Discontinuities are occasionally observed to have clay / silt infilling and signs of iron oxide staining.	1.25 – 1.60	Not proven	Not proven
Forest Marble formation (Mudstone)	Moderately strong, partially weathered bluish grey, sub-horizontally very thinly bedded MUDSTONE. Discontinuities are occasionally observed to have clay / silt infilling and signs of iron oxide staining.	1.10 – 3.20+	Not proven	Not proven

5.1.2 Topsoil

For the purposes of this report, topsoil is defined as the upper layer of an in situ soil profile, usually darker in colour and more fertile than the layer below (subsoil), and which is a product of natural chemical, physical, biological and environmental processes, but does not imply compliance with BS 3882:2015.

Topsoil, overlain by grass was encountered in all exploratory holes undertaken across the site.

5.1.3 Made Ground

Made Ground was encountered underlying Topsoil from depths of between 0.10m bgl to 2.10m bgl in all exploratory Trial Pits undertaken across the site.

North of the site

The base of Made Ground deposits encountered within ranged between 0.30m bgl to 0.40m bgl and generally comprised brown, slightly sandy, slightly gravelly CLAY.

Central Area

With the exception of Trial Pit TP15, Made Ground within the central area was encountered to depths of between 0.80m bgl to 1.35m bgl.

A thicker deposit of Made Ground was encountered in Trial Pit TP15 to depths of 2.10m bgl. This material comprised a grey, clayey, gravelly, fine to coarse SAND with frequent inclusions of brick, ash and clinker. This material is suspected to form materials which may have been used to backfill excavations for the adjacent vertical ventilation shaft which services Box Railway Tunnel.

Made Ground encountered within Trial Pit TP18, which was encountered to a depth of 1.10m bgl, is suspected to form backfilled materials used to reinstated excavations associated with the capped vertical shaft servicing the underlying Spring quarry. This material comprised Made Ground of slightly clayey / silty, sand, sub-rounded to sub-angular, fine to coarse GRAVEL and COBBLES of brick fragments, concrete, clinker, metal debris and possible asbestos tiles.

Made Ground of beige sub-rounded to sub-angular, sandy, gravelly COBBLES of sandstone was encountered in TP20 to a depth of 0.70m. This deposit was encountered over an historic building, which was demolished between 1973 and 1991 as shown on the published historical mapping.

Possible asbestos tiles were encountered in Trial Pits TP17 and TP18.

South of the Site

Made Ground encountered within this area was generally encountered to depths of between 0.35m bgl to 1.10m bgl.

An area of built-up ground (artificially mounded) was investigated with Trial Pit TP28 where Made Ground was encountered to 2.10m bgl. Materials encountered comprised brown and orangish brown, sandy, gravelly CLAY with traces of ceramics, brick fragments and wood debris.

Made Ground was encountered to a depth of 1.50m bgl in TP29A and TP29B. A possible historical septic tank was encountered at the base of the trial pit. Water was encountered at 1.40m, however the source of the water encountered is anticipated to be associated with the septic tank feature. Backfilled materials comprised slightly sandy CLAY with rare boulder sized demolished brick walls and cobbles of concrete with metallic pipe debris. A review of historical plans for the site show this area of the site to comprise former buildings which were demolished by 1977. Trial Pit TP29C was excavated to the south of the buried obstruction and identified natural soils at 0.50m bgl.

Possible evidence of historical earthworks / built-up soil was observed in the vicinity of TP23 over the south western area of the site. This location comprised an area of built up Made Ground adjacent to a car parking area of MoD structure. Made Ground encountered in this area comprised a sandy, gravelly CLAY with traces of possible asbestos tiles overlying a 0.45m thick horizon of Ash to 0.90m bgl.

A buried obstruction was encountered in TP07 at 0.70m bgl. The Trail Pit was extended towards the east of the obstruction which was recorded at 0.75m bgl. A review of the historical plans for the site shows this area to have historically comprised elongated MoD buildings which were demolished before 1977. Made Ground overlying the buried obstruction comprised CLAY with traces of possible asbestos tiles.

Possible asbestos tiles were encountered in Trial Pits TP22, TP23 andTP26.

5.1.4 Destructured Forest Marble Limestone formation

The stratum was encountered across the north of the site and was overlain by Made Ground to depths ranging between 0.30 and 0.40m bgl. Destructured material was generally excavated as

an orange brown, sub-angular to sub-rounded, fine to coarse, sandy GRAVEL and COBBLES with lithorelict structure showing sub-horizontal bedded towards the southeast. No SPT testing was undertaken on the stratum, however from field observations this material is deemed to be moderately packed.. DCP probing undertaken within the material suggest that the material could be of medium density, however in-situ SPT or Dynamic Probing testing would have to be undertaken to confirm this.

Particle Size Distribution (PSD) grading tests undertaken from samples shown the material to range from a GRAVEL to a GRAVEL with a high cobble content.

The weathering horizon for the material was shown to range between 1.25m bgl to 1.60m bgl at which depth the material graded into a Moderately Strong, partially weathered LIMESTONE.

5.1.5 Partially weathered Forest Marble Limestone formation

This stratum was encountered underlying the destructured limestone horizon (discussed in Section 5.1.4) from depths of between 1.25m bgl to 1.60m bgl. This stratum was only encountered within the north of the site. The Forest Marble Limestone formation is anticipated to be present at depth over the remainder of the site.

Strength Index testing was undertaken on the material using a geological hammer on cobble excavated from Trial Pits. This indicated the material to comprised of moderately weak to moderately strong Oolitic Limestone.

Arisings of the partially weathered material showed evidence of clay / silt infilling of discontinuities.

It was not possible to advance Trial Pits through the stratum using a JCB 3CX fitted with a toothed bucket.

5.1.6 Residual Forest Marble Formation comprising Mudstone

This stratum was encountered across central and southern portions of the development site from depths of between 0.30m bgl to 2.10m bgl. The material generally comprised stiff (locally firm) thickly laminated slightly sandy, slight gravelly CLAY showing signs of lithorelict features. Hand Shear Vane undertaken in samples with no gravel content ranged from 60kPa to 110kPa which equates to a medium to high strength material in accordance with guidance from BS EN ISO 14688-2:2004.

A summary of the Atterberg limit testing for the material is summarised in Table 5.2 below.

Table 5.2: Plasticity Index testing summary

Exploratory hole location	Depth (m)	Moisture content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity index (%)	Faction >0.425mm	Modified plasticity index (%)	Volume change potential
TP04	1.50	18	20	17	33	22	25.7	Medium
TP19	1.30	23.7	42	20	22	5	20.9	Medium

An undrained shear strength of 75kPa has been assigned to the stiff materials underlying the site.

A review of NHBC standards 2014 shows the material to have a medium volume change potential.

Occasional areas of silty SAND, which are described as loosely packed, were encountered in Trial Pits TP07, TP08 and TP11. Trial Pits TP07 TP08 and TP11 are located over the far eastern area of the site.

This deposit may represent infilled erosional channels within the Forest Marble formation which are potentially present in the formation.

Field observations showed this material to have a higher water content in comparison to cohesive deposits from the Forest Marble formation.

Table 5.3: Soil Strength Results and Derived Values

Shear Strength (Range)	Method	No. of Results
c_u (kPa)		
60 - 110	Hand shear vane	3

5.1.7 Forest Marble formation comprising Mudstone

Partially weathered Mudstone from the Forest Marble formation was encountered from depths of between 1.10m bgl to 3.20m+ bgl in the central and southern portions of the site. Arisings removed from the Trail Pit excavations occasionally comprised sandy Mudstone and muddy Sandstone in places indicating changes in the composition of the Forest Marble formation across this area. These variations in material type may reflect the presence of infilled erosional channels within the Forest Marble formation as identified on the BGS online resource.

Strength Index testing was undertaken on the material using a geological hammer on cobble sized arisings excavated from Trial Pits. Index testing showed the material to comprise moderately weak to moderately strong MUDSTONE.

Arisings of the partially weathered material showed evidence of clay / silt infilling of discontinuities.

It was not possible to advance Trial Pits through the stratum using a JCB 3CX fitted with a toothed bucket.

5.2 Obstructions

A number of Trial Pits observed obstructions during excavation. These intrusive locations are summarised in Table 5.4.

Table 5.4: Obstructions Encountered During Hydrock Investigations

Exploratory Hole	Depth	Description	Stratum
TP07	0.70	Obstruction comprises a tabular limestone boulder horizontally positioned. The top and base of the obstruction was encountered at 0.70m bgl and 0.75m bgl respectively. The Trial Pit had to be	Made Ground

Exploratory Hole	Depth	Description	Stratum
		extended to progress beyond the obstruction. A review of historical plans shows this trial pit to be located adjacent to an historical MoD building, therefore indicating that the obstruction was likely to be associated with historical buildings on site.	
TP21	0.30	Elongated concrete obstruction encountered at 0.30m bgl. The Trial Pit had to be extended to avoid the buried obstruction. A review of historical plans for the site shows TP21 to be located adjacent to an historical MoD building, therefore indicating that the obstruction was likely to be associated with historical buildings on site.	Made Ground
TP29A and TP28B	1.10	Possible historical septic tank associated with buildings demolished on site before 1977 encountered. Buried obstruction comprises buried brickwork wall and concrete with a metallic pipe running into the structure.	Made Ground

5.3 Visual and Olfactory Evidence of Contamination

Visual and olfactory evidence of contamination, in addition to the more common man-made constituents described above, was noted in a number of trial pits and is summarised in Table 5.5, with this information presented on the Site Zonation Plan in Appendix A.

Table 5.5: Visual and Olfactory Evidence of Contamination

Exploratory Hole	Depth	Description	Stratum
TP07	0.20 – 0.70	Possible asbestos tiles encountered within Made Ground stratum.	Made Ground
TP10	0.15 - 0.45	Possible asbestos tiles encountered within Made Ground stratum.	Made Ground
TP17	0.10 – 0.40	Possible asbestos tiles encountered within Made Ground stratum.	Made Ground
TP18	0.10 – 1.10	Possible asbestos tiles encountered within Made Ground stratum.	Made Ground
TP22	0.15 – 0.35	Possible asbestos tiles encountered within Made Ground stratum.	Made Ground
TP23	0.10 – 0.45	Possible asbestos tiles encountered within Made Ground stratum.	Made Ground
TP26	0.10 – 0.40	Passible asbestos tiles encountered within Made Ground stratum.	Made Ground

5.4 Other Geotechnical Parameters

5.4.1 California Bearing Ratio (CBR)

The CBR results are summarised in Table 5.6 including recommended values that can be assumed for preliminary design purposes within the scope of this report.

Table 5.6: CBR Results and Derived Values

Stratum	Method	No. Tests	CBR (%) (Range)
Made Ground	DCP – TRL probe	8	6 – 9
Residual Forest Marble comprising mudstone	DCP – TRL probe	4	8 – 28
Destructured Forest Marble Limestone formation	DCP – TRL probe	4	21 – 49

5.4.2 Sulfate Content

In accordance with BRE (Special Digest 1), the Design Sulfate (DS) classification and the Aggressive Chemical Environment for Concrete (ACEC) classification are presented in Table 5.7. The assessment summary sheets for individual strata encountered are presented in Appendix F.

No pyrite was visually observed to be present within strata encountered on site.

Table 5.7: Aggressive Chemical Environment Concrete Classification

Stratum	No. Tests	DS	ACEC
Made Ground	3	DS-1	AC-1
Forest Marble Limestone formation	3	DS-1	AC-1
Forest Marble formation comprising Mudstone	6	DS-1	AC-1

5.5 Groundwater

5.5.1 Groundwater Levels

One natural record of very slight groundwater seepage was recorded in Trial Pit TP08 from 1.50m bgl. No other natural groundwater seepages were encountered during the ground investigation.

Anecdotally anthropogenic groundwater was encountered within Trial Pit TP29A at 1.40m bgl. Groundwater encountered is likely to be associated with a buried septic tank structure encountered within the Trial Pit.

5.5.2 Infiltration Tests

The results of the infiltration testing undertaken are summarised in Table 5.8. The results sheets are presented in Appendix F. All testing was carried out in accordance with Hydrock's 1-day assessment methodology. This is in general accordance with BRE Digest 365 (BRE 2007) where infiltration rates allow three test runs during a working day (or where there is no infiltration), but where low infiltration rates were encountered the available time may not have been sufficient to fully comply with the BRE test method.

Where less than three tests were possible in a particular location the results provided should be considered indicative only and should not be used for design purposes. Further discussion

concerning the suitability of infiltration testing at the site is provided in Section Soakaways and Drainage.

Table 5.8: Infiltration Test Results

Stratum	Trial Pit no.	Depth	Infiltration Rate (m/s)		
			Test 1	Test 2	Test 3
Forest Marble Formation (Mudstone)	TP09	2.35	Test abandoned due to poor infiltration rate		
Forest Marble Formation (Mudstone)	TP11	2.35	Test abandoned due to poor infiltration rate		
Forest Marble Limestone Formation	TP12	1.65	$1.02x10^{-03}$m/s	$9.45x10^{-04}$ m/s	$7.23x10^{-04}$ m/s

5.6 Geo-Environmental Results

The chemical test results for soil, leachate and groundwater are given in Appendix H, which also includes summary tables of the data.

Hydrock have not been presented with a proposed site layout plan for the site and have therefore assumed site use to comprise residential site use with gardens for a conservative approach.

Elevated concentrations of hydrocarbons were encountered adjacent to the large capped shaft feature located over the central area of the site. Aluminium, Lead, Chromium (III), Iron, Vanadium and leachate concentrations were also observed to be elevated above their respective inland water EQS and DWS values respectively.

Localised elevated concentrations of PAHs were recorded in an area of build up ground in the southern area of the site.

Elevated leachate concentrations for nickel and zinc were recorded within Made Ground deposits in TP16 and TP24 respectively.

Concentrations of the following determinants were not reported above the laboratory limit of detection.

- Soils – Cadmium, Chromium (VI), Mercury, inorganic, Zinc, Cyanide, Benzo(ghi)perylene, Chrysene, Naphthalene, aliphatics EC5 – EC6 to EC35 – EC44, aromatics EC5 – EC7 to EC35 – EC44, Benzene, Toluene, Ethylbenzene, p & m-xylene, o-xylene, MTBE (Methyl Tertiary Butyl Ether), VOCs and PCBs.
- Waters and leachates – Cd, Hg, Se, Cyanide, Bromate, Chloride, Benzo(a)pyrene, Fluoranthene, Naphthalene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene, indeno(1,2,3-cd)pyrene and phenols.

5.7 Updated Ground Model

The preliminary conceptual site model initially developed from the desk study and walk-over survey (Section 3) has been updated using the findings of the ground investigation. The main features of the site are summarised on the Site Zonation Plan (Appendix A).

Findings from the Entec LQM report for the site identified pockets of Made Ground deposits across the site, however a further investigation has shown Made Ground deposits of varying depth to be present across the development site. Sporadic areas of thicker Made Ground deposits were encountered over the central and southern areas of the site and are typically associated with vertical shafts associated with Box Railway Tunnel and the underlying Quarries. Additionally, areas of historical earthworks / built-up ground and locations of historically demolished buildings showed areas of thicker Made Ground deposits.

Buried obstructions, associated with historical buildings demolished on site are sporadically located across the site. A potential buried septic tank was encountered in Trial Pit TP29A and TP29B in the south of the site.

No perched groundwater was encountered during the ground investigation works. However seasonal changes may result in perched groundwater being present at differing times of the year.

Localised deposits of (loose) damp clayey Sand were encountered across the site. These deposits are anticipated to form infilled erosional channels. These features form soft spots within the natural materials on site. Furthermore, a reduction in moisture content of these features may lead to subsidence issues on site.

Subsequent to the ground model described in Section 3, the ground investigation has conformed ground conditions below the site to comprise:

Northern Area

- Made Ground – from between 0.10m – 0.25m bgl to between 0.30 – 0.40m bgl, generally comprising clay with traces of clinker, ash, brick fragments, metal debris and recorded cement bonded asbestos fragments; over

- Destructured Forest Marble Limestone formation – from between 0.30m -0.40m bgl to between 1.25m to 1.60m bgl, generally comprising gravel and cobbles of Oolitic Limestone Clasts; over

- Partially weathered Forest Marble Limestone formation – from between 1.25m – 1.60m comprising moderately weak to moderately strong Oolitic Limestone.

Central Area

- Made Ground – from between 0.10m – 0.25m bgl to between 0.30m – 2.10m bgl, comprising clay, sand, gravel and cobbles and cobble deposits with traces of clinker, ash, brick fragments, metal debris and recorded cement bonded asbestos fragments; over

- Residual Forest Marble formation comprising Mudstone – from between 0.30m - 2.10 to between 1.60m – 3.20m bgl comprising sub-horizontal, thickly laminated clay and rarely clayey sand deposits; over

- Partially weathered Forest Marble formation comprising Mudstone – from 1.60m - 3.20m bgl, comprising moderately weak to moderately strong Mudstone.

Southern Area

- Made Ground – from between 0.10m – 0.25m bgl to between 0.30 – 2.10m bgl, comprising clay, sand, gravel and cobbles and cobble deposits with traces of clinker, ash, brick fragments, metal debris and recorded cement bonded asbestos fragments.

- Residual Forest Marble formation comprising Mudstone – from between 0.30m - 2.10 to between 1.00m – 3.20m + bgl comprising sub-horizontal, thickly laminated clay and rarely clayey sand; over

- Partially weathered Forest Marble formation comprising Mudstone – from 1.60m - 3.20m bgl, comprising moderately weak to moderately strong Mudstone.

6.0 GEO-ENVIRONMENTAL ASSESSMENT

6.1 Approach

Hydrock have not been presented with a proposed site layout plan for the site and have therefore assumed site use to comprise residential end use with gardens for a conservative approach.

A number of generic risk assessments are undertaken in accordance with the principles of CLR 11 (Environment Agency 2004) using the CSM that has been updated following the ground investigation. Firstly, the risks associated with the identified potential contaminant linkages are estimated using standardised methods (typically involving comparison of site data with published 'screening values'. Secondly, where screening values are exceeded, the risks are evaluated in an authoritative review of the findings with other pertinent information to determine if exceedance may be acceptable in the particular circumstances. For details please refer to Appendix G.

The data sets used comprise the appropriate analytical results obtained by Hydrock and listed in Section 5.6 and includes the chemical data from Entec's LQM assessment of the site.

In cases where unacceptable risks are indicated, mitigation measures such as more advanced stages of risk assessment or remediation will be proposed in Section 7.0.

6.2 Updated Exposure Model

Following the site investigation, the plausible contaminant sources, receptors and pathways identified in Section 3.0 have been updated or confirmed as follows.

6.2.1 Sources

The following sources have source has been added to the exposure model.

- An area of Made Ground identified on the BGS survey sheet for the area located over the area of woodland names 'The Tips, Coverts' located immediately west of the site boundary. This feature is likely to be associated with arisings from a vertical shaft servicing Box Railway Tunnel.

6.2.2 Receptors

No potential receptors have been removed from, or added to, the exposure model.

6.2.3 Pathways

The following pathway has been added to the exposure model.

- Areas of clayey sand, likely to form infilled erosional channels within the Forest Marble formation, have been sporadically identified on the site. These features are likely to have a higher relative permeability in comparison with the surrounding clay deposits and may act as a pathway for perched groundwater migration.

6.3 Human Health Risk Assessment

A conservative Tier 2 assessment using soil screening values for the CLEA land use scenarios residential with plant uptake has been adopted for the site.

The soil screening values used are generic assessment criteria (GAC) and results are given in Appendix G. Note that the Category 4 Screening Levels (C4SL) for lead have been used as there are no recognised GACs and the use of the term 'GAC' in this report includes these.

Statistical testing is used where data sets are suitable. For data sets with low sample numbers and/or a non-random spatial distribution (e.g. where sampling is targeted at specific areas) individual sample test results are compared directly with the screening values.

It should be noted that the phrase 'further assessment required' is used to denote soil concentrations that are equal to, or exceed, a GAC. This does not necessarily mean that the soil is 'contaminated' or not fit for use.

6.3.1 Risk Estimation (Including Statistical Testing)

The 'averaging area' used in this report is based on the conceptual model and the proposed development and is taken to be the entire area of the site. The assessment of the chemical data has been split into Made Ground and natural soils.

In line with the guidance provided by the CIEH (May 2008) the 95th upper confidence level on the true mean (US_{95}) has been calculated from the sample data. Data have been assessed using the one-sample t-test or the one-sided Chebychev Theorem, as appropriate to the distribution and number of samples.

6.3.2 Risk Estimation (With Statistical Testing)

Hydrock Default List of Determinands

Soil chemical analytical results have been compared with the relevant GACs in the summary table in Appendix H. This dataset includes information from the Entec LQM 2010 investigation and the Hydrock 2016 ground investigation. Based on a US95 no exceedance of the GAC for human health was encountered in Made Ground undergoing statistical analysis.

No concentration above the relevant GACs were identified with respect to Plant life within the samples screened from the Made Ground.

Natural Ground

No elevated levels of contaminates were recorded with respect not human health within natural deposits encountered across the site.

No concentration above the relevant GACs were identified with respect to Plant life within the samples screened from the natural soils.

6.3.3 Risk Estimation (Without Statistical Testing)

Asbestos

Asbestos was identified in Made Ground samples as detailed in Table 5.3.

Petroleum Hydrocarbons (PHC)

Table 6.3 located below details the exceedances of petroleum hydrocarbons recorded:

Table 6.1: Pervasive Chemicals of Potential Concern for Which Further Assessment is Required (Human Health)

Location	Depth (m)	Strata	Petroleum Hydrocarbon Fraction	Generic Criterion (mg/kg)	Concentration (mg/kg)
TP18	1.0	Made Ground	Aromatic EC5-EC7	73	390

No elevated petroleum hydrocarbons were identified with the natural soils.

Trial Pit TP18 is located within an area where Aliphatic Hydrocarbons >C21 – C35 were identified during the Entec LQM assessment for the site. Historical information for this area of the site shows a former boiler house and storage drums in a bunded to have been present over this area of the site.

The Entec LQM assessment for the site recorded elevated levels of Aliphatic Hydrocarbons >C21 – C35 in the vicinity of the former Boiler House and Electrical Substation over the central area of the site. Concentrations here are shown to 1.4 times greater than the GAC

Volatile Organic Carbons(VOC) and Semi Volatile Organic Carbons (SVOC)

Samples tested for VOC's during the Hydrock investigation were not shown to be above laboratory detection limits.

Explosives

Samples screened for explosive residue are below laboratory detection limits and are not shown to be above laboratory detection limits.

6.3.4 Area of built up ground

Samples obtained from Trial Pit TP23 reported elevated levels of Benz(a)anthracene, Benzo(a)pyrene and Benzo(b)fluoranthene. Elevated levels of PAH based on PAH double ratio plots indicate the source of PAH is from Coal within Made Ground.

6.3.5 Risk Evaluation

The screening exercise identified the following substances at concentrations above the GAC. These are considered further here to assess if the exceedance may be acceptable with respect to the proposed development.

Slightly elevated Benz(a)anthracene, Benzo(a)pyrene and Benzo(b)fluoranthene concentrations have been identified in the Made Ground. These concentrations suggest the Made Ground within this area of built up ground are a pervasive source of PAH. The concentrations of Benzo(a)pyrene (highest risk PAH in analysis) also exceed the C4SL. Made Ground forming the

area of built up ground is considered a pervasive source of PAH, however it is spatially limited and forms an area of approximately 45m^2.

Elevated petroleum hydrocarbons were identified in single sample of the Made Ground from TP18 at 1.0m with a concentration of 390 mg/kg compared to a GAC of 150 for Aromatic EC5-EC7. The source for recorded hydrocarbons is considered to be associated with the previous boiler house which was present in this location. Further investigation is recommended to delineate this petroleum hydrocarbon impacted material.

6.4 Pollution of Controlled Waters Risk Assessment

6.4.1 Risk Estimation

The risks to groundwater and surface water from contaminants on site have been assessed according to the Environment Agency (2006) Remedial Targets Methodology (RTM).

Under the European Water Framework Directive (2000/60/EC) pollutants from contaminated land sites are considered as passive inputs. Inputs to surface waters and inputs of non-hazardous pollutants to groundwater and are regulated under the Agency's 'limit' pollution objective. As such, site contaminant loadings are compared with relevant threshold values (Water Quality Targets) which are linked to the conceptual site model. Acceptable WQT are defined for protection of human health (based on Drinking Water Standards (DWS)) and for protection of aquatic ecosystems (Environmental Quality Standards (EQS)).

For the purposes of this report, the site data are compared with the various targets as set out according to the Hydrock scenario(s) in

Table 6.4 (see Appendix H for details), on the basis of the following:

- It has been confirmed that the Limestone Principal Aquifer directly underlies the north of the site, but is separated from the site by a horizon of clay (residual mudstone) in central and southern areas. Bands of clayey sand are present within this geological unit which may allow surface water to migrate into the underlying Principle A Aquifer;
- The nearest surface water feature to the site refers to a tertiary river located approximately 234m southeast of the site. Migration of contaminants into the surface water feature from the site is unlikely;
- There are no surface water abstractions within 1,000m of the site; and
- There is a groundwater abstraction well located 500m north east of the site.

Table 6.4: Summary of Water Quality Risk Assessment Protocol

Hydrock Scenario	Water Body Receptors	Secondary Receptors	Example Contaminant Linkages	RTM Level and Data Used	Water Quality Targets
D	Groundwater. Surface water.	Human health (abstraction). Aquatic ecosystem.	Contaminants from site leach or seep into groundwater body and this feeds surface water by base flow. The surface water may be used for human consumption and is an aquatic ecosystem.	RTM Level 1 - Soil leachate	DWS EQS (inland)
Notes: Some EQS are water hardness dependent. This is measured either in the receiving water or in groundwater (if it is part of the pathway), or is estimated from national maps. Inland waters EQS applicable to freshwater, other waters EQS applicable to marine or transitional waters. Where both DWS and EQS are applicable, it is assumed that the EQS is for inland waters. This table and the results of the assessment are considered as a first screening for potential risks of pollution of Controlled Waters. More specific requirements may be stipulated by the relevant Agency.					

The results of the Remedial Targets Methodology assessment are presented in Appendix H and are summarised in Table 6.2.

It should be noted that in some instances the reporting limit (or detection limit) quoted by the laboratory may be greater than the WQT that it is being assessed against. As the current exercise is an initial screening assessment, further assessment of these elements has not been undertaken.

Table 6.2: Chemicals of Potential Concern for Which Further Assessment is Required (Controlled Waters)

Chemical of Potential Concern	Water Quality Target (ug/l)	Basis for Water Quality Target	No. Samples	Min. (ug/l)	Max. (ug/l)	US_{95} (ug/l)	No. Samples Exceeding Target
Soil Leachate							
Aluminium	200	DWS	8	14	620	592	3
Chromium (VI)	3.4	EQS	8	5	29	20.6	8
Nickel	4	EQS	8	0.6	6.7	6.2	3
Iron	200	DWS	8	12	660	555	3
Lead	1.2	EQS	8	1	2.1	2.0	4
Note: the 95%ile value is compared with the water quality target.							

6.4.2 Risk Evaluation

Elevated concentrations of leachable nickel, lead and chromium (VI) have been identified in the Made Ground above the EQS. Additionally, concentrations of aluminium and iron are shown to exceed their DWS water quality targets. Whilst there are elevated concentrations of Chemicals of Potential Concern, based on the investigation works undertaken to date and subject to

agreement with the Environment Agency, Hydrock does not believe the site poses a significant risk to Controlled Water for the following reasons:

- The preparation of samples for leachability analysis is an aggressive methodology and unlikely to be representative of existing site conditions, real site leaching concentrations will be reduced significantly from that indicated by the laboratory testing.
- The EQS for lead, zinc and copper are also based on bioavailability and so this risk assessment is conservative as it assumes 100% bioavailability.
- The elevated concentration are likely to be associated with ash identified in the Made Ground. The ashy Made Ground is only present in a thin horizon (0.30m), therefore there is only a limited source for this material;
- The limestone in the north of the site is classified as a principal aquifer, however the closest groundwater abstraction is located 500m from the site;
- Groundwater is anticipated to be at a significant depth beneath the site;
- The concentrations of leachable substances that could emanate from the site will be subject to dilution and dispersal during transport and so the risks will reduce with distance from the site and into the identified surrounding water bodies; and
- There is no indication under present conditions of pollution of Controlled Waters and conditions following development of the site will not deteriorate, indeed thy may improve with increased hard cover and water-retaining imported garden soils.

No further consideration is recommended.

6.5 The Wider Ecosystem Risk Assessment

The eastern boundary of the Cotswold National Park is located immediately adjacent to the western site boundary. This area of land is located up gradient of the site and the migration of contaminates from the site is not considered to pose a pose a risk to the Cotswold National Park.

6.6 Construction Materials Risk Assessment

6.6.1 Water Pipelines

The current guidance on selection of materials for potable water supply pipes to be laid in contaminated land is contained in a document published jointly by Water UK and the Home Builders Federation (Water UK HBF (2014)). The protocols in that document are for guidance and are not subject to enforcement by Water UK or any agency, but have been adopted by Water UK and by HBF as best practice for their members. Accordingly, this guidance is used in the following assessment. For further details see Appendix G.

A formal water pipe risk assessment is beyond the scope of this report, however, the findings of this investigation have been compared to the threshold values in Water UK Table 1 as far as is practicable to give an indication of the possible restrictions to the use of plastic pipes for water supply to the site.

The site is brownfield and organic contamination (PAH and petroleum hydrocarbons) has been identified in exceedance of the threshold values and Hydrock believes barrier pipe is required.

However, confirmation should be sought from the water supply company at the earliest opportunity.

6.7 Findings of the Generic Risk Assessments

Particular areas of the site which are of potential concern are indicated on the Site Zonation Plan in Appendix A. Site-wide issues are not mapped on the plan, but are listed in the notes. The source-pathway-receptor contaminant linkages given in Table 6.7 are those which, following the risk evaluation process, require further consideration and are discussed further in Section 7.0.

Table 6.7: Final Conceptual Model and Residual Risks Following Risk Evaluation

Contaminant Linkage			Comments	
Sources	**Pathways**	**Receptors**	**General**	**Mitigation**
Asbestos on the Made Ground	Inhalation	End users	Asbestos was identified sporadically within the Made Ground.	Likely mitigation measures will be installation of a clean cover system with anti-dig layer within all soft landscaped areas.
Made Ground forming area of built up ground	Ingestion, contact and Inhalation of vapour	End users	Elevated PAH concentrations were identified within a Made Ground forming the area of built up ground	Confirm the extent of impacts and remediate through clean cover system of removal.
Petroleum hydrocarbons in Trial Pit TP18	Ingestion, contact and Inhalation of vapour	End users	This trial pit is located in the area of a former boiler house. Further investigation required to delineate	Investigate extent and treat area of impacts.

7.0 GEO-ENVIRONMENTAL CONCLUSIONS AND RECOMMENDATIONS

7.1 Key Risk Drivers

7.1.1 Human Health

Asbestos fragments have been identified in the Made Ground across the majority of the site. Quantification is recommended to determine the percentage of asbestos present.

Elevated PAH concentrations were identified within a Made Ground forming the area of built up ground.

There are elevated petroleum hydrocarbons present within Made Ground at Trial Pit TP18, which is anicdotally associated with a former boiler house.

7.1.2 Plant Life

No significant risk to plant life was identified during the investigation.

7.1.3 Controlled Waters

No significant risk to controlled waters were identified during the investigation.

7.2 Mitigation Measures

7.2.1 Asbestos within Made Ground

It is recommended that a clean cover system including a robust anti-dig layer is installed in all soft landscaped areas to prevent end users coming into contact with asbestos impacted material. The placement of the cover system should be verified as completed.

7.2.2 PAH within Made Ground (area of built up ground)

Mitigation of the potential risks is recommended through the installation of a clean cover system (sever the pathway) or removal of this area of Made Ground (source removal), and verification of removal.

7.2.3 Petroleum Hydrocarbons (boiler house)

It is recommended that further site investigation is carried out to delineate the potential petroleum hydrocarbon hotspot. Once fully delineated it is anticipated that this will be removed as a hotspot. Once removal has been carried out there will be a required to chemically verify that the impacted material has been removed.

7.3 Waste Management

Any material excavated on site may be classified as waste and it is the responsibility of the holder of a material to form their own view on whether or not it is waste. This includes determining when waste that has been treated in some way can cease to be classed as waste for a particular purpose. Further details are given in Appendix H.

If material is to be removed from the site (e.g. foundation arisings) the laboratory test results in Appendix H, should be presented to the proposed receiving landfill site (to aid Waste

Characterisation), prior to export, to confirm that it is suitably licensed to accept them. Some additional testing may be necessary at the time of disposal for the receiving landfill to confirm the Waste Acceptance Criteria (WAC) are acceptable for it to receive the waste.

Based on the results of the testing it is anticipated that the natural excavated soils will be classified as inert for off-site disposal purposes and Made Ground will be classified as non-hazardous. However, this will depend on the results of the WAC testing. If the soils are not proven to be inert, they may be classified as non-hazardous.

Non-hazardous soils require pre-treatment prior to disposal. Effective pre-treatment, involving separation, sorting and screening can offer cost reductions through reducing the hazardous nature and volume of soil waste. Costs for disposal of non-hazardous/hazardous soils are significant compared to disposal of inert material.

7.3.1 Materials Management

Any material excavated on site may be classified as waste and it is the responsibility of the holder of a material to form their own view on whether or not it is waste. This includes determining when waste that has been treated in some way can cease to be classed as waste for a particular purpose.

If site-won material is to be re-used on site, a Materials Management Plan will be required, signed off by a Qualified Person as defined in the 'Development Industry Code of Practice' (CL:AIRE, March 2011).

8.0 GEOTECHNICAL ASSESSMENT

8.1 Geotechnical Categorization of the Proposed Development

The general site arrangement and anticipated loads for the development site are not known at the time of writing this report, however Eurocode 7, Section 2 advocates the use of geotechnical categorization of the proposed structures to establish the design requirements. For the purposes of this investigation, the proposed structures are anticipated to be classed as Geotechnical Category 1.

The Geotechnical Category should be re-assessed for the development site on review of the adopted general arrangement for the site. Should the Geotechnical Category be reassessed as Category 2 or 3 then a specific Geotechnical Design Report should be procured for developments on site.

8.2 Groundwork

8.2.1 Site Preparation

A review of buried services information for the development site shows multiple services to be present across the site. An additional drain was recorded on site during the site works that is not present on the utility plans provided. It was not possible to access manhole covers for the service to identify the orientation of the service.

All services on site should be assumed to be live unless otherwise stated. Redevelopment of the site would involve the realignment or removal of existing buried services on site.

It is presumed that the redevelopment will involve demolition of the existing buildings. Buried obstructions were encountered during this investigation associated with foundations of old buildings and the septic tank. Therefore there is a possibility of further such obstructions being encountered.

A demolition grade asbestos survey should be carried out prior to demolition of the structures on site. All identified asbestos should be certified as removed prior to demolition commencing.

Topsoil and unsuitable Made Ground should be removed from beneath all building and hardstanding areas.

No invasive species were observed during the ground investigation works, however ground works and contractors should remain vigilant in identifying invasive species during the construction phase.

8.2.2 Groundworks

Following breaking out of hardstanding and obstructions, excavation of shallow soils should be readily undertaken by conventional plant and equipment. However, excavation through any buried obstructions and intact rock may require heavy duty plant and the use of specialist breaking equipment in order to break out intact bedrock.

Instability of excavation faces was observed during excavation of the trial pits. This is prevalent in the Made Ground strata.

Random and sudden falls should be expected from the faces of near vertically sided excavations put down at the site. This situation is likely to be prevalent in the Made Ground soils

Temporary trench support, or battering of excavation sides, is likely to be required for all excavations that are to be left open for any length of time, and will definitely be required where man entry is required. Particular attention should be paid to excavation at, or close to, site boundaries/adjoining existing roads/structures/buildings, where collapse of excavation faces could have a disproportionate effect.

A risk assessment of the stability of any open excavation should be undertaken by a competent person and appropriate measures adopted to ensure safe working practise in and around open excavations. Further guidance on responsibilities and requirements for working near, and in, excavations can be obtained from the Construction Design and Management Regulations (2015).

Groundwater is generally unlikely to be encountered within anticipated excavation depths (maximum of 2m bgl). However, it should be recognised that groundwater levels will fluctuate seasonally and the timing of construction may dictate the extent of groundwater control required. Any water pumped from excavations is likely to need to be passed via settlement tanks before being discharged to the sewer; discharge consents will also be required.

8.2.3 Earthworks/Reuse of Site-Won Materials

Spoil resulting from excavations within the Made Ground will not be suitable for re-use as engineered fill due to the presence of asbestos and should either placed below a cover system or disposed of off-site to an appropriate location/facility.

The presence of sulfates, or the potential for sulfates to form, is critical in the assessment of suitability for a soil to be stabilised. Sulfate can combine with water, natural minerals within the clay and calcium present in lime to form expansive materials. Current guidance used in the assessment of sulfates suggests that values of total sulfate (as % SO_4) below 0.2% may be acceptable. Values recorded between 0.2% and 1.0% need careful consideration, and values in excess of 1.0% indicate that sulfates would make the soil unsuitable to modify and/or stabilise with lime or cement. However, in all instances, during the mix design phase, samples should be checked for swelling as part of the approval phase, even where very low sulfate values are recorded. In addition to these values for total sulfate, HA 74/07 also recommends converting total sulfur into potential sulfate, and again this would be compared to the current guidance.

From the measurements undertaken during the ground investigation on samples of the Forest Marble formation, the results indicate that soils may be suitable subject to further detailed design and testing and are unlikely to be suitable for improvement by the inclusion of binders.

Where it is proposed to re-use natural site won materials as an engineered fill, it will be necessary to develop an appropriate Site Specific Earthworks Specification as part of the Geotechnical Design Report (GDR) which can be adopted as part of the contract documentation. The basis for the Specification should be BS:6031:2009 and the latest version of the SHW, Series 600 Earthworks.

8.2.4 Consolidation Settlement from Land Raising

It is not known if land raising earthworks will be required for the development site at the time of writing this report.

8.3 Mine workings

8.3.1 MoD Bunker/Stores

Mining related subsidence to the development site from the underlying MoD Bunker and stores is considered to be low on reflection of the site walkover inspection and findings from PB's mining roof and pillar geotechnical investigation.

8.3.2 Shafts

PB mine roof geotechnical assessment has recommended that no development should be planned within 2 metres of the shaft caps / lining.

8.3.3 Box Railway Tunnel

The risk of subsidence resulting from Box Railway tunnel is considered to be low.

PB have suggested a precautionary development exclusion zone across the route of the tunnel. This recommendation appears quite onerous when the tunnel is located a significant depth. Certainly there are other structures located above the tunnel. Hydrock recommend contacting Network Rail to discuss this recommendation.

8.4 Foundations

The general site arrangement and anticipated loads for proposed structures on site are not known at the time of writing this this report. For the purpose of this assessment it is assumed that typical 2 to 3 storey residential buildings and access roads will be considered for the development site.

The Made Ground/low strength natural fine soils/loose natural granular soils is/are considered unsuitable in its/their present condition for use as founding soils on the basis of its/their relatively low strength and high compressibility and should be fully penetrated by all new foundations.

The residual Forest Marble formation comprising mudstone soils are of medium volume change potential. Field logging observations identified possible signs of desiccation at a depth of 2.6m bgl to 2.7m bgl. Sporadic natural moisture content testing results also indicate possible signs of desiccation occurring within the material.

Sporadic mature tree cover was observed across the site, although they are of unknown size, species or maturity. Plots constructed within influencing distance of these trees (whether on- or off-site and whether to remain or be removed), should be constructed in accordance with NHBC Standards.

On the basis of the above, minimum founding depths are likely to range from 0.90m bgl to 2.0m bgl for the residual clay materials from the Forest Marble formation comprised of weathered Mudstone.

Foundations undertaken within the destructured Forest Marble Limestone material would be required to be founded at a minimum depth of 0.75m bgl with a minimum 0.30m embedment depth into the natural material.

Foundations that are carried deeper to mitigate the influence of trees may be stepped up, in accordance with the requirements of EC7, BS EN 1997 as long as a suitable founding stratum is present at shallower depth.

If trees are to be removed, the roots should be grubbed out and foundations extended to below the zone of disturbance created by this activity.

The allowable bearing pressure for foundations takes into consideration the risk of shear failure of the ground (ultimate limit state) and acceptable limits of settlement (serviceability limit state).

The preliminary foundation designs in this section are based on the parameters given in Section 8.2.

Should any foundation span materials of different stiffness then it is recommended that mesh reinforcement be placed at the top and bottom of the foundation.

The depth of foundations should be designed, and the formations inspected by, a Geotechnical Engineer. Any sub-formation materials deemed as unsuitable such as soft or loose zones should be excavated and replaced with well compacted suitable granular fill or lean mix concrete.

Foundation excavations should be protected from water and inclement weather including frost and any water should be removed by pumping from a sump in the base of the excavation.

The Forest Marble formation comprising Mudstone is an over consolidated clay and can swell and soften readily when allowed access to free water. Therefore, care will be required to ensure that foundation excavations are kept as free of water as practicable and that concrete is poured as soon as practicable after excavation.

Foundations in excess of 2.5m depth should be designed by an Engineer in accordance with the requirements of NHBC Standards.

8.4.1 Strip or Trench Fill Foundations

Northern Area

Traditional strip or trench fill foundations are considered suitable for the proposed developments within this section of the development site.

Based on the design soil parameters provided in earlier sections of this report, as a guide, an allowable net bearing pressure of 200kN/m^2 should be available for a foundation bearing at least 300mm into the natural the coarse grained destructured Forest Marble Limestone formation.

An allowable net bearing pressure of 600kN/m^2 should be available for a strip or trench fill foundation bearing onto the partially weathered Forest Marble Limestone rockhead.

These values include a factor of safety of 3.0 against general shear failure and should result in total settlements of not more than 20mm/25mm for foundations up to 1m wide, keeping differential settlements within acceptable limits.

Central and Southern Areas

Traditional strip or trench fill foundations are considered suitable for the proposed developments within this section of the development site.

Based on the design soil parameters provided in earlier sections of this report, as a guide, an allowable net bearing pressure of 125kN/m^2 should be available for a foundation bearing at least 300mm into the natural the cohesive residual clay material from Forest Marble formation .

Trench fill foundations may be taken down to the underlying partially weathered Forest Marble formation comprising Mudstone where an allowable net bearing pressure of 600kN/m^2 should be available.

These values include a factor of safety of 3.0 against general shear failure and should result in total settlements of not more than 20mm/25mm for foundations up to 1m wide, keeping differential settlements within acceptable limits.

8.4.2 Heave Protection

Deepening of foundations in accordance with NHBC Standards/BRE 298 will be required where foundations are within the zone of influence of existing, removed or proposed trees and proposed shrub planting (where cohesive soils are present in the central and southern parts of the site). For existing (and any known removed) trees this will require a tree survey to be undertaken by an arboriculturist in accordance with BS:5873:2012 which must include off-site trees that could have an effect on foundation design, in addition to trees on site. Where foundations are within the influence of trees and are deeper than 1.5m bgl, a suitable compressible material or void former will be required.

Where foundations require deepening to greater than 2.5m below ground level, they must be designed by an engineer, as specified in NHBC Technical Requirement R5.

For residential developments which are to be constructed within the influencing distance of trees and heave protection will be required on the inside faces of the ground beams and slip coatings will be required on the uppermost sections of piles or the upper sections should be overbored (within the influencing depth, as determined in accordance with BRE Digest 240).

8.5 Ground Floor Slabs

Northern Area

The use of ground bearing floor slabs over the northern area is anticipated to be appropriate. However, Made Ground materials will require removal and densification/disposal or testing to confirm the material provides an acceptable stratum for the floor slab.

Prior to the placement of the founding materials and the construction of the ground bearing floor slab, the sub-formation and formation will need to be inspected and checked by a geotechnical engineer to ensure the ground conditions are as expected. This is likely to include sufficient appropriate testing, carried out in accordance with the DMRB IAN 73/06, to confirm the ground conditions at time of construction are consistent with the previous design parameters derived from this ground investigation.

Central and Southern Areas

As Made Ground greater than 600mm thick and clay soils of medium volume change potential are present at the site, it is recommended that suspended floor slabs should be adopted, in accordance with NHBC Standards.

8.6 Roads and Pavements

Topsoil and Made Ground should be removed from below all roads.

Northern Area

Based on the test results, it is considered likely an equilibrium CBR of 2.5% can be achieved in destructured Forest Marble limestone formation material encountered and can be used for preliminary design, subject to in situ testing during construction.

Central and Southern Area

Based on the test results, it is considered likely an equilibrium CBR of 2.5% can be achieved in the residual clay material from the Forest Marble formation comprising Mudstone and can be used for preliminary design, subject to in situ testing during construction.

General

Proof rolling of the formation level will be required and any loose or soft spots should be removed and replaced with an engineered fill, in accordance with a suitable Specification. The formation level will also need to be protected during inclement weather from deterioration; all slopes should be trimmed to falls to shed rain water and the surface sealed to limit infiltration.

Prior to the placement of the founding materials and the construction of the road pavement, the sub-formation and formation will need to be inspected and checked in accordance with a suitable specification to ensure the ground conditions are as expected. All testing should be carried out in accordance with DMRB IAN 73/06 to confirm that the ground conditions at time of construction are consistent with the previous design parameters.

On account of sporadically distributed excessively deep Made Ground on site it is possible that the Local Transport Authority will require deep ground improvement even if suitable CBR values exist at the surface or can be engineered by a capping layer and early consultation is recommended.

8.7 Soakaways and Drainage

Indicative infiltration rates for the ground investigation are presented in Appendix F and are summarised in Table 8.3.

Table 8.3: Infiltration Testing Data

Stratum	Recorded Indicative Infiltration Rate	Comments
	Infiltration rate (m/s)	
Destructured Forest Marble Limestone formation	7.23 x 10-4	One investigation location undertaken within destructured horizon. Infiltration value does not apply to the underlying less weathered material.
Residual Forest Marble formation comprising mudstone	n/a	Very poor infiltration characteristics encountered.

Findings from the investigation show that soakaway design is only appropriate over the northern area of the site within the destructured Forest Marble Limestone formation. Soakaways were only undertaken within the destructured Limestone and not within the partially weathered Limestone material. It should be noted that infiltration rates within the partially weathered Limestone material may be less than in comparison with the destructured material. Detailed design for soakaways would be required to be undertaken by a specialist engineer.

Soakaways within the central and southern areas are not considered appropriate for conventional soak away drainage due to poor infiltration rates.

8.8 Buried Concrete

Based on guidelines provided in BRE Special Digest 1 (BRE 2005), all soils encountered across the site can be classified as Design Sulfate Class DS-1 and ACEC Class AC-1 (Section 5.4.2).

8.9 Interaction Between Geotechnical and Geo-Environmental Recommendations

Consideration into the mobilisation of asbestos will need to be taken into consideration when excavating foundations, pavements, earthworks and utility trenches into Made Ground deposits. Segregation and management of Made Ground materials will be required prevent the mobilisation of asbestos during the site works. It is the Principal Contractors responsibility to ensure that Health and Safety requirements for groundworks is managed with regards to potential exposure to asbestos during the site works.

9.0 UNCERTAINTIES AND LIMITATIONS

9.1 Site-Specific Comments

The following ground model uncertainties still remain for the development site and would be required to be further clarified to further develop the site.

- Quantification of the asbestos present;
- The status of the small infilled quarry or backfilled reservoir in the north of the site.
- The extent of petroleum hydrocarbons in the vicinity of the boiler house; and
- Waste Acceptance Criteria of the materials being removed from site (if required).

9.2 General Comments

Hydrock Consultants Limited (Hydrock) has prepared this report in accordance with the instructions of Inverness Terrace Ltd (the Client), by email dated 31th March 2016 under the terms of appointment for Hydrock. Hydrock shall not be responsible for any use of the report or its contents for any purpose other than that for which it was prepared and provided. Should the Client require to pass copies of the report to other parties for information, the whole of the report should be so copied, but no professional liability or warranty shall be extended to other parties by Hydrock in this connection without the explicit written agreement thereto by Hydrock. The report may be assigned by the Client by way of absolute legal agreement to a purchaser of all or part of the site to which the report refers ("The Site") without the consent of Hydrock being required and such assignment shall be effective upon written notice thereof being given to Hydrock. No further assignments shall be permitted, unless expressly agreed in writing by Hydrock. In the event of the Client entering into a legal joint venture to develop The Site, the report can be regarded as having been issued by Hydrock jointly in favour of the Client and the joint venture partner, and in respect of the report Hydrock would owe the joint venture partner the same duty of care that Hydrock owed to the Client when Hydrock was instructed to prepare the report subject to all the matters contained or referred to in the report.

This report details the findings of work carried out in May 2016. The report has been prepared by Hydrock on the basis of available information obtained during the study period. Although every reasonable effort has been made to gather all relevant information, all potential environmental constraints or liabilities associated with the site may not have been revealed.

Hydrock has used reasonable skill, care and diligence in the design of the investigation of the site. The inherent variation of ground conditions allows only definition of the actual conditions at the locations and depths of trial pits and boreholes at the time of the investigation. At intermediate locations, conditions can only be inferred.

Groundwater findings described are only representative of the dates on which they were made and levels may vary.

Unless otherwise stated, the recommendations in this report assume that ground levels will remain as existing. If there is to be any re-profiling (e.g. to create development platforms or for flood alleviation) then the recommendations may not apply.

Information provided by third parties has been used in good faith and is taken at face value; however, Hydrock cannot guarantee its accuracy or completeness. It is assumed that previous reports provided have been assigned to the Client and can be relied upon. Should this not be the case Hydrock should be informed immediately as additional work may be required.

The work has been carried out in general accordance with recognised best practice. The various methodologies used are explained in Appendix . Unless otherwise stated, no assessment has been made for the presence of radioactive substances or unexploded ordnance. Where the phrase 'suitable for use' is used in this report, it is in keeping with the terminology used in planning control and does not imply any specific warranty or guarantee offered by Hydrock.

The chemical analyses reported were scheduled for the purposes of risk assessment with respect to human health, plant life and controlled waters as discussed in the report. Whilst the results may be useful in applying the Hazardous Waste Assessment Methodology given in Environment Agency Technical Guidance WM3, they are not primarily intended for that purpose and additional analysis may be required should waste classification be required for consideration of off-site disposal of contaminated soils. Separate analyses will be required to meet the Waste Acceptance Criteria for specific landfill sites.

Unless otherwise stated, the chemical testing carried out for this report was not scoped to comply with the requirements of the water supply company and further work may be required.

The preliminary risk assessment process may identify potential risks to site demolition and redevelopment workers. However, consideration of occupational health and safety issues is beyond the scope of this report.

Please note that notwithstanding any site observations concerning the presence or otherwise of archaeological sites, asbestos-containing materials or invasive weeds such as Japanese knotweed, this report does not constitute a formal survey of these potential hazards.

Any site boundary line depicted on plans does not imply legal ownership of land.

10.0 RECOMMENDATIONS FOR FURTHER WORK

The following further works are recommended:

- Undertake asbestos quantification;
- Undertake further investigation to delineate the area of petroleum hydrocarbon impacted material around the old boiler house;
- Investigate the small backfilled quarry and covered reservoir in the north of the site;
- Prepare a remediation strategy;
- Liaise with Network Rail with regard to building over Box railway tunnel;
- Obtain the inspection records for the mine from the MoD;
- Carry out a demolition grade asbestos survey of the buildings;
- Undertake a tree survey;
- Isolate all services;
- Remove all asbestos from structures prior to demolition;
- Carry out demolition;
- Verify petroleum hydrocarbon hotspot removal;
- Verify clean cover system with anti-dig membrane within soft landscaped areas; and
- Prepare a remediation verification report.

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Appendix A

Drawings

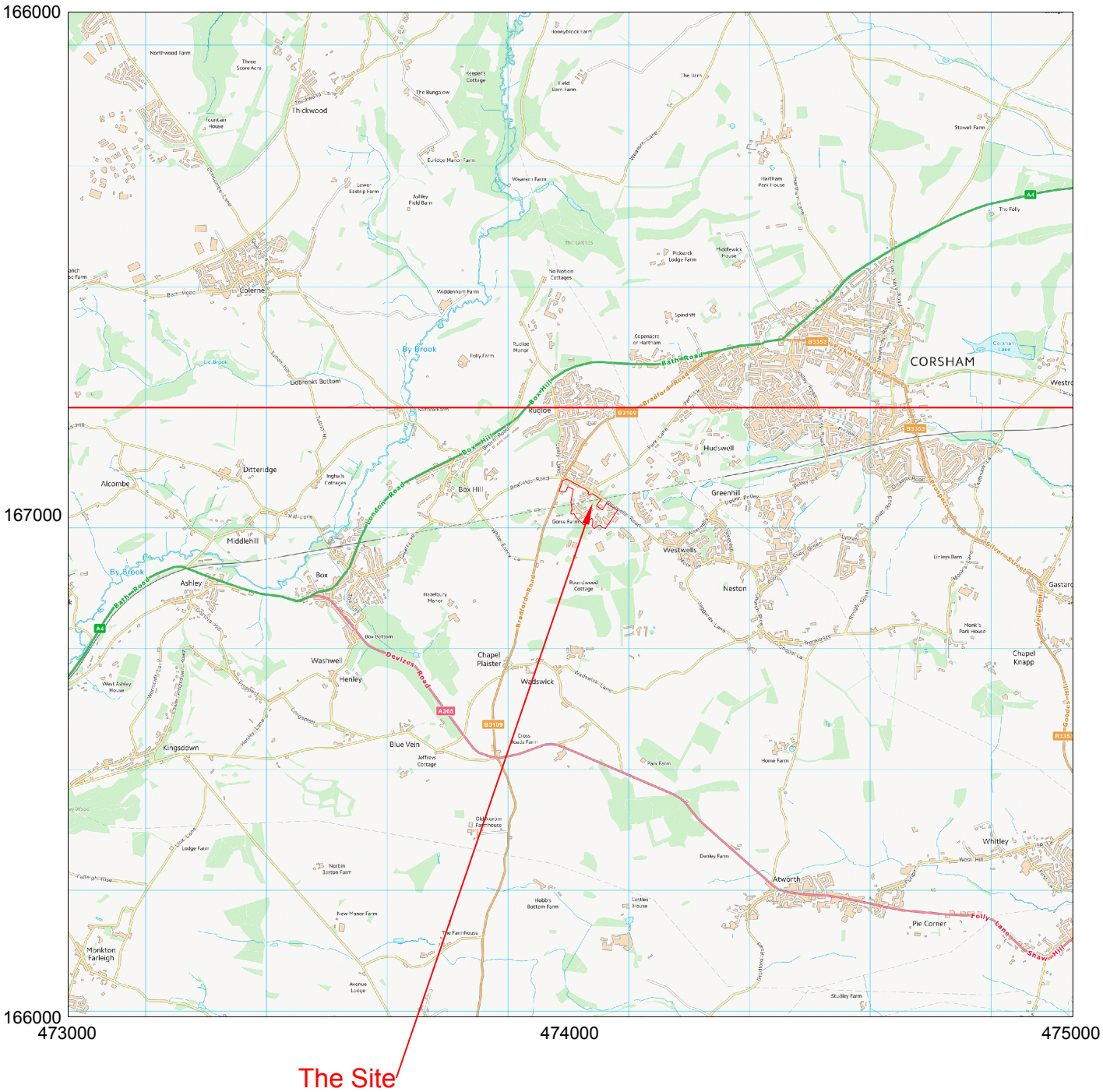
Drawings included in this report:

Rudloe-HYD-XX-XX-D-G-001 – Site Location Plan

Rudloe-HYD-XX-XX-D-G-002 – Exploratory Hole Plan

Rudloe-HYD-XX-XX-D-G-003 – Historical Site Layout Plan

OS NORTH



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Rev	Date	Description	By	Ckd
C1	20/06/16	INFORMATION	JM	AJ

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Client: Inverness Terrace Ltd

Project: Rudloe, Corsham

Title: SITE LOCATION PLAN

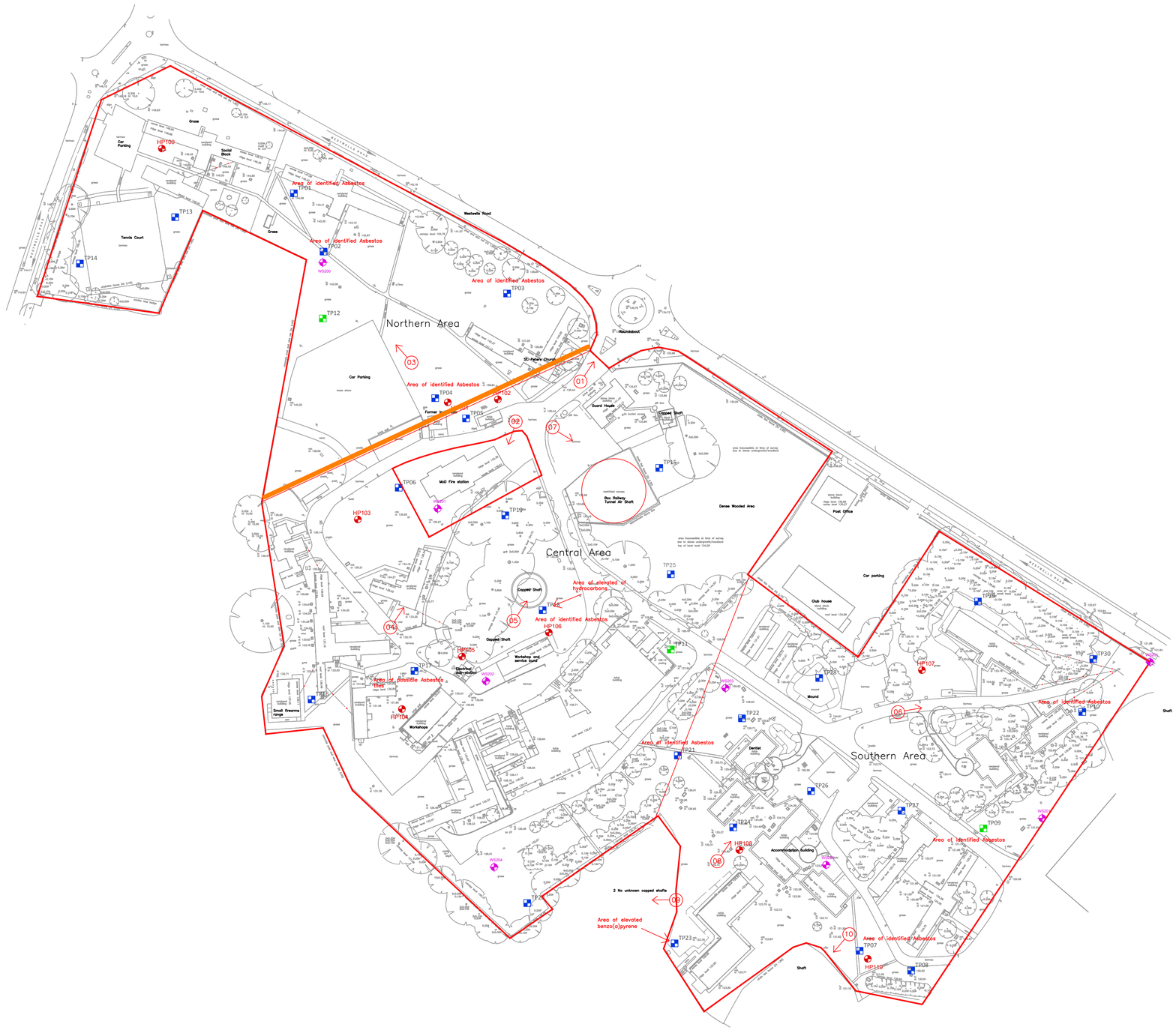
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JM	AJ	1:12,500	01/06/16	01/06/16

Drawing Status: INFORMATION

Drawing No.: RUD-HYD-XX-XX-G-D-001

Revision: C1

OS NORTH



LEGEND

TP01 Hydrock trial pit

SA01 Hydrock soakaway

Site investigation boundary

01 Photo plates

WS201 Entec Ltd window sample location

HP101 Entec Ltd hand pit

Inferred location of the Corsham Fault

Original CAD drawing provided to Hydrock Ltd by Inverness Terrace Ltd. Original source of the drawing is unknown

Rev	Date	Description	By	Ckd
C01	29/07/16	Initial issue	JM	AJ

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Client

INVERNESS TERRACE LIMITED

Project

RUDLOE CORSHAM

Title

EXPLORATORY HOLE LOCATION PLAN

Drawn	Checked	Scale at A1	Date	Issue Date
JM	AJ	1:1000	27/05/16	29/06/16

Drawing Status

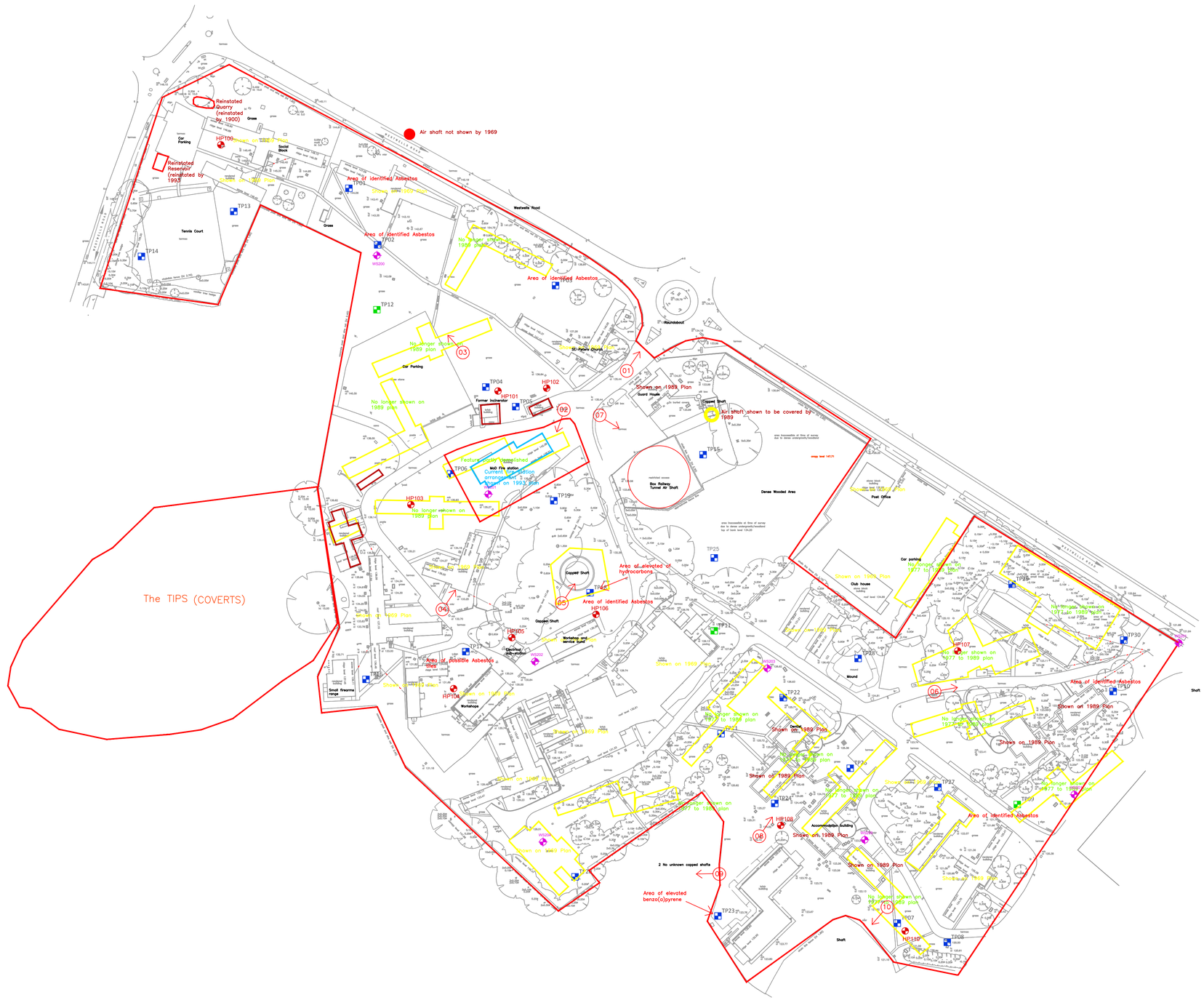
FOR INFORMATION

Drawing No. HYD-XX-XX-D- G002

Revision C01

Notes:
All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.This drawing is to be read in conjunction with all relevant Engineers' and Service Engineers' drawings and specifications. This drawing is copyright.

OS NORTH



LEGEND

TP01 Hydrock trial pit

SA01 Hydrock soakaway

Site investigation boundary

01 Photo plates

WS201 Entec Ltd window sample location

HP101 Entec Ltd hand pit

Features shown in 1969 plan

Features shown on 1989 plan

Original CAD drawing provided to Hydrock Ltd by Inverness Terrace Ltd. Original source of the drawing is unknown

Rev	Date	Description	By	Ckd
C01	29/07/16	Initial issue	JM	AJ

Over Court Barns, Over Lane
Almondsbury, Bristol BS32 4DF
TEL: 01454 619 533 FAX: 01454 614 125
E-Mail: bristol@hydrock.com or visit www.hydrock.com

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Client

INVERNESS TERRACE LIMITED

Project

RUDLOE
CORSHAM

Title

HISTORICAL SUMMARY PLAN

Drawn	Checked	Scale at A1	Date	Issue Date
JM	AJ	1:1000	27/05/16	06/07/16

Drawing Status

FOR INFORMATION

Drawing No.	Revision
HYD-XX-XX-D- G002	C01

Notes:
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Appendix B

Site Walkover Photographs

This appendix may not be included in the printed report to reduce the document size, but is included in the digital version.



Figure 1: Entrance to site off Westwells Road



Figure 2: Fire Station adjacent to site entrance



Figure 3: Building in North of site



Figure 4: Asbestos warning signage on surveyed derelict structures across the site



Figure 5: Capped vertical shaft



Figure 6: Mature tree cover over site



Figure 7: Box Tunnel Vertical shaft in back ground



Figure 8: Living quarters in south of the site



Figure 9: Unknown shaft feature off site



Figure 10: Vertical shaft outside of the site boundary

Appendix C

Historical Ordnance Survey Maps

This appendix may not be included in the printed report to reduce the document size, but is included in the digital version.

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
Fenced
Un-Fenced
Minor Roads
Fenced
Un-Fenced
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
Co. Boro. Bdy. County Borough Boundary (England)
Co. Burgh Bdy. County Burgh Boundary (Scotland)
R.D. Bdy. 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
Coppice
Bracken
Heath
Rough Grassland
Marsh
Reeds
Saltings
Building
Direction of Flow of Water
Shingle
Sand
Glasshouse
Pylon
Electricity Transmission Line
Pole
Sloping Masonry
Cutting
Embankment
Standard Gauge Multiple Track
Road Under
Road Over
Level Crossing
Foot Bridge
Standard Gauge Single Track
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
Shown only when not coincident with other boundaries
Civil Parish
Shown alternately when coincidence of boundaries occurs

BP, BS	Boundary Post or Stone	Pol Sta	Police Station
Ch	Church	PO	Post Office
CH	Club House	PC	Public Convenience
F E Sta	Fire Engine Station	PH	Public House
FB	Foot Bridge	SB	Signal Box
Fn	Fountain	Spr	Spring
GP	Guide Post	TCB	Telephone Call Box
MP	Mile Post	TCP	Telephone Call Post
MS	Mile Stone	W	Well

1:10,000 Raster Mapping

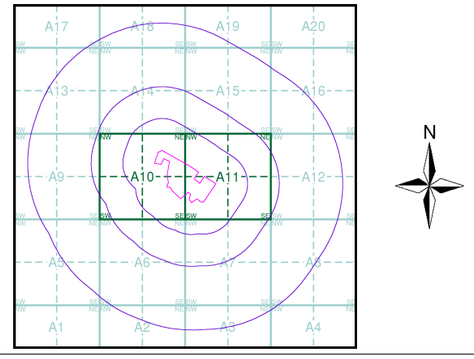
Gravel Pit
Refuse tip or slag heap
Rock
Rock (scattered)
Boulders
Boulders (scattered)
Shingle
Mud
Sand
Sand Pit
Slopes
Top of cliff
General detail
Underground detail
Overhead detail
Narrow gauge railway
Multi-track railway
Single track railway
County boundary (England only)
Civil, parish or community 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
MHW(S) Mean high water (springs)
MLW(S) Mean low water (springs)
Telephone line (where shown)
Electricity transmission line (with poles)
BM 123.45 m 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

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Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Wiltshire	1:10,560	1889	2
Wiltshire	1:10,560	1900 - 1901	3
Gloucestershire	1:10,560	1904	4
Wiltshire	1:10,560	1923	5
Gloucestershire	1:10,560	1923	6
Historical Aerial Photography	1:10,560	1947	7
Ordnance Survey Plan	1:10,000	1955	8
Ordnance Survey Plan	1:10,000	1960 - 1961	9
Ordnance Survey Plan	1:10,000	1975 - 1976	10
Ordnance Survey Plan	1:10,000	1981 - 1982	11
Ordnance Survey Plan	1:10,000	1992	12
10K Raster Mapping	1:10,000	1999 - 2000	13
Historical Aerial Photography	1:10,000	1999	14
10K Raster Mapping	1:10,000	2006	15
VectorMap Local	1:10,000	2016	16

Historical Map - Slice A



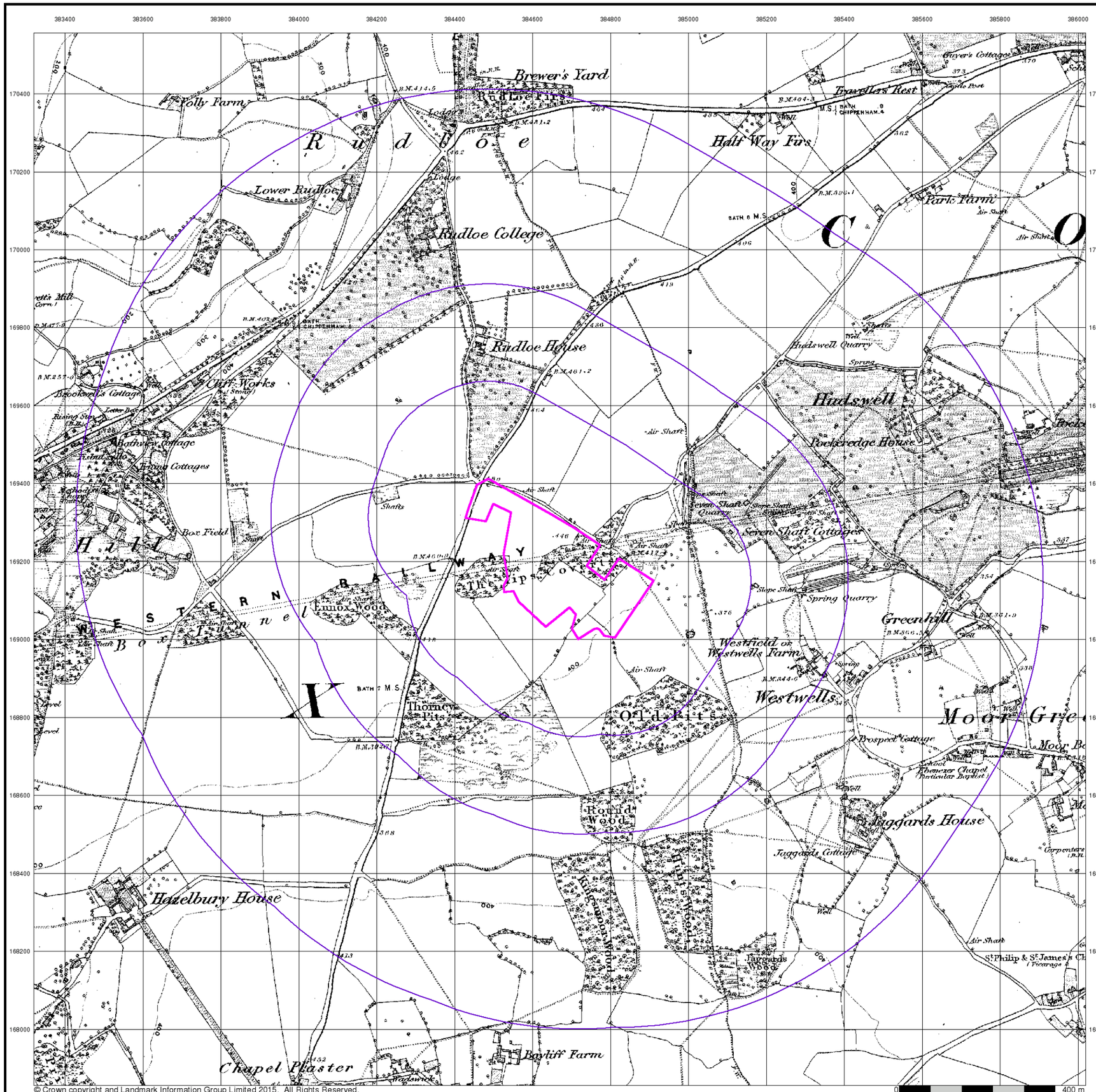
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Slice:	A
Site Area (Ha):	8.46
Search Buffer (m):	1000

Site Details

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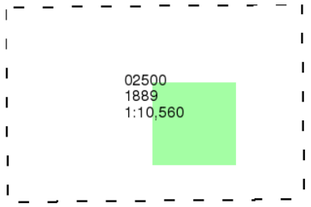
Wiltshire

Published 1889

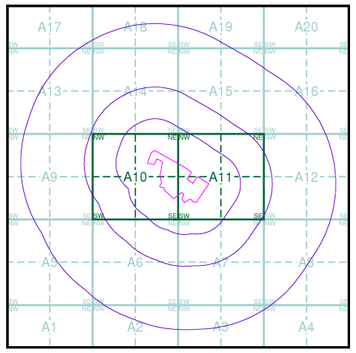
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The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. 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



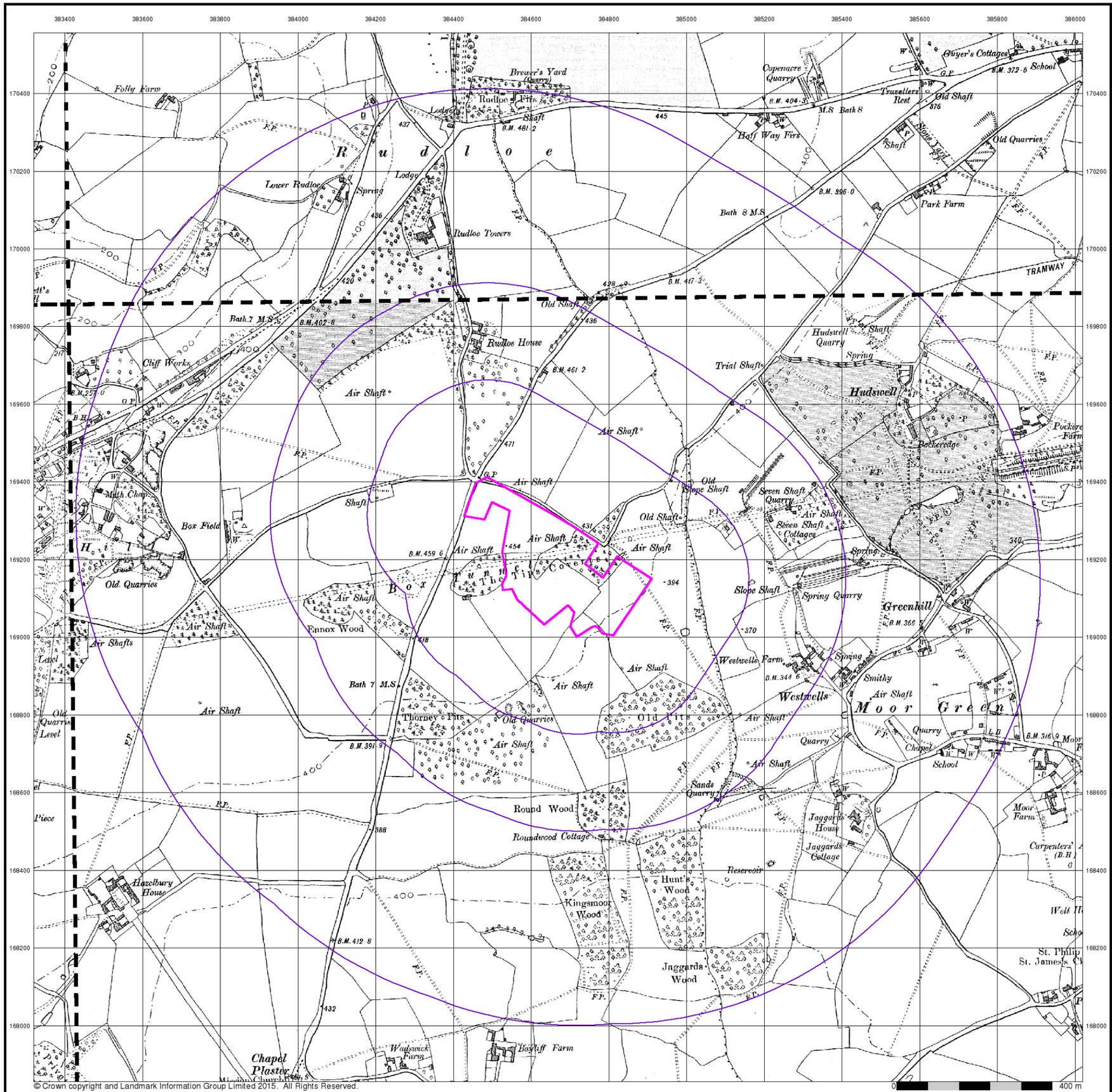
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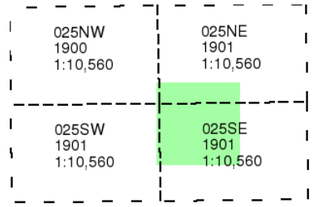
Wiltshire

Published 1900 - 1901

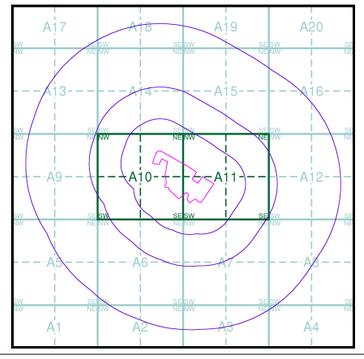
Source map scale - 1:10,560

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Map Name(s) and Date(s)



Historical Map - Slice A



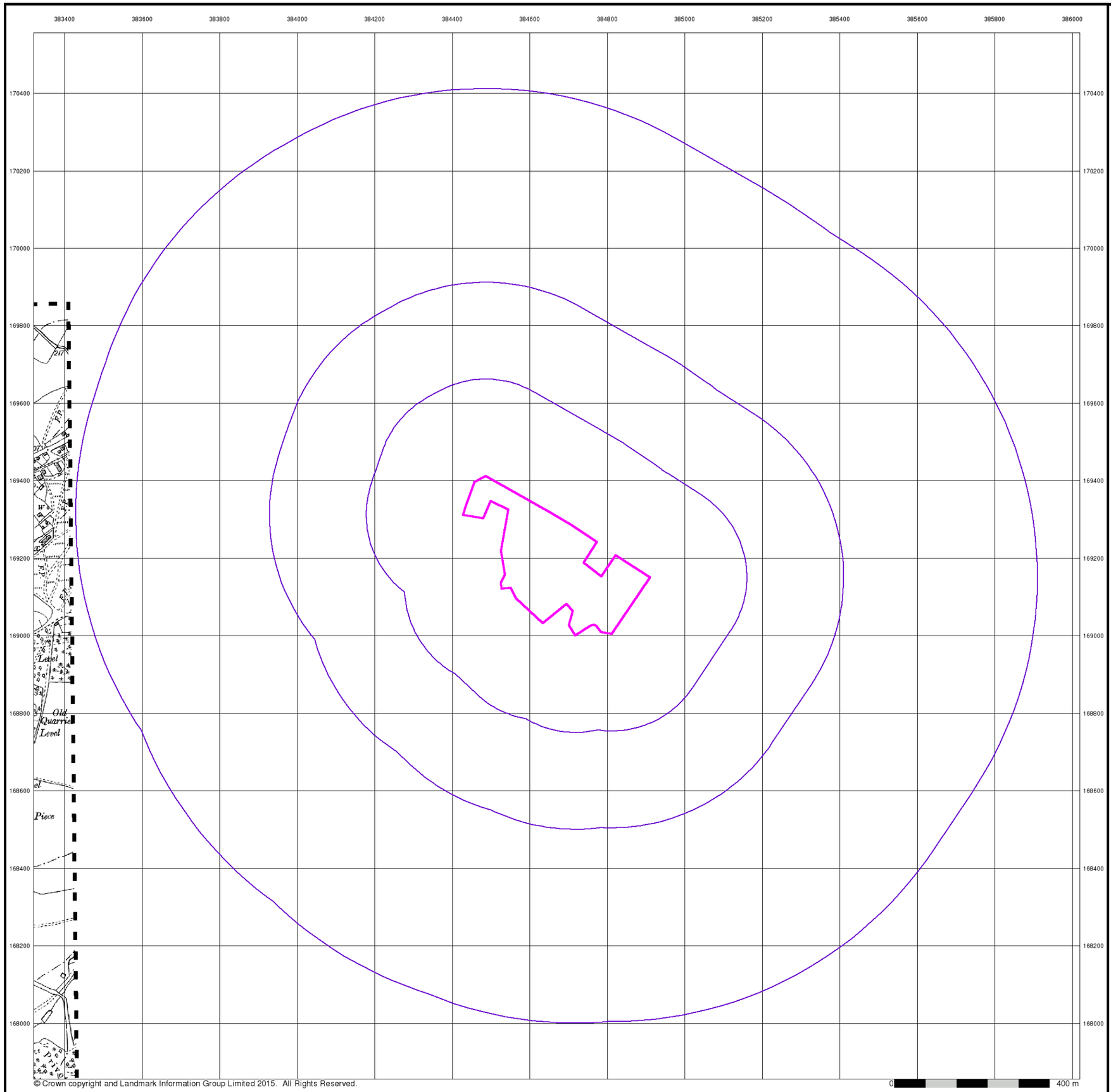
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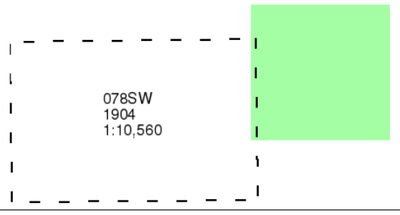
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Published 1904

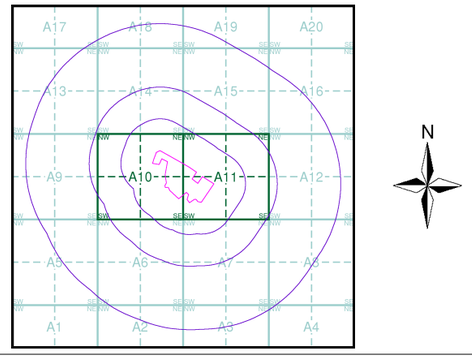
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Map Name(s) and Date(s)



Historical Map - Slice A



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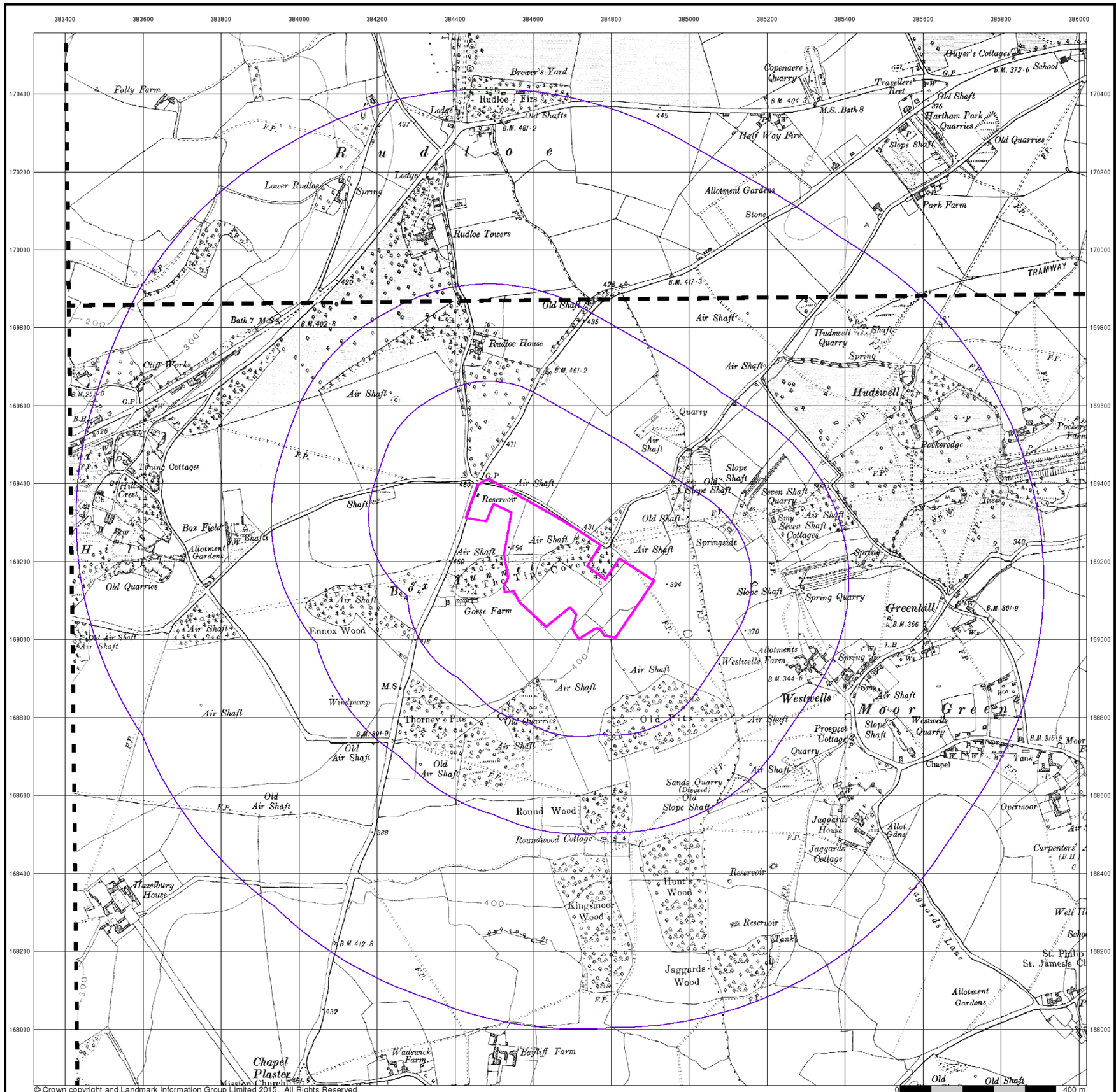
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Wiltshire

Published 1923

Source map scale - 1:10,560

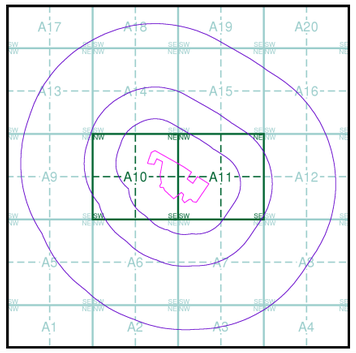
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Map Name(s) and Date(s)

025NE
1923
1:10,560

025SE
1923
1:10,560

Historical Map - Slice A

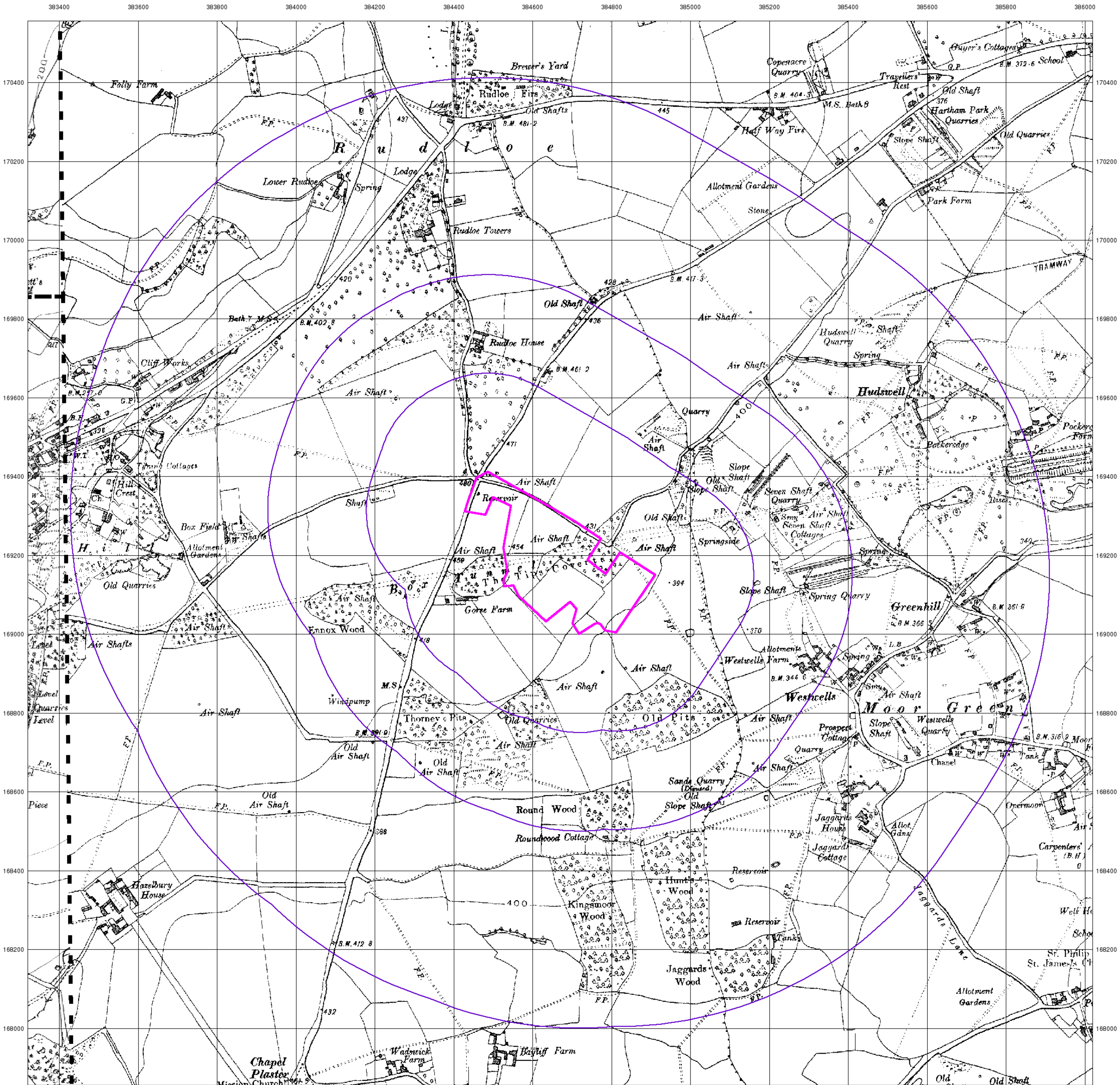


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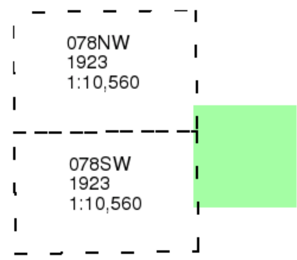
Gloucestershire

Published 1923

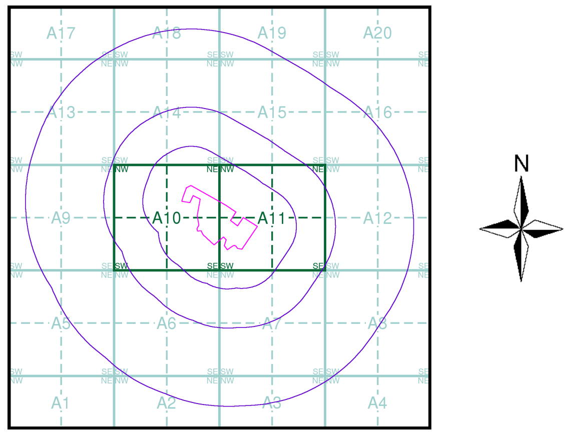
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Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

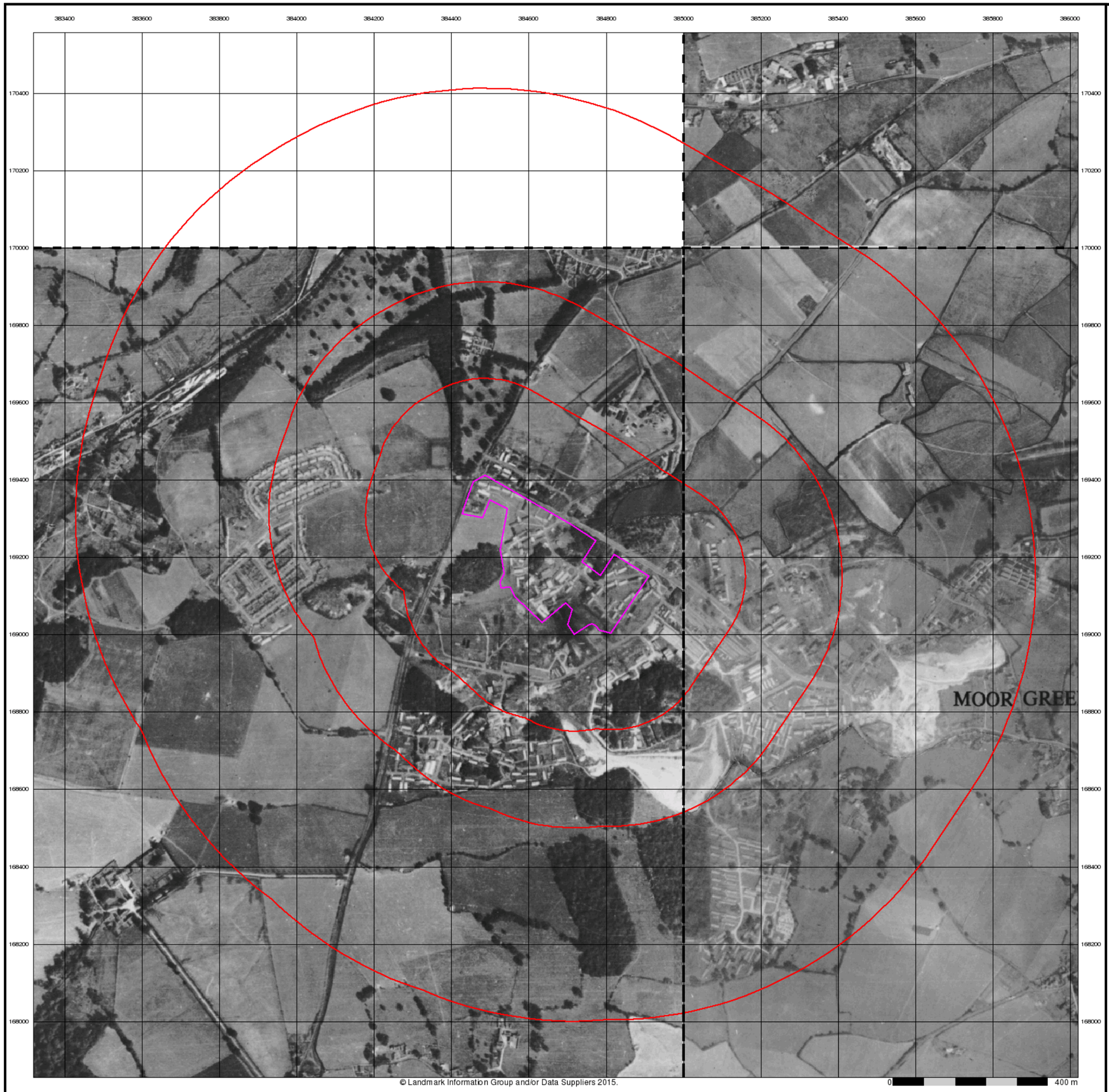
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Search Buffer (m): 1000

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Historical Aerial Photography

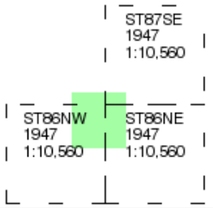
Published 1947

Source map scale - 1:10,560

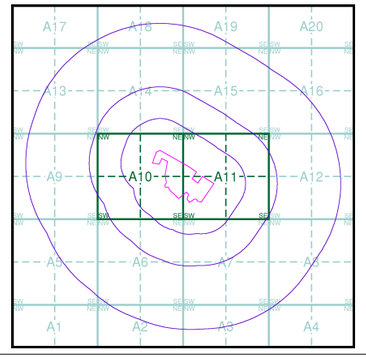
The Historical Aerial Photos were produced by the Ordnance Survey at a scale of 1:1,250 and 1:10,560 from Air Force photography. They were produced between 1944 and 1951 as an interim measure, pending preparation of conventional mapping, due to post war resource shortages. New security measures in the 1950's meant that every photograph was re-checked for potentially unsafe information with security sites replaced by fake fields or clouds. The original editions were withdrawn and only later made available after a period of fifty years although due to the accuracy of the editing, without viewing both revisions it is not easy to spot the edits. Where available Landmark have included both revisions.

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Map Name(s) and Date(s)



Historical Aerial Photography - Slice A



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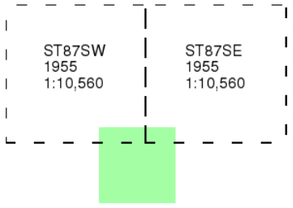
Ordnance Survey Plan

Published 1955

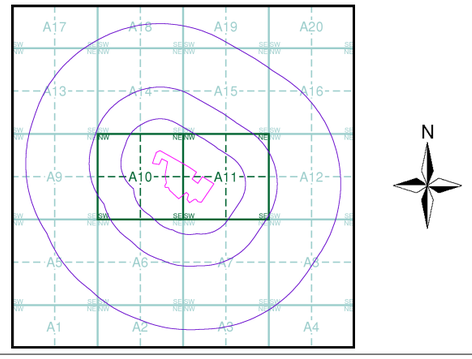
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Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

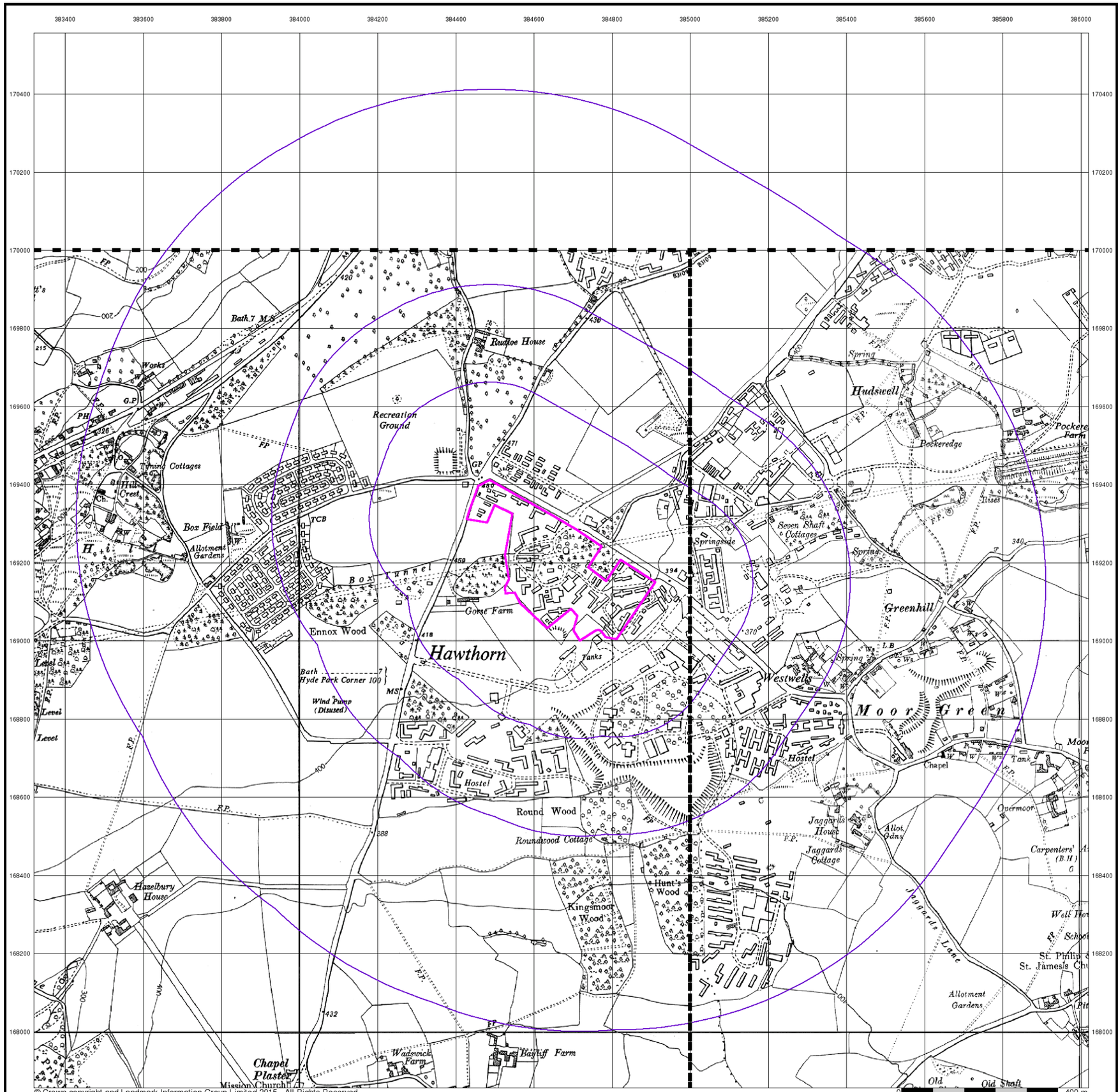
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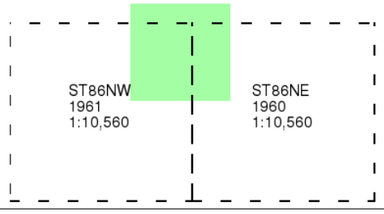
Ordnance Survey Plan

Published 1960 - 1961

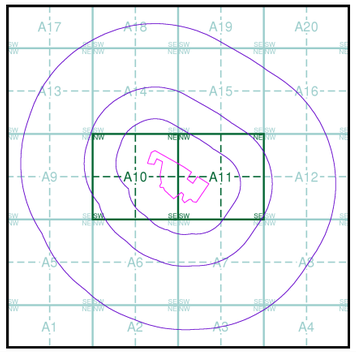
Source map scale - 1:10,000

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



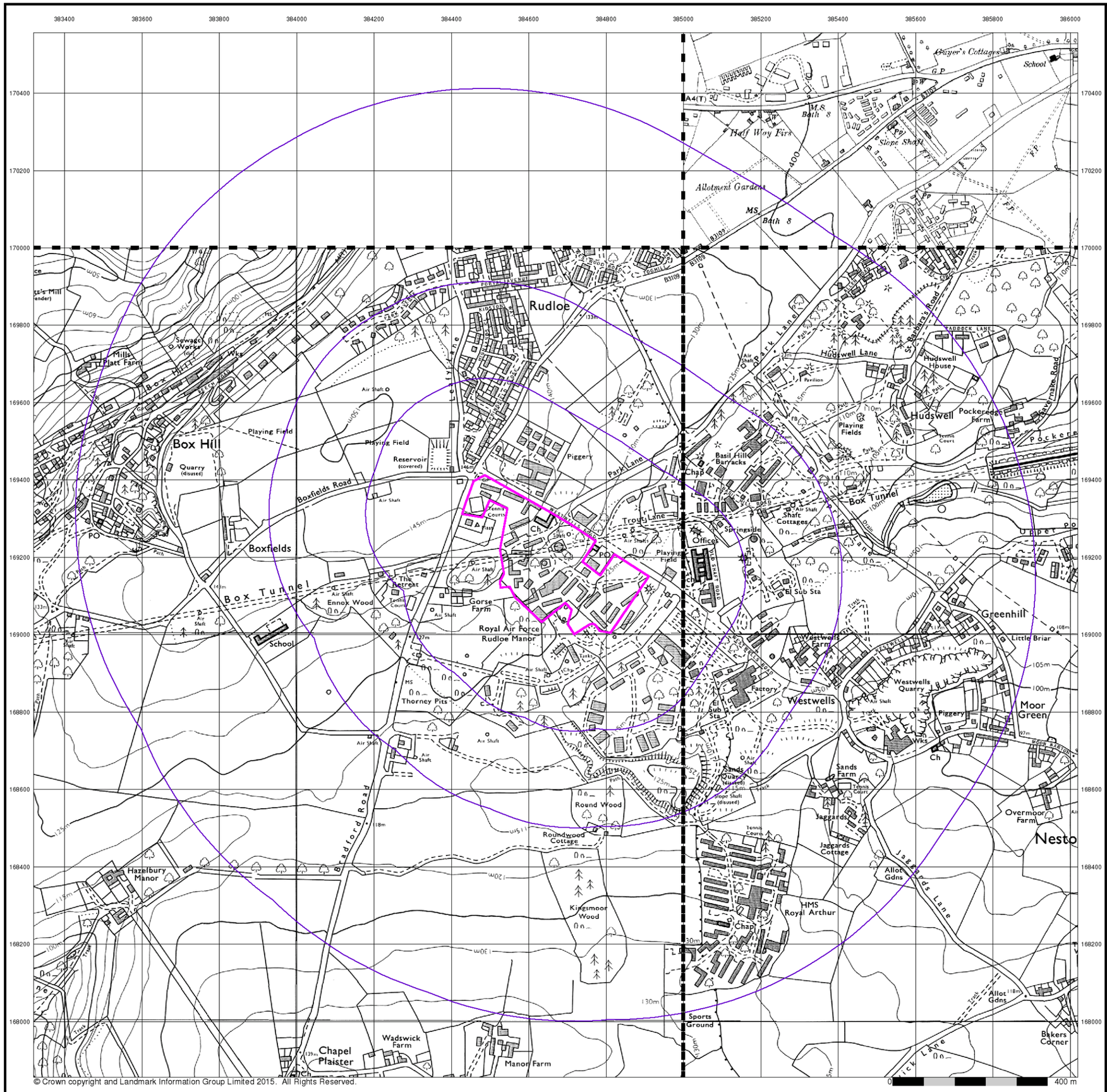
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Order Number:	87557403_1_1
Customer Ref:	C161303
National Grid Reference:	384660, 169200
Slice:	A
Site Area (Ha):	8.46
Search Buffer (m):	1000

Site Details

Site at 384780, 169170

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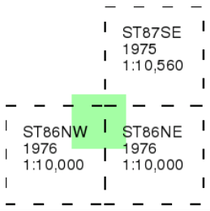
Ordnance Survey Plan

Published 1975 - 1976

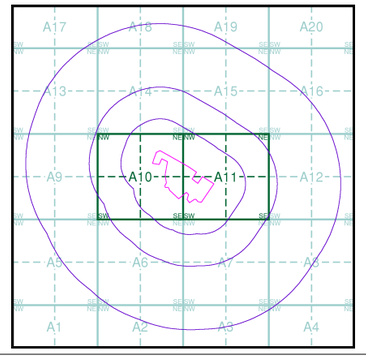
Source map scale - 1:10,000

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Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

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Site Details

Site at 384780, 169170

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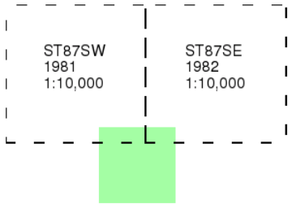
Ordnance Survey Plan

Published 1981 - 1982

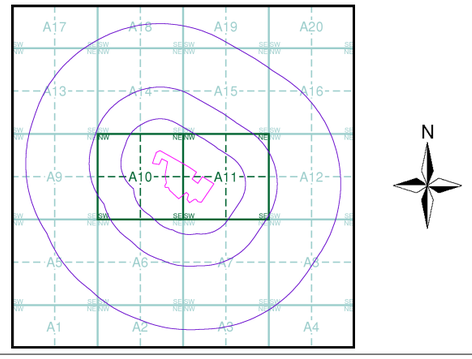
Source map scale - 1:10,000

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



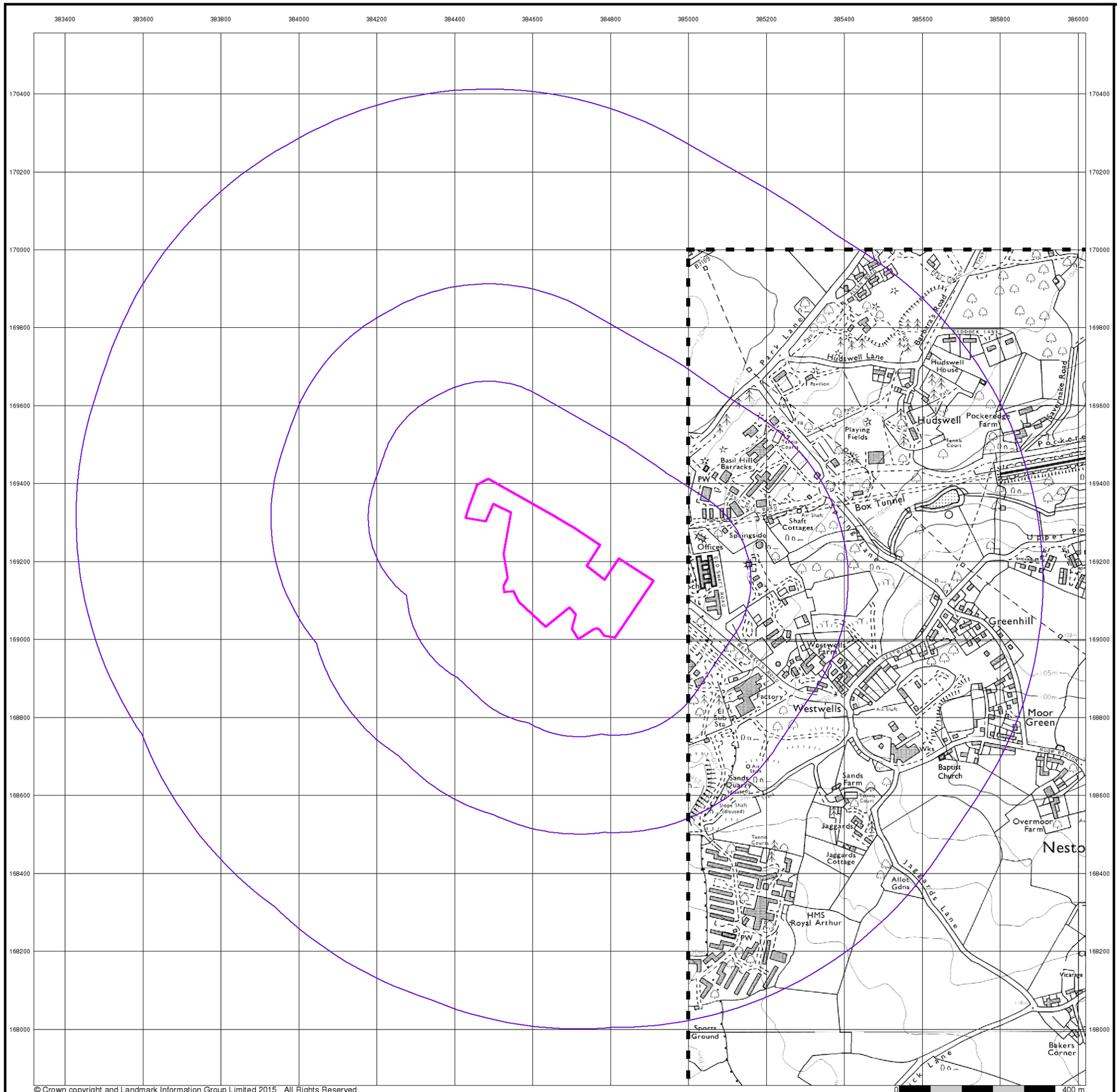
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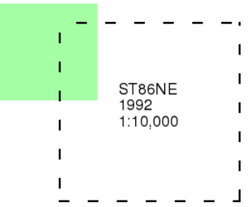
Ordnance Survey Plan

Published 1992

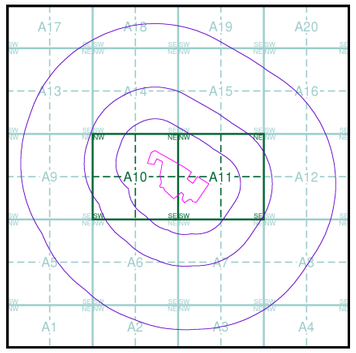
Source map scale - 1:10,000

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Map Name(s) and Date(s)



Historical Map - Slice A



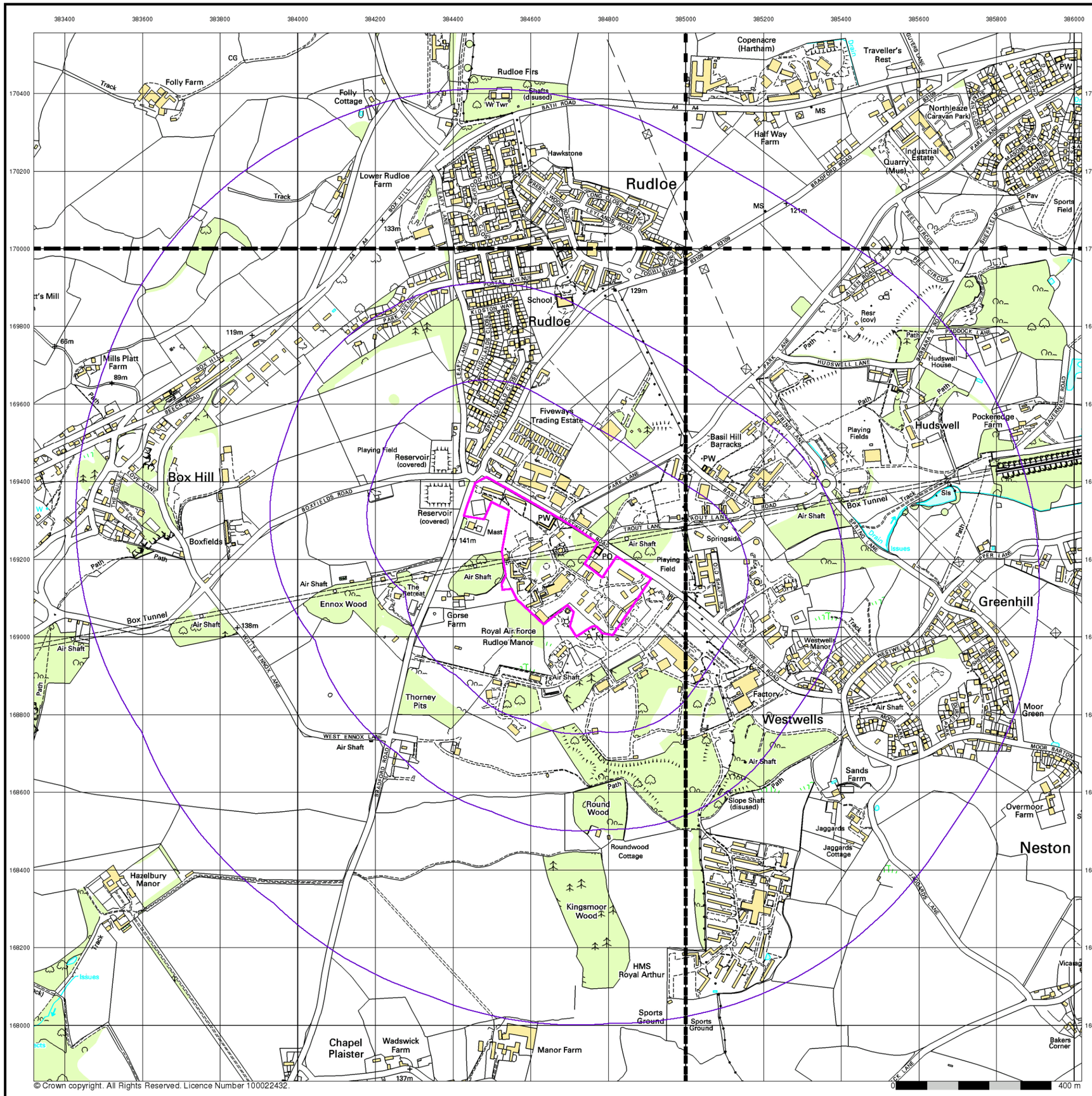
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10k Raster Mapping

Published 1999 - 2000

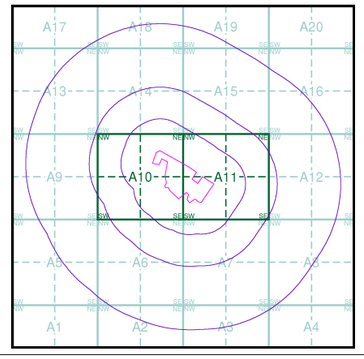
Source map scale - 1:10,000

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)

ST87SW 1999 1:10,000	ST87SE 2000 1:10,000
ST86NW 1999 1:10,000	ST86NE 2000 1:10,000

Historical Map - Slice A



N

Order Details

Order Number:	87557403_1_1
Customer Ref:	C161303
National Grid Reference:	384660, 169200
Slice:	A
Site Area (Ha):	8.46
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Site Details

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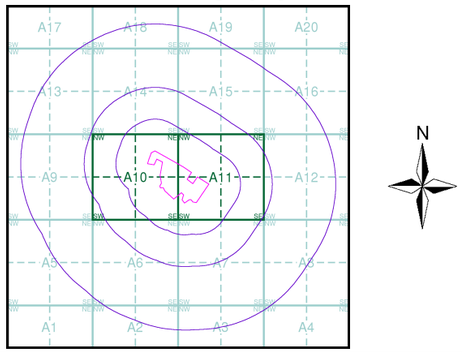


Historical Aerial Photography

Published 1999

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 - Slice A



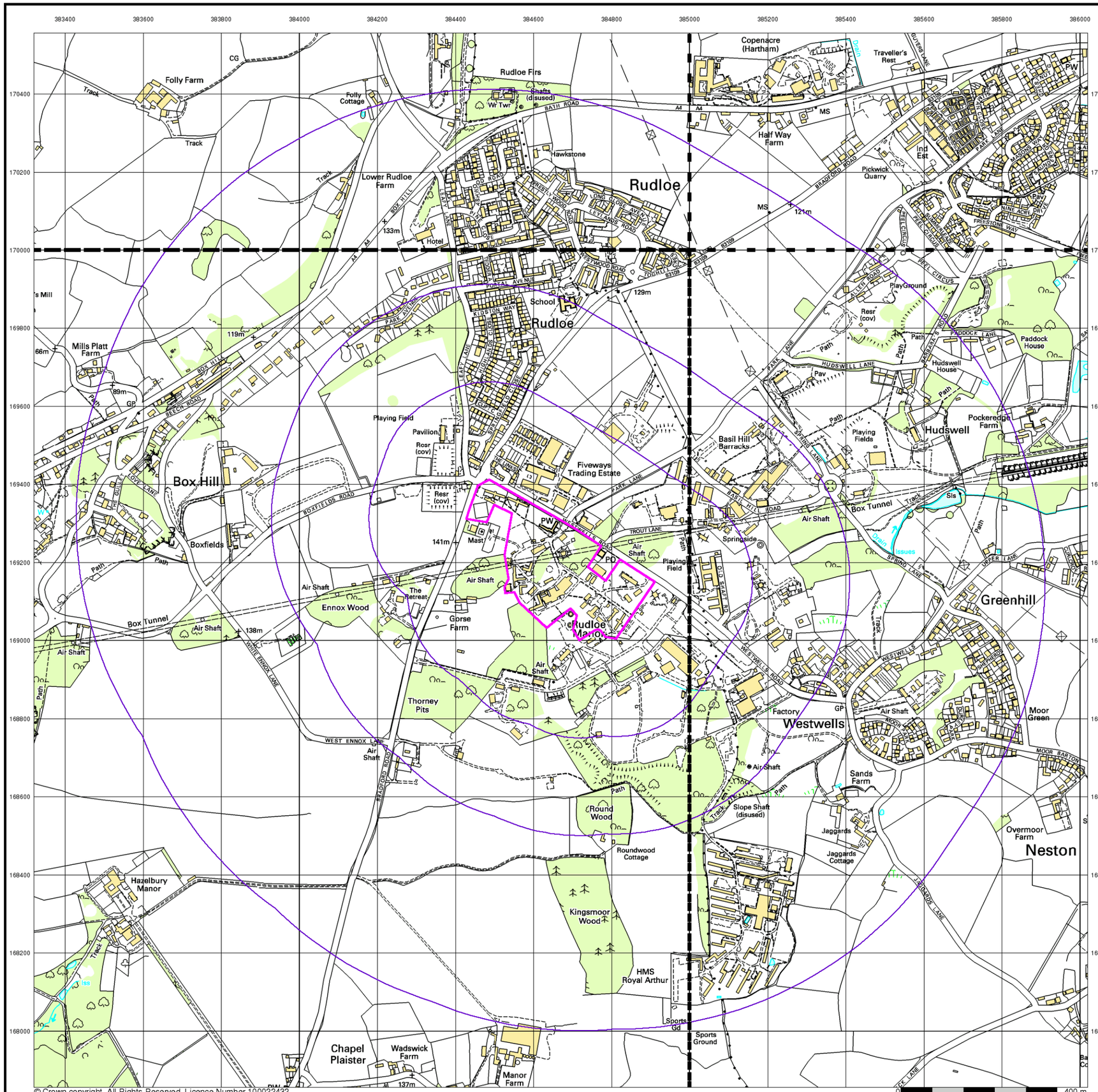
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Site Area (Ha):	8.46
Search Buffer (m):	1000

Site Details

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10k Raster Mapping

Published 2006

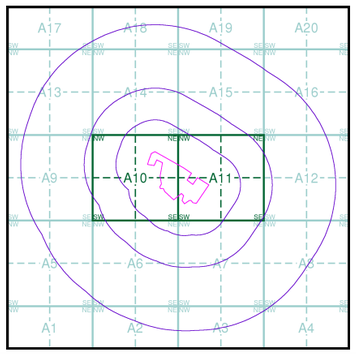
Source map scale - 1:10,000

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)

ST87SW 2006 1:10,000	ST87SE 2006 1:10,000
ST86NW 2006 1:10,000	ST86NE 2006 1:10,000

Historical Map - Slice A



Order Details

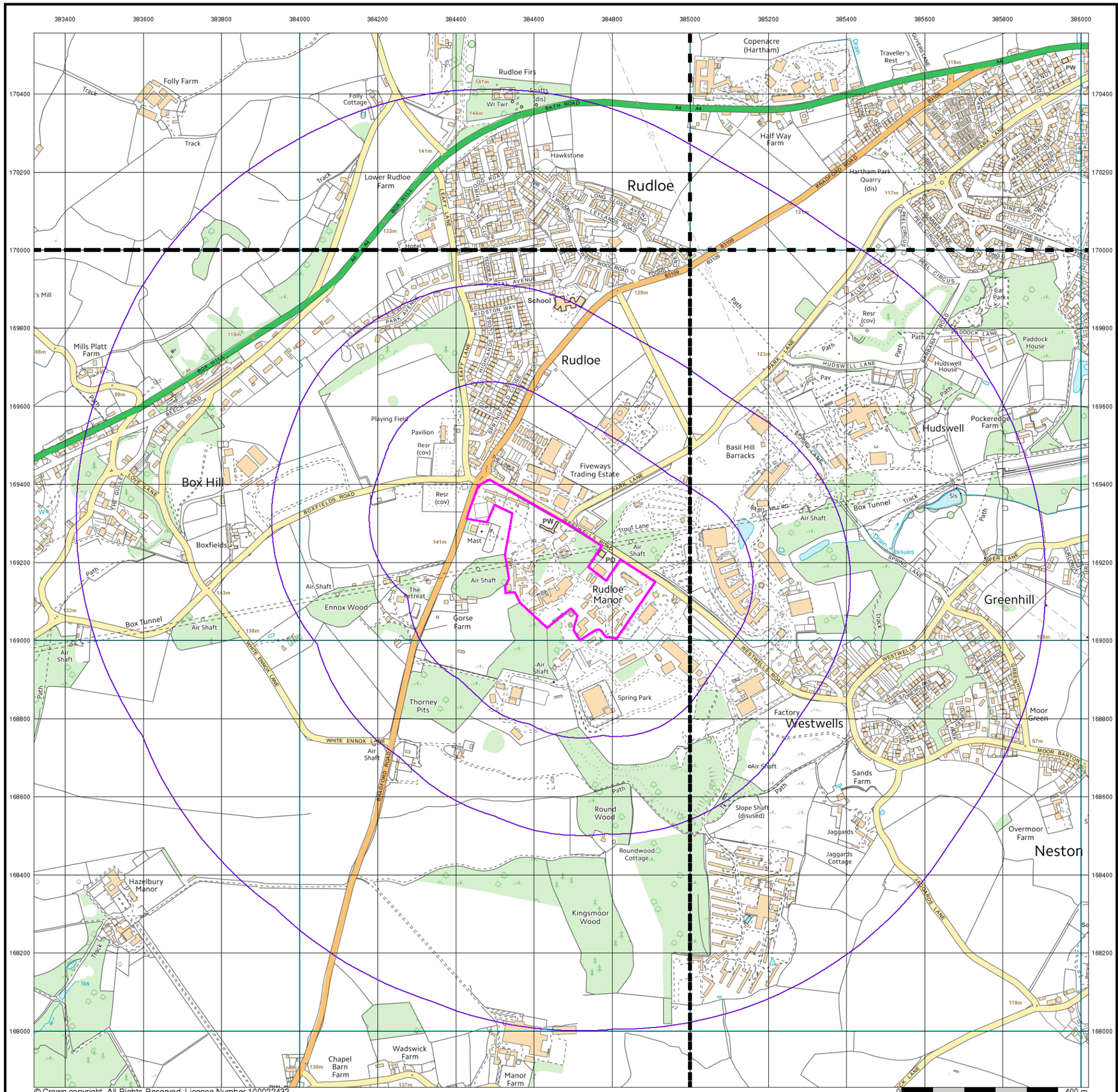
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VectorMap Local

Published 2016

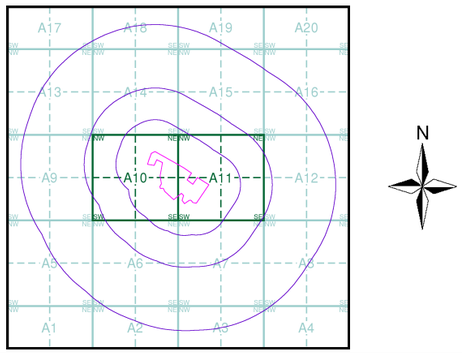
Source map scale - 1:10,000

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)

ST87SW 2016 Variable	ST87SE 2016 Variable
ST86NW 2016 Variable	ST86NE 2016 Variable

Historical Map - Slice A



Order Details

Order Number:	87557403_1_1
Customer Ref:	C161303
National Grid Reference:	384660, 169200
Slice:	A
Site Area (Ha):	8.46
Search Buffer (m):	1000

Site Details

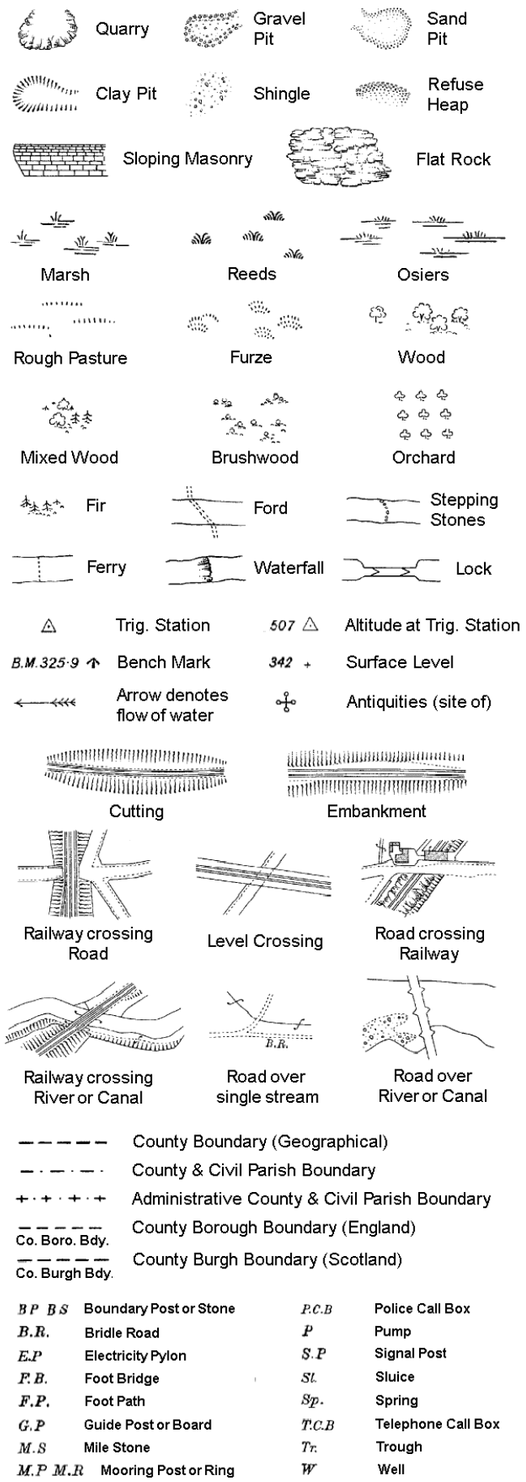
Site at 384780, 169170

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Historical Mapping Legends

Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



County Boundary (Geographical)

County & Civil Parish Boundary

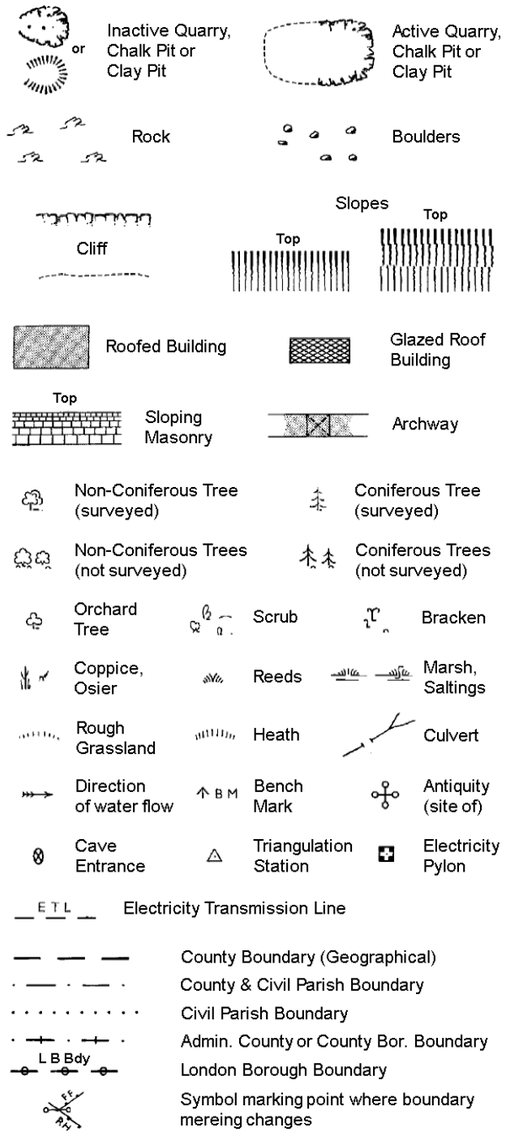
Administrative County & Civil Parish Boundary

Co. Boro. Bdy. County Borough Boundary (England)

Co. Burgh Bdy. County Burgh Boundary (Scotland)

B P B S	Boundary Post or Stone	P.C.B	Police Call Box
B.R.	Bridle Road	P	Pump
E.P	Electricity Pylon	S.P	Signal Post
F.B.	Foot Bridge	St.	Sluice
F.P.	Foot Path	Sp.	Spring
G.P	Guide Post or Board	T.C.B	Telephone Call Box
M.S	Mile Stone	Tr.	Trough
M.P M.R	Mooring Post or Ring	W	Well

Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



County Boundary (Geographical)

County & Civil Parish Boundary

Civil Parish Boundary

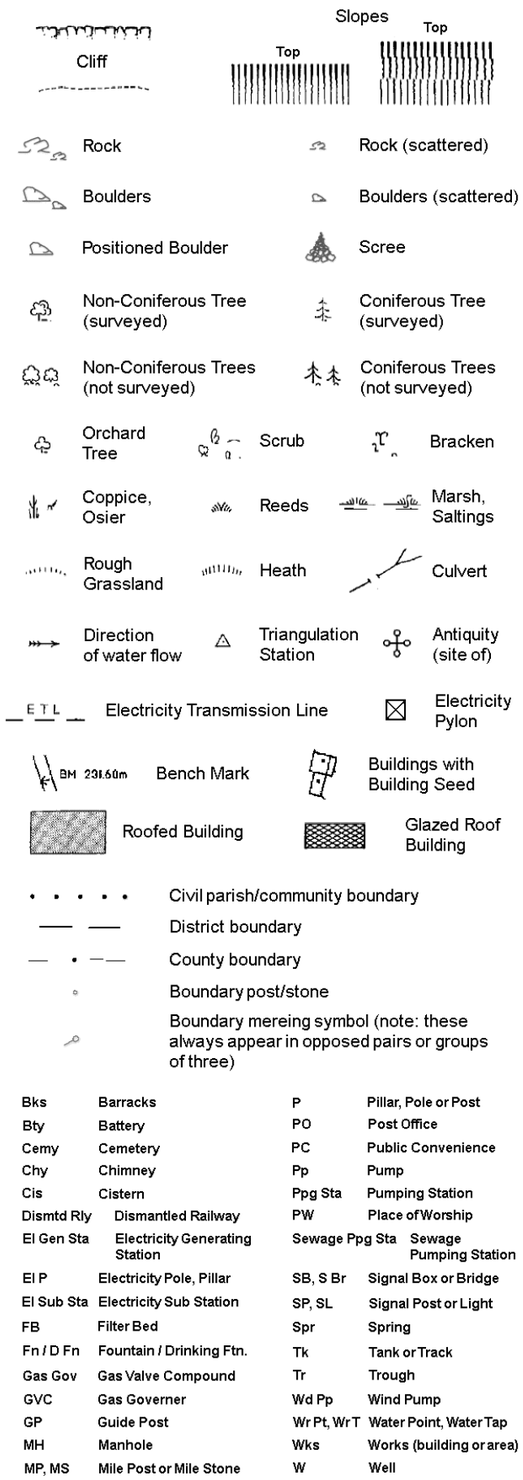
Admin. County or County Bor. Boundary

L B Bdy London Borough Boundary

Symbol marking point where boundary mereing changes

BH	Beer House	P	Pillar, Pole or Post
BP, BS	Boundary Post or Stone	PO	Post Office
Cn, C	Capstan, Crane	PC	Public Convenience
Chy	Chimney	PH	Public House
D Fn	Drinking Fountain	Pp	Pump
El P	Electricity Pillar or Post	SB, S Br	Signal Box or Bridge
FAP	Fire Alarm Pillar	SP, SL	Signal Post or Light
FB	Foot Bridge	Spr	Spring
GP	Guide Post	Tk	Tank or Track
H	Hydrant or Hydraulic	TCB	Telephone Call Box
LC	Level Crossing	TCP	Telephone Call Post
MH	Manhole	Tr	Trough
MP	Mile Post or Mooring Post	Wr Pt, Wr T	Water Point, Water Tap
MS	Mile Stone	W	Well
NTL	Normal Tidal Limit	Wd Pp	Wind Pump

Large-Scale National Grid Data 1:2,500 and 1:1,250



Civil parish/community boundary

District boundary

County boundary

Boundary post/stone

Boundary mereing symbol (note: these always appear in opposed pairs or groups of three)

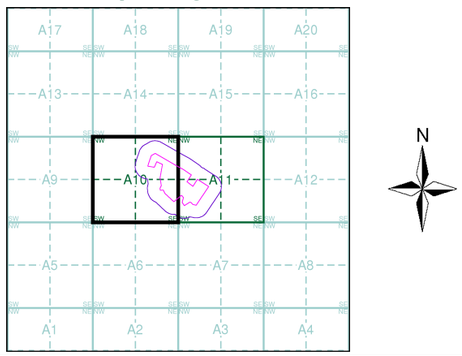
Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity Pole, Pillar	SB, S Br	Signal Box or Bridge
El Sub Sta	Electricity Sub Station	SP, SL	Signal Post or Light
FB	Filter Bed	Spr	Spring
Fn / D Fn	Fountain / Drinking Ftn.	Tk	Tank or Track
Gas Gov	Gas Valve Compound	Tr	Trough
GVC	Gas Governer	Wd Pp	Wind Pump
GP	Guide Post	Wr Pt, Wr T	Water Point, Water Tap
MH	Manhole	Wks	Works (building or area)
MP, MS	Mile Post or Mile Stone	W	Well

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Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Wiltshire	1:2,500	1886	2
Wiltshire	1:2,500	1900	3
Wiltshire	1:2,500	1921	4
Ordnance Survey Plan	1:2,500	1969 - 1974	5
Supply of Unpublished Survey Information	1:2,500	1975	6
Additional SIMs	1:2,500	1977	7
Additional SIMs	1:2,500	1989	8
Large-Scale National Grid Data	1:2,500	1993	9

Historical Map - Segment A10



Order Details

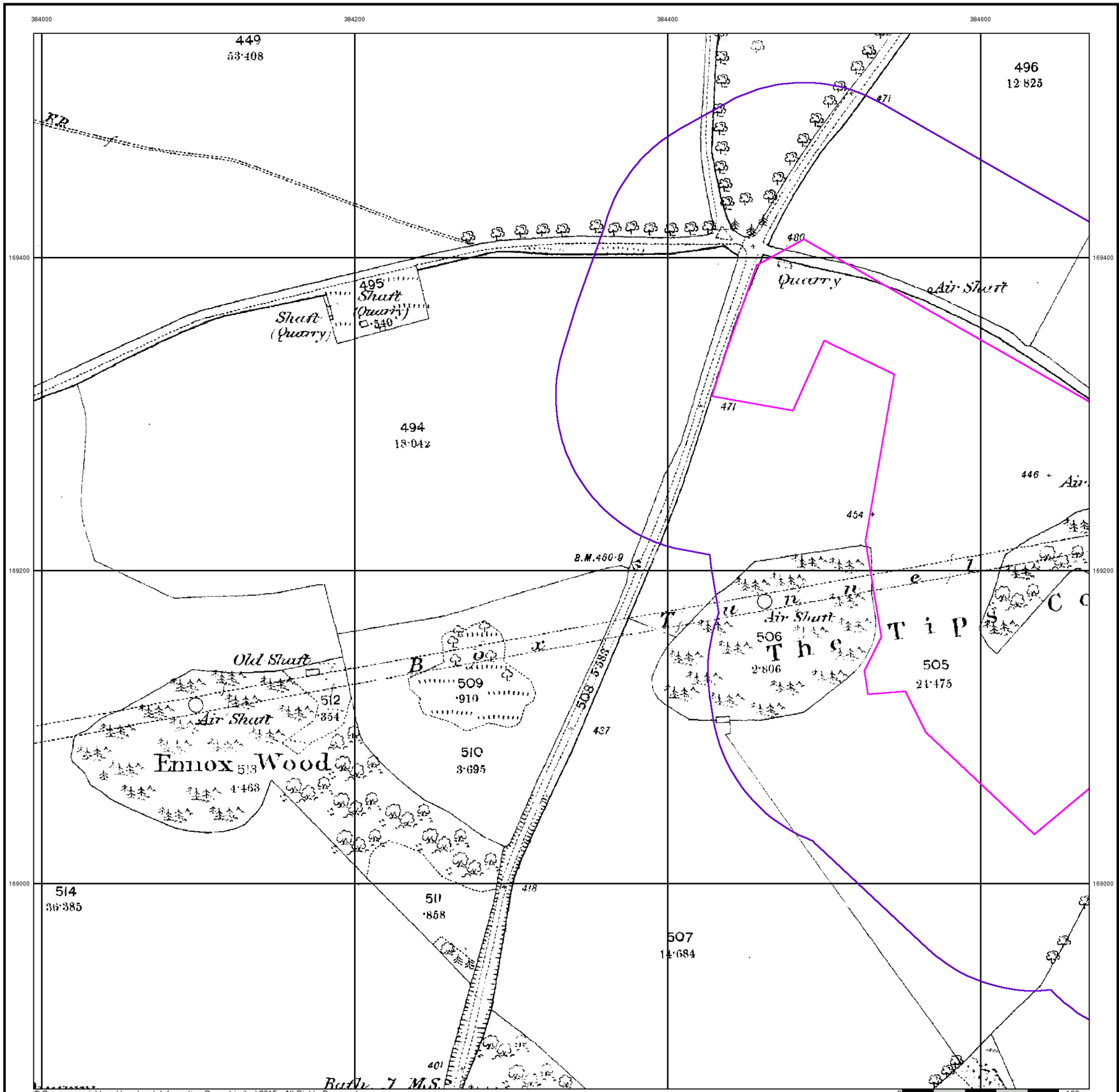
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National Grid Reference:	384660, 169200
Slice:	A
Site Area (Ha):	8.46
Search Buffer (m):	100

Site Details

Site at 384780, 169170

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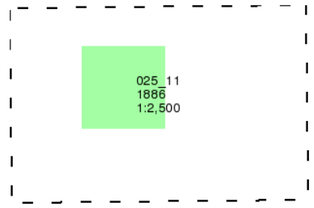
Wiltshire

Published 1886

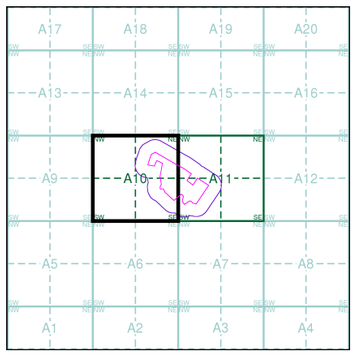
Source map scale - 1:2,500

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 A10



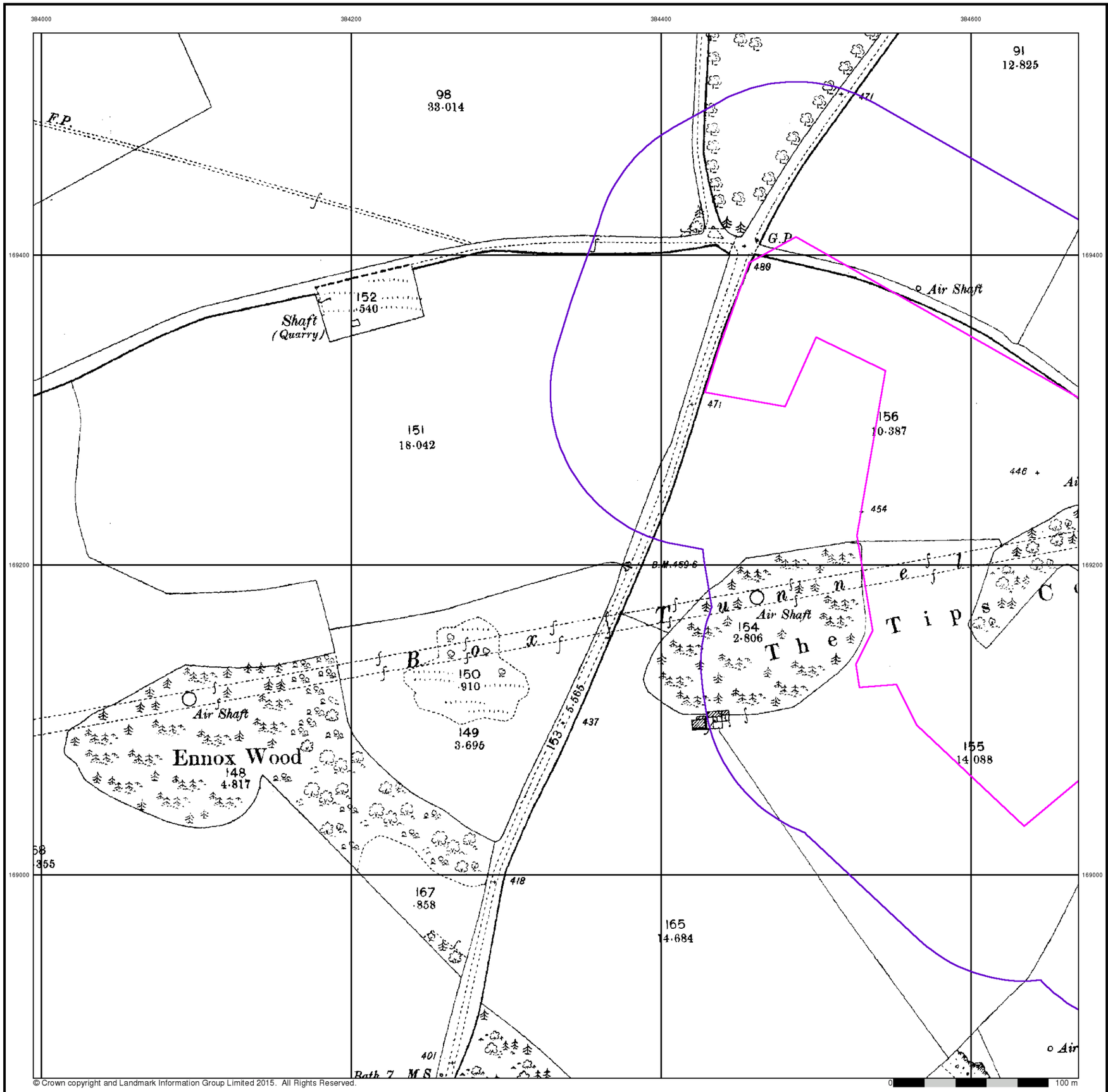
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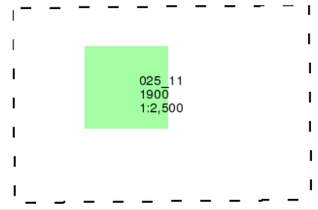
Wiltshire

Published 1900

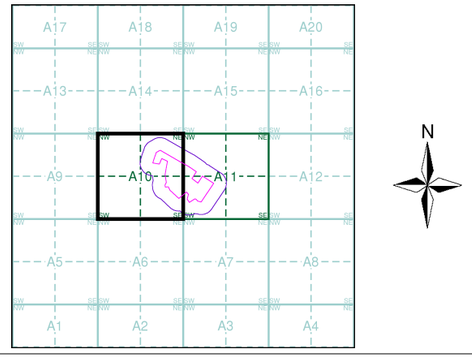
Source map scale - 1:2,500

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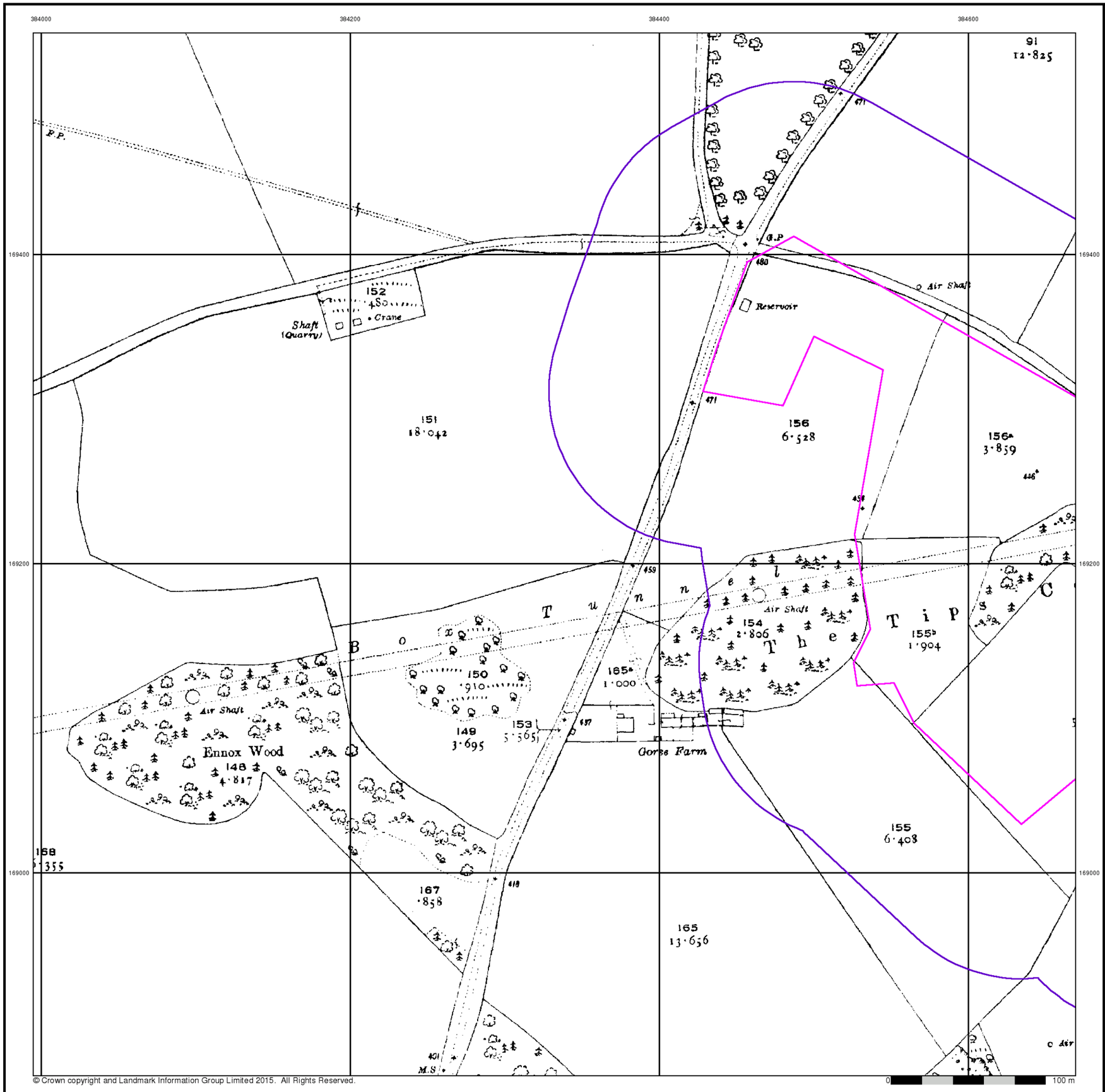
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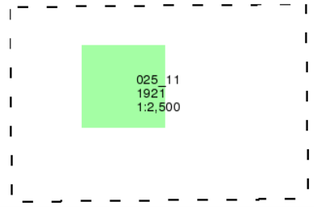
Wiltshire

Published 1921

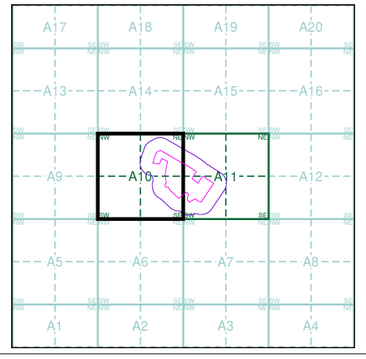
Source map scale - 1:2,500

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 A10



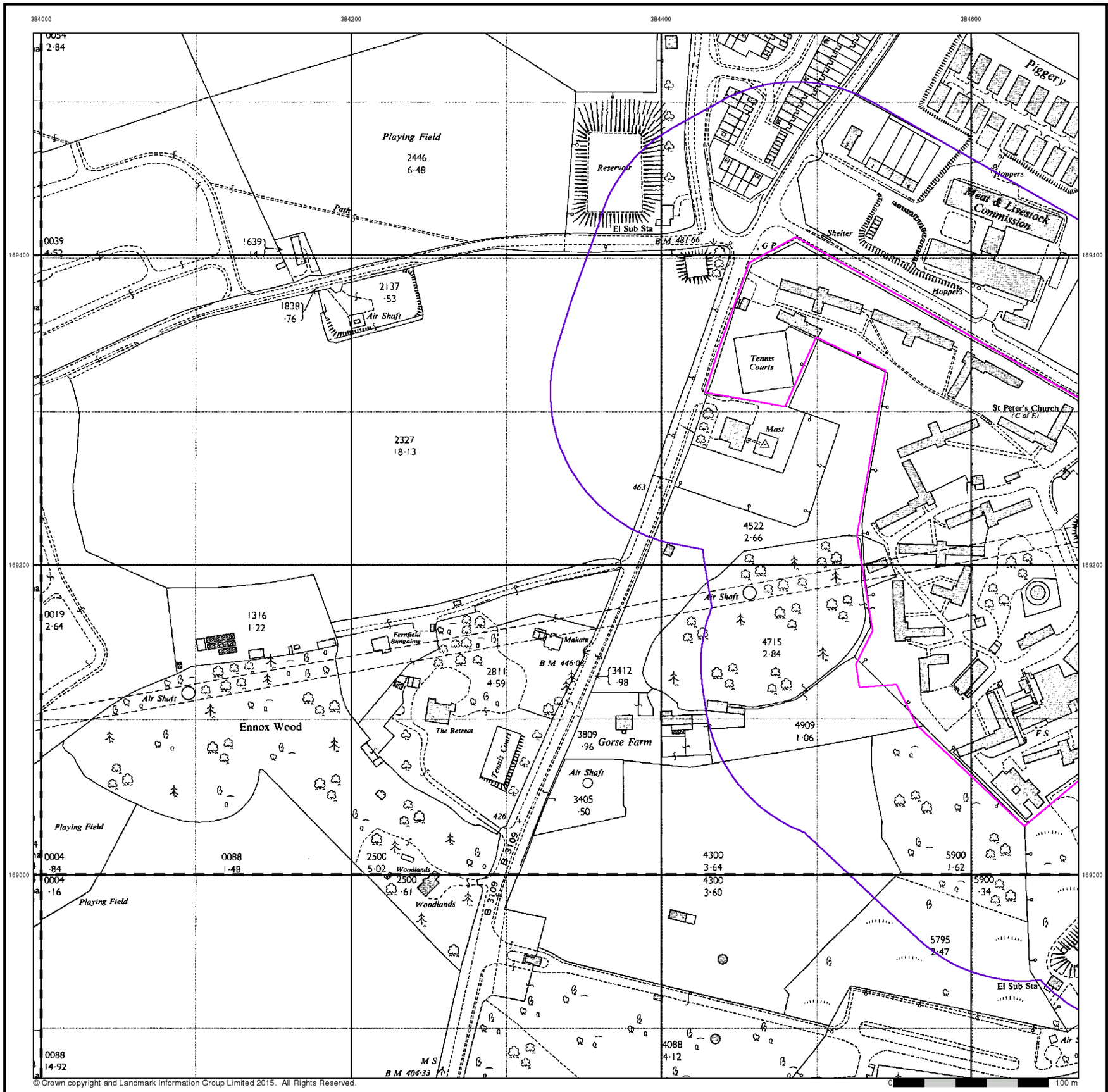
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Customer Ref:	C161303
National Grid Reference:	384660, 169200
Slice:	A
Site Area (Ha):	8.46
Search Buffer (m):	100

Site Details

Site at 384780, 169170

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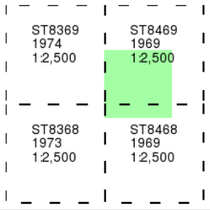
Ordnance Survey Plan

Published 1969 - 1974

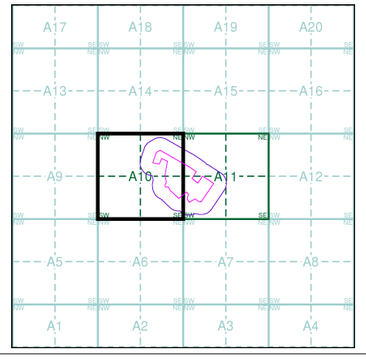
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Historical Map - Segment A10



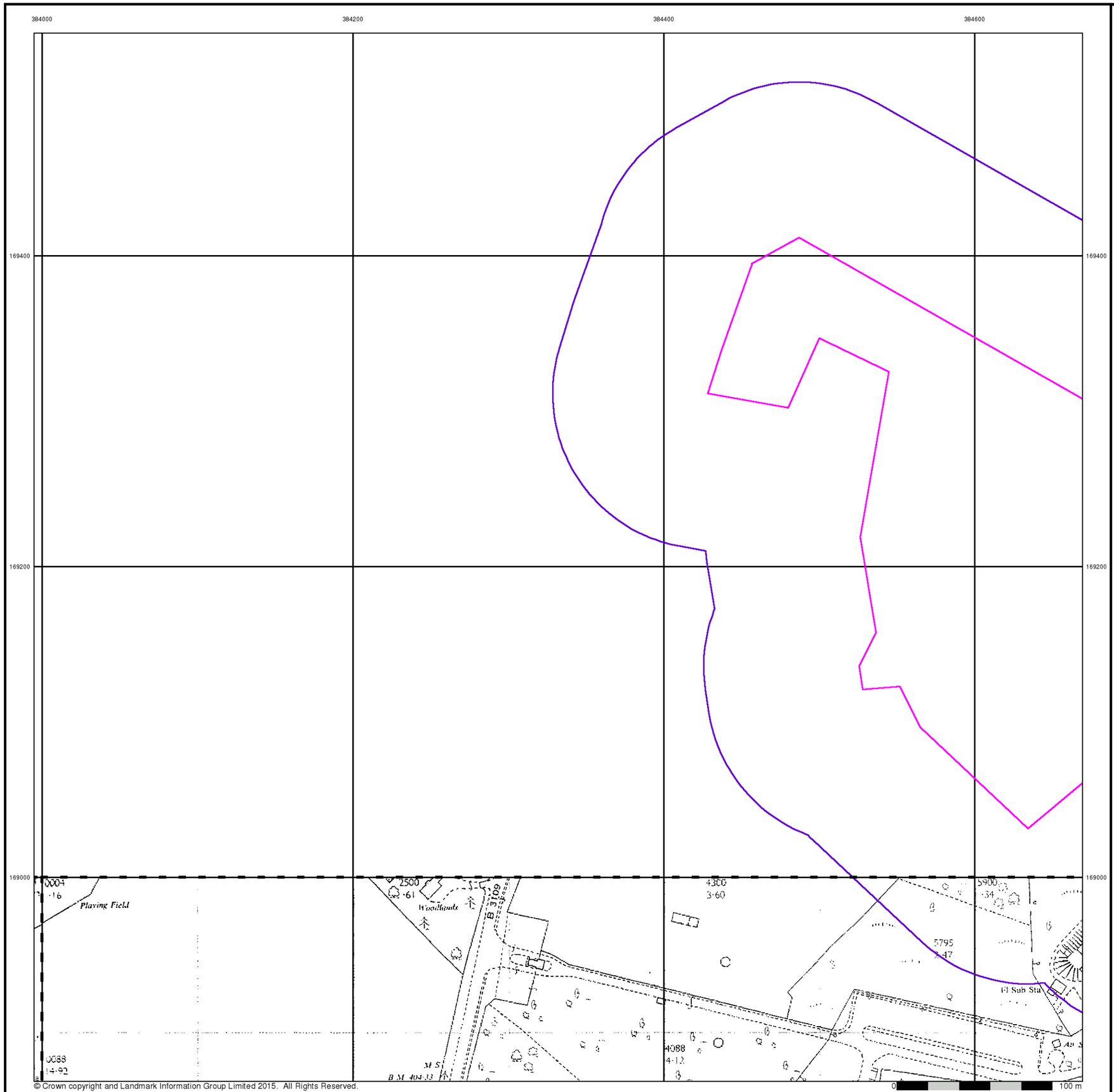
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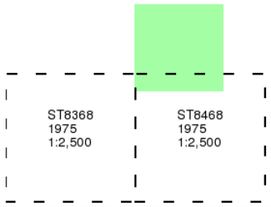
Supply of Unpublished Survey Information

Published 1975

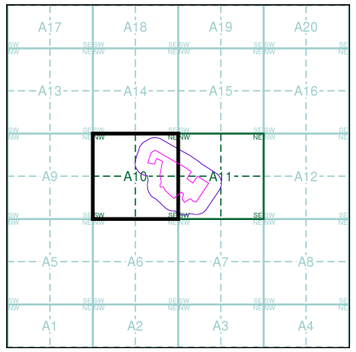
Source map scale - 1:2,500

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)



Historical Map - Segment A10



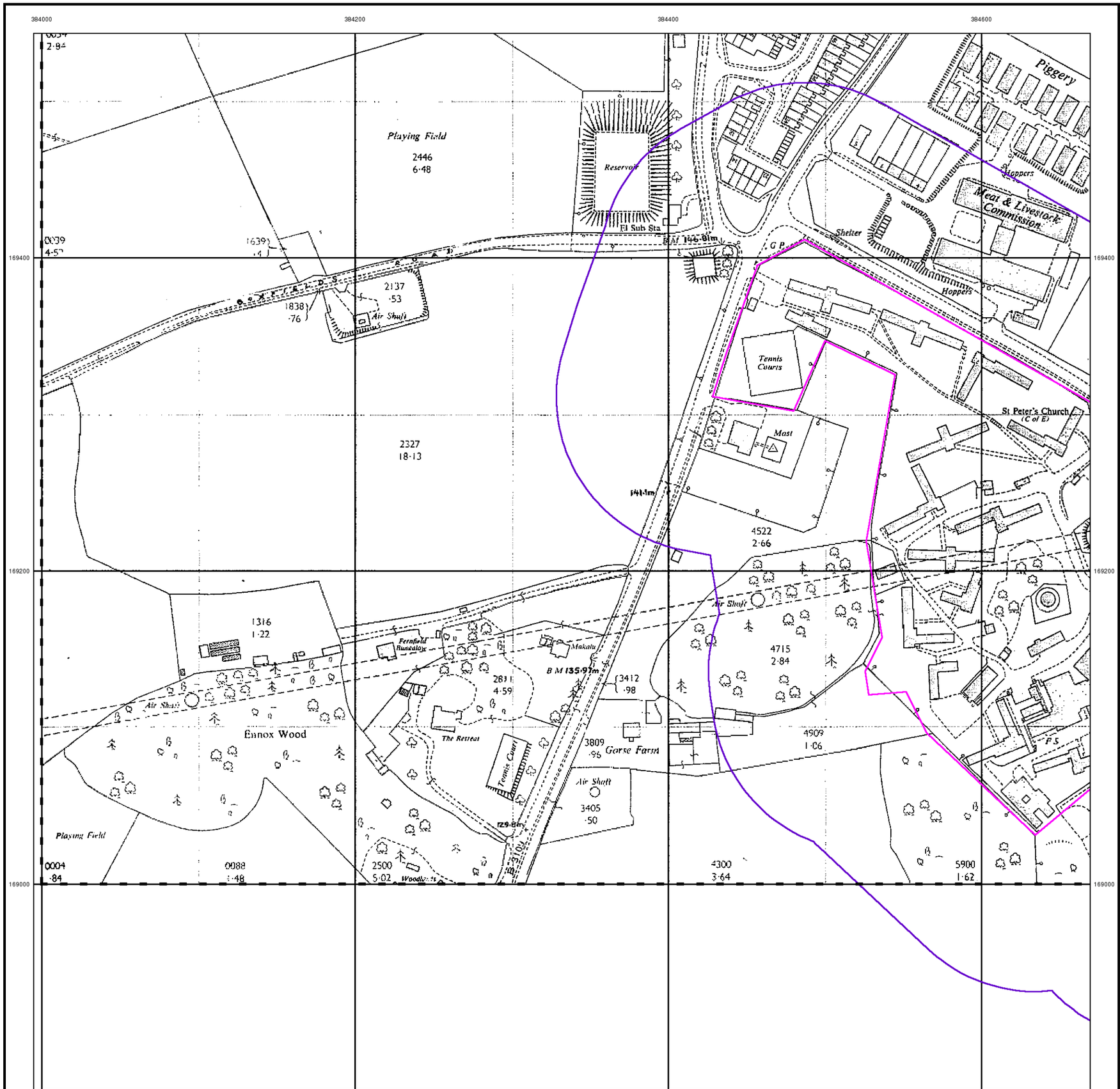
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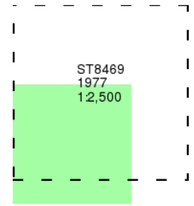
Additional SIMs

Published 1977

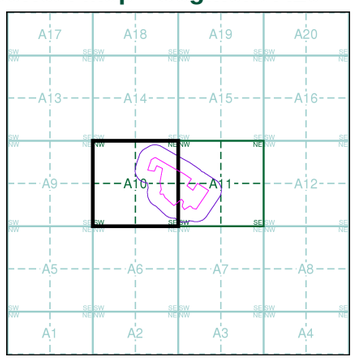
Source map scale - 1:2,500

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)



Historical Map - Segment A10



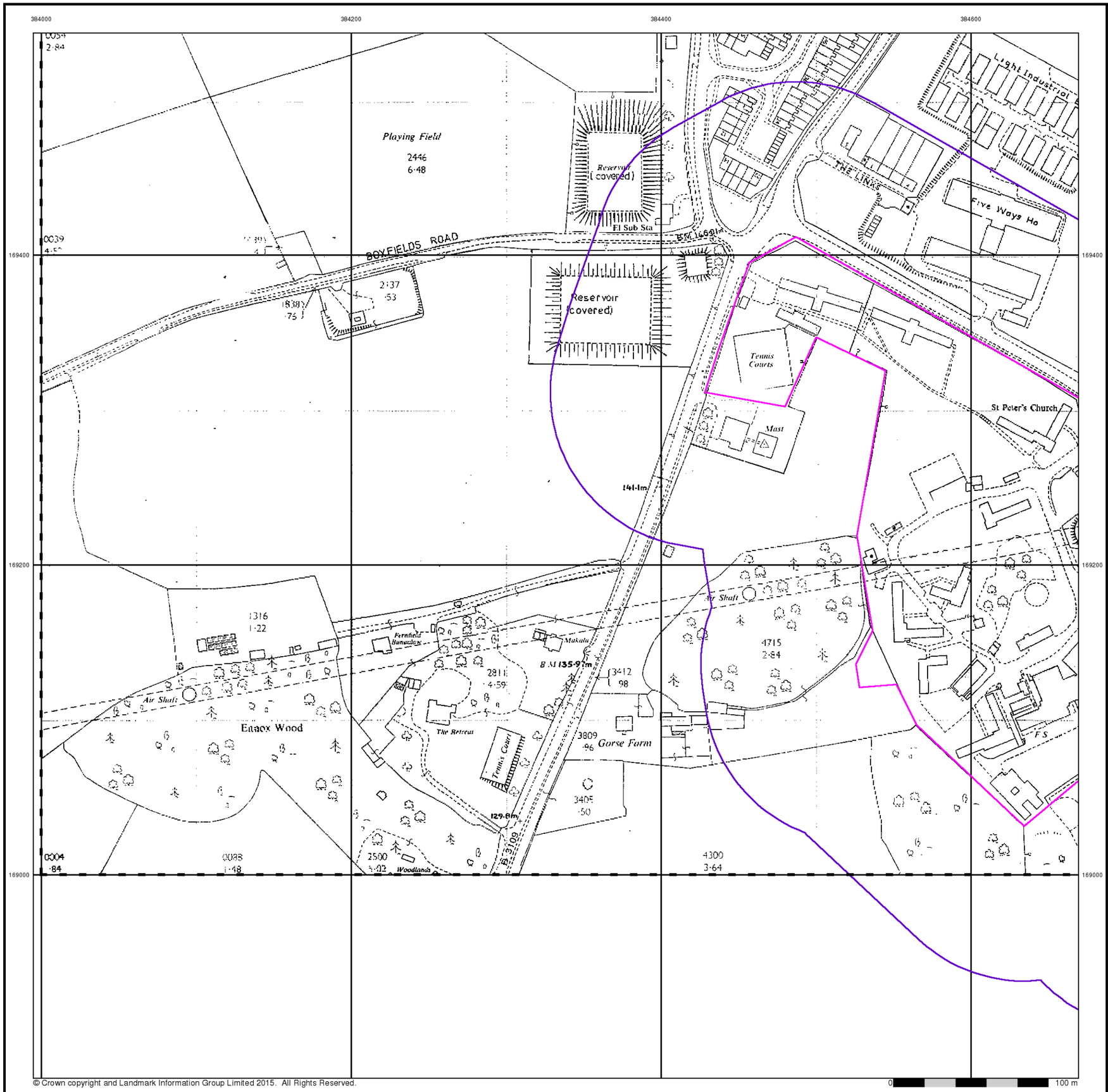
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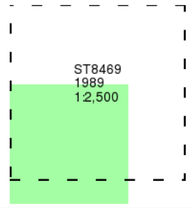
Additional SIMs

Published 1989

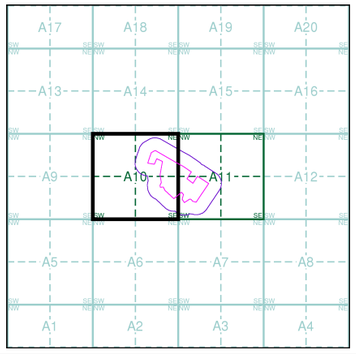
Source map scale - 1:2,500

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)



Historical Map - Segment A10



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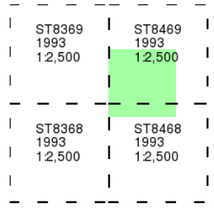
Large-Scale National Grid Data

Published 1993

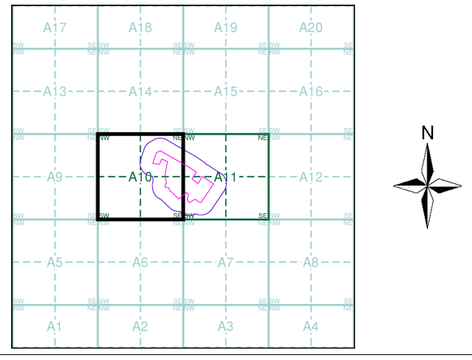
Source map scale - 1:2,500

'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 A10



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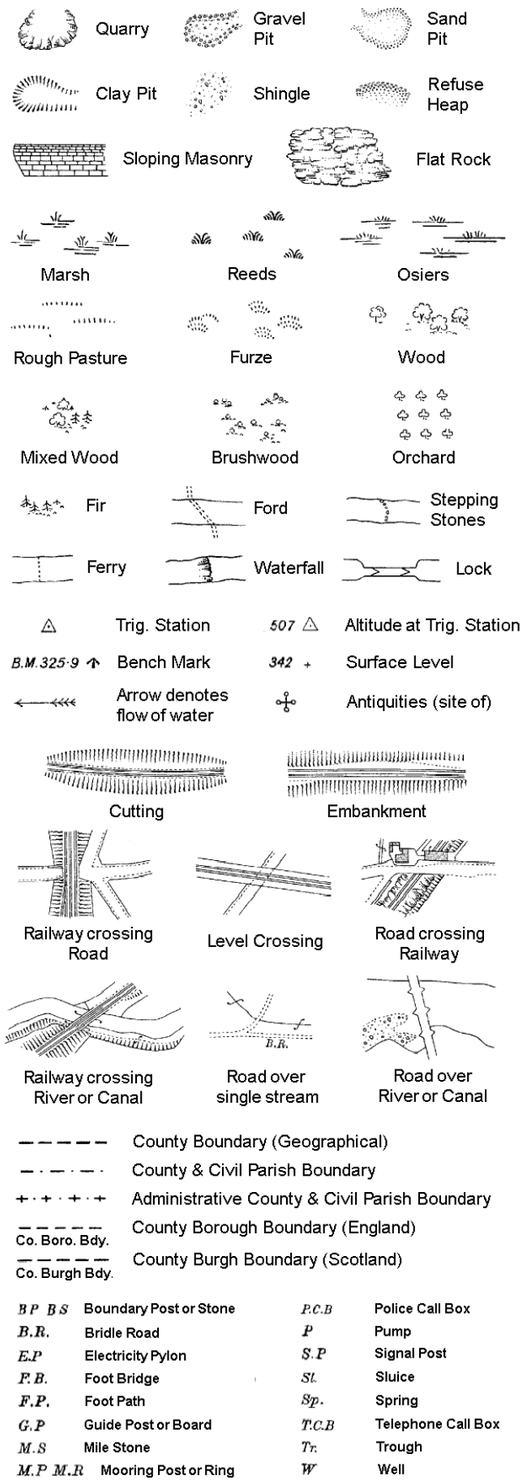
Site at 384780, 169170

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Historical Mapping Legends

Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



County Boundary (Geographical)

County & Civil Parish Boundary

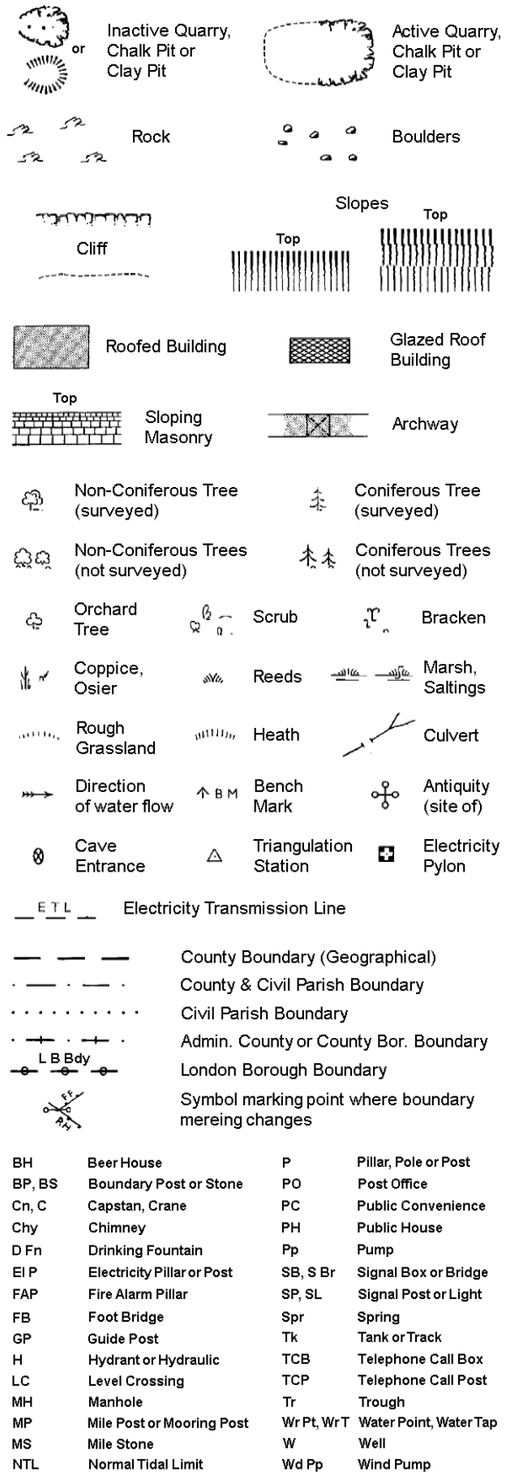
Administrative County & Civil Parish Boundary

Co. Boro. Bdy. County Borough Boundary (England)

Co. Burgh Bdy. County Burgh Boundary (Scotland)

B P B S	Boundary Post or Stone	P.C.B	Police Call Box
B.R.	Bridle Road	P	Pump
E.P	Electricity Pylon	S.P	Signal Post
F.B.	Foot Bridge	St.	Sluice
F.P.	Foot Path	Sp.	Spring
G.P	Guide Post or Board	T.C.B	Telephone Call Box
M.S	Mile Stone	Tr.	Trough
M.P M.R	Mooring Post or Ring	W	Well

Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



County Boundary (Geographical)

County & Civil Parish Boundary

Civil Parish Boundary

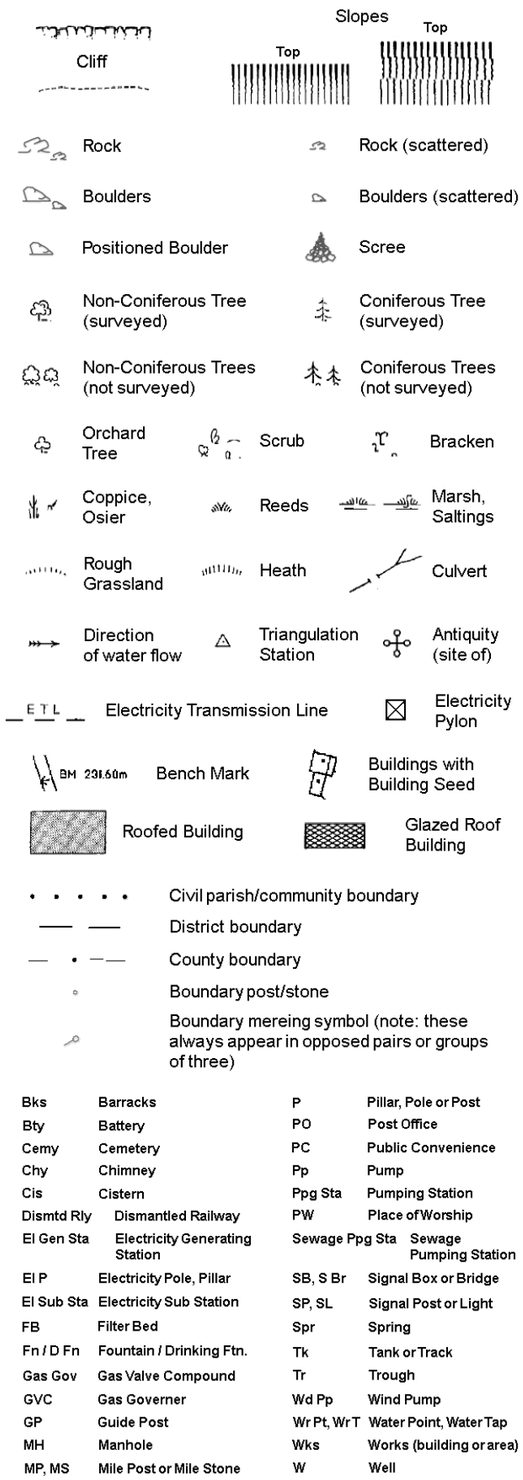
Admin. County or County Bor. Boundary

L B Bdy London Borough Boundary

Symbol marking point where boundary mereing changes

BH	Beer House	P	Pillar, Pole or Post
BP, BS	Boundary Post or Stone	PO	Post Office
Cn, C	Capstan, Crane	PC	Public Convenience
Chy	Chimney	PH	Public House
D Fn	Drinking Fountain	Pp	Pump
El P	Electricity Pillar or Post	SB, S Br	Signal Box or Bridge
FAP	Fire Alarm Pillar	SP, SL	Signal Post or Light
FB	Foot Bridge	Spr	Spring
GP	Guide Post	Tk	Tank or Track
H	Hydrant or Hydraulic	TCB	Telephone Call Box
LC	Level Crossing	TCP	Telephone Call Post
MH	Manhole	Tr	Trough
MP	Mile Post or Mooring Post	Wr Pt, Wr T	Water Point, Water Tap
MS	Mile Stone	W	Well
NTL	Normal Tidal Limit	Wd Pp	Wind Pump

Large-Scale National Grid Data 1:2,500 and 1:1,250



Civil parish/community boundary

District boundary

County boundary

Boundary post/stone

Boundary mereing symbol (note: these always appear in opposed pairs or groups of three)

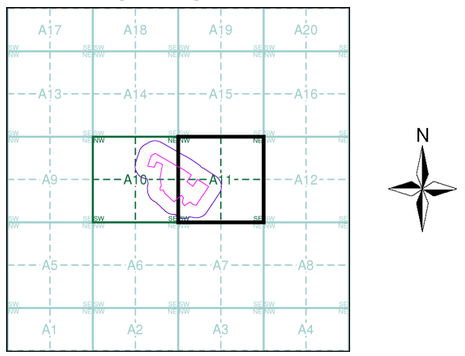
Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity Pole, Pillar	SB, S Br	Signal Box or Bridge
El Sub Sta	Electricity Sub Station	SP, SL	Signal Post or Light
FB	Filter Bed	Spr	Spring
Fn / D Fn	Fountain / Drinking Ftn.	Tk	Tank or Track
Gas Gov	Gas Valve Compound	Tr	Trough
GVC	Gas Governer	Wd Pp	Wind Pump
GP	Guide Post	Wr Pt, Wr T	Water Point, Water Tap
MH	Manhole	Wks	Works (building or area)
MP, MS	Mile Post or Mile Stone	W	Well

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Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Wiltshire	1:2,500	1886	2
Wiltshire	1:2,500	1900	3
Wiltshire	1:2,500	1921	4
Ordnance Survey Plan	1:2,500	1969	5
Supply of Unpublished Survey Information	1:2,500	1975	6
Additional SIMs	1:2,500	1977 - 1989	7
Additional SIMs	1:2,500	1989	8
Large-Scale National Grid Data	1:2,500	1993 - 1995	9

Historical Map - Segment A11



Order Details

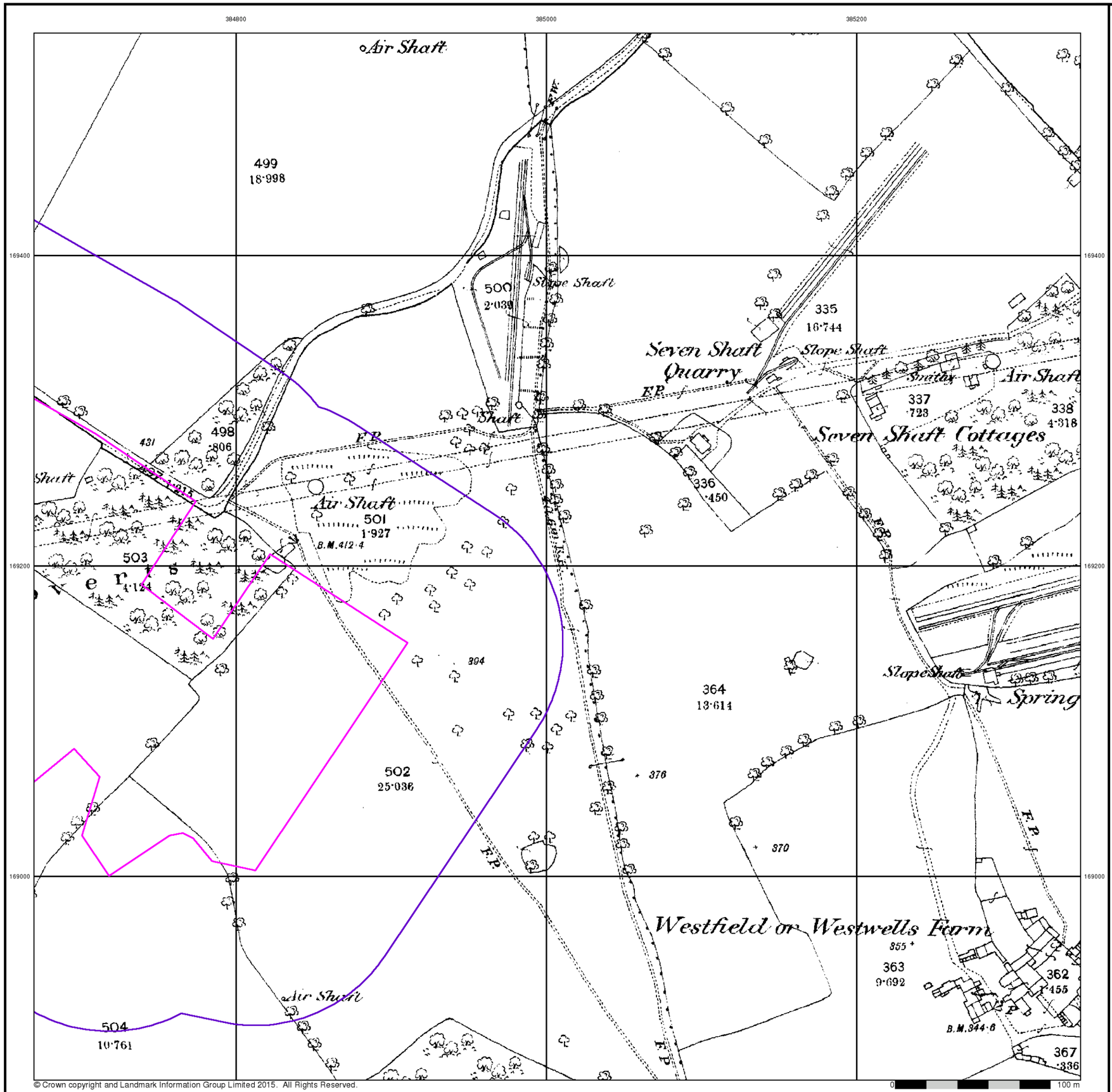
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Search Buffer (m):	100

Site Details

Site at 384780, 169170

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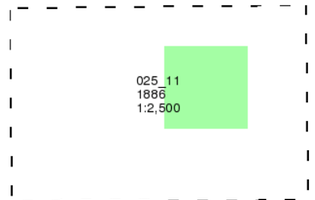
Wiltshire

Published 1886

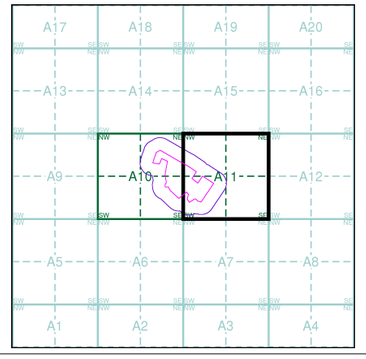
Source map scale - 1:2,500

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Historical Map - Segment A11



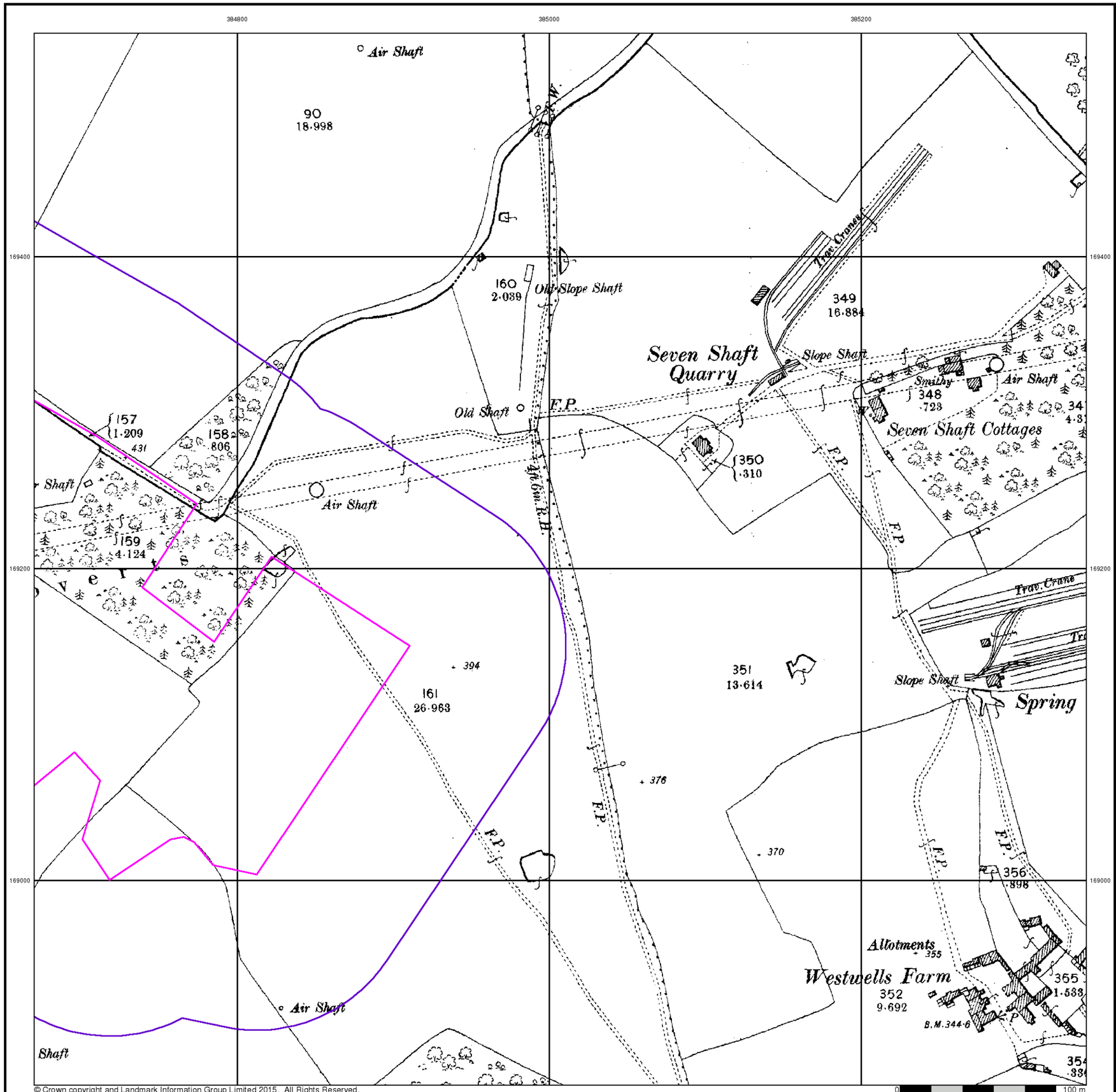
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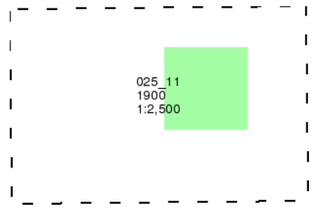
Wiltshire

Published 1900

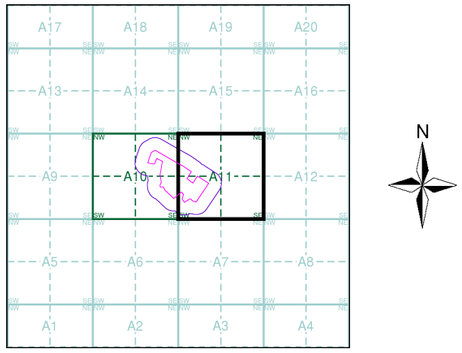
Source map scale - 1:2,500

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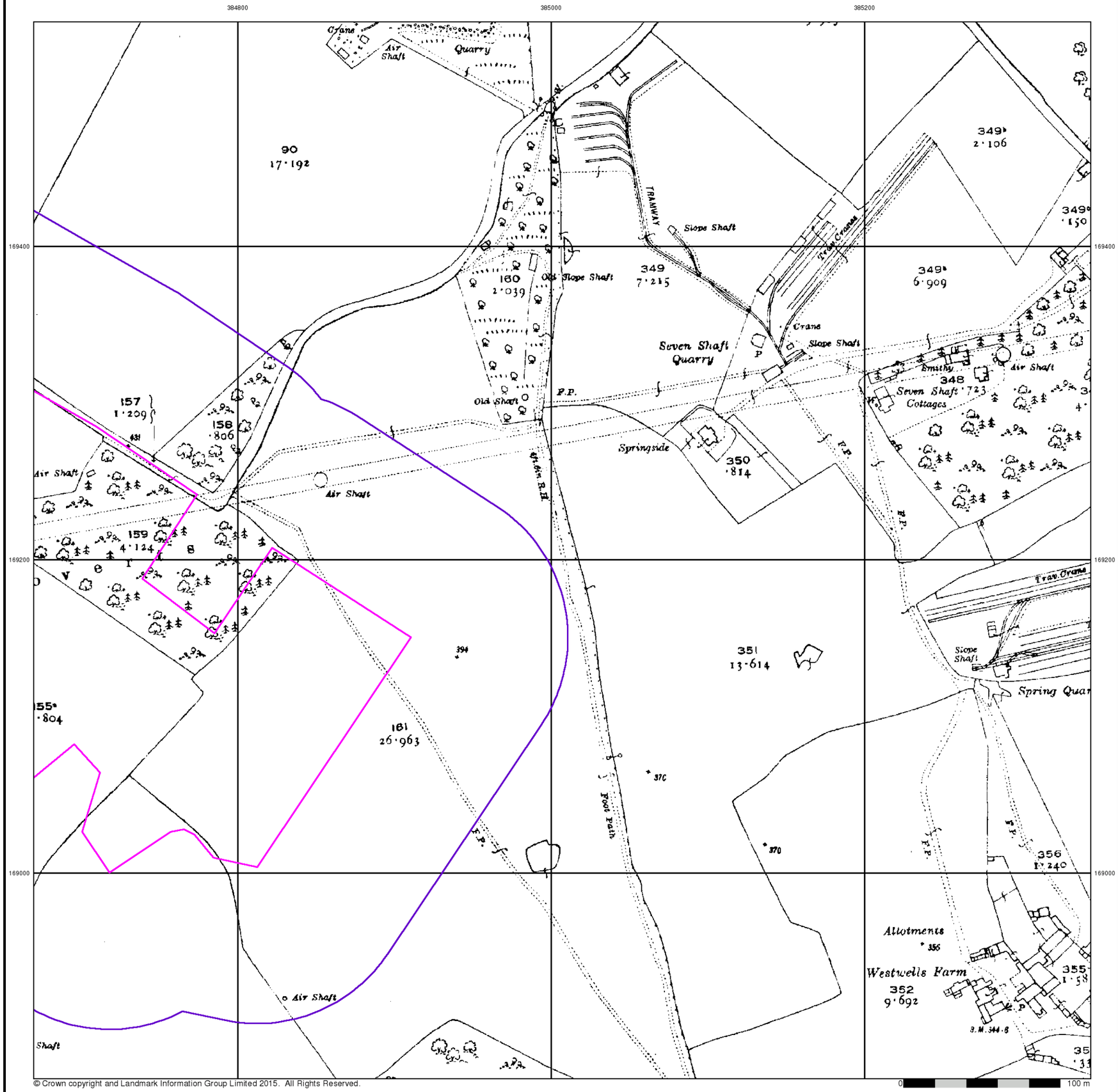
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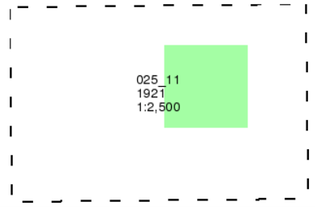
Wiltshire

Published 1921

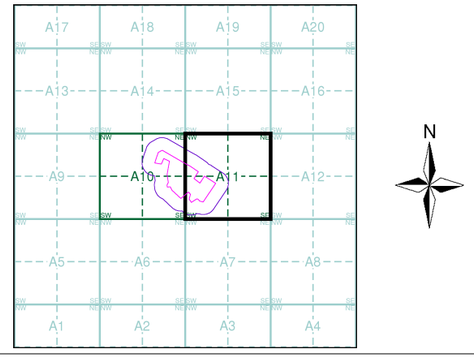
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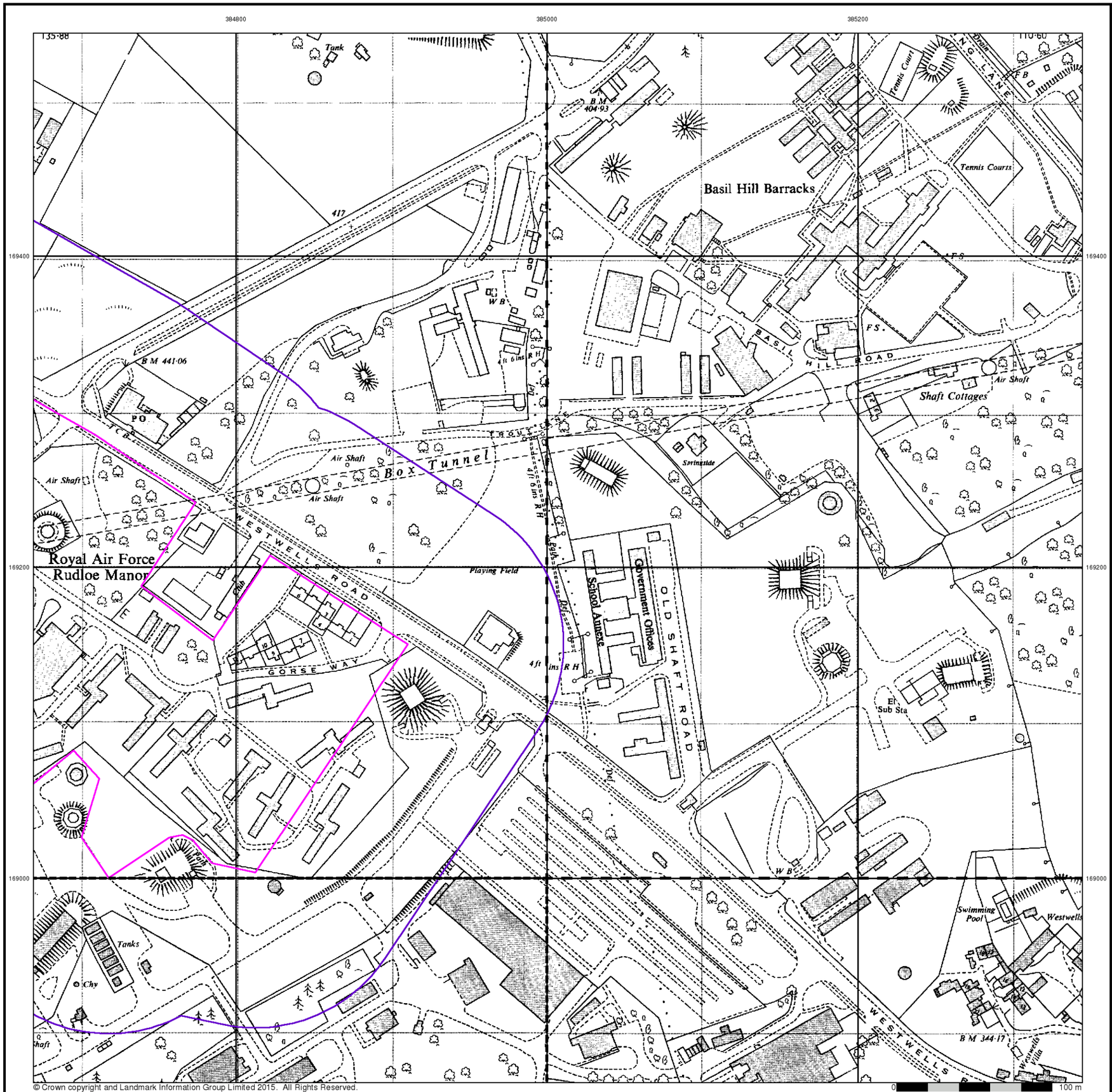
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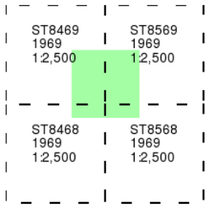
Ordnance Survey Plan

Published 1969

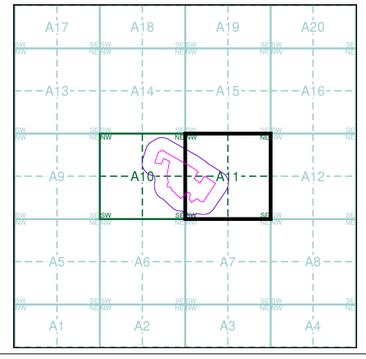
Source map scale - 1:2,500

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 A11



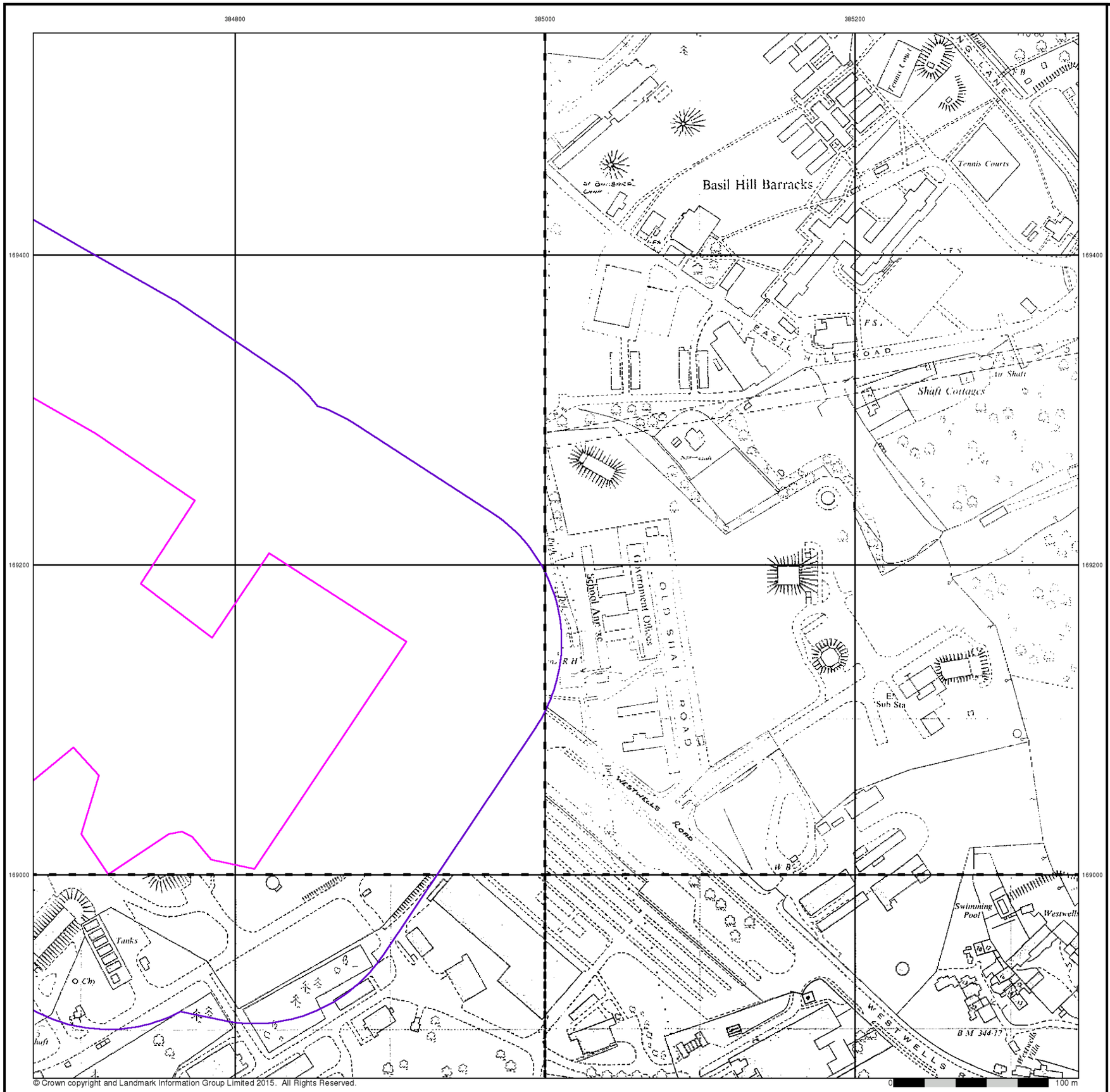
Order Details

Order Number:	87557403_1_1
Customer Ref:	C161303
National Grid Reference:	384660, 169200
Slice:	A
Site Area (Ha):	8.46
Search Buffer (m):	100

Site Details

Site at 384780, 169170

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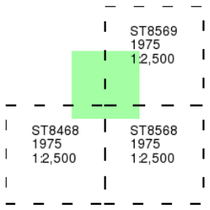
Supply of Unpublished Survey Information

Published 1975

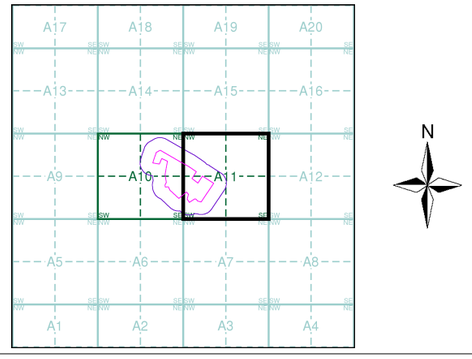
Source map scale - 1:2,500

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)



Historical Map - Segment A11



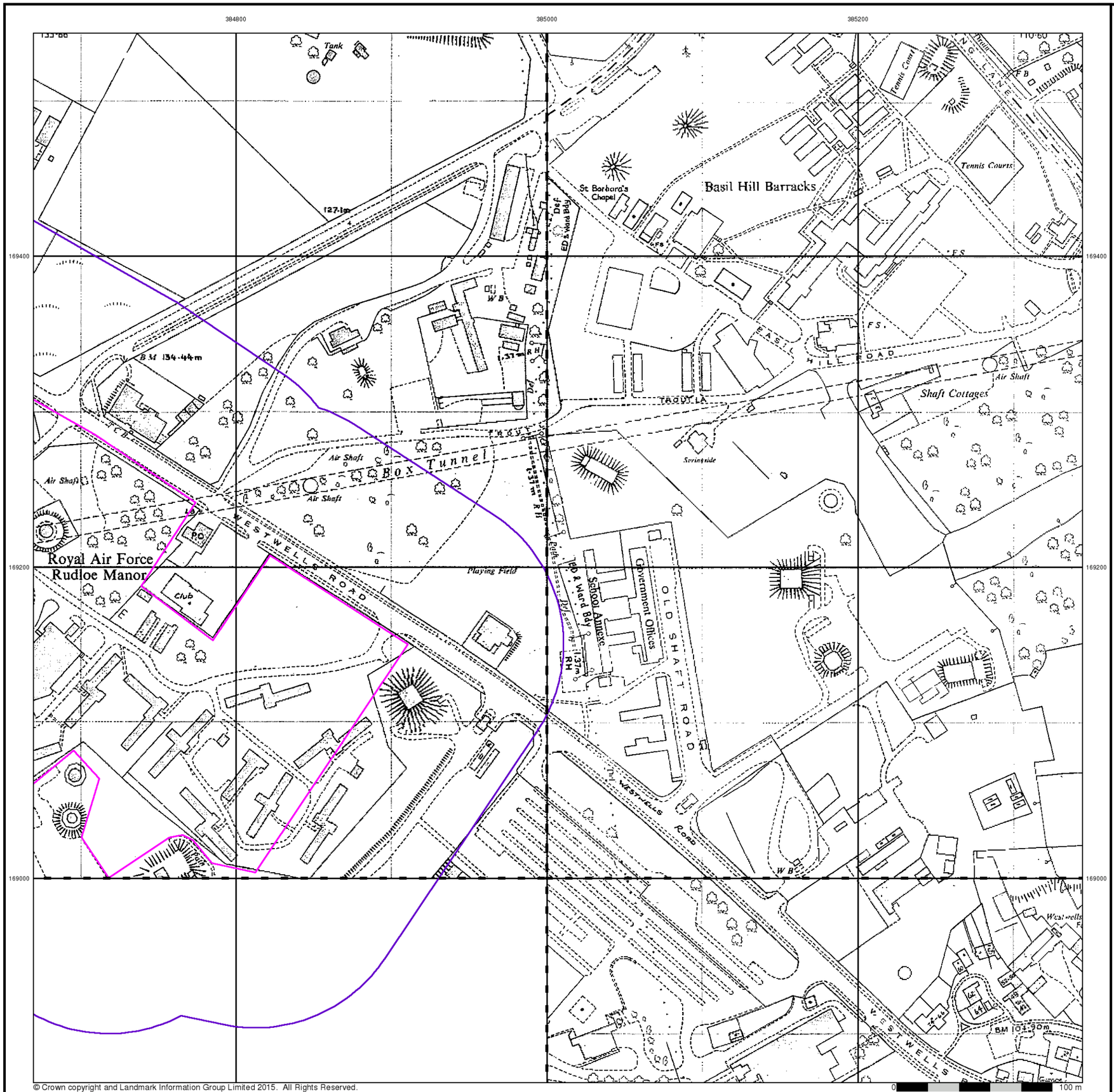
Order Details

Order Number:	87557403_1_1
Customer Ref:	C161303
National Grid Reference:	384660, 169200
Slice:	A
Site Area (Ha):	8.46
Search Buffer (m):	100

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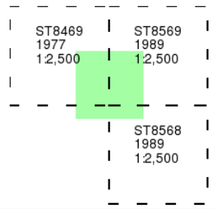
Additional SIMs

Published 1977 - 1989

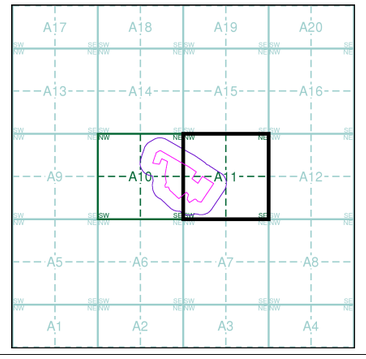
Source map scale - 1:2,500

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)



Historical Map - Segment A11



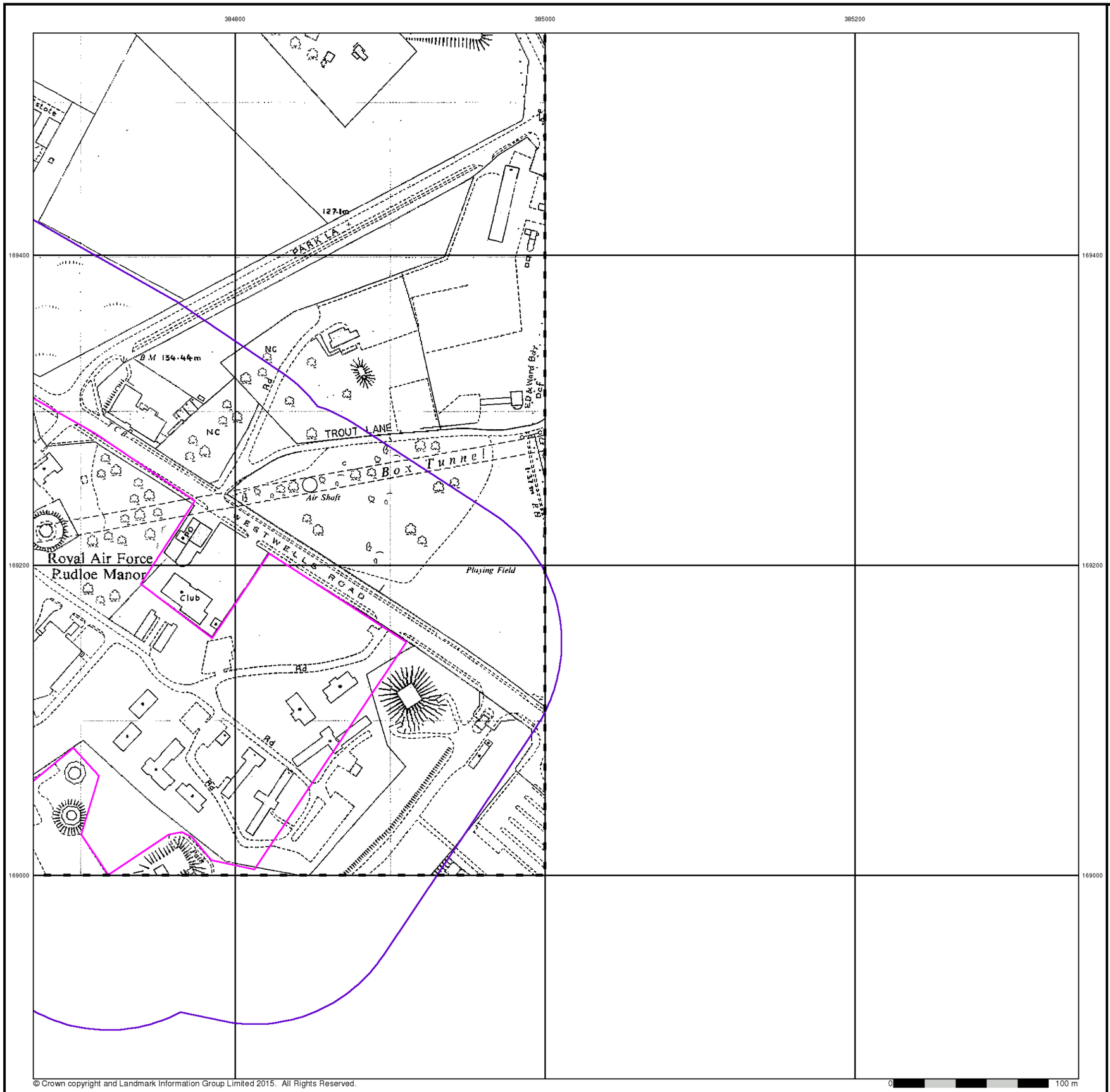
Order Details

Order Number:	87557403_1_1
Customer Ref:	C161303
National Grid Reference:	384660, 169200
Slice:	A
Site Area (Ha):	8.46
Search Buffer (m):	100

Site Details

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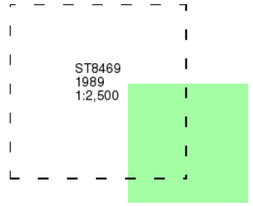
Additional SIMs

Published 1989

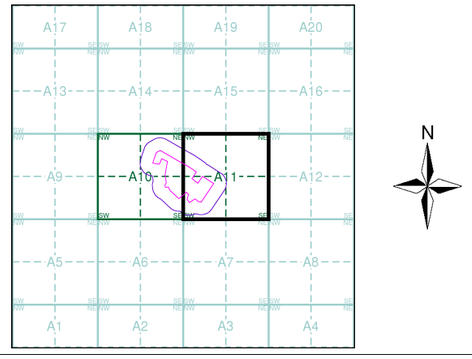
Source map scale - 1:2,500

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)



Historical Map - Segment A11



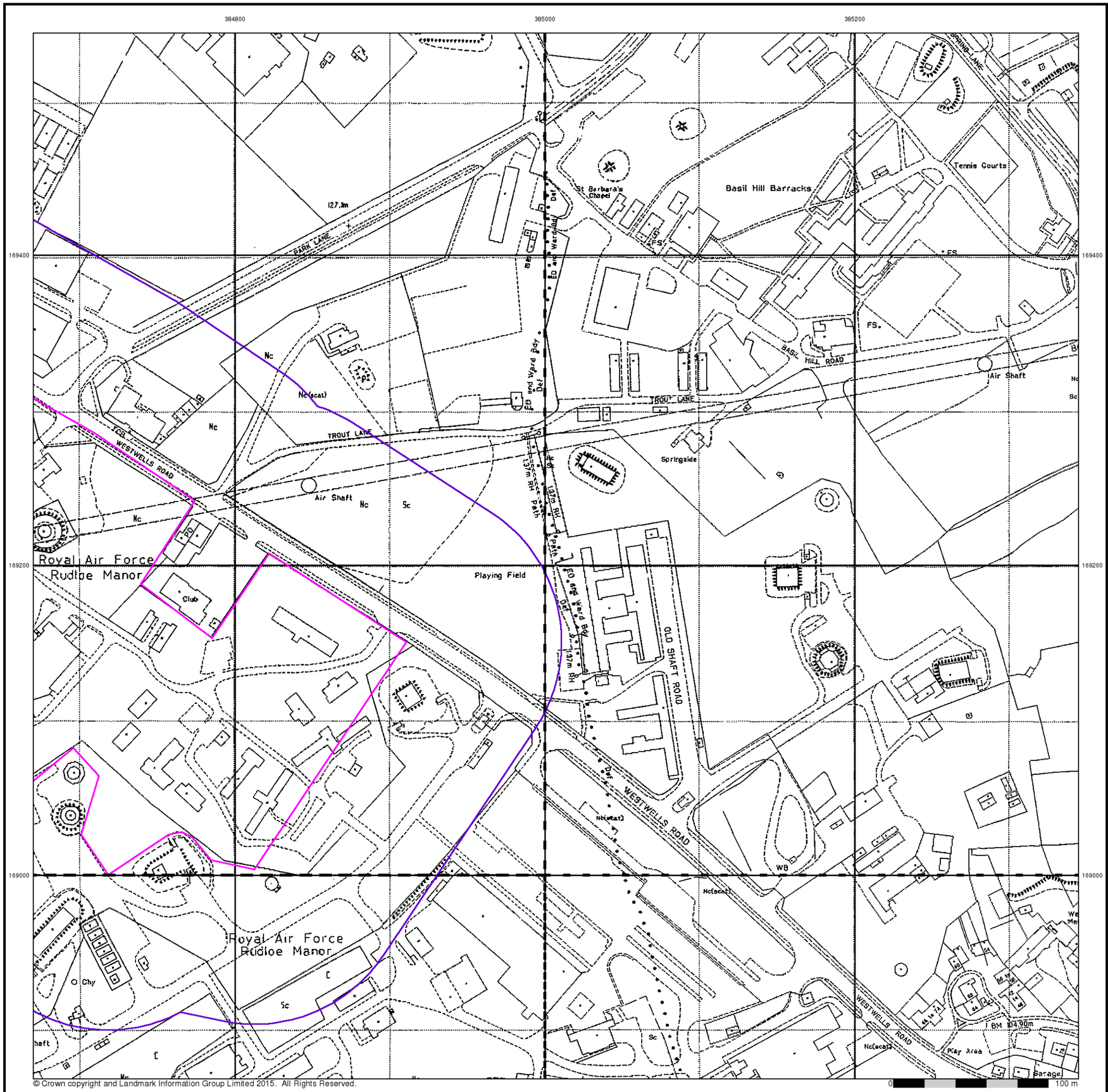
Order Details

Order Number:	87557403_1_1
Customer Ref:	C161303
National Grid Reference:	384660, 169200
Slice:	A
Site Area (Ha):	8.46
Search Buffer (m):	100

Site Details

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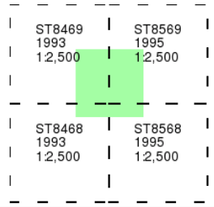
Large-Scale National Grid Data

Published 1993 - 1995

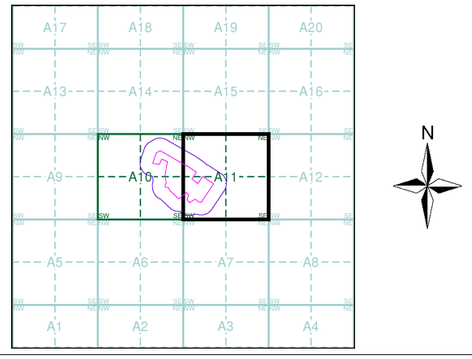
Source map scale - 1:2,500

'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 A11



Order Details

Order Number:	87557403_1_1
Customer Ref:	C161303
National Grid Reference:	384660, 169200
Slice:	A
Site Area (Ha):	8.46
Search Buffer (m):	100

Site Details

Site at 384780, 169170

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Appendix D

Desk Study Research Information

This appendix may not be included in the printed report to reduce the document size, but is included in the digital version.

Envirocheck® Report:

Datasheet

Order Details:

Order Number:
87557403_1_1

Customer Reference:
C161303

National Grid Reference:
384660, 169200

Slice:
A

Site Area (Ha):
8.46

Search Buffer (m):
1000

Site Details:

Site at 384780, 169170

Client Details:

Mr D Patterson
Hydrock Consultants
Lobb Shippon
Plympton
Plymouth
Devon
PL7 5BP

Contents

Report Section	Page Number
Summary	-
Agency & Hydrological	1
Waste	3
Hazardous Substances	7
Geological	8
Industrial Land Use	27
Sensitive Land Use	34
Data Currency	35
Data Suppliers	41
Useful Contacts	42

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 the attached 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 v50.0

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Summary

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	n/a
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 1			1	1
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					
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 1		Yes		
Pollution Incidents to Controlled Waters					
Prosecutions Relating to Authorised Processes					
Registered Radioactive Substances					
River Quality					
River Quality Biology Sampling Points					
River Quality Chemistry Sampling Points					
Substantiated Pollution Incident Register					
Water Abstractions	pg 1				(*2)
Water Industry Act Referrals					
Groundwater Vulnerability	pg 2	Yes	n/a	n/a	n/a
Drift Deposits			n/a	n/a	n/a
Bedrock Aquifer Designations	pg 2	Yes	n/a	n/a	n/a
Superficial Aquifer Designations			n/a	n/a	n/a
Source Protection Zones	pg 2	2			
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
Detailed River Network Lines					n/a
Detailed River Network Offline Drainage	pg 2		Yes		n/a

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Waste					
BGS Recorded Landfill Sites	pg 3				1
Historical Landfill Sites	pg 3				2
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)	pg 3		1		
Local Authority Landfill Coverage	pg 3	2	n/a	n/a	n/a
Local Authority Recorded Landfill Sites	pg 3				1
Potentially Infilled Land (Non-Water)	pg 4		6	3	14
Potentially Infilled Land (Water)	pg 5		2	1	6
Registered Landfill Sites	pg 6				1
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites					
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites	pg 7			1	
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					

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Summary

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 8	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 8	Yes	Yes		Yes
BGS Recorded Mineral Sites	pg 9		6	13	20
BGS Urban Soil Chemistry					
BGS Urban Soil Chemistry Averages					
Brine Compensation Area			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability	pg 16	Yes	n/a	n/a	n/a
Man-Made Mining Cavities	pg 16	1	11	16	27
Natural Cavities	pg 25				1
Non Coal Mining Areas of Great Britain	pg 25	Yes	Yes	n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 25	Yes	Yes	n/a	n/a
Potential for Compressible Ground Stability Hazards	pg 25	Yes	Yes	n/a	n/a
Potential for Ground Dissolution Stability Hazards	pg 26	Yes		n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 26	Yes	Yes	n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 26	Yes	Yes	n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 26	Yes	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 27		21	3	10
Fuel Station Entries	pg 30				1
Points of Interest - Commercial Services	pg 30		6	1	9
Points of Interest - Education and Health					
Points of Interest - Manufacturing and Production	pg 31			3	6
Points of Interest - Public Infrastructure	pg 32		1		2
Points of Interest - Recreational and Environmental	pg 32			3	6
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	pg 34				1
Areas of Adopted Green Belt	pg 34	1			
Areas of Unadopted Green Belt	pg 34	1			
Areas of Outstanding Natural Beauty	pg 34		1		
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones	pg 34	1			
Ramsar Sites					
Sites of Special Scientific Interest	pg 34		1		1
Special Areas of Conservation	pg 34		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: Limited Potential for Groundwater Flooding to Occur	A10SE (W)	76	2	384450 169150
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A10SW (SW)	482	2	384100 168900
1	**Discharge Consents** Operator: Mr Richard Boyd And Mrs Joanna Boyd Property Type: Domestic Property (Single) Location: Stp Serving Roundwood Cottage Roundwood Cottage, Bradford Road, Hawthorn, Corsham, Wiltshire, Sn13 0ny Authority: Environment Agency, South West Region Catchment Area: By Brook/Doncombe Brook Reference: Npswqd008905 Permit Version: 1 Effective Date: 15th October 2009 Issued Date: 15th October 2009 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Final/Treated Effluent - Not Water Company Discharge Environment: Freshwater Stream/River Receiving Water: Unnamed Trib Of Byde Mill Broo **Status:** **New Consent (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 10m	A7SW (S)	488	3	384738 168513
2	**Discharge Consents** Operator: Mr Adrian Phillips Property Type: Domestic Property (Single) Location: The Stables, Neston, Corsham, Wiltshire, Sn13 9rw Authority: Environment Agency, South West Region Catchment Area: Bristol Avon Upper Reach Reference: Eprkp3324gz Permit Version: 1 Effective Date: 2nd June 2011 Issued Date: 2nd June 2011 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Final/Treated Effluent - Not Water Company Discharge Environment: Onto Land/Into Watercourse Receiving Water: Unnamed Ditch **Status:** **New issued under EPR 2010** Positional Accuracy: Located by supplier to within 10m	A12NE (E)	884	3	385786 169270
	Nearest Surface Water Feature	A11NE (E)	234	-	385125 169251
	Water Abstractions Operator: Wessex Water Services Ltd Licence Number: 17/53/004/S/025 Permit Version: 101 Location: Widdenham Springs, Nr Chippenham Authority: Environment Agency, South West Region Abstraction: Public Water Supply: Potable Water Supply - Direct Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Widdenham Springs, Chippenham Authorised Start: 01 April Authorised End: 31 March Permit Start Date: 1st April 2011 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A17NE (NW)	1549	3	383800 170800
	Water Abstractions Operator: Wessex Water Services Ltd Licence Number: 17/53/004/S/025 Permit Version: 100 Location: Widdenham Springs, Nr Chippenham Authority: Environment Agency, South West Region Abstraction: Public Water Supply: Potable Water Supply - Direct Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Widdenham Springs, Chippenham Authorised Start: 01 April Authorised End: 31 March Permit Start Date: 1st April 2005 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A17NE (NW)	1549	3	383800 170800

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Groundwater Vulnerability Soil Classification: Soils of High Leaching Potential (H1) - Soils which readily transmit liquid discharges because they are either shallow, or susceptible to rapid by-pass flow directly to rock, gravel or groundwater Map Sheet: Sheet 37 Southern Cotswolds Scale: 1:100,000	A10SE (NW)	0	3	384657 169201
	Drift Deposits None				
	Bedrock Aquifer Designations Aquifer Designation: Secondary Aquifer - A	A10SE (NW)	0	2	384657 169201
	Superficial Aquifer Designations No Data Available				
3	**Source Protection Zones** Name: Various Source: Environment Agency, Head Office Reference: Not Supplied Type: Zone II (Outer Protection Zone): Either 25% of the source area or a 400 day travel time whichever is greater.	A10SE (NW)	0	3	384657 169201
4	**Source Protection Zones** Name: Various Source: Environment Agency, Head Office Reference: Not Supplied Type: Zone III (Total Catchment): The total area needed to support the discharge from the protected groundwater source.	A10SE (NW)	0	3	384657 169201
	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				
	Detailed River Network Lines None				
5	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D002	A11SW (SE)	149	3	384922 168904
6	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D002	A11SW (SE)	224	3	384993 168873
7	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D002	A11SW (SE)	227	3	384997 168873
8	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D002	A11SW (SE)	228	3	384998 168873

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
9	**BGS Recorded Landfill Sites** Site Name: Sunrise Location: Box Hill, BOX, Wilts Authority: British Geological Survey, National Geoscience Information Service Ground Water: Information not available Surface Water: Information not available Geology: N/A Positional Accuracy: Positioned by the supplier Boundary Accuracy: Good	A9NE (W)	634	-	383799 169383
10	**Historical Landfill Sites** Licence Holder: Roy Francis Plant Hire Limited Location: Hazelbury Hill, Box, Corsham, Wiltshire Name: Hazelbury Hill Quarry Operator Location: The Firs, Quarry Hill, Box Boundary Accuracy: As Supplied Provider Reference: EAHLD09013 First Input Date: 1st June 1979 Last Input Date: 1st June 1984 Specified Waste Type: Deposited Waste included Inert and Household Waste EA Waste Ref: 0 Regis Ref: Not Supplied WRC Ref: 3900/3420 BGS Ref: Not Supplied Other Ref: NW/81/0039/WD, NW/82/0039	A9NE (W)	634	3	383799 169382
11	**Historical Landfill Sites** Licence Holder: Not Supplied Location: Box Hill, Box, Wiltshire Name: Sunrise Operator Location: Sunrise, Box Hill, Box Boundary Accuracy: As Supplied Provider Reference: EAHLD32203 First Input Date: 31st December 1967 Last Input Date: Not Supplied Specified Waste Type: Not Supplied EA Waste Ref: 0 Regis Ref: Not Supplied WRC Ref: Not Supplied BGS Ref: 1599 Other Ref: Not Supplied	A9NE (W)	758	3	383672 169273
12	**Licensed Waste Management Facilities (Locations)** Licence Number: 103735 Location: Unit P1, Fiveways Trading Est, Westwells Road, Hawthorn, Rudloe, Wiltshire, SN13 9RG Operator Name: Waste Away (Wiltshire) Ltd Operator Location: Not Supplied Authority: Environment Agency - South West Region, Wessex Area Site Category: HCI Waste Transfer Station **Licence Status: Issued** Issued: 26th July 2012 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	A10NE (N)	152	3	384616 169513
	Local Authority Landfill Coverage Name: Wiltshire County Council - Has supplied landfill data		0	5	384657 169201
	Local Authority Landfill Coverage Name: North Wiltshire District Council - Has no landfill data to supply		0	4	384657 169201
13	**Local Authority Recorded Landfill Sites** Location: Disused Quarry, Hazelbury Hill, Box Reference: 479 Authority: Wiltshire County Council (now part of Wiltshire Council) **Last Reported Status: Unknown** Types of Waste: Construction Date of Closure: Not Supplied Positional Accuracy: Positioned by the supplier Boundary Quality: Moderate	A9NE (W)	636	5	383797 169380

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
14	**Potentially Infilled Land (Non-Water)** Bearing Ref: NW Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A10NE (NW)	16	-	384568 169384
15	**Potentially Infilled Land (Non-Water)** Bearing Ref: SE Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A11SW (SE)	98	-	384834 168909
16	**Potentially Infilled Land (Non-Water)** Bearing Ref: S Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A10SE (S)	125	-	384656 168892
17	**Potentially Infilled Land (Non-Water)** Bearing Ref: E Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A11NW (E)	171	-	384985 169306
18	**Potentially Infilled Land (Non-Water)** Bearing Ref: S Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A6NE (S)	232	-	384576 168807
19	**Potentially Infilled Land (Non-Water)** Bearing Ref: S Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A6NE (S)	246	-	384544 168803
20	**Potentially Infilled Land (Non-Water)** Bearing Ref: NE Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A11NW (NE)	282	-	384873 169515
21	**Potentially Infilled Land (Non-Water)** Bearing Ref: E Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1992	A11SE (E)	327	-	385236 169176
22	**Potentially Infilled Land (Non-Water)** Bearing Ref: SE Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1992	A7NE (SE)	382	-	385137 168804
23	**Potentially Infilled Land (Non-Water)** Bearing Ref: N Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A15SW (N)	518	-	384738 169865
24	**Potentially Infilled Land (Non-Water)** Bearing Ref: SE Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1992	A7NE (SE)	567	-	385278 168681
25	**Potentially Infilled Land (Non-Water)** Bearing Ref: W Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A9NE (W)	570	-	383861 169260
26	**Potentially Infilled Land (Non-Water)** Bearing Ref: SE Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1992	A8NW (SE)	620	-	385383 168742
27	**Potentially Infilled Land (Non-Water)** Bearing Ref: NE Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1992	A15SE (NE)	621	-	385194 169706
28	**Potentially Infilled Land (Non-Water)** Bearing Ref: SE Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1992	A8NW (SE)	687	-	385497 168794
29	**Potentially Infilled Land (Non-Water)** Bearing Ref: NE Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1992	A15SE (NE)	701	-	385147 169836

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
30	**Potentially Infilled Land (Non-Water)** Bearing Ref: SE Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1992	A8NW (SE)	727	-	385542 168791
31	**Potentially Infilled Land (Non-Water)** Bearing Ref: SW Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A5NE (SW)	795	-	383973 168553
32	**Potentially Infilled Land (Non-Water)** Bearing Ref: W Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A9SW (W)	800	-	383640 169180
33	**Potentially Infilled Land (Non-Water)** Bearing Ref: NE Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1992	A16SW (NE)	824	-	385421 169797
34	**Potentially Infilled Land (Non-Water)** Bearing Ref: W Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A5NE (W)	836	-	383745 168830
35	**Potentially Infilled Land (Non-Water)** Bearing Ref: W Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A9SW (W)	882	-	383557 169176
36	**Potentially Infilled Land (Non-Water)** Bearing Ref: N Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1981	A18SE (N)	981	-	384601 170386
37	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1901	A11NW (E)	4	-	384829 169208
38	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1923	A11SW (SE)	145	-	384992 169013
39	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1923	A6NE (S)	261	-	384515 168800
40	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1961	A7SW (S)	533	-	384877 168476
41	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1960	A7NE (SE)	548	-	385175 168594
42	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1923	A8NW (SE)	607	-	385405 168798
43	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1889	A14NW (N)	637	-	384321 170026
44	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1955	A14NE (N)	658	-	384342 170053
45	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1901	A16SW (NE)	924	-	385608 169756

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
46	**Registered Landfill Sites** Licence Holder: Roy Francis Plant Hire Licence Reference: NW/82/0039 A Site Location: Hazelbury Quarry, Box, Corsham, Wiltshire Licence Easting: 383700 Licence Northing: 169400 Operator Location: The Firs Quarry Hill, Box Hill, CORSHAM, Wiltshire, SN14 9HT Authority: Environment Agency - South West Region, North Wessex Area Site Category: Landfill Max Input Rate: Undefined Waste Source Restrictions: No known restriction on source of waste Status: Licence lapsed/cancelled/defunct/not applicable/surrenderedCancelled Dated: 10th January 1983 Preceded By Licence: Not Given Superseded By Licence: Not Given Positional Accuracy: Manually positioned to the address or location Boundary Accuracy: Not Applicable Authorised Waste: Construction And Demolition Wastes Excavated Natural Materials $ High Density Asbestos Prohibited Waste: Poisonous, Noxious, Polluting Wastes	A9NE (W)	734	3	383700 169400

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
47	**Explosive Sites** Name: Leafield Engineering Ltd Location: Westwells Quarry, Moor Green, Leafield, CORSHAM, Wiltshire **Status: Not Active** Positional Accuracy: Manually positioned within the geographical locality	A11SE (SE)	372	6	385204 168921

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: Great Oolite Group	A10SE (NW)	0	2	384657 169201
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A10SE (NW)	0	2	384657 169201
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A10SE (S)	1	2	384657 169000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 30 - 45 mg/kg	A11SW (E)	90	2	385000 169201
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A6NW (SW)	528	2	384068 168863
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A6NW (SW)	611	2	384000 168814
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 30 - 45 mg/kg	A15NW (N)	633	2	384720 170000

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 Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NE (NW)	804	2	383883 169958
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NE (NW)	806	2	383924 170000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12NE (E)	894	2	385762 169422
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12SE (E)	961	2	385870 169197
48	**BGS Recorded Mineral Sites** Site Name: Westwells Farm Air Shaft Location: , Box Hill, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56011 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A11SW (SE)	86	2	384836 168922
49	**BGS Recorded Mineral Sites** Site Name: Westwells Farm Air Shaft Location: , Box Hill, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56014 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A10SE (S)	123	2	384656 168895

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
50	**BGS Recorded Mineral Sites** Site Name: Rudloe House Shaft Location: , Box Hill, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56024 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A11NW (E)	174	2	384984 169310
51	**BGS Recorded Mineral Sites** Site Name: Westwells Farm Quarries Location: , Box Hill, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56020 Type: Opencast **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A6NE (S)	219	2	384572 168822
52	**BGS Recorded Mineral Sites** Site Name: Clift Mine Location: , Box, Bath, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 120950 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A10NW (W)	227	2	384210 169370
53	**BGS Recorded Mineral Sites** Site Name: Seven Shaft Quarry Slope Shaft Location: , Box Hill, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56025 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A11NW (NE)	246	2	384993 169390
54	**BGS Recorded Mineral Sites** Site Name: Spring Quarry Slope Shaft Location: , Rudloe, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56032 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A11SE (E)	257	2	385167 169146
55	**BGS Recorded Mineral Sites** Site Name: Seven Shaft Location: , Corsham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 8398 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A11NE (E)	307	2	385140 169354

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
56	**BGS Recorded Mineral Sites** Site Name: Rudloe Quarry Air Shaft Location: , Box Hill, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56010 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A11NW (NE)	309	2	384884 169539
57	**BGS Recorded Mineral Sites** Site Name: Westwells Farm Air Shaft Location: , Box Hill, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56015 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A6NE (S)	324	2	384497 168739
58	**BGS Recorded Mineral Sites** Site Name: Cliff Mine Air Shaft Location: , Box Hill, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56019 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Forest Marble Formation Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A14SW (NW)	328	2	384234 169636
59	**BGS Recorded Mineral Sites** Site Name: Spring Quarry Location: , Corsham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 14369 Type: Underground **Status: Dormant** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Great Oolite Group Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A11SE (E)	373	2	385280 169105
60	**BGS Recorded Mineral Sites** Site Name: Rudloe Quarry Location: , Rudloe, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56042 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A15SW (NE)	373	2	384964 169563
61	**BGS Recorded Mineral Sites** Site Name: Thorney Pits Location: , Westwells, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56039 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Forest Marble Formation Commodity: Common Clay and Shale Positional Accuracy: Located by supplier to within 10m	A6NW (SW)	381	2	384332 168793

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
62	**BGS Recorded Mineral Sites** Site Name: Westwells Farm Air Shaft Location: , Box Hill, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56012 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A7NE (SE)	382	2	385137 168804
63	**BGS Recorded Mineral Sites** Site Name: Moor Park Location: , Westwells, Corsham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 8326 Type: Opencast **Status: Dormant** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Forest Marble Formation Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A7NW (SE)	384	2	384915 168635
64	**BGS Recorded Mineral Sites** Site Name: Westwells Farm Air Shaft Location: , Box Hill, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56013 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A7NE (SE)	473	2	385157 168681
65	**BGS Recorded Mineral Sites** Site Name: Thorney Pits Air Shaft Location: , Westwells, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56037 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Forest Marble Formation Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A6NW (SW)	479	2	384312 168678
66	**BGS Recorded Mineral Sites** Site Name: Sands Quarry Location: , Box Hill, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56029 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A7NE (SE)	488	2	385077 168595
67	**BGS Recorded Mineral Sites** Site Name: Rudloe House Shaft Location: , Box Hill, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56023 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A15SW (N)	523	2	384739 169870

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
68	**BGS Recorded Mineral Sites** Site Name: Thorney Pits Shaft Location: , Westwells, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56047 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A6NW (SW)	523	2	384180 168731
69	**BGS Recorded Mineral Sites** Site Name: Moor Green Quarry Location: , Westwells, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56043 Type: Opencast **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A7NE (SE)	560	2	385280 168697
70	**BGS Recorded Mineral Sites** Site Name: Clift Mine Location: , Box, Bath, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 94035 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A9NE (W)	590	2	383840 169270
71	**BGS Recorded Mineral Sites** Site Name: Hudswell Quarry Air Shaft Location: , Hudswell, Corsham, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 120936 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A15SE (NE)	616	2	385195 169700
72	**BGS Recorded Mineral Sites** Site Name: Moor Green Quarry Air Shaft Location: , Westwells, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56034 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A12SW (E)	639	2	385484 168870
73	**BGS Recorded Mineral Sites** Site Name: Cliff Location: , Box, Bath, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 94034 Type: Opencast **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A13SE (NW)	683	2	383810 169615

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
74	**BGS Recorded Mineral Sites** Site Name: Hudswell Quarry Air Shaft Location: , Rudloe, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56033 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A15SE (NE)	706	2	385152 169838
75	**BGS Recorded Mineral Sites** Site Name: Westwells Location: , Westwells, Corsham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 8327 Type: Underground And Opencast **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Forest Marble Formation Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A8NW (SE)	722	2	385530 168780
76	**BGS Recorded Mineral Sites** Site Name: Clift Mine Location: , Kingsdown, Box Hill, Corsham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 8325 Type: Underground **Status: Dormant** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Great Oolite Group Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A13SE (NW)	751	2	383760 169675
77	**BGS Recorded Mineral Sites** Site Name: Thorney Pits Air Shaft Location: , Westwells, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56038 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Forest Marble Formation Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A5NE (SW)	788	2	383981 168554
78	**BGS Recorded Mineral Sites** Site Name: Boxfields Location: , Box, Bath, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 10012 Type: Opencast **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A9SW (W)	804	2	383635 169185
79	**BGS Recorded Mineral Sites** Site Name: Box Hill Location: , Box, Bath, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 94033 Type: Opencast **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A9NW (W)	820	2	383630 169495

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
80	**BGS Recorded Mineral Sites** Site Name: Box Hill Location: , Box Hill, Box, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 14402 Type: Opencast **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A9NW (W)	833	2	383605 169435
81	**BGS Recorded Mineral Sites** Site Name: Hudswell Quarry Location: , Box Hill, Chippenham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 56026 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A16SW (NE)	840	2	385445 169798
82	**BGS Recorded Mineral Sites** Site Name: Box Field Location: , Box, Bath, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 94032 Type: Opencast **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A9SW (W)	883	2	383555 169185
83	**BGS Recorded Mineral Sites** Site Name: Brooklease Mine Location: , Bath, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 9098 Type: Underground **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Great Oolite Group Commodity: Limestone Positional Accuracy: Located by supplier to within 100m	A3NW (S)	901	2	384700 168100
84	**BGS Recorded Mineral Sites** Site Name: Brewer'S Yard Quarry Location: , Rudloe, Corsham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 55991 Type: Opencast **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Forest Marble Formation Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A18SE (N)	969	2	384630 170370
84	**BGS Recorded Mineral Sites** Site Name: Brewer'S Yard Quarry Location: , Rudloe, Corsham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 55991 Type: Opencast **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A18SE (N)	969	2	384630 170370

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
84	**BGS Recorded Mineral Sites** Site Name: Brewer'S Yard Quarry Location: , Corsham, Wiltshire Source: British Geological Survey, National Geoscience Information Service Reference: 8399 Type: Underground And Opencast **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Jurassic Geology: Combe Down Oolite Commodity: Limestone Positional Accuracy: Located by supplier to within 10m	A18SE (N)	980	2	384600 170385
	BGS Measured Urban Soil Chemistry No data available				
	BGS Urban Soil Chemistry Averages No data available				
	Coal Mining Affected Areas In an area that might not be affected by coal mining				
	Mining Instability Mining Evidence: Conclusive Rock Mining Source: Ove Arup & Partners Boundary Quality: As Supplied	A10SE (NW)	0	-	384657 169201
	Man-Made Mining Cavities Easting: 384600 Northing: 169100 Distance: 0 Quadrant Reference: A10 Quadrant Reference: SE Bearing Ref: SW Cavity Type: Underground Bath stone Quarry/Nuclear Bunker Complex Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A10SE (SW)	0	7	384600 169100
	Man-Made Mining Cavities Easting: 384500 Northing: 169300 Distance: 20 Quadrant Reference: A10 Quadrant Reference: NE Bearing Ref: NW Cavity Type: Underground Bath stone Quarry Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A10NE (NW)	20	7	384500 169300
	Man-Made Mining Cavities Easting: 384900 Northing: 169200 Distance: 36 Quadrant Reference: A11 Quadrant Reference: SW Bearing Ref: E Cavity Type: Slope Shaft Entry Underground Bath Stone Quarry/MOD Storage Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A11SW (E)	36	7	384900 169200
	Man-Made Mining Cavities Easting: 384600 Northing: 169400 Distance: 46 Quadrant Reference: A10 Quadrant Reference: NE Bearing Ref: N Cavity Type: Underground Bath stone Quarry Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A10NE (N)	46	7	384600 169400

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Man-Made Mining Cavities Easting: 384600 Northing: 169000 Distance: 47 Quadrant Reference: A10 Quadrant Reference: SE Bearing Ref: S Cavity Type: Underground Bath stone Quarry/Nuclear Bunker Complex Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A10SE (S)	47	7	384600 169000
	Man-Made Mining Cavities Easting: 384900 Northing: 169000 Distance: 75 Quadrant Reference: A11 Quadrant Reference: SW Bearing Ref: SE Cavity Type: Underground Bath stone Quarry/Nuclear Bunker Complex Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A11SW (SE)	75	7	384900 169000
	Man-Made Mining Cavities Easting: 385000 Northing: 169100 Distance: 103 Quadrant Reference: A11 Quadrant Reference: SW Bearing Ref: E Cavity Type: Underground Bath stone Quarry/Nuclear Bunker Complex Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A11SW (E)	103	7	385000 169100
	Man-Made Mining Cavities Easting: 384600 Northing: 168900 Distance: 136 Quadrant Reference: A10 Quadrant Reference: SE Bearing Ref: S Cavity Type: Underground Bath stone Quarry-Known Mined Ground Boundary Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A10SE (S)	136	7	384600 168900
	Man-Made Mining Cavities Easting: 384400 Northing: 169000 Distance: 177 Quadrant Reference: A10 Quadrant Reference: SE Bearing Ref: SW Cavity Type: Underground Bath stone Quarry-Known Mined Ground Boundary Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A10SE (SW)	177	7	384400 169000
	Man-Made Mining Cavities Easting: 384800 Northing: 168800 Distance: 205 Quadrant Reference: A7 Quadrant Reference: NW Bearing Ref: S Cavity Type: Slope Shaft Entry Underground Bath Stone Quarry Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A7NW (S)	205	7	384800 168800

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Man-Made Mining Cavities Easting: 384600 Northing: 168800 Distance: 233 Quadrant Reference: A6 Quadrant Reference: NE Bearing Ref: S Cavity Type: Underground Bath stone Quarry-Known Mined Ground Boundary Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A6NE (S)	233	7	384600 168800
	Man-Made Mining Cavities Easting: 384200 Northing: 169400 Distance: 245 Quadrant Reference: A10 Quadrant Reference: NW Bearing Ref: NW Cavity Type: Underground Bath stone Quarry-Known Mined Ground Boundary Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A10NW (NW)	245	7	384200 169400
	Man-Made Mining Cavities Easting: 384200 Northing: 169200 Distance: 255 Quadrant Reference: A10 Quadrant Reference: SW Bearing Ref: W Cavity Type: Underground Bath stone Quarry-Known Mined Ground Boundary Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A10SW (W)	255	7	384200 169200
	Man-Made Mining Cavities Easting: 384300 Northing: 169600 Distance: 258 Quadrant Reference: A14 Quadrant Reference: SW Bearing Ref: NW Cavity Type: Underground Bath stone Quarry-Known Mined Ground Boundary Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A14SW (NW)	258	7	384300 169600
	Man-Made Mining Cavities Easting: 384900 Northing: 169500 Distance: 285 Quadrant Reference: A11 Quadrant Reference: NW Bearing Ref: NE Cavity Type: Underground Bath stone Quarry-Known Mined Ground Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A11NW (NE)	285	7	384900 169500
	Man-Made Mining Cavities Easting: 385200 Northing: 169200 Distance: 294 Quadrant Reference: A11 Quadrant Reference: SE Bearing Ref: E Cavity Type: Slope Shaft Entry Underground Bath Stone Quarry/MOD Storage Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A11SE (E)	294	7	385200 169200

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Man-Made Mining Cavities Easting: 385100 Northing: 169400 Distance: 314 Quadrant Reference: A11 Quadrant Reference: NE Bearing Ref: NE Cavity Type: Slope Shaft Entry Underground Bath Stone Quarry/MOD Storage Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A11NE (NE)	314	7	385100 169400
	Man-Made Mining Cavities Easting: 384400 Northing: 168800 Distance: 330 Quadrant Reference: A6 Quadrant Reference: NE Bearing Ref: SW Cavity Type: Underground Bath stone Quarry-Known Mined Ground Boundary Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A6NE (SW)	330	7	384400 168800
	Man-Made Mining Cavities Easting: 385000 Northing: 168700 Distance: 358 Quadrant Reference: A7 Quadrant Reference: NW Bearing Ref: SE Cavity Type: Underground Bath stone Quarry-Known Mined Ground Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A7NW (SE)	358	7	385000 168700
	Man-Made Mining Cavities Easting: 384200 Northing: 169700 Distance: 399 Quadrant Reference: A14 Quadrant Reference: SW Bearing Ref: NW Cavity Type: Underground Bath stone Quarry-Known Mined Ground Boundary Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A14SW (NW)	399	7	384200 169700
	Man-Made Mining Cavities Easting: 384400 Northing: 168700 Distance: 406 Quadrant Reference: A6 Quadrant Reference: NE Bearing Ref: SW Cavity Type: Underground Bath stone Quarry-Known Mined Ground Boundary Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A6NE (SW)	406	7	384400 168700
	Man-Made Mining Cavities Easting: 384100 Northing: 169600 Distance: 412 Quadrant Reference: A14 Quadrant Reference: SW Bearing Ref: NW Cavity Type: Underground Bath stone Quarry-Known Mined Ground Boundary Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A14SW (NW)	412	7	384100 169600

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Man-Made Mining Cavities Easting: 385100 Northing: 168700 Distance: 419 Quadrant Reference: A7 Quadrant Reference: NE Bearing Ref: SE Cavity Type: Underground Bath stone Quarry-Known Mined Ground Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A7NE (SE)	419	7	385100 168700
	Man-Made Mining Cavities Easting: 384300 Northing: 169800 Distance: 431 Quadrant Reference: A14 Quadrant Reference: SW Bearing Ref: NW Cavity Type: Underground Bath stone Quarry-Known Mined Ground Boundary Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A14SW (NW)	431	7	384300 169800
	Man-Made Mining Cavities Easting: 384900 Northing: 169700 Distance: 455 Quadrant Reference: A15 Quadrant Reference: SW Bearing Ref: NE Cavity Type: Underground Bath stone Quarry-Known Mined Ground Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A15SW (NE)	455	7	384900 169700
	Man-Made Mining Cavities Easting: 384200 Northing: 168800 Distance: 459 Quadrant Reference: A6 Quadrant Reference: NW Bearing Ref: SW Cavity Type: Bath Stone Quarry Workings Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A6NW (SW)	459	7	384200 168800
	Man-Made Mining Cavities Easting: 384100 Northing: 168900 Distance: 482 Quadrant Reference: A10 Quadrant Reference: SW Bearing Ref: SW Cavity Type: Bath Stone Quarry Workings Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A10SW (SW)	482	7	384100 168900
	Man-Made Mining Cavities Easting: 384400 Northing: 169900 Distance: 496 Quadrant Reference: A14 Quadrant Reference: NE Bearing Ref: N Cavity Type: Underground Bath stone Quarry-Known Mined Ground Boundary Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A14NE (N)	496	7	384400 169900

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Man-Made Mining Cavities Easting: 384000 Northing: 169600 Distance: 501 Quadrant Reference: A14 Quadrant Reference: SW Bearing Ref: NW Cavity Type: Underground Bath stone Quarry-Known Mined Ground Boundary Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A14SW (NW)	501	7	384000 169600
	Man-Made Mining Cavities Easting: 385400 Northing: 169000 Distance: 512 Quadrant Reference: A12 Quadrant Reference: SW Bearing Ref: E Cavity Type: Underground Bath stone Quarry/Nuclear Bunker Complex Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A12SW (E)	512	7	385400 169000
	Man-Made Mining Cavities Easting: 383900 Northing: 169300 Distance: 529 Quadrant Reference: A9 Quadrant Reference: NE Bearing Ref: W Cavity Type: Shaft Entry Bath stone Mine Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A9NE (W)	529	7	383900 169300
	Man-Made Mining Cavities Easting: 385400 Northing: 169400 Distance: 550 Quadrant Reference: A12 Quadrant Reference: NW Bearing Ref: E Cavity Type: Underground Bath stone Quarry/MOD Storage-Known Mined Ground Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A12NW (E)	550	7	385400 169400
	Man-Made Mining Cavities Easting: 383900 Northing: 169100 Distance: 570 Quadrant Reference: A9 Quadrant Reference: SE Bearing Ref: W Cavity Type: Underground Bath stone Quarry-Known Mined Ground Boundary Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A9SE (W)	570	7	383900 169100
	Man-Made Mining Cavities Easting: 385300 Northing: 168700 Distance: 575 Quadrant Reference: A7 Quadrant Reference: NE Bearing Ref: SE Cavity Type: Slope Shaft Entry Underground Bath Stone Quarry Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A7NE (SE)	575	7	385300 168700

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Man-Made Mining Cavities Easting: 384100 Northing: 168700 Distance: 601 Quadrant Reference: A6 Quadrant Reference: NW Bearing Ref: SW Cavity Type: Underground Bath stone Quarry Workings Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A6NW (SW)	601	7	384100 168700
	Man-Made Mining Cavities Easting: 385200 Northing: 168500 Distance: 636 Quadrant Reference: A7 Quadrant Reference: SE Bearing Ref: SE Cavity Type: Underground Bath stone Quarry-Known Mined Ground Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A7SE (SE)	636	7	385200 168500
	Man-Made Mining Cavities Easting: 385600 Northing: 169200 Distance: 692 Quadrant Reference: A12 Quadrant Reference: SW Bearing Ref: E Cavity Type: Underground Bath stone Quarry/Nuclear Bunker Complex Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A12SW (E)	692	7	385600 169200
	Man-Made Mining Cavities Easting: 383800 Northing: 169000 Distance: 702 Quadrant Reference: A9 Quadrant Reference: SE Bearing Ref: W Cavity Type: Underground Bath stone Quarry-Known Mined Ground Boundary Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A9SE (W)	702	7	383800 169000
	Man-Made Mining Cavities Easting: 385600 Northing: 169000 Distance: 706 Quadrant Reference: A12 Quadrant Reference: SW Bearing Ref: E Cavity Type: Underground Bath stone Quarry/Nuclear Bunker Complex Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A12SW (E)	706	7	385600 169000
	Man-Made Mining Cavities Easting: 383700 Northing: 169300 Distance: 729 Quadrant Reference: A9 Quadrant Reference: NE Bearing Ref: W Cavity Type: Adit Entry Underground Bath stone Quarry Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A9NE (W)	729	7	383700 169300

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Man-Made Mining Cavities Easting: 383700 Northing: 169400 Distance: 734 Quadrant Reference: A9 Quadrant Reference: NE Bearing Ref: W Cavity Type: Adit Entry Underground Bath stone Quarry Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A9NE (W)	734	7	383700 169400
	Man-Made Mining Cavities Easting: 383700 Northing: 169200 Distance: 737 Quadrant Reference: A9 Quadrant Reference: SE Bearing Ref: W Cavity Type: Adit Entry Underground Bath stone Quarry Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A9SE (W)	737	7	383700 169200
	Man-Made Mining Cavities Easting: 383700 Northing: 169200 Distance: 737 Quadrant Reference: A9 Quadrant Reference: SE Bearing Ref: W Cavity Type: Adit Entry Underground Bath stone Quarry Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A9SE (W)	737	7	383700 169200
	Man-Made Mining Cavities Easting: 385600 Northing: 168800 Distance: 774 Quadrant Reference: A8 Quadrant Reference: NW Bearing Ref: SE Cavity Type: Slope Shaft Entry Underground Bath Stone Quarry Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A8NW (SE)	774	7	385600 168800
	Man-Made Mining Cavities Easting: 383700 Northing: 169600 Distance: 782 Quadrant Reference: A13 Quadrant Reference: SE Bearing Ref: NW Cavity Type: Adit Entry Underground Bath stone Quarry Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A13SE (NW)	782	7	383700 169600
	Man-Made Mining Cavities Easting: 385700 Northing: 169000 Distance: 804 Quadrant Reference: A12 Quadrant Reference: SE Bearing Ref: E Cavity Type: Slope Shaft Entry Underground Bath Stone Quarry Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A12SE (E)	804	7	385700 169000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Man-Made Mining Cavities Easting: 383600 Northing: 169200 Distance: 836 Quadrant Reference: A9 Quadrant Reference: SW Bearing Ref: W Cavity Type: Adit Entry Underground Bath stone Quarry Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A9SW (W)	836	7	383600 169200
	Man-Made Mining Cavities Easting: 383600 Northing: 169500 Distance: 850 Quadrant Reference: A9 Quadrant Reference: NW Bearing Ref: W Cavity Type: Adit Entry Underground Bath stone Quarry Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A9NW (W)	850	7	383600 169500
	Man-Made Mining Cavities Easting: 385700 Northing: 169500 Distance: 864 Quadrant Reference: A12 Quadrant Reference: NE Bearing Ref: E Cavity Type: Underground Bath stone Quarry/MOD Storage-Known Mined Ground Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A12NE (E)	864	7	385700 169500
	Man-Made Mining Cavities Easting: 385700 Northing: 169500 Distance: 864 Quadrant Reference: A12 Quadrant Reference: NE Bearing Ref: E Cavity Type: Underground Bath stone Quarry/MOD Storage-Known Mined Ground Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A12NE (E)	864	7	385700 169500
	Man-Made Mining Cavities Easting: 385500 Northing: 169800 Distance: 878 Quadrant Reference: A16 Quadrant Reference: SW Bearing Ref: NE Cavity Type: Underground Bath stone Quarry/MOD Storage-Known Mined Ground Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A16SW (NE)	878	7	385500 169800
	Man-Made Mining Cavities Easting: 383600 Northing: 169000 Distance: 886 Quadrant Reference: A9 Quadrant Reference: SW Bearing Ref: W Cavity Type: Underground Bath stone Quarry-Known Mined Ground Boundary Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A9SW (W)	886	7	383600 169000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Man-Made Mining Cavities Easting: 385800 Northing: 169200 Distance: 891 Quadrant Reference: A12 Quadrant Reference: SE Bearing Ref: E Cavity Type: Underground Bath stone Quarry/Nuclear Bunker Complex Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A12SE (E)	891	7	385800 169200
	Man-Made Mining Cavities Easting: 384600 Northing: 170400 Distance: 995 Quadrant Reference: A18 Quadrant Reference: SE Bearing Ref: N Cavity Type: Shaft Entry Multi-level Bath Stone Mine Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A18SE (N)	995	7	384600 170400
	Man-Made Mining Cavities Easting: 385800 Northing: 169600 Distance: 997 Quadrant Reference: A16 Quadrant Reference: SE Bearing Ref: E Cavity Type: Underground Bath stone Quarry/MOD Storage-Known Mined Ground Commodity: Limestone Solid Geology Detail: Great Oolite Group Superficial Geology Detail: No Details	A16SE (E)	997	7	385800 169600
	Natural Cavities Easting: 383610 Northing: 169460 Distance: 832 Quadrant Reference: A9 Quadrant Reference: NW Bearing Ref: W Cavity Type: Gulls/Fissures due to Cambering Solid Geology Detail: Forest Marble Formation, Fullers Earth, Great Oolite Group, Inferior Oolite Group, Lias Group Superficial Geology Detail: No Details	A9NW (W)	832	7	383610 169460
	Non Coal Mining Areas of Great Britain Risk: Likely Source: British Geological Survey, National Geoscience Information Service	A10SE (NW)	0	2	384657 169201
	Non Coal Mining Areas of Great Britain Risk: Likely Source: British Geological Survey, National Geoscience Information Service	A11SW (E)	90	2	385000 169201
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A10SE (NW)	0	2	384657 169201
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A11SW (E)	90	2	385000 169201
	Potential for Compressible Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A10SE (W)	0	2	384556 169166
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A10SE (NW)	0	2	384657 169201
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A11SW (E)	90	2	385000 169201
	Potential for Compressible Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A10SE (S)	127	2	384616 168906

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Potential for Compressible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A7NW (S)	236	2	384718 168764
	Potential for Compressible Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A11NW (NE)	246	2	384870 169473
	Potential for Ground Dissolution Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A10NE (NW)	0	2	384647 169211
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A10SE (NW)	0	2	384657 169201
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A11SW (E)	90	2	385000 169201
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A10SE (NW)	0	2	384657 169201
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A11SW (E)	90	2	385000 169201
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A10SE (NW)	0	2	384657 169201
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A10SE (W)	0	2	384556 169166
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A11SW (E)	90	2	385000 169201
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A10SE (S)	127	2	384616 168906
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A11NW (NE)	246	2	384870 169473
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A10SE (NW)	0	2	384657 169201
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A10NE (NW)	0	2	384647 169211
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A11SW (E)	90	2	385000 169201
	Radon Potential - Radon Affected Areas Affected Area: The property is in a lower probability radon area, as less than 1% of homes are above the action level Source: British Geological Survey, National Geoscience Information Service	A10SE (NW)	0	2	384657 169201
	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	A10SE (NW)	0	2	384657 169201

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
85	**Contemporary Trade Directory Entries** Name: Merry Maids Location: Westwells Rd, Hawthorn, Corsham, Wiltshire, SN13 9RG Classification: Cleaning Services - Domestic **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A11NW (NE)	3	-	384731 169274
86	**Contemporary Trade Directory Entries** Name: P & D Manufacturing Location: Unit A11, Fiveways Trading Estate, Westwells Road, Hawthorn, Corsham, SN13 9RG Classification: Plastics - Injection Moulding **Status: Active** Positional Accuracy: Automatically positioned to the address	A11NW (N)	42	-	384670 169355
86	**Contemporary Trade Directory Entries** Name: Keiron Mould Tools Location: Unit A14, Fiveways Trading Estate, Westwells Road, Hawthorn, Corsham, Wiltshire, SN13 9RG Classification: Plastics - Injection Moulding **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A11NW (N)	84	-	384685 169395
86	**Contemporary Trade Directory Entries** Name: Bohan Engineering Location: Unit A14, Fiveways Trading Estate, Westwells Road, Hawthorn, Corsham, Wiltshire, SN13 9RG Classification: Precision Engineers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A11NW (N)	84	-	384685 169395
86	**Contemporary Trade Directory Entries** Name: Bohan Engineering Location: Unit A14, Fiveways Trading Estate, Westwells Road, Hawthorn, Corsham, Wiltshire, SN13 9RG Classification: Electrical Engineers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A11NW (N)	84	-	384685 169395
86	**Contemporary Trade Directory Entries** Name: Permajet Ltd Location: Fiveways Trading Est,Westwells Rd, Hawthorn, Corsham, Wiltshire, SN13 9RG Classification: Photo & Digital Imaging Bureaus **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A11NW (N)	86	-	384726 169374
87	**Contemporary Trade Directory Entries** Name: Lanwall Systems Ltd Location: 15, Fiveways House, Westwells Road, Hawthorn, Corsham, Wiltshire, SN13 9RG Classification: Office Equipment Servicing & Maintenance **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A10NE (N)	61	-	384614 169409
87	**Contemporary Trade Directory Entries** Name: Silver Imaging Ltd Location: 16, Fiveways House, Westwells Road, Hawthorn, Corsham, Wiltshire, SN13 9RG Classification: Photographic Equipment & Supplies - Wholesale **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A10NE (N)	61	-	384614 169409
87	**Contemporary Trade Directory Entries** Name: Odour Zone Solutions Co (Bath) Location: 11-13, Fiveways House, Westwells Road, Hawthorn, Corsham, Wiltshire, SN13 9RG Classification: Air Purification Equipment **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A10NE (N)	61	-	384614 169409
87	**Contemporary Trade Directory Entries** Name: Camasonics Location: Unit C/2, Fiveways Trading Estate, Westwells Road, Hawthorn, CORSHAM, Wiltshire, SN13 9RG Classification: Ultrasonic Equipment Manufacturers **Status: Active** Positional Accuracy: Automatically positioned to the address	A10NE (N)	75	-	384617 169423

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
87	**Contemporary Trade Directory Entries** Name: Ultronics N D T Ltd Location: Unit Lc2 Fiveways Industrial Estate, Westwells Road, Hawthorn, Corsham, Wiltshire, SN13 9RG Classification: Ultrasonic Equipment Manufacturers **Status: Active** Positional Accuracy: Manually positioned within the geographical locality	A10NE (N)	85	-	384637 169424
88	**Contemporary Trade Directory Entries** Name: Smith'S Vehicle Repairs Location: Unit G-h, Fiveways Trading Estate, Westwells Road, Hawthorn, Corsham, Wiltshire, SN13 9RG Classification: Commercial Vehicle Servicing, Repairs, Parts & Accessories **Status: Active** Positional Accuracy: Automatically positioned to the address	A10NE (N)	117	-	384609 169476
88	**Contemporary Trade Directory Entries** Name: Abbey Building Ltd Location: Unit L, Fiveways Trading Estate, Westwells Road, Hawthorn, Corsham, Wiltshire, SN13 9RG Classification: Joinery Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A10NE (N)	126	-	384579 169504
88	**Contemporary Trade Directory Entries** Name: Alans Motorcycles Location: Unit N/1, Fiveways Trading Estate, Westwells Road, Hawthorn, Corsham, Wiltshire, SN13 9RG Classification: Garage Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A10NE (N)	148	-	384600 169518
88	**Contemporary Trade Directory Entries** Name: Spec Racing Location: Unit P/1, Fiveways Trading Estate, Westwells Road, Hawthorn, Corsham, Wiltshire, SN13 9RG Classification: Aluminium Fabricators **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A10NE (N)	149	-	384613 169511
88	**Contemporary Trade Directory Entries** Name: Fotospeed Location: Fiveways Trading Estate,Westwells Rd, Hawthorn, Corsham, Wiltshire, SN13 9RG Classification: Photographic Equipment & Supplies - Manufacturers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A10NE (N)	155	-	384595 169528
88	**Contemporary Trade Directory Entries** Name: Corsham Body Repairs Location: Unit P/2, Fiveways Trading Estate, Westwells Road, Hawthorn, Corsham, Wiltshire, SN13 9RG Classification: Car Body Repairs **Status: Active** Positional Accuracy: Automatically positioned to the address	A10NE (N)	157	-	384618 169518
88	**Contemporary Trade Directory Entries** Name: Rudloe Body Works Location: Unit N2, Fiveways Trading Estate, Westwells Road, Hawthorn, Corsham, SN13 9RG Classification: Car Body Repairs **Status: Active** Positional Accuracy: Automatically positioned to the address	A10NE (N)	158	-	384606 169525
88	**Contemporary Trade Directory Entries** Name: Corsham Patio Centre Location: Unit Q1-Q2, Fiveways Trading Estate, Westwells Road, Hawthorn, Corsham, Wiltshire, SN13 9RG Classification: Concrete Products **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A10NE (N)	158	-	384631 169511
89	**Contemporary Trade Directory Entries** Name: Casual Bed Co Ltd Location: Unit A15,Fiveways Ind Est,Westwells Rd, Hawthorn, Corsham, Wiltshire, SN13 9RG Classification: Bed & Mattress Manufacturers **Status: Inactive** Positional Accuracy: Manually positioned within the geographical locality	A10NE (N)	140	-	384669 169469

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
90	**Contemporary Trade Directory Entries** Name: Gelson Repairs Location: 62, Springfield Close, Corsham, Wiltshire, SN13 0JR Classification: Concrete & Mortar Ready Mixed **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SE (N)	209	-	384546 169612
91	**Contemporary Trade Directory Entries** Name: Airbus Defence & Space Location: 1001, Skynet Drive, Corsham, SN13 9NP Classification: Radio Communication Equipment **Status: Active** Positional Accuracy: Automatically positioned to the address	A11NW (NE)	263	-	384809 169530
92	**Contemporary Trade Directory Entries** Name: Colour Change Uk Ltd Location: Spring Quarry, Westwells Road, Hawthorn, Corsham, Wiltshire, SN13 9GB Classification: Commercial Vehicle Bodybuilders & Repairers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A11SE (SE)	357	-	385161 168885
92	**Contemporary Trade Directory Entries** Name: Stephens Industries Location: Hawthorn Works, Corsham, Wiltshire, SN13 9RD Classification: Machine Shops **Status: Active** Positional Accuracy: Automatically positioned to the address	A7NE (SE)	372	-	385151 168841
93	**Contemporary Trade Directory Entries** Name: Oakwood Recovery Location: 14, Trenchard Avenue, Corsham, Wiltshire, SN13 0LW Classification: Breakdown and Recovery **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14NE (N)	605	-	384594 170007
94	**Contemporary Trade Directory Entries** Name: E A Bulling & Co Location: 17, Pine Close, Corsham, Wiltshire, SN13 0LB Classification: Electrical Engineers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14NE (N)	644	-	384511 170055
95	**Contemporary Trade Directory Entries** Name: Turnertech Location: 37, Pine Close, Corsham, Wiltshire, SN13 0LB Classification: Mechanical Engineers **Status: Active** Positional Accuracy: Automatically positioned to the address	A14NE (N)	680	-	384571 170086
96	**Contemporary Trade Directory Entries** Name: Wenwood Motors Location: 2a-2b, Beech Road, Box Hill, Corsham, Wiltshire, SN13 8HF Classification: Car Body Repairs **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (NW)	723	-	383788 169671
96	**Contemporary Trade Directory Entries** Name: Pharon Powder Coatings Ltd Location: Beech Road, Box Hill, Corsham, Wiltshire, SN13 8HF Classification: Powder Coatings **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (NW)	723	-	383788 169671
96	**Contemporary Trade Directory Entries** Name: Acorn Joinery Location: 4c-4d, Box Hill, Corsham, Wiltshire, SN13 8HA Classification: Joinery Manufacturers **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SE (NW)	725	-	383805 169712
97	**Contemporary Trade Directory Entries** Name: Nick Ogborne Location: 26, Leylands Road, Corsham, Wiltshire, SN13 0NF Classification: Garage Equipment **Status: Active** Positional Accuracy: Automatically positioned to the address	A15NW (N)	743	-	384902 170030
98	**Contemporary Trade Directory Entries** Name: Dirt Trapper Doormat Co Location: Unit 1 Moon Indust Est,Beech Rd, Box Hill, Corsham, Wiltshire, SN13 8HE Classification: Carpets & Rugs - Manufacturers **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A13SE (NW)	751	-	383740 169619

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
99	**Contemporary Trade Directory Entries** Name: Box Hill Motors Ltd Location: Box Hill, Corsham, Wiltshire, SN13 8HA Classification: Mot Testing Centres **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (NW)	827	-	383662 169627
100	**Contemporary Trade Directory Entries** Name: P J Motor Services Location: Highway, Box Hill, Corsham, Wiltshire, SN13 8EY Classification: Garage Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A9NW (W)	991	-	383460 169519
101	**Fuel Station Entries** Name: Westwells Garage Ltd Location: Westwells Road, Westwells, Neston, CORSHAM, Wiltshire, SN13 9RQ Brand: OBSOLETE Premises Type: Not Applicable **Status: Obsolete** Positional Accuracy: Approximate location provided by supplier	A12SW (E)	505	-	385400 169027
102	**Points of Interest - Commercial Services** Name: Rudloe Body Works Location: Unit A2-A3 Fiveways Trading Estate, Westwells Road, Hawthorn, Corsham, SN13 9RG Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A10NE (N)	85	8	384637 169424
102	**Points of Interest - Commercial Services** Name: Smith's Vehicle Repairs Location: Unit G-h Fiveways Trading Estate, Westwells Road, Hawthorn, Corsham, SN13 9RG Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A10NE (N)	117	8	384609 169476
103	**Points of Interest - Commercial Services** Name: Smiths Vehicle Repairs Location: Unit LB Fiveways Trading Estate, Westwells Road, Hawthorn, Corsham, SN13 9RG Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A10NE (N)	126	8	384554 169518
103	**Points of Interest - Commercial Services** Name: Alans Motorcycles Location: Unit N/1 Fiveways Trading Estate, Westwells Road, Hawthorn, Corsham, SN13 9RG Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A10NE (N)	148	8	384600 169518
103	**Points of Interest - Commercial Services** Name: Rudloe Body Works Location: Unit N/2 Fiveways Trading Estate, Westwells Road, Hawthorn, Corsham, SN13 9RG Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A10NE (N)	156	8	384604 169524
103	**Points of Interest - Commercial Services** Name: Corsham Body Repairs Location: Unit P/2 Fiveways Trading Estate, Westwells Road, Hawthorn, Corsham, SN13 9RG Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A10NE (N)	157	8	384618 169518
104	**Points of Interest - Commercial Services** Name: Colour Change UK Ltd Location: Media Park Spring Quarry, Westwells Road, Hawthorn, Corsham, SN13 9GB Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A11SE (SE)	357	8	385161 168885
105	**Points of Interest - Commercial Services** Name: Corsham Body Repairs Location: 2 Westwells Road, Corsham, SN13 9ET Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A7NE (SE)	509	8	385332 168866

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
106	**Points of Interest - Commercial Services** Name: Wenwood Motors Location: Wenwood Motors 2a-2b, Beech Road, Box Hill, Corsham, SN13 8HF Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A13SE (NW)	723	8	383788 169671
107	**Points of Interest - Commercial Services** Name: The Clift Garage Location: Box Hill, Corsham, SN13 8HA Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A13SE (NW)	824	8	383665 169625
107	**Points of Interest - Commercial Services** Name: Box Hill Motors Ltd Location: Box Hill, Corsham, SN13 8HA Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A13SE (NW)	827	8	383662 169627
107	**Points of Interest - Commercial Services** Name: Box Hill Motors Ltd Location: Box Hill, Corsham, SN13 8HA Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A13SE (NW)	827	8	383662 169627
108	**Points of Interest - Commercial Services** Name: Discount Mobile Car Valet Location: Little Tyning, Box Hill, Corsham, SN13 8HG Category: Personal, Consumer and other Services Class Code: Vehicle Cleaning Services Positional Accuracy: Positioned to address or location	A9NW (W)	829	8	383621 169499
108	**Points of Interest - Commercial Services** Name: Discount Mobile Car Valet Location: Little Tyning, Box Hill, Corsham, SN13 8HG Category: Personal, Consumer and other Services Class Code: Vehicle Cleaning Services Positional Accuracy: Positioned to address or location	A9NW (W)	829	8	383621 169499
109	**Points of Interest - Commercial Services** Name: P J Motor Services Location: Highway, Box Hill, Corsham, SN13 8EY Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A9NW (W)	991	8	383460 169519
109	**Points of Interest - Commercial Services** Name: P J Motor Services Location: Highway, Box Hill, Corsham, SN13 8EY Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A9NW (W)	991	8	383460 169519
110	**Points of Interest - Manufacturing and Production** Name: Factory Location: SN13 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to address or location	A7NE (SE)	374	8	385146 168831
110	**Points of Interest - Manufacturing and Production** Name: Factory Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A7NE (SE)	376	8	385146 168827
111	**Points of Interest - Manufacturing and Production** Name: Slope Shaft (Disused) Location: SN13 Category: Extractive Industries Class Code: Unspecified Quarries Or Mines Positional Accuracy: Positioned to address or location	A7NE (SE)	490	8	385089 168600
112	**Points of Interest - Manufacturing and Production** Name: Shafts Location: SN13 Category: Extractive Industries Class Code: Unspecified Quarries Or Mines Positional Accuracy: Positioned to an adjacent address or location	A9NE (W)	573	8	383858 169257

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
113	**Points of Interest - Manufacturing and Production** Name: Air Shaft Location: SN13 Category: Extractive Industries Class Code: Unspecified Quarries Or Mines Positional Accuracy: Positioned to address or location	A8NW (SE)	637	8	385469 168844
114	**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	A13SE (NW)	715	8	383809 169697
114	**Points of Interest - Manufacturing and Production** Name: Works Location: SN13 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13SE (NW)	722	8	383798 169689
115	**Points of Interest - Manufacturing and Production** Name: Shaft (Disused) Location: SN13 Category: Extractive Industries Class Code: Unspecified Quarries Or Mines Positional Accuracy: Positioned to address or location	A18SE (N)	959	8	384569 170367
115	**Points of Interest - Manufacturing and Production** Name: Shaft (Disused) Location: SN13 Category: Extractive Industries Class Code: Unspecified Quarries Or Mines Positional Accuracy: Positioned to address or location	A18SE (N)	969	8	384608 170373
116	**Points of Interest - Public Infrastructure** Name: Waste Away Wiltshire Ltd Location: Unit J Fiveways Trading Estate, Westwells Road, Hawthorn, Corsham, SN13 9RG Category: Infrastructure and Facilities Class Code: Waste Storage, Processing and Disposal Positional Accuracy: Positioned to address or location	A10NE (N)	127	8	384604 169491
117	**Points of Interest - Public Infrastructure** Name: Sluice Location: SN13 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A12NW (E)	797	8	385671 169388
117	**Points of Interest - Public Infrastructure** Name: Sluice Location: SN13 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A12NW (E)	801	8	385680 169370
118	**Points of Interest - Recreational and Environmental** Name: Play Area Location: Westwells Road, SN13 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to address or location	A11SE (SE)	447	8	385274 168890
118	**Points of Interest - Recreational and Environmental** Name: Play Area Location: Not Supplied Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A11SE (SE)	449	8	385273 168886
119	**Points of Interest - Recreational and Environmental** Name: Play Area Location: Not Supplied Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A14SW (NW)	482	8	384118 169737
120	**Points of Interest - Recreational and Environmental** Name: Playground Location: Tedder Avenue, SN13 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A14NE (N)	545	8	384521 169955

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
120	**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	A14NE (N)	548	8	384521 169958
121	**Points of Interest - Recreational and Environmental** Name: Playground Location: Westwood Road, SN13 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to address or location	A15NW (N)	646	8	384806 169973
121	**Points of Interest - Recreational and Environmental** Name: Play Area Location: Not Supplied Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A15NW (N)	698	8	384815 170027
122	**Points of Interest - Recreational and Environmental** Name: Playground Location: Allen Road, SN13 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to address or location	A16SW (NE)	945	8	385516 169875
122	**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	A16SW (NE)	962	8	385541 169876

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
123	**Ancient Woodland** Name: Kingsmoor Wood Reference: 1110240 Area(m²): 46293.85 Type: Plantation on Ancient Woodland	A7SW (S)	554	9	384705 168446
124	**Areas of Adopted Green Belt** Authority: North Wiltshire District Council (now part of Wiltshire Council) Plan Name: North Wiltshire Local Plan 2011 **Status: Adopted** Plan Date: 30th June 2006	A10NE (W)	0	10	384499 169240
125	**Areas of Unadopted Green Belt** Authority: Wiltshire Council, Planning Department Plan Name: Proposal Map **Status: Submission Draft** Plan Date: 10th July 2012	A10NE (W)	0	11	384502 169248
126	**Areas of Outstanding Natural Beauty** Name: Cotswolds Multiple Areas: N Total Area (m2): 2041091141.357 Designation Date: 30th August 1966 Source: Natural England	A10NE (W)	10	9	384408 169283
127	**Nitrate Vulnerable Zones** Name: Not Supplied Description: Surface Water Source: Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	A10SE (NW)	0	12	384657 169201
128	**Sites of Special Scientific Interest** Name: Box Mine Multiple Areas: Y Total Area (m2): 587402.38 Source: Natural England Reference: 1005600 Designation Details: Site Of Special Scientific Interest Designation Date: 15th February 1991 Date Type: Notified Designation Details: Special Area Of Conservation Designation Date: 15th February 1991 Date Type: Notified Designation Details: Ministry Of Defence Reserve Designation Date: 15th February 1991 Date Type: Notified	A10NE (W)	14	9	384405 169288
129	**Sites of Special Scientific Interest** Name: Corsham Railway Cutting Multiple Areas: Y Total Area (m2): 52479.07 Source: Natural England Reference: 1003317 Designation Details: Geological Conservation Review Designation Date: 6th February 1987 Date Type: Notified Designation Details: Site Of Special Scientific Interest Designation Date: 6th February 1987 Date Type: Notified	A12NE (E)	917	9	385789 169417
130	**Special Areas of Conservation** Name: Bath & Bradford On Avon Bats Multiple Areas: Y Total Area (m2): 1078574.1 Source: Natural England Reference: UK0012584 **Status: Designated**	A10NE (W)	14	9	384405 169288

Agency & Hydrological	Version	Update Cycle
Contaminated Land Register Entries and Notices		
South Gloucestershire Council - Environmental Services Department	January 2015	Annual Rolling Update
West Wiltshire District Council (now part of Wiltshire Council) - Environmental Health Department	June 2008	Not Applicable
Wiltshire Council - Environmental Health Department	March 2015	Annually
North Wiltshire District Council (now part of Wiltshire Council) - Environmental Services	May 2008	Not Applicable
Bath and North East Somerset Council - Environmental Health Department	October 2014	Annual Rolling Update
Discharge Consents		
Environment Agency - South West Region	April 2016	Quarterly
Enforcement and Prohibition Notices		
Environment Agency - South West Region	March 2013	As notified
Integrated Pollution Controls		
Environment Agency - South West Region	October 2008	Not Applicable
Integrated Pollution Prevention And Control		
Environment Agency - South West Region	April 2016	Quarterly
Local Authority Integrated Pollution Prevention And Control		
Bath and North East Somerset Council - Environmental Health Department	February 2015	Annual Rolling Update
South Gloucestershire Council - Environmental Services Department	January 2015	Annual Rolling Update
West Wiltshire District Council (now part of Wiltshire Council) - Environmental Health Department	July 2008	Not Applicable
Wiltshire Council - Environmental Health Department	July 2015	Annually
North Wiltshire District Council (now part of Wiltshire Council) - Environmental Services	September 2008	Not Applicable
Local Authority Pollution Prevention and Controls		
Bath and North East Somerset Council - Environmental Health Department	February 2015	Annual Rolling Update
South Gloucestershire Council - Environmental Services Department	January 2015	Annual Rolling Update
West Wiltshire District Council (now part of Wiltshire Council) - Environmental Health Department	July 2008	Not Applicable
Wiltshire Council - Environmental Health Department	July 2015	Annually
North Wiltshire District Council (now part of Wiltshire Council) - Environmental Services	September 2008	Not Applicable
Local Authority Pollution Prevention and Control Enforcements		
Bath and North East Somerset Council - Environmental Health Department	February 2015	Annual Rolling Update
South Gloucestershire Council - Environmental Services Department	January 2015	Annual Rolling Update
West Wiltshire District Council (now part of Wiltshire Council) - Environmental Health Department	July 2008	Not Applicable
Wiltshire Council - Environmental Health Department	July 2015	Annually
North Wiltshire District Council (now part of Wiltshire Council) - Environmental Services	September 2008	Not Applicable
Nearest Surface Water Feature		
Ordnance Survey	July 2012	Quarterly
Pollution Incidents to Controlled Waters		
Environment Agency - South West Region	September 1999	Not Applicable
Prosecutions Relating to Authorised Processes		
Environment Agency - South West Region	March 2013	As notified
Prosecutions Relating to Controlled Waters		
Environment Agency - South West Region	March 2013	As notified
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 - South West Region - North Wessex Area	April 2016	Quarterly
Environment Agency - South West Region - Wessex Area	April 2016	Quarterly

Agency & Hydrological	Version	Update Cycle
Water Abstractions Environment Agency - South West Region	January 2016	Quarterly
Water Industry Act Referrals Environment Agency - South West Region	April 2016	Quarterly
Groundwater Vulnerability Environment Agency - Head Office	April 2015	Not Applicable
Drift Deposits Environment Agency - Head Office	January 1999	Not Applicable
Bedrock Aquifer Designations British Geological Survey - National Geoscience Information Service	August 2015	As notified
Superficial Aquifer Designations British Geological Survey - National Geoscience Information Service	August 2015	As notified
Source Protection Zones Environment Agency - Head Office	April 2016	Quarterly
Extreme Flooding from Rivers or Sea without Defences Environment Agency - Head Office	February 2016	Quarterly
Flooding from Rivers or Sea without Defences Environment Agency - Head Office	February 2016	Quarterly
Areas Benefiting from Flood Defences Environment Agency - Head Office	February 2016	Quarterly
Flood Water Storage Areas Environment Agency - Head Office	February 2016	Quarterly
Flood Defences Environment Agency - Head Office	February 2016	Quarterly
Detailed River Network Lines Environment Agency - Head Office	March 2012	Annually
Detailed River Network Offline Drainage Environment Agency - Head Office	March 2012	Annually
Surface Water 1 in 30 year Flood Extent Environment Agency - Head Office	October 2013	As notified
Surface Water 1 in 100 year Flood Extent Environment Agency - Head Office	October 2013	As notified
Surface Water 1 in 1000 year Flood Extent Environment Agency - Head Office	October 2013	As notified
Surface Water Suitability Environment Agency - Head Office	October 2013	As notified
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	March 2016	Quarterly
Integrated Pollution Control Registered Waste Sites		
Environment Agency - South West Region	October 2008	Not Applicable
Licensed Waste Management Facilities (Landfill Boundaries)		
Environment Agency - South West Region - North Wessex Area	February 2016	Quarterly
Environment Agency - South West Region - Wessex Area	February 2016	Quarterly
Licensed Waste Management Facilities (Locations)		
Environment Agency - South West Region - North Wessex Area	April 2016	Quarterly
Environment Agency - South West Region - Wessex Area	April 2016	Quarterly
Local Authority Landfill Coverage		
Bath and North East Somerset Council - Planning Services Department	May 2000	Not Applicable
North Wiltshire District Council (now part of Wiltshire Council) - Environmental Services	May 2000	Not Applicable
South Gloucestershire Council - Environmental Services Department	May 2000	Not Applicable
West Wiltshire District Council (now part of Wiltshire Council) - Environmental Health Department	May 2000	Not Applicable
Wiltshire County Council (now part of Wiltshire Council)	May 2000	Not Applicable
Local Authority Recorded Landfill Sites		
Bath and North East Somerset Council - Planning Services Department	May 2000	Not Applicable
North Wiltshire District Council (now part of Wiltshire Council) - Environmental Services	May 2000	Not Applicable
South Gloucestershire Council - Environmental Services Department	May 2000	Not Applicable
West Wiltshire District Council (now part of Wiltshire Council) - Environmental Health Department	May 2000	Not Applicable
Wiltshire County Council (now part of Wiltshire Council)	May 2000	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 - South West Region - North Wessex Area	March 2003	Not Applicable
Registered Waste Transfer Sites		
Environment Agency - South West Region - North Wessex Area	March 2003	Not Applicable
Registered Waste Treatment or Disposal Sites		
Environment Agency - South West Region - North Wessex Area	March 2003	Not Applicable

Hazardous Substances	Version	Update Cycle
Control of Major Accident Hazards Sites (COMAH)		
Health and Safety Executive	February 2016	Bi-Annually
Explosive Sites		
Health and Safety Executive	February 2016	Bi-Annually
Notification of Installations Handling Hazardous Substances (NIHHS)		
Health and Safety Executive	November 2000	Not Applicable
Planning Hazardous Substance Enforcements		
Wiltshire County Council (now part of Wiltshire Council)	December 2008	Annual Rolling Update
Bath and North East Somerset Council - Economic and Environmental Development	February 2016	Annual Rolling Update
Wiltshire Council - Planning Department	February 2016	Annually
North Wiltshire District Council (now part of Wiltshire Council)	June 2009	Not Applicable
South Gloucestershire Council - Development Control: Planning	May 2016	Annual Rolling Update
West Wiltshire District Council (now part of Wiltshire Council)	September 2009	Not Applicable
Planning Hazardous Substance Consents		
Wiltshire County Council (now part of Wiltshire Council)	December 2008	Annual Rolling Update
Bath and North East Somerset Council - Economic and Environmental Development	February 2016	Annual Rolling Update
Wiltshire Council - Planning Department	February 2016	Annually
North Wiltshire District Council (now part of Wiltshire Council)	June 2009	Not Applicable
South Gloucestershire Council - Development Control: Planning	May 2016	Annual Rolling Update
West Wiltshire District Council (now part of Wiltshire Council)	September 2009	Not Applicable

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	May 2016	Bi-Annually
Brine Compensation Area		
Cheshire Brine Subsidence Compensation Board	August 2011	Not Applicable
Coal Mining Affected Areas		
The Coal Authority - Property Searches	March 2014	As notified
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	June 2015	Annually
Potential for Compressible Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Ground Dissolution Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Landslide Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Running Sand Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2015	Annually
Radon Potential - Radon Affected Areas		
British Geological Survey - National Geoscience Information Service	July 2011	As notified
Radon Potential - Radon Protection Measures		
British Geological Survey - National Geoscience Information Service	July 2011	As notified

Industrial Land Use	Version	Update Cycle
Contemporary Trade Directory Entries Thomson Directories	April 2016	Quarterly
Fuel Station Entries Catalist Ltd - Experian	February 2016	Quarterly
Gas Pipelines National Grid	July 2014	Quarterly
Points of Interest - Commercial Services PointX	March 2016	Quarterly
Points of Interest - Education and Health PointX	March 2016	Quarterly
Points of Interest - Manufacturing and Production PointX	March 2016	Quarterly
Points of Interest - Public Infrastructure PointX	March 2016	Quarterly
Points of Interest - Recreational and Environmental PointX	March 2016	Quarterly
Underground Electrical Cables National Grid	January 2016	Bi-Annually

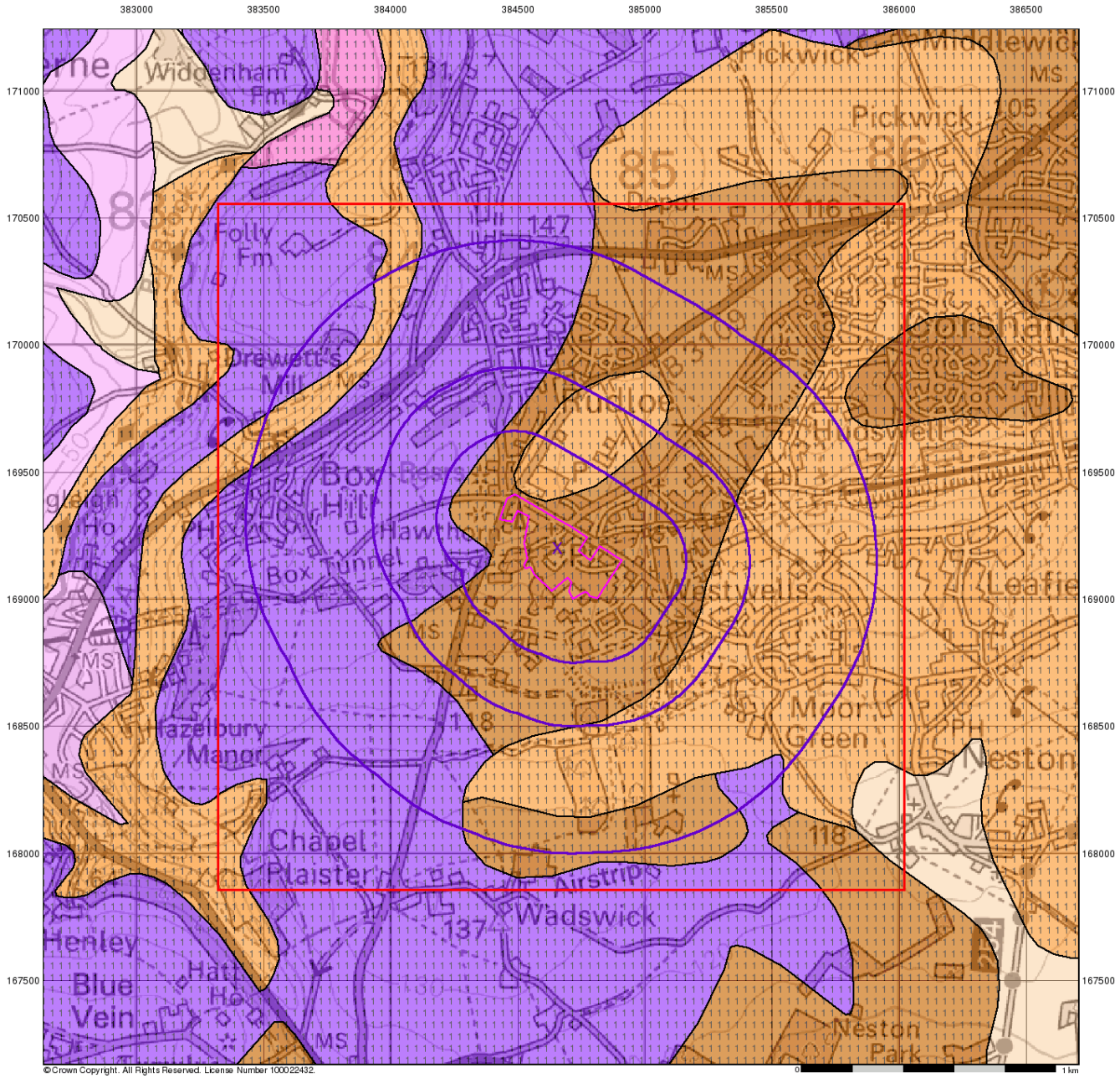
Sensitive Land Use	Version	Update Cycle
Ancient Woodland		
Natural England	June 2015	Bi-Annually
Areas of Adopted Green Belt		
Bath and North East Somerset Council	May 2016	As notified
North Wiltshire District Council (now part of Wiltshire Council)	May 2016	As notified
South Gloucestershire Council	May 2016	As notified
West Wiltshire District Council (now part of Wiltshire Council)	May 2016	As notified
Areas of Unadopted Green Belt		
Bath and North East Somerset Council	November 201	As notified
North Wiltshire District Council (now part of Wiltshire Council)	November 201	As notified
South Gloucestershire Council	November 201	As notified
West Wiltshire District Council (now part of Wiltshire Council)	November 201	As notified
Wiltshire Council - Planning Department	November 201	As notified
Areas of Outstanding Natural Beauty		
Natural England	April 2016	Bi-Annually
Environmentally Sensitive Areas		
Natural England	April 2016	Annually
Forest Parks		
Forestry Commission	April 1997	Not Applicable
Local Nature Reserves		
Natural England	April 2016	Bi-Annually
Marine Nature Reserves		
Natural England	April 2016	Bi-Annually
National Nature Reserves		
Natural England	April 2016	Bi-Annually
National Parks		
Natural England	March 2016	Bi-Annually
Nitrate Sensitive Areas		
Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	April 2016	Not Applicable
Nitrate Vulnerable Zones		
Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	October 2015	Annually
Ramsar Sites		
Natural England	April 2016	Bi-Annually
Sites of Special Scientific Interest		
Natural England	April 2016	Bi-Annually
Special Areas of Conservation		
Natural England	April 2016	Bi-Annually
Special Protection Areas		
Natural England	April 2016	Bi-Annually
World Heritage Sites		
English Heritage - National Monument Record Centre	September 2015	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	
Peter Brett Associates	

Contact	Name and Address	Contact Details
2	**British Geological Survey - Enquiry Service** British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
3	**Environment Agency - National Customer Contact Centre (NCCC)** PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 03708 506 506 Email: enquiries@environment-agency.gov.uk
4	**North Wiltshire District Council (now part of Wiltshire Council) - Environmental Services** County Hall, Bythesea Road, Trowbridge, Wiltshire, BA14 8JN	Telephone: 0300 456 0100 Website: www.wiltshire.gov.uk
5	**Wiltshire County Council (now part of Wiltshire Council)** County Hall, Bythesea Road, Trowbridge, Wiltshire, BA14 8JN	Telephone: 01225 713000 Email: communications@wiltshire.gov.uk Website: www.wiltshire.gov.uk
6	**Health and Safety Executive** 5S.2 Redgrave Court, Merton Road, Bootle, L20 7HS	Website: www.hse.gov.uk
7	**Peter Brett Associates** Caversham Bridge House, Waterman Place, Reading, Berkshire, RG1 8DN	Telephone: 0118 950 0761 Fax: 0118 959 7498 Email: reading@pba.co.uk Website: www.pba.co.uk
8	**PointX** 7 Abbey Court, Eagle Way, Sowton, Exeter, Devon, EX2 7HY	Website: www.pointx.co.uk
9	**Natural England** County Hall, Spetchley Road, Worcester, WR5 2NP	Telephone: 0300 060 3900 Email: enquiries@naturalengland.org.uk Website: www.naturalengland.org.uk
10	**North Wiltshire District Council (now part of Wiltshire Council)** County Hall, Bythesea Road, Trowbridge, Wiltshire, BA14 8JN	Telephone: 0300 456 0100 Website: www.wiltshire.gov.uk
11	**Wiltshire Council - Planning Department** County Hall, Bythesea Road, Trowbridge, Wiltshire, BA14 8JN	Telephone: 01225 713000 Email: customerservices@wiltshire.gov.uk Website: www.wiltshire.gov.uk
12	**Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)** Government Buildings, Otley Road, Lawnswood, Leeds, West Yorkshire, LS16 5QT	Telephone: 0113 2613333 Fax: 0113 230 0879
13	**Environment Agency - Head Office** Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, Avon, BS32 4UD	Telephone: 01454 624400 Fax: 01454 624409
-	**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.



Groundwater Vulnerability

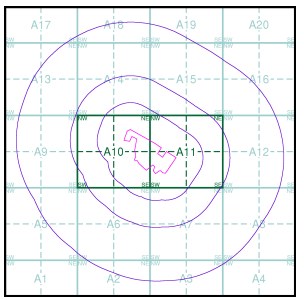
General

Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Agency and Hydrological

Geological Classes	Soil Classes
Major Aquifer (Highly Permeable)	High (H) 1, 2, 3, U
	Intermediate (I) 1, 2
	Low
Minor Aquifer (Variably Permeable)	High (H) 1, 2, 3, U
	Intermediate (I) 1, 2
	Low
Non Aquifer (Negligibly Permeable)	
Water or Sea	
Drift Deposit	

Site Sensitivity Context Map - Slice A



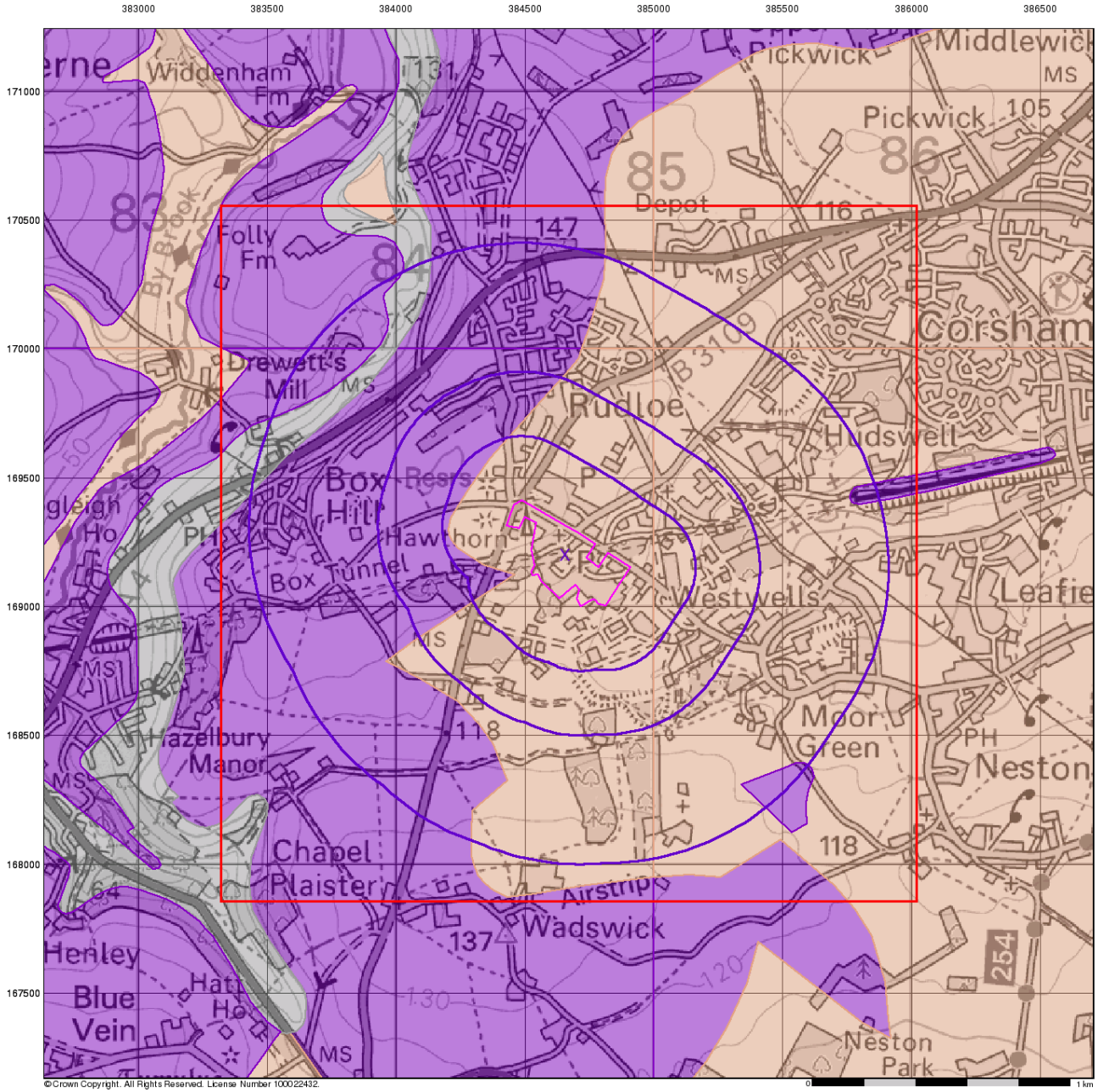
Order Details

Order Number:	87557403_1_1
Customer Ref:	C161303
National Grid Reference:	384660, 169200
Slice:	A
Site Area (Ha):	8.46
Search Buffer (m):	1000

Site Details

Site at 384780, 169170

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Bedrock Aquifer Designation

General

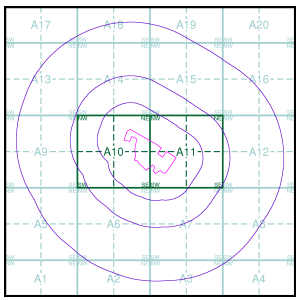
Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown
- Unknown (Lakes and Landslip)

Site Sensitivity Context Map - Slice A

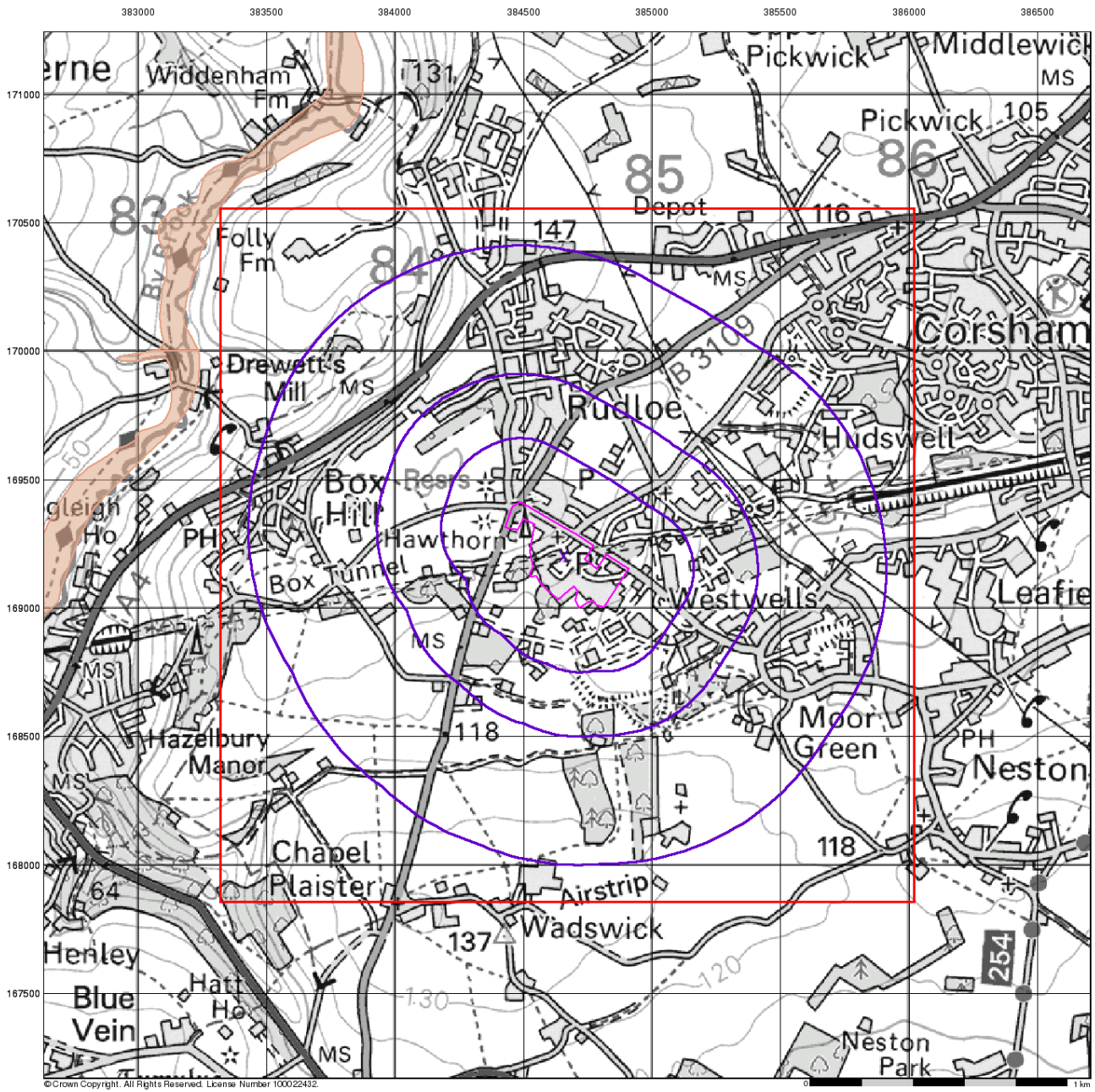


Order Details

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Slice:	A
Site Area (Ha):	8.46
Search Buffer (m):	1000

Site Details

Site at 384780, 169170



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Superficial Aquifer Designation

General

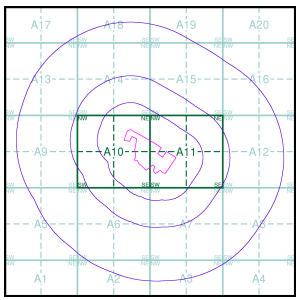
Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown
- Unknown (Lakes and Landslip)

Site Sensitivity Context Map - Slice A



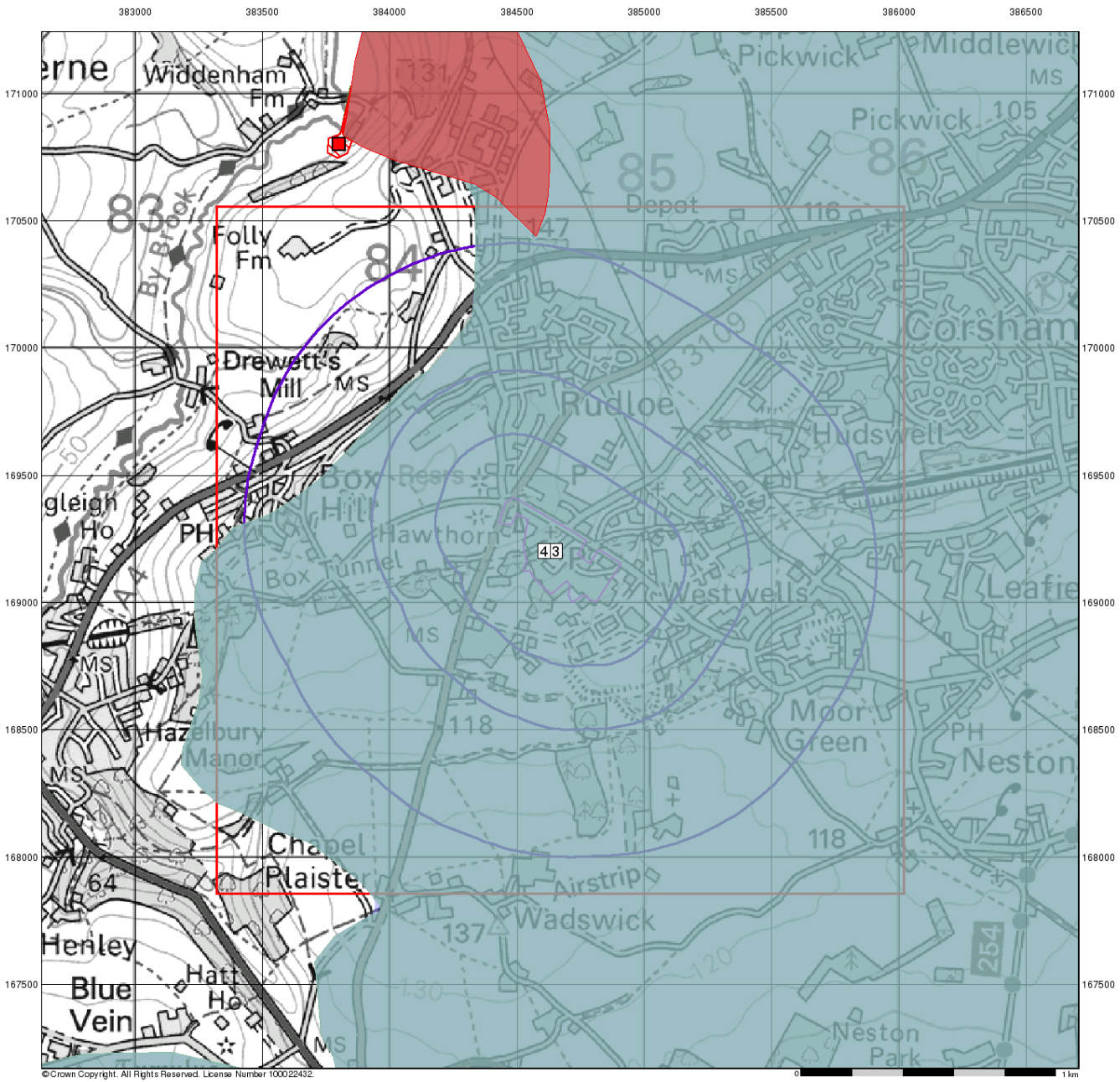
Order Details

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Slice:	A
Site Area (Ha):	8.46
Search Buffer (m):	1000

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Source Protection Zones

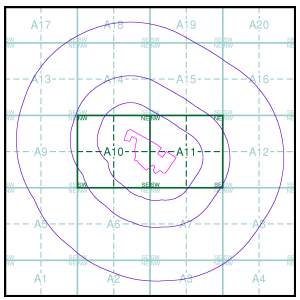
General

Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Agency and Hydrological

- Inner zone (Zone 1)
- Inner zone - subsurface activity only (Zone 1c)
- Outer zone (Zone 2)
- Outer zone - subsurface activity only (Zone 2c)
- Total catchment (Zone 3)
- Total catchment - subsurface activity only (Zone 3c)
- Special interest (Zone 4)
- Source Protection Zone Borehole

Site Sensitivity Context Map - Slice A



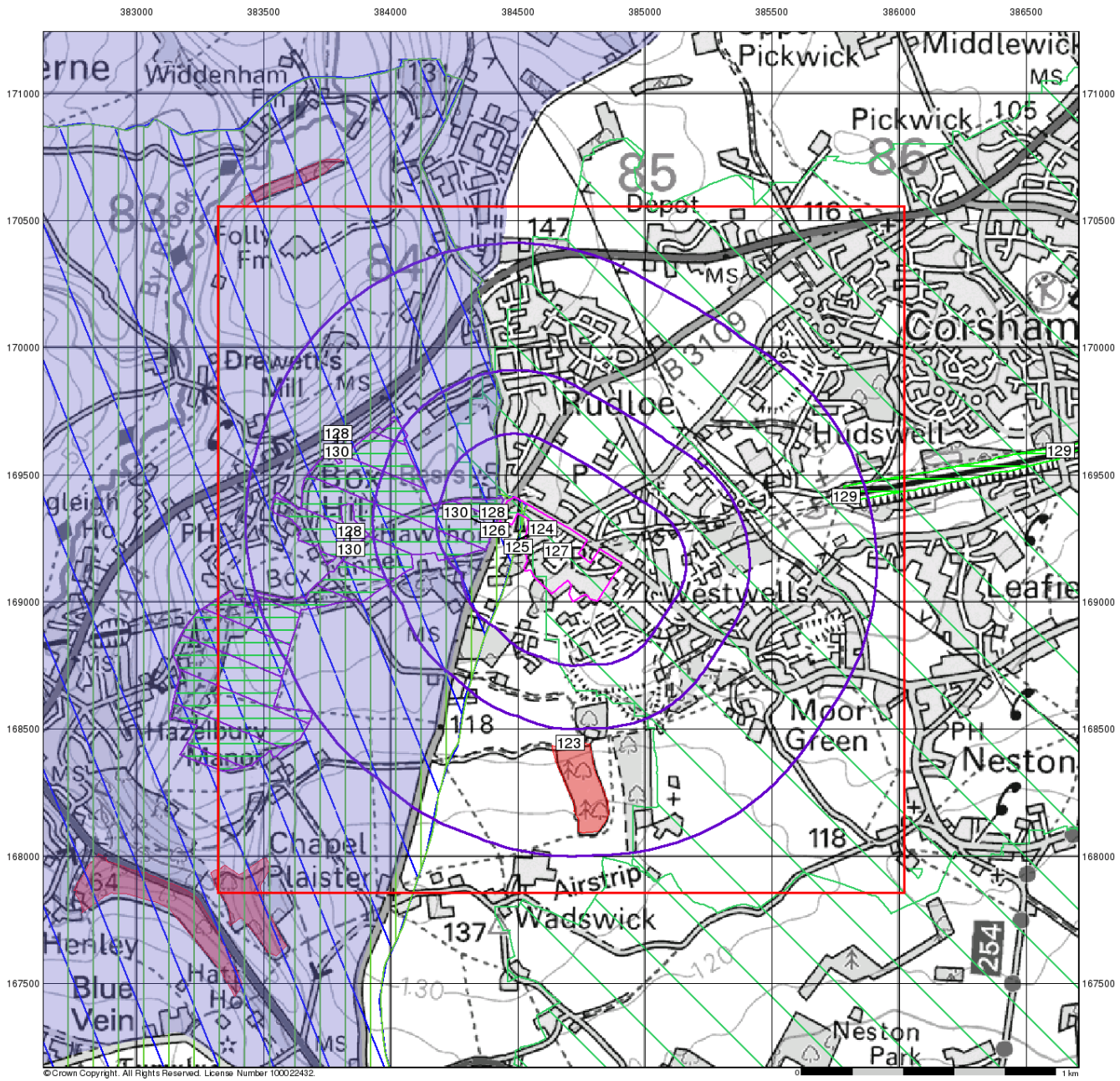
Order Details

Order Number:	87557403_1_1
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Site Details

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Sensitive Land Uses

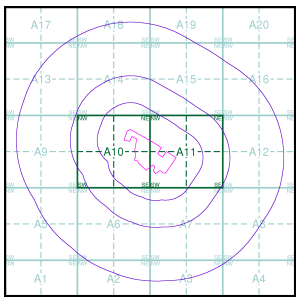
General

Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Sensitive Land Uses

- Ancient Woodland
- Area of Adopted Green Belt
- Area of Unadopted Green Belt
- Area of Outstanding Natural Beauty
- Environmentally Sensitive Area
- Forest Park
- Local Nature Reserve
- Marine Nature Reserve
- National Nature Reserve
- National Park
- Nitrate Sensitive Area
- Nitrate Vulnerable Zone
- Ramsar Site
- Site of Special Scientific Interest
- Special Area of Conservation
- Special Protection Area
- World Heritage Sites

Site Sensitivity Context Map - Slice A



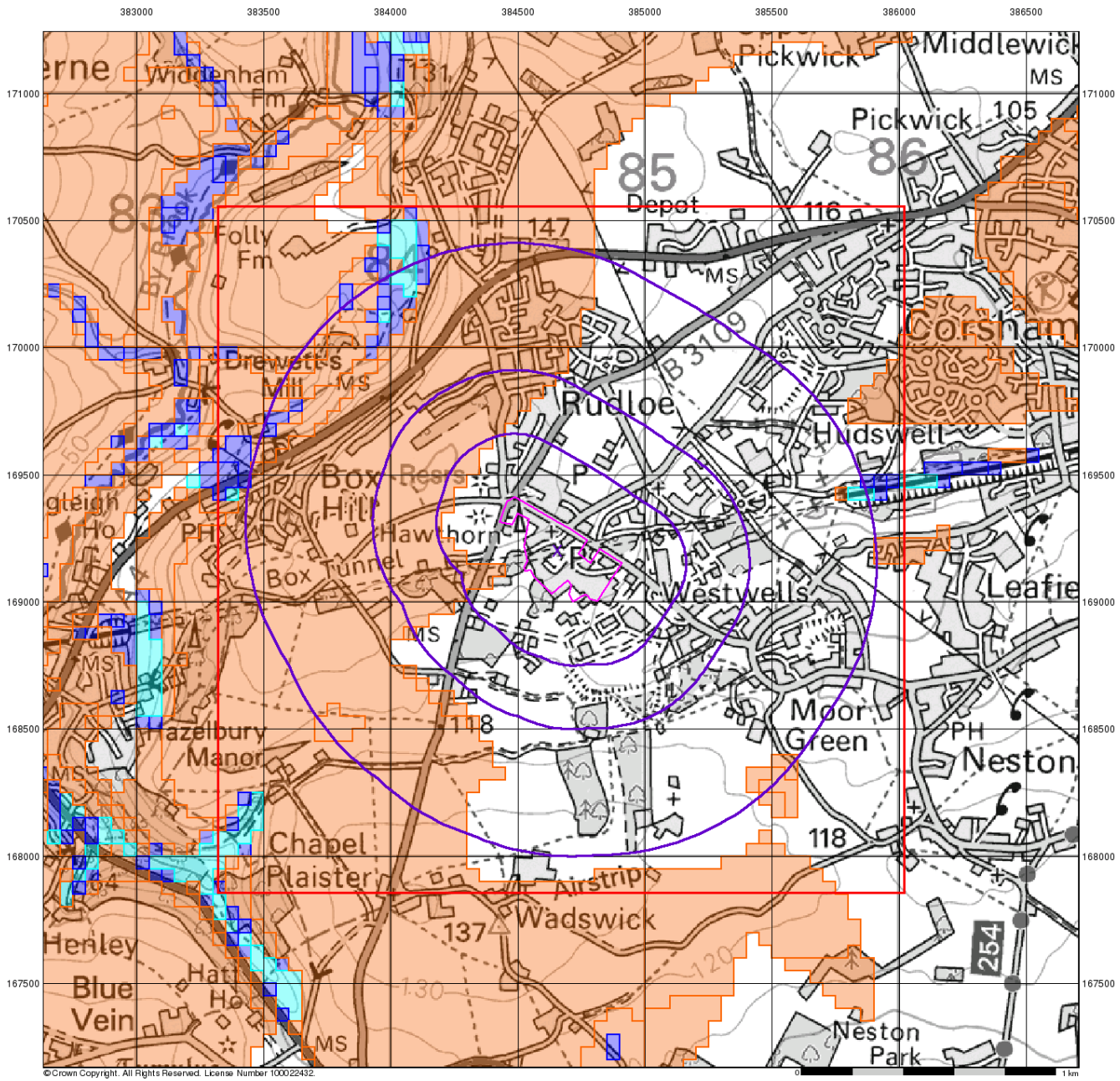
Order Details

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Customer Ref:	C161303
National Grid Reference:	384660, 169200
Slice:	A
Site Area (Ha):	8.46
Search Buffer (m):	1000

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Site at 384780, 169170

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BGS Flood GFS Data

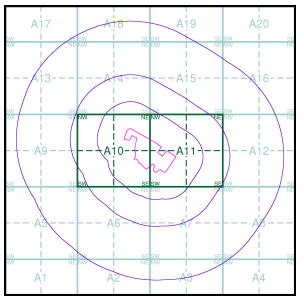
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice

Agency and Hydrological (Flood)

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding of Property Situated Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

Site Sensitivity Context Map - Slice A



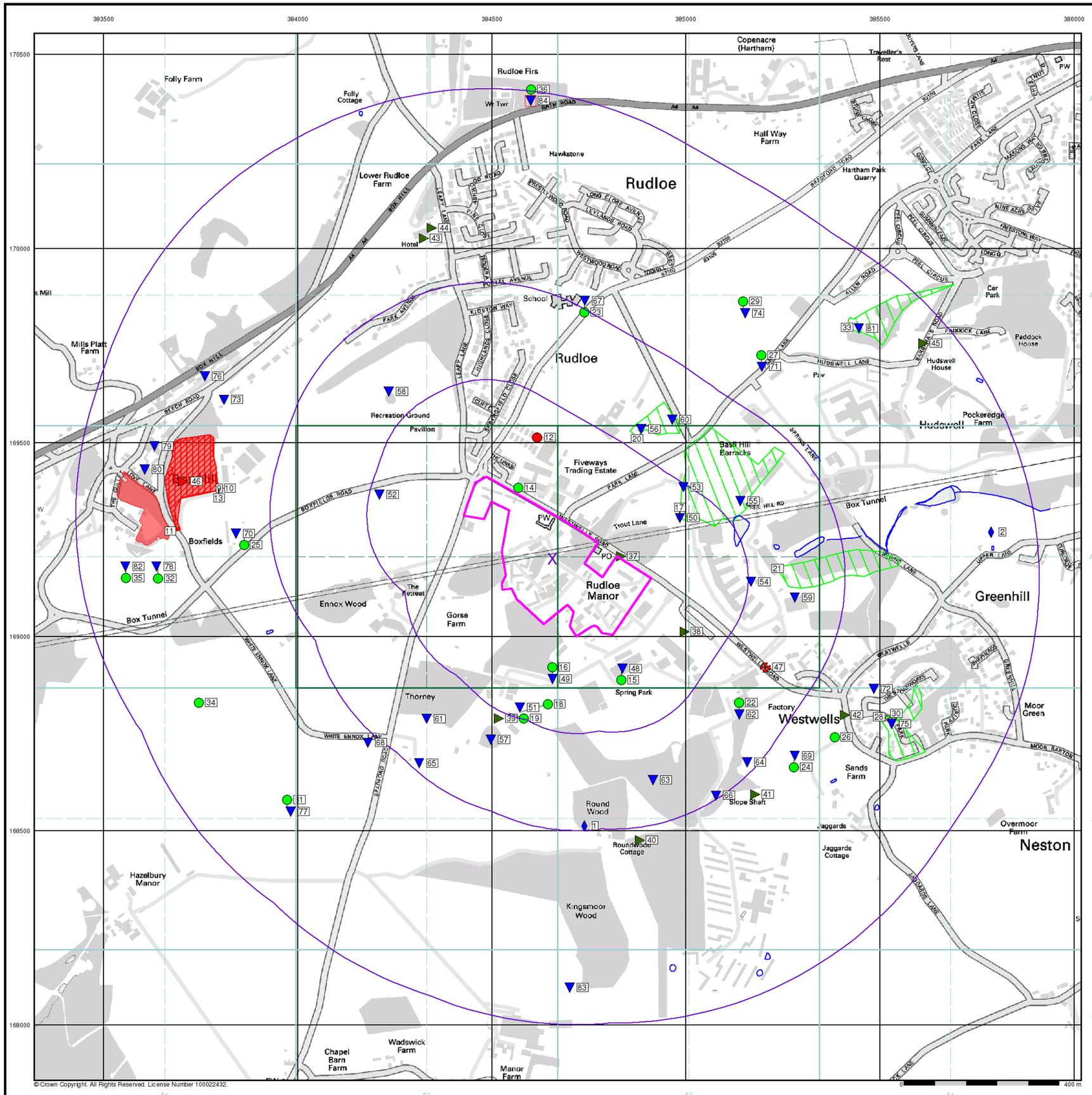
Order Details

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Customer Ref:	C161303
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Slice:	A
Site Area (Ha):	8.46
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General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Map ID

Several of Type at Location

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- River Quality Sampling Point
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- EA Historic Landfill (Buffered Point)
- EA Historic Landfill (Polygon)
- Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facility (Landfill Boundary)
- Licensed Waste Management Facility (Location)
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

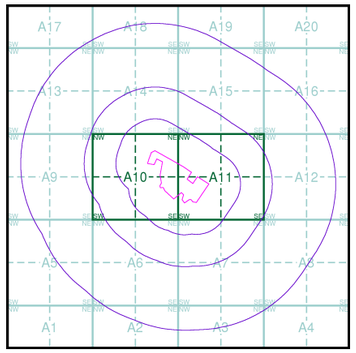
Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

Geological

- BGS Recorded Mineral Site

Site Sensitivity Map - Slice A



Order Details

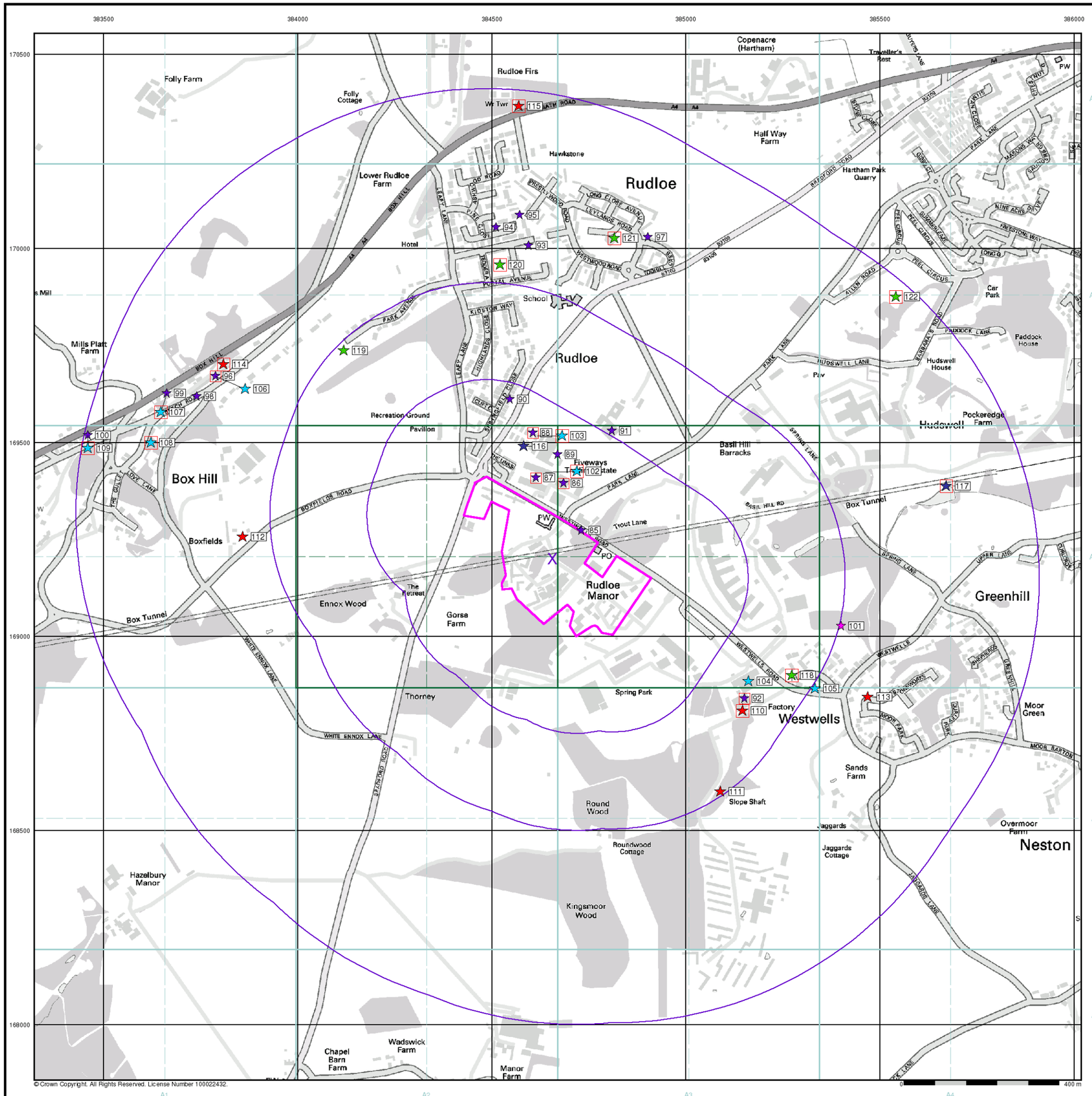
Order Number:	87557403_1_1
Customer Ref:	C161303
National Grid Reference:	384660, 169200
Slice:	A
Site Area (Ha):	8.46
Search Buffer (m):	1000

Site Details

Site at 384780, 169170

Landmark® Information Group

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Industrial Land Use Map

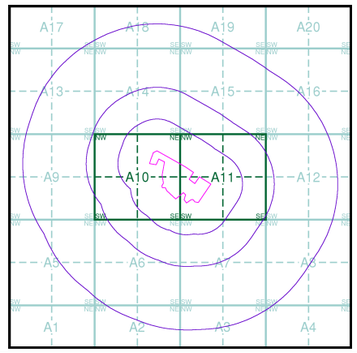
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry
- Gas Pipeline
- Points of Interest - Commercial Services
- Points of Interest - Education and Health
- Points of Interest - Manufacturing and Production
- Points of Interest - Public Infrastructure
- Points of Interest - Recreational and Environmental
- Underground Electrical Cables

Industrial Land Use Map - Slice A



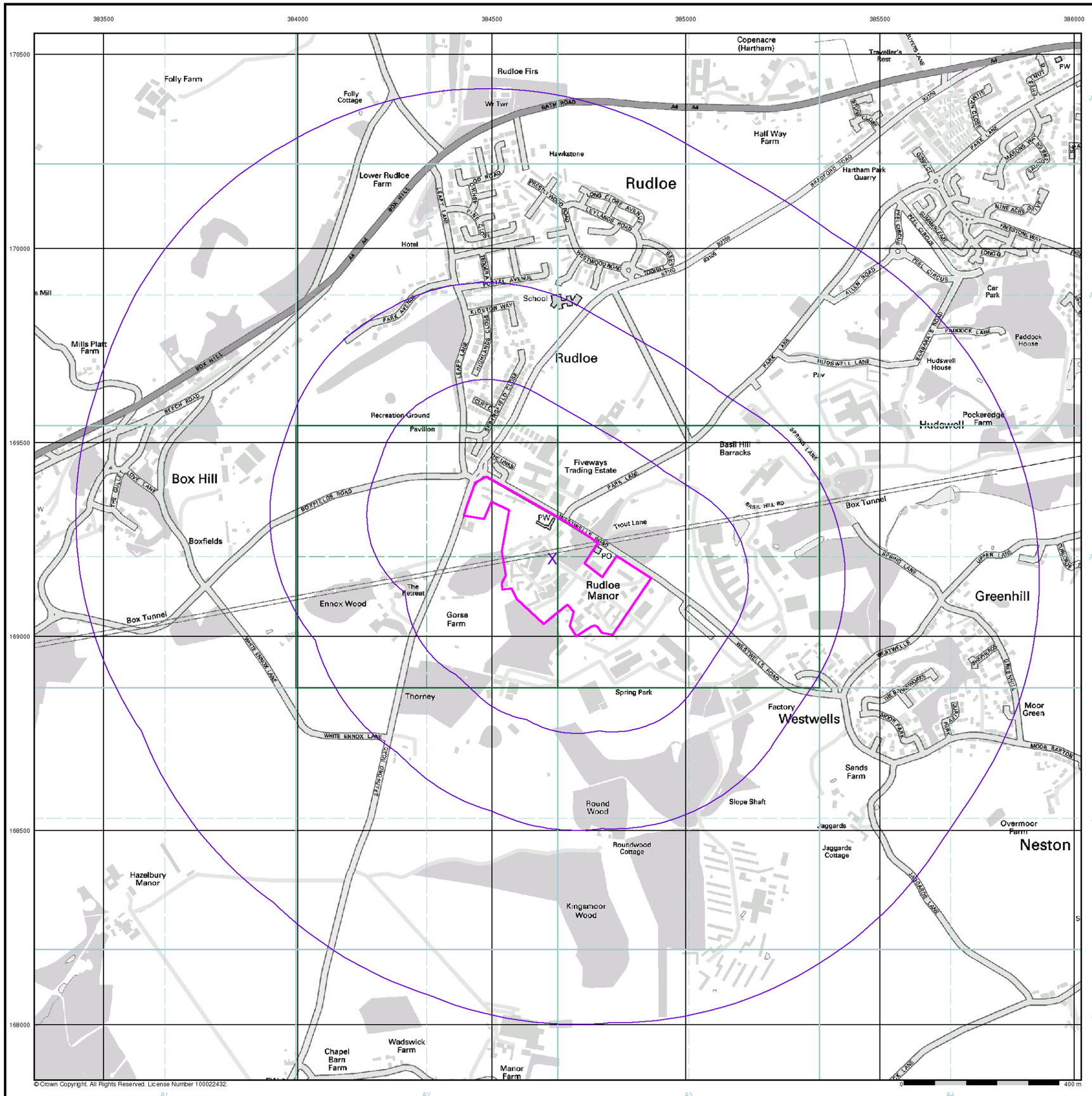
Order Details

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Slice:	A
Site Area (Ha):	8.46
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Site Details

Site at 384780, 169170

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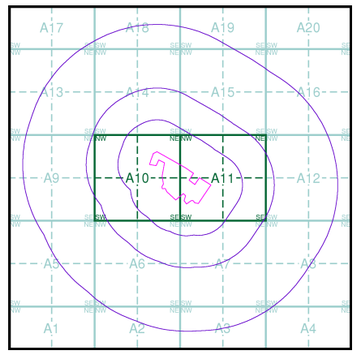
General

- Specified Site
- Specified Buffer(s)
- X Bearing Reference Point

Agency and Hydrological (Flood)

- Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- Flooding from Rivers or Sea without Defences (Zone 3)
- Area Benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Flood Map - Slice A



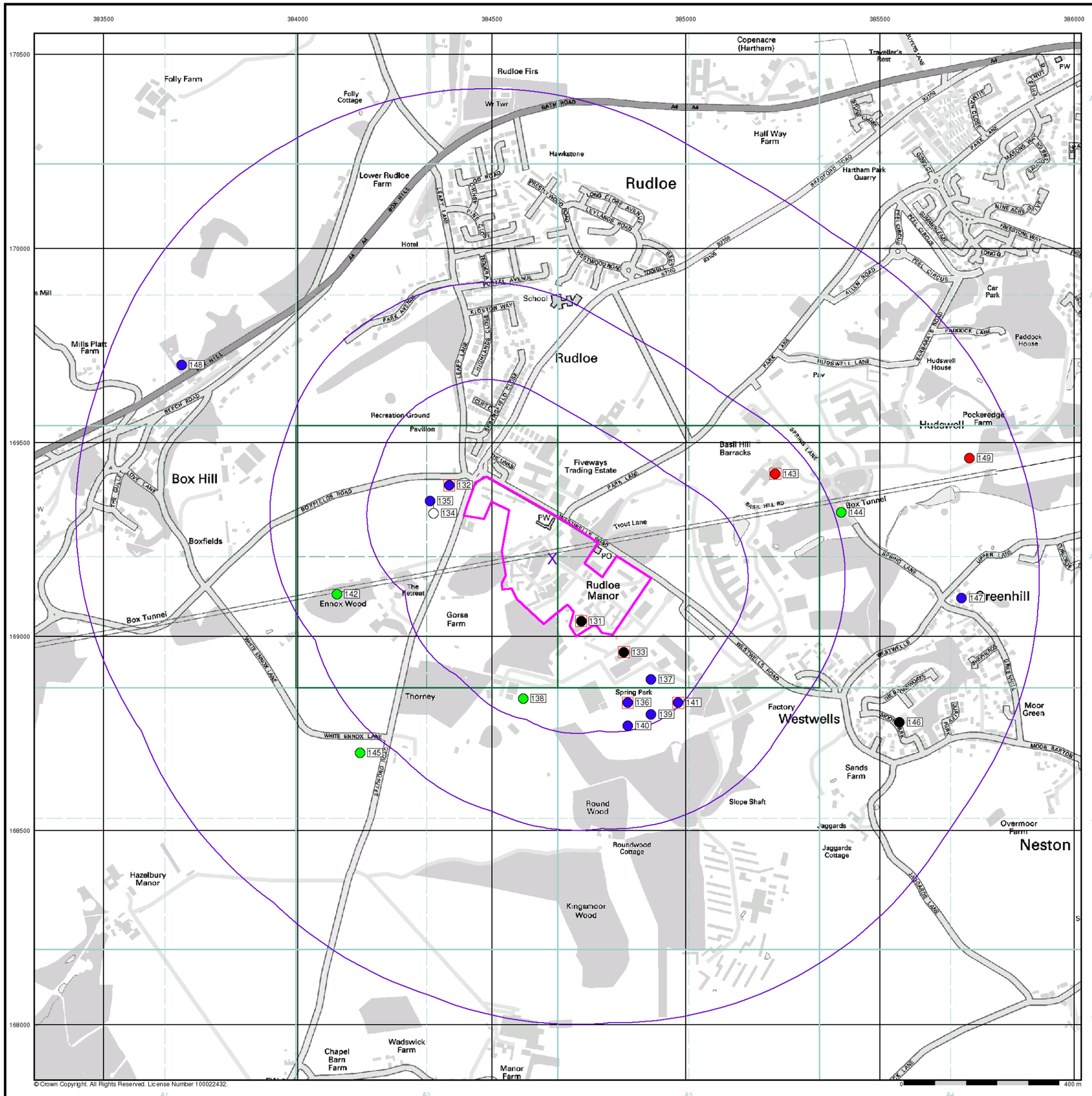
Order Details

Order Number:	87557403_1_1
Customer Ref:	C161303
National Grid Reference:	384660, 169200
Slice:	A
Site Area (Ha):	8.46
Search Buffer (m):	1000

Site Details

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General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

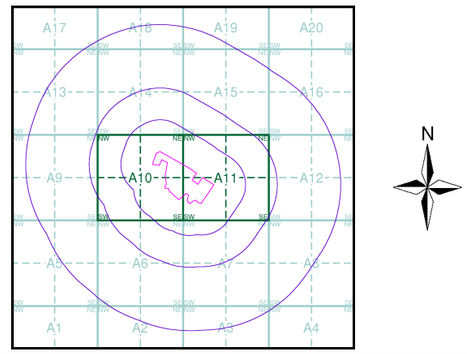
Agency and Hydrological (Boreholes)

- BGS Borehole Depth 0 - 10m
- BGS Borehole Depth 10 - 30m
- BGS Borehole Depth 30m +
- Confidential
- Other

For Borehole information please refer to the Borehole .csv file which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Borehole Map - Slice A



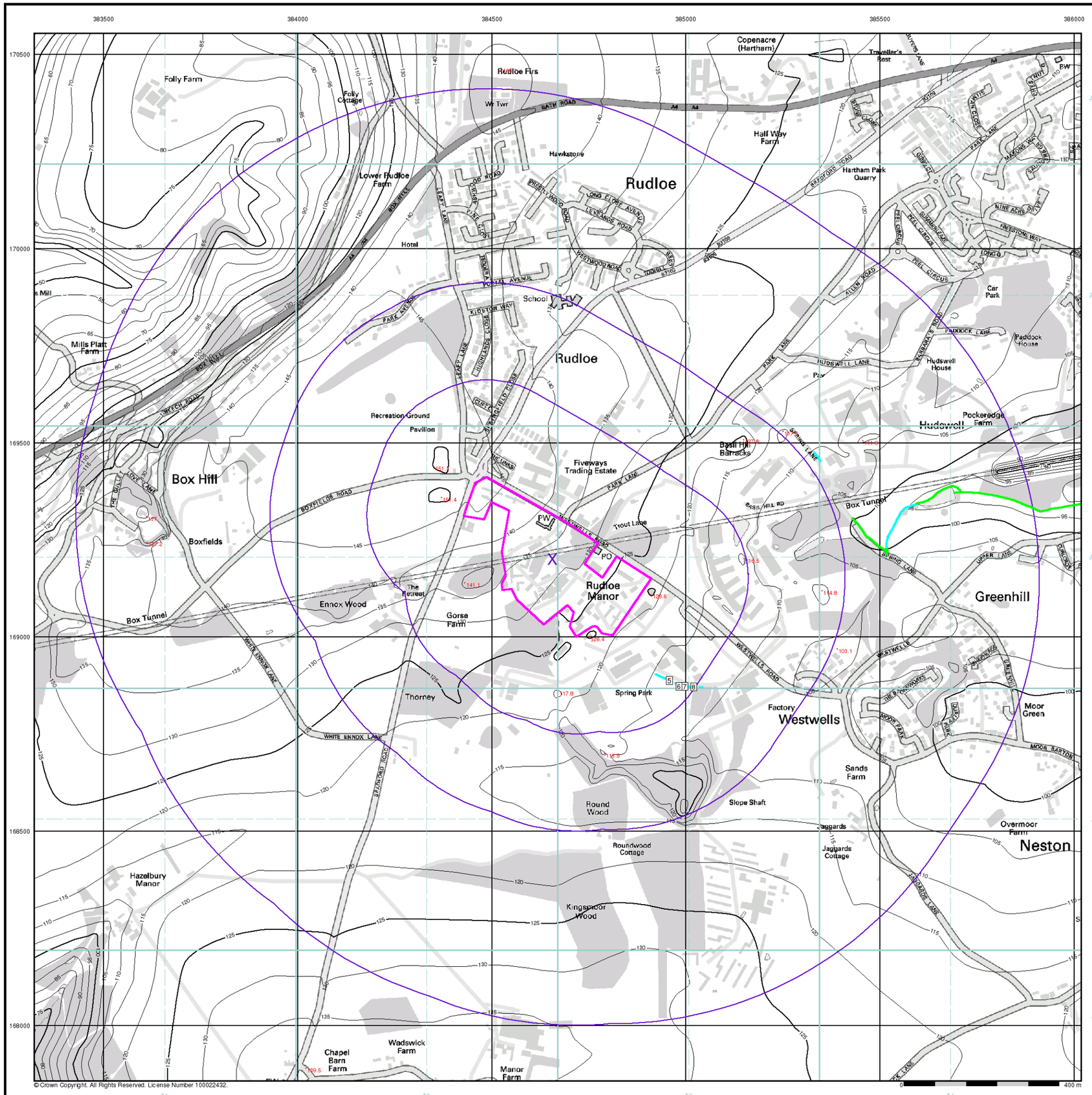
Order Details

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Site Details

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Fax: 0844 844 9951
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General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID

Detailed River Network Data

- Primary River
- Secondary River
- Tertiary River
- Canal
- Canal Tunnel
- Undefined River
- Lake/Reservoir
- Offline Drainage Feature
- Extended Culvert (greater than 50m)
- Underground River (inferred)
- Underground River (local knowledge)
- Downstream of High Water Mark
- Downstream of Seaward Extension
- Not assigned River feature

Contours (height in metres)

Standard Contour 105 100 95

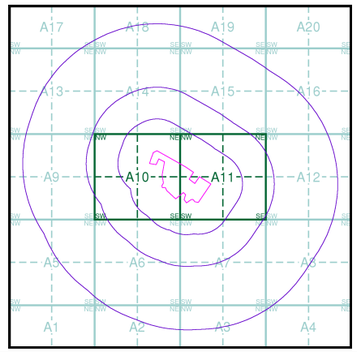
Master Contour

Spot Height *167.3

MLW Mean Low Water

MHW Mean High Water

EA/NRW Detailed River Network Map - Slice A



Order Details

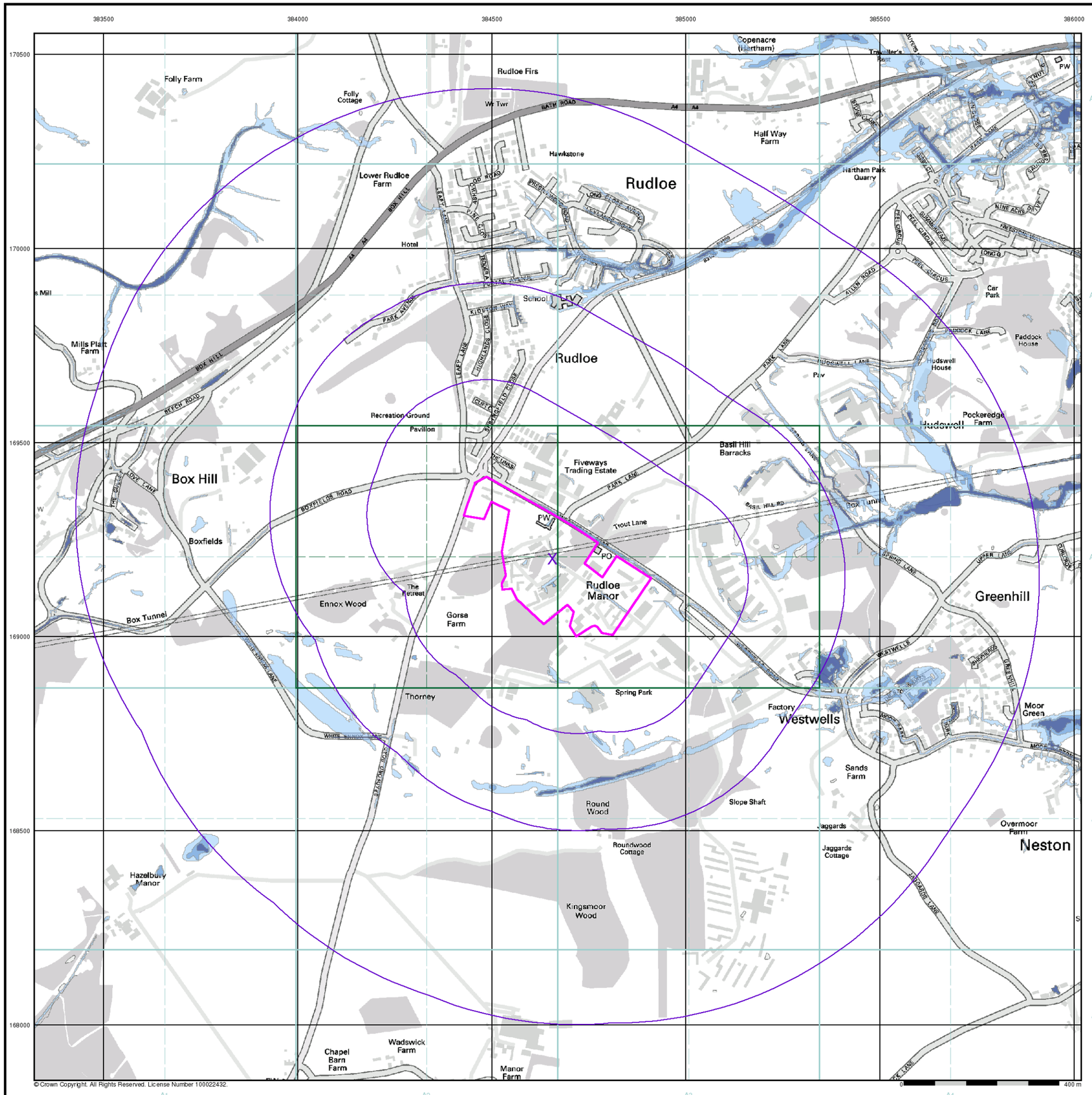
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Customer Ref:	C161303
National Grid Reference:	384660, 169200
Slice:	A
Site Area (Ha):	8.46
Search Buffer (m):	1000

Site Details

Site at 384780, 169170

Landmark® Information Group

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Web: www.envirocheck.co.uk



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General

- Specified Site
- Specified Buffer(s)
- X Bearing Reference Point

Risk of Flooding from Surface Water

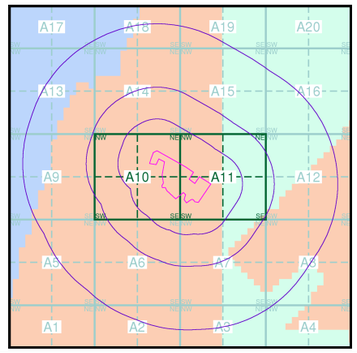
- High - 30 Year Return
- Medium - 100 Year Return
- Low - 1000 Year Return

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



N

Order Details

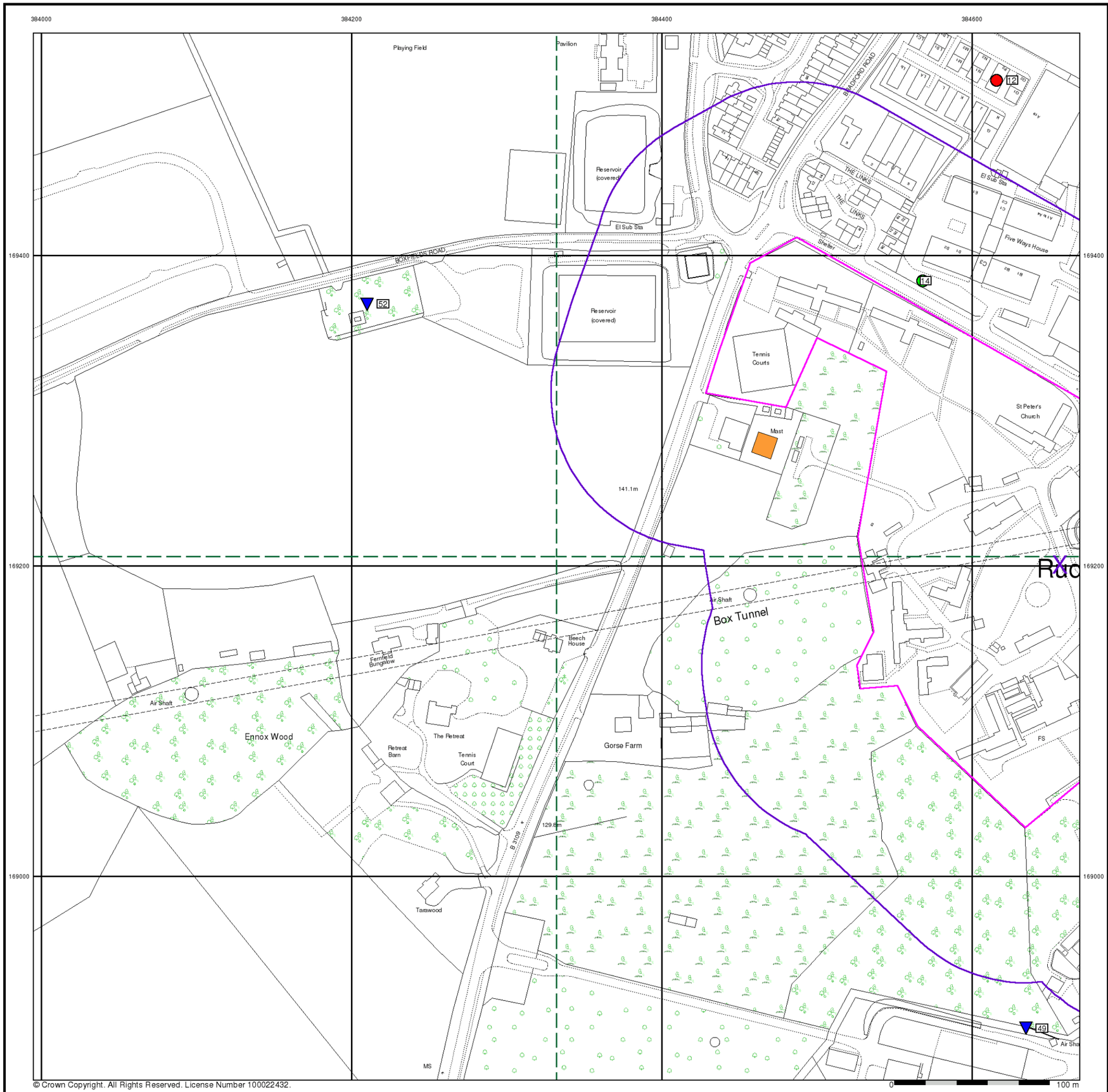
Order Number:	87557403_1_1
Customer Ref:	C161303
National Grid Reference:	384660, 169200
Slice:	A
Site Area (Ha):	8.46
Search Buffer (m):	1000

Site Details

Site at 384780, 169170

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Envirocheck®

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location
- Pylon
- Overhead Transmission Line

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- River Quality Sampling Point
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

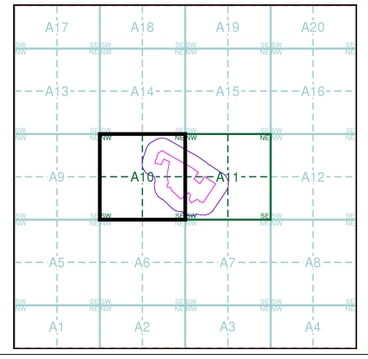
Geological

- BGS Recorded Mineral Site

Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- EA Historic Landfill (Buffered Point)
- EA Historic Landfill (Polygon)
- Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facility (Landfill Boundary)
- Licensed Waste Management Facility (Location)
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

Site Sensitivity Map - Segment A10



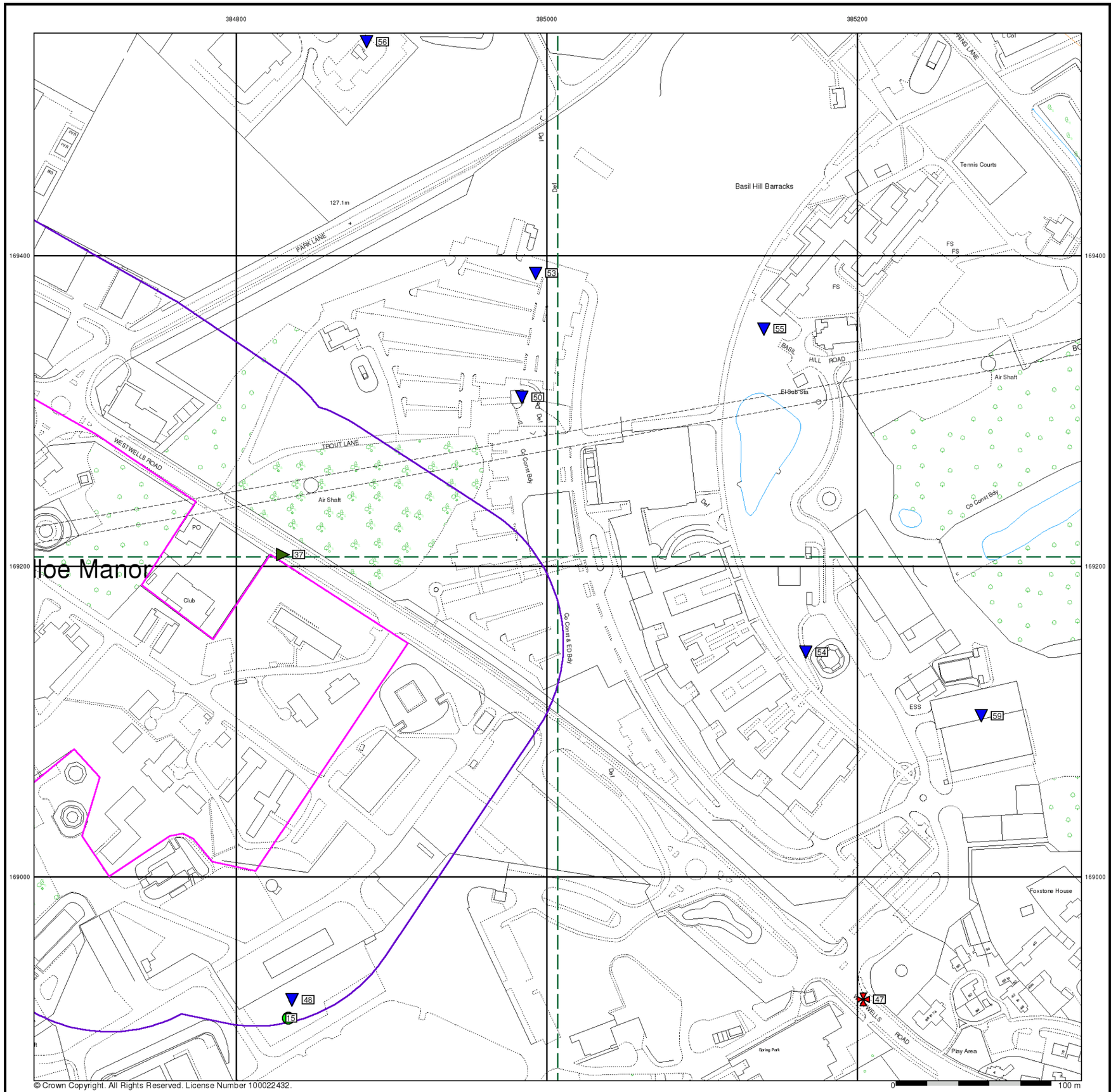
Order Details

Order Number:	87557403_1_1
Customer Ref:	C161303
National Grid Reference:	384660, 169200
Slice:	A
Site Area (Ha):	8.46
Plot Buffer (m):	100

Site Details

Site at 384780, 169170

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Envirocheck®

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location
- Pylon
- Overhead Transmission Line

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- River Quality Sampling Point
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- EA Historic Landfill (Buffered Point)
- EA Historic Landfill (Polygon)
- Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facility (Landfill Boundary)
- Licensed Waste Management Facility (Location)
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

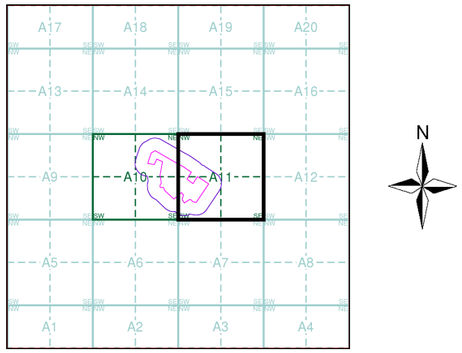
Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

Geological

- BGS Recorded Mineral Site

Site Sensitivity Map - Segment A11



Order Details

Order Number:	87557403_1_1
Customer Ref:	C161303
National Grid Reference:	384660, 169200
Slice:	A
Site Area (Ha):	8.46
Plot Buffer (m):	100

Site Details

Site at 384780, 169170

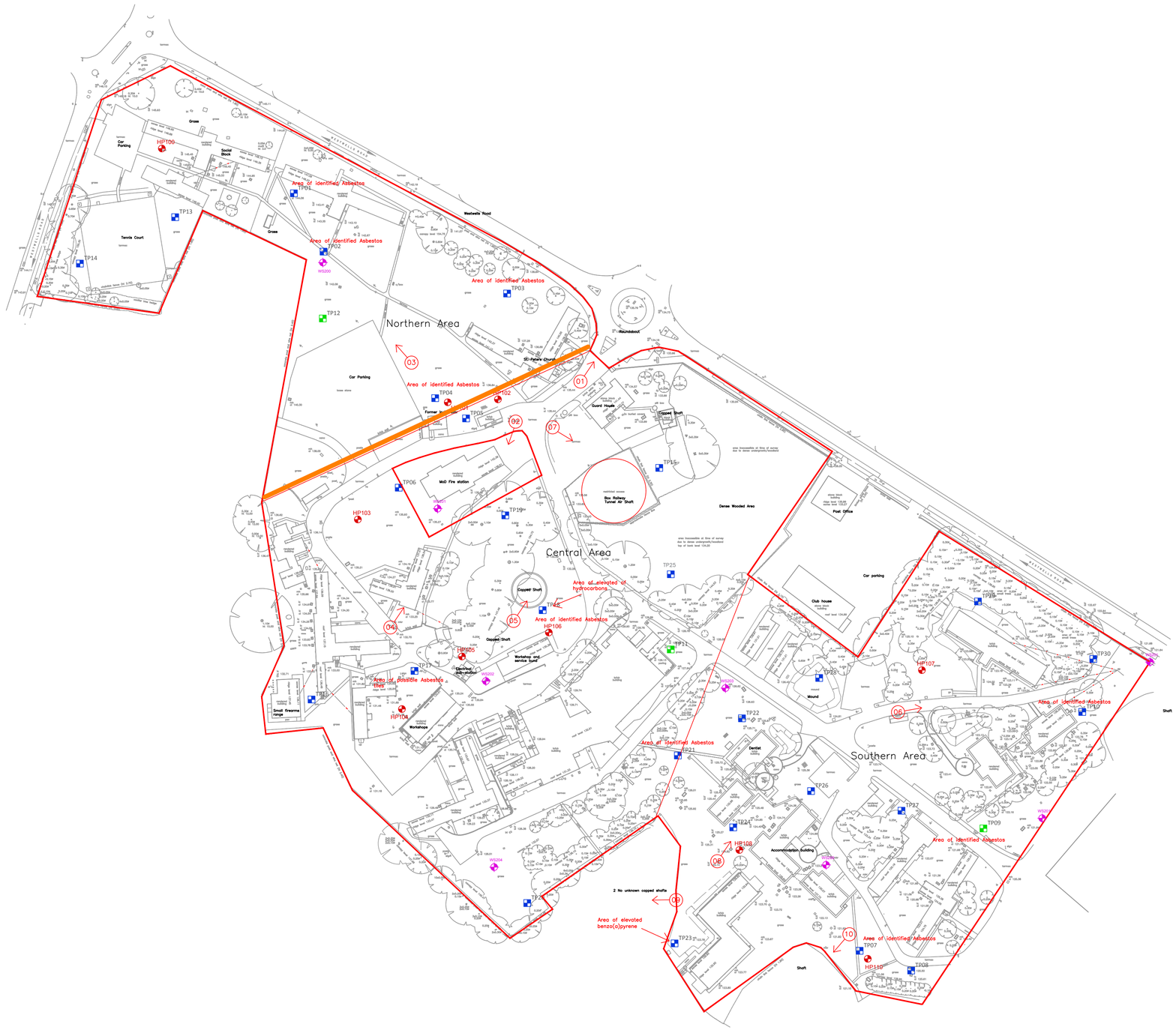
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Appendix E

Ground Investigation Plan, Exploratory Hole Logs and Photographs

This appendix may not be included in the printed report to reduce the document size, but is included in the digital version.

OS NORTH



LEGEND

TP01 Hydrock trial pit

SA01 Hydrock soakaway

Site investigation boundary

01 Photo plates

WS201 Entec Ltd window sample location

HP101 Entec Ltd hand pit

Inferred location of the Corsham Fault

Original CAD drawing provided to Hydrock Ltd by Inverness Terrace Ltd. Original source of the drawing is unknown

Rev	Date	Description	By	Ckd
C01	29/07/16	Initial issue	JM	AJ

Over Court Barns, Over Lane
Almondsbury, Bristol BS32 4DF
TEL: 01454 619 533 FAX: 01454 614 125
E-Mail: bristol@hydrock.com or visit www.hydrock.com

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Client

INVERNESS TERRACE LIMITED

Project

RUDLOE CORSHAM

Title

EXPLORATORY HOLE LOCATION PLAN

Drawn	Checked	Scale at A1	Date	Issue Date
JM	AJ	1:1000	27/05/16	29/06/16

Drawing Status

FOR INFORMATION

Drawing No. HYD-XX-XX-D- G002

Revision C01

Notes:
All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.This drawing is to be read in conjunction with all relevant Engineers' and Service Engineers' drawings and specifications. This drawing is copyright.

Hydrock
Over Court Barns
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E-mail: bristol@hydrock.com
Tel: 01454 619 533

Project: Rudloe, Corsham

Trial Pit No.
TP01

Method: Trial Pit	Date: 10/05/2016	Logged By: J. Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169354.46,384539.72	Pit Stability: Stable	Dimensions: 0.70m x 2.20m
Hydrock Project No: C161303	Elevation:143.99mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				TOPSOIL: Grass over slightly sandy CLAY. (TOPSOIL)	0.10	(0.10)	143.89	
0.20	PT AJ			MADE GROUND comprising brown slighty sandy slightly gravelly CLAY with rare traces to black ash. Gravel as sub-angular to sub-rounded fine to medium limestone and sandstone. (MADE GROUND)	0.30	(0.20)	143.69	
0.50	PT AJ			Tightly packed orange brown with brown staining sandy sub-angular fine to coarse GRAVEL and COBBLES of oolitic limestone. Material sub-horizontally thinly bedded destructured limestone. (FOREST MARBLE LIMESTONE)		(0.95)		
1.20	PT AJ				1.25		142.74	
1.20	B			Moderately strong orange brown sub-horizontally very thinly bedded partially weathered LIMESTONE. (FOREST MARBLE LIMESTONE)	1.30	(0.05)	142.69	
				End of Trial Pit at 1.30 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Tel: 01454 619 533

Project: Rudloe, Corsham

Trial Pit No.
TP02

Method: Trial Pit	Date: 10/05/2016	Logged By: J.Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169329.07,384552.62	Pit Stability: Stable	Dimensions: 2.20m x 0.70m
Hydrock Project No: C161303	Elevation:142.89mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				TOPSOIL: Grass over brown sandy CLAY. (TOPSOIL)	0.10	(0.10)	142.79	
0.20	PT AJ			MADE GROUND comprising brown sandy slightly gravelly CLAY with rare traces of black ash and brick fragments. Gravel as sub-angular to sub-rounded fine to coarse limestone. (MADE GROUND)	0.35	(0.25)	142.54	
0.50	PT AJ			Tightly packed orange brown with brown staining of sandy sub-rounded slightly sandy Gravelly COBBLES of oolitic limestone. Material is destructured sub-horizonally very thinly bedded limestone. (FOREST MARBLE LIMESTONE)	0.80	(0.45)	142.09	
				Moderately strong orange brown sub-horizontally very thinly bedded partially weathered LIMESTONE. (FOREST MARBLE LIMESTONE)	0.85	(0.05)	142.04	
				End of Trial Pit at 0.85 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP03

Page No. 1 of 1

Method: Trial Pit	Date: 09/05/2016-11/05/2016	Logged By: J.Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169310.82,384632.54	Pit Stability: Stable	Dimensions: 2.20m x 0.70m
Hydrock Project No: C161303	Elevation:138.77mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				TOPSOIL: Grass over sandy CLAY. (TOPSOIL)	0.10	(0.10)	138.67	
0.20	PT AJ			MADE GROUND comprising brown sandy slightly gravelly CLAY with traces of clinker, ash, brick and fragments of metal. Gravel as fine to coarse sub-angular to sub-rounded limestone and mudstone. (MADE GROUND)	0.40	(0.30)	138.37	
0.50	PT AJ			Tightly packed brown clayey sandy sub-rounded fine to coarse limestone GRAVEL of oolitic limestone. Material is destructured sub-horizontally very thinly bedded limestone. (FOREST MARBLE)	0.70	(0.30)	138.07	
0.80 0.80	PT AJ B			Tightly packed orange brown very sandy sub-rounded to sub-angular GRAVEL and COBBLES of oolitic limestone. Material isdestructured sub-horizontally very thnly bedded limestone. (FOREST MARBLE LIMESTONE)	1.30	(0.60)	137.47	
1.30	PT AJ			Moderately strong orange brown sub-horizontally very thinly bedded partially weathered LIMESTONE. (FOREST MARBLE LIMESTONE)	1.35	(0.05)	137.42	
				End of Trial Pit at 1.35 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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BS32 4DF
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Tel: 01454 619 533

Project: Rudloe, Corsham

Trial Pit No.
TP04

Method: Trial Pit	Date: 10/05/2016	Logged By: J.Morton	Checked By [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169265.26,384601.21	Pit Stability: Stable	Dimensions: 2.20m x 0.70m
Hydrock Project No: C161303	Elevation:137.78mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				TOPSOIL: Grass over slightly sandy CLAY. (TOPSOIL)	0.10	(0.10)	137.68	
0.20	PT AJ			MADE GROUND comprising slighty sandy slighlty gravelly CLAY with traces of brick fragments. Gravel is sub-rounded to sub-angular fine to medium limestone. (MADE GROUND)	0.50	(0.40)	137.28	
0.60	PT AJ			Soft brown sandy slightly gravelly CLAY. Gravel is sub-rounded to sub-angular fine to medium mudstone. Material is residual mudstone. (FOREST MARBLE)	0.90	(0.40)	136.88	
0.80	B							
1.00	PT AJ			Loosely packed orange brown clayey sandy cobbly sub-rounded fine to coarse GRAVEL of limestone. Material is sub-horizontally very thinly bedded destructured to residual limestone (FOREST MARBLE)	1.30	(0.40)	136.48	
1.50	B			Stiff orange brown sub-horizontally thickly laminated silty CLAY with traces of fine sand and rare cobbles of sub-rounded mudstone. Material is residual mudstone. (FOREST MARBLE)	2.30	(1.00)	135.48	
2.30 2.30	B PT AJ			Moderately strong bluish grey thickly laminated partially weathered MUDSTONE. Discontinuities show iron oxide staining and occasional clay / silt infill. (FOREST MARBLE)	2.50	(0.20)	135.28	
				End of Trial Pit at 2.50 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Rtl 426.46) Hydrock Custom Log Amended Jan 2010

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Over Court Barns
Over Lane
Almondsbury
Bristol
BS32 4DF
E-mail: bristol@hydrock.com
Tel: 01454 619 533

Project: Rudloe, Corsham

Trial Pit No.
TP05

Method: Trial Pit	Date: 10/05/2016	Logged By: J.Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169256.44,384614.65	Pit Stability: Stable	Dimensions: 2.20m x 0.70m
Hydrock Project No: C161303	Elevation:136.76mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				TOPSOIL: Grass over slighly sandy CLAY. (TOPSOIL)	0.10	(0.10)	136.66	
0.20	PT AJ			MADE GROUND comprising brown slightly sandy slightly gravelly CLAY with traces of clinker. Gravel is sub-rounded to sub-angular fine to medium limestone. (MADE GROUND)	0.25	(0.15)	136.51	
0.50	PT AJ			Firm brown slightly sandy slightly gravelly CLAY. Gravel is sub-rounded fine to coarse limestone. Material is residual mudstone. (FOREST MARBLE)	0.55	(0.30)	136.21	
0.50	B							
0.60	PT AJ			Stiff orange brown with grey mottling sub-horizontally thickly laminated slightly gravelly CLAY. Gravel is sub-rounded fine to medium mudstone. Material is residual mudstone. (FOREST MARBLE)	1.90	(1.35)	134.86	
1.00	PT AJ							
1.00	B							
				Moderately strong bluish grey blue grey sub-horizontal very thinly bedded partially weathered MUDSTONE. (FOREST MARBLE)	2.00	(0.10)	134.76	
				End of Trial Pit at 2.00 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Over Lane
Almondsbury
Bristol
BS32 4DF
E-mail: bristol@hydrock.com
Tel: 01454 619 533

Project: Rudloe, Corsham

Trial Pit No.
TP06

Method: Trial Pit	Date: 10/05/2016	Logged By: J.Morton	Checked By [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169226.28,384585.35	Pit Stability: Stable	Dimensions: 2.20m x 0.70m
Hydrock Project No: C161303	Elevation:136.57mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				TOPSOIL: Grass over slightly sandy CLAY. (TOPSOIL)	0.10	(0.10)	136.47	
0.20	PT AJ			MADE GROUND comprising brown slightly sandy slightly gravelly CLAY with rare cobbles and traces of ash. Gravel and cobbles are sub-rounded to sub-angular fine to coarse limestone, mudstone, brick fragments and tiles. (MADE GROUND)		(0.55)		
0.50	PT AJ				0.65		135.92	
				Firm becoming stiff orange brown with grey motting sub-horizontally thinkly laminated slightly gravelly silty CLAY. Gravel is sub-rounded fine to medium mudstone. Material is residual mudstone. (FOREST MARBLE) Becoming stiff				
1.00	PT AJ					(1.15)		
1.60	B				1.80		134.77	
1.80	B			Moderately strong sub-horizontally thinly bedded blue grey partially weathered MUDSTONE (Forest Marble Formation). (FOREST MARBLE)	2.00	(0.20)	134.57	
				End of Trial Pit at 2.00 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bd 426,46) Hydrock Custom Log Amended Jan 2010

Hydrock
Over Court Barns
Over Lane
Almondsbury
Bristol
BS32 4DF
E-mail: bristol@hydrock.com
Tel: 01454 619 533

Project: Rudloe, Corsham

Trial Pit No.
TP07

Method: Trial Pit	Date: 10/05/2016	Logged By: J.Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169024.63,384786.00	Pit Stability: Stable	Dimensions: 6.70m x 0.70m
Hydrock Project No: C161303	Elevation:121.29mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				TOPSOIL: brown slightly sandy CLAY. (TOPSOIL)	0	(0.20)		
0.20	PT AJ				0.20		121.09	
				MADE GROUND comprising orange brown slightly sandy slightly gravelly CLAY with traces of ash staining and traces of brick fragments, clinker and possible asbestos tiles. Gravel as sub-rounded to sub-angular fine to medium limestone and mudstone. (MADE GROUND)		(0.50)		
0.50	PT AJ				0.70		120.59	
				Moderately strong blue grey limestone BOULDER. Obstrucion appears to be artificially positioned. (MADE GROUND)	0.75	(0.05)	120.54	
				Loosely and tightly packed orange brown and mottled grey thickly laminated fine slightly clayey / silty SAND (residual Forest Marble formation) (FOREST MARBLE)	1	(1.25)		
1.50	PT AJ							
2.00	PT AJ				2.00		119.29	
				Moderately strong blue grey sub-horizontally very thinly bedded partially weathered SANDSTONE. (FOREST MARBLE)	2			
					2.10	(0.10)	119.19	
				End of Trial Pit at 2.10 m				
					3			

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. Obstruction encountered at 0.60m bgl, Trail Pit therefore extended beyond the obstruction. No Groundwater encountered. Trial pit terminated on refusal. Possible asbestos tiles encountered within the Made Ground stratum. Trial pit reinstated and compacted in layers with potential asbestos materials at the base of the trial pit.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bd 426,40) Hydrock Custom Log Amended Jan 2010

Hydrock
Over Court Barns
Over Lane
Almondsbury
Bristol
BS32 4DF
E-mail: bristol@hydrock.com
Tel: 01454 619 533

Project: Rudloe, Corsham

Trial Pit No.
TP08

Method: Trial Pit	Date: 09/05/2016	Logged By: J.Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169015.99,384808.42	Pit Stability: Stable	Dimensions: 2.20m x 0.70m
Hydrock Project No: C161303	Elevation:120.37mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				TOPSOIL: Grass over brown sandy CLAY. (TOPSOIL)	0.15	(0.15)	120.22	
0.20	PT AJ			MADE GROUND comprising brown slightly sandy slightly gravelly CLAY with horizons of fine sand and traces of ash, clinker and brick. Gravel as sub-angular to sub-rounded fine to meduim limestone and mudstone. (MADE GROUND)	0.55	(0.40)	119.82	
0.50	PT AJ			MADE GROUND comprising brown slightly sandy CLAY with rare traces of ash and clinker. (MADE GROUND)	0.70	(0.15)	119.67	
				Loosely packed orange brown and mottled grey clayey fine SAND with pockets of soft clay. Material is slighty damp residual sandy mudstone. (FOREST MARBLE)				
1.50	PT AJ			Very slight groundwater seepage observed	2.00	(1.30)	118.37	
2.00	PT AJ			Moderately strong blue grey sub-horizonally thinly bedded clayey / silty fine partially weathered SANDSTONE. (FOREST MARBLE)	2.10	(0.10)	118.27	
				End of Trial Pit at 2.10 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. Very slight groundwater seepage encountered at 1.5m bgl. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426,46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP09

Method: Trial Pit	Date: 11/05/2016	Logged By: J.Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169077.91,384839.88	Pit Stability: Stable	Dimensions: 2.50m x 0.70m
Hydrock Project No: C161303	Elevation:121.73mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over sandy CLAY. (TOPSOIL)	0.15	(0.15)	121.58	
0.20	PT AJ			MADE GROUND comprising brown slightly sandy CLAY with cobbles of brick fragments, limestone and rare traces of clinker and glass. (MADE GROUND)				
0.50	PT AJ				0.55	(0.40)	121.18	
0.60	HSV	110kPa		Stiff high strength orange brown and mottled grey sub-horizontal thickly laminated slightly sandy slightly gravelly CLAY. Gravel as sub-rounded to sub-angular medium mudstone. Material is residual mudstone. (FOREST MARBLE)				
1.00	PT AJ					(1.75)		
2.00	PT AJ							
2.30	PT AJ				2.30		119.43	
				Moderately strong bluish grey sub-horizontal ver thinly bedded partially weathered MUDSTONE. (FOREST MARBLE)	2.35	(0.05)	119.38	
				End of Trial Pit at 2.35 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP10

Method: Trial Pit	Date: 11/05/2016	Logged By: J.Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169128.62,384882.90	Pit Stability: Stable	Dimensions: 2.50m x 0.70m
Hydrock Project No: C161303	Elevation:122.34mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over sandy CLAY. (TOPSOIL)	0.15	(0.15)	122.19	
0.20	PT AJ			MADE GROUND comprising sandy gravelly CLAY with traces of brick fragments, tiles wooden debris and possible asbestos tiles. Gravel as sub-angular to sub-rounded fine to coarse slate, mustones, limestone and sandstone. (MADE GROUND)	0.45	(0.30)	121.89	
0.50	PT AJ			MADE GROUND comprising dark brown slightly sandy slightly gravelly CLAY with traces of brick fragments. Gravel is sub-angular to sub-rounded sandstone mudstone and limestone. (MADE GROUND)	0.75	(0.30)	121.59	
1.00	PT AJ			MADE GROUND comprising dark orange brown with rare dark brown staining of fine sandy SILT / CLAY (reworked natural). (MADE GROUND)	1.45	(0.70)	120.89	
1.80	Bulk			Stiff orange brown and greyish brown sub-horizontally thickly laminated slightly sandy slightly gravelly silty CLAY. Gravel is sub-rounded fine to medium mudstone. Stratum is residual mudstone. (FOREST MARBLE)				
2.00	PT AJ					(1.55)		
2.50	PT AJ				3.00		119.34	
				End of Trial Pit at 3.00 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on excavators maximum reach. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP11

Method: Trial Pit	Date: 11/05/2016	Logged By: J.Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169155.85,384703.74	Pit Stability: Stable	Dimensions: 2.50m x 0.70m
Hydrock Project No: C161303	Elevation:128.94mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass overly sandy CLAY. (TOPSOIL)	0.10	(0.10)	128.84	
0.20	PT AJ			MADE GROUND comprising orange brown fine to medium silty SAND with traces of brick fragments and black ash staining. (MADE GROUND (SUB BASE))	0.35	(0.25)	128.59	
0.30	PT AJ							
0.50	PT AJ			MADE GROUND comprising brown slightly sandy CLAY with traces of brick fragments and ash black staining. (MADE GROUND)	0.60	(0.25)	128.34	
0.50	B							
				Loosely packed reddish brown sub-horizntally thickly laminated clayey fine silty SAND with frequent horizons of soft clay. Material is very saturated in places (FOREST MARBLE)		(1.70)		
1.50	PT AJ							
1.50	B							
2.30	PT AJ				2.30		126.64	
				Moderately strong bluish grey sub-horizontally very thinly bedded sandy partially weathered SILTSTONE. (FOREST MARBLE)	2.35	(0.05)	126.59	
				End of Trial Pit at 2.35 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP12

Method: Trial Pit	Date: 11/05/2016	Logged By: J.Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169299.96,384552.30	Pit Stability: Stable	Dimensions: 2.50m x 0.70m
Hydrock Project No: C161303	Elevation:141.96mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over sandy CLAY. (TOPSOIL)	0.15	(0.15)	141.81	
0.20	PT AJ			MADE GROUND comprising orange brown fine to coarse rounded slightly silty very sandy GRAVEL (Possible Type 1 Fill material). (MADE GROUND)	0.40	(0.25)	141.56	
0.30	PT AJ			Tightly packed orange brown with brown clay staining sub-rounded to sub-angular sandy gravelly COBBLES of oolitic limestone. Material is destructured sub-horizontally very thinly bedded limestone. (FOREST MARBLE LIMESTONE)				
1.00	PT AJ			No brown staining	1.60	(1.20)	140.36	
1.00	B			Moderately strong sub-horizontally very thinly bedded partially weathered LIMESTONE. (FOREST MARBLE LIMESTONE)	1.65	(0.05)	140.31	
				End of Trial Pit at 1.65 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP13

Method: Trial Pit	Date: 11/05/2016	Logged By: J.Morton	Checked By [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169344.06,384488.03	Pit Stability: Stable	Dimensions: 2.50m x 0.70m
Hydrock Project No: C161303	Elevation:145.00mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over sandy CLAY. (TOPSOIL)	0.10	(0.10)	144.90	
0.20	PT AJ			MADE GROUND comprising brown slightly sandy CLAY with occasional black ash staining. (MADE GROUND)	0.30	(0.20)	144.70	
0.60	PT AJ			Tightly packed orange brown fine to coarse sandy gravelly COBBELS of oolitic limestone. Material is destructured sub-horizontally very thinly bedded limestone. (FOREST MARBLE LIMESTONE)		(1.00)		
1.20 1.20	PT AJ B				1.30		143.70	
				Moderately strong orange brown sub-horizntally very thinly bedded partially weathered LIMESTONE. (FOREST MARBLE LIMESTONE)	1.35	(0.05)	143.65	
				End of Trial Pit at 1.35 m				

0
1
2
3

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Rec 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP14

Method: Trial Pit	Date: 11/05/2016	Logged By: J.Morton	Checked By [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169323.86,384446.56	Pit Stability: Stable	Dimensions: 2.50m x 0.70m
Hydrock Project No: C161303	Elevation:145.04mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over sandy CLAY. (TOPSOIL)	0.10	(0.10)	144.94	
0.20	PT AJ			MADE GROUND comprising brown slightly sandy CLAY with rare traces of metal debris and large tree roots. (MADE GROUND) Large tree roots encountered	0.40	(0.30)	144.64	
0.60	PT AJ			Tightly packed orange brown fine to coarse sub-angular sandy gravelly COBBLES of oolitic limestone. Material is destructured sub-horizontally very thinly bedded limestone. (FOREST MARBLE LIMESTONE)		(0.90)		
1.20	PT AJ				1.30		143.74	
1.20	B			Moderately strong orange brown sub-horizontally very thinly bedded partially weathered LIMESTONE. (FOREST MARBLE LIMESTONE)	1.35	(0.05)	143.69	
				End of Trial Pit at 1.35 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 5.1 (Rel: 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP15

Method: Trial Pit	Date: 11/05/2016	Logged By: J.Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169234.90,384698.76	Pit Stability: Unstable	Dimensions: 2.50m x 0.70m
Hydrock Project No: C161303	Elevation:133.75mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
0.20	PT AJ			Grass over slightly sandy CLAY. (TOPSOIL)	0.25	(0.25)	133.50	
0.50	PT AJ			MADE GROUND comprising grey brown verly clayey gravelly fine to coarse SAND with frequent inclusions of brick ash and clinker. Gravel as fine to coarse sub-rounded mudstone. (MADE GROUND)				
1.00	PT AJ					(1.85)		
1.50 1.50	PT AJ B				2.10		131.65	
2.20 2.20 2.30	HSV PT AJ PT AJ	70kPa		Firm becoming stiff dark orange brown and mottled grey grading to light orange brown sub-horizontally thickly laminated slightly sandy CLAY with occasional horizons of ornage brown fine sand lenses. Material is residual mudstone. (FOREST MARBLE) Material becoming stiff Material becoming light orange brown		(1.10)		
				End of Trial Pit at 3.20 m	3.20		130.55	

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as unstable. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP16

Method: Trial Pit	Date: 11/05/2016	Logged By: J.Morton	Checked By [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169134.05,384547.39	Pit Stability: Stable	Dimensions: 2.50m x 0.70m
Hydrock Project No: C161303	Elevation:132.84mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over slightly sandy CLAY. (TOPSOIL)	0.10	(0.10)	132.74	
0.20	PT AJ			MADE GROUND comprising brown slightly sandy slightly gravelly CLAY with frequent bricks fragments and traces of possible asbestos tiles. Gravel as sub-rounded to sub-angular fine to coarse mudstone limestone and sandstone. (MADE GROUND)	0.40	(0.30)	132.44	
0.50	PT AJ			MADE GROUND comprising reddish brown slightly sandy slightly gravelly CLAY with traces of brick fragments. Gravel as sub-rounded to sub-angular fine to coarse mudstone limestone and sandstone. (MADE GROUND)	0.85	(0.45)	131.99	
				Firm orange brown sub-horizontally thickly beddded sandy slightly gravelly silty CLAY. Gravel as sub-rounded fine to coarse mudstone. Material is residual mudstone. (FOREST MARBLE)	1.10	(0.25)	131.74	
1.10 1.10	PT AJ Bulk			Moderately strong bluish grey sub-horizontally closely bedded partially weathered MUDSTONE. (FOREST MARBLE)	1.15	(0.05)	131.69	
				End of Trial Pit at 1.15 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Possible asbestos materials encountered within Made Ground stratum. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 5.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP17

Method: Trial Pit	Date: 11/05/2016	Logged By: J.Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169146.53,384592.23	Pit Stability: Stable	Dimensions: 2.50m x 0.70m
Hydrock Project No: C161303	Elevation:131.79mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over slightly sandy CLAY. (TOPSOIL)	0.10	(0.10)	131.69	
0.20	PT AJ			MADE GROUND comprising slightly sandy slightly gravelly CLAY with frequent possible asbestos tiles, brick fragments and concrete. (MADE GROUND)		(0.30)		
0.40	PT AJ				0.40		131.39	
				Dark orange brown slightly sandy CLAY with no clear structure (Possible residual soil).	0.45	(0.05)	131.34	
				End of Trial Pit at 0.45 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated due to potential asbestos tiles encountered within the Made Ground stratum. Trial pit reinstated and compacted in layers with potential asbestos materials at the base of the trial pit.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Rld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP18

Method: Trial Pit	Date: 11/05/2016	Logged By: J.Morton	Checked By [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169172.95,384648.00	Pit Stability: Unstable	Dimensions: 2.50m x 0.70m
Hydrock Project No: C161303	Elevation:131.86mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass overly slightly sandy CLAY. (TOPSOIL)	0.10	(0.10)	131.76	
0.20	PT AJ			MADE GROUND comprising brown slightly clayey / silty sandy sub-rounded to sub-angular fine to coarse GRAVEL of limestone sandstone and possible asbestos tiles. (MADE GROUND)	0.35	(0.25)	131.51	
0.50	PT AJ			Grey and black slightly clayey / silty sandy sub-rounded to sub-angular fine to coarse GRAVEL and COBBLES of brick, concrete, clinker, metal and traces of ash and possible asbestos tiles. (MADE GROUND)		(0.75)		
1.00	PT AJ				1.10		130.76	
1.50	PT AJ			Loosely packed orange brown clayey fine SAND. Materal is damp and possibly residual sandstone. (FOREST MARBLE)		(0.50)		
					1.60		130.26	
				End of Trial Pit at 1.65 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as unstable. No Groundwater encountered. Possible asbestos maerials encountered within the Made Ground stratum. Trial pit terminated due to presence of potential asbestos materials. Trial pit reinstated and compacted in layers with potential asbestos materials at the base of the trial pit.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 5.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP19

Method: Trial Pit	Date: 11/05/2016	Logged By: J.Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169214.23,384631.74	Pit Stability: Stable	Dimensions: 2.50m x 0.70m
Hydrock Project No: C161303	Elevation:134.59mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over brown slightly sandy CLAY with tree roots present. (TOPSOIL)	0			
0.20	PT AJ			Limestone boulder encountered	0.15	(0.15)	134.44	
0.50	PT AJ			MADE GROUND comprising brown slightly sandy slightly gravelly CLAY with rare boulders and occasional traces of brick fragments. Gravel as sub-rounded fine to coarse limestone mudstone and sandstone. Boulder as sub-angular limestone. (MADE GROUND)	0.80	(0.65)	133.79	
1.30	PT AJ			MADE GROUND comprising brown slightly sandy CLAY with rare traces of brick fragments. (MADE GROUND)	1.35	(0.55)	133.24	
1.60	PT AJ			Firm becoming stiff orange brown sub-horizontally thickly laminated slightly sandy slightly gravelly silty CLAY. Gravel as sub-rounded to rounded fine to medium mudstone. Material is residual mudstone. (FOREST MARBLE)	1.60	(0.25)	132.99	
1.60	B			Moderately strong bluish grey sub-horizontally very thinly bedded partially weathered MUDSTONE. (FOREST MARBLE)	1.65	(0.05)	132.94	
				End of Trial Pit at 1.65 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Rld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP20

Method: Trial Pit	Date: 11/05/2016	Logged By: J.Morton	Checked By [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169045.38,384641.29	Pit Stability: Unstable	Dimensions: 2.50m x 0.70m
Hydrock Project No: C161303	Elevation:127.74mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over brown slightly sandy CLAY. (TOPSOIL)	0.10	(0.10)	127.64	
0.20	PT AJ			MADE GROUND comprising beige sandy gravelly subrounded COBBLES of sandstone with rare traces of brick towards base of stratum. (MADE GROUND) Trail Pit walls unstable from 0.3m to 0.70m bgl		(0.60)		
0.50	PT AJ				0.70		127.04	
				Soft becoming firm reddish brown slightly gravelly silty CLAY with frequent iron oxide staining. Material is residual mudstone. (FOREST MARBLE)				
1.20	PT AJ					(1.00)		
					1.70		126.04	
				Stiff orange brown and rarely mottled grey sub-horizontally thickly laminated slightly sandy silty CLAY. Material is a residual mudstone. (FOREST MARBLE)				
2.00	PT AJ					(1.30)		
					3.00		124.74	
3.00	PT			End of Trial Pit at 3.10 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trial Pit walls unstable within Made Ground stratum. No Groundwater encountered. Trial pit terminated on excavators maximum reach. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP21

Method: Trial Pit	Date: 11/05/2016	Logged By: J.Morton	Checked By [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169109.65,384706.82	Pit Stability: Stable	Dimensions: 2.50m x 0.70m
Hydrock Project No: C161303	Elevation:126.46mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
0.20	PT AJ			Grass over brown slightly sandy CLAY. (TOPSOIL)	0.25	(0.25)	126.21	
0.40	PT AJ			MADE GROUND comprising brown with occasional black ash staining of slightly sandy slightly gravelly CLAY with rare brick fragments. Gravel is sub-rounded fine mudstone. (MADE GROUND)	0.50	(0.25)	125.96	
0.70	PT AJ			Firm grey brown sub-horizontally thickly laminated slightly sandy slightly gravelly CLAY. Gravel is sub-rounded fine to medium mudstone. Material is residual mudstone. (FOREST MARBLE)	0.90	(0.40)	125.56	
1.50	PT AJ			Firm orange brown sub-horizontally thickly laminated fine slightly sandy slightly gravelly CLAY with occasional sand lenses. Material is residual mudstone. (FOREST MARBLE)	1.50	(0.60)	124.96	
1.50	B			Moderately strong bluish grey sub-horizontally very thinly bedded partially weathered MUDSTONE. (FOREST MARBLE)	1.55	(0.05)	124.91	
				End of Trial Pit at 1.55 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP22

Method: Trial Pit	Date: 11/05/2016	Logged By: J.Morton	Checked By [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169125.85,384734.76	Pit Stability: Unstable	Dimensions: 2.50m x 0.70m
Hydrock Project No: C161303	Elevation:126.13mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over brown slightly sandy CLAY. (TOPSOIL)	0.15	(0.15)	125.98	
0.20	PT AJ			MADE GROUND comprising brown slightly sandy slightly gravelly clayey SILT with brick fragments, concrete, metal and possible asbestos tiles. Gravel as sub-rounded fine to coarse limestone. (MADE GROUND) Trial pit walls unstable	0.35	(0.20)	125.78	
0.30	PT AJ			Stiff orange brown sub-horizontal thickly lamianted slightly sandy CLAY. Material is residual mudstone. (FOREST MARBLE)	0.95	(0.60)	125.18	
0.60	PT AJ			Moderately strong bluish grey sub-horizontally very thinly bedded partially weathered MUDSTONE. (FOREST MARBLE)	1.00	(0.05)	125.13	
				End of Trial Pit at 1.00 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as unstable within the Made Ground stratum. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP23

Method: Trial Pit	Date: 11/05/2016	Logged By: J.Morton	Checked By [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169027.85,384705.42	Pit Stability: Stable	Dimensions: 2.50m x 0.70m
Hydrock Project No: C161303	Elevation:124.77mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over brown slightly sandy CLAY. (TOPSOIL)	0.10	(0.10)	124.67	
0.20	PT AJ			MADE GROUND comprising dark brown with frequent black ash staining of slightly sandy slightly gravelly slightly cobbly silty CLAY with rare boulders brick fragments and possible asbestos tiles. Gravel and cobbles are sub-rounded fine to coarse limestone. Boulders are concrete. (MADE GROUND)	0.45	(0.35)	124.32	
0.50	PT AJ			Concrete boulder encountered				
				MADE GROUND comprising dark brown and black fine to medium ash with pockets of firm brown sandy clay. (MADE GROUND)	0.90	(0.45)	123.87	
1.20	PT AJ			Soft becoming firm orangish brown sub-horizontal thickly laminated sandy silty CLAY with lenses of fine to coarse clayey sand. Material is residual mudstone. (FOREST MARBLE)				
1.80	B					(1.50)		
2.00	PT AJ				2.40		122.37	
				Moderately strong bluish grey sub-horizontally very thinly bedded partially weathered MUDSTONE. (FOREST MARBLE)	2.45	(0.05)	122.32	
				End of Trial Pit at 2.45 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP24

Method: Trial Pit	Date: 11/05/2016	Logged By: J.Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169078.35,384730.97	Pit Stability: Unstable	Dimensions: 2.50m x 0.70m
Hydrock Project No: C161303	Elevation:125.30mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over brown slightly sandy CLAY. (TOPSOIL)	0.10	(0.10)	125.20	
0.20	PT AJ			MADE GROUND comprising brown slightly sandy slightly gravelly CLAY with brick fragments and ash staining. Gravel as sub-rounded fine to medium limestone and mudstone. (MADE GROUND)	0.35	(0.25)	124.95	
0.50	PT AJ			MADE GROUND comprising greyish brown subrounded COBBLES and BOULDERS of limestone and sandstone. (MADE GROUND)	1.10	(0.75)	124.20	
1.20 1.20 1.20	HSV PT AJ B	60kPa		Firm and locally soft in places medium strength orange brown slightly sandy CLAY. Material is residual mudstone. (FOREST MARBLE)	2.10	(1.00)	123.20	
2.00	PT AJ							
2.20	B			Loosely packed orange brown and mottled grey sub-horizontally thickly laminated slightly clayey slightly gravelly silty SAND. Gravel as rounded fine to medium sandstone. Material is residual silty sandstone. (FOREST MARBLE)	2.70	(0.60)	122.60	
2.70	PT AJ			Moderately strong sub-horizontalley thickly laminated partially weathered SANDSTONE. (FOREST MARBLE)	2.75	(0.05)	122.55	
				End of Trial Pit at 2.75 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426,46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP25

Method: Trial Pit	Date: 11/05/2016	Logged By: J. Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:384730.91,168991.88	Pit Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: C161303	Elevation:0.00mAOD	Plant: Hand excavated	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				MADE GROUND comprising brown slightly sandy CLAY with frequent wooden debris (MADE GROUND)	0.10	(0.10)	-0.10	
0.20	PT AJ			MADE GROUND comprising greyish brown slightly sandy slightly gravelly CLAY with frequent roots and wooden debris and brick fragments. Gravel as subrounded to subangular fine to coarse limestone and mudstone. (MADE GROUND)		(0.30)		
0.40	PT AJ			Frequent tree roots encountered	0.40		-0.40	
				End of Trial Pit at 0.40 m				

General Remarks:

Hand Pit location scanned using a CAT and Genny prior to breaking ground. Position was hand excavated due to poor excavator access conditions. Hand Pit was reinstated and compacted in layers on reinstatement. Natural ground not proven.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP26

Method: Trial Pit	Date: 11/05/2016	Logged By: J. Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169094.18,384764.85	Pit Stability: Stable	Dimensions: 2.70m x 0.70m
Hydrock Project No: C161303	Elevation:124.13mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over brown slightly sandy CLAY. (TOPSOIL)	0.10	(0.10)	124.03	
0.20	PT AJ			MADE GROUND comprising brown slightly sandy slightly gravelly CLAY with freqent brick fragments, concrete, ceramic pipe, ash and possible asbestos tile debris. (MADE GROUND)		(0.30)		
0.30	PT				0.40		123.73	
				Soft becoming firm orange brown slightly sandy CLAY. (Possible residual FOREST MARBLE formation). (FOREST MARBLE)	0.50	(0.10)	123.63	
0.50	PT AJ			End of Trial Pit at 0.50 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated due to potential asbestos materials encountered within the Made Ground stratum. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP27

Method: Trial Pit	Date: 11/05/2016	Logged By: J. Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords: 169085.66,384804.19	Pit Stability: Stable	Dimensions: 2.70m x 0.70m
Hydrock Project No: C161303	Elevation: 122.67mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over brown slightly sandy CLAY. (TOPSOIL) Frequent tree roots encountered	0.10	(0.10)	122.57	
0.20	PT AJ			MADE GROUND comprising brown slightly sandy slightly gravelly CLAY with traces of brick fragments and concrete. Gravel is sub-angular to sub-angular fine to coarse limestone and mudstone. (MADE GROUND)		(0.45)		
0.50	PT AJ				0.55		122.12	
0.65	HSV	100kPa		Firm grading to stiff hih strength orange brown and mottled grey slightly sandy slightly gravelly CLAY. Gravel as sub-rounded fine to medium mudstone. Material is residual sub-horizontally thickly laminated mudstone. (FOREST MARBLE)		(0.65)		
					1.20		121.47	
1.30 1.30	PT AJ Bulk			Moderately strong bluish grey sub-horizontally thickly laminated partially weathered MUDSTONE with frequent clay infilling of discontinuites. (FOREST MARBLE)	1.30	(0.10)	121.37	
				End of Trial Pit at 1.35 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP28

Method: Trial Pit	Date: 11/05/2016	Logged By: J. Morton	Checked By [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169143.46,384768.41	Pit Stability: Stable	Dimensions: 2.70m x 0.70m
Hydrock Project No: C161303	Elevation:126.89mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over brown slightly sandy CLAY (TOPSOIL)	0.10	(0.10)	126.79	
0.25	PT AJ			MADE GROUND comprising brown slightly sandy slightly gravelly CLAY with frequent cobbles and brick fragments, concrete and ceramic tiles. Gravel as sub-anglar fine to coarse mudstone and limestone. Cobbles as subangular mudstone and limestone. (MADE GROUND)		(0.80)		
0.60	PT AJ				0.90		125.99	
				MADE GROUND comprising dark orangish brown and mottled grey slightly sandy silty CLAY with traces of ceramic tiles, bricks fragments and wooden debris. (MADE GROUND)				
1.50	PT AJ					(1.20)		
					2.10		124.79	
2.30 2.30	PT AJ B			Stiff grey with orangish brown staining of sub-horizontal thickly laminated slightly sandy CLAY showing signs of possible dessication. Material is residual mudstone. (FOREST MARBLE)		(0.50)		
					2.60		124.29	
				Moderately strong bluish grey sub-horizontal very thinly bedded partially weathered MUDSTONE. (FOREST MARBLE)	2.75	(0.15)	124.14	
				End of Trial Pit at 2.75 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 5.1 (Rel: 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP29A

Method: Trial Pit	Date: 11/05/2016	Logged By: J. Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169176.73,384837.49	Pit Stability: Unstable	Dimensions: 2.70m x 0.70m
Hydrock Project No: C161303	Elevation:124.54mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over brown slightly sandy CLAY. (TOPSOIL)	0.10	(0.10)	124.44	
0.20	PT AJ			MADE GROUND comprising brown slightly sandy CLAY with frequent cobbles of brick fragments and ceramic tiles. (MADE GROUND)	0.35	(0.25)	124.19	
0.50	PT AJ			MADE GROUND comprising orange brown slightly sandy CLAY with frequent cobbles of brick, concrete and metallic pipe. (MADE GROUND)				
1.00	PT AJ					(1.15)		
				Rapid water inflow from 1.40m, likely to be associated with possible backfilled septic tank	1.50		123.04	
				End of Trial Pit at 1.50 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as unstable. Possible historical septic tank and buried bricked walls encountered. Trial pit terminated due to encountered obstruction. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP29B

Method: Trial Pit	Date: 11/05/2016	Logged By: J. Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169176.73,384837.49	Pit Stability: Unstable	Dimensions: 2.70m x 0.70m
Hydrock Project No: C161303	Elevation:124.54mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over brown slightly sandy CLAY. (TOPSOIL)	0.10	(0.10)	124.44	
0.20	PT AJ			MADE GROUND comprising orange brown slightly sandy CLAY. (MADE GROUND)				
0.50	PT AJ				0.95	(0.85)	123.59	
1.00	PT AJ			MADE GROUND comprising buried brick wall with ceramic pipe leading into buried feature. Buried concrete feature encountered adjoining a brick structure. (MADE GROUND)	1.10	(0.15)	123.44	
				End of Trial Pit at 1.10 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as unstable. Possible historical septic tank and buried bricked walls encountered there trial pit terminated at shallow depth without proving natural ground. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP29C

Method: Trial Pit	Date: 11/05/2016	Logged By: J. Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169176.73,384837.49	Pit Stability: Stable	Dimensions: 2.70m x 0.70m
Hydrock Project No: C161303	Elevation:124.54mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over brown slightly sandy CLAY. (TOPSOIL) Mature tree roots encountered	0.10	(0.10)	124.44	
0.20	PT AJ			MADE GROUND comprising brown slightly sandy CLAY with occasional plastic, brick fragments and ash debris and tree roots. Buried brick wall boulder encountered. (MADE GROUND) Buried brick wall boulder encountered.	0.50	(0.40)	124.04	
0.50	PT AJ			Firm orange brown with grey mottling of sub-horizontally thickly laminated slightly silty CLAY with frequent iron oxide staining. Stratum showing signs of possible dessication. Material is residual mudstone. (FOREST MARBLE LIMESTONE)				
1.00	PT AJ				1.80	(1.30)	122.74	
				Stiff grey sub-horizontally thickly laminated CLAY with occasional iron oxide straining. Material is residual mudstone. (FOREST MARBLE)	2.30	(0.50)	122.24	
				Moderately strong bluish grey sub-horizontally closely bedded partially weathered MUDSTONE. (FOREST MARBLE)	2.35	(0.05)	122.19	
				End of Trial Pit at 2.35 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as unstable within Made Ground stratum. Possible historical septic tank and buried bricked walls encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426.46) Hydrock Custom Log Amended Jan 2010

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Project: Rudloe, Corsham

Trial Pit No.
TP30

Method: Trial Pit	Date: 11/05/2016	Logged By: J. Morton	Checked By: [redacted]
Client: Inverness Terrace Ltd	Co-Ords:169151.67,384887.66	Pit Stability: Stable	Dimensions: 2.70m x 0.70m
Hydrock Project No: C161303	Elevation:122.38mAOD	Plant: 360 JCB	

Samples and In Situ Testing			Groundwater	Stratum Description	Depth mbgl	Thickness (m)	Level mAOD	Legend
Depth (m)	Type	Results						
				Grass over brown slightly sandy CLAY. (TOPSOIL)	0.10	(0.10)	122.28	
0.25	PT AJ			MADE GROUND comprising dark brown with occasional black ash staining of slightly sandy slightly gravelly CLAY with occasional cobbles and brick fragments. Gravel is subangular and subrounded fine to coarse mudstone and limestone. Cobbles as subangular to subangular mudstone. (MADE GROUND)	0.35	(0.25)	122.03	
0.50	PT AJ			MADE GROUND comprising brown CLAY with occasional horizons of ash. (MADE GROUND)	0.70	(0.35)	121.68	
1.00	PT AJ			Stiff orange brown with grey mottling sub-horizontal thickly bedded slightly gravelly CLAY. Gravel as sub-rounded fine to medium mudstone. Materal is residual mudstone. (FOREST MARBLE)	2.30	(1.60)	120.08	
1.80	PT AJ							
2.50	PT AJ			Moderately strong bluish grey sub-horizontally very thinly bedded partially weathered MUDSTONE. Discontinuities are occasionally clay infilled. (FOREST MARBLE)	2.50	(0.20)	119.88	
				End of Trial Pit at 2.50 m				

General Remarks:

Trial Pit location scanned using a CAT and Genny prior to breaking ground. Trail pit walls recorded as stable in the short term. No Groundwater encountered. Trial pit terminated on refusal. Trial pit reinstated and compacted in layers.

Logged in general accordance with BS5930: 1999, incorporating Amendment 1.

HoleBASE 3.1 (Bld 426,46) Hydrock Custom Log Amended Jan 2010



Figure 14: Trial Pit 04



Figure 15: Trial Pit 05



Figure 16: Trial Pit 06



Figure 17: Trial Pit 07



Figure 18: Trial Pit 08



Figure 19: Trial Pit 09



Figure 20: Trial Pit 10



Figure 21: Trial Pit 11



Figure 22: Trial Pit 12



Figure 23: Trial Pit 13



Figure 24: Trial Pit 14



Figure 25: Trial Pit 15



Figure 26: Trial Pit 16



Figure 26: Trial Pit 16



Figure 27: Trial Pit 17



Figure 28: Trial Pit 18



Figure 29: Trial Pit 19



Figure 30: Trial Pit 20



Figure 31: Trial Pit 21



Figure 32 Trial Pit 22



Figure 33: Trial Pit 23



Figure 34: Trial Pit 24



Figure 35: Trial Pit 25



Figure 36: Trial Pit 26



Figure 37: Trial Pit 27



Figure 38: Trial Pit 28



Figure 39: Trial Pit 29a



Figure 40: Trial Pit 29b



Figure 41: Trial Pit 29c



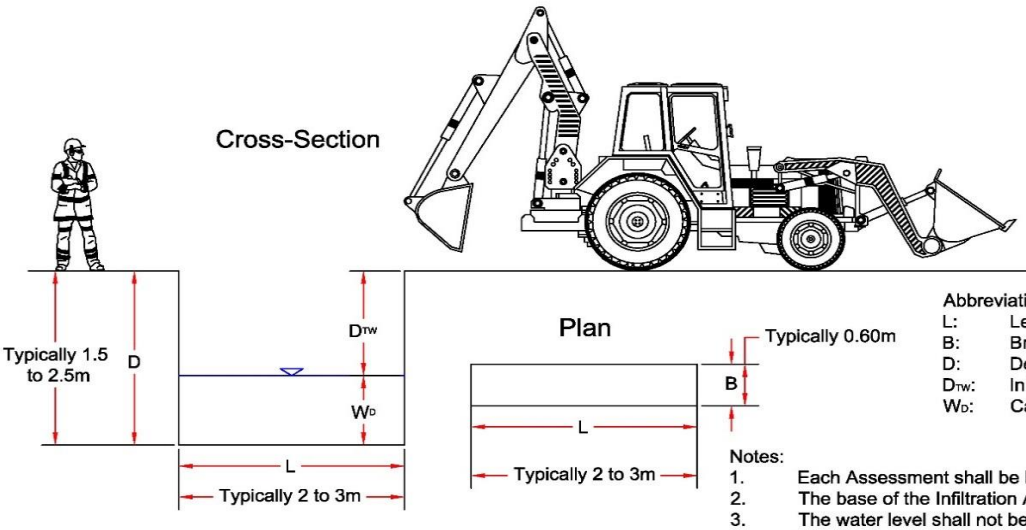
Figure 42: Trial Pit 30

1 DAY INFILTRATION ASSESSMENT - AIDE MEMOIR

Site: Rudloe, Corsham
Client: Inverness Terrace Ltd
Test Location TP12 **Date of start** 11/05/2016 **Date at end** 11/05/2016

ANTICIPATED GROUND PROFILE FROM DESK STUDY	ACTUAL GROUND PROFILE FROM EXCAVATION
GROUND LEVEL	GROUND LEVEL
BASE OF PIT	BASE OF PIT

INFILTRATION ASSESSMENT PIT TYPICAL DIMENSIONS



ACTUAL DIMENSIONS			
L			
B			
D			
D_{TW}			
W_D			

Abbreviations:
L: Length of Infiltration Assessment Pit.
B: Breadth / Width of Infiltration Assessment Pit.
D: Depth of Infiltration Assessment Pit.
D_{TW}: Initial Depth to Top of Water.
W_D: Calculated Water Depth.

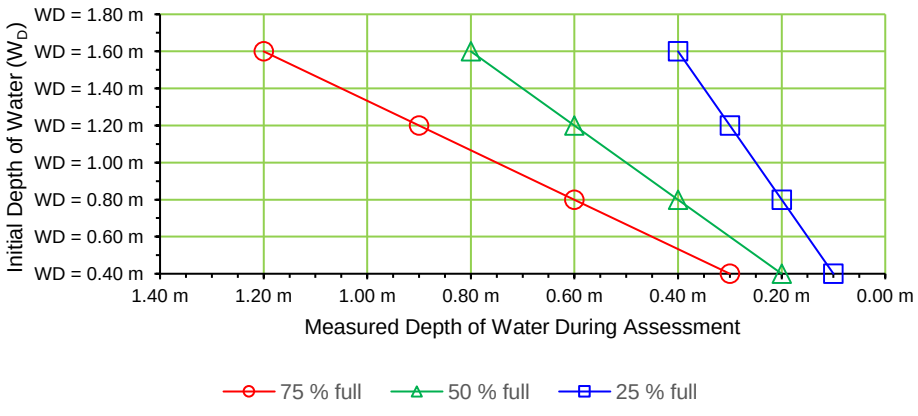
Notes:
1. Each Assessment shall be limited to a single stratum.
2. The base of the Infiltration Assessment Pit shall be below all Made Ground,
3. The water level shall not be raised above the base of the Made Ground.
4. The base of the Infiltration Assessment Pit shall be at least 1m into the stratum which is to be assessed.
5. The base of the Infiltration Assessment Pit shall be above the Water Table.
6. Minimum target depth of water of 1.0m.
7. Where any of the above conditions cannot be met, it shall be reported immediately to the Project Manager for additional guidance before the test is commenced.

Calculated Water Depth (W_D) = $D - D_{TW}$

Maximum Fill Volume (V_w) = $W_D \times B \times L$

Corrected Water Volume (V_{wc}) = $V_w \times$ Gravel Porosity (P_i)

Infiltration	RUN 1		RUN 2		RUN 3	
	W_D		W_D		W_D	
	W_{D1}	D_{TW1}	W_{D2}	D_{TW2}	W_{D3}	D_{TW3}
75% full						
25% full						



SITE OBSERVATIONS - VOLUME LOSS			
Test Run	Infiltration Records up to 6 Hours		Comments
1	<25%		Unlikely without significant attenuation
	<75%		Requires additional BRE DG365 testing
	>75%		Refer to results of Run 2
2	<25%		Unlikely without significant attenuation
	<75%		Requires additional BRE DG365 testing
	>75%		Refer to results of Run 3
3	<25%		Unlikely without significant attenuation
	<75%		Requires additional BRE DG365 testing
	>75%		Indicative Infiltration Rate achieved.

1 DAY INFILTRATION ASSESSMENT - WORKSHEET

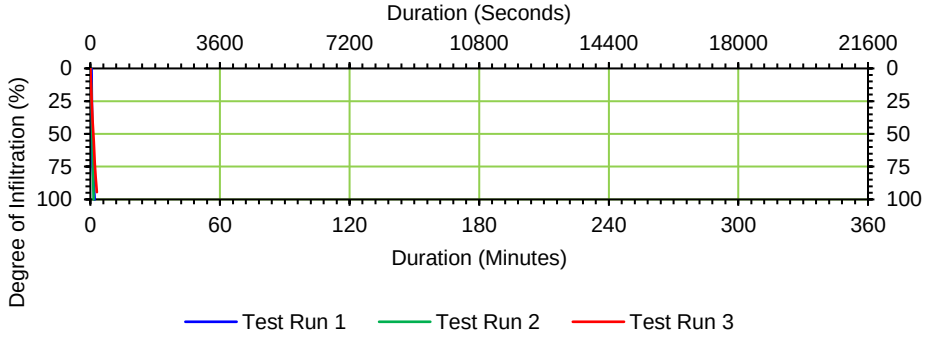
Site:
Client:
Test Location **Date of start** **Date at end**

Test Run 1		Test Run 2		Test Run 3	
Pit Dimensions (m)		**Pit Dimensions (m)**		**Pit Dimensions (m)**	
Trial Pit Length (L)	1.500m	Trial Pit Length (L)	1.500m	Trial Pit Length (L)	1.500m
Trial Pit Breadth / Width (B)	0.800m	Trial Pit Breadth / Width (B)	0.800m	Trial Pit Breadth / Width (B)	0.800m
Effective Depth (D)	1.650m	Effective Depth (D)	1.650m	Effective Depth (D)	1.650m
Time at Start of Filling	9.50	Time at Start of Filling	10.00	Time at Start of Filling	10.10
Time at End of Filling	9.56	Time at End of Filling	10.00	Time at End of Filling	10.14
Depth from Surface to Water (D_{TW})	1.540m	Depth below Surface to Water (D_{TW})	1.560m	Depth below Surface to Water (D_{TW})	1.470m
Water Depth (W_D)	0.110m	Water Depth (W_D)	0.090m	Water Depth (W_D)	0.180m
Maximum Fill Volume (V_W)	0.132m³	Maximum Fill Volume (V_W)	0.108m³	Maximum Fill Volume (V_W)	0.216m³
Gravel used to backfill Test Pit	No	Gravel used to backfill Test Pit	No	Gravel used to backfill Test Pit	No
Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)	
Corrected Water Volume (V_{WC})	0.132m³	Corrected Water Volume (V_{WC})	0.108m³	Corrected Water Volume (V_{WC})	0.216m³

Time to soakaway

Time		Depth to water	Duration	Time		Depth to water	Duration	Time		Depth to water	Duration
Day	Time	(m bgl)	Seconds	Day	Time	(m bgl)	Seconds	Day	Time	(m bgl)	Seconds
1	9.560	1.540	0	1	10.002	1.560	0	1	10.140	1.470	0
1	9.565	0.158	30	1	10.007	1.580	30	1	10.145	1.510	30
1	9.570	1.620	60	1	10.012	1.610	60	1	10.150	1.540	60
1	9.580	1.650	120	1	10.017	1.650	90	1	10.155	1.570	90
			120				90	1	10.160	1.600	120
			120				90	1	10.165	1.620	150
			120				90	1	10.170	1.640	180
			120				90				180
			120				90				180
			120				90				180
			120				90				180
			120				90				180
			120				90				180
			120				90				180
			120				90				180
			120				90				180
			120				90				180
			120				90				180
			120				90				180
			120				90				180
			120				90				180
			120				90				180
			120				90				180
			120				90				180

25% water loss (75% full)			1.568m	**25% water loss (75% full)**			1.583m	**25% water loss (75% full)**			1.515m
50% water loss (50% full)			1.595m	**50% water loss (50% full)**			1.605m	**50% water loss (50% full)**			1.560m
75% water loss (25% full)			1.623m	**75% water loss (25% full)**			1.628m	**75% water loss (25% full)**			1.605m
25% time (seconds)			21 sec	**25% time (seconds)**			32 sec	**25% time (seconds)**			35 sec
75% time (seconds)			65 sec	**75% time (seconds)**			73 sec	**75% time (seconds)**			127 sec
Vp 75-25			0.066m³	**Vp 75-25**			0.054m³	**Vp 75-25**			0.108m³
ap 50 (Actual area from test)			1.453m³	**ap 50 (Actual area from test)**			1.407m³	**ap 50 (Actual area from test)**			1.614m³
tp 75 - 25			44 sec	**tp 75 - 25**			41 sec	**tp 75 - 25**			93 sec
Soil Infiltration Rate		**1.02E-03m/s**		**Soil Infiltration Rate**		**9.45E-04m/s**		**Soil Infiltration Rate**		**7.23E-04m/s**	



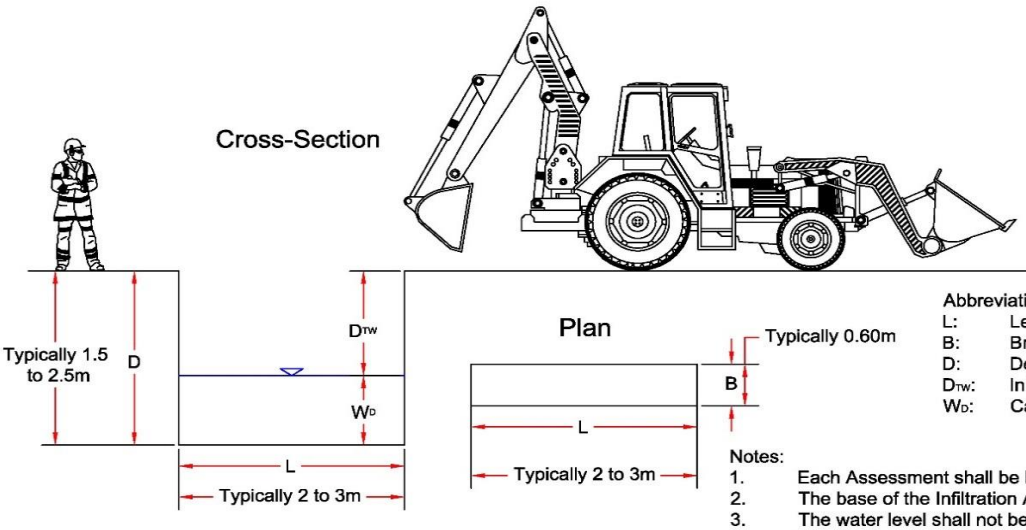
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	SIGN	
	DATE	11/05/2016
Calculated By	PRINT	JDM
	SIGN	
	DATE	14/06/2016
Checked by	PRINT	AJ
	SIGN	
	DATE	27/06/2016

1 DAY INFILTRATION ASSESSMENT - AIDE MEMOIR

Site: Rudloe, Corsham
Client: Inverness Terrace Ltd
Test Location TP11 **Date of start** 11/05/2016 **Date at end** 11/05/2016

ANTICIPATED GROUND PROFILE FROM DESK STUDY	ACTUAL GROUND PROFILE FROM EXCAVATION
GROUND LEVEL	GROUND LEVEL
BASE OF PIT	BASE OF PIT

INFILTRATION ASSESSMENT PIT TYPICAL DIMENSIONS



ACTUAL DIMENSIONS			
L			
B			
D			
D_{TW}			
W_D			

Abbreviations:
L: Length of Infiltration Assessment Pit.
B: Breadth / Width of Infiltration Assessment Pit.
D: Depth of Infiltration Assessment Pit.
D_{TW}: Initial Depth to Top of Water.
W_D: Calculated Water Depth.

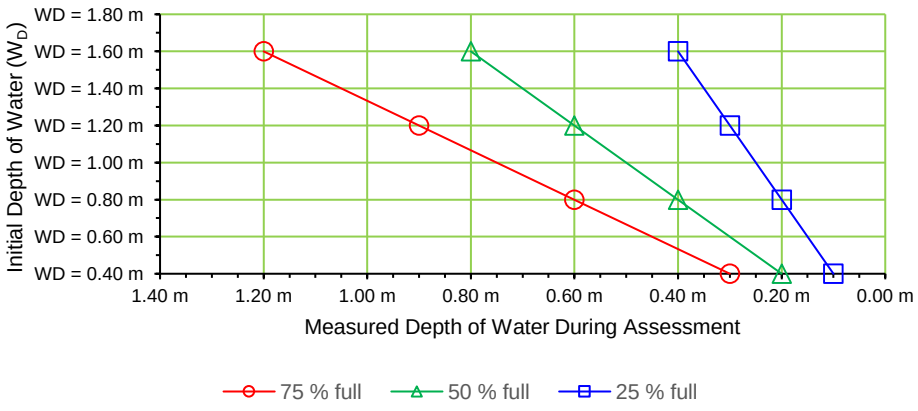
Notes:
1. Each Assessment shall be limited to a single stratum.
2. The base of the Infiltration Assessment Pit shall be below all Made Ground,
3. The water level shall not be raised above the base of the Made Ground.
4. The base of the Infiltration Assessment Pit shall be at least 1m into the stratum which is to be assessed.
5. The base of the Infiltration Assessment Pit shall be above the Water Table.
6. Minimum target depth of water of 1.0m.
7. Where any of the above conditions cannot be met, it shall be reported immediately to the Project Manager for additional guidance before the test is commenced.

Calculated Water Depth (W_D) = D - D_{TW}

Maximum Fill Volume (V_w) = W_D x B x L

Corrected Water Volume (V_{wc}) = V_w x Gravel Porosity (P_t)

Infiltration	RUN 1		RUN 2		RUN 3	
	W_D		W_D		W_D	
	W_{D1}	D_{TW1}	W_{D2}	D_{TW2}	W_{D3}	D_{TW3}
75% full						
25% full						



SITE OBSERVATIONS - VOLUME LOSS			
Test Run	Infiltration Records up to 6 Hours		Comments
1	<25%		Unlikely without significant attenuation
	<75%		Requires additional BRE DG365 testing
	>75%		Refer to results of Run 2
2	<25%		Unlikely without significant attenuation
	<75%		Requires additional BRE DG365 testing
	>75%		Refer to results of Run 3
3	<25%		Unlikely without significant attenuation
	<75%		Requires additional BRE DG365 testing
	>75%		Indicative Infiltration Rate achieved.

1 DAY INFILTRATION ASSESSMENT - WORKSHEET

Site:

Client:

Test Location | **Date of start** | **Date at end**

Test Run 1		Test Run 2		Test Run 3	
Pit Dimensions (m)		**Pit Dimensions (m)**		**Pit Dimensions (m)**	
Trial Pit Length (L)	2.000m	Trial Pit Length (L)		Trial Pit Length (L)	
Trial Pit Breadth / Width (B)	0.800m	Trial Pit Breadth / Width (B)		Trial Pit Breadth / Width (B)	
Effective Depth (D)	1.650m	Effective Depth (D)		Effective Depth (D)	
Time at Start of Filling	11.50	Time at Start of Filling		Time at Start of Filling	
Time at End of Filling	11.51	Time at End of Filling		Time at End of Filling	
Depth from Surface to Water (D_{TW})	0.500m	Depth below Surface to Water (D_{TW})		Depth below Surface to Water (D_{TW})	
Water Depth (W_D)	1.150m	Water Depth (W_D)	-	Water Depth (W_D)	-
Maximum Fill Volume (V_W)	1.840m³	Maximum Fill Volume (V_W)	-	Maximum Fill Volume (V_W)	-
Gravel used to backfill Test Pit	No	Gravel used to backfill Test Pit	No	Gravel used to backfill Test Pit	No
Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)	
Corrected Water Volume (V_{WC})	1.840m³	Corrected Water Volume (V_{WC})	-	Corrected Water Volume (V_{WC})	-

Time to soakaway

Time		Depth to water	Duration
Day	Time	(m bgl)	Seconds
1	11.510	0.500	0
1	11.515	0.560	30
1	11.520	0.550	60
1	11.530	0.550	120
1	11.540	0.550	180
1	11.560	0.560	300
1	12.560	0.570	3900
1	13.560	0.590	7500
1	15.560	0.600	14700
			14700
			14700
			14700
			14700
			14700
			14700
			14700
			14700
			14700
			14700
			14700
			14700
			14700
			14700

25% water loss (75% full)	0.788m	**25% water loss (75% full)**	-
50% water loss (50% full)	1.075m	**50% water loss (50% full)**	-
75% water loss (25% full)	1.363m	**75% water loss (25% full)**	-
25% time (seconds)	-	**25% time (seconds)**	-
75% time (seconds)	-	**75% time (seconds)**	-
Vp 75-25	0.920m³	**Vp 75-25**	-
ap 50 (Actual area from test)	4.820m³	**ap 50 (Actual area from test)**	-
tp 75 - 25		**tp 75 - 25**	
Soil Infiltration Rate	-	**Soil Infiltration Rate**	-

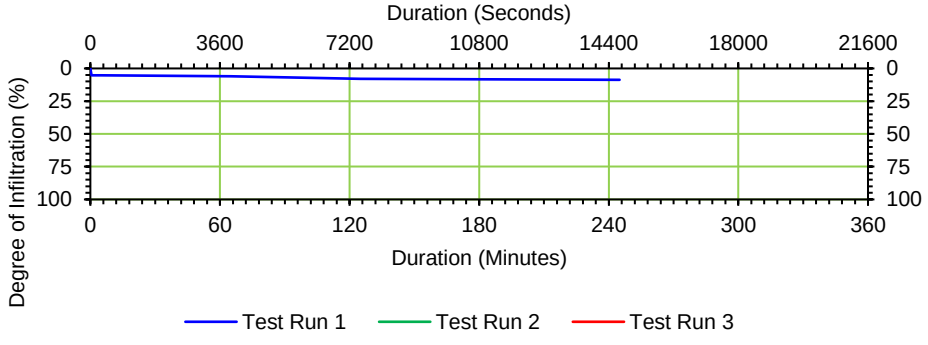
Time to soakaway

Time		Depth to water	Duration
Day	Time	(m bgl)	Seconds

25% water loss (75% full)	-	**25% water loss (75% full)**	-
50% water loss (50% full)	-	**50% water loss (50% full)**	-
75% water loss (25% full)	-	**75% water loss (25% full)**	-
25% time (seconds)	-	**25% time (seconds)**	-
75% time (seconds)	-	**75% time (seconds)**	-
Vp 75-25	-	**Vp 75-25**	-
ap 50 (Actual area from test)	-	**ap 50 (Actual area from test)**	-
tp 75 - 25		**tp 75 - 25**	
Soil Infiltration Rate	-	**Soil Infiltration Rate**	-

Time to soakaway

Time		Depth to water	Duration
Day	Time	(m bgl)	Seconds



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Tested By	PRINT	SM
	SIGN	
	DATE	11/05/2016
Calculated By	PRINT	JDM
	SIGN	
	DATE	14/06/2016
Checked by	PRINT	AJ
	SIGN	
	DATE	27/06/2016

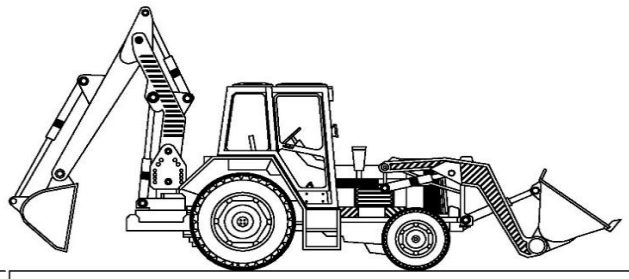
1 DAY INFILTRATION ASSESSMENT - AIDE MEMOIR

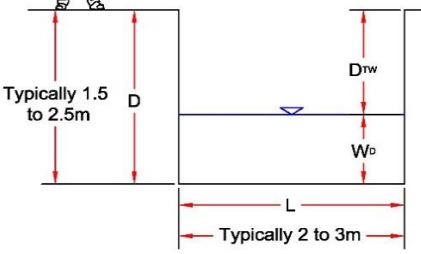
Site: Rudloe, Corsham
Client: Inverness Terrace Ltd
Test Location TP10 **Date of start** 11/05/2016 **Date at end** 11/05/2016

ANTICIPATED GROUND PROFILE FROM DESK STUDY	ACTUAL GROUND PROFILE FROM EXCAVATION
GROUND LEVEL	GROUND LEVEL
BASE OF PIT	BASE OF PIT

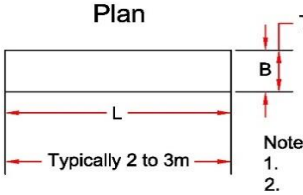
INFILTRATION ASSESSMENT PIT TYPICAL DIMENSIONS

Cross-Section





Plan



ACTUAL DIMENSIONS			
L			
B			
D			
D_{TW}			
W_D			

Abbreviations:
L: Length of Infiltration Assessment Pit.
B: Breadth / Width of Infiltration Assessment Pit.
D: Depth of Infiltration Assessment Pit.
D_{TW}: Initial Depth to Top of Water.
W_D: Calculated Water Depth.

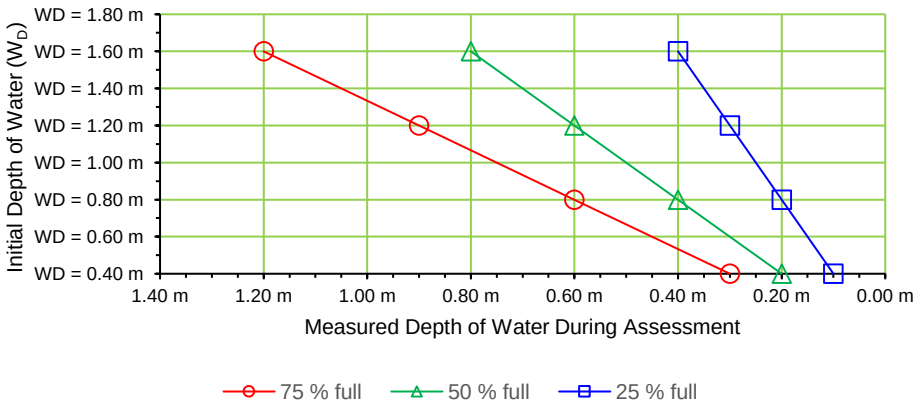
Calculated Water Depth (W_D) = $D - D_{TW}$

Maximum Fill Volume (V_w) = $W_D \times B \times L$

Corrected Water Volume (V_{wc}) = V_w x Gravel Porosity (P_i)

Notes:
1. Each Assessment shall be limited to a single stratum.
2. The base of the Infiltration Assessment Pit shall be below all Made Ground,
3. The water level shall not be raised above the base of the Made Ground.
4. The base of the Infiltration Assessment Pit shall be at least 1m into the stratum which is to be assessed.
5. The base of the Infiltration Assessment Pit shall be above the Water Table.
6. Minimum target depth of water of 1.0m.
7. Where any of the above conditions cannot be met, it shall be reported immediately to the Project Manager for additional guidance before the test is commenced.

Infiltration	RUN 1		RUN 2		RUN 3	
	W_D		W_D		W_D	
	W_{D1}	D_{TW1}	W_{D2}	D_{TW2}	W_{D3}	D_{TW3}
75% full						
25% full						



SITE OBSERVATIONS - VOLUME LOSS			
Test Run	Infiltration Records up to 6 Hours		Comments
1	<25%		Unlikely without significant attenuation
	<75%		Requires additional BRE DG365 testing
	>75%		Refer to results of Run 2
2	<25%		Unlikely without significant attenuation
	<75%		Requires additional BRE DG365 testing
	>75%		Refer to results of Run 3
3	<25%		Unlikely without significant attenuation
	<75%		Requires additional BRE DG365 testing
	>75%		Indicative Infiltration Rate achieved.

1 DAY INFILTRATION ASSESSMENT - WORKSHEET

Site:

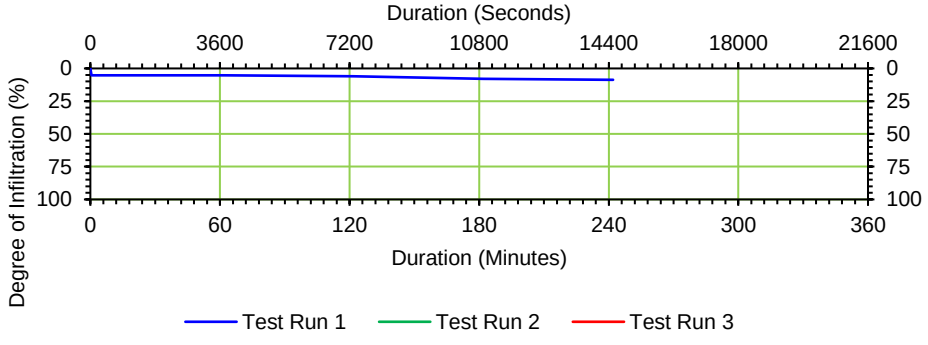
Client:

Test Location | **Date of start** | **Date at end**

Test Run 1		Test Run 2		Test Run 3	
Pit Dimensions (m)		**Pit Dimensions (m)**		**Pit Dimensions (m)**	
Trial Pit Length (L)	2.200m	Trial Pit Length (L)		Trial Pit Length (L)	
Trial Pit Breadth / Width (B)	0.800m	Trial Pit Breadth / Width (B)		Trial Pit Breadth / Width (B)	
Effective Depth (D)	1.650m	Effective Depth (D)		Effective Depth (D)	
Time at Start of Filling	12.10	Time at Start of Filling		Time at Start of Filling	
Time at End of Filling	12.11	Time at End of Filling		Time at End of Filling	
Depth from Surface to Water (D_{TW})	0.500m	Depth below Surface to Water (D_{TW})		Depth below Surface to Water (D_{TW})	
Water Depth (W_D)	1.150m	Water Depth (W_D)	-	Water Depth (W_D)	-
Maximum Fill Volume (V_W)	2.024m³	Maximum Fill Volume (V_W)	-	Maximum Fill Volume (V_W)	-
Gravel used to backfill Test Pit	No	Gravel used to backfill Test Pit	No	Gravel used to backfill Test Pit	No
Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)	
Corrected Water Volume (V_{WC})	2.024m³	Corrected Water Volume (V_{WC})	-	Corrected Water Volume (V_{WC})	-

Time to soakaway				Time to soakaway				Time to soakaway			
Time		Depth to water	Duration	Time		Depth to water	Duration	Time		Depth to water	Duration
Day	Time	(m bgl)	Seconds	Day	Time	(m bgl)	Seconds	Day	Time	(m bgl)	Seconds
1	12.110	0.500	0								
1	12.115	0.560	30								
1	12.120	0.550	60								
1	12.125	0.550	90								
1	12.130	0.550	120								
1	13.130	0.560	3720								
1	14.130	0.570	7320								
1	15.130	0.590	10920								
1	16.130	0.600	14520								
			14520								
			14520								
			14520								
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			14520								
			14520								
			14520								

25% water loss (75% full)	0.788m	**25% water loss (75% full)**	-	**25% water loss (75% full)**	-
50% water loss (50% full)	1.075m	**50% water loss (50% full)**	-	**50% water loss (50% full)**	-
75% water loss (25% full)	1.363m	**75% water loss (25% full)**	-	**75% water loss (25% full)**	-
25% time (seconds)	-	**25% time (seconds)**	-	**25% time (seconds)**	-
75% time (seconds)	-	**75% time (seconds)**	-	**75% time (seconds)**	-
Vp 75-25	1.012m³	**Vp 75-25**	-	**Vp 75-25**	-
ap 50 (Actual area from test)	5.210m³	**ap 50 (Actual area from test)**	-	**ap 50 (Actual area from test)**	-
tp 75 - 25		**tp 75 - 25**		**tp 75 - 25**	
Soil Infiltration Rate	-	**Soil Infiltration Rate**	-	**Soil Infiltration Rate**	-



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Tested By	PRINT	SM
	SIGN	
	DATE	11/05/2016
Calculated By	PRINT	JDM
	SIGN	
	DATE	14/06/2016
Checked by	PRINT	AJ
	SIGN	
	DATE	27/06/2016

Hydrock Consultants

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United Kingdom

Tel: +44 (0)1604 842888
Fax: +44 (0)1604 842666

Email: northampton@hydrock.com

TEST CERTIFICATE

Determination of TRL Dynamic Cone Penetrometer

Tested in accordance with In TRL Road Note 31 & 8 and IAN 73/06 (2009 amendment)

Client: Inverness Terrace Ltd

Client Address: 145-157 ST JOHN STREET
London

Postcode: EC1V 4PW

Contact: [redacted]

Site Name: MoD Rudloe Manor

Site Address: Westwells Road
Corsham

Certificate Number: RYD - 001

Client Reference: Rudloe

Job Number: C161303

Date Received: 11/05/2016

Date Tested: 11/05/2016

Test Results:

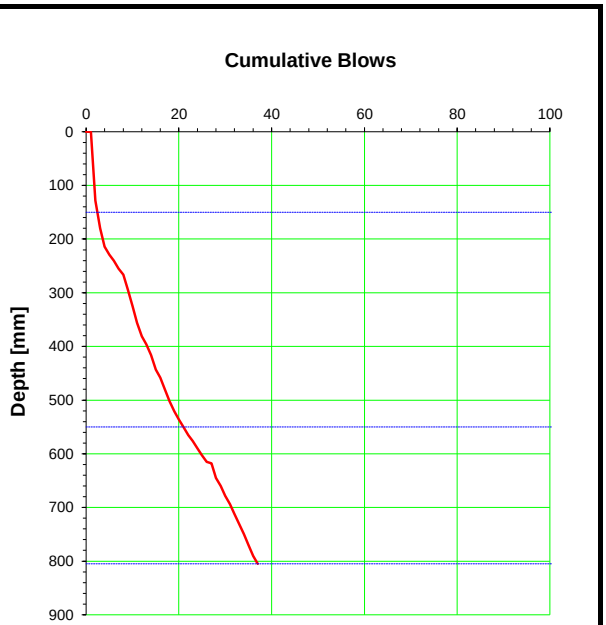
Sample Description: Highly Weathered Mudstone

Sample Number: DCP01

Start Depth [mm]: 160

Test Location: TP09

Layer	No of Blows	Cumulative Blows	CBR [%]	Layer Thickness [mm]	Total Depth [mm]
Topsoil	5	5	8	150	150
Made Ground	15	20	9	400	550
Highly Weathered Mudstone	18	38	18	255	805



Comments: TRL Equation : $Log_{10}(CBR) = 2.480 - 1.057 \times Log_{10}(Strength)$

Approved Signatory:

Name: Justin Morton

Signed:

Position: Geotechnical Engineer

Date Reported: 14 June 2016

Form Number: HD-TRL-DCP ver1

for and behalf of
Hydrock

Registered Office:
Hydrock Consultants Ltd
Over Court Barns
Over Lane Almondsbury
Bristol BS32 4DF U.K.

Registered in England No. 3118932

Hydrock Consultants

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Fax: +44 (0)1604 842666

Email: northampton@hydrock.com

TEST CERTIFICATE

Determination of TRL Dynamic Cone Penetrometer

Tested in accordance with In TRL Road Note 31 & 8 and IAN 73/06 (2009 amendment)

Client: Inverness Terrace Ltd

Client Address: 145-157 ST JOHN STREET
London

Postcode: EC1V 4PW

Contact: DEJones@savills.com

Site Name: MoD Rudloe Manor

Site Address: Westwells Road
Corsham

Certificate Number: RYD - 001

Client Reference: Rudloe

Job Number: C161303

Date Received: 11/05/2016

Date Tested: 11/05/2016

Test Results:

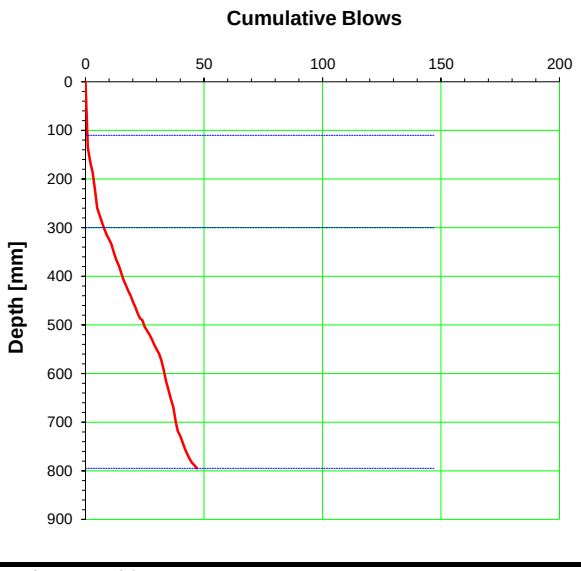
Sample Description: Moderately weathered limestone

Sample Number: DCP02

Start Depth [mm]: 150

Test Location: TP01

Layer	No of Blows	Cumulative Blows	CBR [%]	Layer Thickness [mm]	Total Depth [mm]
Topsoil	4	4	9	110	110
Made Ground	5	9	6	190	300
Gravel and Cobbles	39	48	21	495	795



Comments: TRL Equation : $Log_{10}(CBR) = 2.480 - 1.057 \times Log_{10}(Strength)$

Approved Signatory: Name: Justin Morton Signed:

Position: Geotechnical Engineer

Date Reported: 14 June 2016 Page 1 of 1

Form Number: HD-TRL-DCP ver1

for and behalf of
Hydrock
Registered Office:
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Over Court Barns
Over Lane Almondsbury
Bristol BS32 4DF U.K.

Registered in England No. 3118932

Hydrock Consultants

TEST CERTIFICATE

Determination of TRL Dynamic Cone Penetrometer

Tested in accordance with In TRL Road Note 31 & 8 and IAN 73/06 (2009 amendment)

Construction
Infrastructure
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NN6 8LD

United Kingdom

Tel: +44 (0)1604 842888
Fax: +44 (0)1604 842666

Email: northampton@hydrock.com

Client: Inverness Terrace Ltd

Client Address: 145-157 ST JOHN STREET
London

Postcode: EC1V 4PW

Contact: [redacted]

Site Name: MoD Rudloe Manor

Site Address: Westwells Road
Corsham

Certificate Number: RYD - 001

Client Reference: Rudloe

Job Number: C161303

Date Received: 11/05/2016

Date Tested: 11/05/2016

Test Results:

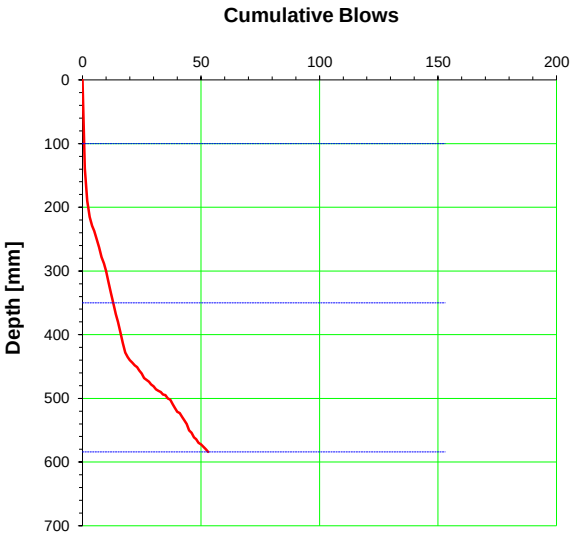
Sample Description: Moderately weathered limestone

Sample Number: DCP03

Start Depth [mm]: 175

Test Location: TP02

Layer	No of Blows	Cumulative Blows	CBR [%]	Layer Thickness [mm]	Total Depth [mm]
Topsoil	3	3	7	100	100
Made Ground	7	10	7	250	350
Gravel and Cobbles	42	52	49	234	584



Comments: TRL Equation : $Log_{10}(CBR) = 2.480 - 1.057 \times Log_{10}(Strength)$

Approved Signatory:

Name: Justin Morton

Signed:

Position: Geotechnical Engineer

Date Reported: 14 June 2016

Form Number: HD-TRL-DCP ver1

for and behalf of
Hydrock
Registered Office:
Hydrock Consultants Ltd
Over Court Barns
Over Lane Almondsbury
Bristol BS32 4DF U.K.

Hydrock Consultants

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Infrastructure
Environment

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NN6 8LD

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Tel: +44 (0)1604 842888
Fax: +44 (0)1604 842666

Email: northampton@hydrock.com

TEST CERTIFICATE

Determination of TRL Dynamic Cone Penetrometer

Tested in accordance with In TRL Road Note 31 & 8 and IAN 73/06 (2009 amendment)

Client: Inverness Terrace Ltd

Client Address: 145-157 ST JOHN STREET
London

Postcode: EC1V 4PW

Contact: [redacted]

Site Name: MoD Rudloe Manor

Site Address: Westwells Road
Corsham

Certificate Number: RYD - 001

Client Reference: Rudloe

Job Number: C161303

Date Received: 11/05/2016

Date Tested: 11/05/2016

Test Results:

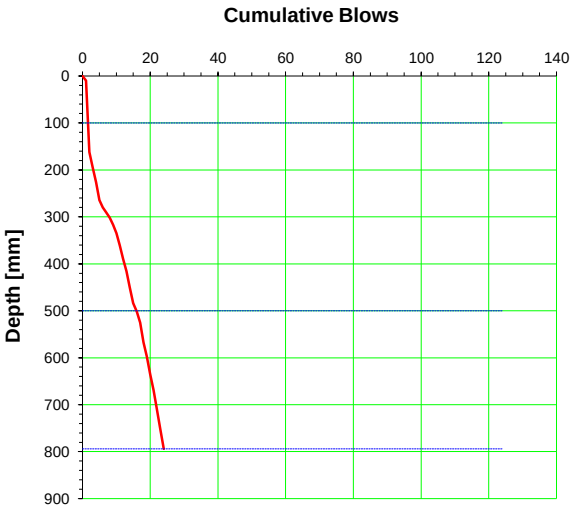
Sample Description: Highly weathered mudstone

Sample Number: DCP04

Start Depth [mm]: 165

Test Location: TP04

Layer	No of Blows	Cumulative Blows	CBR [%]	Layer Thickness [mm]	Total Depth [mm]
Topsoil	2	2	5	100	100
Made Ground	13	15	8	400	500
Clay	10	25	8	294	794



Comments: TRL Equation : $Log_{10}(CBR) = 2.480 - 1.057 \times Log_{10}(Strength)$

Approved Signatory:

Name: Justin Morton

Signed:

Position: Geotechnical Engineer

for and behalf of
Hydrock

Date Reported: 14 June 2016

Form Number: HD-TRL-DCP ver1

Registered Office:
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Email: northampton@hydrock.com

TEST CERTIFICATE

Determination of TRL Dynamic Cone Penetrometer

Tested in accordance with In TRL Road Note 31 & 8 and IAN 73/06 (2009 amendment)

Client: Inverness Terrace Ltd

Client Address: 145-157 ST JOHN STREET
London

Postcode: EC1V 4PW

Contact: [redacted]

Site Name: MoD Rudloe Manor

Site Address: Westwells Road
Corsham

Certificate Number: RYD - 001

Client Reference: Rudloe

Job Number: C161303

Date Received: 11/05/2016

Date Tested: 11/05/2016

Test Results:

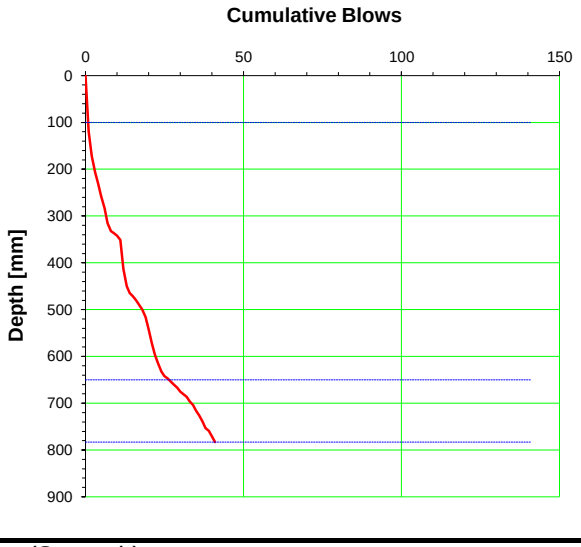
Sample Description: Highly weathered mudstone

Sample Number: DCP05

Start Depth [mm]: 170

Test Location: TP06

Layer	No of Blows	Cumulative Blows	CBR [%]	Layer Thickness [mm]	Total Depth [mm]
Topsoil	3	3	7	100	100
Made Ground	25	28	12	550	650
Clay	14	42	28	133	783



Comments: TRL Equation : $Log_{10}(CBR) = 2.480 - 1.057 \times Log_{10}(Strength)$

Approved Signatory:

Name: Justin Morton

Signed:

Position: Geotechnical Engineer

Date Reported: 14 June 2016

Form Number: HD-TRL-DCP ver1

for and behalf of
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Registered Office:
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TEST CERTIFICATE

Determination of TRL Dynamic Cone Penetrometer

Tested in accordance with In TRL Road Note 31 & 8 and IAN 73/06 (2009 amendment)

Client: Inverness Terrace Ltd

Client Address: 145-157 ST JOHN STREET
London

Postcode: EC1V 4PW

Contact: [redacted]

Site Name: MoD Rudloe Manor

Site Address: Westwells Road
Corsham

Certificate Number: RYD - 001

Client Reference: Rudloe

Job Number: C161303

Date Received: 11/05/2016

Date Tested: 11/05/2016

Test Results:

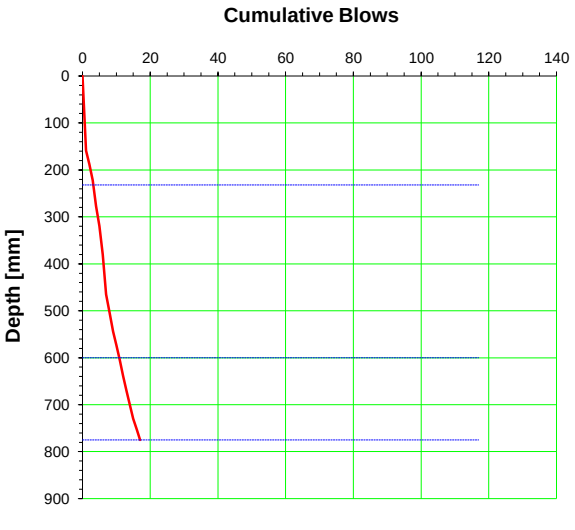
Sample Description: Highly weathered mudstone

Sample Number: DCP06

Start Depth [mm]: 165

Test Location: TP11

Layer	No of Blows	Cumulative Blows	CBR [%]	Layer Thickness [mm]	Total Depth [mm]
Topsoil	3	3	3	232	232
Made Gorund	9	12	6	368	600
Layer 3	6	18	9	175	775



Comments: TRL Equation : $Log_{10}(CBR) = 2.480 - 1.057 \times Log_{10}(Strength)$

Approved Signatory:

Name: Justin Morton

Signed:

Position: Geotechnical Engineer

for and behalf of
Hydrock

Date Reported: 14 June 2016

Form Number: HD-TRL-DCP ver1

Registered Office:
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Over Court Barns
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Email: northampton@hydrock.com

TEST CERTIFICATE

Determination of TRL Dynamic Cone Penetrometer

Tested in accordance with In TRL Road Note 31 & 8 and IAN 73/06 (2009 amendment)

Client: Inverness Terrace Ltd

Client Address: 145-157 ST JOHN STREET
London

Postcode: EC1V 4PW

Contact: [redacted]

Site Name: MoD Rudloe Manor

Site Address: Westwells Road
Corsham

Certificate Number: RYD - 001

Client Reference: Rudloe

Job Number: C161303

Date Received: 11/05/2016

Date Tested: 11/05/2016

Test Results:

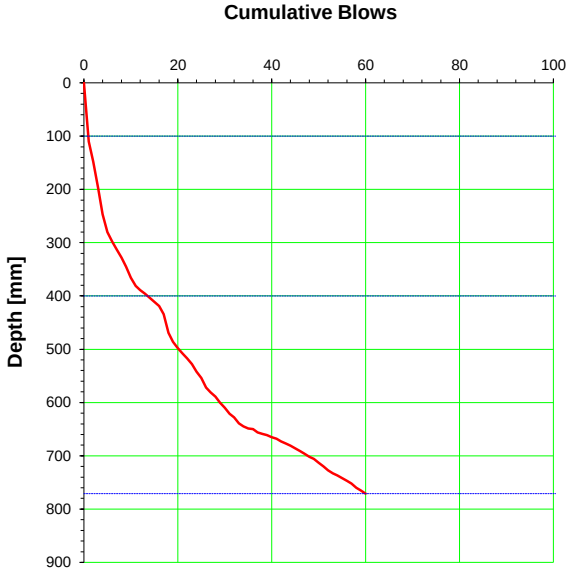
Sample Description: Moderately weathered Limestone

Sample Number: DCP07

Start Depth [mm]: 160

Test Location: TP03

Layer	No of Blows	Cumulative Blows	CBR [%]	Layer Thickness [mm]	Total Depth [mm]
Topsoil	2	2	5	100	100
Made Ground	13	15	11	300	400
Moderately weathered Limestone	45	60	32	371	771



Comments: TRL Equation : $Log_{10}(CBR) = 2.480 - 1.057 \times Log_{10}(Strength)$

Approved Signatory:

Name: Justin Morton

Signed:

Position: Geotechnical Engineer

Date Reported: 14 June 2016

Page 1 of 1

Form Number: HD-TRL-DCP ver1

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TEST CERTIFICATE

Determination of TRL Dynamic Cone Penetrometer

Tested in accordance with In TRL Road Note 31 & 8 and IAN 73/06 (2009 amendment)

Client: Inverness Terrace Ltd

Client Address: 145-157 ST JOHN STREET
London

Postcode: EC1V 4PW

Contact: [redacted]

Site Name: MoD Rudloe Manor

Site Address: Westwells Road
Corsham

Certificate Number: RYD - 001

Client Reference: Rudloe

Job Number: C161303

Date Received: 11/05/2016

Date Tested: 11/05/2016

Test Results:

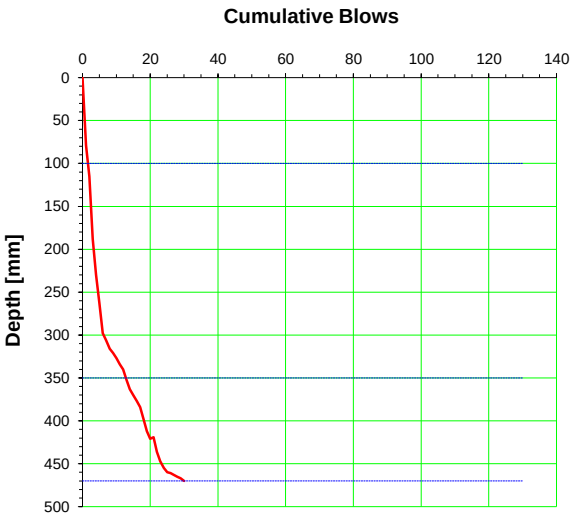
Sample Description: Highly weathered mudstone

Sample Number: DCP08

Start Depth [mm]: 200

Test Location: TP18

Layer	No of Blows	Cumulative Blows	CBR [%]	Layer Thickness [mm]	Total Depth [mm]
Topsoil	2	2	5	100	100
Made Ground	10	12	10	250	350
Made Ground	19	31	43	120	470



Comments: TRL Equation : $Log_{10}(CBR) = 2.480 - 1.057 \times Log_{10}(Strength)$

Approved Signatory:

Name: Justin Morton

Signed:

Position: Geotechnical Engineer

for and behalf of
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Registered Office:
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Over Lane Almondsbury
Bristol BS32 4DF U.K.

Date Reported: 14 June 2016

Form Number: HD-TRL-DCP ver1

Appendix F

Geotechnical Test Results

This appendix may not be included in the printed report to reduce the document size, but is included in the digital version.

2718

Hydrock Consultants
Over Court Barns
Over Lane
Almondsbury
Bristol
BS32 4DF

For the attention of Justin Morton/Andy Jackson

Version No. 1
Page No. 1 of 6
Date of Issue 01/06/2016

TEST REPORT

PROJECT/SITE	Rudloe	Samples received	17/05/2016
GEL REPORT NUMBER	32013	Schedule received	17/05/2016
Your ref/PO:	C161303/G3648	Testing commenced	19/05/2016
Test report refers to	Schedule 1	Status	Final

SUMMARY OF RESULTS ATTACHED

TEST METHOD & DESCRIPTION	QUANTITY	ACCREDITED TEST
BS EN ISO 17892-1: 2014:5. Water Content	10	YES
BS1377: Part 2: 1990:4.2-4.4&5.2-5.4, Liquid & Plastic Limits	10	YES
BS1377: Part 2: 1990:9.2, Particle Size Distribution - Wet Sieve	3	YES

Remarks
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Approved Signatories:
S Robinson (Client Manager) C Andrew (Client Manager)
W Jones (Technical Support) J Hanson (Director) N Parry (Director)

[redacted]

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geotech@geoeng.co.uk
TEL: 01452 527743
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Payments: Geotechnical Engineering Limited
Sort code: 30-15-99 **Bank account**: 00072116

Geotechnical Engineering Limited

LIQUID AND PLASTIC LIMITS

BS.1377 : Part 2 : 1990 : 4 and 5

CLIENT HYDROCK CONSULTANTS

SITE RUDLOE

borehole /trial pit no.	sample		specimen depth (m)	natural water content (%)	specimen preparation and test method	fraction >0.425 mm (%)	liquid limit (%)	plastic limit (%)	plasticity index (%)	description and remarks
	no./type	depth (m)								
TP04	B	1.50	1.50	18.0	BXE	22	50	17	33	Greenish brown slightly sandy slightly gravelly CLAY
TP06	D	1.60	1.60	12.3	BXE	51	47	18	29	Yellowish brown slightly sandy gravelly CLAY
TP08	D	2.00	2.00	25.3	BXE	11	40	18	22	Yellowish brown slightly gravelly silty CLAY
TP09	B	1.00	1.00	20.9	BXE	6	46	19	27	Yellowish grey slightly sandy slightly gravelly CLAY
TP11	B	1.50	1.50	25.7	AXE	0	38	16	22	Orangish brown slightly sandy CLAY
TP15	B	1.50	1.50	21.2	BXE	27	37	17	20	Light grey slightly sandy slightly gravelly CLAY
TP19	B	1.30	1.30	23.7	BXE	5	42	20	22	Brown slightly sandy slightly gravelly CLAY
TP20	B	1.20	1.20	24.6	BXE	0	36	20	16	Orangish brown slightly sandy CLAY
TP28	B	1.50	1.50	27.6	BXE	11	46	19	27	Brown slightly sandy slightly gravelly CLAY with rare rootlets
TP30	B	0.25	0.25	21.1	BXE#	57	38	20	18	Brown slightly sandy gravelly CLAY with rare rootlets

general remarks:
natural water content determined in accordance with BS EN ISO 17892 - 1 : 2014
NP denotes non-plastic
denotes sample tested is smaller than that which is recommended in accordance with BS1377 or BS EN ISO 17892

specimen preparation:
A - as received
B - washed on 0.425mm sieve
C - air dried
D - oven dried (60°C)
E - oven dried (105°C)
F - not known

test method:
X - cone penetrometer (test 4.3)
Y - one point cone penetrometer (test 4.4)
Z - Casagrande apparatus (test 4.5)

CONTRACT **32013**

CHECKED **CA**

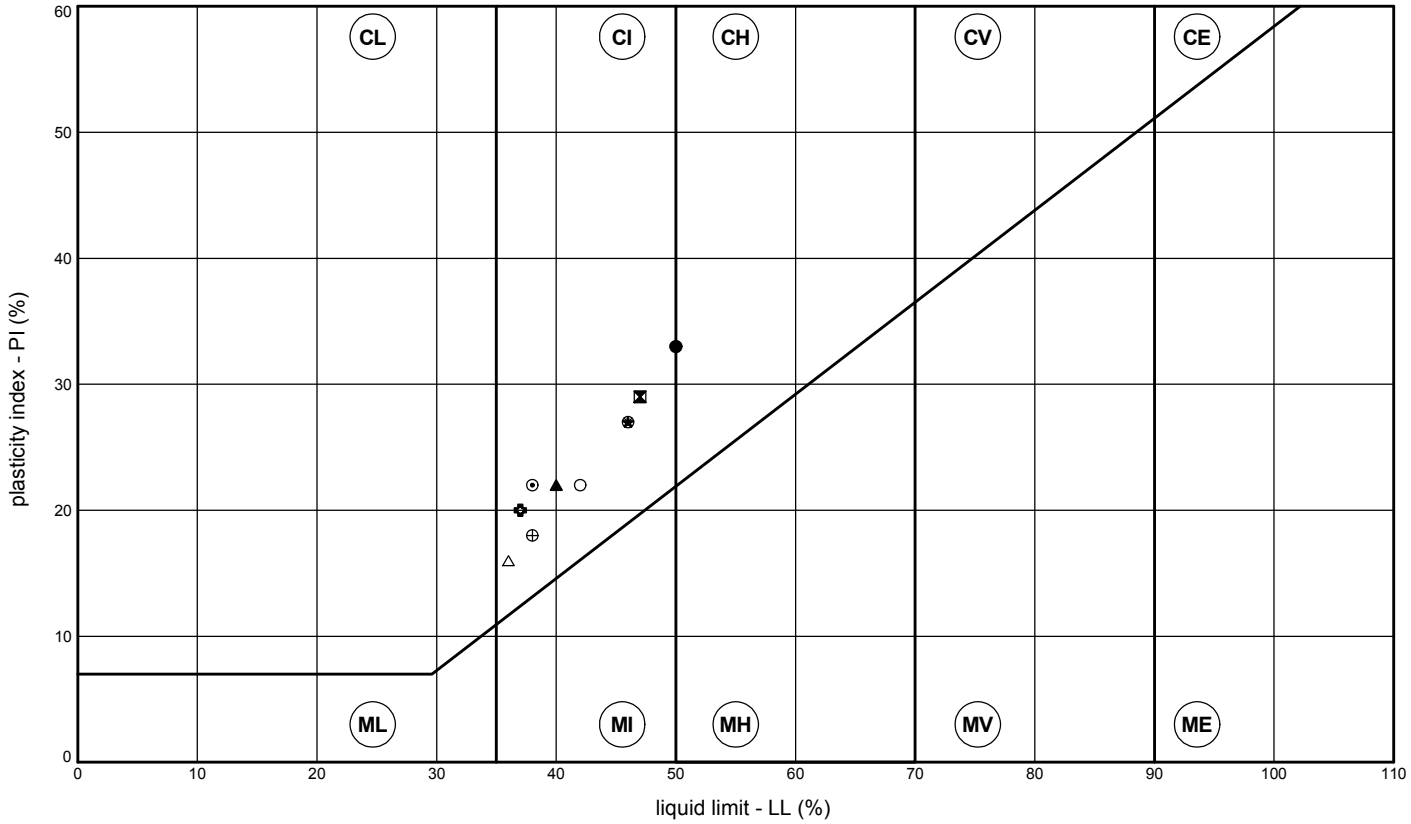
Geotechnical Engineering Ltd, Centurion House, Olympus Park, Quedgeley, Gloucester. GL2 4NF. Tel. 01452 527743 32013.GPJ 01/06/2016 08:21:08

Geotechnical Engineering Limited

ATTERBERG LINE PLOT

CLIENT HYDROCK CONSULTANTS

SITE RUDLOE



	BH/TP No.	depth (m)	LL	PL	PI	remarks
●	TP04	1.50	50	17	33	
⊠	TP06	1.60	47	18	29	
▲	TP08	2.00	40	18	22	
★	TP09	1.00	46	19	27	
⊙	TP11	1.50	38	16	22	
✿	TP15	1.50	37	17	20	
○	TP19	1.30	42	20	22	
△	TP20	1.20	36	20	16	
⊗	TP28	1.50	46	19	27	
⊕	TP30	0.25	38	20	18	

CONTRACT	CHECKED
32013	**CA**

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Geotechnical Engineering Limited

PARTICLE SIZE DISTRIBUTION

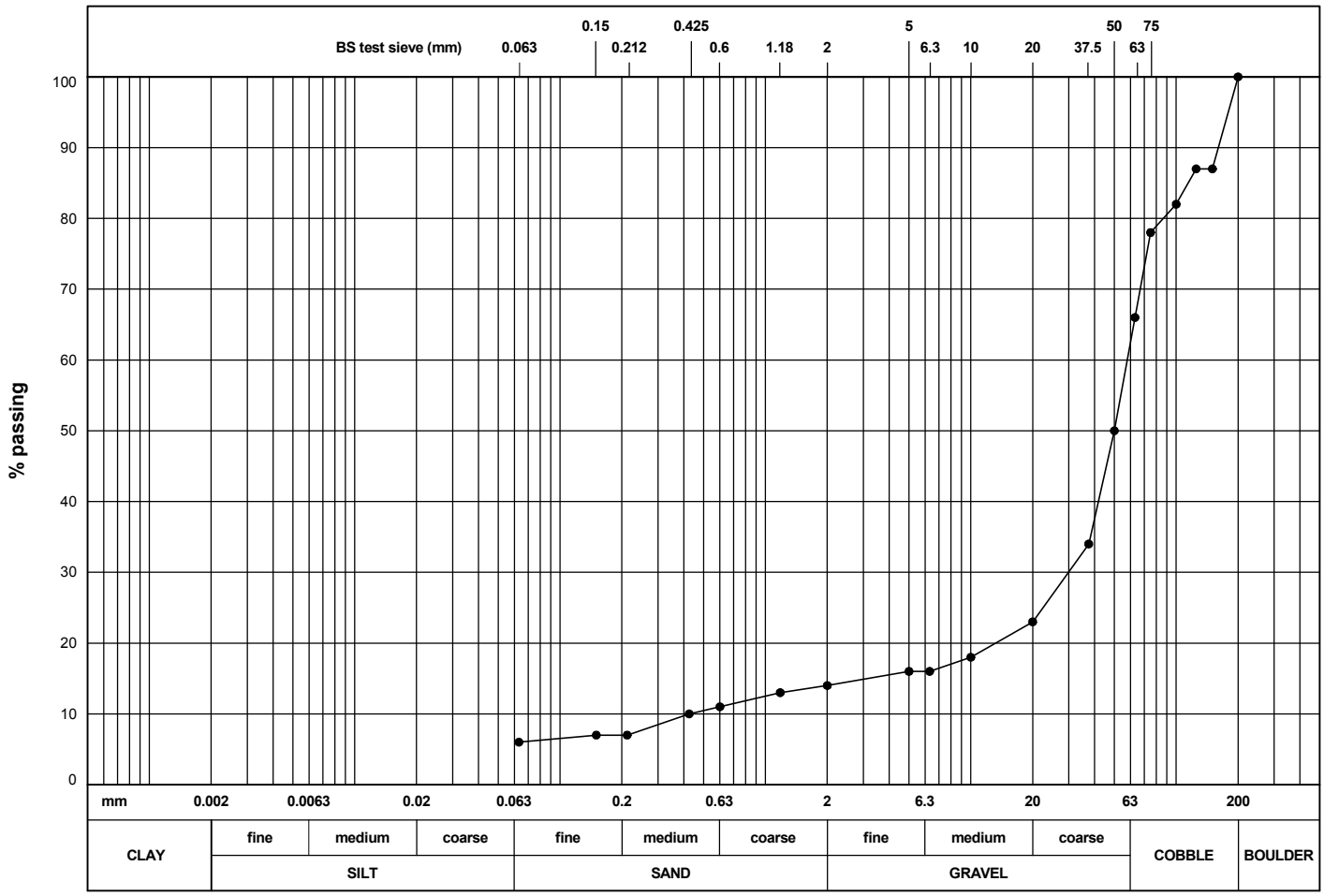
BS.1377 : Part 2 : 1990 : 9

CLIENT HYDROCK CONSULTANTS

SITE RUDLOE

DESCRIPTION Yellowish brown silty sandy GRAVEL with high cobble content

BH/TP No.	TP01
SAMPLE No./TYPE	B
SAMPLE DEPTH (m)	1.20
SPECIMEN DEPTH (m)	1.20



soil type	% fraction
CLAY	
SILT	
SILT & CLAY	6
SAND	8
GRAVEL	52
COBBLE & BOULDER	34
test method(s)	9.2#

BS test sieve (mm)	% passing	BS test sieve (mm)	% passing	particle size (μm)	% finer
150	87	5	16	20	
75	78	2	14	6	
63	66	1.18	13	2	
50	50	0.6	11		
37.5	34	0.425	10		
20	23	0.212	7		
10	18	0.15	7		
6.3	16	0.063	6		

test method:
9.2 - wet sieving
9.3 - dry sieving
9.4 - sedimentation by pipette
9.5 - sedimentation by hydrometer

remarks:
denotes sample tested is smaller than that which is recommended in accordance with BS1377

CONTRACT	CHECKED
32013	**CA**

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PARTICLE SIZE DISTRIBUTION

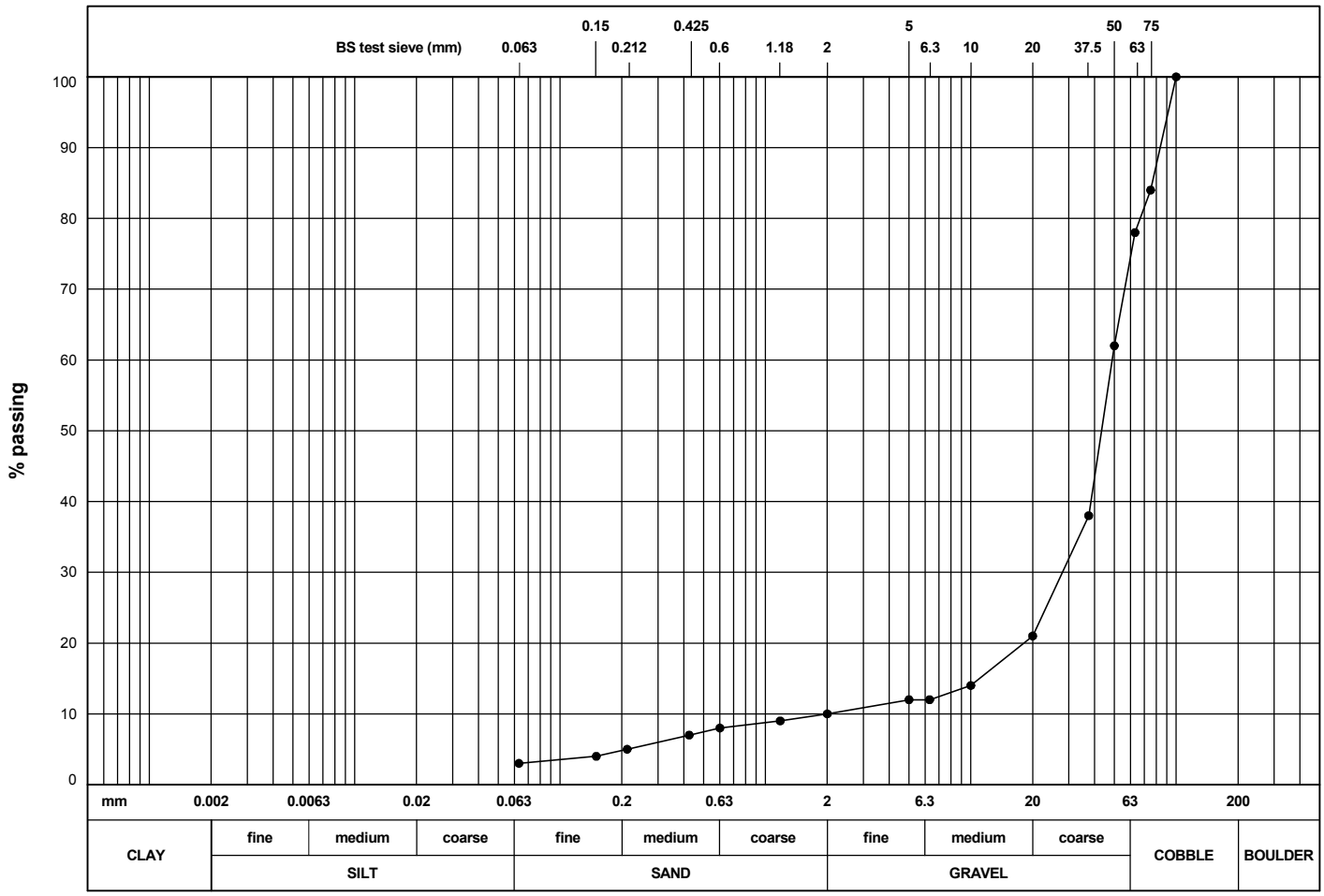
BS.1377 : Part 2 : 1990 : 9

CLIENT HYDROCK CONSULTANTS

SITE RUDLOE

DESCRIPTION Light brown slightly silty sandy GRAVEL with high cobble content

BH/TP No.	TP12
SAMPLE No./TYPE	B
SAMPLE DEPTH (m)	1.00
SPECIMEN DEPTH (m)	1.00



soil type	% fraction
CLAY	
SILT	
SILT & CLAY	3
SAND	7
GRAVEL	68
COBBLE & BOULDER	22
test method(s)	9.2#

test method:
9.2 - wet sieving
9.3 - dry sieving
9.4 - sedimentation by pipette
9.5 - sedimentation by hydrometer

BS test sieve (mm)	% passing	BS test sieve (mm)	% passing	particle size (μm)	% finer
150		5	12	20	
75	84	2	10	6	
63	78	1.18	9	2	
50	62	0.6	8		
37.5	38	0.425	7		
20	21	0.212	5		
10	14	0.15	4		
6.3	12	0.063	3		

remarks:
denotes sample tested is smaller than that which is recommended in accordance with BS1377

CONTRACT **32013**

CHECKED **CA**

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Geotechnical Engineering Limited

PARTICLE SIZE DISTRIBUTION

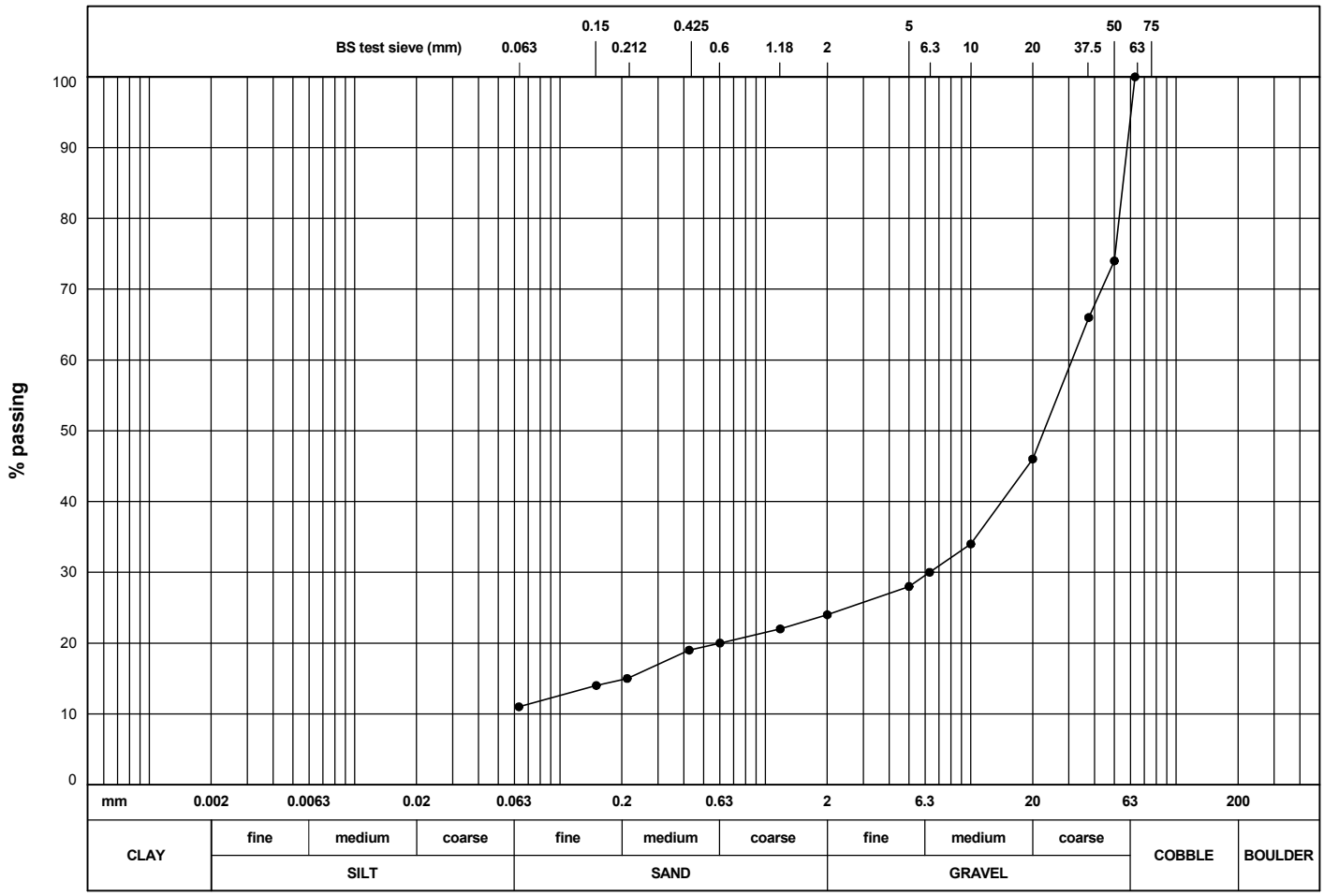
BS.1377 : Part 2 : 1990 : 9

CLIENT HYDROCK CONSULTANTS

SITE RUDLOE

DESCRIPTION Light brown silty sandy GRAVEL

BH/TP No.	TP13
SAMPLE No./TYPE	B
SAMPLE DEPTH (m)	1.20
SPECIMEN DEPTH (m)	1.20



soil type	% fraction
CLAY	
SILT	
SILT & CLAY	11
SAND	13
GRAVEL	76
COBBLE & BOULDER	0
test method(s)	9.2#

BS test sieve (mm)	% passing
150	
75	
63	100
50	74
37.5	66
20	46
10	34
6.3	30

BS test sieve (mm)	% passing
5	28
2	24
1.18	22
0.6	20
0.425	19
0.212	15
0.15	14
0.063	11

particle size (μm)	% finer
20	
6	
2	

test method:
9.2 - wet sieving
9.3 - dry sieving
9.4 - sedimentation by pipette
9.5 - sedimentation by hydrometer

remarks:
denotes sample tested is smaller than that which is recommended in accordance with BS1377

CONTRACT **32013**

CHECKED **CA**

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Hydrock

Client	Location or material to which this assessment applies
Inverness Terrace Ltd	Forest Marble Mudstone
Project	
Rudloe, Corsham	
Job number	
C161303	

Concrete in aggressive ground

After BRE Special Digest 1, 2005

Soil data

	(Adjusted) water soluble sulfate (mg/l)	Total potential sulfate (%)	Water soluble magnesium (mg/l)
Number of tests	6	6	6
No. tests in 20% data set	1	1	1
No. tests with suspected pyrite		1	
Maximum value	459.575	0.8	50
Mean of highest two values	394	1	37
Mean of highest 20%			
Characteristic Value	**394**	**1**	**37**
			Mg not required
	[no pyrite]	**[pyrite suspected]**	
DS Class	**DS-1**	**DS-3**	

If pyrite suspected, DS Class limited to **DS-3**

Is pyrite assumed to be present? No **Adopted DS Class =** **DS-1**

Water data

	(Adjusted) soluble sulfate (mg/l)	Soluble magnesium (mg/l)
Characteristic Value (Maximum Level)	0	0 **Mg not required**
DS Class		

pH data

	Soil	Water
Number of tests	6	0
No. tests in 20% data set	1	
Lowest pH	7.8	
Mean of lowest 20%	7.8	
Characteristic value	**7.8**	
Design value	**7.8**	

Number of soil pH results less than 5.5: 0

DS Class design value

Based on higher of soil and water data **DS-1**

ACEC Class design value

Brownfield Mobile groundwater **AC-1**

Hydrock

Client	Location or material to which this assessment applies
Inverness Terrace Ltd	Made Ground
Project	
Rudloe, Corsham	
Job number	
C161303	

Concrete in aggressive ground

After BRE Special Digest 1, 2005

Soil data

	(Adjusted) water soluble sulfate (mg/l)	Total potential sulfate (%)	Water soluble magnesium (mg/l)
Number of tests	3	3	3
No. tests in 20% data set	1	1	1
No. tests with suspected pyrite		0	
Maximum value	271.275	0.4	3.6
Mean of highest two values	144	0	3
Mean of highest 20%			
Characteristic Value	**271.275**	**0.4**	**3.6**
			Mg not required
	[no pyrite]	**[pyrite suspected]**	
DS Class	**DS-1**	**DS-2**	

If pyrite suspected, DS Class limited to **DS-2**

Is pyrite assumed to be present? No **Adopted DS Class =** **DS-1**

Water data

	(Adjusted) soluble sulfate (mg/l)	Soluble magnesium (mg/l)
Characteristic Value (Maximum Level)	0	0 **Mg not required**
DS Class		

pH data

	Soil	Water
Number of tests	3	2
No. tests in 20% data set	1	0
Lowest pH	8.0	12.0
Mean of lowest 20%	8.0	
Characteristic value	**8.0**	**12.0**
Design value	**8.0**	
Number of soil pH results less than 5.5	0	

DS Class design value

Based on higher of soil and water data **DS-1**

ACEC Class design value

Brownfield
Mobile groundwater **AC-1**

Appendix **G**

Hydrock Methodology

Hydrock Report Appendix on Hydrock Methodology, version 27 updated 25-01-16 applies to this report.

This appendix may not be included in the printed report to reduce the document size, but is included in the digital version. Alternatively, it can be supplied on request by quoting the version number and date.

1.0 HYDROCK REPORT APPENDIX ON HYDROCK METHODOLOGY

This appendix provides additional background information on certain approaches and methods used by Hydrock Consultants Ltd in the preparation of this report.

Throughout the report the term 'geotechnical' is used to describe aspects relating to the physical nature of the site (such as foundation requirements) and the term 'geo-environmental' is used to describe aspects relating to ground-related environmental issues (such as potential contamination). However, it should be appreciated that this is an integrated investigation and these two main aspects are inter-related. The geo-environmental sections are written in broad agreement with BS 10175:2011+A1:2013.

The **first stage** of a two-staged investigation and assessment of a site is the Preliminary Investigation (BS 10175:2011+A1:2013), often referred to as the Phase 1 Study[1], comprising desk study and walk-over survey, which culminates in the Preliminary Risk Assessment. A preliminary conceptual site model (CSM) is developed. From this are identified any geotechnical and geo-environmental hazards and the qualitative degree of risk associated with them. From the geo-environmental perspective, the Hazard Identification process uses professional judgement to evaluate all the hazards in terms of **possible contaminant linkages** (of source-pathway-receptor). Possible contaminant linkages are potentially unacceptable risks in terms of the current contaminated land regime legal framework and require either remediation or further assessment. These are normally addressed via intrusive ground investigation and generic risk assessment.

The **second stage** is the Ground Investigation, Generic Risk Assessment and Geotechnical Interpretation. This represents the further assessment mentioned above. The Ground Investigation comprises field work and laboratory testing based on the findings of the Preliminary Risk Assessment, to reduce uncertainty in the geotechnical and geo-environmental hazard identification. This may include the Exploratory, Main and Supplementary Investigations described in BS 10175:2011+A1:2013.

For the geotechnical aspects of the report, the general requirements of Eurocode 7 (BS EN 1997-2:2007) are to produce a Ground Investigation Report (GIR) which shall form part of the Geotechnical Design Report (GDR). The geotechnical section of this report is intended to fulfil the general requirements of the GIR as outlined in BS EN 1997-2, Section 6.

The GIR contains the factual information including geological features and relevant data, and a geotechnical evaluation of the information stating the assumptions made in the interpretation of the test results.

[1] Please note that it does not refer to a site development phase.

2.0 SITE INVESTIGATION INFORMATION

2.1 Unexploded Ordnance

Clients have a legal duty under the CDM 2015 Regulations to provide designers and contractors with project-specific health and safety information needed to identify hazards and risks. This includes the possibility of unexploded ordnance (UXO) being encountered on the site. Further details are given in CIRIA report C681 (Stone *et al* 2009).

A non-specialist UXO screening exercise has been carried out for the site by considering (a) any evidence of UK defence activities on or near the site evident from the gathered desk study information and (b) the unexploded aerial delivered bomb (UXB) regional risk maps produced by Zetica. Other data sources are available, but as a first stage screening exercise the freely available Zetica maps have been used. The level of risk stated is that determined by Zetica, a company experience in the desk study, field investigation and clearance of UX0/UXB.

2.2 Hydrogeology

Under the Water Framework Directive the designations of principal and secondary aquifers is based on the Environment Agency interactive aquifer designation map. Where aquifers have been mapped, and they are capable of sustaining a yield of 10 m^3/day or supplying 50 people on a continuous basis, the Environment Agency has designated a number of Groundwater Bodies to help manage water quality under the River Basin Management Plans. Groundwater Bodies are defined based on their support for ecosystems as well as their capacity to supply drinking water. Note that some localised small aquifers capable of supporting the above supply may be too small to map and can be identified only by investigation.

Where an aquifer exists and it contains groundwater but is incapable of sustaining the above supply, the groundwater is not part of a Groundwater Body and may not be considered a strategic resource. In which case the groundwater is not a receptor, but can be a pathway to other receptors by virtue of its ability to transport contaminants.

2.3 Geotechnical Testing

Derived values of geotechnical parameters and/or coefficients are obtained from test results, by theory, correlation or empiricism in line with BS EN 1997-2:2007, Section 1.6.

Where derived geotechnical parameters are to be used in designs in accordance with EC7, there are two further stages of interpretation that will be carried out by the geotechnical designer. The first of these is the selection of **characteristic values** for geotechnical parameters using the derived values and complemented by well-established experience as per EN BS 1997-1:2004, Section 2.4.5.2. The characteristic value is a cautious estimate of the value affecting the occurrence of the limit state. Consequently, any particular material type may have more than one characteristic value for each parameter because there may be more than one limit state depending what is being designed.

The second stage is the selection of **design values** as per EN BS 1997-1:2004, Section 2.4.6.2. The design values is either derived from the characteristic value by applying the relevant partial

factor or is assessed directly. Similarly, there can be several design values for the same material type.

In the event that geotechnical designs are included in this report, selection of the characteristic and design values is included. Otherwise, it is the duty of the geotechnical designer to determine these within a separate design report.

3.0 RISK ASSESSMENT RATIONALE

The work presented in this report has been carried out in accordance with recognised best practice as detailed in guidance documents such as in the CLR 11 Model Procedures (Environment Agency 2004a), GP3 (Environment Agency August 2013), BS 5930:2015 and BS 10175:2011+A1:2013. Important aspects of the risk assessment process are transparency and justification. The particular rationale behind the risk assessments presented is given in this appendix.

A preliminary risk assessment is made of both geotechnical and geo-environmental hazards identified at the desk study stage and confirmed (or amended) at the ground investigation stage. In the case of geo-environmental hazards this is based on a simple matrix of probability of occurrence versus the consequence, as explained below, and is referred to as the **exposure model**. In the case of the geotechnical hazard identification, this is referred to as the **ground model**.

The geo-environmental risk assessment process proceeds to the next level, the generic risk assessment, in which actual contaminant concentrations are considered.

3.1 Preliminary Risk Assessment

In line with the CLR 11 Model Procedures (Environment Agency 2004a), the Preliminary Risk Assessment includes a geo-environmental Hazard Identification, which seeks to list all the suspected contaminant **sources**, the **receptors** that might be harmed by those sources and the **pathways** via which the sources might reach the receptors to cause the harm. The source-pathway-receptor concept is known as a contaminant linkage (formerly a pollutant linkage) and only when a linkage is complete is there any possibility of risk of harm arising.

The Hazard Identification process uses professional judgement to evaluate all the hazards in terms of **possible contaminant linkages**. Possible contaminant linkages are potentially unacceptable risks in terms of the current contaminated land regime legal framework and require either remediation or further assessment. These are normally addressed via intrusive ground investigation and the chemical analysis of soil and water samples.

Where no ground investigation has been carried out (i.e. in a desk study only report) there is greater uncertainty in the information available and so a geoenvironmental consequences and probability assessment is undertaken.

Some linkages may be identified which constitute a theoretical connection between a source and a receptor, but professional judgement shows them not to be possible for some reason. These are labelled ‘no linkage’ in the summary table and no further action is required. If a linkage is possible, a comparison is made of consequence against probability in accordance with the guidance given in CIRIA Report C552 (Rudland *et al* 2001), but is modified as mentioned below.

Classification of consequences and probability are given in CIRIA Report C552 Tables 6.3 and 6.4, respectively, but there are a number of inconsistencies in the original Table 6.3, in particular relating to ‘significant harm or significant possibility of significant harm’ (SH/SPOSH). Consequently, the table has been updated by Hydrock in line with current practice and the

revision presented in R&D Publication 66, Annex 4 (NHBC and Environment Agency. 2008, and is given in Table 3.1 below.

The basis of the classification is that 'severe' and 'medium' are likely to result in SH/SPOSH as defined by the EPA 1990, Part 2A, with 'severe' resulting in acute harm. 'Mild' lies below the level of SH/SPOSH but above the level of 'no harm' as implied by the relevant Generic assessment criterion (GAC, see below). Minor lies below the 'no harm' level.

Table 3.1: Classification of Consequences of Geo-environmental Risks

Classification of Consequences for Geo-environmental Risks		
Classification	**Definition**	**Examples**
Severe	Concentration of contaminants is likely to (or is known from previous data to) exceed that indicative of unacceptable intake or contact. Highly elevated concentrations **likely** to result in "significant harm" to human health as defined by the EPA 1990, Part 2A, if exposure occurs. I.e. >>SH/SPOSH, concentrations are high enough to cause acute (short-term) effects. Equivalent to EA **Category 1** pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce. Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population. Catastrophic damage to crops, buildings or property.	Human health: short-term (acute) effects likely to result in significant harm. E.g. high conc. of cyanide on the surface of an informal recreational area. Significant harm to humans is defined as death, disease*, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Planting: complete and rapid die-back of landscaped areas. Controlled waters: short-term pollution, e.g. major spillage into controlled water. Major fish kill in surface water from large spillage of contaminants from site. Highly elevated concentrations of List I and II substances present in groundwater close to small potable abstraction (high sensitivity). Buildings etc.: catastrophic damage, e.g. explosion causing collapse. (can also equate to immediate human health risk if buildings are occupied). Ecosystems: acute risk to a particular ecosystem or organism forming part of that ecosystem in a designated protected area, e.g. by contamination spillage. Damage to a protected area of international significance (e.g. Ramsar site). Site workers: risk assessment required to determine PPE and this may involve USEPA Level A, B or C protection.

Classification of Consequences for Geo-environmental Risks		
Classification	**Definition**	**Examples**
Medium	Concentration of contaminants is likely to (or is known from previous data to) exceed that indicative of unacceptable intake or contact. Elevated concentrations which could result in "significant harm" to human health as defined by the EPA 1990, Part 2A if exposure occurs. I.e. >SH/SPOSH. Equivalent to **EA Category 2** pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce. Significant damage to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population. Significant damage to crops, buildings or property.	Human health: long-term (chronic) effects likely to result in significant harm. E.g. high conc. of contaminants close to the surface of a development site. Significant harm to humans is defined as death, disease*, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Planting: stressed or dead plants in landscaped areas. Controlled waters: pollution of sensitive water resources, e.g. leaching into principal or secondary aquifers or rivers. Buildings etc.: damage renders unsafe to occupy e.g. foundation damage resulting in instability. Ingress of contaminants through plastic potable water pipes. Ecosystems: chronic death of species in a particular ecosystem in a designated protected area, e.g. by contamination spillage. Damage to a protected area of national significance (e.g. Site of Special Scientific Interest). Site workers: risk assessment required to determine PPE and this may involve USEPA Level B, C or D protection.
Mild	Concentration of contaminants is likely to (or is known from previous data to) exceed that indicative of no harm but not unacceptable intake or contact. Exposure to human health **unlikely** to lead to "significant harm". I.e. >SVG/GAC but <SH/SPOSH. Equivalent to **EA Category 3** pollution incident including minimal or short lived effect on water quality; marginal effect on amenity value, agriculture or commerce. Minor or short lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population. Minor damage to crops, buildings or property.	Human health: harm but probably not significant harm unless particularly sensitive individual within the receptor group. May be aesthetic/olfactory impacts. Exposure could lead to slight short-term effects (e.g. mild skin rash). Planting: damage to plants in landscaped areas, e.g. stunted growth, discoloration. Controlled waters: pollution of non-sensitive water bodies e.g. leaching into non-classified groundwater or minor ditches. Buildings etc.: damage to sensitive buildings etc. Surface spalling of concrete. Ecosystems: minor change in a particular ecosystem in a designated protected area, but not significant harm. Damage to a locally important area. Site workers: risk assessment required to determine PPE and this may involve USEPA Level C or D protection.

Classification of Consequences for Geo-environmental Risks		
Classification	**Definition**	**Examples**
Minor	Concentration of contaminants is likely to (or is known from previous data to) be less than that indicative of no harm. No measurable effects on humans. I.e. <SGV/GAC. Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems. Repairable effects of damage to buildings, structures and services.	No measurable effects, but simple PPE required (USEPA Level D protection, i.e. overalls, boots, goggles, hard hat). The loss of plants in a landscaping scheme. Discoloration of concrete.

CIRIA Report C552 Table 6.4 is reproduced as Table 3.2 below. This provides an estimate of the probability that the event described by the contaminant linkage will occur. For example, the likelihood that pollution of groundwater will occur by leaching of metals into the aquifer.

Table 3.2: Classification of Probability of Geo-environmental Risks

Classification of Probability of Geo-environmental Risks	
Classification	**Definition**
High Likelihood	There is a contaminant linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	There is a contaminant linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event in not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a contaminant linkage and circumstances are possible under which an event could occur. However, it is no means certain that even over a longer period such event could take place, and is less likely in the shorter term.
Unlikely	There is a contaminant linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

The perceived level of risk for each pathway is then derived from the probability versus consequences matrix, modified after CIRIA Report C552 Table 6.5, given in Table 3.3 below. Note that by definition, no contaminant linkage equates to no risk.

Table 3.3: Qualitative Risk Level from Consequence and Probability

		Consequence			
Probability	*product*	**Severe**	**Medium**	**Mild**	**Minor**
	High Likelihood	Very high risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Low risk	Very low risk
	Low Likelihood	Moderate risk	Low risk	Low risk	Very low risk
	Unlikely	Low risk	Very low risk	Very low risk	Very low risk
	No Linkage	No risk			

This approach assumes an equivalence between probability and consequences and ignores the difficulty that can arise where to probability of occurrence appears to be almost negligible but the consequences are very severe. In such conditions there is a degree of subjectivity in assessing the level of risk and it could be low, moderate or high. Such risks may require specialist consideration beyond the scope of this standard report.

Finally, a description of the classified risks and the likely action required can be determined from Table 3.4 below.

Table 3.4: Description of the Classified Risks and Likely Action Required

Description of Classified Risks and Likely Action Required	
Very High Risk	A significant contaminant linkage, including actual evidence of significant harm or significant possibility and significant harm, is clearly identifiable at the site (e.g. from visual or documentary evidence) under current conditions, with potential for legal and/or financial consequences for the site owner or other Responsible Person. Remediation advisable based on acute impacts being likely. Immediate action should be considered.
High Risk	A contaminant linkage is identifiable at the site under current and future use conditions. Although likely, there is no obvious actual evidence of significant harm or significant possibility and significant harm under current conditions. Extent of risk is therefore subject to confirmation by investigation and risk assessment and most likely to be deemed significant. Realisation of the risk is likely to present a substantial liability to the site owner or other Responsible Person. Remediation required for redevelopment and may also be required under Part 2A for existing receptors.
Moderate Risk	A contaminant linkage is identifiable at the site under current and future use conditions. However, it is not likely to be a significant linkage under current conditions. It is either relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely, that the harm would be relatively mild. Actual extent of risk subject to confirmation by additional investigation and risk assessment and most likely to lie between no possibility of harm (under current conditions) and significant possibility of significant harm (under conditions created by new use). Remediation may be required for redevelopment.
Low risk	Potential pathways and receptors exist but history of contaminative use or site conditions indicates that contamination is likely to be of limited extent and below the level of no possibility of harm. It is unlikely that the site owner or other Responsible Person would face substantial liabilities from suck a risk. Precautionary investigations and risk assessment advisable on change of use. Any subsequent remedial works are likely to be relatively limited.
Very Low Risk	No contaminant linkage likely to exist under current or future conditions, but this cannot be completely discounted. If harm is realised, it is likely at worst to be mild or minor. Site not capable of being determined under Part 2A where the local authority inspects the site. No further action recommended.
No Risk	No contaminant linkage exists.

3.2 Contaminant Analysis of Samples

The Model Procedures of CLR 11 provide guidance on key information sources with respect to potential contamination arising from past land uses of a site. In particular, the now withdrawn CLR 8 (Environment Agency 2002b), the DoE Industry Profile documents and ISO10381-5 provide good summaries of priority pollutants for UK sites. Additionally, the Environment Agency (2004b) has produced a list of priority pollutants for ecological risk assessment. These documents have been used, with the findings of the Phase 1 investigation, to scope the analyses of chemicals of potential concern. It should be noted that whilst CLR 8 was withdrawn in August 2008 it was not replaced and its findings are still considered useful.

Hydrock considers there to be a minimum requirement for soil chemical analysis, even for greenfield sites, in order to satisfy the 'suitable for use' criterion of the planning regime. This is represented by the 'Hydrock default list of determinands for solids'. The default list is derived

from the above guidance, particularly Tables 2.1 and 2.2 of CLR 8, listing potential inorganic and organic contaminants on typical former **industrial** land in the UK.

Since not all redevelopment sites have former industrial land uses, the default list designed to screen for unacceptable risks to property development and future occupiers comprises those substances with human, vegetation and construction materials receptors. The list includes common metals, metalloids and inorganic species, pH, asbestos fibres and screening tests for common organic compound groups which are deemed chemicals of potential concern. Sulfate is a contaminant whose principal receptor is concrete in the ground and is not considered toxic except in extreme conditions. Sulfate analysis is included in the list of geotechnical tests. Some common determinands such as elemental sulfur and sulfide are not included because there is insufficient information available to calculate meaningful assessment criteria.

The Hydrock default list of determinands for water or soil leaching samples is based on the prevailing UK drinking water standards and the environmental quality standards (EQS) values under the UK's obligations under the European Water Framework Directive (WFD). It includes the most common contaminants for use as a screening exercise but does not represent a complete list.

The two Hydrock default lists of determinands are used as a minimum requirement whatever the findings of the Phase 1 investigation. Added to this may be other suites of determinands based on the findings and review of the aforementioned documents.

Assessment is made of all chemicals of potential concern recorded on the site above the laboratory reporting limit. The reporting limits are less than the generic assessment criteria where this is possible. There are two main reasons why this may not be the case.

Firstly, low-level detection may be available using a more detailed analysis method, but this would be disproportionally expensive for routine screening purposes. More detailed testing may be recommended in some instances as an additional phase of investigation once the results of the screening exercise are known.

Secondly, there may be no suitable laboratory method available. In which case it is impossible to give a definitive opinion.

3.3 Generic Risk Assessment Criteria for Human Health

3.3.1 Policy

Generic assessment criteria (GAC) are criteria derived using largely generic assumptions about the characteristics and behaviour of sources, pathways and receptors. These assumptions will be conservative in a defined range of conditions. The Contaminated Land Exposure Assessment (CLEA) framework uses Soil Guideline Values (SGV) in assessing risks to human health from exposure to soils contaminated with selected contaminants. It has been assumed in this report that the exposure conditions are within the generic conditions used to derive the SGVs.

It should be noted that exceedance of GACs does not automatically mean that the soil is "contaminated". The derivation of GACs includes a number of precautionary assumptions such that non-exceedance will indicate that risk to human health is acceptable and that the land is

suitable for use, with regard to the contaminant in question. SGVs are not binding standards, but may be used to inform judgments about the need for action and the selection of remediation standards or target values for individual sites.

However, the legal test for land contamination under the statutory guidance of Part 2A of the Environment Protection Act 1990 (i.e. "significant harm or significant possibility of significant harm") is **unacceptable** intake or direct bodily contact. Defra (September 2005 and July 2008) has made it clear that exceedance of a GAC does not necessarily meet this legal test, i.e. exceedance of a GAC does not necessarily equate to unacceptable risk. Consequently, the GACs must be considered as screening values only. The situation was clarified by Defra (July 2008) in its guidance on the legal definition of contaminated land and in 2012 by the publication of revised contaminated land statutory guidance. One of the key policy aspects of this revision is to clarify that GACs are only one tool in the decision-making process and that background concentrations and a number of other relevant factors should also be taken into account. The aim is to prevent over-cautious determination of land as being contaminated.

The Environment Agency (2009a) has stated that the Health Criteria Values (HCV) used to derive GACs represent minimal or tolerable risk for long-term human exposure to chemicals in the soil. "Science alone cannot answer the question of whether or not a given *possibility of significant harm* is *significant*, since what is either *significant* or *unacceptable* is a matter of socio-political judgement, and the law entrusts decisions on this to the enforcing authorities (Defra July 2008)."

The former Health Protection Agency (2009) (now Public Health England) also described how HCVs do not represent unacceptable intake and that unacceptable intake is not a toxicological parameter. It further asserts that "unacceptable intake is a policy decision which can only be taken by the local authority." Pointers provided to local authorities in this regard are provided by the following: "The HCVs, and GACs based upon them represent trigger values above which there might be a possibility of significant harm. Whether there is a significant possibility will be linked to factors such as the margin of exceedance, the duration and frequency of exposure, and other site-specific factors."

The 2012 National Planning Policy Framework states that the standard of remediation to be achieved through the grant of planning permission for new development, including permission for land remediation activities, is the removal of unacceptable risk and making sure the site is suitable for its new use. As a minimum, after carrying out the development and commencement of its use, the land should not be capable of being determined as contaminated under Part 2A. The requirements for planning are, therefore, the same as for Part 2A.

The 2012 contaminated land statutory guidance says that GAC represent cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal risk to health. They may be used to indicate when land is very unlikely to pose a significant possibility of significant harm to human health. They should not:

- be used as direct indicators of whether a significant possibility of significant harm to human health may exist. Also, the local authority should not view the degree by which GACs are exceeded (in itself) as being particularly relevant to this consideration, given that the degree of risk posed by land would normally depend on many factors other than simply the amount of contaminants in soil.

- be seen as screening levels which describe the boundary between Categories 3 and 4 (see below);
- be viewed as indicators of levels of contamination above which detailed risk assessment would automatically be required under Part 2A or, under the planning system, in relation to ensuring that land affected by contamination does not meet the Part 2A definition of contaminated land after it has been developed; nor
- be used as generic remediation targets under the Part 2A regime.

Where it is judged that significant uncertainties remain following assessment against generic criteria, there are two options for the developer: either the implementation of an agreed remedial strategy, or to undertake additional testing and/or a detailed quantifiable risk assessment to determine whether remediation is indeed necessary.

Category 4 Screening Levels (C4SL) are criteria developed to screen out land affected by contamination under Part 2A of the EPA 1990 (see Section 3.12 below). They represent a low level of risk, whilst still being protective of human health. The Defra policy document (March 2014) states that "it is anticipated that, where they exist, C4SLs will be used as generic screening criteria that can be used within a GQRA, albeit describing a higher level of risk than the currently or previously available SGVs."

Defra also states that "the Part 2A regime and the planning regime are inter-linked such that the National Planning Policy Framework states that "after development, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990" and that "Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner." The Part 2A Statutory Guidance and accompanying Impact Assessment were developed on the basis that Category 4 Screening Levels could be used under the planning regime, as they would be in Part 2A investigations directly. The estimated benefits that were expected to accrue from the changes to the Part 2A Statutory Guidance and specifically from the use of the new Category 4 Screening Levels were based on this assumption. However, policy responsibility for the National Planning Policy Framework and associated Planning Practice Guidance falls to the Department for Communities and Local Government."

DCLG's Planning Policy Guidance (Reference ID: 33-007-20140612 Land affected by contamination, dated 12 June 2014) states that "if there is a reason to believe contamination could be an issue, developers should provide proportionate but sufficient site investigation information (a risk assessment) to determine the existence or otherwise of contamination, its nature and extent, the risks it may pose and to whom/what (the 'receptors') so that these risks can be assessed and satisfactorily reduced to an acceptable level. Defra has published a policy companion document considering the use of 'Category 4 Screening Levels' in providing a simple test for deciding when land is suitable for use and definitely not contaminated land."

In a letter to Local Authorities dated 3 September 2014, Defra Parliamentary Under Secretary Lord de Mauley confirmed that the Impact Assessment agreed during the revision of the Part 2A Statutory Guidance was developed on the basis that C4SLs could be used under the planning regime, and noted this intent is reflected in the above-mentioned revision of the Planning Policy Guidance. He highlighted that C4SLs provide a simple test for deciding when land is suitable for use. He concluded that the introduction of C4SLs has an important part to play in the

assessment of potentially contaminated land and encouraged Local Authority officials to read Defra's Policy Companion Document.

The NHBC (October 2014) has endorsed the use of C4SLs in the planning framework. "NHBC considers that:

- C4SLs may be used for schemes in England and Wales as generic screening levels for contaminants in soils, as long as they are justifiable and defensible in the conceptual site model for the site. Where representative contaminant concentrations exceed C4SLs, remediation or further detailed assessment will normally be required.
- Developers should, however, check that the use of C4SLs would be accepted by regulators under the relevant planning regime.
- Where a land use scenario covered by a C4SL applies in England and Wales, that use of C4SLs will satisfy NHBC Standards – Chapter 4.1 requirements. For lead, the C4SL value should be adopted as the screening level, though normal background concentrations can be considered when appropriate."

Public Health England has also communicated with Hydrock on a site-specific basis, confirming (in this instance) that the soil benzo(a)pyrene levels below C4SL not to be of particular concern as long as the Local Authority as the regulator is also satisfied.

On this basis, Hydrock considers the C4SLs to be more pragmatic assessment criteria for use in the planning regime. However, it is recommended that the opinion be sought of the Local Authority in question.

3.3.2 Methodology

The sample analyses are divided into representative data sets for the assessment, based on the conceptual model and taking into account such characteristics as variation in soil properties or historical, existing or proposed land uses. The 'averaging area' is the area of soil to which a receptor is exposed or which otherwise contributes to the creation of hazardous conditions.

The determination of averaging areas is clarified in the CLEA Frequently Asked Questions (30 January 2006) document available from the Agency CLEA web pages. In applying statistical tests, the risk assessor is asking the question "are mean (95 percentile upper confidence limit) soil concentrations within the averaging area equal to, or greater than, the SGV/GAC?" If a garden lies within a larger averaging area, but that averaging area is representative of conditions within the garden, then this is the average concentration a receptor using the garden will be exposed to. An averaging area can, therefore, be larger than a single garden and part of a larger zoned area if:

- contaminant concentrations are within the same statistical population, the sample data being representative of the averaging area and the mean concentration of the averaging area;
- hot spots are treated as separate zones or averaging areas; and
- the sampling strategy takes into account uncertainty (spatial heterogeneity) in contaminant concentration.

The approach taken in this report is to characterize the materials that are likely to form the ground cover in garden areas by zoning the site. Each averaging area has been chosen to describe the area(s) of the site, zoned according to material type and existing conditions, within which assessment against GACs has taken place. As pointed out in P5-066/TR (Environment Agency 2000) and by Nathanail (2004), this is a logical way of investigating a large plot of land that is intended for residential use, particularly if the development layout may not have been finalised.

The original Soil Guideline Values were all withdrawn in August 2008 and the Agency started a programme of publishing replacements using its 'new approach', which involves a number of changes to the way exposure is assessed. This was started using the CLEA 1.04 software. The current version is CLEA 1.07. This programme was put in abeyance when Defra started to re-draft the Part 2A statutory guidance and was never re-started.

This new approach included SGVs only at 6% soil organic matter (SOM) content and none for the residential without plant uptake land use. The contaminated land community has addressed this deficiency by publishing other lists of GACs (EIC/AGS/CL:AIRE 2009 and LQM/CIEH (Nathanail *et al* 2009)) and these have been given equal status to the SGVs in the 2012 revised statutory guidance. Hydrock adopted all these SGVs and GACs and where none are published has derived in-house values using generic assumptions about the characteristics and behaviour of sources, pathways and receptors, the CLEA 1.07 software and research of the recommended data sources.

Since the publication of these lists, CL:AIRE (December 2013) has highlighted that several of the original USEPA data sets used as default input parameters in CLEA have been revised based on a better understanding of the science. These are the outdoor soil-to-skin adherence factor, the exposure frequency for dermal contact, the indoor soil vapour inhalation rates and the produce consumption rates. The first three of these changes are based on updated research in a USEPA 2011 document cited by CL:AIRE. These supersede a draft 2006 USEPA document that was used in the default CLEA model and represent new science. The produce consumption rates used by CL:AIRE are from the most recent National Diet and Nutrition Survey (NSDS) (2008/2009 to 2010/11).

In November 2014 Hydrock used these revised parameters to update all the previously published GACs using modifications to CLEA 1.06. These changes are now built into CLEA 1.07 when the C4SL land uses are selected.

The mean and 90th percentile consumption rates from SP1010 Table 3.4 are used. In the derivation of the C4SLs, CL:AIRE used the 90th percentile consumption rates for the "top two" produce types for each substance and mean consumption rates are used for the remaining produce types (SP1010 Table 3.3). This approach has been followed by Hydrock for the C4SL substances. However, the procedure for determining which are the "top two" is time consuming and has not been replicated by Hydrock for all the other chemicals. The 90th percentile values have been taken for all produce types (and is slightly more conservative).

The GACs adopted by Hydrock for the standard CLEA land uses are given in Table 3.5 together with the source of the GAC. The table also lists GACs for open space (see below).

Please note also that CLEA 1.07 allows for other variations, most notably of soil type (9 options) and building type (5 residential options). The defaults are a sandy loam soil, a small terraced house in the residential setting and a pre-1970s office block in the commercial setting. These are generally conservative and the resultant SGV/GAC are protective of other combinations (unlike the default SOM mentioned above). It is not practical to include all permutations in Table 3.5 and in the cases where specific GACs have been derived, this is referred to in the text of the report and the relevant values included in the assessment tables.

Lead is a special case as the former SGV was not based on the CLEA model, but equations utilising blood lead concentrations. There is currently no guidance on how to risk assess lead in order to produce a GAC. The provisional C4SL for lead was derived using a number approaches, again based on blood lead concentrations, but for three different toxicological effects. The use of biokinetic modelling allows conversion to units suitable for use in the CLEA model. The final C4SLs for residential (with home-ground produce) stipulated in the Defra policy document is less than the withdrawn SGV although the SGV was supposed to represent a lower level of risk. It is clear from the work undertaken to develop the C4SLs why the SGVs were withdrawn. Consequently, and in view of the Defra policy document, Hydrock has adopted the C4SLs for lead *in lieu* of the withdrawn SGV or any specifically derived GAC (which would require a thorough review of lead toxicology). The lead C4SLs are, therefore, included under the term "GACs" in this report.

Further details including data sources can be obtained on request. It is Hydrock's policy to continually review GACs and updates are made in response to the latest Government guidance or as more data on the substances becomes available. The date of the last update of the table is indicated.

Table 3.5: Soil GACs Adopted by Hydrock (mg/kg) - on following pages

Updated 18/11/15		Human Health Generic Assessment Criteria (mg/kg)											
Contaminant	**Source of GAC**	Human health - residential without plant uptake (1%SOM)	Human health - residential without plant uptake (2.5%SOM)	Human health - residential without plant uptake (6%SOM)	Human health - residential with plant uptake (1%SOM)	Human health - residential with plant uptake (2.5%SOM)	Human health - residential with plant uptake (6%SOM)	Human health - allotments (1%SOM)	Human health - allotments (2.5%SOM)	Human health - allotments (6%SOM)	Human health - commercial (1%SOM)	Human health - commercial (2.5%SOM)	Human health - commercial (6%SOM)
							Default for SGV			Default for SGV			Default for SGV
Hydrock Default Suite													
Arsenic	SGV report + CLEA 1.07	40	40	40	37	37	37	49	49	49	640	640	640
Beryllium	LQM/CIEH + CLEA 1.07	73	73	73	73	73	73	56	56	56	390	390	390
Boron	LQM/CIEH + CLEA 1.07	11000	11000	11000	300	300	300	47	47	47	190000	190000	190000
Cadmium	SGV report + CLEA 1.07	87	87	87	14	14	14	2.4	2.4	2.4	220	220	220
Chromium (III)	LQM/CIEH + CLEA 1.07	890	890	890	890	890	890	15000	15000	15000	8400	8400	8400
Chromium (VI)	LQM/CIEH + CLEA 1.07	6.1	6.1	6.1	6.1	6.1	6.1	2.3	2.3	2.3	33	33	33
Copper	LQM/CIEH + CLEA 1.07	7300	7300	7300	2500	2500	2500	540	540	540	69000	69000	69000
Lead	C4SL (NB not minimal risk)	310	310	310	200	200	200	80	80	80	2300	2300	2300
Mercury, inorganic	SGV report + CLEA 1.07	240	240	240	170	170	170	81	81	81	3600	3600	3600
Nickel	Hydrock + CLEA 1.07	180	180	180	130	130	130	55	55	55	1700	1700	1700
Selenium	SGV report + CLEA 1.07	600	600	600	360	360	360	130	130	130	13000	13000	13000
Vanadium	LQM/CIEH + CLEA 1.07	1200	1200	1200	410	410	410	94	94	94	9000	9000	9000
Zinc	LQM/CIEH + CLEA 1.07	40000	40000	40000	3900	3900	3900	640	640	640	670000	670000	670000
Cyanide (free)	Hydrock + CLEA 1.07	800	800	800	790	790	790	2300	2300	2300	16000	16000	16000
Phenol	SGV report + CLEA 1.07	750	1300	2300	290	560	1100	69	140	290	760	1500	3200
Acenaphthene	LQM/CIEH + CLEA 1.07	3000	4700	6000	220	520	1100	35	95	210	84000	97000	100000
Acenaphthylene	LQM/CIEH + CLEA 1.07	2900	4600	6000	180	430	940	29	71	170	83000	97000	100000
Anthracene	LQM/CIEH + CLEA 1.07	31000	35000	37000	2400	5500	11000	390	940	2300	520000	540000	540000
Benz(a)anthracene	LQM/CIEH + CLEA 1.07	5.5	7.8	9.4	4.2	6.7	8.6	2.5	5.4	10	86	91	94
Benzo(a)pyrene	LQM/CIEH + CLEA 1.07	1.5	1.6	1.6	1.50	1.50	1.5	2.10	2.2	2.4	14	14	14
Benzo(b)fluoranthene	LQM/CIEH + CLEA 1.07	11.0	11.0	11.0	7.6	9.4	10.0	3.5	7.3	13	97	98	99
Benzo(ghi)perylene	LQM/CIEH + CLEA 1.07	71	72	72	64	69	71	69	110	150	630	640	640
Benzo(k)fluoranthene	LQM/CIEH + CLEA 1.07	15	16	16	12.0	14.0	15	6.7	13	23	140	140	140
Chrysene	LQM/CIEH + CLEA 1.07	13.0	16.0	15	7.7	11.0	13.0	2.6	5.8	12	140	140	140
Dibenz(ah)anthracene	LQM/CIEH + CLEA 1.07	1.30	1.40	1.40	1.10	1.30	1.40	0.75	1.4	2.3	12	12	13
Fluoranthene	LQM/CIEH + CLEA 1.07	1500	1600	1600	290	560	900	52	130	290	23000	23000	23000
Fluorene	LQM/CIEH + CLEA 1.07	2800	3800	4500	170	410	880	28	68	160	63000	68000	71000
Indeno(123cd)pyrene	LQM/CIEH + CLEA 1.07	6.3	6.6	6.7	4.3	5.5	6.2	1.8	3.8	7.1	58	59	60
Naphthalene	LQM/CIEH + CLEA 1.07	2.3	5.6	13.0	2.2	5.2	12.0	4.2	10	24	190	460	1100
Phenanthrene	LQM/CIEH + CLEA 1.07	1300	1500	1500	97	220	440	16	39	92	22000	22000	23000
Pyrene	LQM/CIEH + CLEA 1.07	3700	3800	3800	620	1200	2000	110	270	620	54000	54000	55000
TPH fractions													
TPH ali EC05-EC06	LQM/CIEH + CLEA 1.07	42	78	160	42	78	160	760	1800	4000	300	560	1200
TPH ali >EC06-EC08	LQM/CIEH + CLEA 1.07	100	230	530	100	230	530	2400	5700	13000	140	320	740
TPH ali >EC08-EC10	LQM/CIEH + CLEA 1.07	27	65	160	27	65	150	320	760	1700	78	190	450
TPH ali >EC10-EC12	LQM/CIEH + CLEA 1.07	48	120	280	48	120	280	2100	4200	7000	48	120	280
TPH ali >EC12-EC16	LQM/CIEH + CLEA 1.07	24	59	140	24	59	140	11000	13000	13000	24	59	140
TPH ali >EC16-EC35	LQM/CIEH + CLEA 1.07	65000	93000	110000	65000	92000	110000	260000	270000	270000	1000000	1000000	1000000
TPH ali >EC35-EC44	LQM/CIEH + CLEA 1.07	65000	93000	110000	65000	92000	110000	260000	270000	270000	1000000	1000000	1000000
TPH aro EC05-EC07	LQM/CIEH + CLEA 1.07	370	690	1400	73	150	310	14	28	60	1200	2300	4700
TPH aro >EC07-EC08	LQM/CIEH + CLEA 1.07	860	1800	3900	130	300	680	23	53	120	870	1900	4400
TPH aro >EC08-EC10	LQM/CIEH + CLEA 1.07	47	120	270	35	84	190	8.9	22	52	610	1500	3600
TPH aro >EC10-EC12	LQM/CIEH + CLEA 1.07	250	590	1200	75	180	390	13	32	76	360	900	2200
TPH aro >EC12-EC16	LQM/CIEH + CLEA 1.07	1800	2300	2500	150	330	670	23	58	140	36000	37000	38000
TPH aro >EC16-EC21	LQM/CIEH + CLEA 1.07	1900	1900	1900	260	550	930	46	110	260	28000	28000	28000
TPH aro >EC21-EC35	LQM/CIEH + CLEA 1.07	1900	1900	1900	1100	1500	1700	360	790	1500	28000	28000	28000
TPH aro >EC35-EC44	LQM/CIEH + CLEA 1.07	1900	1900	1900	1100	1500	1700	360	790	1500	28000	28000	28000
TPH >EC44-EC70	LQM/CIEH + CLEA 1.07	1900	1900	1900	1600	1800	1900	1100	2000	2900	28000	28000	28000
VOCs - BTEX & MTBE													
Benzene	SGV report + CLEA 1.07	0.38	0.70	1.4	0.099	0.2	0.42	0.02	0.041	0.09	27	48	90
Toluene	SGV report + CLEA 1.07	860	1800	3900	130	300	680	23	53	120	870	1900	4400
Ethylbenzene	SGV report + CLEA 1.07	240	540	1200	76	180	410	17	40	94	520	1200	2800
Xylene, o-	SGV report + CLEA 1.07	85	200	460	59	140	320	29	70	160	480	1100	2600
Xylene, m-	SGV report + CLEA 1.07	79	190	430	58	140	320	32	77	180	630	1500	3500
Xylene, p- (use this for combined m & p)	SGV report + CLEA 1.07	76	180	410	55	130	300	30	72	170	580	1400	3200
MTBE	EIC/AGS/CL:AIRE + CLEA 1.07	100	170	320	62	110	210	23	45	92	7500	12000	27000
VOCs - other benzenes													
Iso-propylbenzene	EIC/AGS/CL:AIRE + CLEA 1.07	17	40	95	15	38	89	33	81	190	390	950	2300
Propylbenzene	EIC/AGS/CL:AIRE + CLEA 1.07	57	140	320	46	110	260	35	86	200	400	980	2300
1,2,4-Trimethylbenzene	EIC/AGS/CL:AIRE + CLEA 1.07	0.58	1.4	3.3	0.47	1.2	2.7	0.39	0.96	2.3	39	94	210

Updated 18/11/15		Human Health Generic Assessment Criteria (mg/kg)											
Contaminant	**Source of GAC**	Human health - residential without plant uptake (1%SOM)	Human health - residential without plant uptake (2.5%SOM)	Human health - residential without plant uptake (6%SOM)	Human health - residential with plant uptake (1%SOM)	Human health - residential with plant uptake (2.5%SOM)	Human health - residential with plant uptake (6%SOM)	Human health - allotments (1%SOM)	Human health - allotments (2.5%SOM)	Human health - allotments (6%SOM)	Human health - commercial (1%SOM)	Human health - commercial (2.5%SOM)	Human health - commercial (6%SOM)
VOCs - chlorobenzenes													
Bromobenzene	EIC/AGS/CL:AIRE + CLEA 1.07	1.3	3	7	1.2	2.8	6.6	3.3	7.9	18	92	210	490
Chlorobenzene	LQM/CIEH + CLEA 1.07	0.47	1.1	2.4	0.46	1.0	2.4	6.1	14	33	56	130	290
1,2-Dichlorobenzene	LQM/CIEH + CLEA 1.07	24	57	130	23	55	130	97	240	560	570	1400	3200
1,3-Dichlorobenzene	LQM/CIEH + CLEA 1.07	0.44	1.1	2.5	0.41	0.98	2.3	0.26	0.63	1.5	30	73	170
1,4-Dichlorobenzene	LQM/CIEH + CLEA 1.07	60	140	330	38	92	220	16	38	91	230	540	1300
Hexachlorobenzene	LQM/CIEH + CLEA 1.07	0.20	0.50	2.5	0.20	0.50	1.9	0.17	0.42	0.91	0.2	53	55
Pentachlorobenzene	LQM/CIEH + CLEA 1.07	20	30	38	5.9	12	22	1.3	3.1	7.1	640	770	830
1,2,3-trichlorobenzene	LQM/CIEH + CLEA 1.07	1.5	3.7	8.8	1.5	3.6	8.6	4.8	12	28	100	250	590
1,2,4-trichlorobenzene	LQM/CIEH + CLEA 1.07	2.6	3.4	15	2.6	6.4	15	31	77	180	220	530	1300
1,3,5-trichlorobenzene	LQM/CIEH + CLEA 1.07	0.33	0.81	1.9	0.33	0.81	1.9	4.9	12	28	23	55	130
1,2,3,4-tetrachlorobenzene	LQM/CIEH + CLEA 1.07	24	56	120	15	36	78	4.5	11	26	120	300	730
1,2,3,5-tetrachlorobenzene	LQM/CIEH + CLEA 1.07	0.75	1.9	4.3	0.67	1.6	3.7	0.39	0.95	2.2	39	98	240
1,2,4,5-tetrachlorobenzene	LQM/CIEH + CLEA 1.07	0.73	1.7	3.5	0.34	0.78	1.6	0.065	0.16	0.38	20	49	96
VOCs - chloroalkanes & alkanes													
Bromodichloromethane	EIC/AGS/CL:AIRE + CLEA 1.07	0.027	0.049	0.10	0.022	0.040	0.082	0.017	0.033	0.070	2.0	3.5	7.1
Bromoform	EIC/AGS/CL:AIRE + CLEA 1.07	7.4	15	32	3.5	7.3	16	0.98	2.1	4.8	710	1400	3000
Chloroethane	EIC/AGS/CL:AIRE + CLEA 1.07	12	16	26	12	16	26	120	210	390	900	1200	2000
Chloroethene (aka vinyl chloride)	LQM/CIEH + CLEA 1.07	0.00077	0.0010	0.0015	0.00064	0.00087	0.0014	0.00057	0.0010	0.0019	0.059	0.077	0.12
Chloromethane	EIC/AGS/CL:AIRE + CLEA 1.07	0.012	0.014	0.019	0.012	0.014	0.019	0.068	0.13	0.24	1.0	1.1	1.5
1,1-Dichloroethane	EIC/AGS/CL:AIRE + CLEA 1.07	3.6	5.8	11	3.4	5.5	11	9.6	18	37	260	430	800
1,2-Dichloroethane	LQM/CIEH + CLEA 1.07	0.0092	0.013	0.023	0.0071	0.011	0.019	0.0048	0.0086	0.016	0.67	0.97	1.7
1,1-Dichloroethene	EIC/AGS/CL:AIRE + CLEA 1.07	0.33	0.58	1.2	0.32	0.57	1.2	2.9	5.8	12	24	43	87
Cis 1,2 Dichloroethene	EIC/AGS/CL:AIRE + CLEA 1.07	0.17	0.29	0.56	0.16	0.27	0.52	0.27	0.52	1.1	14	23	44
Trans 1,2 Dichloroethene	EIC/AGS/CL:AIRE + CLEA 1.07	0.28	0.50	1.0	0.27	0.48	0.98	0.97	1.9	4.2	21	37	76
Dichloromethane	EIC/AGS/CL:AIRE + CLEA 1.07	3.0	4.0	6.4	0.62	1.1	1.9	0.11	0.19	0.35	260	340	530
1,2-Dichloropropane	EIC/AGS/CL:AIRE + CLEA 1.07	0.034	0.06	0.12	0.034	0.060	0.12	0.64	1.3	2.7	3.1	5.5	11
Hexachloroethane	EIC/AGS/CL:AIRE + CLEA 1.07	0.31	0.77	1.8	0.27	0.66	1.6	0.28	0.069	1.6	8.2	20	48
Tetrachloroethene	LQM/CIEH + CLEA 1.07	1.5	3.3	7.5	1.3	2.9	6.7	1.7	3.9	9.0	120	280	620
1,1,1,2-Tetrachloroethane	LQM/CIEH + CLEA 1.07	1.5	3.6	8.2	1.2	2.8	6.5	0.82	1.9	4.6	110	250	560
1,1,2,2-Tetrachloroethane	LQM/CIEH + CLEA 1.07	4.1	8.3	18	1.7	3.5	7.8	0.42	0.92	2.1	280	560	1200
Tetrachloromethane	LQM/CIEH + CLEA 1.07	0.026	0.056	0.13	0.026	0.056	0.13	0.17	0.38	0.88	2.9	6.3	14
Trichloroethene	LQM/CIEH + CLEA 1.07	0.16	0.33	0.73	0.15	0.31	0.69	0.44	0.99	2.2	11	24	52
1,1,1-Trichloroethane	LQM/CIEH + CLEA 1.07	9.0	18	40	8.8	18	39	50	110	250	660	1400	3000
1,1,2 Trichloroethane	EIC/AGS/CL:AIRE + CLEA 1.07	1.3	2.5	5.5	0.76	1.6	3.5	0.29	0.64	1.4	89	180	380
Trichloromethane	LQM/CIEH + CLEA 1.07	1.3	2.3	4.6	0.98	1.8	3.6	0.37	0.73	1.5	100	180	350
Other phenols & chlorophenols													
2-Chlorophenol	LQM/CIEH + CLEA 1.07	110	170	220	3.9	9.1	20	0.60	1.4	3.4	3600	4000	4300
2,4-Dichlorophenol	LQM/CIEH + CLEA 1.07	94	150	200	0.91	2.1	4.7	0.14	0.31	0.72	3500	3900	4200
2,4-Dimethylphenol	EIC/AGS/CL:AIRE + CLEA 1.07	300	590	1000	20	46	100	3.2	7.4	17	1400	3100	7200
2-Methylphenol	EIC/AGS/CL:AIRE + CLEA 1.07	5300	7700	9900	85	190	430	13	29	67	160000	180000	180000
3-Methylphenol	EIC/AGS/CL:AIRE + CLEA 1.07	6800	9100	11000	85	190	420	13	29	65	170000	180000	190000
4-Methylphenol	EIC/AGS/CL:AIRE + CLEA 1.07	5400	7900	10000	84	190	420	13	29	65	160000	180000	180000
Pentachlorophenol	LQM/CIEH + CLEA 1.07	37	56	69	0.56	1.3	3.1	0.085	0.21	0.49	1200	1300	1400
2,3,4,6-Tetrachlorophenol	LQM/CIEH + CLEA 1.07	140	200	240	0.89	2.1	4.8	0.14	0.32	0.74	3900	4200	4300
2,4,6-Trichlorophenol	LQM/CIEH + CLEA 1.07	140	200	250	1.5	3.5	7.8	0.22	0.53	1.2	3900	4200	4400
Phthalates													
Bis (2-ethylhexyl) phthalate	EIC/AGS/CL:AIRE + CLEA 1.07	3900	4000	4100	290	660	1300	48	120	280	85000	86000	86000
Butyl benzyl phthalate	EIC/AGS/CL:AIRE + CLEA 1.07	61000	63000	64000	1500	3500	7800	230	560	1300	940000	940000	950000
Diethyl Phthalate	EIC/AGS/CL:AIRE + CLEA 1.07	14	29	65	120	270	610	19	43	98	14	29	65
Di-n-butyl phthalate	EIC/AGS/CL:AIRE + CLEA 1.07	650	650	650	13	32	72	2.1	5.1	12	15000	15000	15000
Di-n-octyl phthalate	EIC/AGS/CL:AIRE + CLEA 1.07	4900	4900	4900	2800	3800	4300	920	2000	3900	89000	89000	89000
Pesticides													
Aldrin	LQM/CIEH + CLEA 1.07	3.0	3.1	3.1	2.3	2.7	2.9	1.3	2.5	4.0	54	54	54
Atrazine	LQM/CIEH + CLEA 1.07	45	46	46	0.25	0.58	1.3	0.038	0.089	0.21	870	880	880
DDD	Hydrock + CLEA 1.07	1300	1300	1300	910	1100	1200	400	780	1200	22000	22000	22000
DDE	Hydrock + CLEA 1.07	1300	1300	1300	870	1100	1200	360	740	1300	22000	22000	22000
DDT	Hydrock + CLEA 1.07	1300	1300	1300	830	1000	1200	320	650	1100	21000	21000	21000
Dichlorvos	LQM/CIEH + CLEA 1.07	36	45	53	0.30	0.62	1.3	0.046	0.094	0.20	840	870	890
Dieldrin	LQM/CIEH + CLEA 1.07	5.0	5.4	5.6	0.74	1.5	2.7	0.13	0.32	0.74	90	91	92
Endosulfan - alpha	LQM/CIEH + CLEA 1.07	62	110	160	3.1	7.4	17	0.49	1.2	2.8	2300	3000	3400
Endosulfan - beta	LQM/CIEH + CLEA 1.07	76	130	180	2.9	7.0	16	0.46	1.1	2.6	2500	3100	3500
Hexachlorocyclohexanes - alpha (inc. Lindane)	LQM/CIEH + CLEA 1.07	660	840	940	20	48	110	3.1	7.7	18	14000	15000	15000
Hexachlorocyclohexanes - beta (inc. Lindane)	LQM/CIEH + CLEA 1.07	73	75	76	1.7	4.1	9.2	0.27	0.66	1.6	1100	1100	1100
Hexachlorocyclohexanes - gamma (inc. Lindane)	LQM/CIEH + CLEA 1.07	27	31	33	0.60	1.4	3.3	0.092	0.23	0.54	530	550	550

Updated 18/11/15		Human Health Generic Assessment Criteria (mg/kg)											
Contaminant	**Source of GAC**	**Human health - residential without plant uptake (1%SOM)**	**Human health - residential without plant uptake (2.5%SOM)**	**Human health - residential without plant uptake (6%SOM)**	**Human health - residential with plant uptake (1%SOM)**	**Human health - residential with plant uptake (2.5%SOM)**	**Human health - residential with plant uptake (6%SOM)**	**Human health - allotments (1%SOM)**	**Human health - allotments (2.5%SOM)**	**Human health - allotments (6%SOM)**	**Human health - commercial (1%SOM)**	**Human health - commercial (2.5%SOM)**	**Human health - commercial (6%SOM)**
Dioxins, furans & dioxin-like-PCBs													
Total dioxins, furans & DL-PCB (aerial dep.)	SGV report + CLEA 1.07	0.012	0.012	0.012	0.0099	0.010	0.010	0.0075	0.0083	0.0086	0.24	0.24	0.24
Non-dioxin-like PCBs													
PCB-28	Hydrock + CLEA 1.07	0.63	0.63	0.63	0.24	0.37	0.47	0.056	0.12	0.22	9.0	9.0	9.0
PCB-52	Hydrock + CLEA 1.07	0.63	0.63	0.63	0.24	0.38	0.49	0.058	0.13	0.26	9.0	9.0	9.0
PCB-101	Hydrock + CLEA 1.07	0.63	0.63	0.63	0.50	0.57	0.60	0.290	0.52	0.74	9.0	9.0	9.0
PCB-138	Hydrock + CLEA 1.07	0.63	0.63	0.63	0.54	0.59	0.61	0.39	0.65	0.88	9.0	9.0	9.0
PCB-153	Hydrock + CLEA 1.07	0.63	0.63	0.63	0.56	0.60	0.61	0.49	0.75	0.95	9.0	9.0	9.0
PCB-180	Hydrock + CLEA 1.07	0.63	0.63	0.63	0.58	0.61	0.62	0.58	0.85	1.0	9.0	9.0	9.0
Explosives													
HMX	LQM/CIEH + CLEA 1.07	6700	6700	6700	5.9	13	27	0.89	2.0	4.0	110000	110000	110000
RDX	LQM/CIEH + CLEA 1.07	400	400	400	3.5	7.6	17	0.54	1.2	2.6	6400	6400	6400
2,4,6-Trinitrotoluene	LQM/CIEH + CLEA 1.07	65	65	66	1.6	3.8	8.4	0.25	0.61	1.4	1000	1000	1100
Other inorganics													
Antimony	EIC/AGS/CL:AIRE + CLEA 1.07	380	380	380	190	190	190	54	54	54	6600	6600	6600
Barium	EIC/AGS/CL:AIRE + CLEA 1.07	1400	1400	1400	790	790	790	270	270	270	22000	22000	22000
Mercury, elemental	SGV report + CLEA 1.07	0.24	0.60	1.5	0.24	0.60	1.5	4.3	11	26	4.3	11	26
Molybdenum	EIC/AGS/CL:AIRE + CLEA 1.07	670	670	670	250	250	250	59	59	59	18000	18000	18000
Thiocyanate	Hydrock + CLEA 1.07	13	13	13	13	13	13	28	28	28	190	190	190
Other organics													
Biphenyl	EIC/AGS/CL:AIRE + CLEA 1.07	34	84	200	34	84	200	15	36	86	34	84	200
Carbon disulphide	LQM/CIEH + CLEA 1.07	0.14	0.29	0.62	0.14	0.29	0.62	5.0	11	24	11	22	47
2,4-Dinitrotoluene	EIC/AGS/CL:AIRE + CLEA 1.07	240	250	250	1.5	3.4	7.6	0.23	0.51	1.2	3700	3800	3800
2,6-Dinitrotoluene	EIC/AGS/CL:AIRE + CLEA 1.07	110	120	130	0.82	1.8	4.1	0.12	0.28	0.63	1900	1900	1900
Hexachloro-1,3-butadiene	LQM/CIEH + CLEA 1.07	0.32	0.78	1.8	0.29	0.70	1.6	0.25	0.62	1.4	31	66	120
Mercury, methyl	SGV report + CLEA 1.07	12	16	20	10	13	15	8.0	8.0	8.0	370	390	410
Styrene	EIC/AGS/CL:AIRE + CLEA 1.07	52	120	280	11	25	58	1.6	3.9	9.1	630	1400	3400
Tributyl tin oxide	EIC/AGS/CL:AIRE + CLEA 1.07	12	14	15	0.28	0.67	1.5	0.040	0.11	0.25	230	230	240
2-Chloronaphthalene	EIC/AGS/CL:AIRE + CLEA 1.07	5.4	13	32	5.3	13	31	42	100	230	370	900	2100
Insufficient data to derive GAC													
n butylbenzene	Insufficient data (EIC)	-	-	-	-	-	-	-	-	-	-	-	-
sec butylbenzene	Insufficient data (EIC)	-	-	-	-	-	-	-	-	-	-	-	-
Carbazole	Insufficient data (EIC)	-	-	-	-	-	-	-	-	-	-	-	-
Dimethyl phthalate	Insufficient data (EIC)	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyltoluene	Insufficient data (EIC)	-	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	Insufficient data (EIC)	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	Insufficient data (EIC)	-	-	-	-	-	-	-	-	-	-	-	-
Sulfur (elemental)	Insufficient data (Hydrock)	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	Insufficient data (EIC)	-	-	-	-	-	-	-	-	-	-	-	-
tert butylbenzene	Insufficient data (EIC)	-	-	-	-	-	-	-	-	-	-	-	-
NOTES													
If >1,000,000 is calculated, 1,000,000 is adopted.													
Red text - liquid at ambient temperature, calculated GAC exceeds saturation value and highlighed in red in CLEA - saturation value adopted for GAC													
Orange text - solid at ambient temperature, calculated GAC exceeds saturation value and highlighted red in CLEA - manual calculation not possible as only one HCV - saturated vapour concentration exceed, so saturation value adopted for GAC.													
Blue text - solid at ambient temperature, calculated GAC exceeds saturation value and highlighted red in CLEA - manual calculation not possible as only one HCV - aqueous solubility exceed, so original red-highlighted value adopted for GAC.													
Green text - solid at ambient temperature, calculated GAC exceeds saturation value and highlighted red in CLEA - manual calculation undertaken but result is greater than original red-highlighted value, so original red-highlighted value adopted for GAC.													

Updated 18/11/15							
Contaminant	**Source of GAC**	**Human health - POSresi (1%SOM)**	**Human health - POSresi (2.5%SOM)**	**Human health - POSresi (6%SOM)**	**Human health - POSpark (1%SOM)**	**Human health - POSpark (2.5%SOM)**	**Human health - POSpark (6%SOM)**
Hydrock Default Suite							
Arsenic	SGV report + CLEA 1.07	79	79	79	170	170	170
Beryllium	LQM/CIEH + CLEA 1.07	92	92	92	670	670	670
Boron	LQM/CIEH + CLEA 1.07	21000	21000	21000	46000	46000	46000
Cadmium	SGV report + CLEA 1.07	120	120	120	560	560	560
Chromium (III)	LQM/CIEH + CLEA 1.07	1500	1500	1500	27000	27000	27000
Chromium (VI)	LQM/CIEH + CLEA 1.07	7.7	7.7	7.7	220	220	220
Copper	LQM/CIEH + CLEA 1.07	12000	12000	12000	44000	44000	44000
Lead	C4SL (NB not minimal risk)	630	630	630	1300	1300	1300
Mercury, inorganic	SGV report + CLEA 1.07	470	470	470	1100	1100	1100
Nickel	Hydrock + CLEA 1.07	290	290	290	800	800	800
Selenium	SGV report + CLEA 1.07	1400	1400	1400	2600	2600	2600
Vanadium	LQM/CIEH + CLEA 1.07	2000	2000	2000	5000	5000	5000
Zinc	LQM/CIEH + CLEA 1.07	81000	81000	81000	170000	170000	170000
Cyanide (free)	Hydrock + CLEA 1.07	1600	1600	1600	3400	3400	3400
Phenol	SGV report + CLEA 1.07	760	1500	3200	760	1500	3200
Acenaphthene	LQM/CIEH + CLEA 1.07	15000	15000	15000	29000	30000	30000
Acenaphthylene	LQM/CIEH + CLEA 1.07	15000	15000	15000	29000	30000	30000
Anthracene	LQM/CIEH + CLEA 1.07	74000	74000	74000	150000	150000	150000
Benz(a)anthracene	LQM/CIEH + CLEA 1.07	17	18	18	26	33	40
Benzo(a)pyrene	LQM/CIEH + CLEA 1.07	2.6	2.6	2.6	4.5	5.6	6.5
Benzo(b)fluoranthene	LQM/CIEH + CLEA 1.07	18	18	18	30	38	45
Benzo(ghi)perylene	LQM/CIEH + CLEA 1.07	120	120	120	270	310	350
Benzo(k)fluoranthene	LQM/CIEH + CLEA 1.07	26	26	26	46	57	67
Chrysene	LQM/CIEH + CLEA 1.07	25	26	26	34	45	55
Dibenz(ah)anthracene	LQM/CIEH + CLEA 1.07	2.3	2.3	2.3	4.5	5.5	6.3
Fluoranthene	LQM/CIEH + CLEA 1.07	3100	3100	3100	6300	6300	6400
Fluorene	LQM/CIEH + CLEA 1.07	9900	9900	9900	20000	20000	20000
Indeno(123cd)pyrene	LQM/CIEH + CLEA 1.07	11	11	11	17	22	26
Naphthalene	LQM/CIEH + CLEA 1.07	3900	4100	4200	1100	1600	2300
Phenanthrene	LQM/CIEH + CLEA 1.07	3100	3100	3100	6200	6300	6300
Pyrene	LQM/CIEH + CLEA 1.07	7400	7400	7400	15000	15000	15000
TPH fractions							
TPH ali EC05-EC06	LQM/CIEH + CLEA 1.07	300	590000	600000	300	560	1200
TPH ali >EC06-EC08	LQM/CIEH + CLEA 1.07	600000	610000	620000	140	320	740
TPH ali >EC08-EC10	LQM/CIEH + CLEA 1.07	13000	13000	13000	77	190	450
TPH ali >EC10-EC12	LQM/CIEH + CLEA 1.07	13000	13000	13000	48	120	280
TPH ali >EC12-EC16	LQM/CIEH + CLEA 1.07	13000	13000	13000	24	59	140
TPH ali >EC16-EC35	LQM/CIEH + CLEA 1.07	250000	250000	250000	460000	480000	490000
TPH ali >EC35-EC44	LQM/CIEH + CLEA 1.07	250000	250000	250000	460000	480000	490000
TPH aro EC05-EC07	LQM/CIEH + CLEA 1.07	56000	56000	56000	1200	2300	4700
TPH aro >EC07-EC08	LQM/CIEH + CLEA 1.07	56000	56000	56000	870	1900	4400
TPH aro >EC08-EC10	LQM/CIEH + CLEA 1.07	5000	5000	5000	610	1500	3600
TPH aro >EC10-EC12	LQM/CIEH + CLEA 1.07	5000	5000	5000	360	900	10000
TPH aro >EC12-EC16	LQM/CIEH + CLEA 1.07	5000	5000	5000	10000	10000	10000
TPH aro >EC16-EC21	LQM/CIEH + CLEA 1.07	3800	3800	3800	7600	7700	7800
TPH aro >EC21-EC35	LQM/CIEH + CLEA 1.07	3800	3800	3800	7800	7800	7900
TPH aro >EC35-EC44	LQM/CIEH + CLEA 1.07	3800	3800	3800	7800	7800	7900
TPH >EC44-EC70	LQM/CIEH + CLEA 1.07	3800	3800	3800	7800	7800	7900
VOCs - BTEX & MTBE							
Benzene	SGV report + CLEA 1.07	72	72	73	90	100	110
Toluene	SGV report + CLEA 1.07	56000	56000	56000	870	1900	4400
Ethylbenzene	SGV report + CLEA 1.07	25000	25000	25000	520	1200	2800
Xylene, o-	SGV report + CLEA 1.07	41000	42000	43000	480	1100	2600
Xylene, m-	SGV report + CLEA 1.07	41000	42000	43000	630	1500	3500
Xylene, p- (use this for combined m & p)	SGV report + CLEA 1.07	41000	42000	43000	580	1400	3200
MTBE	EIC/AGS/CL:AIRE + CLEA 1.07	75000	75000	75000	20000	33000	63000
VOCs - other benzenes							
Iso-propylbenzene	EIC/AGS/CL:AIRE + CLEA 1.07	25000	25000	25000	390	950	2300
Propylbenzene	EIC/AGS/CL:AIRE + CLEA 1.07	25000	25000	25000	400	980	2300
1,2,4-Trimethylbenzene	EIC/AGS/CL:AIRE + CLEA 1.07	250	250	250	310	360	410

Updated 18/11/15							
Contaminant	**Source of GAC**	**Human health - POSresi (1%SOM)**	**Human health - POSresi (2.5%SOM)**	**Human health - POSresi (6%SOM)**	**Human health - POSpark (1%SOM)**	**Human health - POSpark (2.5%SOM)**	**Human health - POSpark (6%SOM)**
VOCs - chlorobenzenes							
Bromobenzene	EIC/AGS/CL:AIRE + CLEA 1.07	5200	5400	5600	850	2000	3500
Chlorobenzene	LQM/CIEH + CLEA 1.07	12000	13000	14000	680	1500	2900
1,2-Dichlorobenzene	LQM/CIEH + CLEA 1.07	95000	100000	100000	570	1400	3300
1,3-Dichlorobenzene	LQM/CIEH + CLEA 1.07	300	300	300	390	440	470
1,4-Dichlorobenzene	LQM/CIEH + CLEA 1.07	17000	17000	17000	220	540	1300
Hexachlorobenzene	LQM/CIEH + CLEA 1.07	6.5	6.5	6.5	11	11	11
Pentachlorobenzene	LQM/CIEH + CLEA 1.07	110	110	110	190	190	190
1,2,3-trichlorobenzene	LQM/CIEH + CLEA 1.07	1700	1800	1800	130	330	1600
1,2,4-trichlorobenzene	LQM/CIEH + CLEA 1.07	10000	11000	12000	320	790	1900
1,3,5-trichlorobenzene	LQM/CIEH + CLEA 1.07	1600	1700	1800	37	91	220
1,2,3,4-tetrachlorobenzene	LQM/CIEH + CLEA 1.07	830	830	830	120	1600	1600
1,2,3,5-tetrachlorobenzene	LQM/CIEH + CLEA 1.07	79	79	79	39	120	130
1,2,4,5-tetrachlorobenzene	LQM/CIEH + CLEA 1.07	13	13	13	25	26	26
VOCs - chloroalkanes & alkanes							
Bromodichloromethane	EIC/AGS/CL:AIRE + CLEA 1.07	73	73	74	56	67	81
Bromoform	EIC/AGS/CL:AIRE + CLEA 1.07	3900	3900	4000	2700	4700	5200
Chloroethane	EIC/AGS/CL:AIRE + CLEA 1.07	2600	3500	5700	2600	3500	5700
Chloroethene (aka vinyl chloride)	LQM/CIEH + CLEA 1.07	3.5	3.5	3.5	4.8	5	5.4
Chloromethane	EIC/AGS/CL:AIRE + CLEA 1.07	540	550	560	140	150	170
1,1-Dichloroethane	EIC/AGS/CL:AIRE + CLEA 1.07	46000	47000	48000	1800	3000	5600
1,2-Dichloroethane	LQM/CIEH + CLEA 1.07	29	29	29	21	24	28
1,1-Dichloroethene	EIC/AGS/CL:AIRE + CLEA 1.07	2200	3900	11000	2200	3900	5900
Cis 1,2 Dichloroethene	EIC/AGS/CL:AIRE + CLEA 1.07	1300	1300	1400	690	840	1000
Trans 1,2 Dichloroethene	EIC/AGS/CL:AIRE + CLEA 1.07	3800	4000	4000	1700	2100	2700
Dichloromethane	EIC/AGS/CL:AIRE + CLEA 1.07	760	760	760	1500	1500	1500
1,2-Dichloropropane	EIC/AGS/CL:AIRE + CLEA 1.07	1700	1900	2200	160	210	290
Hexachloroethane	EIC/AGS/CL:AIRE + CLEA 1.07	120	130	130	8.2	20	48
Tetrachloroethene	LQM/CIEH + CLEA 1.07	3400	3400	3400	420	950	2200
1,1,1,2-Tetrachloroethane	LQM/CIEH + CLEA 1.07	1400	1400	1400	1500	1800	2100
1,1,2,2-Tetrachloroethane	LQM/CIEH + CLEA 1.07	1400	1400	1400	1800	2100	2300
Tetrachloromethane	LQM/CIEH + CLEA 1.07	340	350	350	170	240	320
Trichloroethene	LQM/CIEH + CLEA 1.07	1200	1300	1300	660	860	1100
1,1,1-Trichloroethane	LQM/CIEH + CLEA 1.07	140000	140000	140000	1400	2900	6400
1,1,2 Trichloroethane	EIC/AGS/CL:AIRE + CLEA 1.07	990	990	1000	1100	1300	1500
Trichloromethane	LQM/CIEH + CLEA 1.07	1700	1700	1700	2700	2900	3100
Other phenols & chlorophenols							
2-Chlorophenol	LQM/CIEH + CLEA 1.07	610	610	610	1100	1100	1100
2,4-Dichlorophenol	LQM/CIEH + CLEA 1.07	610	610	610	1000	1100	1100
2,4-Dimethylphenol	EIC/AGS/CL:AIRE + CLEA 1.07	5000	5000	5000	1400	9600	9900
2-Methylphenol	EIC/AGS/CL:AIRE + CLEA 1.07	25000	25000	25000	15000	48000	49000
3-Methylphenol	EIC/AGS/CL:AIRE + CLEA 1.07	25000	25000	25000	27000	48000	49000
4-Methylphenol	EIC/AGS/CL:AIRE + CLEA 1.07	25000	25000	25000	27000	48000	49000
Pentachlorophenol	LQM/CIEH + CLEA 1.07	180	180	180	220	250	270
2,3,4,6-Tetrachlorophenol	LQM/CIEH + CLEA 1.07	610	610	610	1000	1100	1100
2,4,6-Trichlorophenol	LQM/CIEH + CLEA 1.07	610	610	610	1100	1100	1100
Phthalates							
Bis (2-ethylhexyl) phthalate	EIC/AGS/CL:AIRE + CLEA 1.07	9700	9700	9700	17000	17000	17000
Butyl benzyl phthalate	EIC/AGS/CL:AIRE + CLEA 1.07	130000	130000	130000	250000	260000	260000
Diethyl Phthalate	EIC/AGS/CL:AIRE + CLEA 1.07	49000	50000	50000	14	93000	96000
Di-n-butyl phthalate	EIC/AGS/CL:AIRE + CLEA 1.07	1300	1300	1300	2600	2700	2600
Di-n-octyl phthalate	EIC/AGS/CL:AIRE + CLEA 1.07	11000	11000	11000	20000	20000	20000
Pesticides							
Aldrin	LQM/CIEH + CLEA 1.07	6.6	6.6	6.6	13	13	13
Atrazine	LQM/CIEH + CLEA 1.07	100	100	100	180	180	180
DDD	Hydrock + CLEA 1.07	2700	2700	2700	5700	5700	5700
DDE	Hydrock + CLEA 1.07	2700	2700	2700	5700	5700	5700
DDT	Hydrock + CLEA 1.07	2600	2600	2600	5500	5500	5500
Dichlorvos	LQM/CIEH + CLEA 1.07	120	120	120	140	160	180
Dieldrin	LQM/CIEH + CLEA 1.07	12	12	12	23	23	23
Endosulfan - alpha	LQM/CIEH + CLEA 1.07	490	490	490	940	970	990
Endosulfan - beta	LQM/CIEH + CLEA 1.07	490	490	490	950	980	990
Hexachlorocyclohexanes - alpha (inc. Lindane)	LQM/CIEH + CLEA 1.07	2000	2000	2000	4000	4100	4100
Hexachlorocyclohexanes - beta (inc. Lindane)	LQM/CIEH + CLEA 1.07	150	150	150	300	300	310
Hexachlorocyclohexanes - gamma (inc. Lindane)	LQM/CIEH + CLEA 1.07	71	71	71	140	140	140

Updated 18/11/15							
Contaminant	**Source of GAC**	**Human health - POSresi (1%SOM)**	**Human health - POSresi (2.5%SOM)**	**Human health - POSresi (6%SOM)**	**Human health - POSpark (1%SOM)**	**Human health - POSpark (2.5%SOM)**	**Human health - POSpark (6%SOM)**
Dioxins, furans & dioxin-like-PCBs							
Total dioxins, furans & DL-PCB (aerial dep.)	SGV report + CLEA 1.07	0.023	0.023	0.023	0.049	0.049	0.049
Non-dioxin-like PCBs							
PCB-28	Hydrock + CLEA 1.07	1.2	1.2	1.2	2.5	2.5	2.5
PCB-52	Hydrock + CLEA 1.07	1.2	1.2	1.2	2.5	2.5	2.5
PCB-101	Hydrock + CLEA 1.07	1.2	1.2	1.2	2.5	2.5	2.5
PCB-138	Hydrock + CLEA 1.07	1.2	1.2	1.2	2.5	2.5	2.5
PCB-153	Hydrock + CLEA 1.07	1.2	1.2	1.2	2.5	2.5	2.5
PCB-180	Hydrock + CLEA 1.07	1.2	1.2	1.2	2.5	2.5	2.5
Explosives							
HMX	LQM/CIEH + CLEA 1.07	13000	13000	13000	23000	23000	24000
RDX	LQM/CIEH + CLEA 1.07	790	790	800	19	1500	1600
2,4,6-Trinitrotoluene	LQM/CIEH + CLEA 1.07	130	130	130	260	270	270
Other inorganics							
Antimony	EIC/AGS/CL:AIRE + CLEA 1.07	740	740	740	1700	1700	1700
Barium	EIC/AGS/CL:AIRE + CLEA 1.07	2700	2700	2700	5800	5800	5800
Mercury, elemental	SGV report + CLEA 1.07	4.3	11	26	4.3	11	26
Molybdenum	EIC/AGS/CL:AIRE + CLEA 1.07	1400	1400	1400	2900	2900	2900
Thiocyanate	Hydrock + CLEA 1.07	25	25	25	53	53	53
Other organics							
Biphenyl	EIC/AGS/CL:AIRE + CLEA 1.07	9500	9500	9500	34	84	19000
Carbon disulphide	LQM/CIEH + CLEA 1.07	11000	11000	12000	1300	1900	2700
2,4-Dinitrotoluene	EIC/AGS/CL:AIRE + CLEA 1.07	500	500	500	140	960	990
2,6-Dinitrotoluene	EIC/AGS/CL:AIRE + CLEA 1.07	250	250	250	290	490	500
Hexachloro-1,3-butadiene	LQM/CIEH + CLEA 1.07	25	25	25	48	50	51
Mercury, methyl	SGV report + CLEA 1.07	53	53	53	73	93	97
Styrene	EIC/AGS/CL:AIRE + CLEA 1.07	3000	3000	3000	630	1400	3400
Tributyl tin oxide	EIC/AGS/CL:AIRE + CLEA 1.07	31	31	31	63	64	65
2-Chloronaphthalene	EIC/AGS/CL:AIRE + CLEA 1.07	7500	8400	9000	110	1800	2800
Insufficient data to derive GAC							
n butylbenzene	Insufficient data (EIC)	-	-	-	-	-	-
sec butylbenzene	Insufficient data (EIC)	-	-	-	-	-	-
Carbazole	Insufficient data (EIC)	-	-	-	-	-	-
Dimethyl phthalate	Insufficient data (EIC)	-	-	-	-	-	-
Isopropyltoluene	Insufficient data (EIC)	-	-	-	-	-	-
1-Methylnaphthalene	Insufficient data (EIC)	-	-	-	-	-	-
2-Methylnaphthalene	Insufficient data (EIC)	-	-	-	-	-	-
Sulfur (elemental)	Insufficient data (Hydrock)	-	-	-	-	-	-
1,3,5-Trimethylbenzene	Insufficient data (EIC)	-	-	-	-	-	-
tert butylbenzene	Insufficient data (EIC)	-	-	-	-	-	-
NOTES							
If >1,000,000 is calculated, 1,000,000 is adopted.							
Red text - liquid at ambient temperature, calculated GAC exceeds saturation value and							
Orange text - solid at ambient temperature, calculated GAC exceeds saturation value a							
Blue text - solid at ambient temperature, calculated GAC exceeds saturation value and							
Green text - solid at ambient temperature, calculated GAC exceeds saturation value a							

3.3.3 Exceedance of Saturation Limits

In some instances the CLEA 1.07 model produces GACs with a warning that the value exceeds the saturation value, which is either the solubility of the substance in water or the vapour saturation limit. Limited guidance is given in SR4 (Section 4.12) on how to assess the GAC in these circumstances. Precedence is also set in a number of SGV reports, to date those dealing with the BTEX compounds. These two sets of documentation are contradictory. The original issue of SR4 (CLEA 1.04) (Environment Agency 2009b) gives an example of how to carry out a manual calculation using data for ethylbenzene, whereas the BTEX SGV reports (e.g. Environment Agency March 2009) state that the GAC should be limited to the saturation level. The revised version of SR4 (CLEA 1.05/6) (Environment Agency 2009c) retains the example, but the name ethylbenzene has been removed.

There are three options: to adopt the value as calculated, to limit the GAC to the saturation value, or to undertake a manual calculation as per Section 4.12 of SR4. Again, the guidance is confusing. SR3 (Environment Agency 2009b) cautions against adopting the saturation limit, which is the most conservative, saying that it may be over-conservative. However, this is the approach taken in the BTEX SGV reports.

Clearly, the adoption of a GAC under conditions where the saturation level is exceeded is subjective and professional judgement is involved. With this in mind, the protocol adopted by Hydrock is as follows, and has been derived at by considering the possible values from the three methods given above.

1. For substances where the GAC is highlighted in amber in CLEA, this is adopted as the GAC. For substances where the GAC is highlighted in red, the following apply.

2. For VOCs including BTEX and the volatile TPH Fractions (less than EC10), the saturation value is adopted in line with the latest recommendations in the BTEX SGV reports.

3. For substances which are liquid at ambient temperature, the saturation value is adopted.

4. For substances which are solid at ambient temperature, the manual calculation is undertaken provided there are both oral and inhalation HCVs. The result is compared with the red-highlighted GAC and the lower of the two adopted as the GAC. If there is only one HCV and the calculation cannot be performed, the red-highlighted value is adopted as the GAC where the saturation limit exceed the aqueous solubility, but the saturation value is adopted where the saturation limit exceed the saturated vapour concentration.

5. In some instances the GACs shows a large difference between different SOM where the saturation value has been taken for, say, 1% SOM and the calculated values for 2.5% and 6% SOM. Whilst this may appear inconsistent on first inspection, the results have been adopted as they are and the difference must be attributed to the physico-chemical influence of organic matter in the soil as modelled by CLEA.

3.3.4 GACs for Public Open Space

The first UK methodology for assessing public open space (POS) was published for the C4SLs (CL:AIRE December 2013) based on two land use scenarios:

- Public open space near residential housing (POS_{resi}) includes the predominantly grassed areas adjacent to high density housing and the central green area around which houses are located, as on many housing estates from the 1930s to 1970s. It also includes the smaller areas commonly incorporated in new developments as informal grassed areas or more formal landscaped areas with a mixture of open space and covered soil with planting. It is considered to be a predominantly grassed area up to 0.05 ha and a considerable portion of this (up to 50%) may be bare soil. The site is regularly used by children for playing and may be used for informal sports activities such as a football "kickabout".
- Public park (POS_{park}) is an area of open space provided for recreational use and usually owned and maintained by the Local Authority and could be used for a wide range of activities such as family visits and picnics, children's play area, sporting activities such as football on an informal basis (although this POS is not considered as a dedicated sports pitch) and dog walking. It is considered to be a relatively large are (>0.5 ha) of predominantly grassed open space with no more than 25% of exposed soil.

Hydrock has calculated GACs for these two standard land uses using the land use scenarios given in Tables 3.6 and 3.7 of the CL:AIRE report, but with the following modifications:

- POS_{resi} (Table 3.6), items omitted from the published table in error: building = small terraced house; occupancy period for lifetime averaging (for Cd) AC10-12 = 19, AC13-16 = 15 & AC17-18 = 16; and indoor inhalation rates updated according to a USEPA 2011 publication that supersedes the draft 2006 version used in the CLEA model previously.
- POS_{park} (Table 3.7), typographic errors in the published table: soil ingestion rate for AC1-12 = 50 mg/day and for AC13-18 = 20 mg/day.

Note that these corrections are included in the revised CLEA 1.07 when the C4SL land uses are selected. The calculated GACs are presented in Table 3.5 and are based on a sandy loam soil of pH 7 su.

3.4 Note on Petroleum Hydrocarbons

Petroleum hydrocarbon contamination is complex. The type of crude oil, its distillation, processing and blending, and the subsequent weathering in the environment all result in the development of petroleum residues of extreme chemical complexity (Environment Agency, 2003). The laboratory analysis of petroleum hydrocarbons is highly method dependent. In addition to contaminants such as fuels and lubricating oils, the analyses also pick up a range of other chemicals such as PAHs and phenols, together with naturally occurring substances like humic and fulvic matter in organic soils. For example, TPH determination on dried oak leaves can give a result of 18,000 mg/kg of TPH.

TPH can only be used as a surrogate for estimating the petroleum load of a soil if a spill is well defined but is generally not a sound basis for risk management and regulatory control. International approaches for assessing risks from petroleum hydrocarbons focus on dividing the components into groups and assigning toxicologically potency and fate-transport to each group.

Approaches have been developed internationally, one such proposal is discussed by the Dutch National Institute of Public Health and the Environment (RIVM) (Franken *et al* 1999). The approach is broadly to sub-divide the TPH into fractions based on equivalent carbon length for aliphatic (straight chain) and aromatic (cyclic) compounds. The choice of the fractions is based

on work carried out by, amongst others, the Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG). The Working Group is guided by a steering committee consisting of representatives from industry, government and academia, with the remit *to develop scientifically defensible information for establishing soil cleanup levels that are protective of human health at petroleum contaminated sites.*

Generic assessment criteria can be developed for each TPH fraction in the same way as they can be for named substances, providing certain assumptions are made regarding the applicability of the data to all the compounds in each fraction. A significant part of the TPHCWG activity has been in determining fraction boundaries to maximize confidence in the eventual criteria.

A modified TPHCWG approach has been adopted in a framework developed by the Environment Agency (2005) for use within the UK. The 13 original TPHCWG fractions have been adopted, with the addition of >EC35-EC44. An undifferentiated (i.e. without aliphatic – aromatic split) fraction of >EC44-EC70 has also been suggested but the Agency says it will be reviewing the need for this in due course, once research has been carried out into the toxicity of these heavy-end products like resins and asphaltenes.

The UK suggested approach to petroleum hydrocarbon risk assessment is summarised as follows:

- Measure indicator chemicals and compare with their GAC – these are chemicals which are considered as key risk drivers at petroleum hydrocarbon contaminated sites. The chemicals of potential concern depend on the type of hydrocarbon product, but a (non-exhaustive) list has been suggested by the Environment Agency (2005):

  Non-threshold: benzene, benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3,cd)pyrene.

  Threshold: toluene, ethylbenzene, xylene, naphthalene, fluoranthene, phenanthrene, pyrene.

- Measure TPH fractions and compare with their GAC, based on threshold toxicity only.

  Aliphatic fractions: >EC5-EC6, >EC6-EC8, >EC8-EC10, >EC10-EC12, >EC12-EC16, >EC16-EC35, >EC35-EC44.

  Undifferentiated: >EC44-EC77 (subject to review and confirmation by Agency).

  Aromatic fractions: >EC5-EC7, >EC7-EC8, >EC8-EC10, >EC10-EC12, >EC12-EC16, >EC16-EC21, >EC21-EC35, >EC35-EC44.

- Carry out an additivity check on the TPH fractions if none of the individual fractions exceed their GAC. A Hazard Quotient is calculated for each fraction by dividing the measured concentration by the GAC and these are summed to give the Hazard Index. Where the Hazard Index exceeds unity, this can indicate a potentially significant risk to human health and consideration should proceed to the next stage (remediation or further assessment). Including all the fractions in a Hazard Index is conservative as it assumes all fractions add together in acting on the same target organ within the critical receptor. The Environment Agency (2005) has stated that fractions exhibiting different toxicological properties might be excluded from this process in due course, once research has been completed and further guidance published. The Louisiana Department of Environmental Quality (LDEQ) (2003) has published more detailed guidance, suggesting the following fractions be grouped: (a)

aliphatic >EC8-EC10, >EC10-EC12 & >EC12-EC16, (b) aromatic >EC8-EC10, >EC10-EC12 & >EC12-EC16 and (c) aromatic >EC16-EC21 & >EC21-EC35.

Hydrock has adopted the first two points from above approach and has developed generic assessment criteria for the TPH fractions up to EC35. These are used for assessment where an appropriate level of sampling and laboratory analysis has been carried out, but cannot be used where more generalised TPH analysis has been scheduled (such as DRO/GRO only).

There is, however, some uncertainty concerning the validity of the additivity check. The Environment Agency (2002a) stated in the now withdrawn CLR 9, Section 4.4, "that it is not valid to simply calculate the sum of the fractions 'soil concentration divided by SGV', and compare this with 1.", because total intake, not just intake from soil, needs to be included. It is assumed that the 2005 document takes this into account and that it is erring on the side of conservatism. Until this is formally resolved, Hydrock will report the additivity check for information, using the LDEQ groupings, but will caution against its use in setting remedial goals without further study or publication of definitive guidance. It is more realistic to carry out the additivity test on individual samples rather than on US_{95} values for the whole population, because it is unlikely that the TPH profile of the averaging area will be represented by the US_{95}s of every fraction. More likely, a sample high in one fraction will be low in another, particularly where a mixture of products is present in the ground.

The analysis required for the above methodology, using the aliphatic / aromatic split of TPH fractions, is referred to by Hydrock its "**TPH Level 2 suite**" of determinands. In instances where a full numerical risk assessment is not required, Hydrock carries out a screening analysis known as its "**TPH Level 1 suite**" of determinands. The TPH is divided into fractions, but without the aliphatic / aromatic split. This allows a semi-quantitative risk assessment on the basis of taking a worst case condition. The fraction split with the lowest GAC is deemed to apply to the whole fraction. For example, if the Level 1 analysis indicates the presence of >EC8-EC10, the result is compared to the GACs for the aliphatic >C8-C10 and the aromatic >EC8-EC10 fractions. The worst case would be to assume the whole fraction is aliphatic because this is the lower of the two GACs. This is a conservative approach, and if the test is passed, there is no need to proceed further. However, if the test is failed this does not necessarily indicate unacceptable risks and a more detailed risk assessment is required, with the full TPH Level 2 analysis suite.

3.5 Note on PAHs

A number of authors have used to concept of PAH double ratio plots to investigate the possible source of PAHs in environmental samples.

NAVFAC (Appendix A, April 2003) defines three major source type: petrogenic - generated from organic matter in ancient sediments by geologic conditions (i.e. including petroleum hydrocarbons and refined products); pyrogenic – generated by combustion of organic matter (wood, coal, petroleum, wastes etc.); and biogenic – generated by modern biological processes or by diagenetic processes (e.g. oxidation of organic matter). The following broad trends in the data were recognised:

- a ratio of fluoranthene to pyrene (Fl/Py) of <1 is indicative petrogenic sources, and of >1 is indicative of pyrogenic sources; and

- a ratio of anthracene to phenanthrene (An/Ph) of <0.2 is indicative of pyrogenic sources and of >0.2 is indicative of petrogenic sources.

Yunker *et al* (2002) carried out a literature study of published PAH ratios for a number of petroleum sources, combustion sources and environmental sources. They identified the following broad trends in the data:

- a ratio of fluoranthene to fluoranthene plus pyrene (Fl/(Fl+Py)) of <0.4 is indicative of petroleum hydrocarbon sources; of 0.4-0.5 is indicative of liquid fossil fuel combustion products; and of >0.5 is indicative of grass, wood and coal combustion products;

- a ratio of benzo(a)anthracene to benzo(a)anthracene plus chyrsene (BaA/(BaA+Ch)) of <0.2 is indicative of petroleum hydrocarbon sources; of 0.2-0.35 is indicative of either petroleum hydrocarbon sources or combustion and of >0.35 is indicative of combustion products;

- a ratio of anthracene to anthracene plus phenanthrene (An/(An+Ph)) of <0.1 is indicative petroleum hydrocarbon sources, but can be emissions from lignite, diesel or oil combustion, and of >0.1 is indicative of combustion sources, but can be diesel, coal or some crude oil hydrocarbons;

- a ratio of indeno(1,2,3)pyrene to indeno(1,2,3)pyrene plus benzo(ghi)perylene (IP/(IP+Bghi)) of <0.2 is indicative of petroleum hydrocarbon sources; of 0.2-0.5 is indicative of petroleum hydrocarbon combustion; and >0.5 is indicative of grass, wood or coal combustion products.

Note that in these authors' study of these and a number of other ratios they cautioned there are exceptions to these generalisations on account of the variability and complexity of, for example, different crude oil sources.

Costa *et al* (2004) and Costa and Sauer (2005) used plots of fluoranthene to pyrene (Fl/Py) against benzo(a)anthracene to chrysene (BaA/Ch), benzo(a)anthracene to benzo(a)pyrene (BaA/BaP) and chrysene to benzo(a)pyrene (Ch/BaP) to distinguish coal tar and creosote contaminants from combustion products they referred to as urban background. They report distinctive areas on the plots relating to the sites being studied. Litton (2006) has also used these ratios to similar effect on other sites.

ALcontrol Laboratories (2006) also uses plots of fluoranthene to pyrene (Fl/Py) against benzo(a)anthracene to chrysene (BaA/Ch). Jones (2008) confirms that the following broad trends are derived from unpublished work at the laboratory:

- a ratio of Fl/Py of <0.65 is indicative of used engine oil when the ratio of BaA/Ch is higher (approaching 1.40) or other petroleum products when the ratio of BaA/Ch is lower (above about 0.35);

- a ratio of F/Py of 0.65-1 is indicative of petroleum combustion products; and

- a ratio of Fl/Py of <1 is indicative of coal when the ratio of BaA/Ch is higher (approaching 1.40) or other combustion soots when the ratio of BaA/Ch is lower (above about 0.35).

Stogiannidis and Laane (2015) undertook a review of published literature and produced a summary (their Table 4 plus supporting text) of a number of PAH ratios and threshold values for the initial screening or identification of pyrogenic or petrogenic PAHs.

It is evident from the literature that if a cross plot is made of two ratios it is often possible to see a separation in samples from different sources and, together with other supporting information, gain a better understanding of the likely source of the PAHs. Different ratios may give differing degrees of separation and so trying several plots is often useful. The work of Stogiannidis and Laane can help distinguish between oil-spill related PAHs and those produced by combustion.

3.6 Note on Cyanide

Cyanide toxicity is complicated but it is generally accepted that cyanide species exist in 'free' and 'complex' forms. Free cyanide species are toxic and it is generally agreed that free cyanide provides a more scientifically correct basis for the establishment of generic criteria. This approach has been followed in this report.

Metal-cyanide complexes (complex cyanide) are generally not considered toxic but in certain environmental fate reactions it is possible that dissociation may release toxic free cyanide into the water environment. This might occur where complex cyanides are exposed to direct sunlight and photolysis takes place. Such circumstances are considered very rare.

There is no published approach to assessing acute toxicity, but this can be a concern on gas works sites where spent oxide or, more particularly foul lime (aka "blue billy") from the older processes, may contain significant concentrations of free cyanide. This is a particular problem because young children may be attracted to the bright blue deposits.

A methodology was presented by Macklin *et al* (December 2012): an acute oral LOAEL dose was identified by the then Health Protection Agency as 0.4 mg/kg bw/day; a dose of 5 g of soil was selected based on USEPA studies, eaten by a 10 kg weight child. This equates to a trigger level of 800 mg/kg free cyanide in soil. Above this concentration, there is a plausible hazard of ingestion of a harmful or fatal dose.

3.7 Note on Polychlorinated Biphenyls

PCBs fall into two groups, the dioxin-like (DL) and the non-dioxin-like (NDL), by virtue of their toxicity.

The Environment Agency methodology for DL-PCBs is included with dioxins and furans in the published dioxins SGV report (Science Report SC050021 / Dioxins SGV). The basis of this report is that because of the additive nature of these substances it is inappropriate to produce individual SGVs. The approach is to obtain speciated analyses of 12 DL-PCBs and, using an Agency spreadsheet, calculate a Hazard Index for a prescribed mixture of substances. SGVs can only be produced for atmospheric fall-out sites where the proportions of the individual substances are assumed to be uniform across the UK according to a table listed in the document.

For potentially industrially contaminated sites (such as where PCBs have escaped from transformers) only a Hazard Index can be produced. This can be converted into a GAC by

calculation, but such a GAC is only applicable to conditions where the mixture of substances is unchanged. In effect, Hazard Indices will be calculated for each soil sample and provided these are all less than unity, the site poses no significant risk.

There is not Agency guidance with respect to NDL-PCBs. Hydrock has produced individual GACs for a number of these. A precautionary approach has been taken, in that the NDL-PCBs are assumed to have additive effects and the same approach is taken as with Hydrock's assessment of contamination by TPH fractions. Namely, each substance is compared with its GAC, but there is an additional stage in which a Hazard Index is also calculated. This is similar to the Agency's approach for DL-PCBs, but the Hazard Index calculation is performed at a different stage in the process.

Currently, these two approaches are separate. That is to say, there is no assumption of additvity of effect between DL- and NDL-PCBs. The logic for this is the fact that these two groups where established in the first place on account of their different effects.

The toxicity of the DL-PCBs is far greater than that of the NDL-PCBs. For example, the residential SGV for the full list of dioxins, furans and DL-PCBs under atmospheric fall-out conditions is 0.0087 mg/kg (NB: using only the 12 DL-PCBs in this list gives a GAC of 0.051 mg/kg), whist the lowest GAC for the NDL-PCBs is 0.32 mg/kg under the same exposure conditions. Analyses for DL-PCBs must be undertaken with very low laboratory reporting limits (typically 1ng/kg).

In real life examples, it is almost certain that both forms of PCBs will be present at a site. This is because the marketed products (known as Aroclors) were mixtures of many PCB congeners and they all appear to contain members from both groups (according to literature researched by Hydrock). Perhaps this is why the Agency has only issued guidance on the DL-PCBs.

Logically, if a site contains any PCBs (for example as a 'total' analysis) it is likely to contain DL-PCBs. In which case, the safe concentrations will be very low and can only be confirmed by re-analysing using low detection methods and following the Agency methodology on a sample-by-sample basis. This is effect means that GACs for NDL-PCBs are redundant. The implications of the Agency methodology have yet to be fully understood by the contaminated land community. For example, it would appear that standard laboratory tests for NDL-PCBs are irrelevant. Furthermore, standard reporting limits are far too high, typically 1ug/kg. The only instance where NDL-PCBs become the risk driver at a PCB contaminated site would be if for some reason the DL-PCBs had preferentially degraded.

The Hydrock methodology for PCB risk assessment is to carry out analyses for the 12 DL-PCBs (commonly referred to as the WHO-12) and the 7 most persistent NDL-PCBs (commonly referred to as the ICES-7) at a detection limit of 1 ng/kg (Table 3.6). This is considered conservative because it covers both groups even though the risk driver is most likely to be the DL-PCB group.

The WHO-12 are assessed using the Environment Agency SGV report methodology, to produce a Hazard Index, and the ICES-7 are compared to Hydrock-derived GACs with additivity check. Note that PCB118 appears in both lists and so in assessed under the Environment Agency methodology as a DL-PCB.

Table 3.6: PCB Suites

WHO-12 (dioxin-like)	ICES-7 (most persistent)
PCB-77	PCB-28
PCB-81	PCB-52
PCB-126	PCB-101
PCB-169	PCB-118
PCB-105	PCB-138
PCB-114	PCB-153
PCB-118	PCB-180
PCB-123	(Non-dioxin-like apart
PCB-156	from PCB-118)
PCB-157	
PCB-167	
PCB-189	

3.8 Note on Pesticides and Herbicides

Unless there is evidence to suggest that a certain pesticide or herbicide has been used on the land, the standard approach adopted by Hydrock is to screen for the presence of common pesticides in the organochlorine, organophosphorous and organonitrogen groups (OCP, OPP & OPN), for example on agricultural land. Note that the only available GACs are for pesticides in these groups (and then only a sub-set of the whole).

3.9 Note on Radon

Advice on radon protection in England is provided by Public Health England (www.ukradon.org), formerly the Health Protection Agency (*The Indicative Atlas of Radon in England and Wales,* HPA-RPD-033 (Miles *et al* 2007) and RCE-15 (2010)), and by the BRE (BRE Report BR 211 (Scivyer 2015)). An area of the country can be categorised according to the percentage of existing homes where radon is present above the Action Level: 0-1% lower probability, 1-3% and 3-10% intermediate probability and >10% higher probability. It is important to understand that the database on which these numbers are based is incomplete and contains more data points in areas of the country that have traditionally been known for high radon concentrations. As more properties are monitored, the categorisation may change.

The areas where >1% of homes exceed the Action Level are known as Radon Affected Areas.

The Building Regulations cite BR 211 and require basic radon protection measures in new buildings in areas of England and Wales where 3-10% of properties exceed the Action Level and full radon protection measures where >10% exceed the Action Level.

Landlords and employers have a legal duty to keep radon levels as low as practicable and to install remedial measures if levels are too high. Commercial new build includes protection measures similar to those for new homes, but once occupied they are subject to the HSW Act and the Ionising Radiations Regulations 1999.

Private residents are advised to have a radon test where their property is in a Radon Affected Area, and to fit remedial measures if levels are too high.

The Law Society's advice to conveyancing solicitors is to ask the vendor standard questions concerning whether the property is in a radon affected area, whether it was constructed with radon protection measures and whether a radon test has been carried out by the vendor. Hydrock understands that PHE is discussing with the Law Society the adoption of stronger wording to these questions.

In 2009 the then Health Protection Agency recommended that Building Regulations and supporting documents should be amended to ensure that *all* new buildings, extensions, conversions and refurbished buildings in the UK include basic radon protective measures as a minimum. This recommendation was rejected by the Government. Consequently, the current situation is that a developer is *required* only to install protective measures in buildings where >3% of existing properties are above the Action Level, but is not required to install them in Radon Affected Areas where 1-3% of existing properties exceed the Action Level (even though there may be future implications for occupiers of these buildings).

Note that whilst membranes intended to protect against radon *may* also protect against methane and carbon dioxide, this will only be the case if they have also been specifically designed (and installed) to protect against those gases (BS 8485:2015, Annex G).

3.10 Note on the Use of Non-UK Assessment Criteria

In rare instances reference to assessment criteria or other trigger values published by other authoritative bodies (other than those concerned with the UK contaminated land regime) may provide background information on the likely degree of contamination of a substance. Trigger levels indicative of naturally occurring concentrations or risk-based guidance from other countries often help place site analysis results into context. It must be remembered that use of non-UK assessment criteria is not in compliance with the UK contaminated land assessment regime given in the Model Procedures. However, these criteria can be of use as an aid to professional judgement and can help in determining a cost-effective and sustainable remedial strategy for a site, in consultation with the regulatory authorities.

3.11 Site-specific Assessment Criteria for Volatile Substances

The CLEA methodology includes the inhalation of indoor vapours where there are occupied buildings in the standard land use scenarios. For volatile substances such as those listed in Table 3.7 the percentage contribution of the indoor vapour pathway to the average daily exposure (ADE) can be seen to be significant (up to 100%). Consequently, if this pathway can be severed by the installation of a suitably designed and installed organic vapour barrier in the buildings only the remaining CLEA exposure pathways need to be considered for the site. Assessment criteria can be calculated for the remaining exposure pathways.

Site Specific Assessment Criteria (SSAC) have been calculated using CLEA UK using the same input parameters etc. as for the Hydrock GACs but with the indoor vapour pathway turned off in the model. The resulting SSACs can be used to inform on risk from these contaminants in the same way as GACs are used, but apply only if suitable membranes are provided and verified.

Table 3.7: Derivation of Site Specific Assessment Criteria for Volatile Substances for CLEA Standard Land Uses *Excluding the Indoor Vapour Pathway* (mg/kg) – on following page(s).

Updated 18/11/15		Human Health Generic Assessment Criteria (no indoor vapour pathway) (mg/kg)								
Contaminant	**Source of GAC**	Human health - residential without plant uptake, no indoor vapour (1%SOM)	Human health - residential without plant uptake, no indoor vapour (2.5%SOM)	Human health - residential without plant uptake, no indoor vapour (6%SOM)	Human health - residential with plant uptake, no indoor vapour (1%SOM)	Human health - residential with plant uptake, no indoor vapour (2.5%SOM)	Human health - residential with plant uptake, no indoor vapour (6%SOM)	Human health - commercial, no indoor vapour (1%SOM)	Human health - commercial, no indoor vapour (2.5%SOM)	Human health - commercial, no indoor vapour (6%SOM)
TPH fractions										
TPH ali EC05-EC06	LQM/CIEH + CLEA 1.07	320000	320000	320000	5000	11000	25000	300	560	1200
TPH ali >EC06-EC08	LQM/CIEH + CLEA 1.07	320000	320000	320000	15000	34000	71000	140	320	740
TPH ali >EC08-EC10	LQM/CIEH + CLEA 1.07	6400	6400	6400	1600	2900	4300	78	94000	94000
TPH ali >EC10-EC12	LQM/CIEH + CLEA 1.07	6500	6500	6500	4600	5500	6000	94000	95000	95000
TPH ali >EC12-EC16	LQM/CIEH + CLEA 1.07	6500	6500	6500	6300	6300	6400	95000	95000	95000
TPH ali >EC16-EC35	LQM/CIEH + CLEA 1.07	-	-	-	-	-	-	-	-	-
TPH ali >EC35-EC44	LQM/CIEH + CLEA 1.07	-	-	-	-	-	-	-	-	-
TPH aro EC05-EC07	LQM/CIEH + CLEA 1.07	29000	29000	29000	90	180	390	1200	2300	4700
TPH aro >EC07-EC08	LQM/CIEH + CLEA 1.07	29000	29000	29000	150	350	800	870	420000	420000
TPH aro >EC08-EC10	LQM/CIEH + CLEA 1.07	2600	2600	2600	58	140	310	38000	38000	38000
TPH aro >EC10-EC12	LQM/CIEH + CLEA 1.07	1800	1800	1800	83	200	430	38000	38000	38000
TPH aro >EC12-EC16	LQM/CIEH + CLEA 1.07	-	-	-	-	-	-	-	-	-
TPH aro >EC16-EC21	LQM/CIEH + CLEA 1.07	-	-	-	-	-	-	-	-	-
TPH aro >EC21-EC35	LQM/CIEH + CLEA 1.07	-	-	-	-	-	-	-	-	-
TPH aro >EC35-EC44	LQM/CIEH + CLEA 1.07	-	-	-	-	-	-	-	-	-
TPH >EC44-EC70	LQM/CIEH + CLEA 1.07	-	-	-	-	-	-	-	-	-
VOCs - BTEX & MTBE										
Benzene	SGV report + CLEA 1.07	37	37	37	0.13	0.27	0.59	530	530	540
Toluene	SGV report + CLEA 1.07	29000	29000	29000	150	350	800	870	420000	420000
Ethylbenzene	SGV report + CLEA 1.07	13000	13000	13000	110	260	600	180000	180000	190000
Xylene, o-	SGV report + CLEA 1.07	22000	22000	22000	190	460	1100	260000	280000	300000
Xylene, m-	SGV report + CLEA 1.07	22000	22000	22000	210	500	1200	260000	280000	300000
Xylene, p- (use this for combined m & p)	SGV report + CLEA 1.07	22000	22000	22000	200	470	1100	260000	280000	300000
MTBE	EIC/AGS/CL:AIRE + CLEA 1.07	39000	39000	39000	150	300	600	550000	550000	560000
VOCs - other benzenes										
Iso-propylbenzene	EIC/AGS/CL:AIRE + CLEA 1.07	13000	13000	13000	220	520	1200	180000	180000	180000
Propylbenzene	EIC/AGS/CL:AIRE + CLEA 1.07	13000	13000	13000	230	550	1200	180000	190000	190000
1,2,4-Trimethylbenzene	EIC/AGS/CL:AIRE + CLEA 1.07	130	130	130	2.5	6.1	14	1800	1800	1900
VOCs - chlorobenzenes										
Bromobenzene	EIC/AGS/CL:AIRE + CLEA 1.07	2900	3000	3000	22	52	120	31000	34000	37000
Chlorobenzene	LQM/CIEH + CLEA 1.07	6200	6300	6400	40	94	210	63000	77000	91000
1,2-Dichlorobenzene	LQM/CIEH + CLEA 1.07	54000	55000	56000	640	1500	3500	580000	670000	730000
1,3-Dichlorobenzene	LQM/CIEH + CLEA 1.07	130	130	130	1.7	4.1	9.3	3000	3100	3100
1,4-Dichlorobenzene	LQM/CIEH + CLEA 1.07	8800	8900	8900	100	250	570	130000	130000	130000
Hexachlorobenzene	LQM/CIEH + CLEA 1.07	-	-	-	-	-	-	-	-	-
Pentachlorobenzene	LQM/CIEH + CLEA 1.07	-	-	-	-	-	-	-	-	-
1,2,3-trichlorobenzene	LQM/CIEH + CLEA 1.07	950	960	960	31	74	160	12000	13000	13000
1,2,4-trichlorobenzene	LQM/CIEH + CLEA 1.07	6300	6500	6600	200	480	1100	49000	60000	69000
1,3,5-trichlorobenzene	LQM/CIEH + CLEA 1.07	920	940	940	31	74	160	9300	11000	12000
1,2,3,4-tetrachlorobenzene	LQM/CIEH + CLEA 1.07	-	-	-	-	-	-	-	-	-
1,2,3,5-tetrachlorobenzene	LQM/CIEH + CLEA 1.07	34	34	34	2.4	5.4	11.0	690	700	700
1,2,4,5-tetrachlorobenzene	LQM/CIEH + CLEA 1.07	-	-	-	-	-	-	-	-	-
VOCs - chloroalkanes & alkanes										
Bromodichloromethane	EIC/AGS/CL:AIRE + CLEA 1.07	38	38	38	0.11	0.22	0.46	500	520	530
Bromoform	EIC/AGS/CL:AIRE + CLEA 1.07	-	-	-	-	-	-	-	-	-
Chloroethane	EIC/AGS/CL:AIRE + CLEA 1.07	350000	350000	350000	780	1400	2600	2600	3500	5700
Chloroethene (aka vinyl chloride)	LQM/CIEH + CLEA 1.07	1.8	1.8	1.8	0.0038	0.0069	0.013	26	26	26
Chloromethane	EIC/AGS/CL:AIRE + CLEA 1.07	310	310	310	0.45	0.88	1.6	1900	2200	3000
1,1-Dichloroethane	EIC/AGS/CL:AIRE + CLEA 1.07	25000	25000	25000	64	120	240	1800	3000	5600
1,2-Dichloroethane	LQM/CIEH + CLEA 1.07	15	15	15	0.032	0.057	0.11	200	200	210
1,1-Dichloroethene	EIC/AGS/CL:AIRE + CLEA 1.07	5700	5700	5700	19	39	82	2200	3900	8000
Cis 1,2 Dichloroethene	EIC/AGS/CL:AIRE + CLEA 1.07	680	690	690	1.8	3.5	7.1	3900	6600	9900
Trans 1,2 Dichloroethene	EIC/AGS/CL:AIRE + CLEA 1.07	2100	2100	2100	6.5	13	27	3400	6200	13000
Dichloromethane	EIC/AGS/CL:AIRE + CLEA 1.07	390	390	390	0.70	1.3	2.3	7300	9000	9000
1,2-Dichloropropane	EIC/AGS/CL:AIRE + CLEA 1.07	1200	1300	1400	4.3	8.4	18	1200	2100	11000
Hexachloroethane	EIC/AGS/CL:AIRE + CLEA 1.07	64	64	64	1.8	4.3	9.3	900	920	930
Tetrachloroethene	LQM/CIEH + CLEA 1.07	1700	1700	1700	11	26	58	420	950	26000
1,1,1,2-Tetrachloroethane	LQM/CIEH + CLEA 1.07	730	730	730	5.4	13	29	10000	10000	11000
1,1,2,2-Tetrachloroethane	LQM/CIEH + CLEA 1.07	730	730	730	2.8	6.1	14	11000	11000	11000
Tetrachloromethane	LQM/CIEH + CLEA 1.07	180	180	180	1.1	2.5	5.7	1500	2500	2500
Trichloroethene	LQM/CIEH + CLEA 1.07	660	660	660	3.0	6.5	15	1500	3200	9000
1,1,1-Trichloroethane	LQM/CIEH + CLEA 1.07	75000	76000	76000	330	730	1600	1400	2900	6400
1,1,2 Trichloroethane	EIC/AGS/CL:AIRE + CLEA 1.07	510	510	510	2.0	4.2	9.4	7100	7300	7400
Trichloromethane	LQM/CIEH + CLEA 1.07	880	880	880	2.5	4.8	10	5200	9100	20000
Other inorganics										
Antimony	EIC/AGS/CL:AIRE + CLEA 1.07	-	-	-	-	-	-	-	-	-
Barium	EIC/AGS/CL:AIRE + CLEA 1.07	-	-	-	-	-	-	-	-	-

Updated 18/11/15		Human Health Generic Assessment Criteria (no indoor vapour pathway) (mg/kg)								
Contaminant	**Source of GAC**	Human health - residential without plant uptake, no indoor vapour (1%SOM)	Human health - residential without plant uptake, no indoor vapour (2.5%SOM)	Human health - residential without plant uptake, no indoor vapour (6%SOM)	Human health - residential with plant uptake, no indoor vapour (1%SOM)	Human health - residential with plant uptake, no indoor vapour (2.5%SOM)	Human health - residential with plant uptake, no indoor vapour (6%SOM)	Human health - commercial, no indoor vapour (1%SOM)	Human health - commercial, no indoor vapour (2.5%SOM)	Human health - commercial, no indoor vapour (6%SOM)
Mercury, elemental	SGV report + CLEA 1.07	4.3	11	26	4.3	11	26	4.3	11	26
Molybdenum	EIC/AGS/CL:AIRE + CLEA 1.07	-	-	-	-	-	-	-	-	-
Thiocyanate	Hydrock + CLEA 1.07									
Other organics										
Biphenyl	EIC/AGS/CL:AIRE + CLEA 1.07	-	-	-	-	-	-	-	-	-
Carbon disulphide	LQM/CIEH + CLEA 1.07	6200	6300	6300	33	70	150	2100	4200	75000
2,4-Dinitrotoluene	EIC/AGS/CL:AIRE + CLEA 1.07	-	-	-	-	-	-	-	-	-
2,6-Dinitrotoluene	EIC/AGS/CL:AIRE + CLEA 1.07	-	-	-	-	-	-	-	-	-
Hexachloro-1,3-butadiene	LQM/CIEH + CLEA 1.07	13	13	13	1.5	3.1	5.6	290	290	290
Mercury, methyl	SGV report + CLEA 1.07	-	-	-	-	-	-	-	-	-
Styrene	EIC/AGS/CL:AIRE + CLEA 1.07	1500	1500	1500	11	25	58	23000	23000	23000
Tributyl tin oxide	EIC/AGS/CL:AIRE + CLEA 1.07	-	-	-	-	-	-	-	-	-
2-Chloronaphthalene	EIC/AGS/CL:AIRE + CLEA 1.07	-	-	-	-	-	-	-	-	-
NOTES										
If >1,000,000 is calculated, 1,000,000 is adopted.										
Red text - liquid at ambient temperature, calculated GAC exceeds saturation value and highlighed in red in CLEA - saturation value adopted for GAC										
Orange text - solid at ambient temperature, calculated GAC exceeds saturation value and highlighted red in CLEA - manual calculation not possible as only one HCV - saturated vapour concentration exceed, so saturation valu										
Blue text - solid at ambient temperature, calculated GAC exceeds saturation value and highlighted red in CLEA - manual calculation not possible as only one HCV - aqueous solubility exceed, so original red-highlighted value ad										
Green text - solid at ambient temperature, calculated GAC exceeds saturation value and highlighted red in CLEA - manual calculation undertaken but result is greater than original red-highlighted value, so original red-highlighte										

3.12 Determination of Contaminated Land Under Part 2A of the Environmental Protection Act 1990

The legal test for land contamination under the statutory guidance of Part 2A of the Environment Protection Act 1990 (i.e. "significant harm or significant possibility of significant harm") is **unacceptable** intake or direct bodily contact.

The situation was clarified by Defra (July 2008) in its guidance on the legal definition of contaminated land.

Part 2A does not prescribe number-based thresholds because it would be very difficult to produce numbers which are meaningful and proportionate, given the lack of scientific information about many substances and the site specific nature of risks. Instead, it relies on local authorities to assess risks posed on individual sites, then decide whether (in their view) the risks represent SPOSH, and thus whether land qualifies as **contaminated**.

The intention of the approach is that local authorities can use their judgement to ensure that Part 2A focuses on the SPOSH it was designed to address, whilst avoiding unnecessary burdens on land where contaminants may be present but there is no SPOSH.

In making Part 2A decisions, local authorities are likely to face some difficult decisions caused by uncertainty on the nature of risks. But they should be confident in exercising their judgement on the basis of available information. Part 2A clearly leaves judgements about what constitutes a SPOSH to local authorities, and it is up to them to make decisions.

GACs are not proxy thresholds for SPOSH, and should not be used as such. They describe levels (based on cautious estimates and assumptions in hypothetical example situations) at which concentrations of contaminants in soil may cease to pose **no appreciable/ minimal** risk. They do not seek to describe levels at which there might be a SPOSH.

Thus, if a GAC is exceeded, the assessor will usually need to conduct a detailed quantitative risk assessment to discover whether there is a **possibility of significant harm** and, if so, the nature of that risk. Whether or not SPOSH exists will depend on the results of risk assessment, the existence and nature of any pollutant linkages, and (ultimately) the judgement of the local authority.

As a general guide:

(i) For substances where there is a GAC, the more the GAC is exceeded, the more likely it is that an authority should consider the risks to be SPOSH.

(ii) Generally, the cautious nature of GACs means that local authorities may conclude that SPOSH is unlikely to exist at concentrations close to GACs.

(iii) In some cases, land with concentrations of contaminants which marginally exceed a GAC (say, up to a few times the GAC) might give rise to SPOSH if, for example, the receptor is particularly sensitive; or if further assessment finds that exposure is higher than that estimated in the GAC; or if there is little uncertainty in the underlying toxicology and HCV.

(iv) In other cases a GAC may be exceeded by tens of times and there might be no SPOSH (e.g. if further assessment found that exposure was much lower than that estimated using the GAC).

In view of the above, Hydrock has not to attempted to derive numerical SPOSH concentrations, but to use GACs as screening values. Where GACs are exceeded, it is recommended that the linkages and the uncertainties in the data are reviewed in consultation the regulatory authority to aid its judgment on determination.

A possible next phase would be to refine the generic risk assessment with a detailed risk assessment. This would involve using site-specific input parameters relevant to the particular site, in the CLEA model.

Revised contaminated land statutory guidance was published by Defra in 2012 with respect to Part 2A. The Act itself is unchanged. A new four category test (and associated classifications) has been introduced to ensure a high standard without being excessive. The aims are to make the regime target higher risk sites more efficiently, remove excessive cost burdens and facilitate the development of technical tools to increase consistency over time. This includes supporting non-technical guidance including a possible framework to aid in deciding into which of the proposed four new Categories of land a site should be placed.

Conversely, the regime is not intended to intervene where there is only a low level of risk, particularly in cases where it is difficult to demonstrate anything other than a very small hypothetical risk, as might be the case with vast swathes of land.

Defra states that there is a need for a more pragmatic approach. In practice, deciding when regulatory intervention is justified involves making decisions about when to act on a wide spectrum of risk, with varying levels of uncertainty over the precise nature of the risks. A number of the changes are intended to clarify when land is “contaminated land”. These are most likely to affect the assessment and remediation of contaminated land and are listed below.

1. Statutory explanation of broad objectives of the regime to explain that regulators should seek a reasonable balance between dealing with unacceptable risks whilst ensuring that burdens on businesses and society are manageable and sustainable. The regime should be seen as an option of last resort; that land is in effect “innocent until proven guilty”. This should give greater clarity for all concerned on what the regime seeks to achieve, and what it seeks to avoid.

2. Local Authorities to produce risk summaries before land may be determined as “contaminated”. Summaries must be understandable to non-experts to provide greater transparency and accountability. Easier for all involved to understand what local authority considers risks to be. It should be easier for Local Authorities managers, lawyers and councillors to be involved in decision making, particularly more difficult sites where wider socio-economic effects need to be take into account. Easier to share experience between Local Authorities leading to greater consistency in decision making.

3. Clarification of the legal test of significant harm to human health to mean serious unhealthy conditions of the body or part of it, and not minor/trivial complaints. This is unlikely to have a major effect because, to date, no site in England and Wales has been determined on

grounds that significant harm to human health has actually been caused. However, greater clarity on the meaning of significant harm is likely to help clarify the related legal test of significant possibility of significant harm.

4. Explanation of how to decide when land is (and is not) "contaminated land". A new four category test which recognises the spectrum of risk encountered by assessors, and the reality that some sites are clearly contaminated land (Category 1), some clearly are not (Category 4), and others need more detailed consideration before a decision can be taken (Categories 2 and 3). Greater clarity that decision making is a two stage process in which the regulator must first understand the risk before deciding whether the risk is sufficiently high to justify regulatory intervention. The aim is to create legal certainty around what definitely is, and is not, contaminated land, whilst leaving Local Authorities with discretion to exercise local judgement on less straightforward land.

5. Category 4 will include normal background levels of contamination unless there is some exceptional reason to consider otherwise. Clarification that land at SGV/GAC levels is likely to be well into Category 4. Statutory backing for the sector to develop new tests to describe the top of Category 4 (including the production of Category 4 Screening Levels). This should provide clarity on when land will not be caught, reduced uncertainty and costs for landowners and businesses and faster decision making on non-problematic land.

6. Clarify the status of GACs and how they should (and should not) be used including a legal backing for the use of robust GACs produced by reputable, non-governmental, organisations within the sector (LQM/CIEH, EIC/AGS/CL:AIRE). Backing the development of new GACs (or similar tools) as might be developed by the sector to help implement the new Guidance. Specific legal backing for the current set of SGVs/GACs, and clarity on how they can (and cannot) be used.

7. Category 1 land is clearly caught by the regime when there is clear evidence of an unacceptable risk (e.g. similar land is known to have caused significant harm). This should give clarity on when land is definitely "contaminated land", and help frame the spectrum of risk raised by land contamination.

8. New category of land under which Local Authorities would decide whether a site is in Category 2 (contaminated land) or Category 3 (not contaminated land). The new test would rest on whether or not the local authority believes there is a strong case for regulatory action, taking account of the scientific evidence, the objectives of the regime, and other factors. The local authority would start by considering health risks alone, and if they clearly tend towards the Category 4 or the Category 1 the decision could be taken at this point. However, if this does not lead to a decision, the local authority would consider wider socio-economic factors (e.g. cost, views of local people, etc) before deciding. If the local authority still cannot decide, the default decision is that the site is not contaminated land.

9. Reduce "regulatory creep" (excessive remediation of land forced by regulatory uncertainty) with greater clarity on what the enforcing authority can "reasonably" require by way of remediation. Clarity that SGVs/GACs must not be used as "one size fits all" remediation requirements; and that Part 2A can only be used to force remediation to a level where land

is no longer contaminated land (i.e. to a point where land is in Category 3), but it should not be used to force remediation beyond this point.

10. Guidance on the process of risk assessment: the need to take a strategic approach; the aim of dismissing low risk sites as soon as possible in order to focus on finding higher risk sites; and the general need to ensure that risk assessment is conducted in a timely and efficient manner. Clarify that in considering possible future risks the local authority should consider likely future situations (e.g. rather than hypothetical worst possible case situations). Recognise that in practice there is often a need for authorities to bring in external experts and act in accordance with their advice. Recognise that scientific and technical uncertainty is an inevitable part of contaminated land risk assessment, and set out broadly how regulators should deal with it. It is important that this is recognised in the Guidance to support the regulators who have to make decisions in the face of uncertainty.

In deciding whether or not a significant possibility of significant harm to human health exists, the local authority should first understand the possibility of significant harm from the relevant contaminant linkage(s) and the levels of uncertainty attached to that understanding, before it goes on to decide whether or not the possibility of significant harm is significant.

The term “possibility of significant harm” means the risk posed by one or more relevant contaminant linkage(s) relating to the land. It comprises:

- the estimated likelihood that significant harm might occur to an identified receptor, taking account of the current use of the land in question; and
- the estimated impact if the significant harm did occur i.e. the nature of the harm, the seriousness of the harm to any person who might suffer it, and (where relevant) the extent of the harm in terms of how many people might suffer it.

Having completed its estimation of the possibility of significant harm, the local authority should produce a risk summary.

The decision on whether the possibility of significant harm being caused is significant (SPOSH) is a regulatory decision to be taken by the relevant local authority. In deciding whether the possibility of significant harm being caused is significant, the authority is deciding whether the possibility of significant harm posed by contamination in, on or under the land is sufficiently high that regulatory action should be taken to reduce it, with all that would entail.

In deciding whether or not land is contaminated land on grounds of significant possibility of significant harm to human health, the local authority should use the four categorisations.

The decision between Categories 2 and 3 is a positive legal test, which means that the starting assumption should be that land does not pose a significant possibility of significant harm unless there is reason to consider otherwise. Category 3 may include land where the risks are not low, but nonetheless the authority considers that regulatory intervention under Part 2A is not warranted.

The local authority should first consider its assessment of the possibility of significant harm to human health, including the estimated likelihood of such harm, the estimated impact if it did occur, the timescale over which it might occur, and the levels of certainty attached to these

estimates. If the authority considers, on the basis of this consideration alone, that the strong case does or does not exist, the authority should make its decision on whether the land falls into Category 2 or Category 3 on this basis regardless of any other factors.

However, if the authority considers that it cannot make a decision, it should consider other factors which it considers are relevant, including:

- The likely direct and indirect health benefits and impacts of regulatory intervention including benefits of reducing or removing the risk posed by contamination, any risks from contaminants being mobilised during remediation and any indirect impacts such as stress-related health effects that may be experienced by affected people, particularly local residents. If it is not clear to the authority that the health benefits of remediation would outweigh the health impacts, the authority should presume the land falls into Category 3 unless there is strong reason to consider otherwise.
- The authority's initial estimate of what remediation would involve; how long it would take; what benefit it would be likely to bring; whether the benefits would outweigh the financial and economic costs; and any impacts on local society or the environment from taking action that the authority considers to be relevant.

Deregulatory Change to Definition of Contaminated Land as it Relates to Water Pollution.

Defra will commence Section 86 of the Water Act 2003 so that in future this would only be the case if there is significant pollution of controlled waters or significant possibility of such pollution. To explain how to decide whether or not "significant" pollution is being caused, the Statutory Guidance introduced new Category 1-4 tests similar to those for deciding when there is a significant risk to human health as described above. There will be new technical guidance produced by the Environment Agency. In practice, this change is likely to have little effect on the practical implementation of the Part 2A regime because the Environment Agency has already been prioritising sites likely to meet the new "significance" test.

The 'pollution of Controlled Waters' means the entry into controlled Waters of any poisonous, noxious or polluting matter or any solid waste matter. Given that the Part 2A regime seeks to identify and deal with significant pollution (rather than lesser levels of pollution), the local authority should seek to focus on pollution which: (i) may be harmful to human health or the quality of aquatic ecosystems or terrestrial ecosystems directly depending on aquatic ecosystems; (ii) which may result in damage to material property; or (iii) which may impair or interfere with amenities and other legitimate uses of the environment.

In deciding whether significant pollution of Controlled Waters is being caused, the local authority should consider that this test is only met where it is satisfied that the substances in question are continuing to enter controlled Waters; or that they have already entered the waters and are likely to do so again in such a manner that past and likely future entry in effect constitutes on-going pollution.

3.13 Generic Risk Assessment Criteria for Risk to Plants

Soil contaminants, if present at sufficient concentrations, can have an adverse effect on the plant population. Phytotoxic effects can be manifested by a variety of responses, such as growth inhibition, interference with plant processes, contaminant-induced nutrient deficiencies and

chlorosis (yellowing of leaves). All chemicals are probably capable of causing phytotoxic effects. Thus the phytotoxic potential of substances is dependent on the concentrations capable of having adverse effects on plants and the concentrations likely to be found at contaminated sites. Phytotoxicity is a difficult parameter to quantify given that experimental techniques vary widely and variations exist in plant tolerances, soil effects and synergistic/antagonistic reactions between chemicals.

Contaminants may be taken up and accumulated by plants through a range of mechanisms. The principal pathways are active and/or passive uptake through the plant root, adsorption to root surfaces and volatilisation from the soil surface followed by foliar uptake. After plant uptake, contaminants may be metabolised or excreted, or they may be bioaccumulated.

Many of the substances capable of adversely affecting vegetation exert this effect because of their water solubility, a characteristic that could result in their transport from contaminated sites into adjacent locations where the chemical may generate a phytotoxic response. This could be important if, for example, the adjacent site has important conservation status.

Whilst many contaminants may be phytotoxic, data are limited. Some heavy metals are essential as trace elements for plant growth but may become toxic at higher concentrations. Toxicity may be displayed in many forms, including signs of stress such as reduction in growth or yellowing of the tissue. The concentration in soil at which substances become phytotoxic depend on a range of factors including plant type, soil type, pH, the form and availability of the contaminant and other vegetation stress factors that may be present (such as drought).

Hydrock has carried out a review of a number of current and former guidance documents and other texts on phytotoxicity. It is not possible to produce a definitive list of phytotoxic substances on account of the variables mentioned above. However, a number of metals are repeatedly cited as commonly occurring priority pollutants. As a result, the following list is adopted as Hydrock's indicators of the potential for phytotoxicity: As, B, Cr, Cu, Ni and Zn.

As the CLEA framework is a risk based approach, applied to humans, an alternative strategy is required to assess the risk to plants from substances that are phytotoxic. Reference to published criteria and background concentrations can help put site data into context.

Published assessment criteria for the protection of plant life from a number of countries are given in Table 3.8. Also included in the table are some measures of natural background concentrations in typical soils.

The most authoritative source is the British Standard for topsoil, but this only lists three elements. CLR 11 states that the ICRCL Guidance Note 70/90 can be used for initial screening criteria. This approach has been adopted by Hydrock where BS 3882 is lacking, but where an ICRCL 70/90 criterion is lacking, the lowest criterion in Table 3.8 from, firstly MAFF, and, secondly, another country has been adopted. The adopted criteria are highlighted in Table 3.8. The MAFF value of 250 mg/kg has been chosen for As over the ICRCL value of 50 mg/kg as MAFF explains the 50 is applicable to vegetables and human health, whereas 250 is applicable to the plants themselves.

Table 3.8: Published Assessment Criteria and Natural Background Concentrations for Phytotoxic Elements (mg/kg)

Reference	As	B	Cr (total)	Cr (III)	Cr (VI)	Cu	Ni	Zn
Published assessment criteria (mg/kg)								
British Standard for topsoil (BS 3882:2015)						200 (pH>7) 135 (pH 6-7) 100 (pH 5.5-6.0)	110 (pH>7) 75 (pH 6-7) 60 (pH 5.5-6.0)	300 (pH>7) 200 (pH 6-7) 200 (pH 5.5-6.0)
MAFF Code of Good Agricultural Practice for the Protection of Soil (1998)	250			unlikely to be toxic except in v low pH. 400 for sites containing sewage sludge		500 (grass) but may fall to 250 for clover and sensitive species (at pH≥6)	110 (pH>7) 75 (pH 6-7) 60 (pH 5.5-6.0)	1000 (clover & grass at pH 6), may fall to 300 for sensitive species (at pH 6-7)
Australian Guideline B(1) (1999), Interim Urban Ecological Investigation Level (EIL). Soils not generally considered phytotoxic below these EILs.	20			400	1	100	60	200
Considered toxic to plants - Ponnamperuma *et al* (1979)		5 (hot water soluble)						
Dutch ecotoxicological intervention value (Swartjes 1993 & 1994) *	40	7	230			190		
Alberta Environment (1990) Tier 1 (draft) *	10 acid sandy soils			600 acid sandy soils	25 acid sandy soils	130 acid sandy soils		
Ontario MoE (1989) *	20 acid sandy soils 25 clay soils							
ICRCL 59/83 (1987) now withdrawn for human health assessment		3 (hot water soluble)				130	70	300
ICRCL 70/90 (1990) threshold trigger value	50				25	250		1000
New Zealand guidelines for timber treatment sites (1997), estimated based on Cu bioavailability *						500-1000 clay soils		
New Zealand guidelines for timber treatment sites (1997), soil criteria for protection of plant life (residential/agricultural setting)	10-20	3 (soluble)		600	25	130		

Reference	As	B	Cr (total)	Cr (III)	Cr (VI)	Cu	Ni	Zn
Natural Background Concentrations (mg/kg)								
Dutch background level (target value) (VROM 2000)	29		100			36	35	140
UK ICRCL 42/80 (2nd ed. 1983) - Normal conc. In agricultural soil	0.1-40	2-100	5-500			2-100	5-500	10-300
UK ICRCL 70/90 (1st ed. 1990) - Typical range (and mean) in agricultural soils	2.3 - 53 (11.0)					5.8-62 (19) [1.2-19 4.9) extractable]		29-210 (78.1) [1.5-21 (5.6) extractable]
Canadian assessment criteria (i.e. background) (CCME 1991)	5	1(hot water soluble)	20		2.5	30		60
New Zealand timber sites (1997) – background	2-30							
Australian Guideline B(1) (1999), typical background levels	1-50		5-1000			2-100	5-500	10-300
* cited in New Zealand Ministry for the Environment (1997) timber treatment chemicals guidelines.								

3.14 Generic Risk Assessment Criteria for Controlled Waters

The following aquifer definitions are adopted.

- **Principal aquifers** - These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.
- **Secondary aquifers** - These include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage. Secondary aquifers are subdivided into two types:
- **Secondary A** - permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers; and
- **Secondary B** - predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.
- **Secondary undifferentiated** - has been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
- **Unproductive strata** - These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

The Environment Agency (August 2013) Groundwater Protection Policy (known as GP3) contains the legal framework, detailed policies, technical background and the tools to be used in the protection of groundwater.

The European Water Framework Directive (2000/60/EC) (WFD) and its daughter Directives establish a consolidated way of controlling water quality of the whole water environment. The UK Government has revised its guidance to the Environment Agency and Natural Resources Wales (the Agencies) to remain relevant to the second and subsequent planning cycles. *River basin planning guidance* (Defra and Welsh Government July 2014) is a point of reference for other regulators, bodies and individuals affected by or contributing to the river basin planning process. Parts of this guidance are transposed into The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015, which support The Water Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations 2015 (Statutory Instrument 2015 No. 1623) which came into force on 14 September 2015. This updates the 2003 Regulations to include the revised EQS Directive (2013/39/EU) which has been amended to cover the second planning cycle, starting on 22 December 2015.

Water Framework Directive implementation in England and Wales: new and updated standards to protect the water environment (Defra and Welsh Government May 2014) informs interested parties of the new and updated environmental standards. There are a number of support documents produced by the UK Technical Advisory Group on the Water Framework Directive (UKTAG), including *Updated Recommendations on Environmental Standards* for the 2015-21 river basin management programme.

A groundwater body is defined as groundwater in an aquifer capable of supporting an abstraction of 10 m^3/day or 50 people over a sustained period under the WFD. Groundwater bodies are a strategic resource, even if there is no current abstraction. Lesser amounts of groundwater in an aquifer may not be considered as receptors in their own right, but may still be pathways to other receptors such as surface water bodies or aquatic ecosystems. However, if the conceptual site model indicates a potable supply of less than 10 m^3/day, this source will be included in the risk assessment.

One of the main objectives of the Agencies is to 'prevent or limit' inputs of substances. Substances are defined as either 'hazardous substances' or 'non-hazardous pollutants'. Directive 2006/118/EC include the objective of preventing the input of hazardous substances into groundwater and limiting inputs of other (non-hazardous) pollutants so as to avoid deterioration of the groundwater body. The revised EQS Directive 2013/39/EU Annex I contains a list of 'priority substances' in the field of water policy and includes those identified as 'priority hazardous substances'.

For practical purposes, the Agency interprets prevention of inputs of hazardous substances and any other substances which meet the criteria for persistence, toxicity and bioaccumulation taking into account those substances listed in WFD (2000/60/EC) Annex VIII.

The 'prevent' objective applies to active inputs such as industrial discharges and *de minimus* concentrations are set as a series of minimum reporting values (MRV). Inputs to Controlled Waters from contaminated land sites are classed as passive inputs under the WFD and, as such, were regulated under the Agency's 'limit' objective. However, paragraph 9.3 of the revised *River*

basin planning guidance (Defra and Welsh Government July 2014) states that the governments will issue revised Directions to take into account the recommendations of UKTAG (November 2013, amended January 2014) as well as Directive 2013/39/EU. These recommendations provide approached for hazardous and non-hazardous substances as follows.

- Hazardous substances – standards in groundwater help to assess whether or not measures to prevent inputs from identified sources have been successful and are based on 'limits of quantification' achieved routinely by competent laboratories (also known as minimum reporting values, MRV). Recommended standards are given in Table 13 of the UKTAG document. These standards are recommended for use in assessing risks posed by new developments (such as landfills) and whether or not existing activities and contaminated land with the potential to cause inputs are doing so.

  This is potentially more onerous than the previous 'limit' objective and the UKTAG document states that actions currently taken with respect to contaminated land are not always sufficient to prevent inputs of hazardous substances and additional remediation may be required. However, it also states that exemptions are available where measures would be disproportionately costly.

- Non-hazardous pollutants – standards in groundwater help to assess the extent to which inputs need to be limited to ensure they do not cause deterioration. Standards vary depending on the receptor at risk. Acceptable water quality targets are defined for protection of human health (based on drinking water standards (DWS)) and for protection of aquatic ecosystems (environmental quality standards (EQS)).

In the event, when the revised Directions were issued (namely, The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015) there was no mention of the use of MRVs with respect to inputs from land subjected to contamination. Consequently, MRVs are not used by Hydrock in this report.

All substances which are not determined to be hazardous are potentially non-hazardous pollutants. The final say lies with the Agencies as to which chemicals they consider to be of potential concern and whilst the indicator substances analysed for by Hydrock in this report may be indicative of the likely risk of pollution of Controlled Waters, this report may not be definitive and the relevant Agency may require additional work.

The definition of pollution is "the direct or indirect introduction, as a result of human activity, of substances or heat into the air water or land which may be harmful to human health or the quality of aquatic ecosystems or terrestrial ecosystems directly depending on aquatic ecosystems, which result in damage to material property, or which impair or interfere with amenities and other legitimate uses of the environment."

Pollution equates to harm. In order to protect receptors there is a regulatory regime. This involves setting an environmental standard at the receptor (i.e. minimum acceptable water quality). In recognition that pollutants may degrade *en route* to the receptor it is possible to set a limit value at the source of the pollution and compliance values at locations along the pathway, such that water reaching the receptor does not exceed the environmental standard. By definition, the target value is greater than or equal to the compliance value, which in turn is greater than or equal to the environmental standard, depending on the amount of degradation

expected. This concept is used in the Remedial Targets Methodology (Environment Agency 2006a) to determine how land contamination impacts on groundwater and surface water quality.

The applied environmental standards vary with the hydrogeological conditions and the perceived value of the water resource, and are subject to local assessment by the relevant Agency. Note that protection of Controlled Waters may involve work over and above that required for 'suitable use' of a site for the proposed development.

Note also that Article 6.3(e)(ii) of the WFD enables the regulatory authorities to exempt measures from the prevent and limit requirements where it would be disproportionately costly to remove or control the further movement of pollutants that are already in the ground. Where a continuing source that has given rise in the past to land contamination this must be brought under control to prevent further unacceptable inputs to groundwater, but it is clear that the extent is limited by what is considered to be 'reasonableness'.

This report provides an initial assessment of the risks of pollution of Controlled Waters using water quality targets (WQT) as screening values. These are the drinking water standards (DWS) and the environmental quality standards (EQS), the latter designed to protect the surface water ecosystems. EQS are available for inland surface waters (freshwater) and other surface waters (transitional and marine). In addition, the recommended standards for hazardous substances in groundwater (UKTAG November 2013, amended January 2014, Table 13, Column 2) are also used where appropriate.

DWS are given in the Water Supply Regulations 2010 (which amends to Water Quality (Water Supply) Regulations 2000, Schedule 1, Table B, Part 1 (Directive requirements) and Part 2 (national requirements)). Where no UK or EU drinking water standard exists, reference is made to the World Health Organization (2011).

The list of EQS for priority substances is published in Directive 2013/39/EU. In addition, each Member State has to define country-specific substances and their EQS (river basin specific pollutants). Those adopted by the UK listed by Defra and Welsh Government (May 2014) and the 2015 Directions. These documents form the basis for the DWS and EQS used in this report.

It is noted that the EQS for iron in *Water Framework Directive implementation in England and Wales: new and updated standards to protect the water environment* is given in Table 5.2a as 1 µg/l. The 'standard status' in that table is listed as an existing standard. However, the existing standard was 1 mg/l (i.e. 1000 µg/l) and the tabulated value appears to be an error. This has been carried forward to the 2015 Directions. Consequently, Hydrock continues to use 1000 µg/l in its assessments.

Several EQS are based on bioavailable metal proportions (i.e. copper, lead, manganese, nickel and zinc). For zinc, this is the concentration in excess of the ambient background concentration (ABC). A software tool (M-BAT) is available from the Water Framework Directive - UK TAG web site for calculating the bioavailable fraction of Cu, Mn, Ni and Zn, but not Pb, and it also lists regional ABC values (WFD-UKTAG July 2014). Use of the tool requires knowledge of certain determinants of the receiving waters. Consequently, unless otherwise stated in the report text, this modelling has not been used in Hydrock's initial screening exercise and so an assessment

based on the total dissolved metal concentrations will be conservative and a further level of risk assessment may be required.

Where this tool has been used, the bioavailability has been taken into account by calculating site-specific $PNEC_{dissolved}$ (Predicted No Effect Concentration) values. These enable the dissolved concentration data to be compared with the PNEC as if it were an EQS.

The WFD imposes a duty on the Agencies to classify surface water and groundwater bodies and to ensure long-term improvement (where necessary) to achieve acceptable standards. Threshold Values (TV) for individual groundwater bodies (GWB) are published. Each GWB has been identified by the Agencies and specific TVs calculated based on the perceived risks to that GWB. Failure of a TV is an indicator of potential adverse impact in specific circumstances. These TVs are not intended to be applied to meet the 'prevent or limit' objective of the Agencies (UKTAG September 2008) and are not to be used as part of specific site investigations (The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015) and they are not used by Hydrock in this report.

Generic criteria for contaminated soils which might result in groundwater contamination can be derived from generic assumptions using the Environment Agency (2006) Remedial Targets Methodology. A tiered approach is detailed in this document. In accordance with CLR 11, EQS and DWS can be used as generic water quality targets with respect to contamination of controlled waters.

It is clearly not cost-effective to analyse every water sample for all determinands. Hydrock has produced a default *de minimus* suite which includes a number of common water quality indicators plus a selection of the more common chemicals of potential concern, drawn from the lists of Specific Pollutants and Priority Substances / Priority Hazardous Substances plus additional common contaminants listed in the EPA-H1 Part 2 document, as being indicators of Good water quality under the terms of the Directive.

In addition to this, Hydrock will add to this list any chemicals identified as potential risks by reference to the conceptual site model.

Using the WQTs discussed above, the risks to groundwater and surface water from contaminants on site have been assessed according to the remedial targets methodology (RTM) prescribed by the Environment Agency (2006a).

The Level 1 soil zone assessment considers whether the contaminant concentrations in the soil moisture are sufficient to impact the water receptor(s). It is a conservative model and compares soil pore water concentrations with the above criteria, taking no account of dilution, dispersion or attenuation. Pore water concentrations can be estimated by analysis of perched water samples, analysis of eluates produced in the laboratory by standard leaching of soil samples, or by calculation from physico-chemical properties of the substances. Calculation may be more appropriate for poorly soluble substances where retention times may not be long enough during the standard leaching tests to reach equilibrium. However, the Environment Agency (2009d) cautions that the use of published k_d values to calculate pore water concentrations "can lead to a conservative estimate of risk" and suggest that leaching tests may be designed for non-volatile organics using BS 18772:2008.

The Level 2 groundwater assessment is applicable where groundwater quality data are available and compares these with the above criteria, again taking no account of dilution, dispersion or attenuation.

The remedial targets methodology also allows for more detailed assessment (soil Level 2, 3 or 4, or groundwater Level 3 or 4) for substances which fail the above-mentioned assessments. These are progressively more complex assessments and do take into account attenuation and/or dilution, as applicable to the conceptual exposure model. Such assessment is beyond the scope of this report.

Where more than one water quality target is available it is important to apply the one relevant to the critical receptor. The DWS apply to groundwater or to surface water used for abstraction and the EQS apply to surface water where the aquatic ecosystem is the receptor. EQS are available for *inland* surface waters (freshwater) and *other* surface waters (transitional and marine). Where the most appropriate water quality target cannot be determined with certainty, the lowest one is adopted in line with the precautionary principle.

For the purposes of this report, the site data are compared with the various targets as set out in Table 3.9

Table 3.9: Summary of Water Quality Risk Assessment Protocol

Scenario	Water body Receptors	Secondary Receptors	Example Contaminant Linkages	RTM Level and Samples Used (if Available)	Water Quality Targets
A	Groundwater.	Human health (abstraction).	Contaminants from site leach or seep into groundwater body and this is a (potential/actual) source of human consumption or a strategic resource.	RTM Level 2 - Groundwater. RTM Level 1 - Soil leachate (including any calculated pore water concentrations) or pore water.	DWS
A	Groundwater. Surface water.	Human health (abstraction).	Contaminants from site leach or seep into groundwater body and this feeds surface water by base flow. The surface water may be used for human consumption.		DWS
B	Groundwater. Surface water.	Aquatic ecosystem.	Contaminants from site leach or seep into groundwater body and this feeds surface water by base flow. The surface water may be an aquatic ecosystem.		EQS (inland)
C	Groundwater. Surface water.	Aquatic ecosystem.	Contaminants from site leach or seep into groundwater body and this feeds surface water by base flow. The surface water may be an aquatic ecosystem.		EQS (other)
D	Groundwater. Surface water.	Human health (abstraction). Aquatic ecosystem.	Contaminants from site leach or seep into groundwater body and this feeds surface water by base flow. The surface water may be used for human consumption and is an aquatic ecosystem.		DWS EQS (inland)

Scenario	Water body Receptors	Secondary Receptors	Example Contaminant Linkages	RTM Level and Samples Used (if Available)	Water Quality Targets
E	Surface water.	Human health (abstraction).	Contaminants from site leach or seep into surface water which may be used for human consumption.	RTM Level 1 - Soil leachate (including any calculated pore water concentrations) or pore water. Although not part of the RTM, these scenarios are used to compare surface water data to the water quality targets.	DWS
F	Surface water.	Aquatic ecosystem.	Contaminants from site leach or seep into surface water which may be an aquatic ecosystem.		EQS (inland)
G	Surface water.	Aquatic ecosystem.	Contaminants from site leach or seep into surface water which may be an aquatic ecosystem.		EQS (other)
H	Surface water.	Human health (abstraction). Aquatic ecosystem.	Contaminants from site leach or seep into surface water which may be used for human consumption and is an aquatic ecosystem.		DWS EQS (inland)

Notes:
Some EQS are water hardness dependent. This is measured either in the receiving water or in groundwater (if it is part of the pathway), or is estimated from national maps.
Inland waters EQS applicable to freshwater, other waters EQS applicable to marine or transitional waters.
Where both DWS and EQS are applicable, it is assumed that the EQS is for inland waters.
This table and the results of the assessment are considered as a first screening for potential risks of pollution of Controlled Waters. More specific requirements may be stipulated by the Environment Agency.

Note that in some instances the reporting limit (or detection limit) quoted by the laboratory may be greater than the water quality target that it is being assessed against. Where this is the case it is noted in the table. The current exercise is an initial screening assessment.

There are three main possible reasons for this. Firstly, it may be that the 'standard' method gives a relatively higher reporting limit, but that a lower one could be obtained using a more specialised technique. However, it would be disproportionately expensive to adopt the more costly specialist technique for this initial screening exercise. Secondly, it may be that the sample in question was not 'clean' because the matrix was contaminated by other substances which interfere with the analysis and so a less sensitive method has been used to protect the laboratory equipment. Thirdly, it may be that no method exists that can reach the required limit. Hydrock has contacted the Environment Agency's own National Laboratory Service and even they cannot reach low enough limits for several of the substances in the Hydrock default suite (Cr(VI), total cyanide, phenols and certain PAHs). Consequently, and depending on the particular chemicals, it may be possible with additional effort to refine the assessment, or it may be the case that it is not possible to say for certainty because suitable techniques are not available. Methods are being continually updated and new ones may become available.

The problem is compounded when EQS are revised downwards (eg the PAHs in 2013/39/EU Annex II) on the basis of toxicology, but laboratory techniques have yet to catch up. Indeed, the Directive acknowledges this in the revised Article 3b and where it states "... measurement, when carried out using the best available technique not entailing excessive costs, is referred to as "less than limit of quantification", and the limit of quantification of that technique is above the EQS, the result for the substance being measured shall not be considered for the purposes of assessing the overall chemical status of that water body."

In some cases all samples are below the detection limit but above the water quality target. It is not possible to make any judgement about these. However, in other cases, even though the detection limit is greater than the water quality target, some sample results do exceed the target.

3.14.1 Petroleum Hydrocarbons in Water

With respect to hydrocarbons in water, the Water Supply (Water Quality) Regulations 1989 (as amended 1999) contained a prescribed concentration of 10 µg/l for "dissolved or emulsified hydrocarbons (after extraction with petroleum ether); mineral oils". This was removed from the 2000 (consolidated 2007) Regulations. It was confirmed by email from the Drinking Water Inspectorate to Hydrock (1 November 2005) that dissolved hydrocarbons are no longer a prescribed substance under the Regulations. However, the 10 µg/l limit did remain in the Private Drinking Water Regulations 1991 until their revision at the end of 2009.

In the absence of a prescribed concentration for drinking water, many Environment Agency officers continue to use the superseded value. This is perhaps because petroleum hydrocarbons are a hazardous substance (former List 1) under the WFD. There is, however, no clear UK policy on hydrocarbon contamination of controlled waters. This is partly because analyses for 'petroleum hydrocarbons' are fraught with complications concerning false positives, the results being method dependent and not restricted to petroleum products.

Guidance written by the Environment Agency on risk assessment of hydrocarbons in groundwater is dated 2009 but has never been officially released through the Agency's website, although the dissemination status of the document is given as publicly available. This gives a table of water quality targets for hydrocarbons and lists "TPH (dissolved or emulsified hydrocarbons)". No minimum reporting value (MRV) is quoted, the value that would equate to a *de minimus* concentration under the prevention objective. The target of 10 µg/l is given and this is described as coming from the "Private Water Supply Regulations 1991 No. 2790 (due to be updated in 2009)". As mentioned above, the 2009 Regulations no longer list dissolved hydrocarbons.

Furthermore, the guidance also states that in cases where petroleum hydrocarbons have already entered the water, the Agency will regulate under its limit objective, rather than the prevention objective. This means that EQS or DWS will be appropriate. However, none exist.

In the absence of definitive guidance on petroleum hydrocarbons in water Hydrock recognises that it is not possible to provide EQS and so regulation with respect to aquatic ecosystems is impossible. However, it is possible to extend the use of DWS by calculating screening criteria for the speciated TPH fractions. This provides a rational, transparent and risk-based approach using established scientific principles, rather than simply adopting a withdrawn standard.

Whilst not strictly applicable to aquatic ecosystems, at least this approach can help inform the judgement as to the degree of degradation of a water body.

Accordingly Hydrock has calculated guidelines for drinking water quality based on the methodology proposed by the World Health Organisation (WHO, 2005). This is based on an adult consuming 2 litres of water per day. Whereas the WHO document assumes a body weight of 60kg, Hydrock has assumed 70kg in keeping with the UK Contaminated Land CLEA methodology.

A conservative allocation of 10% of the oral Tolerable Daily Intake (TDI) has been attributed to intake from drinking water. It is noted by the WHO (2005) that exposure from other sources would be expected to be very small and that it would be possible to allocate a greater percentage to drinking water if required. In other words, this approach is very conservative and is appropriate as an initial screening value and allows for potential additive toxicity and simultaneous exposure from other sources.

The TDIs used are the same as those used in the derivation of soil GACs and are listed in Table 3.10 along with the calculated health-based water quality targets for drinking water. Note, however, that the Environment Agency (2009d) states that when considering carbon bands, one does not know the range of toxicities and health effects of the individual chemicals, and it is precautionary to assume that the toxicological effects are additive when setting water quality targets even though the toxic endpoints and modes of action might in reality be quite different. The recommendation is to adopt a precautionary approach whereby the water quality target for each band is divided by the number of bands with detected concentrations.

Table 3.10: Calculated Water Quality Targets for Petroleum Hydrocarbons in Drinking Water

Determinand	TDI (µg/kg/day)	Solubility (µg/l)	Water Quality Target (see Note 1) (µg/l)	Notes
Ali EC5-EC6	5000	35900	**17500**[1]	
Ali >EC6-EC8	5000	5370	**17500**[1]	This concentration would be significantly above the solubility in water.
Ali >EC8-EC10	100	427	**350**[1]	
Ali >EC10-EC12	100	33.9	**350**[1]	This concentration would be significantly above the solubility in water.
Ali >EC12-EC16	100	0.759	**350**[1]	This concentration would be significantly above the solubility in water.
Ali >EC16-EC44	2000	0.00254	**7000**[1]	This concentration would be significantly above the solubility in water.
Aro EC5-EC7	223	1780000	**1**[1]	Based on the TDI for toluene as recommended by Environment Agency (2005) P5-080/TR3 gives 780. In reality the UK DWS for benzene = **1** takes precedence.
Aro >EC7-EC8	223	590000	**700**[1]	Calculated as 780, WHO DWS = **700** takes precedence.
Aro >EC8-EC10	40	64600	**140**[1]	
Aro >EC10-EC12	40	24500	**140**[1]	
Aro > EC12-EC16	40	5750	**140**[1]	
Aro >EC16-EC21	30	653	**105**[1]	
Aro >EC21-EC44	30	6.61	**105**[1]	This concentration would be significantly above the solubility in water.
Benzene	n/a	1780000	**1**	Calculation not possible as non-threshold substance, UK DWS = **1** takes precedence.
Toluene	223	590000	**700**	Calculated as 780, WHO DWS = **700** takes precedence.
Ethylbenzene	100	180000	**300**	Calculated as 350, WHO DWS = **300** takes precedence.
Xylene	180	200000	**500**	Calculated as 630, WHO DWS = **500** takes precedence.
MTBE	300	48000000	**15**	Calculated as 1050 so the odour threshold = **15** is adopted.

Determinand	TDI (µg/kg/day)	Solubility (µg/l)	Water Quality Target (see Note 1) (µg/l)	Notes
Note 1: The value to be used in a risk assessment (for carbon bands) is the value in the table divided by the number of bands with detected concentrations. Last updated 29/06/10				

In instances where a simple 'total' TPH is reported for water samples this should be considered indicative only. This is particularly the case if groundwater or surface water samples were not available and an indication of pore water quality has been derived by subjecting soil samples to a standard leaching procedure or calculation.

Where petroleum hydrocarbon contamination of Controlled Waters is suspected, Hydrock recommends that discussion with the Environment Agency is entered into at the earliest opportunity.

3.15 Statistical Tests of Soil Contamination Results

As discussed above, the sample analyses are divided into representative data sets for the assessment, based on the conceptual site model, and are referred to as 'averaging areas'. In this case it has been chosen to characterize materials that are likely to form the ground cover in critical receptor areas (e.g. gardens), on a material by material basis. The critical part of the soil column is the upper metre in terms of contact with end users of a development site.

Under the **land use planning system** where the aim is to demonstrate 'suitability for use' the key question will usually be "can we say confidently that the level of contamination of this land is low relative to some appropriate measure of risk, sometimes referred to as the critical concentration?" The critical concentration can be, for example, the relevant GAC.

It is necessary to demonstrate that (for each contaminant) the mean concentration on the site is **below** the critical concentration. The true mean concentration of a contaminant is not known because all the site soil has not been tested. An estimation of the true mean can be obtained from the samples tested during the investigation. The greater the number of samples tested, the closer the mean of these values is to the true mean.

In practice, this involves calculation of a quantity known as the 95th Upper Confidence Limit (UCL) of the true population mean, also known as the US_{95}. This is the estimate of the true mean at a 95% level of confidence (i.e. there is a 95% probability that the true mean will not be greater than this, given the values obtained from the investigation sample testing).

The statistical test that is carried out, therefore, is used to demonstrate that there is a 95% probability that the true mean falls below critical concentration (typically the GAC in a screening exercise).

In statistical language, a **null hypothesis** is stated; that the level of contamination is the same as, or higher than, the critical concentration. The **alternative hypothesis** is that the level of contamination is lower than the critical concentration. The statistical test is used to decide whether or not the null hypothesis is rejected.

If it is rejected, the assessor can conclude that the alternative hypothesis is more likely to be true, i.e. that contaminant concentrations are low relative to the critical concentration and that, potentially, the land is suitable for use. Conversely, if the null hypothesis is not rejected, the assessor should conclude that contaminant concentrations may be the same as, or higher than, the critical concentration and further measures may be needed.

A useful summary of the methodology is provided by CIEH & CL:AIRE (May 2008), which forms the basis for the approach adopted by Hydrock, and is described below. Appendix I of the C4SL report SP1010 (CL:AIRE, December 2013) contains a review of this methodology.

Firstly, the data set is assessed for outliers and normality. This is mainly a visual exercise rather than following a particular statistical method. Two graphs are considered, the data frequency histogram with a normal 'bell curve' for comparison and a quantlie-quantile (q-q) plot. The closer the data points lie to the 45° line, the closer they are to a normal distribution. Kinks in the q-q plot are indicative of more than one data set. Individual points away from the 45° line are indicative of outliers.

Additional evidence of outliers is obtained through a simple method of robust statistics advocated by the Royal Society of Chemistry (2001) and others. The measure of the mean is taken to be the median value because this is less susceptible to outliers and non-normal data sets. A value known as the mean absolute deviation (MAD) is calculated and from this can be calculated a robust standard deviation estimate by multiplying by 1.483.

A z-score can then be calculated, which is the absolute value of the data value minus the median, divided by the robust standard deviation. This is then compared with a critical value which, if exceeded, suggests a possible outlier. The critical value represents the number of standard deviations from the mean (or in this case the median). A critical value of 3 to 3.5 is generally considered appropriate. The attraction of this approach is that it is a robust, non-parametric method suitable for all data sets. It is not considered as definitive, but merely a tool to aid decision making.

If a potential outlier is identified it could be a laboratory or typographic error. If this is not the case it could be representative of a different contaminative incident and, therefore, be a hot-spot. However, it could also be simply the result of heterogeneous ground conditions and a relatively low number of sampling points. The initial review of the data is then coupled to a knowledge of the conceptual site model before an outlier is removed from the data set. A good reason is required to justify the removal of outliers and this will be reported in the text.

The second stage of the assessment is to carry out the statistical test as described previously. Two alternative methods are highlighted in the CIEH/CL:AIRE document. The one-sample t-test is said to be appropriate for normally distributed data (it is a parametric test) but is not sensitive to moderate departures from normality. The Chebychev Theorem is a non-parametric test which is said to be suitable for all data distributions. It is a less powerful test (statistically) and gives a more cautious result than the t-test because there is less certainty about the shape of the distribution.

The CL:AIRE review of 2013 considers the use of the t-test in more detail and states that if enough samples have been taken the distribution that describes the uncertainty about the mean depends only on the mean concentration and the size of between-location variation (as

measured by the observed standard deviation, not the shape of the variation. The review goes on to say that in certain circumstances, the use of the Chebychev Theorem may be unsound and suggests the use of statistical tests not based on the null hypothesis test.

The method of determining when there are enough samples to be able to use the t-test is based on the condition that the relative standard error (RSE) is less than 0.25. The RSE is calculated from the relative standard deviation (RSD) by dividing my the square root of the number of samples. The RSD is the standard deviation divided by the mean. The number of samples required for an unbiased estimate of the average concentration are listed in Table 2 of Appendix I of SP1010, for various values of RSD and based on RSE of 0.25. The number of samples required and the RSE are calculated for each chemical on the Hydrock statistics spreadsheet and a note appears as to whether or not the t-test is applicable on this basis.

The risk assessor ultimately decides, based on all the evidence, whether to use the t-test (by selecting the data as being treated as normally distributed) or the Chebychev Theorem (data treated as non-normal). The chosen method is applied and the outcome recorded with respect to whether or not the null hypothesis is rejected and the site is potentially suitable for use.

Please note that under certain circumstances a 'divided by 0' error can occur in the spreadsheets used in the statistical analyses. This happens when all the data points are the same integer value, for example where all results are <3 mg/kg and they have been assumed to be 3 mg/kg. To prevent this error, one of the results can be altered by a small amount (e.g. 3 becomes 2.99999). This allows the statistical tests to be carried out but makes no difference to the outcome. However, it does mean that the q-q and histogram plots show a spurious point, which should be ignored.

It should be noted that a similar, but opposite, set of propositions applies in the case of a potential Part 2A determination where the level of contamination must be higher than some appropriate level of risk (critical concentration) (e.g. that indicative of SPOSH). In this case, however, a lower standard of proof may be accepted and the guidance suggests that if the statistical test of significance at the 95% confidence level does not indicate rejection of the null hypothesis, then the test should be repeated at the 51% level to see if there is evidence to suggest the null hypothesis be rejected on the balance of probabilities. Where no SPOSH concentrations are available and, say C4SLs, are being used as a low-level screen under Part 2A, the same approach as for the planning regime is appropriate.

When considering potential Part 2A sites, updated guidance published by Barnes *et al* (2010) recommends the t-test for all data sets where exceedance of a critical concentration is being tested (unless the data are negatively skewed, something these authors have never seen in contaminated land data sets).

3.15.1 Note on Clustered Data Sets

The assumption behind the statistical tests is that each sample represents an equal fraction of the averaging area (Nathanail, 2004). If the data are clustered, i.e. the sampling points are not equally spaced, the calculated US_{95} would be too high if targeted sampling has taken place around suspected high concentration areas to determine the extent of the high contamination. Conversely, the calculated US_{95} would be too low if there is a high density of sampling in an area of low contaminant concentration.

The sampling pattern used in this report has been reviewed to determine if clustering of data points is likely to affect the statistical tests significantly. In cases where the area represented by each sample is judged to be similar, the tests have been carried out without modification. The error in this approach is likely to be conservative to human health because the Hydrock approach to targeted sampling is more likely to produce more closely spaced higher concentrations than more closely spaced lower concentrations.

Erring on the conservative side is, however, counter-productive when it would indicate unnecessary remediation, i.e. remediation triggered by a US_{95} which is skewed by clustered data. This is taken into consideration in the risk evaluation part of the risk assessment exercise and can take the form of professional judgement, the modification of the averaging area datasets to decluster them, or the weighting of sample results to decluster the data set. The latter method involves weighting the measured concentrations according the proportion of the area they represent, giving greater weight to samples representative of a larger area.

3.15.2 Statistical Tests and Risk to Controlled Waters

Where only a few water quality tests are available, the maximum concentrations are compared with the standards because the 95 percentile will be close to the maximum value. However, where a larger population is available, the 95 percentile is compared with the standards, as recommended by the Environment Agency.

3.16 Ground Gas Risk Assessment

The permanent ground gases methane (CH_4) and carbon dioxide (CO_2) are monitored in accordance with the principles of BS 8576:2013 and the site records are reported in an appendix. Instrument calibration records are kept in accordance with Hydrock's in-house protocol for ground gas monitoring.

The risks associated with the methane and carbon dioxide are assessed using BS 8485:2015 and guidelines from CIRIA (Wilson *et al* 2007), the NHBC (Boyle and Witherington 2007) and CL:AIRE RB17 (Card *et al* 2012).

In the above guidance, 'Situation B' is defined as the specific development of low-rise (1 or 2 storey) housing with beam and block floors, vented sub-floor void and gardens. Initial risk classification can be made according to NHBC Table 8.1. This determines the appropriate risk strategy for protection, including the need to progress to generic quantitative risk assessment (GQRA). Even where no risk assessment is recommended by this table, one may be carried out if so desired. The GQRA is known as the 'NHBC traffic light classification' as it uses red, amber and green designations to portray levels of risk.

'Situation A' covers all other forms of development. This uses a modified version of the Wilson and Card (1999) methodology.

The idealised frequency of monitoring is suggested in CIRIA Tables 5.5a and 5.5b. These tables are adapted from Wilson and Haines (2005) Table 3 which gives examples of ground conditions with the various gas generation potentials, ranging from inert Made Ground (very low potential) to post 1960s domestic landfill (very high potential).

The report does not constitute a design for gas protection measures, but lists the recommendations given by the above-mentioned guidance for the particular "Situation" considered relevant. Reference should be made to BS 8485:2015 which provides guidance for the design, based on a system of scoring depending on the type of building, the type of structural barrier, ventilation protection measures and the gas membrane. The design of gas protection measures according to BS 8485:2015 requires the building(s), or different parts thereof, to be categorized into one of four building types: Type A, Type B, Type C or Type D. This is because the construction and use of the building, together with the control of future structural changes to the building and its maintenance (the building's management) should be assessed, since potential risks posed by ground gases are strongly influenced by these factors. Note that if a membrane is installed it must be verified in accordance with CIRIA C735 (Mallet *et al* 2014) or it will score zero points and will not be deemed to afford any protection.

CL:AIRE RB17 (Card *et al* 2012) is a pragmatic approach to ground gas risk assessment and was developed because gas concentration, pressure and flow rate measured in a well headspace may not be representative of the conditions in the surrounding formation. This approach is endorsed in BS 8485:2015. This is particularly the case where landfill or mine gases are not present, but there is scope for gas generation from Made Ground or naturally occurring organic matter in the soil. If generation rates are low, relatively high concentrations may be present in the soil pores but there is no driving force to expel gases at sufficiently high fluxes so as to represent a risk by entering enclosed living spaces.

In these low risk situations, the approach is to use the conceptual site model and the estimation of the likely gas generation from a source to identify:

- where gas monitoring is required to better define the risks;
- where it may be appropriate to reduce the period of monitoring required (or avoid extra monitoring in response to anomalous results); or
- gas protection measures where the total organic content (TOC) is not greater than 6%.

In summary:

Natural soils only with no credible methane source:

- no action required (monitoring or gas protection measures) as this represents Characteristic Situation 1 (CS1).

Natural soils with peat/organic alluvium or Made Ground with low organic content and a radon barrier is being provided:

- no action required (monitoring or gas protection measures).

Natural soils with peat/organic alluvium or Made Ground with low organic content and a radon barrier is *not* being provided:

- no gas monitoring required;
- if peat/organic alluvium is present this represents CS2 (note Table A1 in RB17 reads CS3 and this is an error according to Wilson (pers. Comm.);

- if Made Ground is present, is less than 1 m thick and is inert material such as sub-base of mineral soils no gas protection is required as this represents CS1;
- if Made Ground is present, is less than 5 m (maximum) and less than 3 m (average) thick determine TOC and forensic description (Table 3.11) and Characteristic Situation (and hence gas protection measures) (Table 3.12);
- if Made Ground is present, is greater than 5 m thick (for example and 'old refuse tip' on the Ordnance Survey map) determine Characteristic Situation (and hence gas protection measures) from TOC with forensic description plus gas generation modelling and gas monitoring to provide a lines of evidence approach. The findings of the TOC and gas modelling may mean gas monitoring for a period shorter than recommended by CIRIA.

Table 3.11: TOC and Forensic Description

Made Ground Fraction	TOC (%)
Fine soil <10mm organic	Laboratory test for TOC
Fine soil <10mm inorganic	Zero (inert) or confirm TOC with lab test
Coarse inert – clinker, gravel, concrete, brick etc.	Zero (inert)
Wood, trees, branches etc.	57 (=IPCC (2006) DOC of 43% x 1.33 according to Hesse (1971))
Vegetable matter	27 (=IPCC (2006) DOC of 20% x 1.33 according to Hesse (1971))
Metal, glass, ceramic and other inert matter	Zero (inert)
Paper and card	53 (=IPCC (2006) DOC of 40% x 1.33 according to Hesse (1971))
Other degradable matter	Food: 20 (=IPCC (2006) DOC of 15% x 1.33 according to Hesse (1971) Nappies: 32 (=IPCC (2006) DOC of 24% x 1.33 according to Hesse (1971) Construction / demolition waste: 5 (=IPCC (2006) DOC of 4% x 1.33 according to Hesse (1971)
Cloth and leather	32 (=IPCC (2006) DOC of 24% x 1.33 according to Hesse (1971))
Total TOC for the sample	**Weighted average of above based on mass of fractions**

Table 3.12: Characteristic Situation Based on TOC of Made Ground Maximum 5 m Thick, Average 3 m Thick

Maximum TOC (%) Made Ground in Place for 20 years or Less	Maximum TOC (%) Made Ground in Place for More Than 20 years	Characteristic Situation (CIRIA C665)
≤ 1.0	≤ 1.0	CS1
≤ 1.5	≤ 3.0	CS2
≤ 4.0	≤ 6.0	CS3
Not applicable for >CS3. Gas monitoring required if TOC > 4% (or 6% in old Made Ground)		

In a scenario where Made Ground is greater than 5 m thick the gas generation potential can be calculated according to the equation on page 10 of RB17, but ignoring the summation as no iteration is required if no new Made Ground is placed every year (Wilson, pers. comm.). The equation comes from LTGN03 (Environment Agency 2004c) and was originally developed to calculate the gas generation potential of landfill sites based on iterations representing the amount of waste deposited year by year. The rate constants (half-life) Hydrock uses as default

are the fast, medium and slow degradation waste types from LTGN03 (viz 0.185/yr, 0.1/yr and 0.03/yr, respectively).

The result of the above calculation is assumed to represent the surface emission rate from a given area and mass of degradable Made Ground. This can be converted into a borehole emission rate (rounded up to the nearest 0.5%) for comparison with CIRIA C665 by assuming one borehole is equivalent to 10 m^2 of ground surface (Pecksen 1986).

Furthermore, the above calculated surface emission rate can be used with the equations from the NHBC Appendix F (Boyle and Witherington 2007) to estimate gas content in as house and compare this with the permissible concentrations.

4.0 WATER SUPPLY PIPES

The current guidance on selection of materials for potable water supply pipes to be laid in contaminated land is contained in a document published jointly by Water UK and the Home Builders Federation (Water UK HBF 2014). The protocols in that document are for guidance and are not subject to enforcement by Water UK or any agency, but have been adopted by Water UK and by HBF as best practice for their members. It has been produced to replace the guidance published by UK Water Industry Research (UKWIR) (Report 10/WM/03/02 and reissued in 2010), which came under criticism from contaminated land specialists. Accordingly this guidance is used in the following assessment.

The contaminants are divided into a number of 'parameter groups'. Threshold values for a selection of organic contaminants that may have a detrimental effect on pipes and fittings, together with threshold values for certain parameters that could cause corrosion of metal pipes, are presented.

It is generally accepted that the UKWIR document contains a number of technical errors and inconsistencies and was not universally accepted (AGS June 2014). The Water UK guidance document states that UKWIR Tables 3.1 and G1 are "not considered a definitive guide" and replaces these with its own Table 1 which clarifies the guidance. This is reproduced as within Table 4.1 below and although not stated in the document, it is assumed the units are mg/kg.

With respect to VOCs it is not clear whether or not BTEX and MTBE are to be included within the total VOC category. They appear in the USEPA method 8260C list of priority pollutants, but the text does not say to exclude them from the VOC total even though there is a separate group for BTEX and MTBE. The text does specifically exclude certain sub-sets of the SVOC list and so Hydrock has taken the guidance at face value and includes BTEX and MTBE in the VOC total.

Table 4.1: Water UK Threshold Values for Water Pipes

Parameter Group	Testing Required?	PE Pipe Threshold (mg/kg)	Metal or Barrier Pipe Threshold
Total VOC Sum of all USEPA 8260C VOC >10ug/kg and TIC >20ug/kg	Where preliminary risk assessment has identified land potentially affected by contamination	0.5	No limit
Total BTEX and MTBE		0.1	No limit
Total SVOC Sum of all USEPA 8270D SVOC >10ug/kg and TIC >20ug/kg but excluding PAH and those substances marked with an asterisk below.		2	No limit
TPH >EC5-EC10		2	No limit

Parameter Group	Testing Required?	PE Pipe Threshold (mg/kg)	Metal or Barrier Pipe Threshold
TPH >EC10-EC16		10	No limit
TPH >EC16-EC40		500	No limit
Phenols* from SVOC analysis		2	No limit
Cresols* and chlorinated phenols* from SVOC analysis		2	No limit
Ethers*	Only where identified from former land use	0.5	No limit
Nitrobenzene*		0.5	No limit
Ketones*		0.5	No limit
Aldehydes*		0.5	No limit
Amines*		Nothing >LoD	No limit
Corrosive indicators, pH, conductivity EC and redox potential Eh	Where metal pipes are contemplated	No limit	Wrapped steel: corrosive if pH<7 and EC>400uS/cm. Wrapped ductile iron corrosive if pH<5, Eh not neutral and EC>400uS/cm. Copper: corrosive if pH<5 or >* and Eh positive.
Presence of liquid free phase hydrocarbons	Observation	None allowed	None allowed

Within the guidance the soil tested must be representative of that in which the pipes will be laid, be it existing ground, remediated ground or imported soil, and should be sampled to at least 0.5 m below the underside of the pipe and along the pipe runs with sufficient number of samples to satisfy sampling strategies set out in CLR 4, CRL 11 and P5-066/TR. Following this, the data are to be incorporated into a specified risk assessment methodology.

Note that, unless stated otherwise, the Hydrock report does not constitute a formal water pipe risk assessment. Rather, the findings of the standard site investigation are screened against the threshold values in Table 4.1 insofar as is practicable given the data availability to give an indication of the possible restrictions to the use of plastic water pipes.

Note that the use of barrier pipe (PE-Al-PE) is applicable for all brownfield sites according to the guidelines, unless there are liquid free phase hydrocarbons present.

Note also that the Water UK guidance also includes greenfield sites where the preliminary risk assessment indicates there is a potential for contamination to be present.

The Water UK guidance above concentrates on direct contact of pipes with contaminated soil. It also refers to contact with excessive vapour phase and contaminated groundwater, but does not define either of these nor give any threshold concentrations.

The guidance also cautions against the creation of new pathways during construction, mainly the ability of contaminated groundwater to flow into granular pipe bedding.

It is **strongly recommended** that site-specific approval of the materials for underground pipes to be used for water supply be obtained from the water company that will be supplying this site and/or adopting the pipe work.

5.0 FLOOD RISK

The following additional information concerns the background to flood risk mentioned in the report. Guidance is given in the document *Technical Guidance to the National Planning Policy Framework* (DCLG March 2012) which retains key elements from the withdrawn Planning Policy Statement 25.

The Environment Agency flood maps are divided into Flood Zones, as follows.

- Flood Zone 1 is land outside the extent of extreme flooding and the annual risk is less than 1:1000, low probability (depicted as white on the web-based map).

- Flood Zone 2 is land unlikely to flood except in extreme conditions if no defences are present and the annual risk is between 1:100 and 1:1000 (for rivers) or 1:200 and 1:1000 (for the sea), medium probability (depicted as light blue on the web-based map).

- Flood Zone 3 is land within the floodplain at risk of flooding if no defences are present and the annual risk is greater than or equal to 1:100 (for rivers) or 1:200 (for the sea), high probability (depicted as dark blue on the web-based map).

The Agency flood maps also define the risk of flooding: as 'low' (≤1:200), 'moderate' (>1:200 to ≤1:75) or 'significant' (>1:75), which are not the same divisions as those in the guidance mentioned above. Note that the published flood map only relates to flooding from rivers, estuaries and the sea and does not include other potential sources such as surface water, groundwater, sewers, canals and reservoirs. Note also that the presence on the map of flood defences, or areas benefiting from flood defences, should not be taken to imply that a proposed development in these areas is acceptable.

The **Environment Agency in England** has issued Flood Risk Standing Advice. However, this is to be reviewed following the publication of the NPPF (see http://www.environment-agency.gov.uk/research/planning/33098.aspx for updates and details).

The flood map mentioned above can be accessed at the Agency's website.

The Technical Guidance states:

- Within Flood Zone 1 all uses of land are appropriate. For development proposals on sites comprising one hectare or above, the vulnerability to flooding from other sources as well as from river and sea flooding; and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a flood risk assessment (FRA) to accompany the planning application. This need only be brief unless the factors above or other local considerations require particular attention. For development proposals less than one hectare no flood risk assessment (FRA) is required.

- Within Flood Zone 2, water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure (as defined in Technical Guidance, Table 2) are appropriate in this zone. The Sequential Test is required and must be passed and for highly vulnerable uses in Table 2 the Exception Test must be applied and passed also. All

development proposals in this zone should be accompanied by a flood risk assessment (FRA).

- Flood Zone 3 is sub-divided into 3a and 3b, but these are not distinguished on the published maps. Flood Zone 3a is land having an annual probability of flooding of >1:100 (from rivers) or >1:200 (from the sea). The water-compatible and less vulnerable uses of land (as defined in Technical Guidance, Table 2) are appropriate in this zone. The highly vulnerable uses in Table 2 should not be permitted in this zone. The Sequential Test is required and must be passed and for the more vulnerable and essential infrastructure uses in Table 2 the Exception Test must be applied and passed also. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood. All development proposals in this zone should be accompanied by a flood risk assessment (FRA).

  Flood Zone 3b is known as the 'functional floodplain' and comprises land where water has to flow or be stored in times of flood and should be identified on Strategic Flood Risk Assessments (SFRA) undertaken by the Local Planning Authority. Such land is defined as land which would flood with an annual probability of 1:20 or greater, or is *designed* to flood in an extreme (1:1000) flood, or at another probability to be agreed between the Local Planning Authority and the Environment Agency, including water conveyance routes). Only the water-compatible uses and the essential infrastructure (as defined in Technical Guidance, Table 2) that has to be there should be permitted in this zone. It should be designed and constructed to: remain operational and safe for users in times of flood; result in no net loss of floodplain storage; not impede water flows; and not increase flood risk elsewhere. The Sequential Test is required and must be passed and for essential infrastructure the Exception Test must be applied and passed also. All development proposals in this zone should be accompanied by a FRA.

Natural Resources Wales points users to the Environment Agency flood map, but it is not used for planning purposes (only to provide information on flood risk and to raise awareness). Development advice with respect to flooding is provided by the Welsh Assembly Government (July 2004) Technical Advice Note 15 (TAN15) and the accompanying development advice maps. An interactive map is available from the WAG web site.

The development advice map containing three zones (A, B and C with subdivision into C1 and C2) should be used to trigger the appropriate planning tests.

- Zone A is considered to be at little or no risk of fluvial or tidal/coastal flooding. The justification test (TAN15, Section 6) is not applicable and there is no need to consider flood risk further. This equates to Flood Zone 1 on the Agency maps.

- Zone B is land known to have been flooded in the past evidenced by sedimentary deposits. As part of a precautionary approach site levels should be checked against the extreme (1:1000) flood level. If site levels are greater than the flood levels used to define adjacent extreme flood outline there is no need to consider flood risk further. This land within Flood Zone 1 of the Agency maps but close to Flood Zone 2 or 3.

- Zone C is based on the Environment Agency extreme flood outline, equal to or greater than 1:1000 (river, tidal or coastal) and equates to Flood Zones 2 and 3 on the Agency map. Flooding issues should be considered as an integral part of decision making by the application of the justification test (TAN15, Section 6) including assessment of consequences (TAN15, Section 7) is required. Sub-division C1 is land in the floodplain which are developed and served by significant infrastructure, including flood defences. Development can take place subject to application of the justification test, including acceptability of consequences. Sub-division C2 is land in the floodplain without significant flood defence infrastructure. Only less vulnerable development should be considered subject to application of the justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered. The categories of land use are defined in TAN15, Figure 2.

6.0 WASTE MANAGEMENT

6.1 Introduction

Any material excavated on site may be classified as waste and it is the responsibility of the holder of a material to form their own view on whether or not it is waste. This includes determining when waste that has been treated in some way can cease to be classed as waste for a particular purpose.

One of the ways this can be achieved is set out in the Development Industry Code of Practice (CoP) (CL:AIRE, March 2011). This builds on the Environment Agency guidance document Definition of waste: developing greenfield and brownfield sites (2006b).

The handling, re-use or disposal of waste is regulated by the Environment Agency. The Agency will take into account the use of the CoP in deciding whether to regulate materials as waste. If materials are dealt with in accordance with the CoP, the Agency considers that those materials are unlikely to be waste at the point when they are to be used for the purpose of land development. This may be because the materials were never discarded in the first place, or because they have been submitted to a recovery operation and have been completely recovered so that they have ceased to be waste.

Further details are provided in the CoP.

The chemical analyses in this report were scheduled for the purposes of risk assessment with respect to human health, plant life and controlled waters as discussed in the report. Whilst the results may be useful in applying the Hazardous Waste Assessment Methodology given in Environment Agency Technical Guidance WM3, they are not primarily intended for that purpose and additional analysis may be required should waste classification be required for consideration of off-site disposal of contaminated soils. As part of the report, Hydrock may have undertaken a preliminary exercise to characterise the soils encountered in the investigation in order to inform the waste characterisation process. This has been undertaken using a proprietary web-based tool and in not necessarily identical to the assessment that could be made by a particular landfill operator.

Separate analyses are required to meet the Waste Acceptance Criteria for specific landfill sites.

6.2 Classification of Materials for Off-Site Disposal Purposes

With respect to the possible waste streams from a site, it is recommended that a phased approach is implemented. This phased approach comprises Waste Characterisation and Waste Acceptance Criteria.

6.2.1 Waste Characterisation

Background

All wastes going to landfill must be classified as ‘inert’, ‘non-hazardous’ or ‘hazardous’, with a sub-category of hazardous waste known as ‘stable non-reactive hazardous waste’. Individual landfill sites must operate in accordance with their Environmental Permits.

Basic Characterisation

The first step is to determine if a waste is hazardous or non-hazardous.

Contaminated soil is a 'mirror entry' in the Consolidated European Waste Catalogue, and is not necessarily a hazardous waste. It is only classified as hazardous if it contains dangerous substances above certain threshold concentrations. The Environment Agency document *Waste Sampling and Testing for Disposal to Landfill* (March 2013) suggests that waste holders should use the information collected as part of the contaminated land risk assessment to inform decisions as to the concentrations that might reasonably be expected to be present in the contaminated soil, given the past and current uses of the site.

The waste must be assessed against all the appropriate hazards in accordance with the Environment Agency Technical Guidance WM3. This makes certain worst case assumptions about the chemical composition if specific compounds are not analysed for.

The classification of the soils as waste in England and Wales is undertaken in accordance with the revised Waste Framework Directive (WFD) (2008/98/EC).

Defining the class of waste is carried out on the actual waste being disposed of and the destination landfill site will have the final decision on acceptability of the waste. Therefore, it is recommended that if soils are to be removed from the site, the appointed contractor should approach a landfill site with the available chemical data and seek a formal waste characterisation.

The waste characterisation in this report is for information purposes only and should be considered in the light of the final decision made by the landfill site.

6.2.2 Waste Acceptance Criteria

If the waste is destined for landfill, the second step is Waste Acceptance Criteria (WAC) testing to determine if the receiving landfill can accept the waste. Further sampling and testing may be required.

WAC testing must be carried out on waste classified as non-hazardous to check if it can be disposed of at an inert landfill. Otherwise, it can be disposed of at a non-hazardous landfill without WAC testing.

WAC testing must be carried out on waste classified as hazardous to check if it can be disposed of at a hazardous landfill (or in a special stable non-reactive hazardous waste landfill site/cell).

The WAC are a list of limit values for certain parameters obtained from total content tests and standard leaching tests. If the limit values are exceeded, the waste is not suitable for disposal at that class of landfill site and alternative disposal methods have to be found.

Maximum permissible limit values are determined by the EU (part of what is known as 'full waste acceptance criteria') but individual landfills may have more stringent values to take into account the environmental setting, liner system or additional nature of specific waste streams.

WAC tests should be performed on the soils leaving the site and is not normally part of a site investigation exercise.

6.3 Materials Management

Any material excavated on site may be classified as waste and it is the responsibility of the holder of a material to form their own view on whether or not it is waste. This includes determining when waste that has been treated in some way can cease to be classed as waste for a particular purpose. One of the ways this can be achieved is set out in the Development Industry Code of Practice (CoP) (CL:AIRE, March 2011).

The handling, re-use or disposal of waste is regulated by the Environment Agency. The Agency will take into account the use of the CoP in deciding whether to regulate materials as waste. If materials are dealt with in accordance with the CoP, the Agency considers that those materials are unlikely to be waste at the point when they are to be used for the purpose of land development. The MMP must be signed off by a Qualified Person as defined in the CoP.

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Appendix **H**

Contamination Test Results and Statistical Analysis

This appendix may not be included in the printed report to reduce the document size, but is included in the digital version.

Assessment of Chemicals of Potential Concern to Human Health

Hydrock

All values in mg/kg unless otherwise stated

Chemical of Potential Concern	Lab. RL	No. Samples	Min. Value	Max. Value	No. Samples > or = GAC	GAC	US_{95}	Result of Significance Test	Soil Type	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
									Location & Depth	TP01	TP02	TP03	TP06	TP07	TP09	TP10	TP11	TP13	TP15	TP16	TP18	TP19	TP20	TP21
										0.2	0.2	0.2	0.5	0.5	0.5	0.5	0.5	0.2	0.5	0.5	0.5	0.5	0.2	0.2
Arsenic	1	48	3.5	30	0	37	17.07592	POTENTIALLY SUITABLE FOR USE		16	17	13	14	18	13	21	11	21	9	11	13	11	30	16
Beryllium	0.06	48	0.096	2.5	0	73	1.154828	POTENTIALLY SUITABLE FOR USE		0.88	0.76	0.78	0.86	0.93	0.92	1	0.61	2.5	0.5	0.63	1.5	0.52	1.1	0.8
Boron	0.2	48	0.4	4.1	0	300	1.983386	POTENTIALLY SUITABLE FOR USE		2.6	2.4	2.5	2	1	2.9	2.4	1	3.8	2	1.5	2.4	1.6	2	1.2
Cadmium	0.2	48	0.045	1.55	0	14	0.506497	POTENTIALLY SUITABLE FOR USE		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
Chromium (III)	1	47	1.2	40	0	890	24.02091	POTENTIALLY SUITABLE FOR USE		18	25	20	32	18	19	30	14	19	16	18	28	16	40	20
Chromium (VI)	1.2	48	0.6	30.4	1	6.1	4.217797	POTENTIALLY SUITABLE FOR USE		1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Copper	1	48	1.4	508	0	2500	75.64335	POTENTIALLY SUITABLE FOR USE		16	19	13	27	31	17	35	14	37	22	6	43	14	58	36
Lead	2	48	2.37	160	0	200	57.5532	POTENTIALLY SUITABLE FOR USE		31	27	22	59	21	23	160	18	53	15	19	120	33	76	61
Mercury, inorganic	0.3	48	0.14	0.3	0	170	0.274167	POTENTIALLY SUITABLE FOR USE		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Nickel	2	48	0.47	48	0	130	24.3868	POTENTIALLY SUITABLE FOR USE		19	18	16	24	24	21	20	15	48	14	15	27	15	22	19
Selenium	1	48	1	1.4	0	360	1.05803	POTENTIALLY SUITABLE FOR USE		1	1	1	1	1.4	1	1	1	1	1	1	1	1	1	1
Vanadium	1	48	3.6	80	0	410	45.91015	POTENTIALLY SUITABLE FOR USE		61	55	33	51	35	36	61	30	80	33	41	55	30	78	36
Zinc	2	48	16	1100	0	3900	202.1838	POTENTIALLY SUITABLE FOR USE		79	54	54	110	120	46	160	41	120	60	51	1100	94	120	230
Cyanide (free)	1	25	1	1	0	790	1	POTENTIALLY SUITABLE FOR USE		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Phenol (total)	2	25	1	1	0	290	1	POTENTIALLY SUITABLE FOR USE		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Acenaphthene	0.05	47	0.008	0.141	0	220	0.08991	POTENTIALLY SUITABLE FOR USE		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Acenaphthylene	0.05	47	0.012	2.78	0	180	0.374749	POTENTIALLY SUITABLE FOR USE		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Anthracene	0.05	47	0.016	2.37	0	2400	0.346637	POTENTIALLY SUITABLE FOR USE		0.1	0.1	0.1	0.1	0.1	0.1	0.46	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Benz(a)anthracene	0.05	47	0.014	1.9	0	4.2	0.615456	POTENTIALLY SUITABLE FOR USE		0.1	0.1	0.1	0.1	0.1	0.1	1.9	0.1	0.94	0.1	0.34	0.46	0.1	0.1	0.28
Benzo(a)pyrene	0.05	47	0.015	1.5	1	1.5	0.517558	POTENTIALLY SUITABLE FOR USE		0.1	0.1	0.1	0.1	0.1	0.1	1.5	0.1	0.83	0.1	0.34	0.61	0.1	0.1	0.3
Benzo(b)fluoranthene	0.05	47	0.0176	2.36	0	7.6	0.701618	POTENTIALLY SUITABLE FOR USE		0.1	0.1	0.1	0.1	0.1	0.1	1.6	0.1	1.1	0.1	0.33	0.59	0.1	0.1	0.33
Benzo(ghi)perylene	0.05	47	0.024	0.815	0	64	0.311819	POTENTIALLY SUITABLE FOR USE		0.05	0.05	0.05	0.05	0.05	0.05	0.73	0.05	0.55	0.05	0.05	0.32	0.05	0.05	0.05
Benzo(k)fluoranthene	0.05	47	0.014	1.1	0	12	0.355636	POTENTIALLY SUITABLE FOR USE		0.1	0.1	0.1	0.1	0.1	0.1	1.1	0.1	0.44	0.1	0.2	0.43	0.1	0.1	0.22
Chrysene	0.05	47	0.0159	1.86	0	7.7	0.60927	POTENTIALLY SUITABLE FOR USE		0.05	0.05	0.05	0.05	0.05	0.05	1.8	0.05	1.2	0.05	0.44	0.6	0.05	0.05	0.36
Dibenz(a,h)anthracene	0.05	47	0.023	0.347	0	1.1	0.12025	POTENTIALLY SUITABLE FOR USE		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Fluoranthene	0.05	47	0.0219	4	0	290	1.029184	POTENTIALLY SUITABLE FOR USE		0.1	0.1	0.1	0.1	0.1	0.1	4	0.1	2.3	0.1	0.88	0.59	0.1	0.1	0.48
Fluorene	0.05	47	0.01	0.449	0	170	0.127284	POTENTIALLY SUITABLE FOR USE		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Indeno(1,2,3,cd)pyrene	0.05	47	0.018	0.783	0	4.3	0.285118	POTENTIALLY SUITABLE FOR USE		0.1	0.1	0.1	0.1	0.1	0.1	0.75	0.1	0.38	0.1	0.1	0.25	0.1	0.1	0.1
Naphthalene	0.05	47	0.009	0.394	0	2.2	0.082841	POTENTIALLY SUITABLE FOR USE		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Phenanthrene	0.05	47	0.015	2.3	0	97	0.50226	POTENTIALLY SUITABLE FOR USE		0.1	0.1	0.1	0.1	0.1	0.1	2.3	0.1	0.96	0.1	0.3	0.16	0.1	0.1	0.17
Pyrene	0.05	47	0.0207	3.21	0	620	0.907215	POTENTIALLY SUITABLE FOR USE		0.1	0.1	0.1	0.1	0.1	0.1	3	0.1	2	0.1	0.71	0.59	0.1	0.1	0.4
Asbestos identified	Y/N									Y	Y	Y	N	NY	Y	Y	N	N	N	N	Y	N	N	Y
FOC (dimensionless)	0.01638	**(mean)**								0.021	0.016	0.018	0.014	0.024	0.011	0.018	0.02	0.0053	0.04	0.0061	0.0084	0.024	0.016	0.027
SOM (calculated)	2.82%	**(mean)**								3.62%	2.76%	3.10%	2.41%	4.14%	1.90%	3.10%	3.45%	0.91%	6.90%	1.05%	1.45%	4.14%	2.76%	4.65%
pH (su)	8.2	**(mean)**								7.9	8.1	8	8.8	8	8.1	7.9	7.9	7.9	8.3	8.2	8.5	9	7.9	7.9

Risk parameter: Human health - residential with plant uptake (1%SOM)
Data set: Made Ground
Client: Inverness Terrace Ltd
Site: Rudloe
Job no.: C161303
Lab. report no(s).: 16-017963-1

Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.
Values in red are equal to, or greater than, the generic assessment criterion (GAC) or +ve asbestos ID.
MG denotes Made Ground
NAT denotes natural ground

Assessment of Chemicals of Potential Concern to Human Health

Hydrock

All values in mg/kg unless otherwise stated								Soil Type	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG						
								Location & Depth	TP22	TP24	TP24	TP25	TP26	TP27	TP28	TP29	TP30	TP05	HP102	HP104	HP105	HP106	HP111	DUP111
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**US_{95}**	**Result of Significance Test**	**0.2**	**0.2**	**0.5**	**0.2**	**0.2**	**0.2**	**0.25**	**0.5**	**0.2**	**0.2**	**0.1**	**0.3**	**0.1**	**0.1**	**0.1**	**0.1**
Arsenic	1	48	3.5	30	0	37	17.07592	POTENTIALLY SUITABLE FOR USE	15	15	13	7.9	13	17	11	8.6	14	17	11.1	26	14.5	14.6	11.5	13.1
Beryllium	0.06	48	0.096	2.5	0	73	1.154828	POTENTIALLY SUITABLE FOR USE	0.8	0.88	0.98	0.45	0.95	0.62	0.69	0.74	0.73	0.77	1	1.3	0.6	0.85	1.1	1.23
Boron	0.2	48	0.4	4.1	0	300	1.983386	POTENTIALLY SUITABLE FOR USE	1.1	1.9	1.7	4.1	1.9	1.2	0.4	1.5	1.7	2.1	1	1	1	1	1	1
Cadmium	0.2	48	0.045	1.55	0	14	0.506497	POTENTIALLY SUITABLE FOR USE	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.14	0.65	0.34	0.54	0.56	0.045
Chromium (III)	1	47	1.2	40	0	890	24.02091	POTENTIALLY SUITABLE FOR USE	19	18	18	17	25	16	12	17	15	30	-1.6	19.2	10.9	16.7	18	22.8
Chromium (VI)	1.2	48	0.6	30.4	1	6.1	4.217797	POTENTIALLY SUITABLE FOR USE	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	30.4	0.6	0.6	0.6	0.6	0.6
Copper	1	48	1.4	508	0	2500	75.64335	POTENTIALLY SUITABLE FOR USE	26	15	14	17	13	18	12	13	47	16	14.4	39	9.9	12.2	19.4	18.6
Lead	2	48	2.37	160	0	200	57.5532	POTENTIALLY SUITABLE FOR USE	63	30	18	13	18	78	23	8.3	55	37	45.2	26.5	31.9	31.7	13.6	13.2
Mercury, inorganic	0.3	48	0.14	0.3	0	170	0.274167	POTENTIALLY SUITABLE FOR USE	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.14	0.14	0.14	0.14	0.14	0.14
Nickel	2	48	0.47	48	0	130	24.3868	POTENTIALLY SUITABLE FOR USE	20	21	22	12	23	16	17	18	18	22	18.6	25.3	13	17.2	22.7	27.3
Selenium	1	48	1	1.4	0	360	1.05803	POTENTIALLY SUITABLE FOR USE	1	1.1	1.2	1	1	1	1	1	1	1	1	1	1	1	1	1
Vanadium	1	48	3.6	80	0	410	45.91015	POTENTIALLY SUITABLE FOR USE	37	36	33	23	37	31	32	28	33	49	32	34	26	29	24	31
Zinc	2	48	16	1100	0	3900	202.1838	POTENTIALLY SUITABLE FOR USE	120	87	44	33	57	68	59	31	120	97	70	69	56	65	55	45
Cyanide (free)	1	25	1	1	0	790	1	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1	1	1						
Phenol (total)	2	25	1	1	0	290	1	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1	1	1						
Acenaphthene	0.05	47	0.008	0.141	0	220	0.08991	POTENTIALLY SUITABLE FOR USE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.008	0.008	0.008	0.008	0.008
Acenaphthylene	0.05	47	0.012	2.78	0	180	0.374749	POTENTIALLY SUITABLE FOR USE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.0149	0.0257	0.0137	0.012	0.012
Anthracene	0.05	47	0.016	2.37	0	2400	0.346637	POTENTIALLY SUITABLE FOR USE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.0243	0.0466	0.0263	0.016	0.016
Benz(a)anthracene	0.05	47	0.014	1.9	0	4.2	0.615456	POTENTIALLY SUITABLE FOR USE	0.42	0.27	0.1	0.1	0.1	0.1	0.1	0.1	1.5	0.1		0.119	0.362	0.134	0.0394	0.046
Benzo(a)pyrene	0.05	47	0.015	1.5	1	1.5	0.517558	POTENTIALLY SUITABLE FOR USE	0.37	0.23	0.1	0.1	0.1	0.1	0.1	0.1	1.2	0.1		0.103	0.427	0.152	0.0263	0.0422
Benzo(b)fluoranthene	0.05	47	0.0176	2.36	0	7.6	0.701618	POTENTIALLY SUITABLE FOR USE	0.49	0.34	0.1	0.1	0.1	0.1	0.1	0.1	1.3	0.1		0.167	0.625	0.21	0.0442	0.0575
Benzo(ghi)perylene	0.05	47	0.024	0.815	0	64	0.311819	POTENTIALLY SUITABLE FOR USE	0.21	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.73	0.05		0.103	0.341	0.123	0.024	0.0408
Benzo(k)fluoranthene	0.05	47	0.014	1.1	0	12	0.355636	POTENTIALLY SUITABLE FOR USE	0.28	0.16	0.1	0.1	0.1	0.1	0.1	0.1	1	0.1		0.0667	0.24	0.0699	0.0177	0.0261
Chrysene	0.05	47	0.0159	1.86	0	7.7	0.60927	POTENTIALLY SUITABLE FOR USE	0.47	0.32	0.05	0.05	0.05	0.05	0.05	0.05	1.4	0.05		0.116	0.359	0.126	0.0287	0.0481
Dibenz(a,h)anthracene	0.05	47	0.023	0.347	0	1.1	0.12025	POTENTIALLY SUITABLE FOR USE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.023	0.0817	0.0294	0.023	0.023
Fluoranthene	0.05	47	0.0219	4	0	290	1.029184	POTENTIALLY SUITABLE FOR USE	0.59	0.42	0.1	0.1	0.1	0.1	0.1	0.1	2.1	0.1		0.222	0.551	0.3444	0.0517	0.075
Fluorene	0.05	47	0.01	0.449	0	170	0.127284	POTENTIALLY SUITABLE FOR USE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.01	0.01	0.01	0.01	0.01
Indeno(1,2,3,cd)pyrene	0.05	47	0.018	0.783	0	4.3	0.285118	POTENTIALLY SUITABLE FOR USE	0.18	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.53	0.1		0.0724	0.271	0.0977	0.018	0.0267
Naphthalene	0.05	47	0.009	0.394	0	2.2	0.082841	POTENTIALLY SUITABLE FOR USE	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		0.0172	0.0143	0.027	0.0199	0.0441
Phenanthrene	0.05	47	0.015	2.3	0	97	0.50226	POTENTIALLY SUITABLE FOR USE	0.16	0.21	0.1	0.1	0.1	0.1	0.1	0.1	0.51	0.1		0.0805	0.125	0.13	0.0485	0.075
Pyrene	0.05	47	0.0207	3.21	0	620	0.907215	POTENTIALLY SUITABLE FOR USE	0.51	0.33	0.1	0.1	0.1	0.1	0.1	0.1	1.9	0.1		0.181	0.469	0.235	0.0435	0.0594
Asbestos identified	Y/N								N	N	N	N	N	N	N	N	N	N						
FOC (dimensionless)	0.01638	**(mean)**							0.025	0.024	0.007	0.018	0.0069	0.011	0.0085	0.0023	0.014	0.024						
SOM (calculated)	2.82%	**(mean)**							4.31%	4.14%	1.21%	3.10%	1.19%	1.90%	1.47%	0.40%	2.41%	4.14%						
pH (su)	8.2	**(mean)**							8	8	8.2	8.1	8.1	8.1	8.2	8.2	8.3	9.5						

Risk parameter: **Human health - residential with plant uptake (1%SOM)**
Data set: Made Ground
Client: Inverness Terrace Ltd
Site: Rudloe
Job no.: C161303
Lab. report no(s).: 16-017963-1

Assessment of Chemicals of Potential Concern to Human Health

Hydrock

All values in mg/kg unless otherwise stated								Soil Type																
								Location & Depth	WS200	WS202	WS207	WS207	WS208	HP100	HP103	HP107	HP108	HP109	HP110	WS203	WS204	WS205	WS206	WS206
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**US_{95}**	**Result of Significance Test**	**0.1**	**0.1**	**0.1**	**0.4**	**0.3**	**0.1**	**0.3**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.32**
Arsenic	1	48	3.5	30	0	37	17.07592	POTENTIALLY SUITABLE FOR USE	16.1	19.2	10.6	12.5	3.5	12.4	15.9	14.9	15.4	14.4	16.8	11.5	9.95	14.4	18.1	10.2
Beryllium	0.06	48	0.096	2.5	0	73	1.154828	POTENTIALLY SUITABLE FOR USE	0.9	1.2	0.78	0.935	0.096	0.975	0.92	1.48	1	1.04	0.98	0.87	1.11	0.895	1.65	1.02
Boron	0.2	48	0.4	4.1	0	300	1.983386	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Cadmium	0.2	48	0.045	1.55	0	14	0.506497	POTENTIALLY SUITABLE FOR USE	0.22	0.77	0.53	0.54	0.15	0.47	0.213	0.875	0.675	0.668	0.604	0.175	0.234	0.568	1.55	0.48
Chromium (III)	1	47	1.2	40	0	890	24.02091	POTENTIALLY SUITABLE FOR USE	18.2	25.7	15	18.2	1.2	6.55	20.8	18.4	22.2	23	21.4	17.7	11.6	17.6	39.9	17.5
Chromium (VI)	1.2	48	0.6	30.4	1	6.1	4.217797	POTENTIALLY SUITABLE FOR USE	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Copper	1	48	1.4	508	0	2500	75.64335	POTENTIALLY SUITABLE FOR USE	9.6	14.8	9.45	9.99	1.4	16.9	22.2	508	14.4	18.6	36	19.1	12.2	14.9	49.4	13.8
Lead	2	48	2.37	160	0	200	57.5532	POTENTIALLY SUITABLE FOR USE	24.2	22.4	12.5	13.2	2.37	18.2	87.1	84.3	27.8	33.2	29.4	36.3	14.4	25.1	97.2	23.7
Mercury, inorganic	0.3	48	0.14	0.3	0	170	0.274167	POTENTIALLY SUITABLE FOR USE	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Nickel	2	48	0.47	48	0	130	24.3868	POTENTIALLY SUITABLE FOR USE	16.7	32.5	16.2	18.2	0.47	16.2	19.1	24.4	23.5	21	24.2	15.7	13.2	19.5	37	16.8
Selenium	1	48	1	1.4	0	360	1.05803	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1.09	1	1	1	1	1	1	1	1
Vanadium	1	48	3.6	80	0	410	45.91015	POTENTIALLY SUITABLE FOR USE	51	36	25.8	27.9	3.6	26	36.3	34.5	33.8	36.8	30.8	31.9	25.8	28.6	58.2	28.85
Zinc	2	48	16	1100	0	3900	202.1838	POTENTIALLY SUITABLE FOR USE	65	63	42	45	16	61	130	186	112	92.8	75.3	105	33.3	65.3	222	148
Cyanide (free)	1	25	1	1	0	790	1	POTENTIALLY SUITABLE FOR USE																
Phenol (total)	2	25	1	1	0	290	1	POTENTIALLY SUITABLE FOR USE																
Acenaphthene	0.05	47	0.008	0.141	0	220	0.08991	POTENTIALLY SUITABLE FOR USE	0.008	0.008	0.008	0.008	0.008	0.141	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008
Acenaphthylene	0.05	47	0.012	2.78	0	180	0.374749	POTENTIALLY SUITABLE FOR USE	0.057	0.02	0.0325	0.012	0.012	2.78	0.0254	0.0251	0.012	0.012	0.0263	0.0305	0.012	0.015	0.0346	0.012
Anthracene	0.05	47	0.016	2.37	0	2400	0.346637	POTENTIALLY SUITABLE FOR USE	0.188	0.0313	0.0519	0.016	0.016	2.37	0.0513	0.044	0.016	0.016	0.0243	0.0417	0.016	0.09921	0.093	0.016
Benz(a)anthracene	0.05	47	0.014	1.9	0	4.2	0.615456	POTENTIALLY SUITABLE FOR USE	0.986	0.192	0.339	0.014	0.014	1.86	0.164	0.331	0.0339	0.0847	0.107	0.225	0.0322	1.46	0.449	0.0381
Benzo(a)pyrene	0.05	47	0.015	1.5	1	1.5	0.517558	POTENTIALLY SUITABLE FOR USE	0.881	0.194	0.361	0.015	0.172	1.28	0.159	0.384	0.0282	0.0733	0.104	0.281	0.0486	1.1	0.521	0.0414
Benzo(b)fluoranthene	0.05	47	0.0176	2.36	0	7.6	0.701618	POTENTIALLY SUITABLE FOR USE	1.04	0.253	0.538	0.0225	0.0176	1.97	0.184	0.574	0.0411	0.121	0.129	0.382	0.0654	2.36	0.691	0.0603
Benzo(ghi)perylene	0.05	47	0.024	0.815	0	64	0.311819	POTENTIALLY SUITABLE FOR USE	0.533	0.133	0.296	0.024	0.0367	0.735	0.101	0.316	0.024	0.0703	0.0749	0.222	0.0364	0.815	0.385	0.0385
Benzo(k)fluoranthene	0.05	47	0.014	1.1	0	12	0.355636	POTENTIALLY SUITABLE FOR USE	0.435	0.0928	0.203	0.014	0.014	0.663	0.0744	0.187	0.014	0.0493	0.0593	0.133	0.0276	0.951	0.239	0.0191
Chrysene	0.05	47	0.0159	1.86	0	7.7	0.60927	POTENTIALLY SUITABLE FOR USE	0.807	0.151	0.37	0.0159	0.0168	1.86	0.173	0.321	0.021	0.086	0.0904	0.203	0.0326	1.57	0.39	0.0283
Dibenz(a,h)anthracene	0.05	47	0.023	0.347	0	1.1	0.12025	POTENTIALLY SUITABLE FOR USE	0.143	0.0323	0.0643	0.023	0.023	0.229	0.023	0.0774	0.023	0.023	0.023	0.056	0.023	0.347	0.0985	0.023
Fluoranthene	0.05	47	0.0219	4	0	290	1.029184	POTENTIALLY SUITABLE FOR USE	1.85	0.328	0.614	0.0219	0.0363	2.4	0.37	0.533	0.0438	0.141	0.178	0.404	0.047	1.93	0.72	0.0511
Fluorene	0.05	47	0.01	0.449	0	170	0.127284	POTENTIALLY SUITABLE FOR USE	0.01	0.01	0.01	0.01	0.01	0.449	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0248	0.1
Indeno(1,2,3,cd)pyrene	0.05	47	0.018	0.783	0	4.3	0.285118	POTENTIALLY SUITABLE FOR USE	0.488	0.11	0.226	0.018	0.018	0.634	0.0841	0.246	0.018	0.05	0.0566	0.176	0.0287	0.783	0.308	0.027
Naphthalene	0.05	47	0.009	0.394	0	2.2	0.082841	POTENTIALLY SUITABLE FOR USE	0.036	0.148	0.029	0.009	0.0173	0.394	0.0149	0.0265	0.009	0.009	0.009	0.011	0.009	0.0157	0.0595	0.0149
Phenanthrene	0.05	47	0.015	2.3	0	97	0.50226	POTENTIALLY SUITABLE FOR USE	0.702	0.101	0.186	0.015	0.0437	1.6	0.177	0.176	0.0225	0.057	0.0646	0.106	0.0212	0.639	0.318	0.0251
Pyrene	0.05	47	0.0207	3.21	0	620	0.907215	POTENTIALLY SUITABLE FOR USE	1.33	0.28	0.512	0.0207	0.0314	3.21	0.305	0.445	0.0345	0.122	0.145	0.349	0.0418	1.33	0.614	0.0476
Asbestos identified	Y/N																							
FOC (dimensionless)	0.01638	**(mean)**																						
SOM (calculated)	2.82%	**(mean)**																						
pH (su)	8.2	**(mean)**																						

Risk parameter: **Human health - residential with plant uptake (1%SOM)**
Data set: Made Ground
Client: Inverness Terrace Ltd
Site: Rudloe
Job no.: C161303
Lab. report no(s).: 16-017963-1

Assessment of Chemicals of Potential Concern to Human Health

Hydrock

All values in mg/kg unless otherwise stated								Soil Type	
								Location & Depth	HP101
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**US_{95}**	**Result of Significance Test**	**0.1**
Arsenic	1	48	3.5	30	0	37	17.07592	POTENTIALLY SUITABLE FOR USE	13.7
Beryllium	0.06	48	0.096	2.5	0	73	1.154828	POTENTIALLY SUITABLE FOR USE	0.78
Boron	0.2	48	0.4	4.1	0	300	1.983386	POTENTIALLY SUITABLE FOR USE	1
Cadmium	0.2	48	0.045	1.55	0	14	0.506497	POTENTIALLY SUITABLE FOR USE	0.22
Chromium (III)	1	47	1.2	40	0	890	24.02091	POTENTIALLY SUITABLE FOR USE	15.6
Chromium (VI)	1.2	48	0.6	30.4	1	6.1	4.217797	POTENTIALLY SUITABLE FOR USE	0.6
Copper	1	48	1.4	508	0	2500	75.64335	POTENTIALLY SUITABLE FOR USE	11.2
Lead	2	48	2.37	160	0	200	57.5532	POTENTIALLY SUITABLE FOR USE	24.7
Mercury, inorganic	0.3	48	0.14	0.3	0	170	0.274167	POTENTIALLY SUITABLE FOR USE	0.14
Nickel	2	48	0.47	48	0	130	24.3868	POTENTIALLY SUITABLE FOR USE	15.2
Selenium	1	48	1	1.4	0	360	1.05803	POTENTIALLY SUITABLE FOR USE	1
Vanadium	1	48	3.6	80	0	410	45.91015	POTENTIALLY SUITABLE FOR USE	38.6
Zinc	2	48	16	1100	0	3900	202.1838	POTENTIALLY SUITABLE FOR USE	78.6
Cyanide (free)	1	25	1	1	0	790	1	POTENTIALLY SUITABLE FOR USE	
Phenol (total)	2	25	1	1	0	290	1	POTENTIALLY SUITABLE FOR USE	
Acenaphthene	0.05	47	0.008	0.141	0	220	0.08991	POTENTIALLY SUITABLE FOR USE	0.008
Acenaphthylene	0.05	47	0.012	2.78	0	180	0.374749	POTENTIALLY SUITABLE FOR USE	0.012
Anthracene	0.05	47	0.016	2.37	0	2400	0.346637	POTENTIALLY SUITABLE FOR USE	0.0213
Benz(a)anthracene	0.05	47	0.014	1.9	0	4.2	0.615456	POTENTIALLY SUITABLE FOR USE	0.0461
Benzo(a)pyrene	0.05	47	0.015	1.5	1	1.5	0.517558	POTENTIALLY SUITABLE FOR USE	0.0407
Benzo(b)fluoranthene	0.05	47	0.0176	2.36	0	7.6	0.701618	POTENTIALLY SUITABLE FOR USE	0.0622
Benzo(ghi)perylene	0.05	47	0.024	0.815	0	64	0.311819	POTENTIALLY SUITABLE FOR USE	0.0313
Benzo(k)fluoranthene	0.05	47	0.014	1.1	0	12	0.355636	POTENTIALLY SUITABLE FOR USE	0.0294
Chrysene	0.05	47	0.0159	1.86	0	7.7	0.60927	POTENTIALLY SUITABLE FOR USE	0.0453
Dibenz(a,h)anthracene	0.05	47	0.023	0.347	0	1.1	0.12025	POTENTIALLY SUITABLE FOR USE	0.023
Fluoranthene	0.05	47	0.0219	4	0	290	1.029184	POTENTIALLY SUITABLE FOR USE	0.0621
Fluorene	0.05	47	0.01	0.449	0	170	0.127284	POTENTIALLY SUITABLE FOR USE	0.01
Indeno(1,2,3,cd)pyrene	0.05	47	0.018	0.783	0	4.3	0.285118	POTENTIALLY SUITABLE FOR USE	0.0301
Naphthalene	0.05	47	0.009	0.394	0	2.2	0.082841	POTENTIALLY SUITABLE FOR USE	0.009
Phenanthrene	0.05	47	0.015	2.3	0	97	0.50226	POTENTIALLY SUITABLE FOR USE	0.015
Pyrene	0.05	47	0.0207	3.21	0	620	0.907215	POTENTIALLY SUITABLE FOR USE	0.05335
Asbestos identified	Y/N								
FOC (dimensionless)	0.01638	**(mean)**							
SOM (calculated)	2.82%	**(mean)**							
pH (su)	8.2	**(mean)**							

Risk parameter: **Human health - residential with plant uptake (1%SOM)**
Data set: Made Ground
Client: Inverness Terrace Ltd
Site: Rudloe
Job no.: C161303
Lab. report no(s).: 16-017963-1

Assessment of Chemicals of Potential Concern to Plant Life

Hydrock

All values in mg/kg unless otherwise stated								Soil Type	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
								Location & Depth	TP01	TP02	TP03	TP06	TP07	TP09	TP10	TP11	TP13	TP15	TP16	TP18	TP19	TP20	TP21
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**US_{95}**	**Result of Significance Test**	**0.2**	**0.2**	**0.2**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.2**	**0.5**	**0.5**	**0.5**	**0.5**	**0.2**	**0.2**
Arsenic	1	48	3.5	30	0	250	17.07592	POTENTIALLY SUITABLE FOR USE	16	17	13	14	18	13	21	11	21	9	11	13	11	30	16
Boron	0.2	48	0.4	4.1	2	3	1.983386	POTENTIALLY SUITABLE FOR USE	2.6	2.4	2.5	2	1	2.9	2.4	1	3.8	2	1.5	2.4	1.6	2	1.2
Chromium (III)	1	47	1.2	40	0	400	24.02091	POTENTIALLY SUITABLE FOR USE	18	25	20	32	18	19	30	14	19	16	18	28	16	40	20
Chromium (VI)	1.2	48	0.6	30.4	1	25	4.217797	POTENTIALLY SUITABLE FOR USE	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Copper	1	48	1.4	508	1	135	75.64335	POTENTIALLY SUITABLE FOR USE	16	19	13	27	31	17	35	14	37	22	6	43	14	58	36
Nickel	2	48	0.47	48	0	75	24.3868	POTENTIALLY SUITABLE FOR USE	19	18	16	24	24	21	20	15	48	14	15	27	15	22	19
Zinc	2	48	16	1100	1	300	202.1838	POTENTIALLY SUITABLE FOR USE	79	54	54	110	120	46	160	41	120	60	51	1100	94	120	230
	Mean																						
pH (su)	8.2								7.9	8.1	8	8.8	8	8.1	7.9	7.9	7.9	8.3	8.2	8.5	9	7.9	7.9

Risk parameter: Plant life pH 7
Data set: Made Ground
Client: Inverness Terrace Ltd
Site: Rudloe
Job no.: C161303
Lab. report no(s).: 16-017963-1

Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.
Values in red are equal to, or greater than, the generic assessment criterion (GAC).
MG denotes Made Ground
NAT denotes natural ground

Assessment of Chemicals of Potential Concern to Plant Life

Hydrock

All values in mg/kg unless otherwise stated								Soil Type	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG						
								Location & Depth	TP22	TP24	TP24	TP25	TP26	TP27	TP28	TP29	TP30	TP05	HP102	HP104	HP105	HP106	HP111	DUP111
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**US_{95}**	**Result of Significance Test**	**0.2**	**0.2**	**0.5**	**0.2**	**0.2**	**0.2**	**0.25**	**0.5**	**0.2**	**0.2**	**0.1**	**0.3**	**0.1**	**0.1**	**0.1**	**0.1**
Arsenic	1	48	3.5	30	0	250	17.07592	POTENTIALLY SUITABLE FOR USE	15	15	13	7.9	13	17	11	8.6	14	17	11.1	26	14.5	14.6	11.5	13.1
Boron	0.2	48	0.4	4.1	2	3	1.983386	POTENTIALLY SUITABLE FOR USE	1.1	1.9	1.7	4.1	1.9	1.2	0.4	1.5	1.7	2.1	1	1	1	1	1	1
Chromium (III)	1	47	1.2	40	0	400	24.02091	POTENTIALLY SUITABLE FOR USE	19	18	18	17	25	16	12	17	15	30	-1.6	19.2	10.9	16.7	18	22.8
Chromium (VI)	1.2	48	0.6	30.4	1	25	4.217797	POTENTIALLY SUITABLE FOR USE	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	30.4	0.6	0.6	0.6	0.6	0.6
Copper	1	48	1.4	508	1	135	75.64335	POTENTIALLY SUITABLE FOR USE	26	15	14	17	13	18	12	13	47	16	14.4	39	9.9	12.2	19.4	18.6
Nickel	2	48	0.47	48	0	75	24.3868	POTENTIALLY SUITABLE FOR USE	20	21	22	12	23	16	17	18	18	22	18.6	25.3	13	17.2	22.7	27.3
Zinc	2	48	16	1100	1	300	202.1838	POTENTIALLY SUITABLE FOR USE	120	87	44	33	57	68	59	31	120	97	70	69	56	65	55	45
	Mean																							
pH (su)	8.2								8	8	8.2	8.1	8.1	8.1	8.2	8.2	8.3	9.5						

Risk parameter: **Plant life pH 7**
Data set: Made Ground
Client: Inverness Terrace Ltd
Site: Rudloe
Job no.: C161303
Lab. report no(s).: 16-017963-1

Assessment of Chemicals of Potential Concern to Plant Life

Hydrock

All values in mg/kg unless otherwise stated								Soil Type																	
								Location & Depth	WS200	WS202	WS207	WS207	WS208	HP100	HP103	HP107	HP108	HP109	HP110	WS203	WS204	WS205	WS206	WS206
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**US_{95}**	**Result of Significance Test**	**0.1**	**0.1**	**0.1**	**0.4**	**0.3**	**0.1**	**0.3**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.32**
Arsenic	1	48	3.5	30	0	250	17.07592	POTENTIALLY SUITABLE FOR USE	16.1	19.2	10.6	12.5	3.5	12.4	15.9	14.9	15.4	14.4	16.8	11.5	9.95	14.4	18.1	10.2
Boron	0.2	48	0.4	4.1	2	3	1.983386	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Chromium (III)	1	47	1.2	40	0	400	24.02091	POTENTIALLY SUITABLE FOR USE	18.2	25.7	15	18.2	1.2	6.55	20.8	18.4	22.2	23	21.4	17.7	11.6	17.6	39.9	17.5
Chromium (VI)	1.2	48	0.6	30.4	1	25	4.217797	POTENTIALLY SUITABLE FOR USE	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Copper	1	48	1.4	508	1	135	75.64335	POTENTIALLY SUITABLE FOR USE	9.6	14.8	9.45	9.99	1.4	16.9	22.2	508	14.4	18.6	36	19.1	12.2	14.9	49.4	13.8
Nickel	2	48	0.47	48	0	75	24.3868	POTENTIALLY SUITABLE FOR USE	16.7	32.5	16.2	18.2	0.47	16.2	19.1	24.4	23.5	21	24.2	15.7	13.2	19.5	37	16.8
Zinc	2	48	16	1100	1	300	202.1838	POTENTIALLY SUITABLE FOR USE	65	63	42	45	16	61	130	186	112	92.8	75.3	105	33.3	65.3	222	148
	Mean																								
pH (su)	8.2																								

Risk parameter: **Plant life pH 7**
Data set: Made Ground
Client: Inverness Terrace Ltd
Site: Rudloe
Job no.: C161303
Lab. report no(s).: 16-017963-1

Assessment of Chemicals of Potential Concern to Plant Life

Hydrock

All values in mg/kg unless otherwise stated								Soil Type	
								Location & Depth	HP101
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**US_{95}**	**Result of Significance Test**	**0.1**
Arsenic	1	48	3.5	30	0	250	17.07592	POTENTIALLY SUITABLE FOR USE	13.7
Boron	0.2	48	0.4	4.1	2	3	1.983386	POTENTIALLY SUITABLE FOR USE	1
Chromium (III)	1	47	1.2	40	0	400	24.02091	POTENTIALLY SUITABLE FOR USE	15.6
Chromium (VI)	1.2	48	0.6	30.4	1	25	4.217797	POTENTIALLY SUITABLE FOR USE	0.6
Copper	1	48	1.4	508	1	135	75.64335	POTENTIALLY SUITABLE FOR USE	11.2
Nickel	2	48	0.47	48	0	75	24.3868	POTENTIALLY SUITABLE FOR USE	15.2
Zinc	2	48	16	1100	1	300	202.1838	POTENTIALLY SUITABLE FOR USE	78.6
	Mean								
pH (su)	8.2								

Risk parameter: **Plant life pH 7**
Data set: Made Ground
Client: Inverness Terrace Ltd
Site: Rudloe
Job no.: C161303
Lab. report no(s).: 16-017963-1

Assessment of Chemicals of Potential Concern to Human Health

Hydrock

							Soil Type	FMDST	FMDST										
	All values in mg/kg unless otherwise stated						Location & Depth	TP08	TP17										
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**		**0.6**	**0.4**										
Arsenic	1	2	7.4	13	0	37		7.4	13										
Beryllium	0.06	2	0.73	0.98	0	73		0.98	0.73										
Boron	0.2	2	1.1	2.1	0	300		2.1	1.1										
Cadmium	0.2	2	0.2	0.2	0	14		0.2	0.2										
Chromium (III)	1	2	18	25	0	890		25	18										
Chromium (VI)	1.2	2	1.2	1.2	0	6.1		1.2	1.2										
Copper	1	2	6.9	18	0	2500		18	6.9										
Lead	2	2	17	30	0	200		17	30										
Mercury, inorganic	0.3	2	0.3	0.3	0	170		0.3	0.3										
Nickel	2	2	18	20	0	130		20	18										
Selenium	1	2	1	1	0	360		1	1										
Vanadium	1	2	33	36	0	410		36	33										
Zinc	2	2	49	75	0	3900		49	75										
Cyanide (free)	1	2	1	1	0	790		1	1										
Phenol (total)	2	2	1	2	0	560		2	1										
Acenaphthene	0.05	2	0.1	1	0	520		1	0.1										
Acenaphthylene	0.05	2	0.1	1	0	430		1	0.1										
Anthracene	0.05	2	0.1	1	0	5500		1	0.1										
Benz(a)anthracene	0.05	2	0.1	0.38	0	6.7		0.38	0.1										
Benzo(a)pyrene	0.05	2	0.1	0.35	0	1.5		0.35	0.1										
Benzo(b)fluoranthene	0.05	2	0.1	0.32	0	9.4		0.32	0.1										
Benzo(ghi)perylene	0.05	2	0.05	0.05	0	69		0.05	0.05										
Benzo(k)fluoranthene	0.05	2	0.1	0.23	0	14		0.23	0.1										
Chrysene	0.05	2	0.05	0.36	0	11		0.36	0.05										
Dibenz(a,h)anthracene	0.05	2	0.1	0.1	0	1.3		0.1	0.1										
Fluoranthene	0.05	2	0.1	0.6	0	560		0.6	0.1										
Fluorene	0.05	2	0.1	0.1	0	410		0.1	0.1										
Indeno(1,2,3,cd)pyrene	0.05	2	0.1	0.1	0	5.5		0.1	0.1										
Naphthalene	0.05	2	0.05	0.05	0	5.2		0.05	0.05										
Phenanthrene	0.05	2	0.1	0.1	0	220		0.1	0.1										
Pyrene	0.05	2	0.1	0.54	0	1200		0.54	0.1										
Asbestos identified	Y/N							N	N										
FOC (dimensionless)	0.0093	**(mean)**						0.0095	0.0091										
SOM (calculated)	1.60%	**(mean)**						1.64%	1.57%										
pH (su)	8.1	**(mean)**						8.1	8										

Risk parameter: Human health - residential with plant uptake (2.5%SOM)
Data set: Forest Marble Formation
Client: Inverness Terrace Ltd
Site: Rudloe
Job no.: C161303
Lab. report no(s).: 16-017963-1

Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.
Values in red are equal to, or greater than, the generic assessment criterion (GAC) or +ve asbestos ID.
MG denotes Made Ground
NAT denotes natural ground

Assessment of Chemicals of Potential Concern to Plant Life

Hydrock

						Soil Type	FMDST	FMDST										
All values in mg/kg unless otherwise stated						Location & Depth	TP08	TP17										
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**0.6**	**0.4**										
Arsenic	1	2	7.4	13	0	250	7.4	13										
Boron	0.2	2	1.1	2.1	0	3	2.1	1.1										
Chromium (III)	1	2	18	25	0	400	25	18										
Chromium (VI)	1.2	2	1.2	1.2	0	25	1.2	1.2										
Copper	1	2	6.9	18	0	135	18	6.9										
Nickel	2	2	18	20	0	75	20	18										
Zinc	2	2	49	75	0	300	49	75										
	Mean																	
pH (su)	8.1						8.1	8										

Risk parameter: Plant life pH 7
Data set: Forest Marble Formation
Client: Inverness Terrace Ltd
Site: Rudloe
Job no.: C161303
Lab. report no(s).: 16-017963-1

Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.
Values in red are equal to, or greater than, the generic assessment criterion (GAC).
MG denotes Made Ground
NAT denotes natural ground

Assessment of Chemicals of Potential Concern to Human Health

Hydrock

							Soil Type	MG	MG											
All values in mg/kg unless otherwise stated							Location & Depth	TP23	TP23											
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**		**0.2**	**0.6**											
Arsenic	1	2	9.6	15	0	37		9.6	15											
Beryllium	0.06	2	0.59	0.91	0	73		0.59	0.91											
Boron	0.2	2	0.2	1.2	0	300		0.2	1.2											
Cadmium	0.2	2	0.2	0.2	0	14		0.2	0.2											
Chromium (III)	1	2	18	19	0	890		19	18											
Chromium (VI)	1.2	2	1.2	1.2	0	6.1		1.2	1.2											
Copper	1	2	13	18	0	2500		13	18											
Lead	2	2	10	29	0	200		10	29											
Mercury, inorganic	0.3	2	0.3	0.3	0	170		0.3	0.3											
Nickel	2	2	16	21	0	130		16	21											
Selenium	1	2	1	1	0	360		1	1											
Vanadium	1	2	23	30	0	410		23	30											
Zinc	2	2	45	84	0	3900		45	84											
Cyanide (free)	1	2	1	1	0	790		1	1											
Phenol (total)	2	2	1	1	0	560		1	1											
Acenaphthene	0.05	2	0.51	2.2	0	520		2.2	0.51											
Acenaphthylene	0.05	2	0.1	0.1	0	430		0.1	0.1											
Anthracene	0.05	2	1.3	4.9	0	5500		4.9	1.3											
Benz(a)anthracene	0.05	2	9.2	13	2	6.7		13	9.2											
Benzo(a)pyrene	0.05	2	6.8	9.1	2	1.5		9.1	6.8											
Benzo(b)fluoranthene	0.05	2	10	11	2	9.4		11	10											
Benzo(ghi)perylene	0.05	2	3.6	4	0	69		4	3.6											
Benzo(k)fluoranthene	0.05	2	4.5	5.9	0	14		5.9	4.5											
Chrysene	0.05	2	7.2	8.4	0	11		8.4	7.2											
Dibenz(a,h)anthracene	0.05	2	1	1.1	0	1.3		1.1	1											
Fluoranthene	0.05	2	14	24	0	560		24	14											
Fluorene	0.05	2	0.37	2.3	0	410		2.3	0.37											
Indeno(1,2,3,cd)pyrene	0.05	2	3.2	4.4	0	5.5		4.4	3.2											
Naphthalene	0.05	2	0.25	1.8	0	5.2		1.8	0.25											
Phenanthrene	0.05	2	7	21	0	220		21	7											
Pyrene	0.05	2	11	19	0	1200		19	11											
Asbestos identified	Y/N							N	N											
FOC (dimensionless)	0.0124	**(mean)**						0.0078	0.017											
SOM (calculated)	2.14%	**(mean)**						1.34%	2.93%											
pH (su)	8.2	**(mean)**						8.3	8.1											

Risk parameter: **Human health - residential with plant uptake (2.5%SOM)**
Data set: Made Ground in built up area
Client: Inverness Terrace Ltd
Site: Rudloe
Job no.: C161303
Lab. report no(s).: 16-017963-1

Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.
Values in red are equal to, or greater than, the generic assessment criterion (GAC) or +ve asbestos ID.
MG denotes Made Ground
NAT denotes natural ground

Assessment of Chemicals of Potential Concern to Human Health

Hydrock

All values in mg/kg unless otherwise stated

Chemical of Potential Concern	Lab. RL	No. Samples	Min. Value	Max. Value	No. Samples > or = GAC	GAC	US_{95}	Result of Significance Test
Aliphatics EC5-EC6	0.01	31	0.01	0.1	0	42	0.064574	POTENTIALLY SUITABLE FOR USE
Aliphatics >EC6-EC8	0.01	31	0.01	0.1	0	100	0.064804	POTENTIALLY SUITABLE FOR USE
Aliphatics >EC8-EC10	0.01	31	0.01	0.1	0	27	0.066548	POTENTIALLY SUITABLE FOR USE
Aliphatics >EC10-EC12	0.01	31	0.01	0.114	0	48	0.071102	POTENTIALLY SUITABLE FOR USE
Aliphatics >EC12-EC16	0.1	31	0.1	18.7	0	24	10.68107	POTENTIALLY SUITABLE FOR USE
Aliphatics >EC16-EC35	0.1	31	0.1	408	0	65000	86.41039	POTENTIALLY SUITABLE FOR USE
Aliphatics >EC35-EC44	0.1	31	0.1	190	0	65000	46.45239	POTENTIALLY SUITABLE FOR USE
Aromatics EC5-EC7	0.01	31	0.01	390	1	73	69.13041	POTENTIALLY SUITABLE FOR USE
Aromatics >EC7-EC8	0.01	31	0.01	0.1	0	130	0.064592	POTENTIALLY SUITABLE FOR USE
Aromatics >EC8-EC10	0.01	31	0.01	0.1	0	35	0.06524	POTENTIALLY SUITABLE FOR USE
Aromatics >EC10-EC12	0.01	31	0.01	0.1	0	75	0.066035	POTENTIALLY SUITABLE FOR USE
Aromatics >EC12-EC16	0.1	31	0.1	13.5	0	150	7.273126	POTENTIALLY SUITABLE FOR USE
Aromatics >EC16-EC21	0.1	31	0.1	21.9	0	260	8.478339	POTENTIALLY SUITABLE FOR USE
Aromatics >EC21-EC35	0.1	31	2.16	129	0	1100	49.81479	POTENTIALLY SUITABLE FOR USE
Aromatics >EC35-EC44	0.1	31	0.32	260	0	1100	59.75282	POTENTIALLY SUITABLE FOR USE

Soil Type	Location & Depth																																			
MG	TP01	0.2	MG	TP07	0.5	MG	TP16	0.5	MG	TP18	0.5	MG	TP18	1	MG	TP28	0.25	MG	TP29	0.5	MG	TP05	0.2	MG	HP102	0.1	MG	HP104	0.3	MG	HP105	0.1	MG	HP106	0.1	MG	HP111	0.1
0.064804			0.1			0.1			0.1			0.1			0.1			0.1			0.1			0.01			0.01			0.01			0.01			0.01		
0.066548			0.1			0.1			0.1			0.1			0.1			0.1			0.1			0.01			0.01			0.01			0.01			0.01		
0.071102			0.1			0.1			0.1			0.1			0.1			0.1			0.1			0.01			0.01			0.01			0.01			0.01		
10.68107			1			1			1			1			1			1			1			18.5			0.2			0.1			18.7			15.7		
86.41039			2			2			2			2			2			2			2			6.92			8.74			191			3.15			408		
46.45239			10			10			10			10			190			10			10			0.1			2.91			89.1			0.108			91		
69.13041			8.4			8.4			8.4			8.4			390			8.4			8.4			0.01			0.01			0.01			0.01			0.01		
0.064592			0.1			0.1			0.1			0.1			0.1			0.1			0.1			0.01			0.01			0.01			0.01			0.01		
0.06524			0.1			0.1			0.1			0.1			0.1			0.1			0.1			0.01			0.01			0.01			0.01			0.01		
0.066035			0.1			0.1			0.1			0.1			0.1			0.1			0.1			0.01			0.01			0.01			0.01			0.01		
7.273126			1			1			1			1			1			1			1			6.56			6.35			5.07			13.5			7.72		
8.478339			2			2			2			2			2			2			2			3.39			3.45			5.36			11.4			16.2		
49.81479			10			10			10			10			10			10			10			19.2			14.5			82.7			21.4			129		
59.75282			10			10			10			10			260			10			10			32			11.5			12			58			12.5			43.4		

Soil Type	Location & Depth																																			
MG	DUP111	0.1	MG	WS200	0.1	MG	WS202	0.1	MG	WS207	0.1	MG	WS207	0.4	MG	WS208	0.3	MG	HP100	0.1	MG	HP103	0.3	MG	HP107	0.1	MG	HP108	0.1	MG	HP109	0.1	MG	HP110	0.1	MG	WS203	0.1
0.064804		0.1		0.0132		0.01			0.01			0.01			0.01			0.01		0.0187	0.01		0.01		0.01			0.01			0.01			0.01			0.01		
0.066548		0.1		0.0624		0.01			0.01			0.01			0.01			0.01		0.0165	0.01		0.01		0.01			0.01			0.01			0.01			0.0153		
0.071102		0.1		0.114		0.01			0.01			0.01			0.01			0.01		0.0209	0.01		0.01		0.01			0.01			0.01			0.01			0.0519		
10.68107		1		11.6		3.28			4.9			6.65			0.21			7.21		15.2			17.9		12.8			8.18			0.295			1.64			0.1		
86.41039		40		7.869		2.23			12.5			13.2			3.02			17.7		4.26			9.84		5.42			2.6			0.1			0.291			3.74		
46.45239		4.5		0.1		0.334			1.23			1.79			7.63			10.1		7.44			1.54		0.766			0.29			0.1			0.1			1.49		
69.13041		0.01		0.01		0.01			0.01			0.01			0.01			0.01		0.01			0.01		0.01			0.01			0.01			0.01			0.01		
0.064592		0.01		0.01		0.01			0.01			0.01			0.01			0.011		0.01			0.01		0.01			0.01			0.01			0.01			0.01		
0.06524		0.01		0.0264		0.01			0.01			0.01			0.01			0.023		0.01			0.01		0.01			0.01			0.01			0.01			0.0118		
0.066035		0.01		0.0408		0.01			0.01			0.01			0.01			0.0132		0.01			0.01		0.01			0.01			0.01			0.01			0.0342		
7.273126		0.1		5.08		0.695			7.09			0.1			0.705			8.03		5.41			9.61		7.744			7.18			5.81			12.6			5.16		
8.478339		2.58		3.53		0.787			6.05			0.1			0.302			21.9		3.65			11.5		5.02			3.76			4.56			4.27			3.05		
49.81479		18		16.5		8.84			20.4			2.16			23.3			61.2		21.9			53.9		15			25.1			20.3			29.7			14		
59.75282		10		5.23		5.36			5.36			6.38			0.32			47.9		16.8			18.3		11.5			10.4			8.32			19.6			17.2		

Soil Type	Location & Depth																																			
MG	WS205	0.1	MG	WS206	0.32	MG	HP101	0.1																														
0.064804			0.01			0.01																																
0.066548			0.01			0.01																																
0.071102			0.01			0.01																																
10.68107			1.56		0.1		11.4																																
86.41039			0.23		0.1		3.2																																
46.45239			0.521		1.78		7.46																																
69.13041			0.01		0.01		0.01																																
0.064592			0.01		0.01		0.01																																
0.06524			0.01		0.01		0.01																																
0.066035			0.01		0.01		0.01																																
7.273126			4.93		2.41		0.994		4.53																														
8.478339			9.55		5.39		1.19		3.66																														
49.81479			14		86.2		56.1		22.1		15.5																												
59.75282			6.71		29.5		24.9		6.23		11																												

ADDITIVITY CHECK

HAZARD QUOTIENTS FOR EACH FRACTION

Aliphatics EC5-EC6	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aliphatics >EC6-EC8	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aliphatics >EC8-EC10	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aliphatics >EC10-EC12	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aliphatics >EC12-EC16	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.771	0.008	0.004	0.779	0.654	0.198	0.483	0.137	0.204	0.277	0.009	0.300	0.633	0.746	0.533	0.341	0.012	0.068	0.004	0.341	0.065	0.004	0.475					
Aliphatics >EC16-EC35	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.006	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aliphatics >EC35-EC44	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aromatics EC5-EC7	0.115	0.115	0.115	0.115	5.342	0.115	0.115	0.115	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aromatics >EC7-EC8	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aromatics >EC8-EC10	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aromatics >EC10-EC12	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aromatics >EC12-EC16	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.044	0.042	0.034	0.090	0.051	0.001	0.034	0.005	0.047	0.001	0.005	0.054	0.036	0.064	0.052	0.048	0.039	0.084	0.034	0.033	0.016	0.007	0.030					
Aromatics >EC16-EC21	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.013	0.013	0.021	0.044	0.062	0.010	0.014	0.003	0.023	0.000	0.001	0.084	0.014	0.044	0.019	0.014	0.018	0.016	0.012	0.037	0.021	0.005	0.014					
Aromatics >EC21-EC35	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.017	0.013	0.075	0.019	0.117	0.016	0.015	0.008	0.019	0.002	0.021	0.056	0.020	0.049	0.014	0.023	0.018	0.027	0.013	0.078	0.051	0.020	0.014					
Aromatics >EC35-EC44	0.009	0.009	0.009	0.009	0.236	0.009	0.009	0.029	0.010	0.011	0.053	0.011	0.039	0.005	0.005	0.005	0.006	0.000	0.044	0.015	0.017	0.010	0.009	0.008	0.018	0.016	0.006	0.027	0.023	0.006	0.010					
Hazard Index for all>C8-C16	**0.047**	**0.047**	**0.047**	**0.047**	**0.047**	**0.047**	**0.047**	**0.047**	**0.771**	**0.009**	**0.005**	**0.780**	**0.655**	**0.199**	**0.488**	**0.137**	**0.205**	**0.278**	**0.009**	**0.301**	**0.634**	**0.746**	**0.534**	**0.341**	**0.013**	**0.070**	**0.005**	**0.341**	**0.066**	**0.005**	**0.476**					
Hazard Index for aro>C8-C16	**0.011**	**0.011**	**0.011**	**0.011**	**0.011**	**0.011**	**0.011**	**0.011**	**0.044**	**0.043**	**0.034**	**0.090**	**0.052**	**0.001**	**0.035**	**0.005**	**0.048**	**0.001**	**0.005**	**0.054**	**0.036**	**0.064**	**0.052**	**0.048**	**0.039**	**0.085**	**0.035**	**0.033**	**0.016**	**0.007**	**0.031**					
Hazard Index for aro>C16-C35	**0.017**	**0.017**	**0.017**	**0.017**	**0.017**	**0.017**	**0.017**	**0.017**	**0.030**	**0.026**	**0.096**	**0.063**	**0.180**	**0.026**	**0.029**	**0.011**	**0.042**	**0.002**	**0.022**	**0.140**	**0.034**	**0.093**	**0.033**	**0.037**	**0.036**	**0.043**	**0.024**	**0.115**	**0.072**	**0.025**	**0.028**					

Risk parameter: Human health - residential with plant uptake (1%SOM)
Data set: Made Ground
Client: Inverness Terrace Ltd
Site: Rudloe
Job no.: C161303
Lab. report no(s).: 16-017963-1

Considered additive

Considered additive

Considered additive

Legend:
Hazard Index table - HI or HQ greater than 1 highlighted with yellow shading.
Main table values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.
Main table alues in red are equal to, or greater than, the generic assessment criterion (GAC).
MG denotes Made Ground
NAT denotes natural ground

Scenario D - Summary of Remedial Targets Methodology

Hydrock

RTM Level 1 - Soil Zone Assessment - leachate samples

Water body receptor(s): Groundwater and surface water
Secondary receptor(s): Human health (abstraction) and aquatic ecosystem
Data set: Leachate
Client: Inverness Terrace Limited
Site: Rudloe
Job no: C161303

2008/105/EC Annex II: [P]= priority substance, [PH] = priority hazardous substances.

Chemicals of Potential Concern (concentrations in µg/l)	Summary of Sample Data					Value Being Compared to Target = Maximum Value	Water Quality Target (Exceeded if Red Text)		No. Samples Exceeding Water Quality Target		Notes
	No. of Samples	Limit of Detection	Minimum Value	Maximum Value	95-%ile Value		DWS	Inland Waters EQS	DWS	Inland Waters EQS	EQS compared to dissolved metals as an initial screen, with no adjustment for bioavailability or ABC.
Hardness as mg/l CaCO3	-	-	300	-	-	-		-			Used with some EQS.
Ag (dissolved)	8	1	1	1	1	1	n/a	0.05	0	8	EQS is lower than detection limit
Al (dissolved)	8	12	14	620	592	620	200	n/a	3	0	
As (dissolved)	8	1.1	1.1	4.6	3.375	4.6	10	50	0	0	
B (dissolved)	8	10	10	34	28.75	34	1000	2000	0	0	
Ba (dissolved)	8	0.05	3.5	94	82.8	94	700	n/a	0	0	
Cd (dissolved) [PH]	8	0.08	0.08	0.08	0.08	0.08	5	0.25	0	0	
Co (dissolved)	8	0.3	0.3	0.6	0.565	0.6	n/a	3	0	0	
Cr (VI) (dissolved)	8	5	5	29	20.6	29	n/a	3.4	0	8	
Cr (III) (dissolved)	8	1	1	1.2	1.13	1.2	n/a	4.7	0	0	
Cr (total) (dissolved)	8	0.4	0.4	26	17.32	26	50	n/a	0	0	
Cu (dissolved)	8	0.7	1.1	3.2	3.13	3.2	2000	1	0	8	EQS is lower than detection limit
Fe (dissolved)	8	4	12	660	555	660	200	1000	3	0	
Hg (dissolved) [PH]	8	0.01	0.01	0.01	0.01	0.01	1	0.07	0	0	
Mn (dissolved)	8	0.06	0.74	9.3	7.935	9.3	50	123	0	0	
Mo (dissolved)	8	0.4	0.9	4.2	3.815	4.2	n/a	n/a	0	0	
Na (dissolved)	8	10	1200	4800	4170	4800	200000	n/a	0	0	
Ni (dissolved) [P]	8	0.3	0.6	6.7	6.245	6.7	20	4	0	3	
Pb (dissolved) [P]	8	1	1	2.1	1.995	2.1	10	1.2	0	4	
Sb (dissolved)	8	1.7	1.7	16	11.695	16	5	n/a	1	0	EQS is lower than detection limit
Se (dissolved)	8	4	4	4	4	4	10	n/a	0	0	
Sn (dissolved)	8	1	1	1.7	1.56	1.7	n/a	25	0	0	
V (dissolved)	8	1.7	1.7	25	16.845	25	n/a	60	0	0	
Zn (dissolved)	8	0.4	2.8	52	42.2	52	n/a	10.9	0	3	EQS is lower than detection limit
Cyanide (free)	8	10	10	10	10	10	n/a	1	0	8	EQS is lower than detection limit
Cyanide (total)	8	10	10	10	10	10	50	n/a	0	0	
Ammonium (NH4+)	8	15	49	110	106.5	110	500	n/a	0	0	
Bromate (BrO3)	8	2	2	2	2	2	10	n/a	0	0	
Chloride (Cl-)	8	4000	4000	4000	4000	4000	250000	250000	0	0	
Fluoride (F-)	8	50	240	720	713	720	1500	5000	0	0	
Nitrate (NO3-)	8	50	340	4210	4101.5	4210	50000	n/a	0	0	
Nitrite (NO2-)	8	5	5	120	104.6	120	500	n/a	0	0	
Sulfate (SO42-)	8	100	932	9250	8063.5	9250	250000	400000	0	0	
pH (min.) (su)	8	0	7.1	6.6	7.065	6.6	6.5	6.0	0	0	Max & Min interchanged to compare min. value.
pH (max.) (su)	8	10	6.6	7.1	7.065	7.1	9.5	9.0	0	0	
Electrical conductivity (µS/cm)	8	1	110	180	180	180	2500	n/a	0	0	
Anthracene [PH]	8	0.01	0.01	0.01	0.01	0.01	n/a	0.1	0	0	

Scenario D - Summary of Remedial Targets Methodology

Hydrock

RTM Level 1 - Soil Zone Assessment - leachate samples

Water body receptor(s): Groundwater and surface water
Secondary receptor(s): Human health (abstraction) and aquatic ecosystem
Data set: Leachate
Client: Inverness Terrace Limited
Site: Rudloe
Job no: C161303

2008/105/EC Annex II: [P]= priority substance, [PH] = priority hazardous substances.

Chemicals of Potential Concern (concentrations in µg/l)	Summary of Sample Data					Value Being Compared to Target = Maximum Value	Water Quality Target (Exceeded if Red Text)		No. Samples Exceeding Water Quality Target		Notes
	No. of Samples	Limit of Detection	Minimum Value	Maximum Value	95-%ile Value		DWS	Inland Waters EQS	DWS	Inland Waters EQS	EQS compared to dissolved metals as an initial screen, with no adjustment for bioavailability or ABC.
Benzo(a)pyrene [PH]	8	0.01	0.01	0.01	0.01	0.01	0.01	0.00017	0	8	EQS is lower than detection limit
Fluoranthene [P]	8	0.01	0.01	0.38	0.2505	0.38	n/a	0.0063	0	8	EQS is lower than detection limit
Naphthalene [P]	8	0.01	0.01	0.01	0.01	0.01	n/a	2	0	0	
PAHs = sum of benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene, indeno(1,2,3-cd)pyrene [PH]	8	0.02	0.02	0.02	0.02	0.02	0.1	n/a	0	0	
Phenol	8	10	1	1	1	1	n/a	7.7	0	0	

Andy Jackson
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Preliminary Report Number : 16-17963

Project / Site name:	Rudloe	**Samples received on:**	17/05/2016
Your job number:	C161303	**Samples instructed on:**	17/05/2016
Your order number:	C161303-G3647	**Analysis completed by:**	not complete
Report Issue Number:	0	**Report issued on:**	23/05/2016
Samples Analysed:	8 leachate samples - 41 soil samples		

Signed: [redacted]

Rexona Rahman
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Signed:

Emma Winter
Assistant Reporting 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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Preliminary reports provided at the request of the client should be considered as incomplete and have not been through the complete quality control procedure.
Results contained in preliminary reports may be subject to change and therefore should not be used as a basis for decision making, except at the risk of the client.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575608	575609	575610	575611	575612
Sample Reference				TP01	TP01	TP02	TP03	TP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.00	0.20	0.20	0.60
Date Sampled				10/05/2016	10/05/2016	10/05/2016	10/05/2016	10/05/2016
Time Taken				1000	1000	1120	1200	1230
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	%	N/A	NONE	16	10	16	17	17
Total mass of sample received	kg	0.001	NONE	0.45	0.48	0.46	0.92	0.46
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile - Insulation lagging	-	Chrysotile - Loose fibres	Chrysotile - Loose fibres	-
Asbestos in Soil	Type	N/A	ISO 17025	Detected	-	Detected	Detected	Not-detected
General Inorganics								
pH	pH Units	N/A	MCERTS	7.9	8.6	8.1	8.0	8.1
Free Cyanide	mg/kg	1	MCERTS	< 1	-	< 1	< 1	< 1
Total Sulphate as SO_4	mg/kg	50	MCERTS	-	1100	-	620	-
Total Sulphate as SO_4	%	0.005	MCERTS	-	0.113	-	0.062	-
Water Soluble Sulphate (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.014	0.0040	0.010	0.0056	0.0034
Water Soluble Sulphate (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	13.8	4.0	10.3	5.6	3.4
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	-	4.8	-	10	-
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	2.4	-	5.0	-
Total Sulphur	mg/kg	50	NONE	-	490	-	320	-
Total Sulphur	%	0.005	NONE	-	0.049	-	0.032	-
Ammonium as NH_4	mg/kg	0.5	MCERTS	-	< 0.5	-	< 0.5	-
Ammonium as NH_4 (leachate equivalent)	mg/l	0.05	MCERTS	-	< 0.1	-	0.1	-
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.021	-	0.016	0.018	0.0079
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	-	< 2.0	-	5.7	-
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent	mg/l	5	NONE	-	< 5.0	-	< 5.0	-
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	< 0.10
Pyrene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	< 0.10
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	-	< 1.60	< 1.60	< 1.60

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575608	575609	575610	575611	575612
Sample Reference				TP01	TP01	TP02	TP03	TP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.00	0.20	0.20	0.60
Date Sampled				10/05/2016	10/05/2016	10/05/2016	10/05/2016	10/05/2016
Time Taken				1000	1000	1120	1200	1230
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	-	17	13	17
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.88	-	0.76	0.78	1.0
Boron (water soluble)	mg/kg	0.2	MCERTS	To follow	-	To follow	To follow	To follow
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	-	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	18	-	25	20	20
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	-	25	20	20
Copper (aqua regia extractable)	mg/kg	1	MCERTS	16	-	19	13	20
Lead (aqua regia extractable)	mg/kg	1	MCERTS	31	-	27	22	20
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	19	-	18	16	24
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	61	-	55	33	68
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	79	-	54	54	93
Magnesium (water soluble)	mg/kg	5	NONE	-	< 5.0	-	7.2	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	< 2.5	-	3.6	-
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	-	-	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
o-xylene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	< 8.0
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	NONE	-	-	-	-	< 10
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	-	-	< 8.4
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	-	-	< 8.4

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575608	575609	575610	575611	575612
Sample Reference				TP01	TP01	TP02	TP03	TP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.00	0.20	0.20	0.60
Date Sampled				10/05/2016	10/05/2016	10/05/2016	10/05/2016	10/05/2016
Time Taken				1000	1000	1120	1200	1230
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chloroethane	µg/kg	1	ISO 17025	-	-	-	-	-
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-	-
Vinyl Chloride	µg/kg	1	ISO 17025	-	-	-	-	-
Trichlorofluoromethane	µg/kg	1	ISO 17025	-	-	-	-	-
1,1-dichloroethene	µg/kg	1	MCERTS	-	-	-	-	-
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	NONE	-	-	-	-	-
Trichloromethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,2-dichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1-Dichloropropene	µg/kg	1	NONE	-	-	-	-	-
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	NONE	-	-	-	-	-
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	MCERTS	-	-	-	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	NONE	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
Styrene	µg/kg	1	MCERTS	-	-	-	-	-
Tribromomethane	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	-
Isopropylbenzene	µg/kg	1	NONE	-	-	-	-	-
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-	-
N-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
2-Chlorotoluene	µg/kg	1	NONE	-	-	-	-	-
4-Chlorotoluene	µg/kg	1	NONE	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
Tert-Butylbenzene	µg/kg	1	NONE	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
Sec-Butylbenzene	µg/kg	1	NONE	-	-	-	-	-
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	NONE	-	-	-	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
Hexachlorobutadiene	µg/kg	1	NONE	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	1	NONE	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575608	575609	575610	575611	575612
Sample Reference				TP01	TP01	TP02	TP03	TP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.00	0.20	0.20	0.60
Date Sampled				10/05/2016	10/05/2016	10/05/2016	10/05/2016	10/05/2016
Time Taken				1000	1000	1120	1200	1230
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
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	-	-	-	-	-
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	0.1	MCERTS	-	-	-	-	-
Acenaphthene	mg/kg	0.1	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	0.1	MCERTS	-	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Phenanthrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Anthracene	mg/kg	0.1	MCERTS	-	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-	-
Fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	-
Pyrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.1	MCERTS	-	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575608	575609	575610	575611	575612
Sample Reference				TP01	TP01	TP02	TP03	TP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.00	0.20	0.20	0.60
Date Sampled				10/05/2016	10/05/2016	10/05/2016	10/05/2016	10/05/2016
Time Taken				1000	1000	1120	1200	1230
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	-
Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575613	575614	575615	575616	575617
Sample Reference				TP04	TP05	TP06	TP07	TP08
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	1.00	0.50	0.50	0.60
Date Sampled				10/05/2016	10/05/2016	10/05/2016	10/05/2016	10/05/2016
Time Taken				1230	1300	1345	1430	1530
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	%	N/A	NONE	11	13	18	36	18
Total mass of sample received	kg	0.001	NONE	0.48	0.43	0.49	0.44	0.48
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	Chrysotile - Loose fibres; Amosite -	-
Asbestos in Soil	Type	N/A	ISO 17025	-	-	Not-detected	Detected	Not-detected
General Inorganics								
pH	pH Units	N/A	MCERTS	8.6	8.4	8.8	8.0	8.1
Free Cyanide	mg/kg	1	MCERTS	-	-	< 1	< 1	< 1
Total Sulphate as SO_4	mg/kg	50	MCERTS	720	760	-	-	-
Total Sulphate as SO_4	%	0.005	MCERTS	0.072	0.076	-	-	-
Water Soluble Sulphate (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0028	0.0056	0.11	0.0055	0.0066
Water Soluble Sulphate (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	2.8	5.6	113	5.5	6.6
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	4.9	5.8	-	-	-
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	2.4	2.9	-	-	-
Total Sulphur	mg/kg	50	NONE	250	310	-	-	-
Total Sulphur	%	0.005	NONE	0.025	0.031	-	-	-
Ammonium as NH_4	mg/kg	0.5	MCERTS	< 0.5	< 0.5	-	-	-
Ammonium as NH_4 (leachate equivalent)	mg/l	0.05	MCERTS	0.1	0.1	-	-	-
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	-	-	0.014	0.024	0.0095
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	< 2.0	< 2.0	-	-	-
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent	mg/l	5	NONE	< 5.0	< 5.0	-	-	-
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	-	-	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	-	-	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	-	-	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	-	-	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg	0.1	MCERTS	-	-	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	-	-	< 0.10	< 0.10	0.60
Pyrene	mg/kg	0.1	MCERTS	-	-	< 0.10	< 0.10	0.54
Benzo(a)anthracene	mg/kg	0.1	MCERTS	-	-	< 0.10	< 0.10	0.38
Chrysene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	0.36
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	-	-	< 0.10	< 0.10	0.32
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	-	-	< 0.10	< 0.10	0.23
Benzo(a)pyrene	mg/kg	0.1	MCERTS	-	-	< 0.10	< 0.10	0.35
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	-	-	< 0.10	< 0.10	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	-	-	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	-	-	< 1.60	< 1.60	2.78

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575613	575614	575615	575616	575617
Sample Reference				TP04	TP05	TP06	TP07	TP08
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	1.00	0.50	0.50	0.60
Date Sampled				10/05/2016	10/05/2016	10/05/2016	10/05/2016	10/05/2016
Time Taken				1230	1300	1345	1430	1530
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	-	14	18	7.4
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	-	0.86	0.93	0.98
Boron (water soluble)	mg/kg	0.2	MCERTS	-	-	To follow	To follow	To follow
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	-	-	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	-	-	32	18	25
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	32	18	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-	27	31	18
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	-	59	21	17
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	-	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	-	24	24	20
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	< 1.0	1.4	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	51	35	36
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-	110	120	49
Magnesium (water soluble)	mg/kg	5	NONE	< 5.0	< 5.0	-	-	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	< 2.5	< 2.5	-	-	-
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
o-xylene	µg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	-	-	< 0.1	-	< 0.1
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	-	-	< 0.1	-	< 0.1
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	< 0.1	-	< 0.1
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	< 2.0	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	< 8.0	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	< 8.0	-	< 8.0
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	NONE	-	-	< 10	-	< 10
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	< 8.4	-	< 8.4
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	-	-	< 0.1	-	< 0.1
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	-	-	< 0.1	-	< 0.1
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	< 0.1	-	< 0.1
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	< 2.0	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	< 10	-	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	< 10	-	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	< 8.4	-	< 8.4

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575613	575614	575615	575616	575617
Sample Reference				TP04	TP05	TP06	TP07	TP08
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	1.00	0.50	0.50	0.60
Date Sampled				10/05/2016	10/05/2016	10/05/2016	10/05/2016	10/05/2016
Time Taken				1230	1300	1345	1430	1530
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chloroethane	µg/kg	1	ISO 17025	-	-	-	-	-
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-	-
Vinyl Chloride	µg/kg	1	ISO 17025	-	-	-	-	-
Trichlorofluoromethane	µg/kg	1	ISO 17025	-	-	-	-	-
1,1-dichloroethene	µg/kg	1	MCERTS	-	-	-	-	-
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	NONE	-	-	-	-	-
Trichloromethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,2-dichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1-Dichloropropene	µg/kg	1	NONE	-	-	-	-	-
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	NONE	-	-	-	-	-
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	MCERTS	-	-	-	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	NONE	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
Styrene	µg/kg	1	MCERTS	-	-	-	-	-
Tribromomethane	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	-
Isopropylbenzene	µg/kg	1	NONE	-	-	-	-	-
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-	-
N-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
2-Chlorotoluene	µg/kg	1	NONE	-	-	-	-	-
4-Chlorotoluene	µg/kg	1	NONE	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
Tert-Butylbenzene	µg/kg	1	NONE	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
Sec-Butylbenzene	µg/kg	1	NONE	-	-	-	-	-
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	NONE	-	-	-	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
Hexachlorobutadiene	µg/kg	1	NONE	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	1	NONE	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575613	575614	575615	575616	575617
Sample Reference				TP04	TP05	TP06	TP07	TP08
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	1.00	0.50	0.50	0.60
Date Sampled				10/05/2016	10/05/2016	10/05/2016	10/05/2016	10/05/2016
Time Taken				1230	1300	1345	1430	1530
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
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	-	-	-	-	-
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	0.1	MCERTS	-	-	-	-	-
Acenaphthene	mg/kg	0.1	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	0.1	MCERTS	-	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Phenanthrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Anthracene	mg/kg	0.1	MCERTS	-	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-	-
Fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	-
Pyrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.1	MCERTS	-	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575613	575614	575615	575616	575617
Sample Reference				TP04	TP05	TP06	TP07	TP08
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	1.00	0.50	0.50	0.60
Date Sampled				10/05/2016	10/05/2016	10/05/2016	10/05/2016	10/05/2016
Time Taken				1230	1300	1345	1430	1530
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	-
Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575618	575619	575620	575621	575622
Sample Reference				TP09	TP09	TP10	TP10	TP11
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.50	2.00	0.50
Date Sampled				11/05/2016	11/05/2016	11/05/2016	11/05/2016	11/05/2016
Time Taken				0920	0920	1030	1030	1130
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	%	N/A	NONE	21	15	21	13	18
Total mass of sample received	kg	0.001	NONE	0.36	0.44	0.42	0.43	0.48
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile - Loose fibres	-	Chrysotile - Loose fibres	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Detected	-	Detected	-	Not-detected
General Inorganics								
pH	pH Units	N/A	MCERTS	8.1	8.2	7.9	8.2	7.9
Free Cyanide	mg/kg	1	MCERTS	< 1	-	< 1	-	< 1
Total Sulphate as SO_4	mg/kg	50	MCERTS	-	1500	-	1600	-
Total Sulphate as SO_4	%	0.005	MCERTS	-	0.149	-	0.155	-
Water Soluble Sulphate (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0089	0.0059	0.013	0.45	0.0044
Water Soluble Sulphate (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	8.9	5.9	12.9	451	4.4
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	-	6.2	-	7.0	-
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	3.1	-	3.5	-
Total Sulphur	mg/kg	50	NONE	-	530	-	580	-
Total Sulphur	%	0.005	NONE	-	0.053	-	0.058	-
Ammonium as NH_4	mg/kg	0.5	MCERTS	-	< 0.5	-	< 0.5	-
Ammonium as NH_4 (leachate equivalent)	mg/l	0.05	MCERTS	-	< 0.1	-	0.1	-
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.011	-	0.018	-	0.020
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	-	< 2.0	-	< 2.0	-
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent	mg/l	5	NONE	-	< 5.0	-	< 5.0	-
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	-	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	-	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	-	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	-	2.3	-	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	-	0.46	-	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	-	4.0	-	< 0.10
Pyrene	mg/kg	0.1	MCERTS	< 0.10	-	3.0	-	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	-	1.9	-	< 0.10
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	1.8	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	-	1.6	-	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	-	1.1	-	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	-	1.5	-	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	-	0.75	-	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	-	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	0.73	-	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	-	19.0	-	< 1.60

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575618	575619	575620	575621	575622
Sample Reference				TP09	TP09	TP10	TP10	TP11
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.50	2.00	0.50
Date Sampled				11/05/2016	11/05/2016	11/05/2016	11/05/2016	11/05/2016
Time Taken				0920	0920	1030	1030	1130
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	-	21	-	11
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.92	-	1.0	-	0.61
Boron (water soluble)	mg/kg	0.2	MCERTS	To follow	-	To follow	-	To follow
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	-	< 1.2	-	< 1.2
Chromium (III)	mg/kg	1	NONE	19	-	30	-	14
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19	-	30	-	14
Copper (aqua regia extractable)	mg/kg	1	MCERTS	17	-	35	-	14
Lead (aqua regia extractable)	mg/kg	1	MCERTS	23	-	160	-	18
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	21	-	20	-	15
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	36	-	61	-	30
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	46	-	160	-	41
Magnesium (water soluble)	mg/kg	5	NONE	-	< 5.0	-	100	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	< 2.5	-	50	-
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	-
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	NONE	-	-	-	-	-
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575618	575619	575620	575621	575622
Sample Reference				TP09	TP09	TP10	TP10	TP11
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.50	2.00	0.50
Date Sampled				11/05/2016	11/05/2016	11/05/2016	11/05/2016	11/05/2016
Time Taken				0920	0920	1030	1030	1130
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chloroethane	µg/kg	1	ISO 17025	-	-	-	-	-
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-	-
Vinyl Chloride	µg/kg	1	ISO 17025	-	-	-	-	-
Trichlorofluoromethane	µg/kg	1	ISO 17025	-	-	-	-	-
1,1-dichloroethene	µg/kg	1	MCERTS	-	-	-	-	-
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	NONE	-	-	-	-	-
Trichloromethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,2-dichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1-Dichloropropene	µg/kg	1	NONE	-	-	-	-	-
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	NONE	-	-	-	-	-
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	MCERTS	-	-	-	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	NONE	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
Styrene	µg/kg	1	MCERTS	-	-	-	-	-
Tribromomethane	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	-
Isopropylbenzene	µg/kg	1	NONE	-	-	-	-	-
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-	-
N-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
2-Chlorotoluene	µg/kg	1	NONE	-	-	-	-	-
4-Chlorotoluene	µg/kg	1	NONE	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
Tert-Butylbenzene	µg/kg	1	NONE	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
Sec-Butylbenzene	µg/kg	1	NONE	-	-	-	-	-
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	NONE	-	-	-	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
Hexachlorobutadiene	µg/kg	1	NONE	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	1	NONE	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575618	575619	575620	575621	575622
Sample Reference				TP09	TP09	TP10	TP10	TP11
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.50	2.00	0.50
Date Sampled				11/05/2016	11/05/2016	11/05/2016	11/05/2016	11/05/2016
Time Taken				0920	0920	1030	1030	1130
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
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	-	-	-	-	-
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	0.1	MCERTS	-	-	-	-	-
Acenaphthene	mg/kg	0.1	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	0.1	MCERTS	-	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Phenanthrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Anthracene	mg/kg	0.1	MCERTS	-	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-	-
Fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	-
Pyrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.1	MCERTS	-	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575618	575619	575620	575621	575622
Sample Reference				TP09	TP09	TP10	TP10	TP11
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.50	2.00	0.50
Date Sampled				11/05/2016	11/05/2016	11/05/2016	11/05/2016	11/05/2016
Time Taken				0920	0920	1030	1030	1130
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	-
Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575623	575624	575626	575627	575628
Sample Reference				TP13	TP13	TP15	TP16	TP17
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.20	0.50	0.50	0.40
Date Sampled				11/05/2016	11/05/2016	11/05/2016	12/05/2016	12/05/2016
Time Taken				1345	1345	1530	0900	1000
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	%	N/A	NONE	25	9.5	19	15	18
Total mass of sample received	kg	0.001	NONE	0.41	0.41	0.47	0.46	1.9
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	Not-detected
General Inorganics								
pH	pH Units	N/A	MCERTS	7.9	8.4	8.3	8.2	8.0
Free Cyanide	mg/kg	1	MCERTS	< 1	-	< 1	< 1	< 1
Total Sulphate as SO_4	mg/kg	50	MCERTS	-	990	-	-	-
Total Sulphate as SO_4	%	0.005	MCERTS	-	0.099	-	-	-
Water Soluble Sulphate (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.029	0.0065	0.022	0.0084	0.0095
Water Soluble Sulphate (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	28.8	6.5	22.1	8.4	9.5
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	-	6.4	-	-	-
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	3.2	-	-	-
Total Sulphur	mg/kg	50	NONE	-	460	-	-	-
Total Sulphur	%	0.005	NONE	-	0.046	-	-	-
Ammonium as NH_4	mg/kg	0.5	MCERTS	-	< 0.5	-	-	-
Ammonium as NH_4 (leachate equivalent)	mg/l	0.05	MCERTS	-	0.1	-	-	-
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.0053	-	0.040	0.0061	0.0091
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	-	5.4	-	-	-
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent	mg/l	5	NONE	-	< 5.0	-	-	-
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	0.96	-	< 0.10	0.30	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	2.3	-	< 0.10	0.88	< 0.10
Pyrene	mg/kg	0.1	MCERTS	2.0	-	< 0.10	0.71	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	0.94	-	< 0.10	0.34	< 0.10
Chrysene	mg/kg	0.05	MCERTS	1.2	-	< 0.05	0.44	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	1.1	-	< 0.10	0.33	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	0.44	-	< 0.10	0.20	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	0.83	-	< 0.10	0.34	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	0.38	-	< 0.10	< 0.10	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.55	-	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	10.6	-	< 1.60	3.54	< 1.60

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575623	575624	575626	575627	575628
Sample Reference				TP13	TP13	TP15	TP16	TP17
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.20	0.50	0.50	0.40
Date Sampled				11/05/2016	11/05/2016	11/05/2016	12/05/2016	12/05/2016
Time Taken				1345	1345	1530	0900	1000
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	21	-	9.0	11	13
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	2.5	-	0.50	0.63	0.73
Boron (water soluble)	mg/kg	0.2	MCERTS	To follow	-	To follow	To follow	To follow
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	-	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	19	-	16	18	18
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19	-	16	18	18
Copper (aqua regia extractable)	mg/kg	1	MCERTS	37	-	22	6.0	6.9
Lead (aqua regia extractable)	mg/kg	1	MCERTS	53	-	15	19	30
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	48	-	14	15	18
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	80	-	33	41	33
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	120	-	60	51	75
Magnesium (water soluble)	mg/kg	5	NONE	-	5.9	-	-	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	3.0	-	-	-
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	-	-	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	-	-	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	NONE	-	-	< 10	< 10	< 10
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	< 8.4	< 8.4	< 8.4
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	-	-	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	-	-	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	< 10	< 10	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	< 8.4	< 8.4	< 8.4

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575623	575624	575626	575627	575628
Sample Reference				TP13	TP13	TP15	TP16	TP17
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.20	0.50	0.50	0.40
Date Sampled				11/05/2016	11/05/2016	11/05/2016	12/05/2016	12/05/2016
Time Taken				1345	1345	1530	0900	1000
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Chloroethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Vinyl Chloride	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Trichlorofluoromethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
1,1-dichloroethene	µg/kg	1	MCERTS	-	-	-	-	< 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	NONE	-	-	-	-	< 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	NONE	-	-	-	-	< 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	NONE	-	-	-	-	< 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	MCERTS	-	-	-	-	< 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	NONE	-	-	-	-	< 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	MCERTS	-	-	-	-	< 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	NONE	-	-	-	-	< 1.0
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
N-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
2-Chlorotoluene	µg/kg	1	NONE	-	-	-	-	< 1.0
4-Chlorotoluene	µg/kg	1	NONE	-	-	-	-	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Tert-Butylbenzene	µg/kg	1	NONE	-	-	-	-	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Sec-Butylbenzene	µg/kg	1	NONE	-	-	-	-	< 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	NONE	-	-	-	-	< 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	NONE	-	-	-	-	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	NONE	-	-	-	-	< 1.0

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575623	575624	575626	575627	575628
Sample Reference				TP13	TP13	TP15	TP16	TP17
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.20	0.50	0.50	0.40
Date Sampled				11/05/2016	11/05/2016	11/05/2016	12/05/2016	12/05/2016
Time Taken				1345	1345	1530	0900	1000
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
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
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	-	-	-	-	< 0.1
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	0.1	MCERTS	-	-	-	-	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
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	0.1	MCERTS	-	-	-	-	< 0.10
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	0.1	MCERTS	-	-	-	-	< 0.10
Anthracene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
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	0.1	MCERTS	-	-	-	-	< 0.10
Pyrene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-	< 0.3
Benzo(a)anthracene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-	< 0.05

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575623	575624	575626	575627	575628
Sample Reference				TP13	TP13	TP15	TP16	TP17
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.20	0.50	0.50	0.40
Date Sampled				11/05/2016	11/05/2016	11/05/2016	12/05/2016	12/05/2016
Time Taken				1345	1345	1530	0900	1000
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
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	mg/kg	0.007	MCERTS	-	-	-	-	< 0.007

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575629	575630	575631	575632	575634
Sample Reference				TP18	TP18	TP19	TP20	TP20
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.50	0.20	1.20
Date Sampled				12/05/2016	12/05/2016	12/05/2016	12/05/2016	12/05/2016
Time Taken				1045	1045	1150	1245	1245
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	%	N/A	NONE	19	13	15	27	16
Total mass of sample received	kg	0.001	NONE	0.41	0.41	0.50	0.45	0.50
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile - Loose fibres	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Detected	-	Not-detected	Not-detected	-
General Inorganics								
pH	pH Units	N/A	MCERTS	8.5	9.6	9.0	7.9	7.8
Free Cyanide	mg/kg	1	MCERTS	< 1	-	< 1	< 1	-
Total Sulphate as SO_4	mg/kg	50	MCERTS	-	2900	-	-	200
Total Sulphate as SO_4	%	0.005	MCERTS	-	0.294	-	-	0.020
Water Soluble Sulphate (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.052	0.26	0.11	0.012	0.0043
Water Soluble Sulphate (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	52.4	260	111	11.9	4.3
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	-	11	-	-	6.5
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	5.5	-	-	3.2
Total Sulphur	mg/kg	50	NONE	-	1200	-	-	300
Total Sulphur	%	0.005	NONE	-	0.123	-	-	0.030
Ammonium as NH_4	mg/kg	0.5	MCERTS	-	< 0.5	-	-	< 0.5
Ammonium as NH_4 (leachate equivalent)	mg/l	0.05	MCERTS	-	0.1	-	-	0.1
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.0084	-	0.024	0.016	-
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	-	2.4	-	-	2.8
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent	mg/l	5	NONE	-	< 5.0	-	-	< 5.0
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	-
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	-
Fluorene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	-
Phenanthrene	mg/kg	0.1	MCERTS	0.16	-	< 0.10	< 0.10	-
Anthracene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	-
Fluoranthene	mg/kg	0.1	MCERTS	0.59	-	< 0.10	< 0.10	-
Pyrene	mg/kg	0.1	MCERTS	0.59	-	< 0.10	< 0.10	-
Benzo(a)anthracene	mg/kg	0.1	MCERTS	0.46	-	< 0.10	< 0.10	-
Chrysene	mg/kg	0.05	MCERTS	0.60	-	< 0.05	< 0.05	-
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	0.59	-	< 0.10	< 0.10	-
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	0.43	-	< 0.10	< 0.10	-
Benzo(a)pyrene	mg/kg	0.1	MCERTS	0.61	-	< 0.10	< 0.10	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	0.25	-	< 0.10	< 0.10	-
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	-	< 0.10	< 0.10	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.32	-	< 0.05	< 0.05	-
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	4.60	-	< 1.60	< 1.60	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575629	575630	575631	575632	575634
Sample Reference				TP18	TP18	TP19	TP20	TP20
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.50	0.20	1.20
Date Sampled				12/05/2016	12/05/2016	12/05/2016	12/05/2016	12/05/2016
Time Taken				1045	1045	1150	1245	1245
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	-	11	30	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.5	-	0.52	1.1	-
Boron (water soluble)	mg/kg	0.2	MCERTS	To follow	-	To follow	To follow	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	< 0.2	-
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	-	< 1.2	< 1.2	-
Chromium (III)	mg/kg	1	NONE	28	-	16	40	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	28	-	16	40	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	43	-	14	58	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	120	-	33	76	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	27	-	15	22	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	55	-	30	78	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	1100	-	94	120	-
Magnesium (water soluble)	mg/kg	5	NONE	-	< 5.0	-	-	< 5.0
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	< 2.5	-	-	< 2.5
Monoaromatics								
Benzene	ug/kg	1	MCERTS	< 1.0	-	-	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
o-xylene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	190	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	NONE	190	-	-	-	-
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	390	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	260	-	-	-	-
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	390	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575629	575630	575631	575632	575634
Sample Reference				TP18	TP18	TP19	TP20	TP20
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.50	0.20	1.20
Date Sampled				12/05/2016	12/05/2016	12/05/2016	12/05/2016	12/05/2016
Time Taken				1045	1045	1150	1245	1245
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Chloroethane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Bromomethane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Vinyl Chloride	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Trichlorofluoromethane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
1,1-dichloroethene	µg/kg	1	MCERTS	< 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	NONE	< 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	NONE	< 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	NONE	< 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	MCERTS	< 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	NONE	< 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	MCERTS	< 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	NONE	< 1.0	-	-	-	-
Bromobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
N-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
2-Chlorotoluene	µg/kg	1	NONE	< 1.0	-	-	-	-
4-Chlorotoluene	µg/kg	1	NONE	< 1.0	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Tert-Butylbenzene	µg/kg	1	NONE	< 1.0	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Sec-Butylbenzene	µg/kg	1	NONE	< 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	NONE	< 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	NONE	< 1.0	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	1	NONE	< 1.0	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575629	575630	575631	575632	575634
Sample Reference				TP18	TP18	TP19	TP20	TP20
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.50	0.20	1.20
Date Sampled				12/05/2016	12/05/2016	12/05/2016	12/05/2016	12/05/2016
Time Taken				1045	1045	1150	1245	1245
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
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	-	-	-	-
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	< 0.1	-	-	-	-
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	0.1	MCERTS	< 0.10	-	-	-	-
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	-	-	-	-
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	0.1	MCERTS	< 0.10	-	-	-	-
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	0.1	MCERTS	0.16	-	-	-	-
Anthracene	mg/kg	0.1	MCERTS	< 0.10	-	-	-	-
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	0.1	MCERTS	0.59	-	-	-	-
Pyrene	mg/kg	0.1	MCERTS	0.59	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	-	-	-	-
Benzo(a)anthracene	mg/kg	0.1	MCERTS	0.46	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	0.60	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	0.59	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	0.43	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1	MCERTS	0.61	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	0.25	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.32	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575629	575630	575631	575632	575634
Sample Reference				TP18	TP18	TP19	TP20	TP20
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.50	0.20	1.20
Date Sampled				12/05/2016	12/05/2016	12/05/2016	12/05/2016	12/05/2016
Time Taken				1045	1045	1150	1245	1245
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	-
Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575635	575636	575637	575638	575639
Sample Reference				TP21	TP22	TP22	TP23	TP23
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.20	0.30	0.20	0.60
Date Sampled				12/05/2016	12/05/2016	12/05/2016	12/05/2016	12/05/2016
Time Taken				1345	1500	1500	1600	1600
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	%	N/A	NONE	20	16	14	13	18
Total mass of sample received	kg	0.001	NONE	0.44	0.48	0.47	0.43	0.51
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile - Loose fibres	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Detected	Not-detected	-	Not-detected	Not-detected
General Inorganics								
pH	pH Units	N/A	MCERTS	7.9	8.0	8.1	8.3	8.1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	-	< 1	< 1
Total Sulphate as SO_4	mg/kg	50	MCERTS	-	-	430	-	-
Total Sulphate as SO_4	%	0.005	MCERTS	-	-	0.043	-	-
Water Soluble Sulphate (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0072	0.0055	0.0044	0.0071	0.0079
Water Soluble Sulphate (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	7.2	5.5	4.4	7.1	7.9
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	-	-	7.6	-	-
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	-	3.8	-	-
Total Sulphur	mg/kg	50	NONE	-	-	280	-	-
Total Sulphur	%	0.005	NONE	-	-	0.028	-	-
Ammonium as NH_4	mg/kg	0.5	MCERTS	-	-	< 0.5	-	-
Ammonium as NH_4 (leachate equivalent)	mg/l	0.05	MCERTS	-	-	0.1	-	-
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.027	0.025	-	0.0078	0.017
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	-	-	6.3	-	-
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent	mg/l	5	NONE	-	-	< 5.0	-	-
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	1.8	0.25
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	-	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	-	2.2	0.51
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	-	2.3	0.37
Phenanthrene	mg/kg	0.1	MCERTS	0.17	0.16	-	21	7.0
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	-	4.9	1.3
Fluoranthene	mg/kg	0.1	MCERTS	0.48	0.59	-	24	14
Pyrene	mg/kg	0.1	MCERTS	0.40	0.51	-	19	11
Benzo(a)anthracene	mg/kg	0.1	MCERTS	0.28	0.42	-	13	9.2
Chrysene	mg/kg	0.05	MCERTS	0.36	0.47	-	8.4	7.2
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	0.33	0.49	-	11	10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	0.22	0.28	-	5.9	4.5
Benzo(a)pyrene	mg/kg	0.1	MCERTS	0.30	0.37	-	9.1	6.8
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	0.18	-	4.4	3.2
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	-	1.1	1.0
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.21	-	4.0	3.6
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	2.54	3.68	-	131	80.0

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575635	575636	575637	575638	575639
Sample Reference				TP21	TP22	TP22	TP23	TP23
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.20	0.30	0.20	0.60
Date Sampled				12/05/2016	12/05/2016	12/05/2016	12/05/2016	12/05/2016
Time Taken				1345	1500	1500	1600	1600
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	15	-	9.6	15
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.80	0.80	-	0.59	0.91
Boron (water soluble)	mg/kg	0.2	MCERTS	To follow	To follow	-	To follow	To follow
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	< 0.2	-	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	-	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	20	19	-	19	18
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	19	-	19	18
Copper (aqua regia extractable)	mg/kg	1	MCERTS	36	26	-	13	18
Lead (aqua regia extractable)	mg/kg	1	MCERTS	61	63	-	10	29
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	19	20	-	16	21
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	36	37	-	23	30
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	230	120	-	45	84
Magnesium (water soluble)	mg/kg	5	NONE	-	-	5.1	-	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	-	2.6	-	-
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	-
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	NONE	-	-	-	-	-
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575635	575636	575637	575638	575639
Sample Reference				TP21	TP22	TP22	TP23	TP23
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.20	0.30	0.20	0.60
Date Sampled				12/05/2016	12/05/2016	12/05/2016	12/05/2016	12/05/2016
Time Taken				1345	1500	1500	1600	1600
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chloroethane	µg/kg	1	ISO 17025	-	-	-	-	-
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-	-
Vinyl Chloride	µg/kg	1	ISO 17025	-	-	-	-	-
Trichlorofluoromethane	µg/kg	1	ISO 17025	-	-	-	-	-
1,1-dichloroethene	µg/kg	1	MCERTS	-	-	-	-	-
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	NONE	-	-	-	-	-
Trichloromethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,2-dichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1-Dichloropropene	µg/kg	1	NONE	-	-	-	-	-
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	NONE	-	-	-	-	-
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	MCERTS	-	-	-	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	NONE	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
Styrene	µg/kg	1	MCERTS	-	-	-	-	-
Tribromomethane	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	-
Isopropylbenzene	µg/kg	1	NONE	-	-	-	-	-
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-	-
N-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
2-Chlorotoluene	µg/kg	1	NONE	-	-	-	-	-
4-Chlorotoluene	µg/kg	1	NONE	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
Tert-Butylbenzene	µg/kg	1	NONE	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
Sec-Butylbenzene	µg/kg	1	NONE	-	-	-	-	-
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	NONE	-	-	-	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
Hexachlorobutadiene	µg/kg	1	NONE	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	1	NONE	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575635	575636	575637	575638	575639
Sample Reference				TP21	TP22	TP22	TP23	TP23
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.20	0.30	0.20	0.60
Date Sampled				12/05/2016	12/05/2016	12/05/2016	12/05/2016	12/05/2016
Time Taken				1345	1500	1500	1600	1600
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
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	-	-	-	-	-
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	0.1	MCERTS	-	-	-	-	-
Acenaphthene	mg/kg	0.1	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	0.1	MCERTS	-	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Phenanthrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Anthracene	mg/kg	0.1	MCERTS	-	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-	-
Fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	-
Pyrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.1	MCERTS	-	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575635	575636	575637	575638	575639
Sample Reference				TP21	TP22	TP22	TP23	TP23
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.20	0.30	0.20	0.60
Date Sampled				12/05/2016	12/05/2016	12/05/2016	12/05/2016	12/05/2016
Time Taken				1345	1500	1500	1600	1600
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	-
Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575640	575641	575642	575643	575644
Sample Reference				TP24	TP24	TP25	TP26	TP27
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	0.20	0.20	0.20
Date Sampled				13/05/2016	13/05/2016	13/05/2016	13/05/2016	13/05/2016
Time Taken				0900	0900	1000	1100	1045
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	%	N/A	NONE	20	14	16	16	13
Total mass of sample received	kg	0.001	NONE	0.32	0.43	0.48	0.54	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	Not-detected	Not-detected
General Inorganics								
pH	pH Units	N/A	MCERTS	8.0	8.2	8.1	8.1	8.1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO_4	mg/kg	50	MCERTS	-	-	-	-	-
Total Sulphate as SO_4	%	0.005	MCERTS	-	-	-	-	-
Water Soluble Sulphate (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0080	0.0058	0.021	0.0075	0.014
Water Soluble Sulphate (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	8.0	5.8	21.2	7.5	13.8
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	-	-	-	-	-
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	-	-	-	-
Total Sulphur	mg/kg	50	NONE	-	-	-	-	-
Total Sulphur	%	0.005	NONE	-	-	-	-	-
Ammonium as NH_4	mg/kg	0.5	MCERTS	-	-	-	-	-
Ammonium as NH_4 (leachate equivalent)	mg/l	0.05	MCERTS	-	-	-	-	-
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.024	0.0070	0.018	0.0069	0.011
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	-	-	-	-	-
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent	mg/l	5	NONE	-	-	-	-	-
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	0.21	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	0.42	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	mg/kg	0.1	MCERTS	0.33	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	0.27	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	mg/kg	0.05	MCERTS	0.32	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	0.34	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	0.16	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	0.23	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	2.28	< 1.60	< 1.60	< 1.60	< 1.60

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575640	575641	575642	575643	575644
Sample Reference				TP24	TP24	TP25	TP26	TP27
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	0.20	0.20	0.20
Date Sampled				13/05/2016	13/05/2016	13/05/2016	13/05/2016	13/05/2016
Time Taken				0900	0900	1000	1100	1045
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	13	7.9	13	17
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.88	0.98	0.45	0.95	0.62
Boron (water soluble)	mg/kg	0.2	MCERTS	To follow	To follow	To follow	To follow	To follow
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	18	18	17	25	16
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	18	17	26	16
Copper (aqua regia extractable)	mg/kg	1	MCERTS	15	14	17	13	18
Lead (aqua regia extractable)	mg/kg	1	MCERTS	30	18	13	18	78
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	21	22	12	23	16
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.1	1.2	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	36	33	23	37	31
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	87	44	33	57	68
Magnesium (water soluble)	mg/kg	5	NONE	-	-	-	-	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	-	-	-	-
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	-	-	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
o-xylene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	< 8.0
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	NONE	-	-	-	-	< 10
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	-	-	< 8.4
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	-	-	< 8.4

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575640	575641	575642	575643	575644
Sample Reference				TP24	TP24	TP25	TP26	TP27
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	0.20	0.20	0.20
Date Sampled				13/05/2016	13/05/2016	13/05/2016	13/05/2016	13/05/2016
Time Taken				0900	0900	1000	1100	1045
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chloroethane	µg/kg	1	ISO 17025	-	-	-	-	-
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-	-
Vinyl Chloride	µg/kg	1	ISO 17025	-	-	-	-	-
Trichlorofluoromethane	µg/kg	1	ISO 17025	-	-	-	-	-
1,1-dichloroethene	µg/kg	1	MCERTS	-	-	-	-	-
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	NONE	-	-	-	-	-
Trichloromethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,2-dichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1-Dichloropropene	µg/kg	1	NONE	-	-	-	-	-
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	NONE	-	-	-	-	-
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	MCERTS	-	-	-	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	NONE	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
Styrene	µg/kg	1	MCERTS	-	-	-	-	-
Tribromomethane	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	-
Isopropylbenzene	µg/kg	1	NONE	-	-	-	-	-
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-	-
N-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
2-Chlorotoluene	µg/kg	1	NONE	-	-	-	-	-
4-Chlorotoluene	µg/kg	1	NONE	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
Tert-Butylbenzene	µg/kg	1	NONE	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
Sec-Butylbenzene	µg/kg	1	NONE	-	-	-	-	-
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	NONE	-	-	-	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
Hexachlorobutadiene	µg/kg	1	NONE	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	1	NONE	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575640	575641	575642	575643	575644
Sample Reference				TP24	TP24	TP25	TP26	TP27
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	0.20	0.20	0.20
Date Sampled				13/05/2016	13/05/2016	13/05/2016	13/05/2016	13/05/2016
Time Taken				0900	0900	1000	1100	1045
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
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	-	-	-	-	-
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	0.1	MCERTS	-	-	-	-	-
Acenaphthene	mg/kg	0.1	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	0.1	MCERTS	-	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Phenanthrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Anthracene	mg/kg	0.1	MCERTS	-	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-	-
Fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	-
Pyrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.1	MCERTS	-	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575640	575641	575642	575643	575644
Sample Reference				TP24	TP24	TP25	TP26	TP27
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	0.20	0.20	0.20
Date Sampled				13/05/2016	13/05/2016	13/05/2016	13/05/2016	13/05/2016
Time Taken				0900	0900	1000	1100	1045
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	-
Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575645	575646	575647	575648	575649
Sample Reference				TP27	TP28	TP29	TP29	TP30
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.30	0.25	0.50	1.90	0.20
Date Sampled				13/05/2016	13/05/2016	13/05/2016	13/05/2016	13/05/2016
Time Taken				1045	1300	1400	1400	1500
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	%	N/A	NONE	12	16	13	18	16
Total mass of sample received	kg	0.001	NONE	0.48	0.50	0.47	0.37	0.44
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
General Inorganics								
pH	pH Units	N/A	MCERTS	8.3	8.2	8.2	8.0	8.3
Free Cyanide	mg/kg	1	MCERTS	-	< 1	< 1	-	< 1
Total Sulphate as SO_4	mg/kg	50	MCERTS	680	-	-	2100	-
Total Sulphate as SO_4	%	0.005	MCERTS	0.068	-	-	0.210	-
Water Soluble Sulphate (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.011	0.010	0.014	0.31	0.053
Water Soluble Sulphate (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	10.5	10.0	14.4	309	52.6
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	12	-	-	25	-
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	6.2	-	-	12	-
Total Sulphur	mg/kg	50	NONE	To follow	-	-	2800	-
Total Sulphur	%	0.005	NONE	To follow	-	-	0.281	-
Ammonium as NH_4	mg/kg	0.5	MCERTS	< 0.5	-	-	< 0.5	-
Ammonium as NH_4 (leachate equivalent)	mg/l	0.05	MCERTS	0.1	-	-	0.2	-
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	-	0.0085	0.0023	-	0.014
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	< 2.0	-	-	< 2.0	-
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent	mg/l	5	NONE	< 5.0	-	-	< 5.0	-
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	-	< 1.0	< 1.0	-	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	-	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	-	< 0.10	< 0.10	-	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	-	< 0.10	< 0.10	-	< 0.10
Fluorene	mg/kg	0.1	MCERTS	-	< 0.10	< 0.10	-	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	-	< 0.10	< 0.10	-	0.51
Anthracene	mg/kg	0.1	MCERTS	-	< 0.10	< 0.10	-	0.10
Fluoranthene	mg/kg	0.1	MCERTS	-	< 0.10	< 0.10	-	2.1
Pyrene	mg/kg	0.1	MCERTS	-	< 0.10	< 0.10	-	1.9
Benzo(a)anthracene	mg/kg	0.1	MCERTS	-	< 0.10	< 0.10	-	1.5
Chrysene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	-	1.4
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	-	< 0.10	< 0.10	-	1.3
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	-	< 0.10	< 0.10	-	1.0
Benzo(a)pyrene	mg/kg	0.1	MCERTS	-	< 0.10	< 0.10	-	1.2
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	-	< 0.10	< 0.10	-	0.53
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	-	< 0.10	< 0.10	-	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	-	0.73
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	-	< 1.60	< 1.60	-	12.3

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575645	575646	575647	575648	575649
Sample Reference				TP27	TP28	TP29	TP29	TP30
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.30	0.25	0.50	1.90	0.20
Date Sampled				13/05/2016	13/05/2016	13/05/2016	13/05/2016	13/05/2016
Time Taken				1045	1300	1400	1400	1500
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	11	8.6	-	14
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	0.69	0.74	-	0.73
Boron (water soluble)	mg/kg	0.2	MCERTS	-	To follow	To follow	-	To follow
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	-	< 1.2	< 1.2	-	< 1.2
Chromium (III)	mg/kg	1	NONE	-	12	17	-	15
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	12	17	-	15
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	12	13	-	47
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	23	8.3	-	55
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	17	18	-	18
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0	< 1.0	-	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	32	28	-	33
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	59	31	-	120
Magnesium (water soluble)	mg/kg	5	NONE	< 5.0	-	-	48	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	< 2.5	-	-	24	-
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
o-xylene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	-	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	< 8.0	-	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	< 8.0	-	-	< 8.0
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	NONE	-	< 10	-	-	< 10
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	< 8.4	-	-	< 8.4
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	-	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	< 10	-	-	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	< 10	-	-	32
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	< 8.4	-	-	< 8.4

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575645	575646	575647	575648	575649
Sample Reference				TP27	TP28	TP29	TP29	TP30
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.30	0.25	0.50	1.90	0.20
Date Sampled				13/05/2016	13/05/2016	13/05/2016	13/05/2016	13/05/2016
Time Taken				1045	1300	1400	1400	1500
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chloroethane	µg/kg	1	ISO 17025	-	-	-	-	-
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-	-
Vinyl Chloride	µg/kg	1	ISO 17025	-	-	-	-	-
Trichlorofluoromethane	µg/kg	1	ISO 17025	-	-	-	-	-
1,1-dichloroethene	µg/kg	1	MCERTS	-	-	-	-	-
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	NONE	-	-	-	-	-
Trichloromethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,2-dichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1-Dichloropropene	µg/kg	1	NONE	-	-	-	-	-
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	NONE	-	-	-	-	-
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	MCERTS	-	-	-	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	NONE	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
Styrene	µg/kg	1	MCERTS	-	-	-	-	-
Tribromomethane	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	-
Isopropylbenzene	µg/kg	1	NONE	-	-	-	-	-
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-	-
N-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
2-Chlorotoluene	µg/kg	1	NONE	-	-	-	-	-
4-Chlorotoluene	µg/kg	1	NONE	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
Tert-Butylbenzene	µg/kg	1	NONE	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
Sec-Butylbenzene	µg/kg	1	NONE	-	-	-	-	-
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	NONE	-	-	-	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
Hexachlorobutadiene	µg/kg	1	NONE	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	1	NONE	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575645	575646	575647	575648	575649
Sample Reference				TP27	TP28	TP29	TP29	TP30
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.30	0.25	0.50	1.90	0.20
Date Sampled				13/05/2016	13/05/2016	13/05/2016	13/05/2016	13/05/2016
Time Taken				1045	1300	1400	1400	1500
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
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	-	-	-	-	-
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	0.1	MCERTS	-	-	-	-	-
Acenaphthene	mg/kg	0.1	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	0.1	MCERTS	-	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Phenanthrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Anthracene	mg/kg	0.1	MCERTS	-	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-	-
Fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	-
Pyrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.1	MCERTS	-	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575645	575646	575647	575648	575649
Sample Reference				TP27	TP28	TP29	TP29	TP30
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.30	0.25	0.50	1.90	0.20
Date Sampled				13/05/2016	13/05/2016	13/05/2016	13/05/2016	13/05/2016
Time Taken				1045	1300	1400	1400	1500
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	-
Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	-

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575669				
Sample Reference				TP05				
Sample Number				None Supplied				
Depth (m)				0.20				
Date Sampled				10/05/2016				
Time Taken				1300				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	19				
Total mass of sample received	kg	0.001	NONE	0.46				
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-				
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected				
General Inorganics								
pH	pH Units	N/A	MCERTS	9.5				
Free Cyanide	mg/kg	1	MCERTS	< 1				
Total Sulphate as SO_4	mg/kg	50	MCERTS	-				
Total Sulphate as SO_4	%	0.005	MCERTS	-				
Water Soluble Sulphate (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.13				
Water Soluble Sulphate (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	129				
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	-				
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-				
Total Sulphur	mg/kg	50	NONE	-				
Total Sulphur	%	0.005	NONE	-				
Ammonium as NH_4	mg/kg	0.5	MCERTS	-				
Ammonium as NH_4 (leachate equivalent)	mg/l	0.05	MCERTS	-				
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.024				
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	-				
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent	mg/l	5	NONE	-				
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0				
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10				
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10				
Fluorene	mg/kg	0.1	MCERTS	< 0.10				
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10				
Anthracene	mg/kg	0.1	MCERTS	< 0.10				
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10				
Pyrene	mg/kg	0.1	MCERTS	< 0.10				
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10				
Chrysene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10				
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10				
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10				
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10				
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05				
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60				

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575669				
Sample Reference				TP05				
Sample Number				None Supplied				
Depth (m)				0.20				
Date Sampled				10/05/2016				
Time Taken				1300				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	17				
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.77				
Boron (water soluble)	mg/kg	0.2	MCERTS	To follow				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2				
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2				
Chromium (III)	mg/kg	1	NONE	30				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	30				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	16				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	37				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	22				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	49				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	97				
Magnesium (water soluble)	mg/kg	5	NONE	-				
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-				
Monoaromatics								
Benzene	ug/kg	1	MCERTS	< 1.0				
Toluene	µg/kg	1	MCERTS	< 1.0				
Ethylbenzene	µg/kg	1	MCERTS	< 1.0				
p & m-xylene	µg/kg	1	MCERTS	< 1.0				
o-xylene	µg/kg	1	MCERTS	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0				
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	< 0.1				
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	< 0.1				
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1				
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	NONE	< 10				
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4				
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	< 0.1				
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	< 0.1				
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1				
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	14				
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4				

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575669				
Sample Reference				TP05				
Sample Number				None Supplied				
Depth (m)				0.20				
Date Sampled				10/05/2016				
Time Taken				1300				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-				
Chloroethane	µg/kg	1	ISO 17025	-				
Bromomethane	µg/kg	1	ISO 17025	-				
Vinyl Chloride	µg/kg	1	ISO 17025	-				
Trichlorofluoromethane	µg/kg	1	ISO 17025	-				
1,1-dichloroethene	µg/kg	1	MCERTS	-				
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	NONE	-				
Trichloromethane	µg/kg	1	MCERTS	-				
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-				
1,2-dichloroethane	µg/kg	1	MCERTS	-				
1,1-Dichloropropene	µg/kg	1	NONE	-				
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	NONE	-				
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	MCERTS	-				
1,2-Dibromoethane	µg/kg	1	ISO 17025	-				
Chlorobenzene	µg/kg	1	MCERTS	-				
1,1,1,2-Tetrachloroethane	µg/kg	1	NONE	-				
Ethylbenzene	µg/kg	1	MCERTS	-				
p & m-xylene	µg/kg	1	MCERTS	-				
Styrene	µg/kg	1	MCERTS	-				
Tribromomethane	µg/kg	1	MCERTS	-				
o-xylene	µg/kg	1	MCERTS	-				
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-				
Isopropylbenzene	µg/kg	1	NONE	-				
Bromobenzene	µg/kg	1	MCERTS	-				
N-Propylbenzene	µg/kg	1	ISO 17025	-				
2-Chlorotoluene	µg/kg	1	NONE	-				
4-Chlorotoluene	µg/kg	1	NONE	-				
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-				
Tert-Butylbenzene	µg/kg	1	NONE	-				
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-				
Sec-Butylbenzene	µg/kg	1	NONE	-				
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	NONE	-				
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-				
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-				
Hexachlorobutadiene	µg/kg	1	NONE	-				
1,2,3-Trichlorobenzene	µg/kg	1	NONE	-				

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575669				
Sample Reference				TP05				
Sample Number				None Supplied				
Depth (m)				0.20				
Date Sampled				10/05/2016				
Time Taken				1300				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
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	-				
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	0.1	MCERTS	-				
Acenaphthene	mg/kg	0.1	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	0.1	MCERTS	-				
Azobenzene	mg/kg	0.3	MCERTS	-				
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-				
Hexachlorobenzene	mg/kg	0.3	MCERTS	-				
Phenanthrene	mg/kg	0.1	MCERTS	-				
Anthracene	mg/kg	0.1	MCERTS	-				
Carbazole	mg/kg	0.3	MCERTS	-				
Dibutyl phthalate	mg/kg	0.2	MCERTS	-				
Anthraquinone	mg/kg	0.3	MCERTS	-				
Fluoranthene	mg/kg	0.1	MCERTS	-				
Pyrene	mg/kg	0.1	MCERTS	-				
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-				
Benzo(a)anthracene	mg/kg	0.1	MCERTS	-				
Chrysene	mg/kg	0.05	MCERTS	-				
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	-				
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	-				
Benzo(a)pyrene	mg/kg	0.1	MCERTS	-				
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	-				
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	-				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-				

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575669				
Sample Reference				TP05				
Sample Number				None Supplied				
Depth (m)				0.20				
Date Sampled				10/05/2016				
Time Taken				1300				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-				
PCB Congener 52	mg/kg	0.001	MCERTS	-				
PCB Congener 101	mg/kg	0.001	MCERTS	-				
PCB Congener 118	mg/kg	0.001	MCERTS	-				
PCB Congener 138	mg/kg	0.001	MCERTS	-				
PCB Congener 153	mg/kg	0.001	MCERTS	-				
PCB Congener 180	mg/kg	0.001	MCERTS	-				
Total PCBs	mg/kg	0.007	MCERTS	-				

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575650	575651	575652	575653	575654
Sample Reference				TP05	TP07	TP16	TP18	TP19
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	0.50	0.50	0.50
Date Sampled				10/05/2016	10/05/2016	12/05/2016	12/05/2016	12/05/2016
Time Taken				1300	1430	0900	1045	1150
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	6.6	6.6	6.7	6.8	6.9
Electrical Conductivity	µS/cm	10	NONE	150	160	180	110	180
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Free Cyanide	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
Sulphate as SO_4	µg/l	100	ISO 17025	932	1220	1600	5860	9250
Chloride	mg/l	4	NONE	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Fluoride	µg/l	50	NONE	280	700	720	240	510
Ammonium as NH_4	µg/l	15	NONE	73	62	51	100	54
Nitrate as N	mg/l	0.01	NONE	0.56	0.56	0.88	0.15	0.95
Nitrate as NO_3	mg/l	0.05	NONE	2.49	2.46	3.90	0.65	4.21
Nitrite as N	µg/l	1	NONE	23	37	9.1	< 1.0	10
Nitrite as NO_2	µg/l	5	NONE	76	120	30	< 5.0	34
Hardness - Total	mgCaCO3/l	1	NONE	87.6	70.2	83.1	48.8	91.8
Bromate (Subcontracted)	µg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols								
Total Phenols	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(ghi)perylene	µg/l	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PAH Sums								
Sum of Benzo(b)fluoranthene & Benzo(k)fluoranthene	µg/l	0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Sum of Benzo(ghi)fluoranthene & Indeno(1,2,3-cd)pyrene	µg/l	0.002	NONE	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Sum of Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(ghi)fluoranthene & Indeno(1,2,3-cd)pyrene	µg/l	0.022	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575650	575651	575652	575653	575654
Sample Reference				TP05	TP07	TP16	TP18	TP19
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	0.50	0.50	0.50
Date Sampled				10/05/2016	10/05/2016	12/05/2016	12/05/2016	12/05/2016
Time Taken				1300	1430	0900	1045	1150
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Aluminium (dissolved)	mg/l	0.012	ISO 17025	0.62	0.027	0.059	0.54	0.096
Antimony (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7	< 1.7	16	3.7
Arsenic (dissolved)	µg/l	1.1	ISO 17025	< 1.1	< 1.1	< 1.1	4.6	< 1.1
Barium (dissolved)	µg/l	0.05	ISO 17025	12	14	9.9	94	62
Boron (dissolved)	µg/l	10	ISO 17025	11	10	< 10	19	34
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
Chromium (hexavalent)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	29	< 5.0
Chromium (III)	µg/l	1	NONE	1.2	< 1.0	< 1.0	< 1.0	< 1.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	1.2	0.7	0.7	26	0.6
Cobalt (dissolved)	µg/l	0.3	ISO 17025	0.5	< 0.3	0.3	0.6	< 0.3
Copper (dissolved)	µg/l	0.7	ISO 17025	3.0	3.0	1.4	2.6	2.2
Iron (dissolved)	mg/l	0.004	ISO 17025	0.66	0.061	0.11	0.36	0.18
Lead (dissolved)	µg/l	1	ISO 17025	1.6	1.2	1.3	2.1	1.8
Manganese (dissolved)	µg/l	0.06	ISO 17025	5.3	0.74	1.9	5.4	4.2
Mercury (dissolved)	µg/L	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	0.9	3.0	1.6	4.2	3.1
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.1	0.6	6.7	4.3	3.7
Silver (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Tin (dissolved)	µg/l	1	ISO 17025	1.7	< 1.0	1.3	< 1.0	1.2
Vanadium (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7	< 1.7	25	< 1.7
Zinc (dissolved)	µg/l	0.4	ISO 17025	3.9	3.7	3.2	24	3.1

Calcium (dissolved)	mg/l	0.012	ISO 17025	34	28	33	19	35
Magnesium (dissolved)	mg/l	0.005	ISO 17025	0.36	0.38	0.44	0.21	1.1
Sodium (dissolved)	mg/l	0.01	ISO 17025	4.8	1.6	1.4	1.2	3.0

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575655	575656	575657		
Sample Reference				TP20	TP24	TP29		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.50	0.50	0.50		
Date Sampled				12/05/2016	13/05/2016	13/05/2016		
Time Taken				1245	0900	1400		
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	7.0	7.0	7.1		
Electrical Conductivity	µS/cm	10	NONE	120	120	110		
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10		
Free Cyanide	µg/l	10	NONE	< 10	< 10	< 10		
Sulphate as SO_4	µg/l	100	ISO 17025	968	1600	2520		
Chloride	mg/l	4	NONE	< 4.0	< 4.0	< 4.0		
Fluoride	µg/l	50	NONE	380	610	630		
Ammonium as NH_4	µg/l	15	NONE	110	49	100		
Nitrate as N	mg/l	0.01	NONE	0.19	0.14	0.08		
Nitrate as NO_3	mg/l	0.05	NONE	0.84	0.63	0.34		
Nitrite as N	µg/l	1	NONE	9.3	1.3	< 1.0		
Nitrite as NO_2	µg/l	5	NONE	31	< 5.0	< 5.0		
Hardness - Total	mgCaCO3/l	1	NONE	54.8	59.6	48.6		
Bromate (Subcontracted)	µg/l	2	NONE	< 2.0	< 2.0	< 2.0		
Total Phenols								
Total Phenols	µg/l	1	NONE	To follow	< 1.0	< 1.0		
Speciated PAHs								
Naphthalene	µg/l	0.01	NONE	To follow	< 0.01	< 0.01		
Anthracene	µg/l	0.01	NONE	To follow	< 0.01	< 0.01		
Fluoranthene	µg/l	0.01	NONE	To follow	< 0.01	< 0.01		
Benzo(b)fluoranthene	µg/l	0.01	NONE	To follow	< 0.01	< 0.01		
Benzo(k)fluoranthene	µg/l	0.01	NONE	To follow	< 0.01	< 0.01		
Benzo(a)pyrene	µg/l	0.01	NONE	To follow	< 0.01	< 0.01		
Indeno(1,2,3-cd)pyrene	µg/l	0.001	NONE	To follow	< 0.001	< 0.001		
Benzo(ghi)perylene	µg/l	0.001	NONE	To follow	< 0.001	< 0.001		
PAH Sums								
Sum of Benzo(b)fluoranthene & Benzo(k)fluoranthene	µg/l	0.02	NONE	To follow	< 0.02	< 0.02		
Sum of Benzo(ghi)fluoranthene & Indeno(1,2,3-cd)pyrene	µg/l	0.002	NONE	To follow	< 0.002	< 0.002		
Sum of Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(ghi)fluoranthene & Indeno(1,2,3-cd)pyrene	µg/l	0.022	NONE	To follow	< 0.02	< 0.02		

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Analytical Report Number: 16-17963

Project / Site name: Rudloe

Your Order No: C161303-G3647

Lab Sample Number				575655	575656	575657		
Sample Reference				TP20	TP24	TP29		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.50	0.50	0.50		
Date Sampled				12/05/2016	13/05/2016	13/05/2016		
Time Taken				1245	0900	1400		
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Aluminium (dissolved)	mg/l	0.012	ISO 17025	0.016	0.42	0.014		
Antimony (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7	< 1.7		
Arsenic (dissolved)	µg/l	1.1	ISO 17025	< 1.1	< 1.1	< 1.1		
Barium (dissolved)	µg/l	0.05	ISO 17025	10	5.5	3.5		
Boron (dissolved)	µg/l	10	ISO 17025	< 10	< 10	< 10		
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08		
Chromium (hexavalent)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0		
Chromium (III)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0		
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4	1.0	0.8		
Cobalt (dissolved)	µg/l	0.3	ISO 17025	< 0.3	< 0.3	0.5		
Copper (dissolved)	µg/l	0.7	ISO 17025	2.2	3.2	1.1		
Iron (dissolved)	mg/l	0.004	ISO 17025	0.013	0.34	0.012		
Lead (dissolved)	µg/l	1	ISO 17025	1.2	< 1.0	< 1.0		
Manganese (dissolved)	µg/l	0.06	ISO 17025	2.6	9.3	3.3		
Mercury (dissolved)	µg/L	0.01	NONE	< 0.01	< 0.01	< 0.01		
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	1.4	1.6	1.8		
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.9	5.4	1.0		
Silver (dissolved)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0		
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0		
Tin (dissolved)	µg/l	1	ISO 17025	< 1.0	1.1	< 1.0		
Vanadium (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7	< 1.7		
Zinc (dissolved)	µg/l	0.4	ISO 17025	14	52	2.8		

Calcium (dissolved)	mg/l	0.012	ISO 17025	22	24	19		
Magnesium (dissolved)	mg/l	0.005	ISO 17025	0.17	0.20	0.061		
Sodium (dissolved)	mg/l	0.01	ISO 17025	1.6	1.8	2.1		

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Preliminary Report Number : 16-17963

Project / Site name: Rudloe

* 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 topsoil/loam 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 *
575608	TP01	None Supplied	0.20	Brown loam and clay with vegetation.
575609	TP01	None Supplied	1.00	Light brown loam and sand with gravel.
575610	TP02	None Supplied	0.20	Brown loam and clay with gravel and vegetation.
575611	TP03	None Supplied	0.20	Brown loam and clay with gravel and vegetation.
575612	TP04	None Supplied	0.60	Brown loam and clay with vegetation.
575613	TP04	None Supplied	1.00	Light brown loam and sand with gravel.
575614	TP05	None Supplied	1.00	Grey clay and sand.
575615	TP06	None Supplied	0.50	Brown loam and clay with gravel.
575616	TP07	None Supplied	0.50	Light brown sandy clay.
575617	TP08	None Supplied	0.60	Light brown clay and loam with vegetation.
575618	TP09	None Supplied	0.50	Brown loam and clay with vegetation.
575619	TP09	None Supplied	1.00	Grey clay and sand.
575620	TP10	None Supplied	0.50	Brown loam and clay with gravel.
575621	TP10	None Supplied	2.00	Grey sandy clay.
575622	TP11	None Supplied	0.50	Light brown loam and clay.
575623	TP13	None Supplied	0.20	Brown loam and clay with gravel and vegetation.
575624	TP13	None Supplied	1.20	Light brown clay with gravel.
575626	TP15	None Supplied	0.50	Grey clay and sand with brick.
575627	TP16	None Supplied	0.50	Brown loam and clay with vegetation.
575628	TP17	None Supplied	0.40	Brown loam and clay with vegetation.
575629	TP18	None Supplied	0.50	Brown loam and sand with gravel.
575630	TP18	None Supplied	1.00	To Follow
575631	TP19	None Supplied	0.50	Brown loam and clay with vegetation.
575632	TP20	None Supplied	0.20	Brown loam and clay with vegetation.
575634	TP20	None Supplied	1.20	Light brown sandy clay.
575635	TP21	None Supplied	0.20	Brown loam and clay with vegetation.
575636	TP22	None Supplied	0.20	Brown loam and clay with vegetation.
575637	TP22	None Supplied	0.30	Light brown loam and clay with gravel and vegetation.
575638	TP23	None Supplied	0.20	Brown clay and sand with gravel.
575639	TP23	None Supplied	0.60	Brown loam and clay with vegetation.
575640	TP24	None Supplied	0.20	Brown loam and clay with vegetation.
575641	TP24	None Supplied	0.50	Light brown clay and sand with vegetation.
575642	TP25	None Supplied	0.20	Brown clay and loam with vegetation.
575643	TP26	None Supplied	0.20	Light brown clay and sand with gravel and vegetation.
575644	TP27	None Supplied	0.20	Brown loam and clay with gravel.
575645	TP27	None Supplied	1.30	Light brown clay and sand.
575646	TP28	None Supplied	0.25	Brown loam and clay with gravel.
575647	TP29	None Supplied	0.50	Light brown clay and sand with vegetation.
575648	TP29	None Supplied	1.90	Grey clay and sand.
575649	TP30	None Supplied	0.20	Brown loam and clay with brick and vegetation.
575669	TP05	None Supplied	0.20	Brown loam and clay with gravel and vegetation.

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Preliminary Report Number : 16-17963

Project / Site name: Rudloe

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
Ammonium as NH4 in leachate	Determination of Ammonium/Ammonia/Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	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 in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	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
Bromate in Leachate Subcon	Bromate in Leachate - Subcontracted Analysis.	Subcontracted Analysis	PL	W	NONE
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride in leachate	Determination of chloride in leachate by titration against silver nitrate.	In house based on MEWAM Method ISBN 0117516260.	L024-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests. 2:1 extraction.	L082-PL	D	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Electrical conductivity of leachate	Determination of electrical conductivity in leachate by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031-PL	W	NONE
Fluoride in leachate	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033-PL	W	NONE
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L023-PL	D	NONE
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	NONE
Free cyanide in soil	Determination of free 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
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	NONE
Hexavalent chromium in soil (Lower Level)	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

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Preliminary Report Number : 16-17963

Project / Site name: Rudloe

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
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Mercury Low Level in Leachate	Determination of mercury in leachate by CV-AFS.	In-house method based on USEPA method 1631	L085-PL	W	NONE
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	NONE
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
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	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
Nitrate, leachate soluble, in leachate	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	NONE
Nitrate, water soluble, in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	D	NONE
Nitrite, leachate soluble, in leachate	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton & Polish Standard Method PN-82/C-04579.08	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton & Polish Standard Method PN-82/C-04579.08	L077-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
pH in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by GCMS	Determination of speciated phenols in leachate by extraction in hexane followed by GC-MS.	In-house method based on USEPA 8270	L070-PL	W	NONE
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
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	L070-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
Specific PAH sums in leachate	Determination of PAH compounds in leachate by extraction in hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L070-PL	W	NONE

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Preliminary Report Number : 16-17963

Project / Site name: Rudloe

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
Sulphate in leachates	Determination of sulphate 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
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in leachate	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	ISO 17025
Total Hardness of leachates	Determination of hardness in leachates by calculation from calcium and magnesium.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	NONE
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
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 based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038-PL	D	NONE
TPH Chromatogram	TPH Chromatogram.	In-house method	L064-PL	D	NONE
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding.	L076-PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L076-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

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.

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Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref
TP04		S	16-17963	575612	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL
TP04		S	16-17963	575612	b	TPHCWG (Soil)	L076-PL

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Test Deviation code
b
b

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Appendix **I**

British Geological Survey Radon Report

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British Geological Survey
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GeoReports

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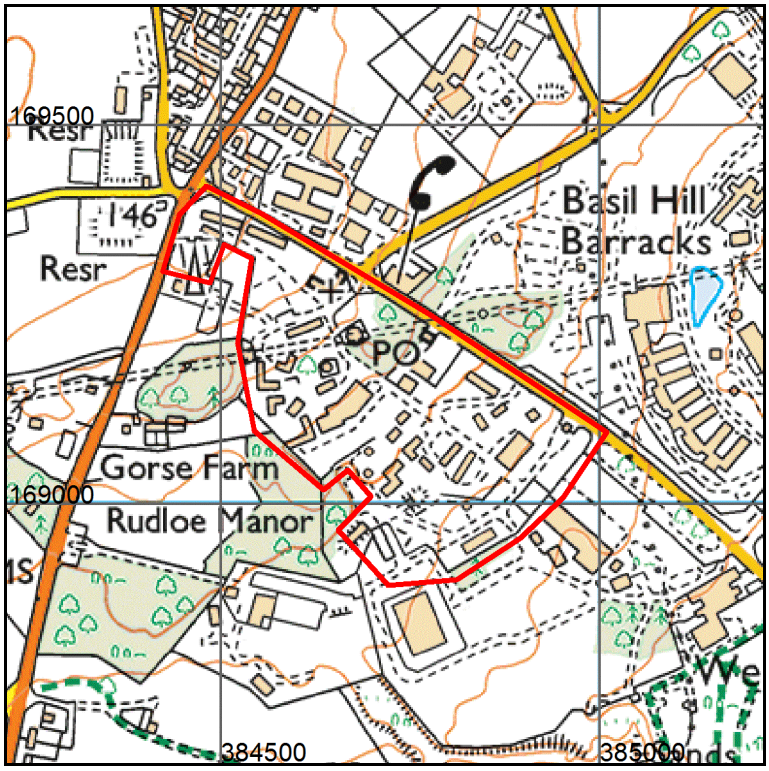
Radon Report: England and Wales

Advisory report on the requirement for radon protective measures in new buildings, conversions and extensions to existing buildings. The report also indicates whether a site is located within a radon Affected Area

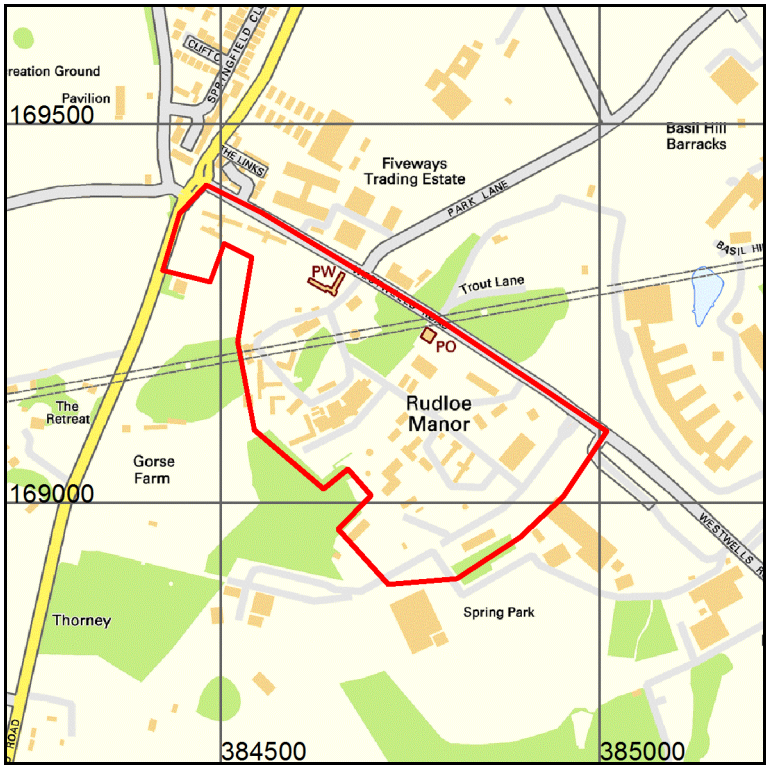
Report Id: ***GR_213836/1***

Client reference: C161303 Rudlloe

Search location



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Scale: 1:10 000 (1cm = 100 m)



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OS Street View: Scale: 1:10 000 (1cm = 100 m)

This report describes a site located at National Grid Reference 384716, 169156. Note that for sites of irregular shape, this point may lie outside the site boundary. Where the client has submitted a site plan the assessment will be based on the area given.

Search location indicated in red

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Radon Report: England and Wales

This is an advisory report on the requirement for radon protective measures in new buildings, conversions and extensions. The report also indicates whether a site is located within a radon Affected Area

Requirement for radon protective measures
The determination below follows advice in *BR211 Radon: Guidance on protective measures for new buildings (2007 edition)*, which also provides guidance on what to do if the result indicates that protective measures are required.

NO RADON PROTECTIVE MEASURES ARE REQUIRED FOR THE REPORT AREA.

The BGS is not able to provide advice on the technical specifications of 'basic' and 'full' radon protective measures. This information is detailed in **BRE Report BR211 Radon: guidance on protective measures for new buildings** which may be purchased from **brebookshop.com.** This report offers guidance on the technical solutions that are required to satisfy Building Regulations requirements.

Technical solutions to radon protection in new build and existing dwellings in radon affected areas are available on the BRE web site at:
http://www.bre.co.uk/page.jsp?id=1626 and http://www.bre.co.uk/radon/ and in a range of technical reports available from **brebookshop.com;** Tel: 01923 664262, email: bookshop@bre.co.uk.
Summary guidance is available on the web at:
http://www.bre.co.uk/radon/protect.html.

If you require further information or guidance, you should contact your local authority building control officer or approved inspector.

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Radon in existing buildings

Is this property in a radon affected area – NO

The answer to the standard enquiry on house purchase known as **CON29 Standard Enquiry of Local Authority 3.13 Radon Gas: Location of the Property in a radon Affected Area is NO** this property is not in a Radon Affected Area as defined by Public Health England (PHE).

The estimated probability of the property being above the Action Level for radon is: 0-1% (LOWER PROBABILITY).

The result informs you of the estimated probability that this particular property is above the Action Level for radon. This does not necessarily mean there is a radon problem in the property. The only way to determine whether it is above or below the Action Level is to carry out a radon measurement within the existing property.

Radon Affected Areas are designated by Public Health England. They advise that radon gas should be measured in all properties within Radon Affected Areas.

If you are buying a new build property in a Radon Affected Area, you should ask the builder whether radon protective measures were incorporated in the construction of the property.

If you are buying a currently occupied property in a Radon Affected Area you should ask the present owner whether radon levels have been measured in the property. If they have, ask whether the results were above the Radon Action Level and if so whether remedial measures were installed, radon levels were retested, and the that the results of re-testing confirmed the effectiveness of the measures.

In radon affected homes, the problem of radon can usually be tackled with simple, effective and relatively inexpensive measures. These measures are comparable in cost to work such as damp-proofing and timber treatment. You can get practical advice about construction work to reduce radon levels from the Building Control Officer at your local council.

For further information, advice about radon, its health risks and details of how to order the radon test, please contact the PHE Radon Helpline on 01235 822622 or go online at www.ukradon.org or write to Radon Survey, Public Health England, Centre for Radiation, Chemical and Environmental Hazards, Chilton, Didcot, Oxon, OX11 0RQ, email: radon@hpa.org.uk. You can obtain an information pack from the PHE free Radon answerphone on 0800 614529

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What is radon?

Radon is a naturally occurring radioactive gas, which is produced by the radioactive decay of radium which, in turn, is derived from the radioactive decay of uranium. Uranium is found in small quantities in all soils and rocks, although the amount varies from place to place. Radon released from rocks and soils is quickly diluted in the atmosphere. Concentrations in the open air are normally very low and do not present a hazard. Radon that enters enclosed spaces such as some buildings (particularly basements), caves, mines, and tunnels may reach high concentrations in some circumstances. The construction method and degree of ventilation will influence radon levels in individual buildings. A person's exposure to radon will also vary according to how particular buildings and spaces are used.

Inhalation of the radioactive decay products of radon gas increases the chance of developing lung cancer. If individuals are exposed to high concentrations for significant periods of time, there may be cause for concern. In order to limit the risk to individuals, the Government has adopted an Action Level for radon in homes of 200 becquerels per cubic metre (Bq m^{-3}). The Government advises householders that, where the radon level exceeds the Action Level, measures should be taken to reduce the concentration.

Radon in workplaces

The Ionising Radiation Regulations, 1999, require employers to take action when radon is present above a defined level in the workplace. Advice may be obtained from your local Health and Safety Executive Area Office or the Environmental Health Department of your local authority. The BRE publishes a guide (BR293)**: Radon in the workplace.** BRE publications may be obtained from the BRE Bookshop, Tel: 01923 664262, email: bookshop@bre.co.ukwebsite: www.brebookshop.com

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- Detail, which is clearly defined and accurately depicted on large-scale maps, may be lost when small-scale maps are derived from them.
- Although samples and records are maintained with all reasonable care, there may be some deterioration in the long term.
- The most appropriate techniques for copying original records are used, but there may be some loss of detail and dimensional distortion when such records are copied.
- Data may be compiled from the disparate sources of information at BGS's disposal, including material donated to BGS by third parties, and may not originally have been subject to any verification or other quality control process.
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- The topography shown on any map extracts is based on the latest OS mapping and is not necessarily the same as that used in the original compilation of the BGS geological map, and to which the geological linework available at that time was fitted.
- Note that for some sites, the latest available records may be quite historical in nature, and while every effort is made to place the analysis in a modern geological context, it is possible in some cases that the detailed geology at a site may differ from that described.

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BGS Enquiry Service

Appendix **J**

DE&S Rudloe Phase I Explosive Ordnance Risk Assessment

This appendix may not be included in the printed report to reduce the document size, but is included in the digital version.

DE&S Rudloe

Phase I Explosive Ordnance Risk Assessment

ESG/10/026



Defence Equipment & Support

MINISTRY OF DEFENCE

DE&S RUDLOE
PHASE I Explosive Ordnance Risk Assessment

ESG/10/026
March 2010

Report Prepared for:

Major Tony Hastings
DE Ops South

This Explosive Ordnance Risk Assessment (EORA) should be used for the following purposes:

- **Identification of areas of potential land contamination (or areas of concern). These should be included in the site risk register;**
- **Identification of areas of concern to be included in Part 4b of the Statement of Known Hazards (relating to potential for underground obstructions, buried ordnance and buried chemicals or hazardous substances);**
- **Provision of information to regulatory bodies (primarily the Local Authority and Environment Agency, or SEPA in Scotland).**

The EORA is 'owned' by the Head of Establishment (HoE) who should nominate the most suitable person for storage and upkeep of the information (e.g. Site Estates Representative (SER), Site Environmental Protection Officer (EPO), Site Safety, Health, Environment and Fire (SHEF) representative).

This statement is endorsed by Defence Estates.

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Deputy Head of Environmental
Science Group

This document has been prepared for DE&S Rudloe. Feedback from site staff is encouraged and questions regarding the report welcomed. ESG has expertise in various environmental areas including waste management, land remediation, environmental chemistry and environmental engineering. The group's core functions are:

- **Land Quality Assessment**
- **Environmental Risk Assessment**
- **Demilitarisation of Land**

Please contact ESG if you require environmental advice, information or any of the above services at the following address:

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A SITE LOCATION PLAN
B SITE LAYOUT PLAN
C HISTORICAL MAPS
D AERIAL PHOTOGRAPHS
E SITE WALKOVER PHOTOGRAPHS

1 INTRODUCTION

1.1 Tasking

The Environmental Science Group (ESG) of the Defence Equipment and Support (DE&S) were tasked by Major Tony Hastings under verbal request of June 2009 to undertake a Phase I Explosive Ordnance Risk Assessment (EORA) of the site known as DE&S Rudloe. This report also includes Gorse Farm, located to the south-west of DE&S Rudloe and farmland and woodland to the south. An Explosive Ordnance Risk Assessment of this site is required in order to assess the present condition of the site in compliance with MoD policy.

1.2 Assessment Objectives

The aims and objectives of the Phase I assessment were as follows:

- to assess the general likelihood of explosive ordnance contamination;
- to identify potential contamination distribution, depth, density, type and condition;
- to assess the findings in terms of risk to human receptors such as current site staff and people using the site in the future;
- to assess the findings in terms of risk, to the current and future built and environmental receptors;
- to make recommendations for further investigation and risk mitigation if necessary.

The EORA only considers risks to receptors from the activities that occur or that have previously occurred on the site. It is not a survey of the buildings themselves and the fabric or construction condition of the buildings has not been considered in this report. This report does not include explosive residues.

1.3 Work Programme

The scope of work for the desk study was as follows;

- meeting with the relevant personnel to obtain historical, military and current information on site specifications and uses;
- researching enemy action (e.g. World War II bombs), military contamination and defensive ordnance (e.g. pipe mines);
- site reconnaissance to investigate buildings/areas which may have been used for storage or use of ordnance;
- review of information provided by, the following government and non-governmental sources:-
    - Ordnance Survey Maps;
    - National Archives;
        - AIR 28/1262;
        - AIR 28/1701
        - AIR 28/2104
        - AIR 28/2105;
        - AIR 28/2305;
    - National Monuments Record Centre (English Heritage);
    - EnviroCheck® report;
    - N.J. McCamley, Secret Underground Cities, Pen & Sword, 1998.

The Environmental Science Group has prepared this report on the basis of the available information obtainable during the study period. Every reasonable effort has been made to obtain all relevant information, however if additional data becomes available in the future, this assessment may need to be reviewed.

This report does not include the underground areas or the small firing range in the south of the site.

2 SITE DESCRIPTION

2.1 Site Location

The National Grid reference for DE&S Rudloe is ST 847 689 (Ordnance Survey Map 1:50,000 series: Sheet No. 173, Swindon and Devizes). The main DE&S Rudloe site lies to the south of Westwells Road, south-west of Corsham. Gorse Farm and associated land and the open land and woodland are located to the west of Bradford Road.

A Site Location Plan can be found in Appendix A.

2.2 Current Site Use

DE&S Rudloe consists of approximately 40 hectares and comprises of the main DE&S Rudloe site, Gorse Farm with associated land and open land and woodland to the south.

The main DE&S Rudloe site contains a number of buildings of a variety of sizes located on hardstanding. The western boundary of the site is heavily overgrown and slightly higher then the ground within DE&S Rudloe.

Ventilation or air shafts for Box Tunnel which runs underneath the site are visible in a straight line across the site, running east to west. Access shafts and air shafts for the underground workings beneath DE&S Rudloe are also visible across the site. Access into the underground area is not allowed and are blocked or fenced off.

Gorse Farm is located outside of the security fence of DE&S Rudloe and can be accessed from Bradford Road. It comprises of a large farm house and associated outhouses, all of which have been bricked up, preventing access. This land does not appear to have been used for a number of years and is heavily overgrown.

The open land and woodland are also accessed from Bradford Road and appear to be currently used by local people for walking dogs and running. Thorney Pits is labelled on the site maps in the south-west corner of the site.

Spring Quarry is located underneath the eastern section of DE&S Rudloe and was converted to a factory during WWII. Access shafts to Spring Quarry are located across the eastern part of the site, all of which have limited access. Box Tunnel passes underneath the northern part of the site.

A Site Layout Plan, showing the different areas can be found in Appendix B.

2.3 Surrounding Land Use

DE&S Rudloe is located to the south-west of both Basil Hill Barracks and the underground Tunnel Quarry, (a WWII ammunition depot). Westwells Road runs along the north-east boundary of the site and Bradford Road runs along the western boundary.

A ‘spur’ of light industrial and agricultural land with buildings of a variety of sizes is located going into the centre of the main Rudloe site, from the east (i.e. south of the main site and north of the open land and woodland), with access from Westwells Road, near Westwells village. Some of this land may have originally been part of DE&S Rudloe, with access from within the fenced area of the site. Round Wood is adjacent to the southern boundary.

The village of Westwells is located directly east of the site, with Rudloe village to the north and Box Hill to the north-west. Fiveways Trading Estate is located to the north of the site.

3 SITE HISTORY

3.1 General

Bath stone has been quarried in the Bath area since Roman times. Isambard Kingdom Brunel built Box Tunnel in 1838 and the extent of the stone in the area was established.

A large part of the Pockeredge Estate was purchased in 1936 to provide the spacious layout of Basil Hill Barracks, with the house converted into the Royal Army Ordnance Corps (RAOC) Officers Mess.

In August 1960, it was announced that CAD Corsham would close. Four years were scheduled to clear the 300,000 tons of ammunition that were stored in the depot. The stocks were sent to small aboveground depots. A large amount of the stock was also dumped into the sea. The last box of ammunition left Tunnel on the 4th of December, 1962.

Tunnel Quarry, located beneath Basil Hill Barracks, held a wide variety of ammunition, with some shells weighing up to 1 ton each. Browns Quarry, a small independent quarry to the north of Tunnel, was located underneath the former manor site of RAF Rudloe Manor. The quarry was converted into the secure underground Command Centre for No. 10 Group RAF Fighter Command. It included a large wood-panelled hexagonal operations room with plotting table, over looked by two mezzanine floors. The room is 45 ft high, with no roof supports used.

Construction of the underground factory in Spring Quarry began in 1941 and was completed in 1942. The factory was used to build aircraft engines, though it never reached full output and was shut in 1945. Part of Spring Quarry was converted into an emergency war headquarters that would run the country in the event of a war.

RAF Rudloe Manor was built during WWII. The main site was used as a communication centre both during and after the war. The site was also used as accommodation for the mine construction workers and site workers. After the war, many of the hostel buildings were converted into office blocks. The manor site of RAF Rudloe Manor was closed in 2000.

3.2 Historical Maps

The historical maps which accompany this section have been sourced from a variety of sources and can be found in Appendix C. The red outline indicates the position of the present site boundary. Pertinent information illustrated by the historical maps is present in Table 3.1 (e.g. change of land use, infrastructure development, potentially contaminative activities):

Table 3.2.1: Historical Map Information.

Map Type/Title Date	Observations
Wiltshire 1898 1:10,000	The location of DE&S Rudloe is mostly agricultural land, with pockets of woodland along the line of Box Tunnel, which runs underneath the site. This woodland is called The Tips Coverts and is in two sections, both clustered around air shafts for the tunnel. Thorney Pits is shown in the south-west corner of the site and is made up of woodland. Part of the southern area of the site is marked as rough pasture. Westwells Farm is located to the west of the site and Rudloe House and Rudloe College are to the north. Seven Shaft Quarry and Spring Quarry are situated to the east of the site. Old Pits woodland is located in the section between the northern and southern parts of the site.
Wiltshire 1901 1:10,000	The site appears unchanged from the previous map. Old Quarries are shown located to the east of Thorney Pits, on land adjacent to the site. Three air shafts are also shown in the vicinity of the Old Quarries. Sands Quarry is located on the south-east boundary of the site.
Wiltshire 1923 1:10,000	Gorse Farm is shown on the map, comprising of three buildings and small paddocks or fields. A reservoir is located in the northern corner of the site. Sands Quarry is now shown as disused.
Ordnance Survey 1955/1960/1961 1:10,000	The Rudloe site is on the 1960 and 1961 parts of the map and is shown for the first time. A large number of buildings of a variety of sizes are located across the site. Gorse Farm is still shown on the map, with the immediate area around clear of any additional buildings. A hostel is labelled on the map in the south-west corner. The south-east corner is shown to be raised land. The two areas of woodland previously labelled as The Tips Coverts is still shown on the map, but no longer labelled. Thorney Pits is no longer labelled on the map; however the area is still shown as woodland. A large amount of building has occurred to the north of the site, in the area currently Basil Hill Barracks. Further building has occurred to the east of the site, close to Westwells village. Spring Quarry and Sands Quarry are no longer shown on the map. Building has occurred around both quarries. The village of Rudloe has expanded in a southernly direction.
Ordnance Survey 1975/1976 1:10,000	The site is located on the 1976 part of the map and is labelled as RAF Rudloe Manor. A number of the buildings within the site have been either modified or replaced. The buildings in the south-west of the site, including the hostel are no longer shown and the area now appears to be agriculture land. Thorney Pits is now shown on the map. Sands Quarry is shown on the south-east boundary and is now labelled as disused. Basil Hill Barracks to the north is now labelled on the map and further building has occurred.
Ordnance Survey 1976/1981/1982/1992 1:10,000	The site is located on the 1976 and 1992 parts of the map and appears unchanged from the previous map. The field to the south of Gorse Farm has been subdivided and the smaller field has an air shaft present. The surrounding area appears unchanged from the previous map.

3.3 Aerial Photographs

Aerial photographs provided by the English Nature National Monument Record Centre are included in Appendix D. Pertinent information concerning DE&S Rudloe is present in Table 3.3.1 below:

Table 3.3.1: Aerial Photograph Information

Reference and Date	Comment
RAF/106G/UK/1415 14th April 1946 Unknown height	The southern most part of the site is not covered by this photograph. There are numerous flat roofed buildings across the north and west of the site. The land surrounding these buildings appears to be hardstanding and vegetation, with two wooded areas to the north. Gorse Farm is visible to the south-west of the western wooded area. The open land to the south of Gorse Farm appears to be being used as open-air storage. Air shafts for Box Tunnel and the underground works are visible. The southern section of the site, south of Thorney Pits is covered in flat roofed buildings. Excavation or similar works appears to be in progress to the north of Thorney Pits. Some sort of ground disturbance is also shown in the south-east corner of the site, tying in with the area shown as raised on the 1960/61 map. Buildings of a similar construction to the buildings on site are located to the north of Rudloe, in the area now known as Basil Hill Barracks. Flat roofed buildings, open-aired storage and a car park are located on the area of land located between the northern and southern sections of the site. Agricultural land is situated to the west and north-west.
OS/66061 16th May 1966 7,500'	This photograph does not include the southern section of the site. The main part of the site does not appear to have drastically changed from the previous photograph. A few small buildings in the north-east of the site are no longer visible. A wooded area is now visible in the centre of the site and Gorse Farm is now surrounded by trees. The open-air storage previously seen to the south of Gorse Farm is now no longer visible. The air vents and access shafts for the underground areas and Box Tunnel are more visible in this photograph. The wooded area around Thorney Pits has increased in a northernly direction. The buildings visible in the south of the site (the 'Hostel' area) in the previous photograph have disappeared and the land now appears to be grassland. The land between the northern and southern sections of the site appears unchanged from the previous photograph. Construction of a number of buildings has occurred directly north of the site.
OS/98437 17th September 1998 Unknown height	This photograph does not show the northern tip of the site. A number of the buildings in the northern section of the site are no longer visible. The southern section of the site is agricultural or grass land. The area to the south-east is now shown to be heavily wooded. The land to the south of the site is predominantly agricultural, with two areas of woodland. An area containing small buildings is located adjacent to the southern boundary.

3.4 Bombing Records and Abandoned Bomb Register

The only enemy attacks recorded in the Corsham area hit Monkton Farleigh, located south-west of the site, in August 1940, though were likely to be intended for Colerne airfield to the north.

4 ENVIRONMENTAL SETTING

4.1 Geology

Information gained from the Geological Survey Map of Great Britain (England and Wales) for Bath, sheet number 265, (1:50,000 series, 1965 Solid and Drift map) shows that DE&S Copenacre lies on Forest Marble, over Great Oolite Limestone and Fuller's Earth. The map indicates that there is no drift present.

Corsham Fault passes under the site, running in a north-east to south-west direction. The difference between the two sides of the fault is believed to be 20 feet.

Forest Marble is a laminated shelly limestone alternating with clays and calcareous sandstones. Fuller's Earth is a non-plastic clay or claylike earthy material, usually with high magnesium oxide content. Great Oolite Limestone grades from a sandy clay in lower levels to limestone in the upper.

4.2 Hydrogeology

The groundwater vulnerability map of the Southern Cotswolds (Sheet 37) published by the National Rivers Authority (now the Environment Agency) shows the site to be mostly underlain by a minor aquifer with high leaching potential. The south-east corner of the site is a minor aquifer with low soil classes and the south-west corner is shown to be a major aquifer with a high soil class.

4.3 Hydrology

There are no surface water features within DE&S Rudloe.

4.4 Conservation Designations

There are no conservation designations within DE&S Rudloe. An Area of Outstanding Natural Beauty is located directly west of the site, across Bradford Road. Kingsmoor Wood, an Ancient Replanted Woodland is located to the south.

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5 SITE WALKOVER

A site walkover was conducted by two members of ESG on the 26th of October 2009.

During this visit up to date information concerning explosive ordnance risk was gained supported by a visual survey, review of documentation, interviews and anecdotal information from site personnel.

A number of photographs taken during the site walkover may be found in Appendix E.

The walkover commenced in the fenced area of DE&S Rudloe. The majority of the buildings appear to be of WWII age construction. The buildings are surrounded by hardstanding and grass. The western section of the site, near the boundary, is slightly higher than the rest of the site, and is covered with trees. An outdoor training area for weapon handling is located on the western boundary. ESG staff was informed that firing does not and has not occurred here. A canon was observed outside of a building. ESG staff was informed that the canon has been certified free from explosives.

Access shafts to the underground areas are visible across the main site. The shafts are either bricked up or fenced off. Construction work is being carried out on a number of the shafts. Two large ventilation shafts for Box Tunnel are also visible on site.

Gorse Farm is accessed from Bradford Road. All the windows and doors in the farmhouse and outbuildings have been bricked up, preventing access. The immediate area around the farm buildings is severely overgrown with nettles and gorse, with woodland to the north. The wooded area to the north of Gorse Farm is higher than the surrounding area. A brick ventilation shaft is located in the woods to the north of Gorse Farm, possibly for Box Tunnel. The land to the south of Gorse Farm is open grassland and appears to not be farmed.

The southern part of DE&S Rudloe comprises of open grassland to the west and a wooded section to the east. A substation is situated within the grassland and is fenced off from the surrounding area. A footpath runs across the grassed area, to the wooded area and then along the southern boundary. A raised area is located within the wooded area, which shows signs of having been worked historically. A section of concrete pipe and a wall were located next to the footpath and could possible be part of an old assault course.

A small firing range, which is not included in this report as it is to be retained by the MoD, is located on the south-east boundary of the site, within the wooded section.

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6 PRELIMINARY RISK ASSESSMENT

6.1 General

The risk assessment relies on researched historical documentary records, site reconnaissance and information obtained from site personnel, to initially determine and identify the areas of the site which may have the potential for ordnance contamination.

This section assesses the main contaminants in terms of source description, pathway and sensitive receptor or target.

6.2 Source-Pathway-Receptor

Ordnance contamination may present an explosive risk by a variety of pathways to one or more targets which, in turn, vary in importance depending on the site's setting and current and/or proposed use. The established source-pathway-receptor model is used as follows:

Source (Hazard): In this risk assessment the hazard term is confined to explosive ordnance and energetic materials. The risk considered is that related to a detonation or deflagration. The magnitude of the hazard is related to the Net Explosive Quantity (NEQ) and the fragmentation characteristics of the explosive ordnance. Whilst certain energetic materials may have toxic properties, the toxicity risk will be considered in more detail in the exposure assessment undertaken within the site Land Quality Assessment.

Pathway: This is the route by which the hazard reaches a sensitive receptor. In this assessment it is considered as the mechanism by which the energy in the ordnance is transferred harmfully to the receptor. It is related to both the accessibility of the ordnance and the ease of initiation.

Receptor: The most sensitive receptor is that of human health. Minor risks to ecology, aquatic environments and built structures also exist at a very much lower level.

6.3 Human Health

For humans, the following direct pathways may be identified affecting those presently on site or those that may be on site in the future;

- Blast and shock;
- Fragment impact.

In addition there are indirect pathways affecting third party property, individuals or the general environment;

- Contact from the blast wave and or flying debris created by an ordnance item initiation;
- Airborne (wind) movement of contaminated dusts or gas clouds.

The ranking system detailed below is used to determine the likelihood and consequence of an event. It is defined numerically as follows:

6.4 Explosive Ordnance Risk Assessment Method

The following risk assessment is based on the evidence collected during the desk study and site walkover and is therefore made in the absence of data from intrusive investigations (Phase II EORA). As a result, this should be treated as a preliminary risk assessment.

An EORA only considers contaminant sources that are likely to be present in, on or under the land at the time of the assessment, for example, ordnance underneath the surface.

The first stage of the risk assessment process identifies potential sources of explosive ordnance contamination. The next stage is to evaluate the possible linkages, to identify whether significant harm can be caused and the impact of such harm.

6.4.1 Risk Estimation Procedure

In order to provide a numerical evaluation of risk, two scores are assigned which consider:

- The **likelihood** of a ordnance linkage becoming complete; and
- The **severity of the consequence** that would result from this linkage.

The risk rating is then calculated by multiplying the scores together as follows:

Consequence x Likelihood = Risk

6.4.2 Categories of Likelihood

0. No explosives or pathway present.

1. Explosive ordnance unlikely to be present; no pathway to sensitive receptors; initiation unlikely.

2. Explosive ordnance likely to be present; established pathway to receptors; initiation possible.

3. Explosive ordnance present; established pathway to sensitive receptors; initiation possible.

4. Explosive ordnance present; established pathway to sensitive receptors; initiation likely.

6.4.3 Categories of Consequence

0. No buildings, property or persons effected.

1. Damage to buildings or properties; no risk to human health.

2. Significant damage to buildings or properties; minor risk to human health.

3. Severe damage to buildings or properties; severe damage to Listed Buildings, Scheduled Ancient Monuments etc; risk of major injuries to human health; low number of fatalities.

4. Destruction of buildings or properties; destruction of Listed Buildings, Scheduled Ancient Monuments etc; multiple fatalities.

This numerical rating is assigned a descriptive level of risk priority; very low, low, medium or high, according to the following table.

Likelihood					
4	0	4	8	12	16
3	0	3	6	9	12
2	0	2	4	6	8
1	0	1	2	3	4
0	0	0	0	0	0
	0	1	2	3	4
			Consequence		

= Very Low **= Medium**

= Low **= High**

6.4.4 Risk Estimation Table (Conceptual Site Model)

As part of the preliminary risk assessment, a conceptual site model has been developed. The model, in form of a table, aims to represent all possible relationships between contaminants, pathways and receptors and is therefore used to support the identification and assessment of pollutant linkages. The results of the risk estimation are also included in this table.

The risks were considered and rated by a panel of qualified and experienced subject matter experts.

6.5 Explosive Ordnance Risk: DE&S Rudloe

Using the preliminary risk assessment method described above, the risk has been estimated for DE&S Rudloe, detailed in Table 6.5.1 below.

Table 6.5.1 – Risk Estimation

Potential Source	Receptor	Potential Pathway	Consequence	Likelihood	Risk Rating	Risk	Justification
Buried explosives	Contractors, site personnel, visitors and trespassers	High velocity fragmentation	2	1	2	**Low**	There is no evidence that any ordnance is located within the site. Due to the long period of military activity in the area, including the location of CAD Corsham to the north, the risk of buried ordnance cannot be ruled out completely. The likelihood of finding buried ordnance however, is considered to be low.
		Blast	2	1	2	**Low**	
Field to the south of the Gorse Farm	Contractors, site personnel, visitors and trespassers	High velocity fragmentation	2	1	2	**Low**	The 1946 aerial photograph shows evidence of open air storage, though unlikely, it is possible that ordnance was stored here and there may be items buried.
		Blast	2	1	2	**Low**	

7 CONCLUSION

The only potential explosive ordnance risk within DE&S Rudloe is buried explosives. The risk has been assessed as **low** for blast and high velocity fragmentation pathways.

The close proximity to the former CAD Corsham, could mean that ordnance items were stored in this area as CAD Corsham utilised many places in the surrounding area for open-air ordnance storage.

It should be noted that this report does not cover the underground areas beneath DE&S Rudloe, only the surface site. The small firing range on the south-east boundary is also not included as it is to be retained by the MoD.

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8 RECOMMENDATIONS

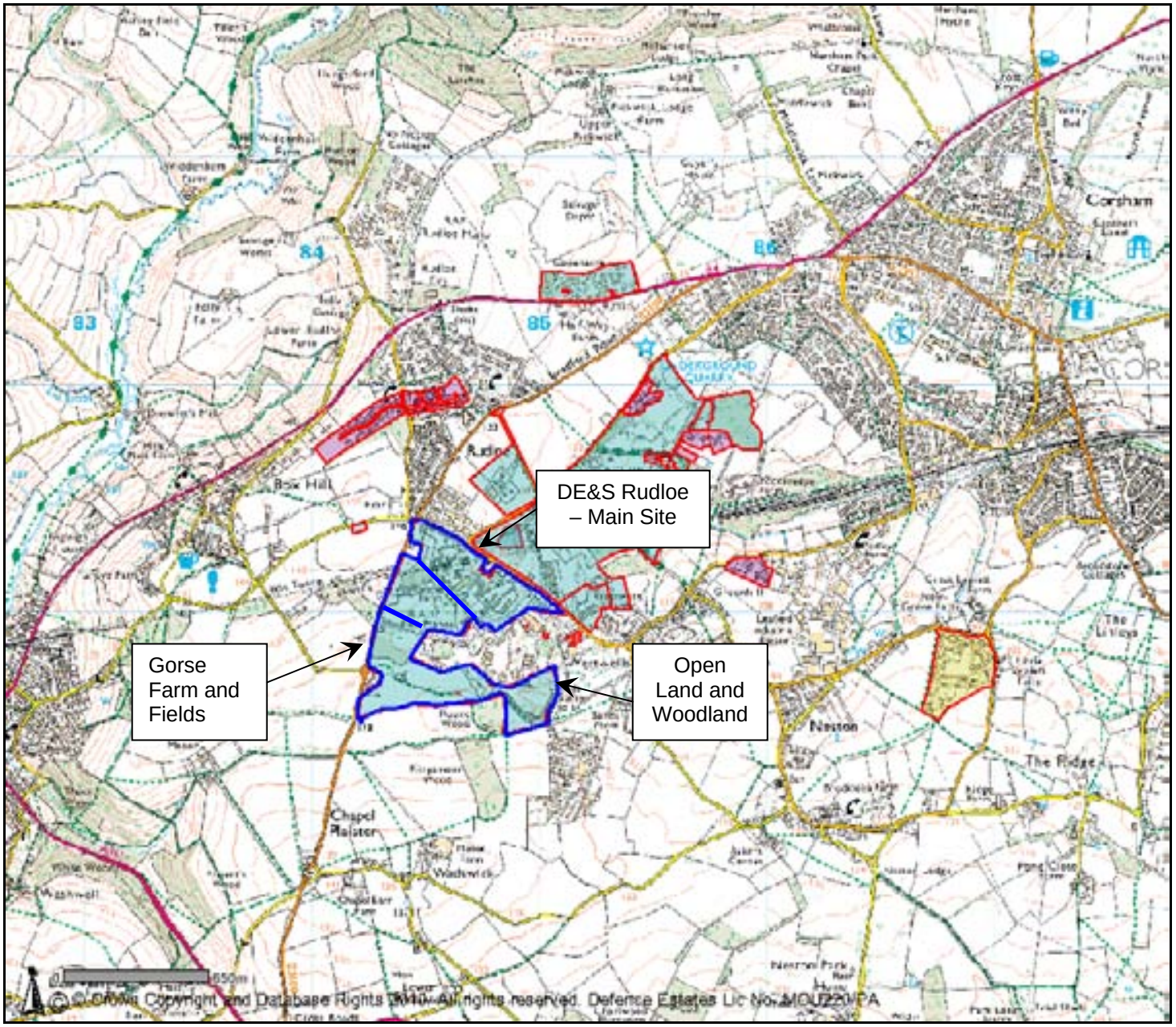
ESG recommends that care be taken when breaking ground at DE&S Rudloe and that the Statement of Known Hazards operated by the regional contractor and site estate representative is followed. Any other relevant guidelines and Health & Safety requirements should be adhered to.

Although a low risk, as a precautionary measure, ESG recommends that the open areas to the south of Gorse Farm should be scanned with a magnetometer array. A sample of any anomalies detected would be dug, allowing identification to occur.

If the site is redeveloped, the contractors should follow construction industry guidelines (CIRIA report number: C681, Unexploded ordnance (UXO): a guide to the construction industry).

Appendix A

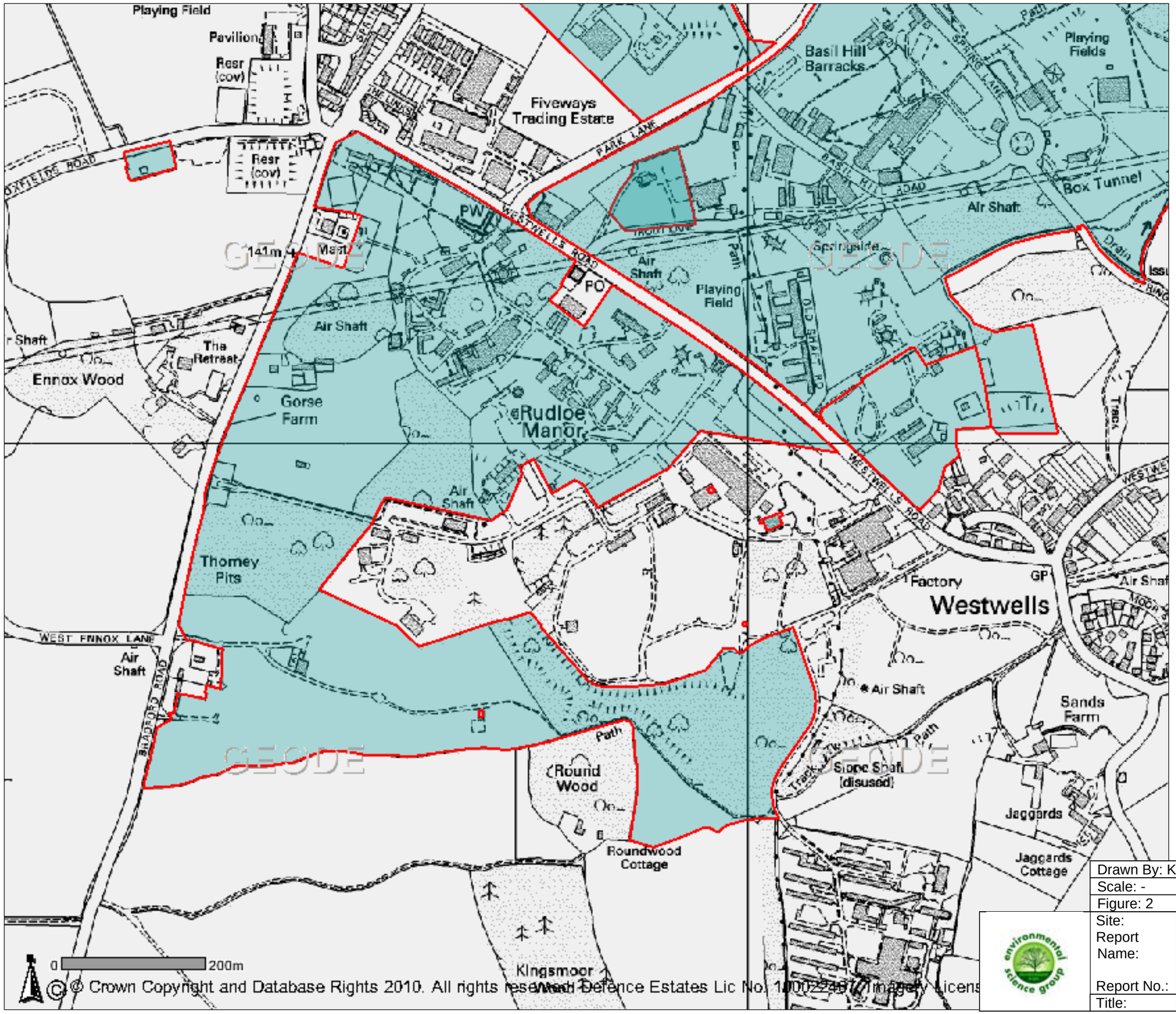
SITE LOCATION PLAN



environmental science group	Site:	DE&S Rudloe		de&s
	Report Title:	Phase I Explosive Ordnance Risk Assessment	Title: Site Location Plan	
	Report No.:	ESG/10/026	Figure: 1	

Appendix B

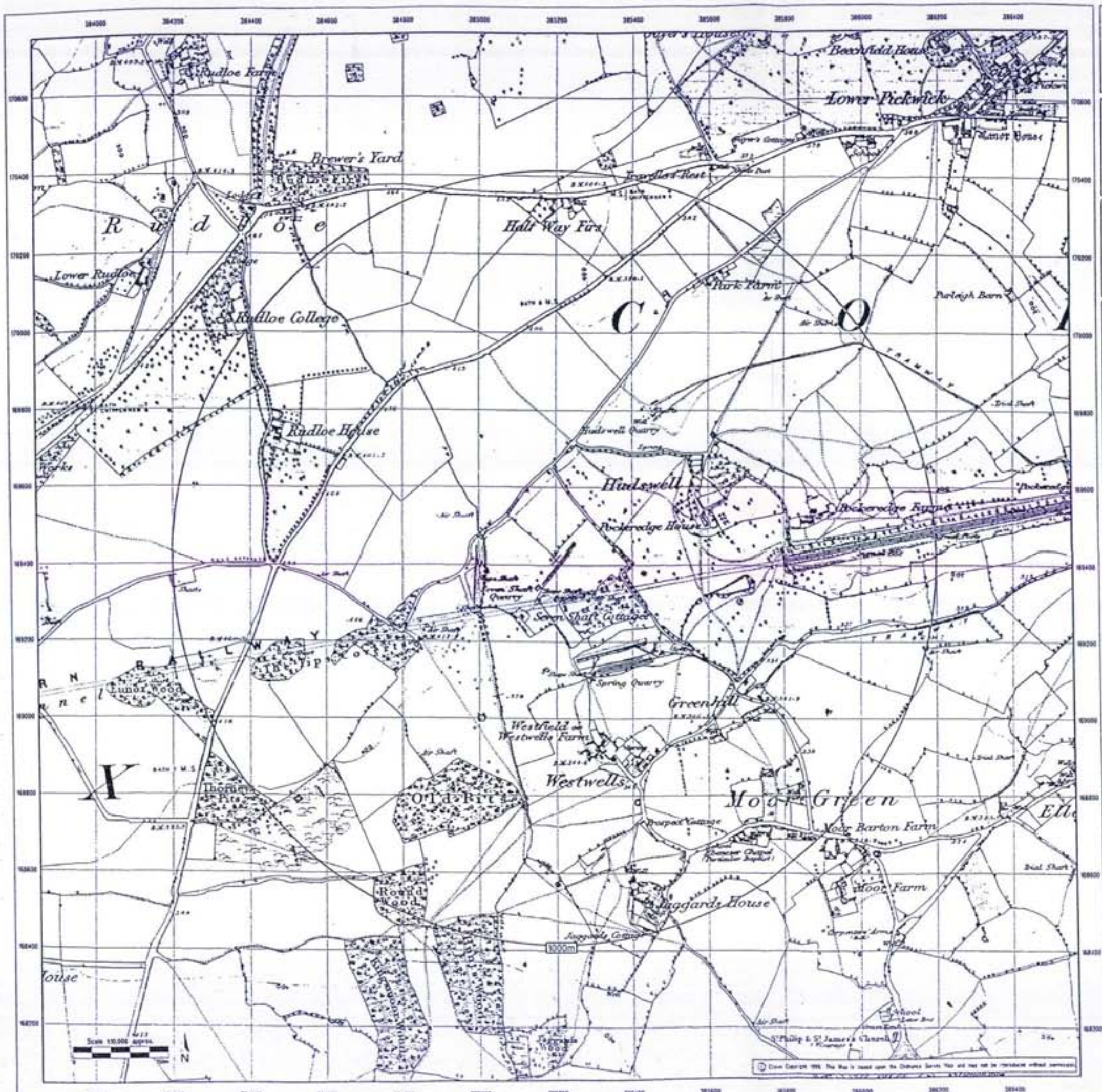
SITE LAYOUT PLAN



Drawn By: KT	Checked By: SP
Scale: -	Date: 06.04.10
Figure: 2	Revision No.: A
Site:	DE&S Rudloe
Report Name:	Phase I Explosive Ordnance Risk Assessment
Report No.:	ESG/10/026
Title:	Site Layout Plan

Appendix C

HISTORICAL MAPS



EnviroCheck

Environmental Site Sensitivity Data

CLIENT DETAILS — Order No. EH29985-1

Customer Ref: Ian Harper
Gibb Environmental
Gibb House London Road
READING
Berkshire RG6 1BL

SITE DETAILS — Grid Reference 385198 169414

Basil Hill Barracks

Spring Lane
CORSHAM
Wiltshire SN13 9NR

Historical Map Legend

- Quarry
- Shingle
- Railway over Road
- Road over Railway
- Railway over River
- Gravel Pit
- Sand Pit
- Level Crossing
- Other Pits
- Road over River or Canal
- Road over Stream
- Mixed Wood
- Rough Pasture
- Road over Stream
- Sunken Road
- Raised Road
- Marsh
- Sketched Contour
- Instrumental Contour
- Arrow denotes flow of water

WILTSHIRE county

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 dates given on the right (duration in office terms years later than the surveyed date. Before 1856, 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 overlying 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 unregistered with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The previous projection continued until recently, with new editions appearing every 10 years or so for urban areas.

1885

Date(s) of Publication

Ordnance Survey
Value Added Reseller

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Exeter EX2 7HY
LANDMARK Telephone 01392 441729 Fax 01392 441709



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Environmental Site Sensitivity Data

CLIENT DETAILS

Order No. EH29985-1

Customer Ref: Ian Harper
Gibb Environmental
Gibb House London Road
READING
Berkshire RG6 1BL

SITE DETAILS

Grid Reference 385198 169414

Basil Hill Barracks

Spring Lane
CORSHAM
Wiltshire SN13 9NR

Historical Map Legend

Quarry
Shingle
Railway over Road
Road over Railway
Railway over River
Gravel Pit
Sand Pit
Level Crossing
Other Pits
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WILTSHIRE county

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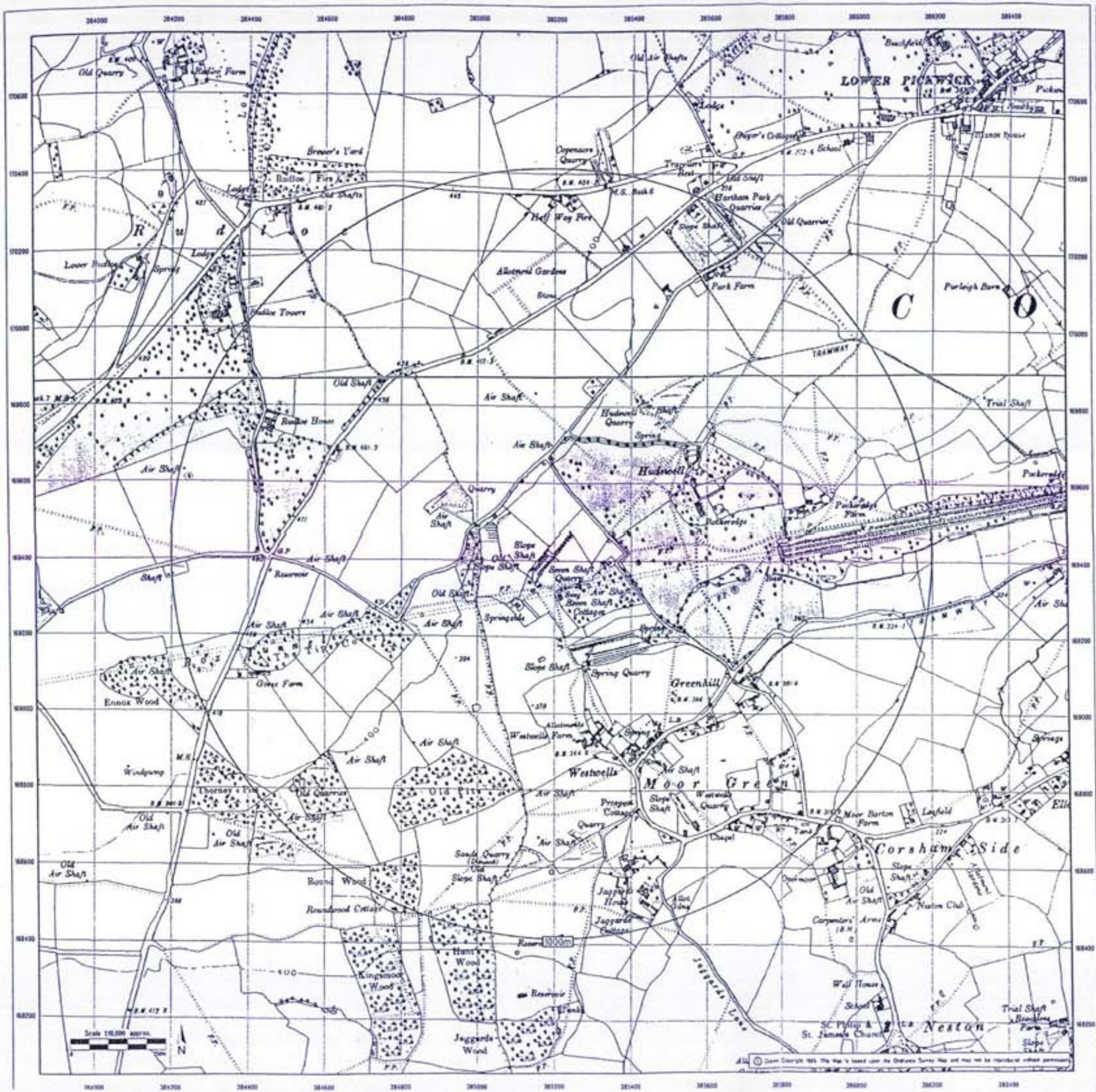
1901	
1901	

Date(s) of Publication

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EnviroCheck

Environmental Site Sensitivity Data

CLIENT DETAILS

Order No. EH29985-1

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Gibb Environmental
Gibb House London Road
READING
Berkshire RG6 1BL

SITE DETAILS

Grid Reference 385198 169414

Basil Hill Barracks

Spring Lane
CORSHAM
Wiltshire SN13 9NR

Historical Map Legend

Quarry
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Railway over Road
Road over Railway
Railway over River
Gravel Pit
Sand Pit
Level Crossing
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Road over River or Canal
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Sunken Road
Raised Road
Sketched Contour
Instrumental Contour
Arrow denotes flow of water

WILTSHIRE county

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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 1956, 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.

1923
1923

Date(s) of Publication

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Road over Stream
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Rough Pasture
Road over Stream
Marsh
Sunken Road
Raised Road
Sketched Contour
Instrumental Contour
Arrow denotes flow of water

Ordnance Survey Plan

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 1:10,560 scale was adopted for mapping urban areas; these maps were used to replace the 1:10,560 maps. The published date given on the right classifies 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 discontinuities on overlying areas.

In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of counties. The maps appear unfinished - with all military essays and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1974, 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.

1933	1955
1961	1960

Date(s) of Publication

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EnviroCheck

Environmental Site Sensitivity Data

CLIENT DETAILS

Order No. EH29985-1

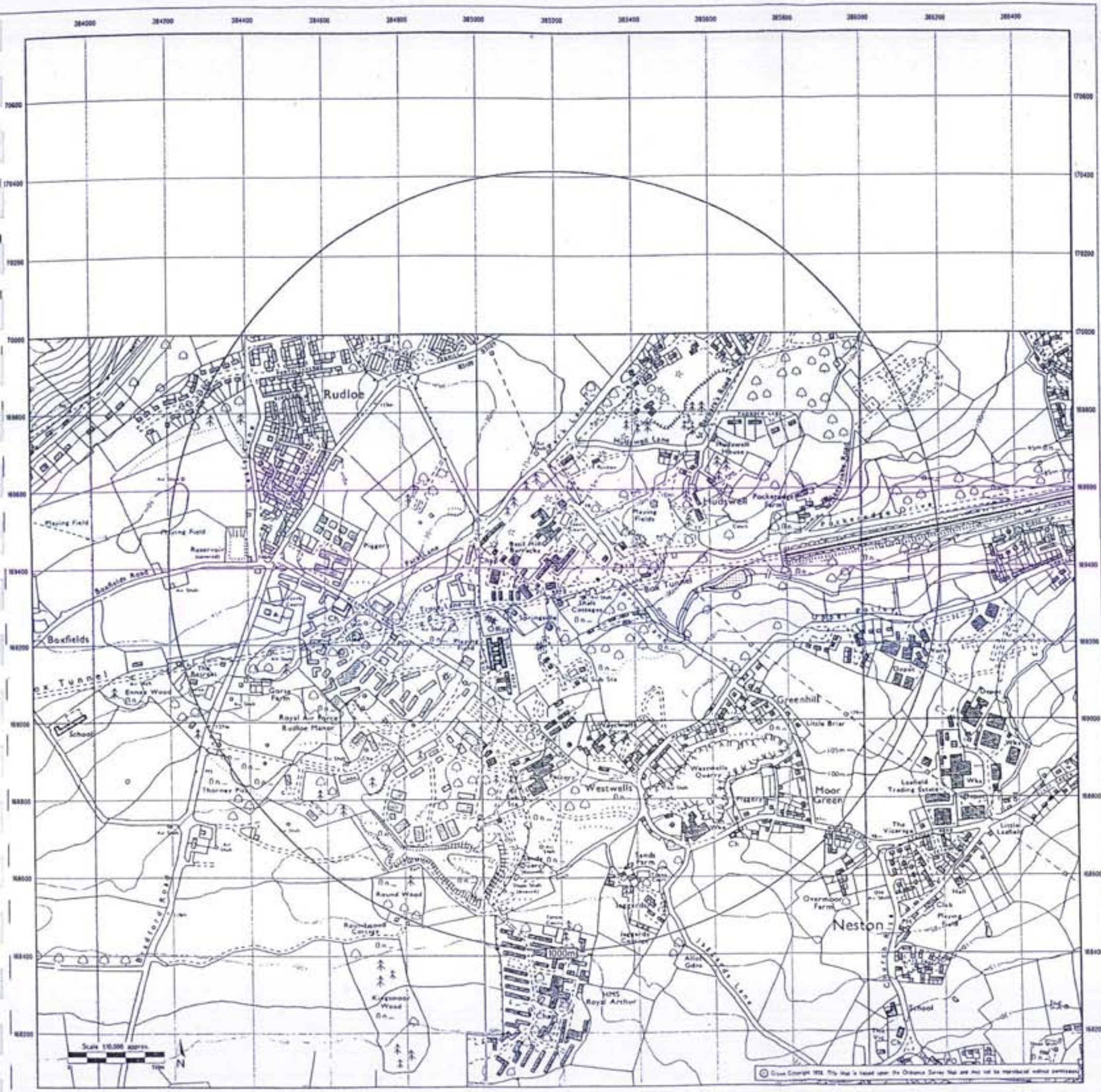
Customer Ref: Ian Harper
Gibb Environmental
Gibb House London Road
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Berkshire RG6 1BL

SITE DETAILS

Grid Reference 385198 169414

Basil Hill Barracks

Spring Lane
CORSHAM
Wiltshire SN13 9NR



Historical Map Legend

- Chalk Pit, Clay Pit or Quarry
- Gravel Pit
- Sand Pit
- Disused Pit or Quarry
- Refuse or Slag Heap
- Lake, Loch or Pond
- Bracken
- Non-Coniferous Trees
- Coniferous Trees
- Scrub
- Heath
- Rough Grassland
- Reeds
- Marsh
- Pylon
- Electricity Transmission Line
- Pole
- Direction of Flow of Water
- Shingle
- Sand
- Saltings
- Cutting
- Embankment
- Standard Gauge Multiple Track
- Standard Gauge Single Track
- Road Under
- Road Over
- Level Crossing
- Foot Bridge
- Siding, Tramway or Mineral Line
- Narrow Gauge

Ordnance Survey Plan

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 on the right sometimes 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 overlying 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 unrevised - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1978, 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.

1976	1976

Date(s) of Publication

Ordnance Survey
Value Added Reseller

Landmark Information Group Limited
7 Abbey Court, Eagle Way, Sowton
Exeter EX2 7HY
Telephone 01392 441728 Fax 01392 441709

EnviroCheck

Environmental Site Sensitivity Data

CLIENT DETAILS

Order No. EH29985-1

Customer Ref: Ian Harper
Gibb Environmental
Gibb House London Road
READING
Berkshire RG6 1BL

SITE DETAILS

Grid Reference 385198 169414

Basil Hill Barracks

Spring Lane
CORSHAM
Wiltshire SN13 9NR



Historical Map Legend

- Chalk Pit, Clay Pit or Quarry
- Gravel Pit
- Sand Pit
- Disused Pit or Quarry
- Refuse or Slag Heap
- Lake, Loch or Pond
- Non-Coniferous Trees
- Coniferous Trees
- Scrub
- Pylon
- Electricity Transmission Line
- Pole
- Direction of Flow of Water
- Shingle
- Sand
- Cutting
- Embankment
- Road Under
- Road Over
- Level Crossing
- Foot Bridge
- Bracken
- Heath
- Rough Grassland
- Reeds
- Marsh
- Saltings
- Standard Gauge Multiple Track
- Standard Gauge Single Track
- Siding, Tramway or Mineral Line
- Narrow Gauge

Ordnance Survey Plan

The historical maps shown were reproduced from maps predominantly both 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 on the right therefore is often some years later than the surveyed date. Before 1854, 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 overlying areas.

In the late 1840's a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unattached - with all military stamps and other non-essential items removed. These maps were initially overprinted with the National Grid. In 1870, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new additions appearing every 10 years or so for urban areas.

1901	1982
1976	1982

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Appendix D

AERIAL PHOTOGRAPHS



N

	Site:	DE&S Rudloe		
	Report Title:	Phase I Explosive Ordnance Risk Assessment	Title: Aerial Photograph 1 Date: 6th July 1940	
	Report No.:	ESG/10/026	Figure: 3	



	Site:	DE&S Rudloe		
	Report Title:	Phase I Explosive Ordnance Risk Assessment	Title: Aerial Photograph 2 Date: 14th April 1946	
	Report No.:	ESG/10/026	Figure: 4	



N

	Site:	DE&S Rudloe		
	Report Title:	Phase I Explosive Ordnance Risk Assessment	Title: Aerial Photograph 3 Date: 16th May 1966	
	Report No.:	ESG/10/026	Figure: 5	



N

	Site:	DE&S Rudloe		
	Report Title:	Phase I Explosive Ordnance Risk Assessment	Title: Aerial Photograph 4 Date: 13th June 1967	
	Report No.:	ESG/10/026	Figure: 6	

Appendix E

SITE WALKOVER PHOTOGRAPHS



Plate 1: Outdoor training area for weapon handling



Plate 2: Canon located outside of a building.



Plate 3: Access shaft into underground areas, fenced off by construction workers.



Plate 4: Access shaft to underground areas, secured shut.



Plate 5: Ventilation shaft for underground areas.



Plate 6: Bricked up windows of Gorse Farm.



Plate 7: Fields to the south of Gorse Farm.



Plate 8: Open land in the south of the site.



Plate 9: Raised woodland in the south of the site.



Plate 10: Part of the former assault course to the south of the site.

Environmental Science Group
Spur 12, E Block
Ensleigh
Bath.
BA1 5AB

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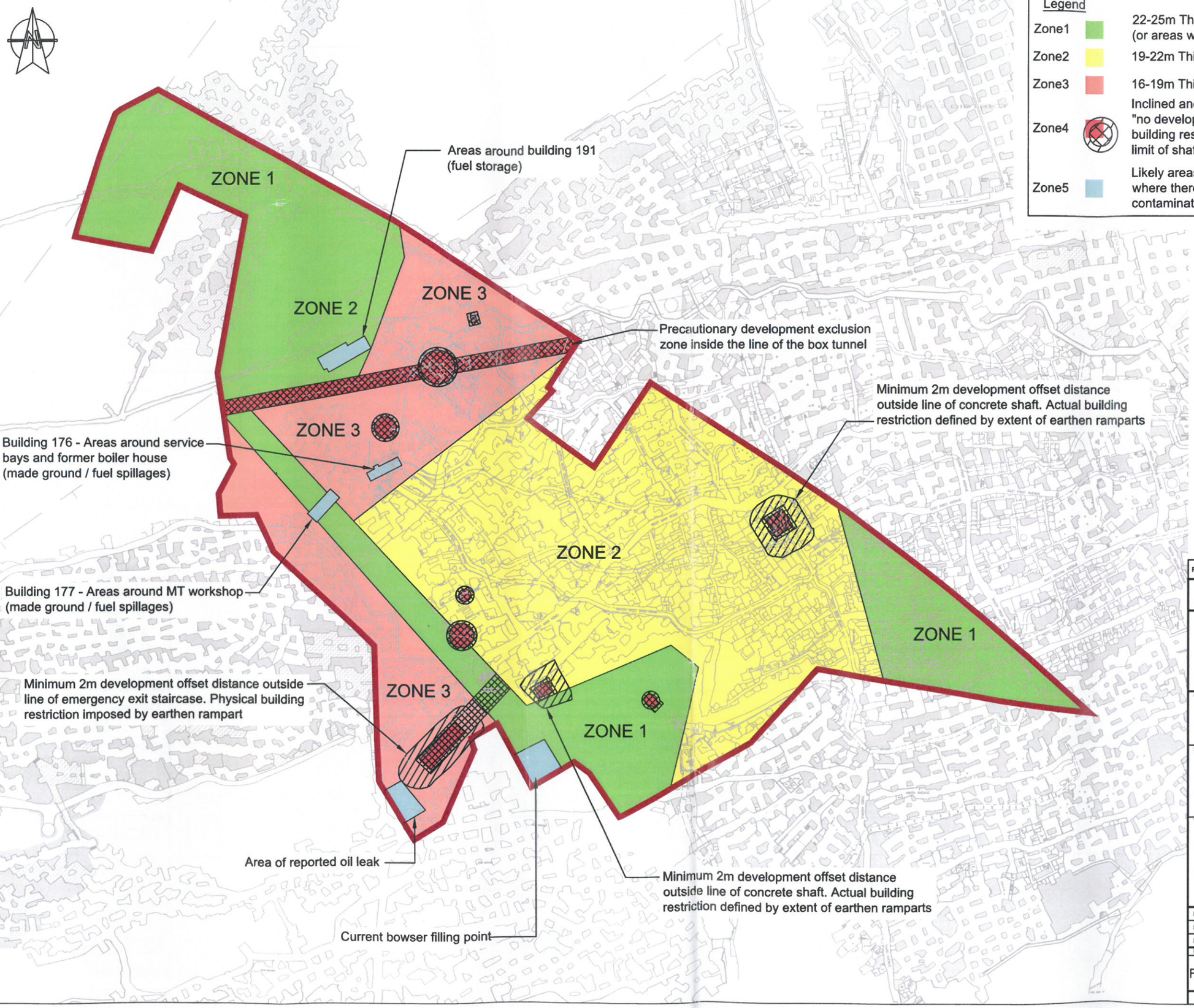
MINISTRY OF DEFENCE

Appendix **H**

Bath Stone quarry below surface maps

This appendix may not be included in the printed report to reduce the document size, but is included in the digital version.

Project Number: FSE3511078A | Drawing Number: Figure 11 | Revision:



Rev | Date | Description | By | Chk | App

DRAFT

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CF11 9HA
Tel: 44-(0)29-2082-7000
Fax: 44-(0)29-2082-7001

Client:
DEFENCE INFRASTRUCTURE ORGANISATION

Site/Project:
RUDLOE NO.2
SITE STABILITY STUDY

Title:
DEVELOPMENT CONSTRAINTS PLAN

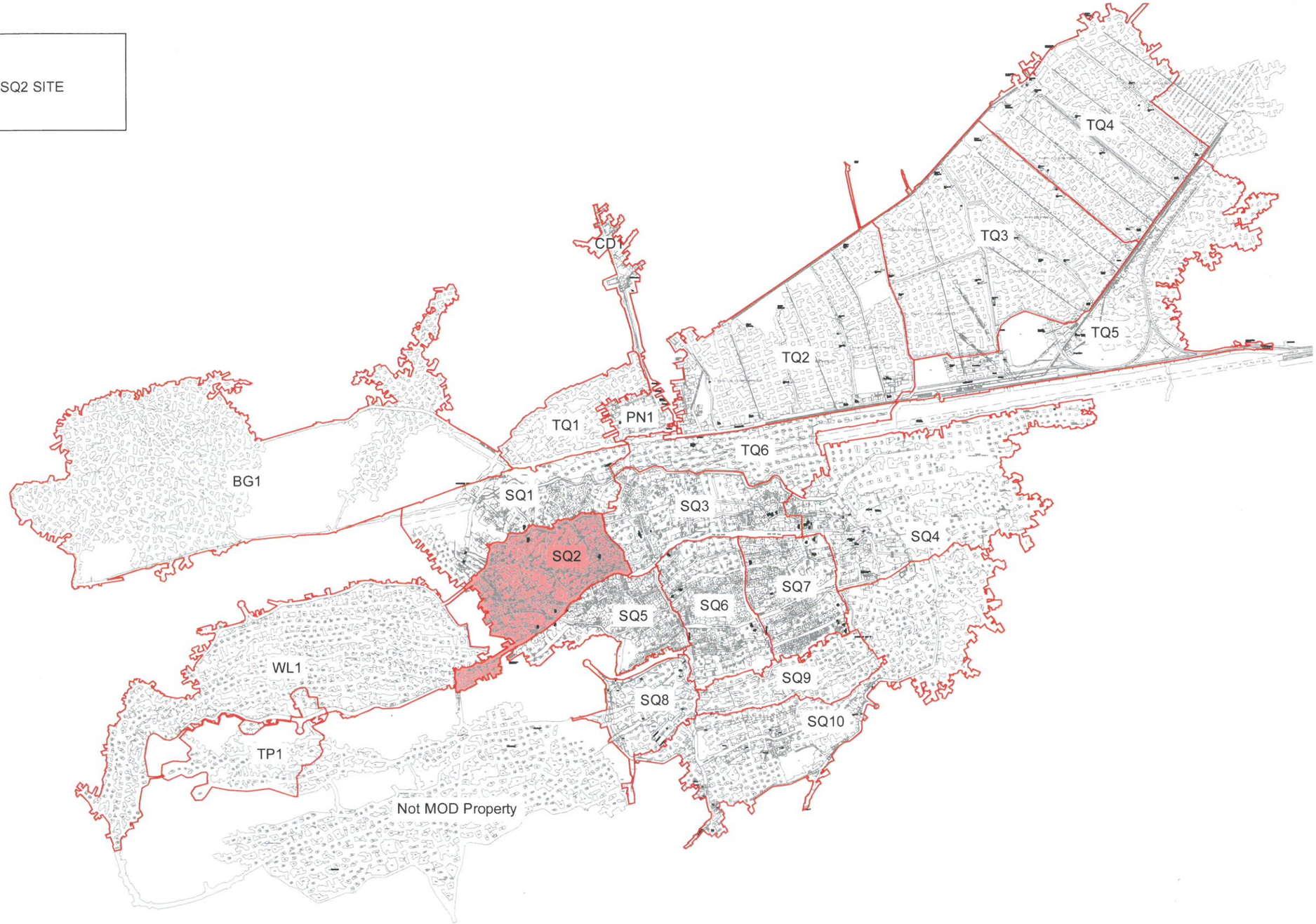
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Designed: GJ	Approved: AD
Date: 28/06/2011	Scale: 1:2500 A3 Sheet:
Project Number: FSE3511078A	Drawing Number: Figure 11 Revision:

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Login: Beavan, James
Plot Date: 01/07/2011 15:12:48

KEY

SQ2 SITE



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17/03/10

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• CLIENT/PROJECT

DEFENCE ESTATES
CORSHAM MINE
BASELINE GEOLOGICAL CONDITION SURVEY

• TITLE

ENTIRE MINE COMPLEX
SQ2 SITE

• DATE 19/02/10
• SCALE 1:5000 @ A3
• CAD REF SQ2_Fig1.dwg

DRAWN BY	MNL
PRODUCED BY	MNL
CHECKED	GJ
APPROVED	AD

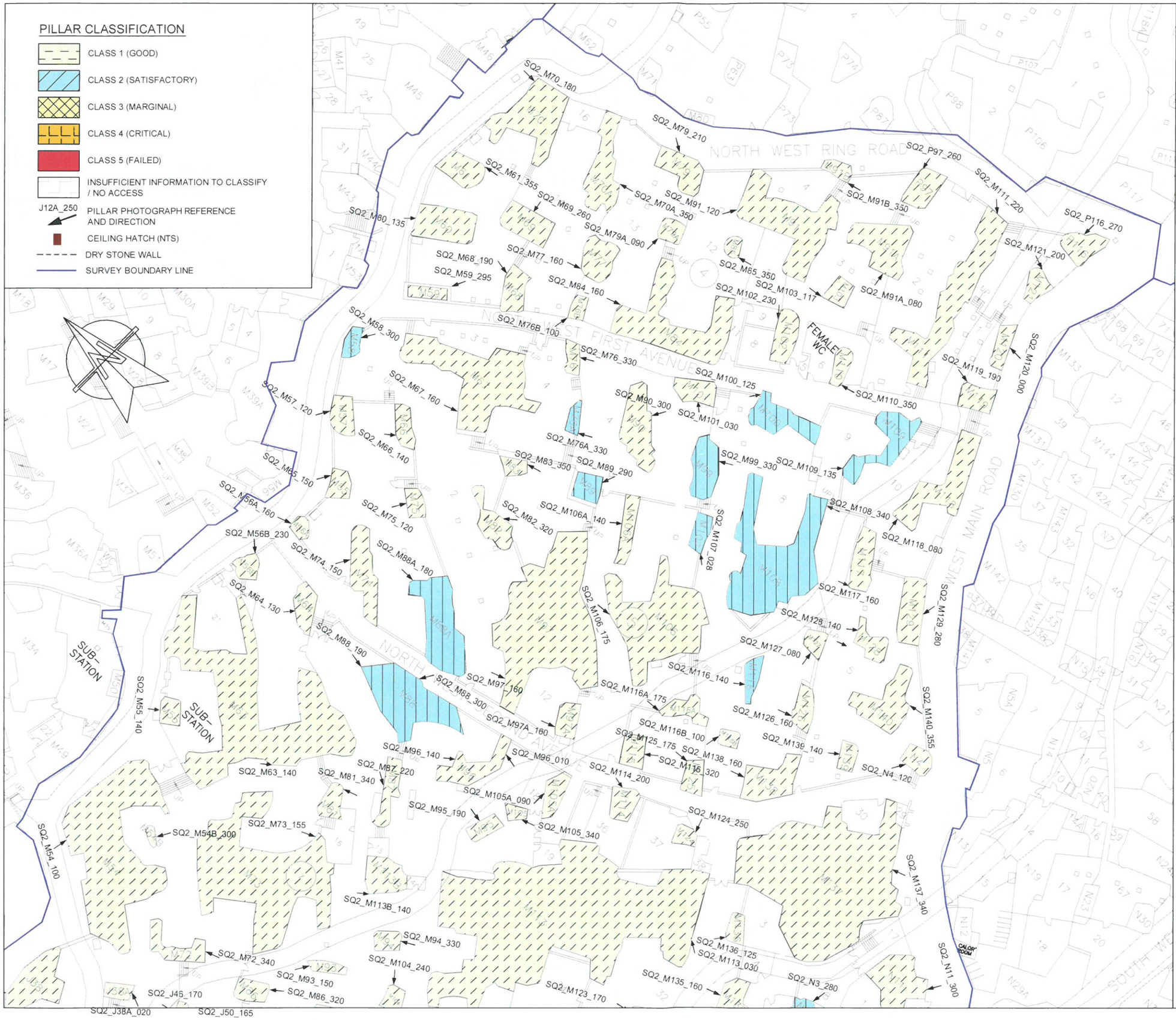
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FIGURE 1 | –

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- CLASS 3 (MARGINAL)
- CLASS 4 (CRITICAL)
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- INSUFFICIENT INFORMATION TO CLASSIFY / NO ACCESS
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1 OF 3
2 OF 3
3 OF 3

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DEFENCE ESTATES
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BASELINE GEOLOGICAL CONDITION SURVEY

- TITLE

SQ2 SITE
PILLAR CONDITION
SHEET 1 OF 3

• DATE	17/02/10	DRAWN BY	CJH
• SCALE	1:500 @ A3	PRODUCED BY	CJH
• CAD REF	SQ2 Pillar.dwg	CHECKED	GJ
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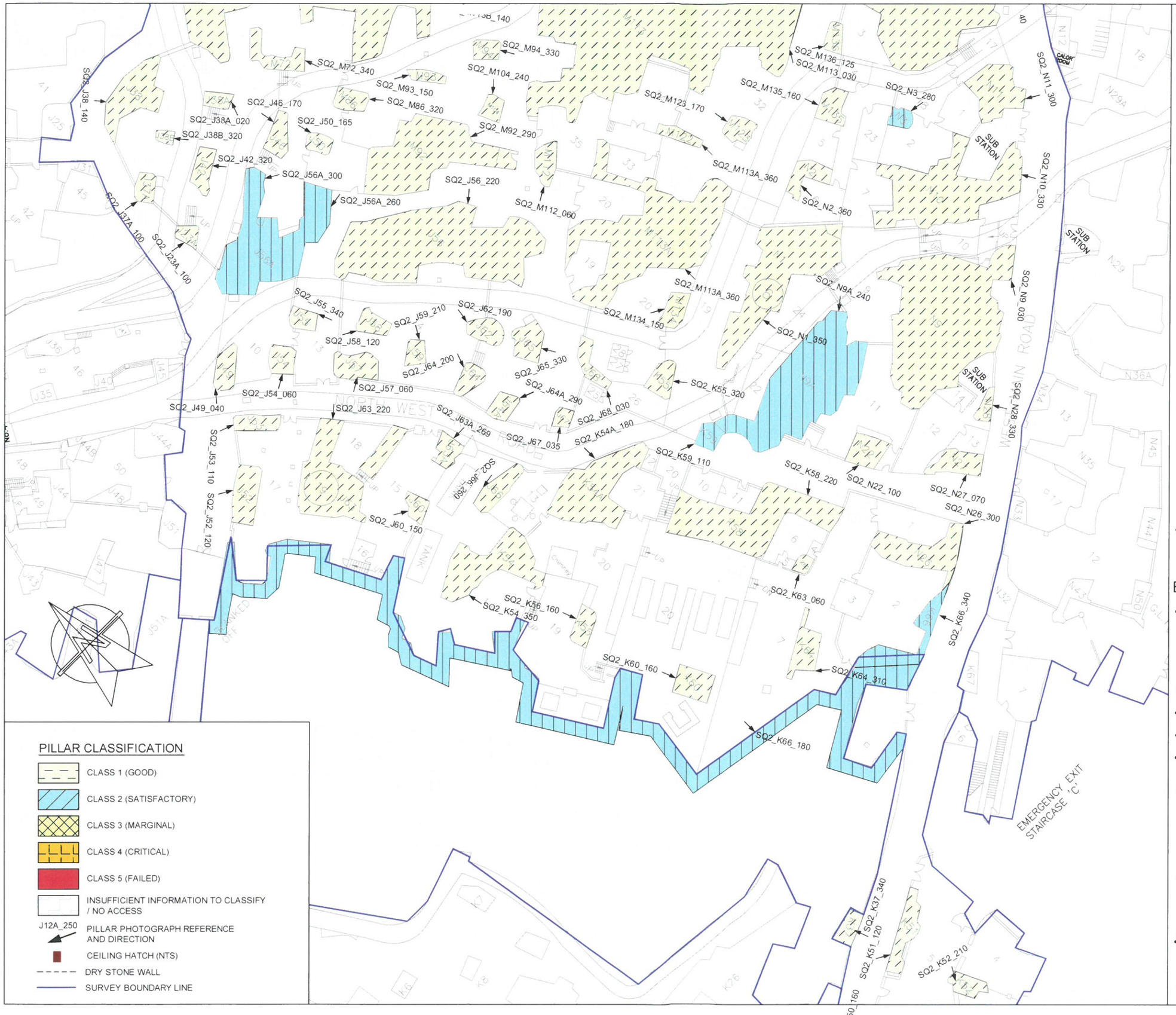
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FIGURE 2 | –

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- CLASS 3 (MARGINAL)
- CLASS 4 (CRITICAL)
- CLASS 5 (FAILED)
- INSUFFICIENT INFORMATION TO CLASSIFY / NO ACCESS
- J12A_250 PILLAR PHOTOGRAPH REFERENCE AND DIRECTION
- CEILING HATCH (NTS)
- DRY STONE WALL
- SURVEY BOUNDARY LINE

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2 OF 3
3 OF 3

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DEFENCE ESTATES
CORSHAM MINE
BASELINE GEOLOGICAL CONDITION SURVEY

• TITLE

SQ2 SITE
PILLAR CONDITION
SHEET 2 OF 3

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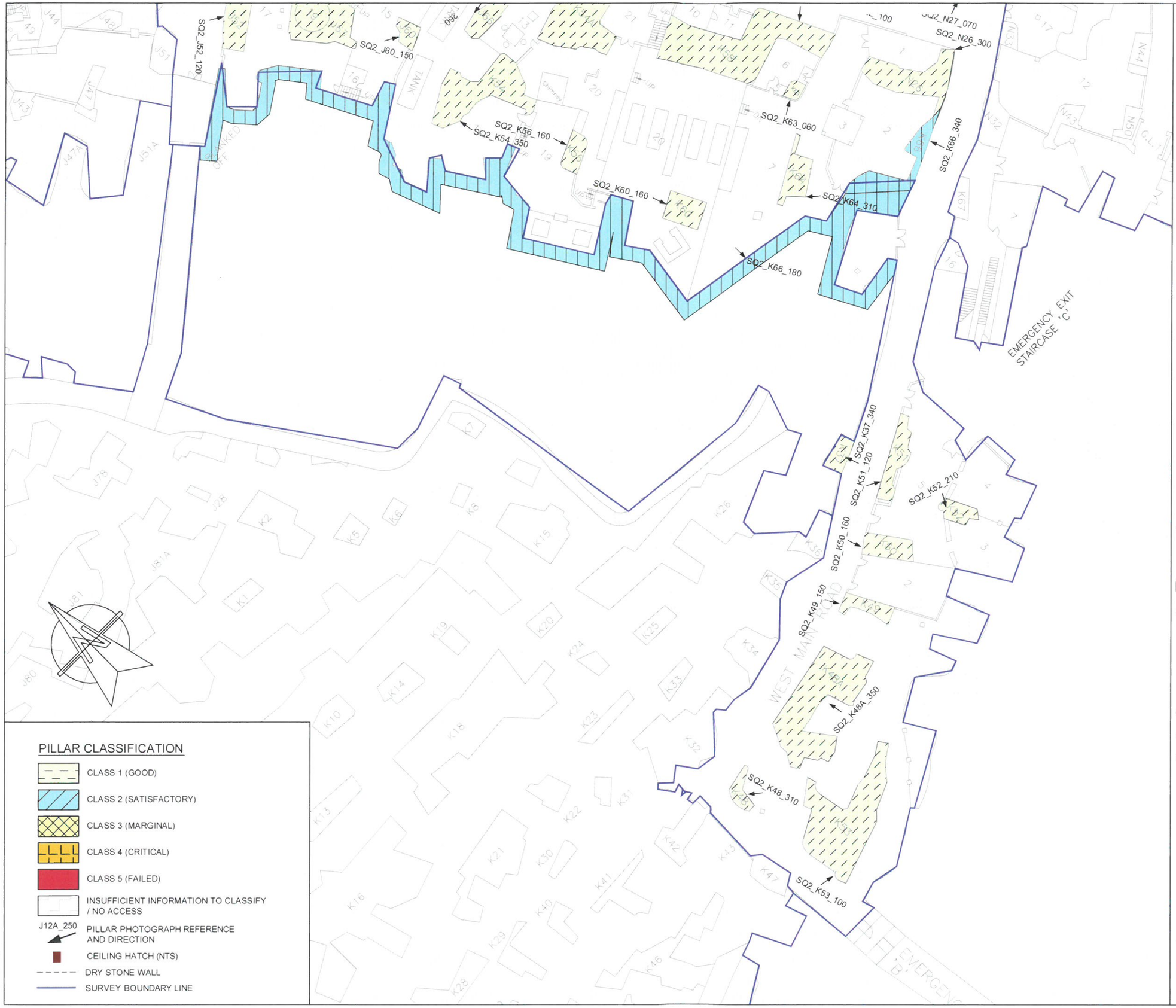
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FIGURE 3 | –

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- INSUFFICIENT INFORMATION TO CLASSIFY / NO ACCESS
- J12A_250 — PILLAR PHOTOGRAPH REFERENCE AND DIRECTION
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- DRY STONE WALL
- SURVEY BOUNDARY LINE

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2 OF 3
3 OF 3

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DEFENCE ESTATES
CORSHAM MINE
BASELINE GEOLOGICAL CONDITION SURVEY

• TITLE

SQ2 SITE
PILLAR CONDITION
SHEET 3 OF 3

• DATE	17/02/10	DRAWN BY	CJH
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FIGURE 4 | –

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ROOF CLASSIFICATION*

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*UNLESS INDICATED OTHERWISE, ROOF CLASSIFICATION IS CLASS I (GOOD)

PHOTOGRAPH REFERENCES

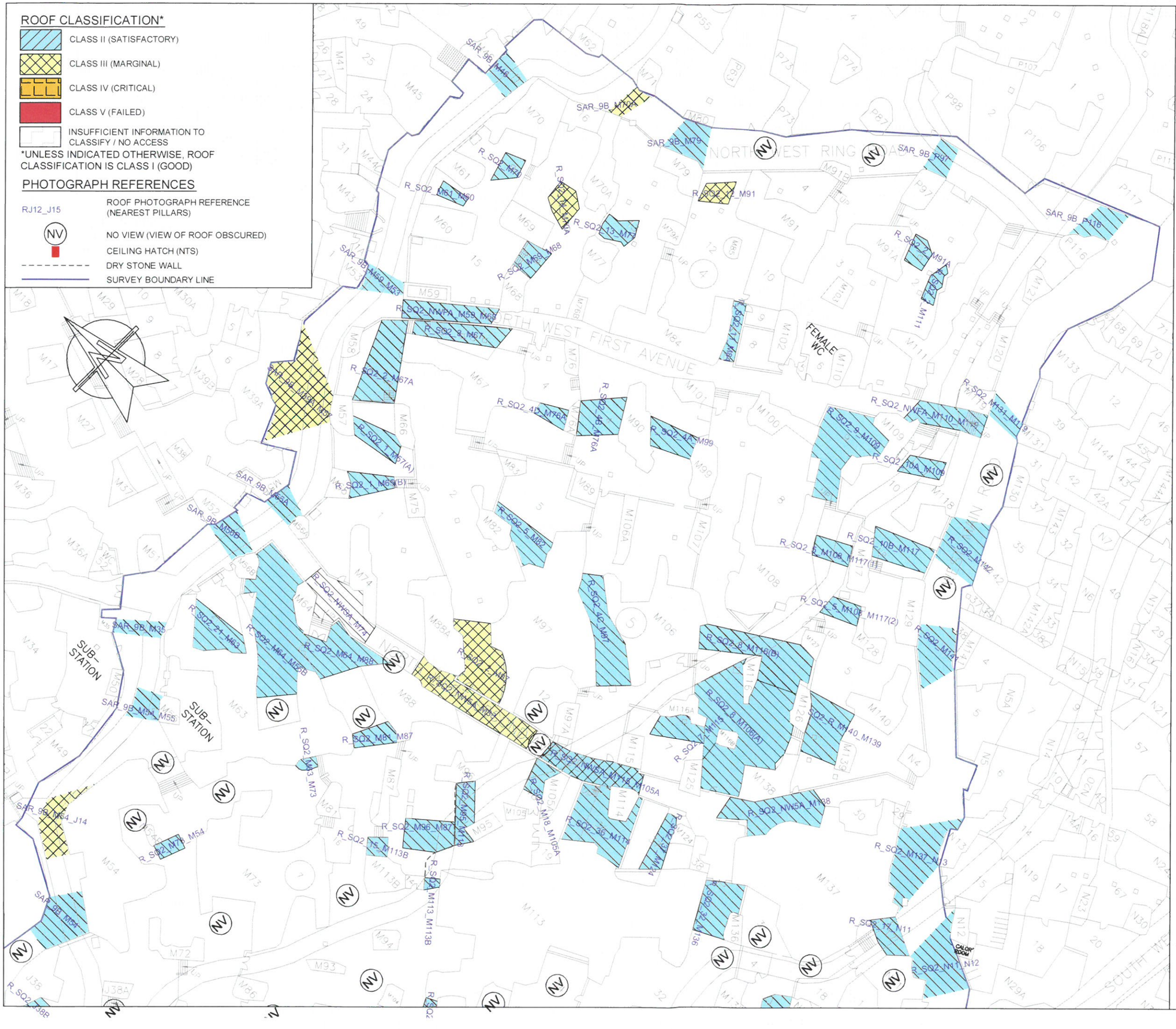
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NV — NO VIEW (VIEW OF ROOF OBSCURED)

CEILING HATCH (NTS)

DRY STONE WALL

SURVEY BOUNDARY LINE



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1 OF 3
2 OF 3
3 OF 3

- CLIENT/PROJECT

DEFENCE ESTATES
CORSHAM MINE
BASELINE GEOLOGICAL CONDITION SURVEY

- TITLE

SQ2 SITE
ROOF CONDITION
SHEET 1 OF 3

• DATE	17/02/10	DRAWN BY	CJH
• SCALE	1:500 @ A3	PRODUCED BY	CJH
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FIGURE 5 | –

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1 OF 3
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3 OF 3

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- CLASS III (MARGINAL)
- CLASS IV (CRITICAL)
- CLASS V (FAILED)
- INSUFFICIENT INFORMATION TO CLASSIFY / NO ACCESS

*UNLESS INDICATED OTHERWISE, ROOF CLASSIFICATION IS CLASS I (GOOD)

PHOTOGRAPH REFERENCES

- RJ12_J15 — ROOF PHOTOGRAPH REFERENCE (NEAREST PILLARS)
- (NV) — NO VIEW (VIEW OF ROOF OBSCURED)
- CEILING HATCH (NTS)
- DRY STONE WALL
- SURVEY BOUNDARY LINE

• CLIENT/PROJECT

DEFENCE ESTATES
CORSHAM MINE
BASELINE GEOLOGICAL CONDITION SURVEY

• TITLE

SQ2 SITE
ROOF CONDITION
SHEET 2 OF 3

• DATE	17/02/10	DRAWN BY	CJH
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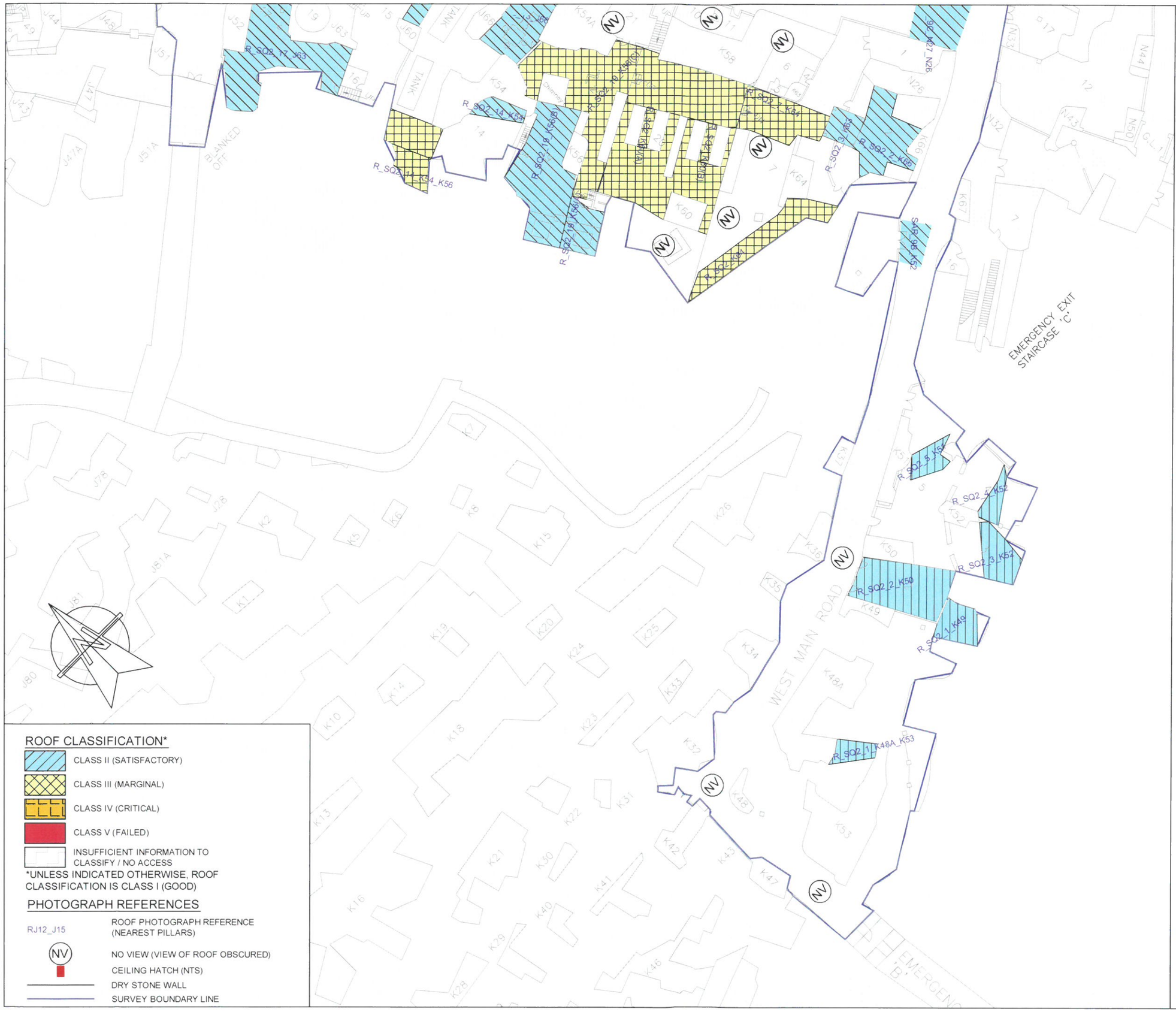
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FIGURE 6 | –

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ROOF CLASSIFICATION*

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- CLASS IV (CRITICAL)
- CLASS V (FAILED)
- INSUFFICIENT INFORMATION TO CLASSIFY / NO ACCESS

*UNLESS INDICATED OTHERWISE, ROOF CLASSIFICATION IS CLASS I (GOOD)

PHOTOGRAPH REFERENCES

- RJ12_J15 — ROOF PHOTOGRAPH REFERENCE (NEAREST PILLARS)
- (NV) — NO VIEW (VIEW OF ROOF OBSCURED)
- CEILING HATCH (NTS)
- DRY STONE WALL
- SURVEY BOUNDARY LINE

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1 OF 3
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3 OF 3

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DEFENCE ESTATES
CORSHAM MINE
BASELINE GEOLOGICAL CONDITION SURVEY

• TITLE

SQ2 SITE
ROOF CONDITION
SHEET 3 OF 3

• DATE	17/02/10	DRAWN BY	CJH
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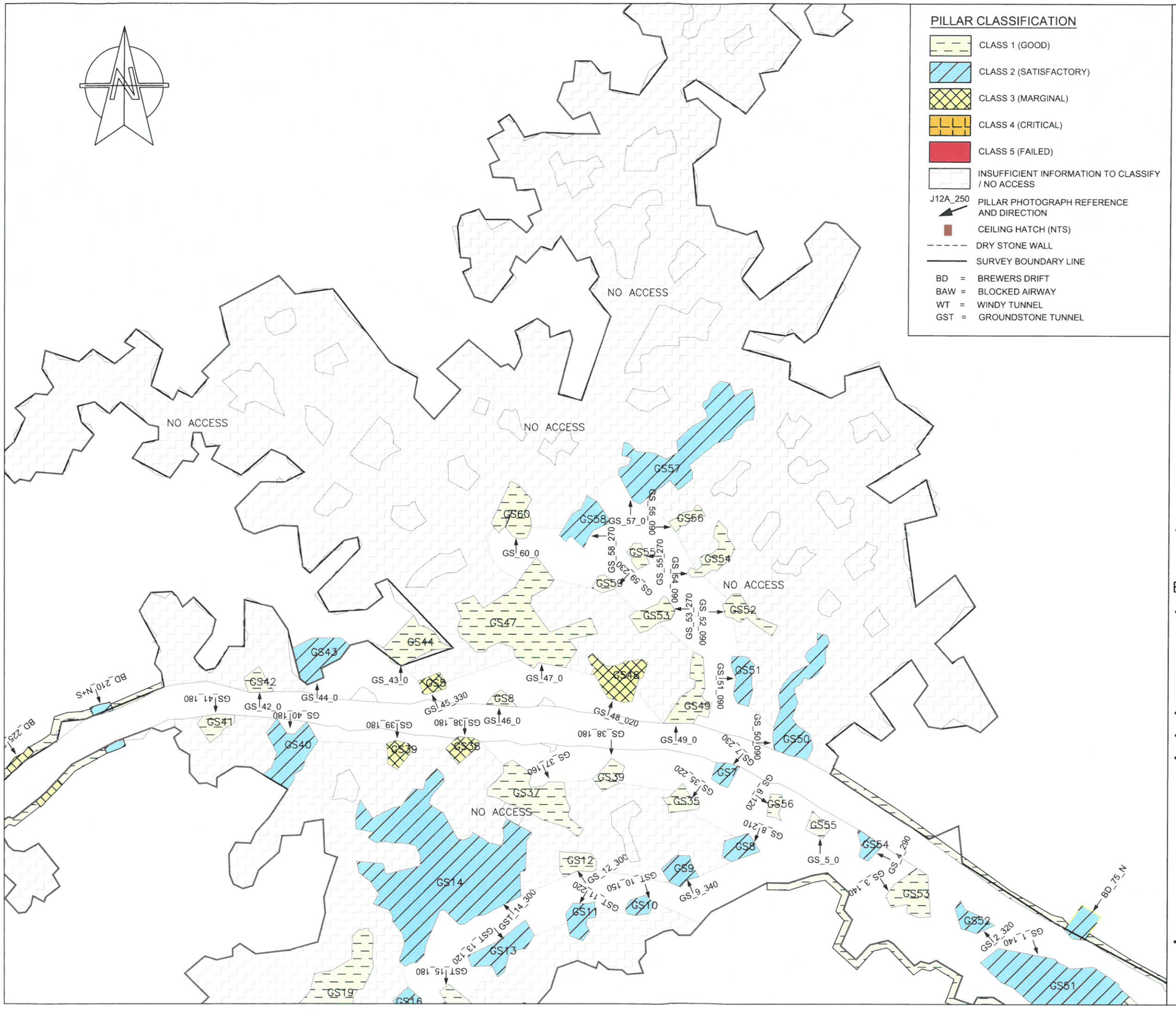
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FIGURE 7 | –

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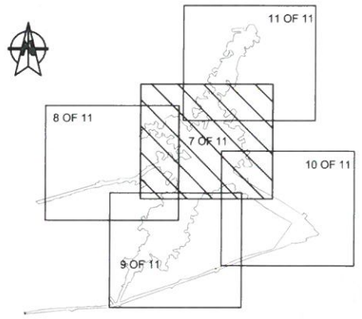
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- CLASS 2 (SATISFACTORY)
- CLASS 3 (MARGINAL)
- CLASS 4 (CRITICAL)
- CLASS 5 (FAILED)
- INSUFFICIENT INFORMATION TO CLASSIFY / NO ACCESS
- J12A_250 PILLAR PHOTOGRAPH REFERENCE AND DIRECTION
- CEILING HATCH (NTS)
- DRY STONE WALL
- SURVEY BOUNDARY LINE

BD = BREWERS DRIFT
BAW = BLOCKED AIRWAY
WT = WINDY TUNNEL
GST = GROUNDSTONE TUNNEL

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• CLIENT/PROJECT

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CORSHAM MINE
BASELINE GEOLOGICAL CONDITION SURVEY

• TITLE

BG1 SITE
PILLAR CONDITION
SHEET 7 OF 11

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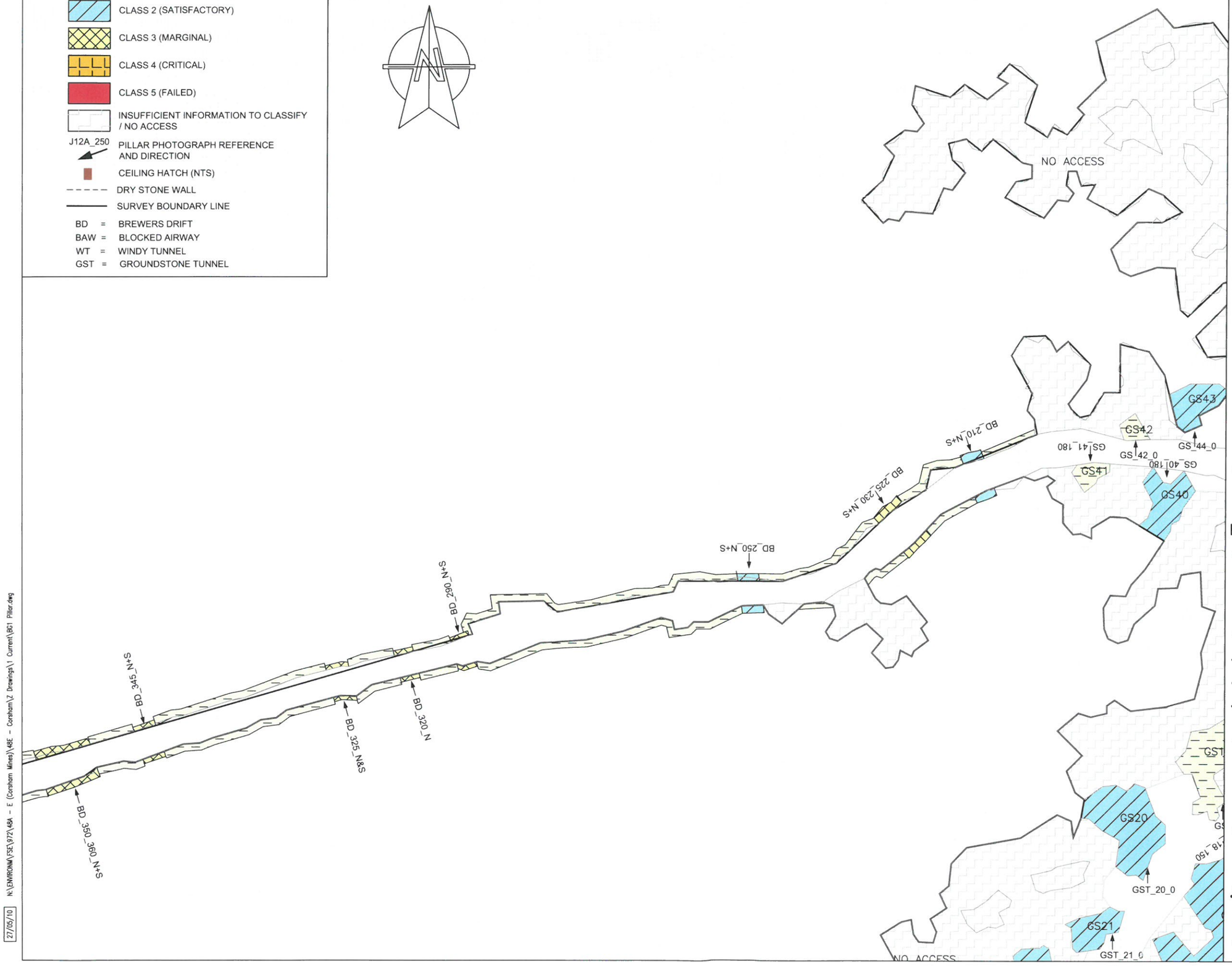
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PILLAR CLASSIFICATION

- CLASS 1 (GOOD)
- CLASS 2 (SATISFACTORY)
- CLASS 3 (MARGINAL)
- CLASS 4 (CRITICAL)
- CLASS 5 (FAILED)
- INSUFFICIENT INFORMATION TO CLASSIFY / NO ACCESS
- J12A_250 PILLAR PHOTOGRAPH REFERENCE AND DIRECTION
- CEILING HATCH (NTS)
- DRY STONE WALL
- SURVEY BOUNDARY LINE

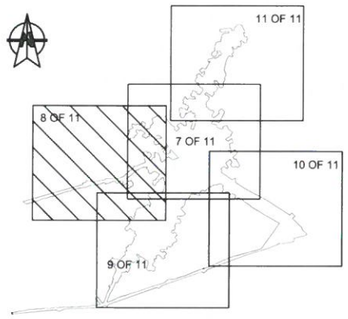
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CORSHAM MINE
BASELINE GEOLOGICAL CONDITION SURVEY

• TITLE

BG1 SITE
PILLAR CONDITION
SHEET 8 OF 11

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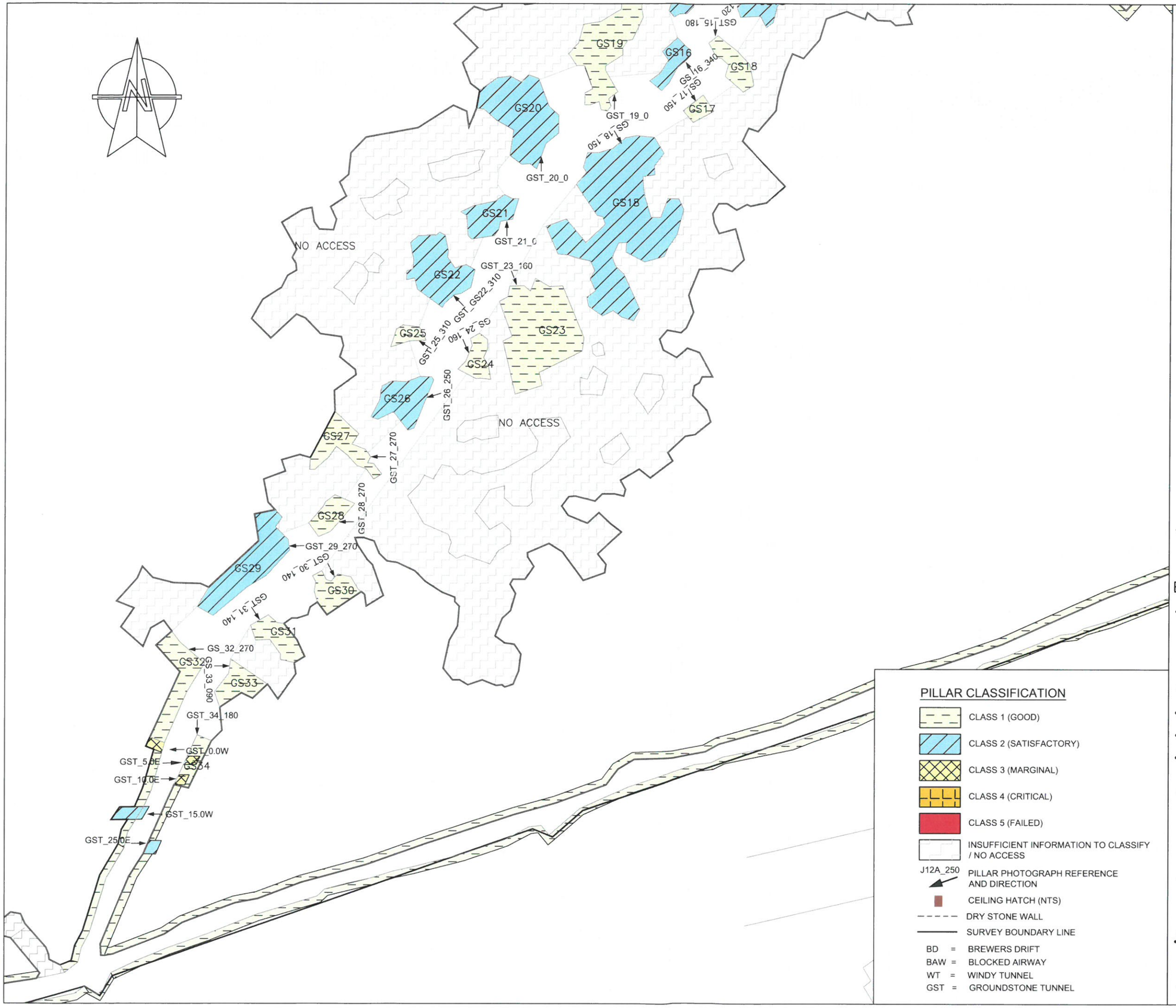
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FIGURE 9 | –

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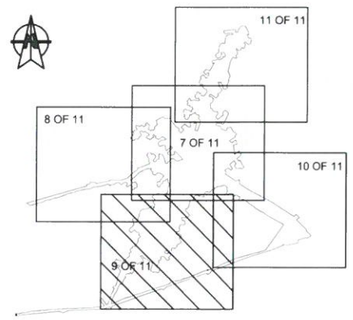
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- CLASS 2 (SATISFACTORY)
- CLASS 3 (MARGINAL)
- CLASS 4 (CRITICAL)
- CLASS 5 (FAILED)
- INSUFFICIENT INFORMATION TO CLASSIFY / NO ACCESS
- J12A_250 PILLAR PHOTOGRAPH REFERENCE AND DIRECTION
- CEILING HATCH (NTS)
- DRY STONE WALL
- SURVEY BOUNDARY LINE

BD = BREWERS DRIFT
BAW = BLOCKED AIRWAY
WT = WINDY TUNNEL
GST = GROUNDSTONE TUNNEL

• CLIENT/PROJECT

DEFENCE ESTATES
CORSHAM MINE
BASELINE GEOLOGICAL CONDITION SURVEY

• TITLE

BG1 SITE
PILLAR CONDITION
SHEET 9 OF 11

• DATE	12/05/10	DRAWN BY	MNL
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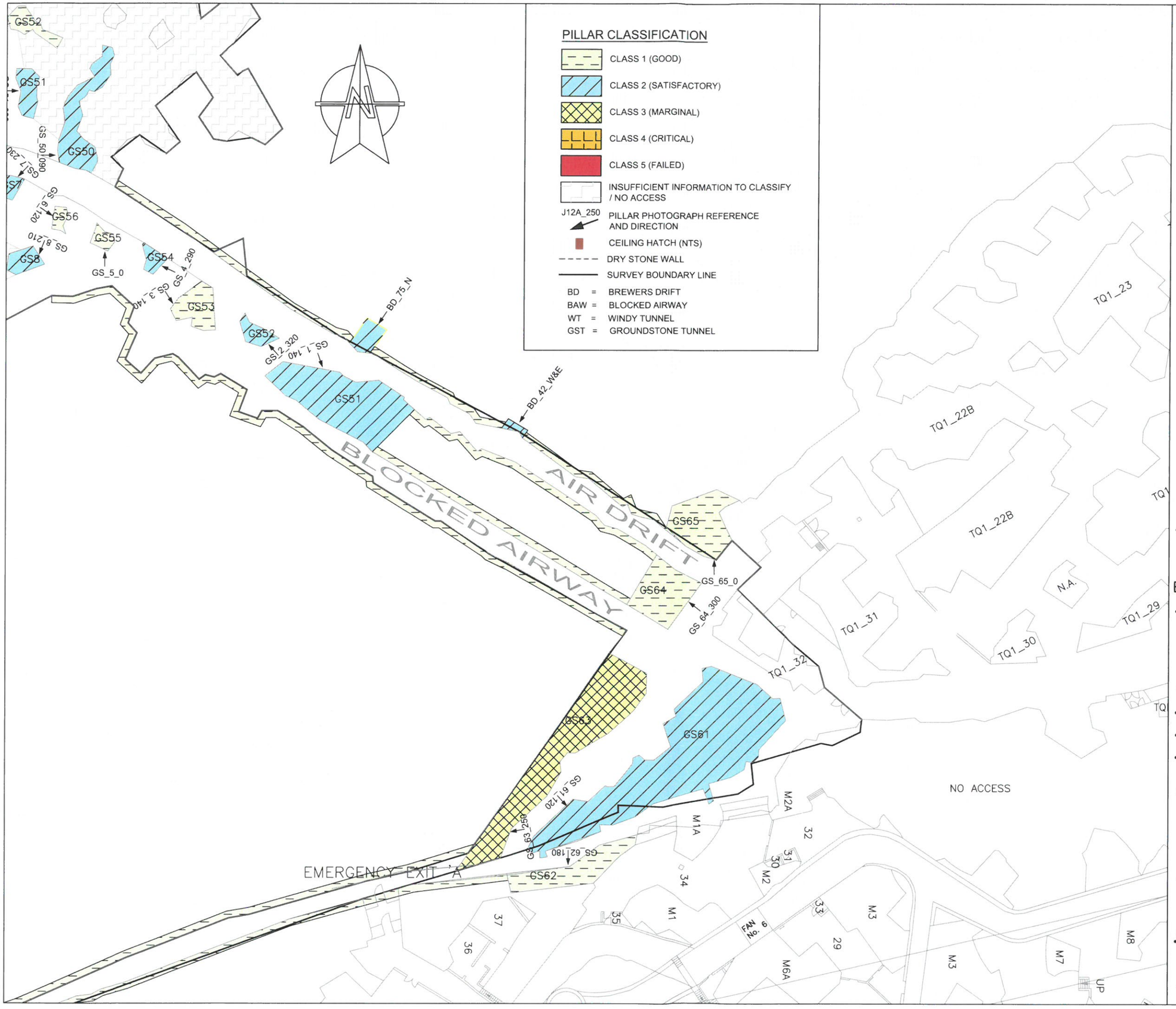
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FIGURE 10 | –

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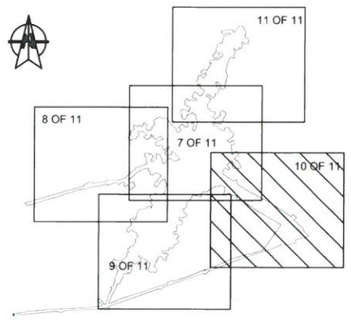
27/05/10 N:\ENVIRONM\7SE\972\48A - E (Corsham Mines)\48E - Corsham\Z_Drawings\1 Current\BG1 Pillar.dwg



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REV	DATE		BY	CHKD	APPD

NOTES



• CLIENT/PROJECT

DEFENCE ESTATES
CORSHAM MINE
BASELINE GEOLOGICAL CONDITION SURVEY

• TITLE

BG1 SITE
PILLAR CONDITION
SHEET 10 OF 11

• DATE	12/05/10	DRAWN BY	MNL
• SCALE	1:500 @ A3	PRODUCED BY	MNL
• CAD REF	BG1 Pillars.dwg	CHECKED	AS
		APPROVED	AD

PB PARSONS BRINCKERHOFF 100 YEARS

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Tel: 44-(0)29 2082 7000 Fax: 44-(0)29 2082 7001

• DRAWING NUMBER

FIGURE 11 | –

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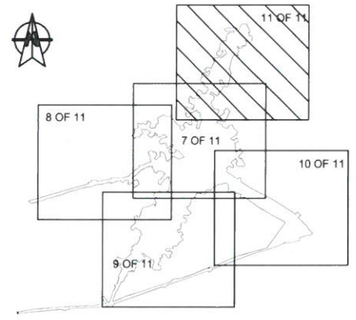
27/05/10 N:\ENVIRONM\FSE\9724\48A - 3 - (Corsham Mines)\48E - Corsham\Z Drawings\1 Current\BG1 Pillar.dwg



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NOTES



PILLAR CLASSIFICATION

- CLASS 1 (GOOD)
- CLASS 2 (SATISFACTORY)
- CLASS 3 (MARGINAL)
- CLASS 4 (CRITICAL)
- CLASS 5 (FAILED)
- INSUFFICIENT INFORMATION TO CLASSIFY / NO ACCESS
- J12A_250 PILLAR PHOTOGRAPH REFERENCE AND DIRECTION
- CEILING HATCH (NTS)
- DRY STONE WALL
- SURVEY BOUNDARY LINE

BD = BREWERS DRIFT
BAW = BLOCKED AIRWAY
WT = WINDY TUNNEL
GST = GROUNDSTONE TUNNEL

• CLIENT/PROJECT

DEFENCE ESTATES
CORSHAM MINE
BASELINE GEOLOGICAL CONDITION SURVEY

• TITLE

BG1 SITE
PILLAR CONDITION
SHEET 11 OF 11

• DATE	12/05/10	DRAWN BY	MNL
• SCALE	1:500 @ A3	PRODUCED BY	MNL
• CAD REF	BG1 Pillars.dwg	CHECKED	AS
		APPROVED	AD

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FIGURE 12 | –

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ROOF CLASSIFICATION*

- CLASS II (SATISFACTORY)
- CLASS III (MARGINAL)
- CLASS IV (CRITICAL)
- CLASS V (FAILED)

*UNLESS INDICATED OTHERWISE, ROOF CLASSIFICATION IS CLASS I (GOOD)

PHOTOGRAPH REFERENCES

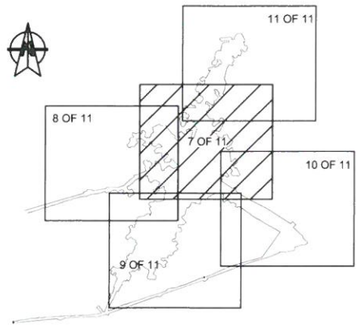
- RJ12_J15 ROOF PHOTOGRAPH REFERENCE (NEAREST PILLARS)
- NV NO VIEW (VIEW OF ROOF OBSCURED)
- CEILING HATCH (NTS)
- SURVEY BOUNDARY LINE

NO ACCESS
NO ACCESS
NO ACCESS
NO ACCESS
GS57
GS60
GS58
GS56
GS55
GS54
GS59
GS53
GS52
GS47
GS44
GS43
GS48
GS51
GS42
GS5
GS8
GS41
GS40
GS39
GS38
GS50
GS7
GS37
GS35
GS12
GS9
GS14
GS1
GS10
GS13
GS19
GS16
GS49
GS8
GS53
GS52
GS51
R_GS_BD_190m
R_GS_BD_130m
R_GS_BD_90m
R_GS_BD_70m_50m
R_GS_BD_75m_65m

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REV	DATE		BY	CHKD	APPD

NOTES



• CLIENT/PROJECT

DEFENCE ESTATES
CORSHAM MINE
BASELINE GEOLOGICAL CONDITION SURVEY

• TITLE

BG1 SITE
ROOF CONDITION
SHEET 7 OF 11

• DATE	21/05/10	DRAWN BY	JBM
• SCALE	1:500 @ A3	PRODUCED BY	JBM
• CAD REF	BG1 Roof.dwg	CHECKED	AS
		APPROVED	AD

PB PARSONS BRINCKERHOFF 100 YEARS

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• DRAWING NUMBER

FIGURE 19 | –

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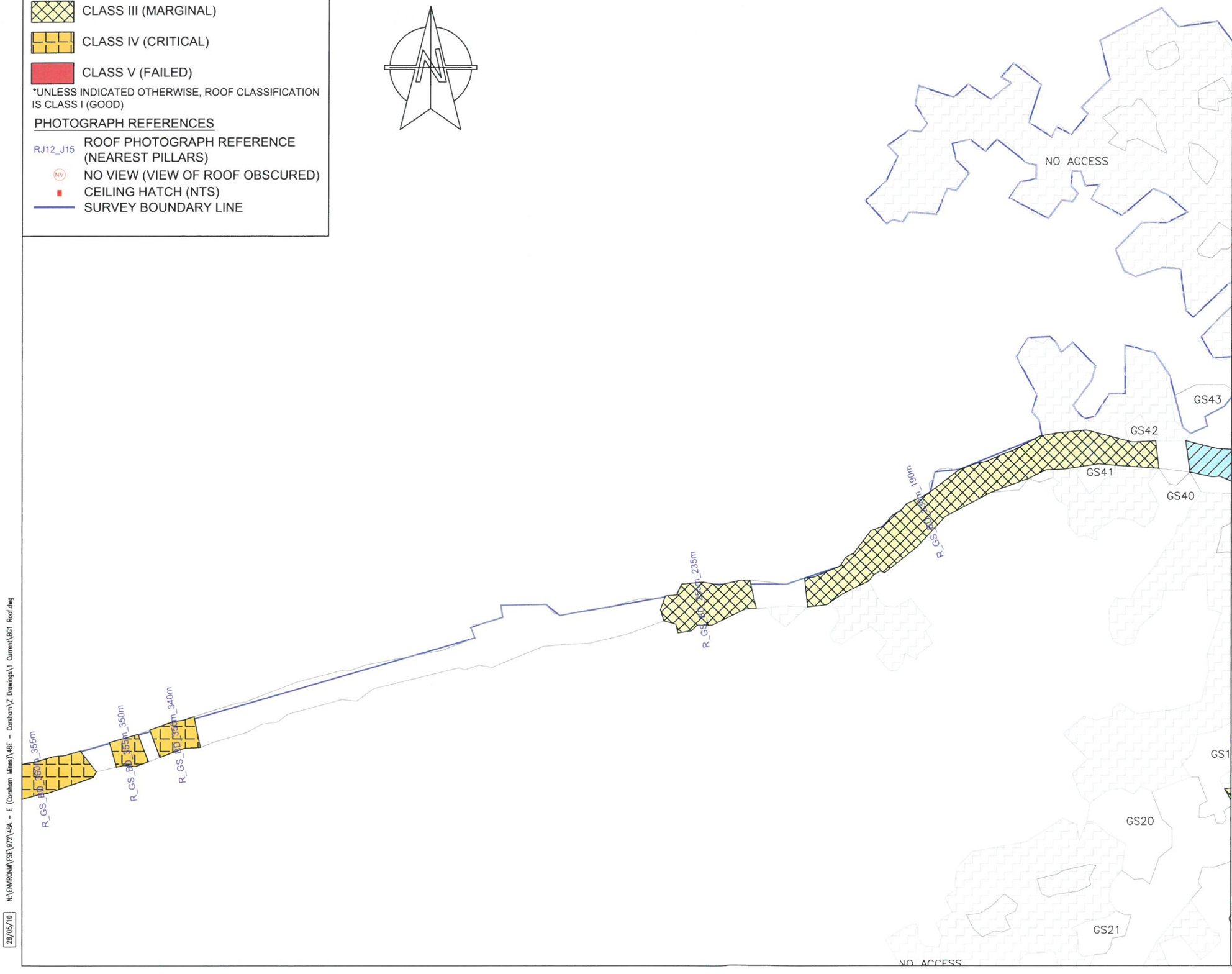
ROOF CLASSIFICATION*

- CLASS II (SATISFACTORY)
- CLASS III (MARGINAL)
- CLASS IV (CRITICAL)
- CLASS V (FAILED)

*UNLESS INDICATED OTHERWISE, ROOF CLASSIFICATION IS CLASS I (GOOD)

PHOTOGRAPH REFERENCES

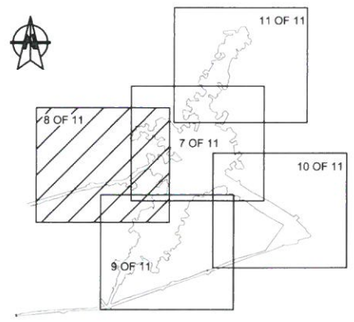
- RJ12_J15 ROOF PHOTOGRAPH REFERENCE (NEAREST PILLARS)
- NV NO VIEW (VIEW OF ROOF OBSCURED)
- CEILING HATCH (NTS)
- SURVEY BOUNDARY LINE



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REV	DATE		BY	CHKD	APPD

NOTES



- CLIENT/PROJECT

DEFENCE ESTATES
CORSHAM MINE
BASELINE GEOLOGICAL CONDITION SURVEY

- TITLE

BG1 SITE
ROOF CONDITION
SHEET 8 OF 11

• DATE	21/05/10	DRAWN BY	JBM
• SCALE	1:500 @ A3	PRODUCED BY	JBM
• CAD REF	BG1 Roof.dwg	CHECKED	AS
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FIGURE 20 | –

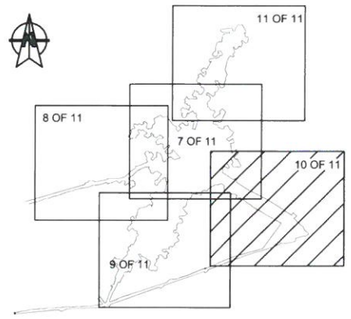
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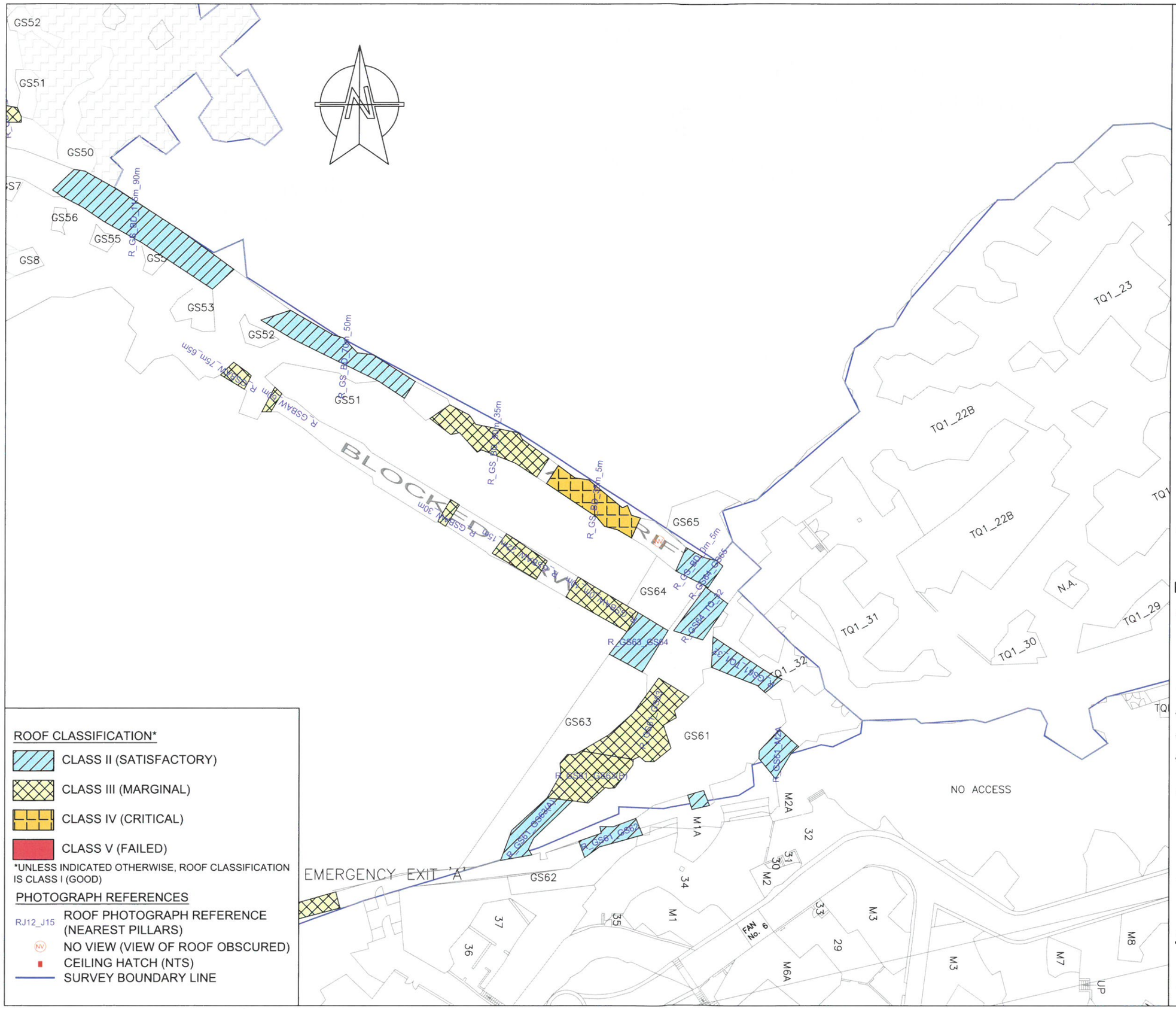
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REV	DATE		BY	CHKD	APPD

NOTES





ROOF CLASSIFICATION*

- CLASS II (SATISFACTORY)
- CLASS III (MARGINAL)
- CLASS IV (CRITICAL)
- CLASS V (FAILED)

*UNLESS INDICATED OTHERWISE, ROOF CLASSIFICATION IS CLASS I (GOOD)

PHOTOGRAPH REFERENCES

- RJ12_J15 ROOF PHOTOGRAPH REFERENCE (NEAREST PILLARS)
- (NV) NO VIEW (VIEW OF ROOF OBSCURED)
- CEILING HATCH (NTS)
- SURVEY BOUNDARY LINE

N:\ENVIRONM\FSE\9721\48A - 3 - (Corsham Mines)\48E - Corsham\Z Drawings\1 Current\BG1 Roof.dwg
28/05/10

• CLIENT/PROJECT

DEFENCE ESTATES
CORSHAM MINE
BASELINE GEOLOGICAL CONDITION SURVEY

• TITLE

BG1 SITE
ROOF CONDITION
SHEET 10 OF 11

• DATE	21/05/10	DRAWN BY	JBM
• SCALE	1:500 @ A3	PRODUCED BY	JBM
• CAD REF	BG1 Roof.dwg	CHECKED	AS
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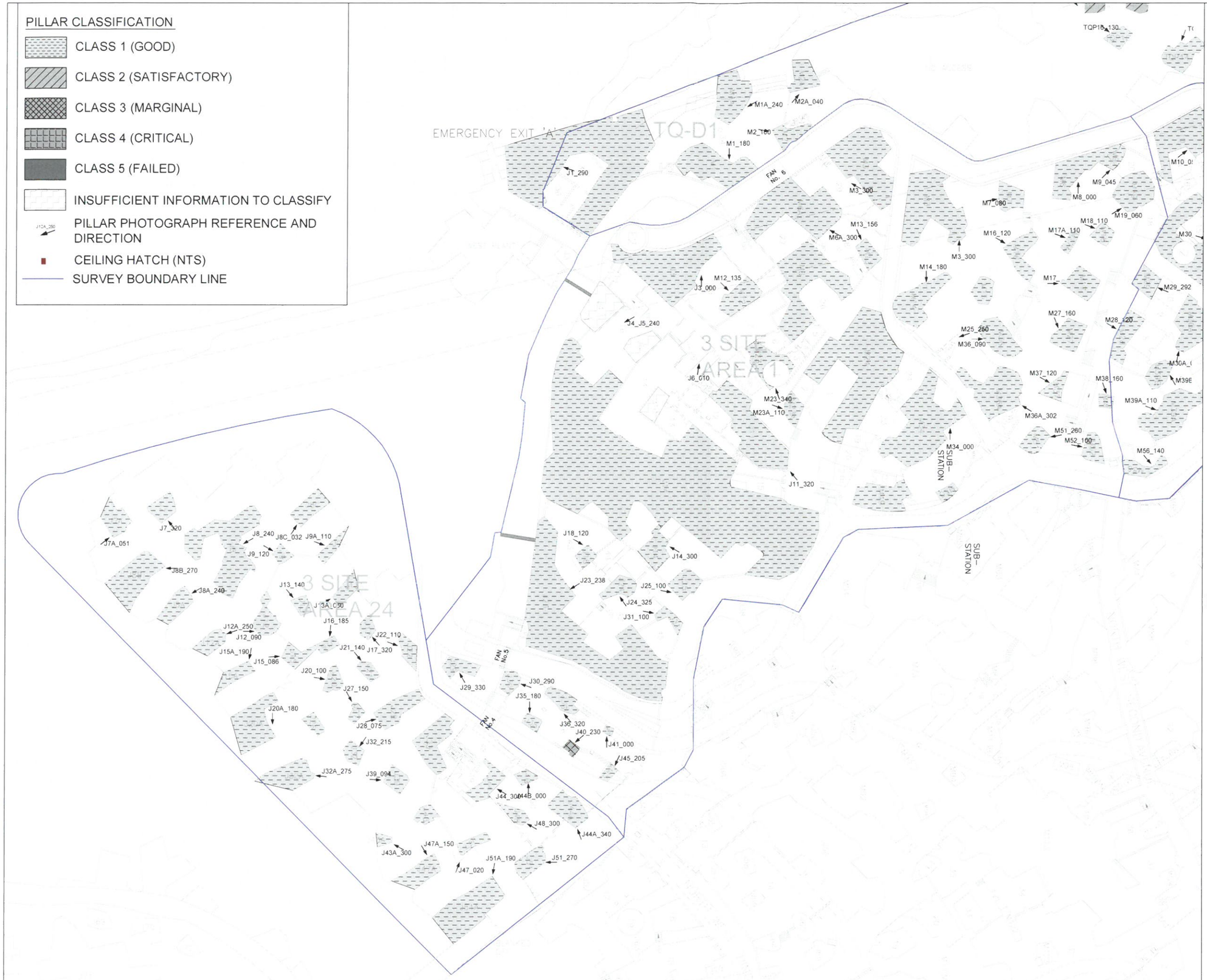
• DRAWING NUMBER

FIGURE 22 | –

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PILLAR CLASSIFICATION

- CLASS 1 (GOOD)
- CLASS 2 (SATISFACTORY)
- CLASS 3 (MARGINAL)
- CLASS 4 (CRITICAL)
- CLASS 5 (FAILED)
- INSUFFICIENT INFORMATION TO CLASSIFY
- J12A_250 PILLAR PHOTOGRAPH REFERENCE AND DIRECTION
- CEILING HATCH (NTS)
- SURVEY BOUNDARY LINE



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A	01/12/09	CHANGED FROM COLOUR TO GRAYSCALE.	BH	AS	GJ

NOTES

- CLIENT/PROJECT

DEFENCE ESTATES
CORSHAM MINE
BASELINE GEOLOGICAL CONDITION SURVEY

- TITLE

SQ1 3 SITE AREA 1
& 3 SITE AREA 24
PILLAR CONDITION

- DATE 29/09/09
- SCALE 1:500 @ A3
- CAD REF F1_4.dwg

DRAWN BY	JBM
PRODUCED BY	JBM
CHECKED	AS
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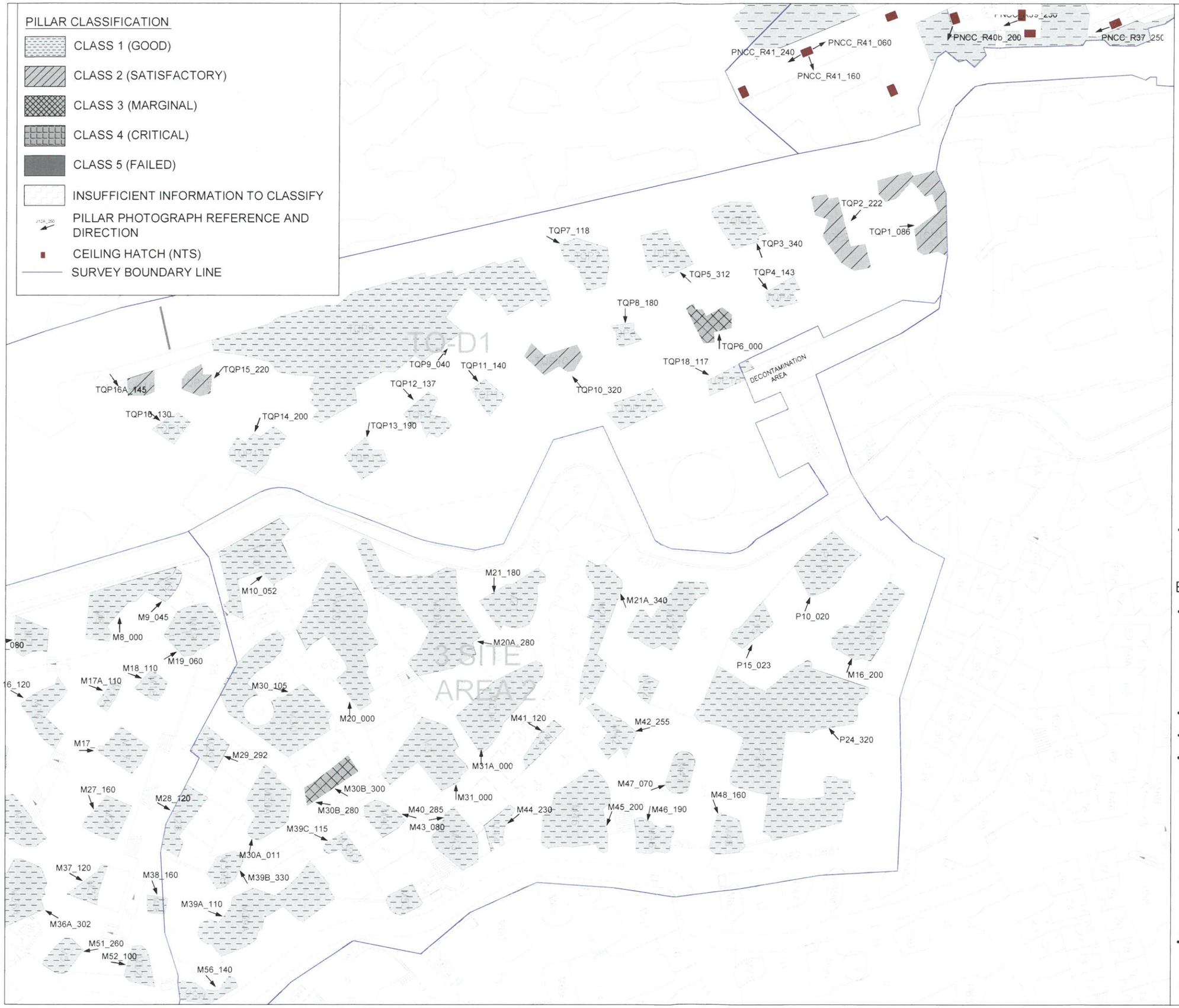
FIGURE 2 | A

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01/12/09 N:\ENVIRONM\FSE\972\48A – Corsham Mine Survey\48C – MOD Corsham Geological Condition Surveys\7 Drawings\7 Current\Booklets\Pillar\SQ1\F2_3.dwg

PILLAR CLASSIFICATION

- CLASS 1 (GOOD)
- CLASS 2 (SATISFACTORY)
- CLASS 3 (MARGINAL)
- CLASS 4 (CRITICAL)
- CLASS 5 (FAILED)
- INSUFFICIENT INFORMATION TO CLASSIFY
- PILLAR PHOTOGRAPH REFERENCE AND DIRECTION (e.g. J12A_250)
- CEILING HATCH (NTS)
- SURVEY BOUNDARY LINE



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REV	DATE		BY	CHKD	API
A	01/12/09	CHANGED FROM COLOUR TO GRAYSCALE.	BH	AS	GJ

NOTES

- CLIENT/PROJECT

DEFENCE ESTATES
CORSHAM MINE
BASELINE GEOLOGICAL CONDITION SURVEY

- TITLE

SQ1 TUNNEL QUARRY DISTRICT 1 AND 3 SITE AREA 2
PILLAR CONDITION

- DATE 29/09/09
- SCALE 1:500 @ A3
- CAD REF F1_4.dwg

DRAWN BY	JBM
PRODUCED BY	JBM
CHECKED	AS
APPROVED	GAJ

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- DRAWING NUMBER

FIGURE 3 | A

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01/12/09

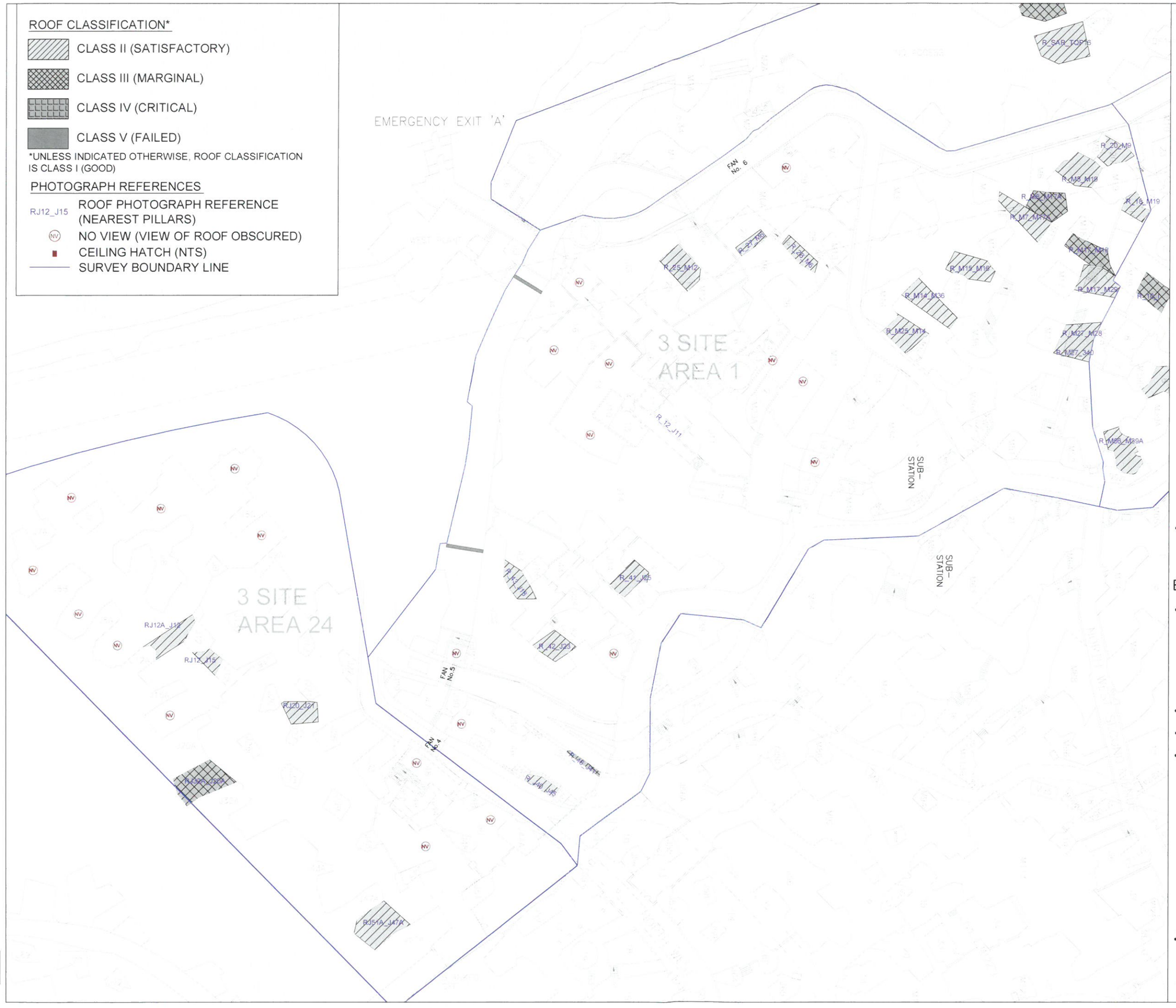
ROOF CLASSIFICATION*

- CLASS II (SATISFACTORY)
- CLASS III (MARGINAL)
- CLASS IV (CRITICAL)
- CLASS V (FAILED)

*UNLESS INDICATED OTHERWISE, ROOF CLASSIFICATION IS CLASS I (GOOD)

PHOTOGRAPH REFERENCES

- RJ12_J15 ROOF PHOTOGRAPH REFERENCE (NEAREST PILLARS)
- (NV) NO VIEW (VIEW OF ROOF OBSCURED)
- CEILING HATCH (NTS)
- SURVEY BOUNDARY LINE



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A	01/12/09	CHANGED FROM COLOUR TO GRAYSCALE.	BH	AS	GJ

NOTES

- CLIENT/PROJECT

DEFENCE ESTATES
CORSHAM MINE
BASELINE GEOLOGICAL CONDITION SURVEY

- TITLE

SQ1 3 SITE AREA 1
& 3 SITE AREA 24
ROOF CONDITION

- DATE 29/09/09
- SCALE 1:500 @ A3
- CAD REF F5_8.dwg

DRAWN BY	JBM
PRODUCED BY	JBM
CHECKED	AS
APPROVED	GAJ

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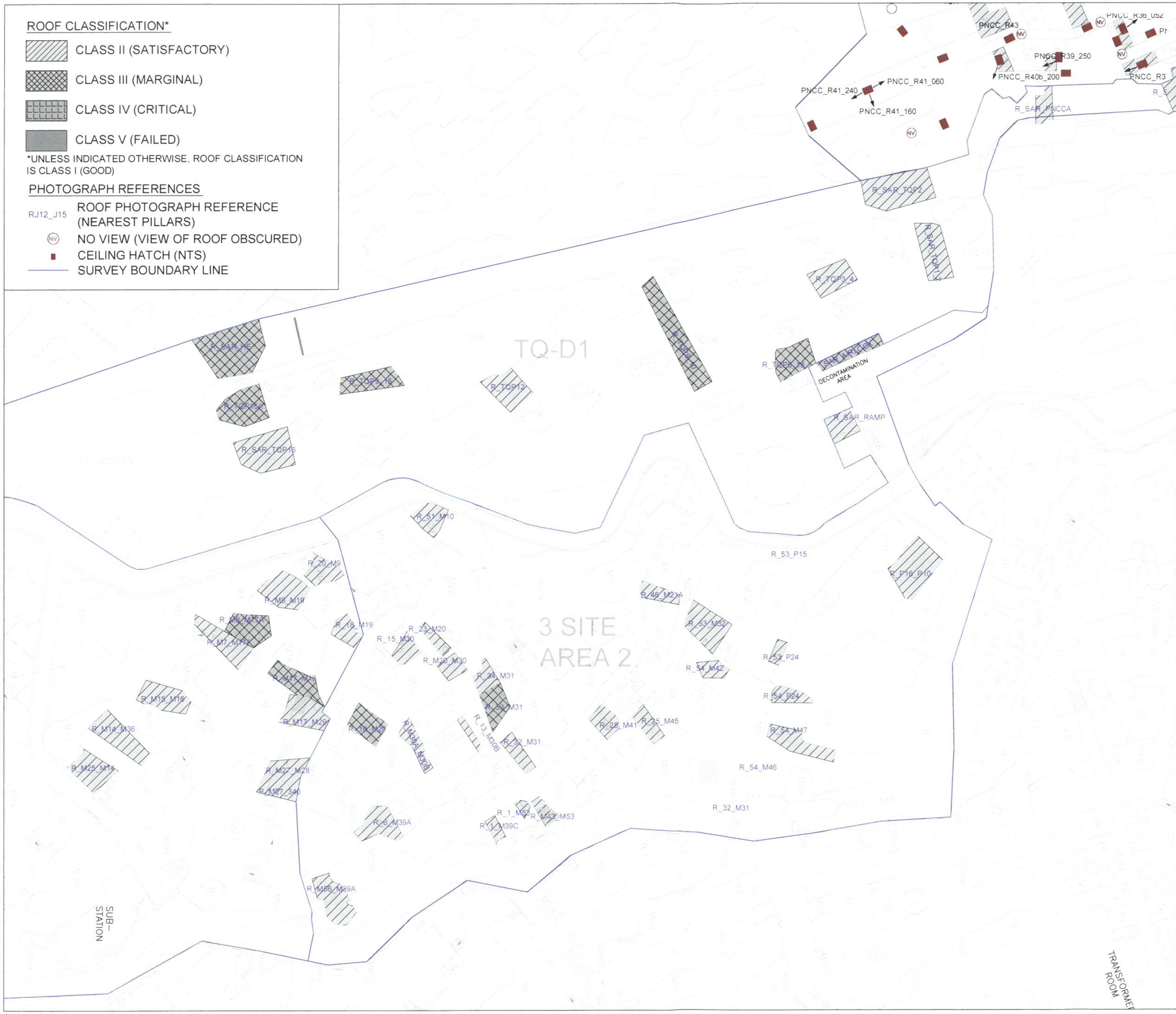
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- DRAWING NUMBER

FIGURE 4 | A

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A	01/12/09	CHANGED FROM COLOUR TO GRAYSCALE.	BH	AS	GJ

NOTES

• CLIENT/PROJECT

DEFENCE ESTATES
CORSHAM MINE
BASELINE GEOLOGICAL CONDITION SURVEY

• TITLE

SQ1 TUNNEL QUARRY DISTRICT 1 AND 3 SITE AREA 2 ROOF CONDITION

• DATE	29/09/09	DRAWN BY	JBM
• SCALE	1:500 @ A3	PRODUCED BY	JBM
• CAD REF	F5_8.dwg	CHECKED	AS
		APPROVED	GAJ

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FIGURE 5 | A

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N:\ENVIRONM\FSE\972\48A - Corsham Mine Survey\48C - MOD Corsham Geological Condition Surveys\Z Drawings\1 Current\Booklets\Roof\SQ1\Fig 4_5.dwg

01/12/09