A PHASE 2 GROUND INVESTIGATION REPORT FOR GATEWAY TO WALES, QUEENSFERRY

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Key Questions Answered by this Report

Question	Answer
What is the contamination status of the site relative to human health?	During testing, A single fibre of asbestos was identified in a 1 No. of 11 No. soil samples screened for asbestos. The laboratory were unable to undertake quantification testing of this sample as the only bundle present in the sample was removed during the initial screen. The asbestos was noted in the limestone subbase type material present at surface in the former parking area in the north of Site. To remove the risk to human health, this material should be removed from beneath any proposed soft landscaped areas and only reused beneath areas of hardstanding or structures. No other contaminants have been identified at a level that presents a risk to commercial end users.
What is the risk to controlled waters at the Site?	No risk to controlled waters has been identified at the Site.
Where is the groundwater level and will it pose any technical difficulties?	A continuous groundwater body is present within Tidal Flat Deposits and locally within Made Ground. The ground water level was measured at depths between 1.02m to 1.46m bgl during monitoring. Shallow groundwater was encountered at depths between 0.45m and 0.50m in the location of an assumed former basement / swimming pool. This water had a stagnant odour and is considered contained within the structure. Groundwater at the Site may present difficulties should a shallow foundation solution be utilised. Particularly in the footprint of the former hotel where deeper areas of Made Ground are present and foundations may need to be set below the groundwater level.
What significant features should be noted for the enabling works?	Widespread relict foundations are present in the footprint of the former hotel that will need to be removed during enabling works. The pumping of any stagnant water from the infilled basement feature (within the footprint of the former hotel) should be undertaken prior to its grubbing. This water will need to be removed from site to a suitably licenced waste facility.
What is the anticipated foundation solution for the Site?	Variable Granular Made Ground was encountered at all exploratory hole locations from ground level to depths between 0.45m and 1.90m bgl. Deeper Made Ground (1.40m to 1.90m) was encountered beneath the footprint of former hotel, particularly around the infilled basement feature (see figure C21379G2 in Appendix A). Away from the infilled basement feature, Made Ground was encountered to depths of between 0.45m and 0.90m bgl. The untreated Made Ground would not be considered suitable for the support of the proposed structures owing to the risk of excessive and unpredictable total and differential settlements. Tidal Flat Deposits were encountered from depths between 0.45m and 1.90m to a maximum proven depth of 3.00m bgl. This material was generally encountered as a fine to medium, locally slightly gravelly, silty sand. Testing has shown that the sand is generally loose to around 1.50m bgl becoming medium dense thereafter This material is considered suitable as a founding stratum using the recommended design parameters in Table 9.1. Based on the results of groundwater monitoring, it is recommended that a bearing capacity correction factor assuming a worst case groundwater level of 1.00m bgl is used for design purposes. Given the encountered ground conditions and anticipated loads, shallow foundations will be suitable for proposed retail units B2, B3 and B4 (as shown on the proposed layout plan in Appendix A); however, pad sizes will need to account for the presence of loose to medium dense sands and shallow groundwater. Deeper Made Ground (up to 1.9m bgl) beneath the location of the proposed Costa Coffee unit (as shown on the proposed layout plan in Appendix A) may present difficulties in the use of shallow foundations. The installation of shallow foundations beneath this unit may require supported excavations below the groundwater level and dewatering to install. Loads are likely to be minimal for the costa coffee unit, therefore there will be a requirement to remove the relict foundations and structures associated the former hotel, replace the resultant voids with suitably compacted fill and form the structure on a raft foundation. Ground improvement options such as CMC piles or vibro stone columns would also be suitable at the site and would have the added benefit of providing a platform for a ground bearing floor slab. It should be noted that consideration would need to be made to the impact of the vibrations on nearby structures and the culverted drain for driven foundations and vibro stone columns.

Does the site need ground gas protection measures and, if so, what is the likely design?	The site does not require ground gas protection measures.
Are the soils environmentally suitable to be reused on site?	The majority of Made Ground soils are considered environmentally suitable to be re-used on Site; however, the subbase type material in the location of the former parking area should only be used under areas of hardstanding or structures due to the presence of low level asbestos. It is understood that the quantum of material which is likely to be reused will be less that 1000 tons and, as such, this may be undertaken under a U1 exemption; however, if this 1000 tons is exceeded, the soils will need to be reused under a materials management plan. Unsuitable material will need to be removed from the demolition waste material if it to be reused. This will include the removal and crushing of the oversize material.
What is the remediation strategy for the site?	• The pumping of any stagnant water from the infilled basement feature within the footprint of the former hotel and removal to waste facility • General site clearance of structures not to be retained, to include relict foundations and sub surface structures. • Earthworks to bring site to proposed levels. • A piling mat / working platform may be required if a deeper foundation solution is to be used. • Due to the presence of a hotspot of low level asbestos, the limestone subbase type material within this area should be removed as part of the remediation strategy at the site.
What further works are required for the development?	Production of a remediation strategy for the removal of the asbestos hotspot Removal of asbestos hotspot and verification in line with the remediation strategy Watching brief by geoenvironmental engineer during enabling works to ensure that no previously unidentified hydrocarbon impacted soils, tanks or other contamination sources are encountered.

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1 INTRODUCTION

Terra97 was commissioned by Valedown Developments Ltd to undertake a Phase 2 Ground Investigation for a site referred to as Gateway to Wales, Queensferry (the "Site"). It is understood the development involves the construction of 4 No. commercial units ranging from 130m^3 to 371m^3.

Taking into account the planned future use of the Site, the objectives of this appraisal were:

- Review a Phase 1 Desk Study Report produced by SEP ltd.
- Present the findings of the Terra97 Site Investigation and incorporate the findings of the SEP ltd boreholes into any recommendations.
- Carry out a human health risk and controlled waters risk assessment for the Site.
- Provide recommendations for enabling works, floor slabs and foundations.

This report, which was designed to meet the requirements of all relevant current guidance, presents the factual information available during this appraisal, interpretation of the data obtained and recommendations relevant to the defined objectives.

1.1 LIMITATIONS

This report and its findings should be considered in relation to the terms of reference and objectives agreed between Terra97 and the Client as indicated earlier in this Section.

During the ground investigation reasonable effort has been made to obtain an overview of the site ground conditions; however, during the investigation works no attempt has been made to advance exploratory holes in areas of the site that are unsafe or present a risk to health and safety or areas which were inaccessible. Due to the Site being partially demolished, the position of the exploratory holes were constrained due to the presence of sub surface structures that presented a barrier.

2 SITE DETAILS AND DESCRIPTION

2.1 SITE DETAILS

Table 2-1 ***Current Site Overview.***

Site name	Gateway to Wales, Queensferry
Site address	118 Welsh Rd, Deeside CH5 2HX
National Grid Reference	333090, 369170
Location description	The Site is located on the east of Garden City in the town of Queensferry, Flintshire. The site is generally level, with the north of the site covered in subbase type material, the central part of the site covered in demolition rubble associated with the former hotel and the west of the site grass covered.
Approximate Site area	293m^2
Site shape	Irregularly shaped.
Current land use	At the time of the Site investigation the site was currently disused.
Surrounding land uses	The immediate surrounding areas are mixed residential and commercial.
Existing structures	An electricity substation is present in the northwest of the Site; however, this if of relatively modern construction.
Invasive plant species	None recorded. It is recommended that this is confirmed by a qualified ecologist.

3 PREVIOUS INVESTIGATION FINDINGS

The following report has been made available to Terra97 Ltd.

- Phase 1 Desk Study Report For the proposed re-development for the former site of the Gateway to Wales Hotel, Deeside, North Wales. Dated May 2019.
- Borehole logs produced by SEP ltd during a preliminary site investigation.

The information listed above is presented in Appendix C.

3.1 SEP LTD PHASE 1 DESK STUDY REVIEW

The Phase 1 Desk Study produced by SEP Ltd is summarised in Table 3.1 below.

Table 3-1 ***Summary of SEP Ltd Phase 1 Desk Study Report***

Site name	Gateway to Wales Hotel, Queensferry
Site Description	This is situated on Welsh Road, Deeside on the west side of the A494 trunk road. The site is currently a level area with a surface covering of broken brick and concrete from the demolition of the former hotel on the site.
Historical Summary	• 1874: The surrounding land is predominantly open farmland. An apparent flood defence embankment is shown adjacent to the northern corner of the Site. A road is shown to the southeast of the Site. • 1938: A 'club' building is shown adjacent to the southwest boundary of the Site. • 1954: A rectangular building is shown on the Site. The dual carriageway A494 has been constructed to the east of the Site. • 1979: A petrol filling station is shown on the Site. • 1992: The Gateway to Wales Hotel has been built over the footprint of the former filling station. • Present day: The Gateway to Wales Hotel is known to have been destroyed by fire in 2017.
Anticipated geology	Based on information published by the British Geological Survey the site is underlain by recent superficial Tidal Flat Deposits comprising clays, silts and sands of the Quaternary Period overlying rocks of the Pennine Middle Measures including mudstones, siltstones and sandstones of Carboniferous age. Borehole records in the vicinity of the site indicate the drift materials are a minimum of 13m thick.
Ground Stability	The site is categorised as having moderate hazard potential for problems related to compressible ground and running sands due to the presence of tidal flat deposits beneath the area.
Mining	The site is not located within a Coal Mining Reporting Area.
Landfill and Hazardous Ground Gases	There are no historic or currently licensed landfill sites or backfilled mineral workings within close proximity to the site. However, if petroleum hydrocarbons have entered the ground this could have resulted in the presence of gases relating to product degradation. The site is not within an area where specific precautionary measures are deemed necessary in the construction of new buildings in respect to Radon.
Hydrogeology and Hydrology	The superficial deposits are classified as "Secondary Undifferentiated". Bedrock beneath the site is categorised as "Secondary A Aquifer" The site is not within a Source Protection Zone. An open watercourse is shown aligned NW-SE on either side of the site but is approximately culverted beneath the site itself. This drain is subject to a number of discharge consents and several cases of pollution incidents to controlled waters have been recorded although typically within Category 3 – Minor Incident. There are no records of any nearby licensed groundwater abstractions or pollution incidents that could have had any adverse effects on the quality of groundwater in close proximity to the site. The site and the general area is classified as at risk from extreme flooding from rivers or sea without defences (Zone 2) although benefitting from flood defence.

Identified sources, pathways and receptors	**Identified potential sources:** • Contaminants in made ground including metals, PAHs, TPHs and asbestos • Mobile contaminants in made ground including metals and PAHs. • Hazardous vapours from volatile contaminants. **Identified potential pathways:** • Inhalation of vapours • Inhalation and dermal contact • Uptake in root zone • Leeching from Made Ground • Ingestion and absorption by direct contact; including hand to mouth contact, absorption through the skin, consumption of soil with vegetables. • Migration via groundwater **Identified potential receptors:** • Site workers. • Site users (future) • Site users (current) • Adjacent land users • Surface water • Groundwater
Recomendations	A Phase 2 investigation is necessary to identify the presence of any potentially contaminated ground at the site and in particular any legacy issues due to the former occupation of the site by a filling station, for example have the old underground fuel tanks been adequately dealt with and if any historical leakages occurred into the underlying ground. On completion of this work a Phase 2 report will be produced including a revised risk assessment as appropriate, and an assessment of geotechnical issues affecting the proposed redevelopment.

3.1.1 SEP ltd Site Investigation

Following the Phase I report SEP ltd undertook a limited site investigation comprising 6 No. window sample holes to depths between 2.20m and 4.45m bgl. In summary, the ground conditions comprised granular Made Ground to depths between 0.15m and 1.10m overlying loose to medium dense becoming dense fine sand to a maximum proven depths of 4.45m bgl. A bed of silt was also noted from 0.15m to 0.80m bgl at exploratory hole WS3.

Window sample WS5 terminated on an SPT refusal at 2.20m bgl. It is considered unlikely that this would be due to the presence of hard/very dense natural strata and it may indicate the presence of an obstruction associated with the former hotel structure (i.e a relict foundation).

Made Ground descriptions were not written to BS5930 on the SEP logs and it is considered probable that the boreholes were logged by drillers. As such, reliance cannot be placed on the strata descriptions. The SPT results are considered reliable.

3.1.2 Terra97 Comments on the SEP ltd Phase I Report

On review of the information presented in the SEP Phase I Report, Terra97 consider that the majority of the potential pollutant linkages have been identified for the site; however, the conceptual model presented by SEP does not adequately address the pollutant linkages that they have identified.

For instance, the conceptual site model presented by SEP does not highlight the significance of the former filling station as a potential source of hydrocarbons or the potential for PFAS contamination of the groundwater due to the use of firefighting foam during the fire at the hotel in 2017. Furthermore, there was no quantitative risk assessment undertaken as part of the model.

As such, Terra97 have drafted a revised Preliminary Conceptual Model the Site, presented in Section 5.

4 PROPOSED DEVELOPMENT

It is understood the development involves the construction of 4 No. commercial units ranging from 130m^3 to 371m^3 with associated areas of parking and localised soft landscaping.

The proposed site layout plan is presented on C4 Projects Drawing No 19028-C4P-AV-ZZ-DR-A-0501within Appendix A.

5 PRELIMINARY CONCEPTUAL MODEL

Based on the information presented in the SEP ltd Phase I Report and the associated Envirocheck Report, a combined preliminary conceptual site model and conceptual exposure model has been developed for the proposed future land use. This summarises the understanding of surface and sub-surface features, the potential contaminant sources, transport pathways and receptors. In assessing the likely contaminants present at the Site, reference has also been made to Defra and Environment Agency supporting documentation. A preliminary qualitative risk assessment has also been made of the likelihood of the linkage operating and its potential significance.

The potential pollutant linkages identified and the qualitative risk assessment for these are presented in Table 5.1. The terms used in the preliminary qualitative risk assessment are defined in the appendices.

5.1 JUSTIFICATION

The following factors are considered pertinent in defining the conceptual model.

5.1.1 Land Use

In summary, the site appears to have been predominantly in use as agricultural land until the early 1950s after which several unidentified structures were shown within the Site. From the 1970s until the early 2000s a Royal British Legion Club was present in the west of the Site and from the 1970s until before the 1990s a filling station (with a footprint of approximately 108m^2) was present in the north of the site. Contact has been made with the local petroleum licencing officer and Terra97 are awaiting the results of the search; this information will be submitted upon receipt of the results. The Gateway to Wales Hotel (shown on OS plans from 1992) was constructed over the footprint of the historical filling station. The Gateway to Wales Hotel burnt down in 2017 and has subsequently been demolished.

The Site is located to the east of Garden City in the town of Queensferry, Flintshire. The site is generally level, with the north of the site covered in subbase type material, the central part of the site covered in demolition rubble associated with the former hotel and the west of the site grass covered.

An electricity substation is present in the north of the Site; however, it was constructed after 1976 therefore the risk of PCB contamination can be discounted.

No potentially contaminative surround land uses have been identified during the desk study.

BGS records show ground conditions at the site to comprise Tidal Flat Deposits (clay, silt, sand) overlying rocks of the Pennine Middle Measures (mudstones, siltstones and sandstones). Made Ground is anticipated based on the sites history of development.

The site is categorised as at moderate hazard potential for problems related to compressible ground and running sands due to the presence of tidal flat deposits beneath the area.

Superficial Deposits beneath the Site are classified as a Secondary Undifferentiated Aquifer and Bedrock is classified as a Secondary A Aquifer. The Site does not lie within a Source Protection Zone.

The nearest water abstraction is 300m southeast of the Site. This licence was active from 1989 from Manor Drain. It is considered probable that the licence is no longer active. No other abstraction licences are within 500m of the Site.

The nearest surface water receptor is the culverted watercourse running WNW-ESE through the northern part of the Site. The River Dee is located 760m south of the Site.

The Site is not within an area which requires basic Radon Protection Measures.

5.1.2 Potential Sources

- Possible asbestos, metal, PAH, phenol, petroleum hydrocarbons, sulphate, volatile and semi-volatile organic compounds, acid and alkali contamination associated with potential on site Made Ground.
- Possible hydrocarbon contamination associated with the sites former use as a filling station, including potential hazardous vapour generation.
- Possible PFAS contamination associated with firefighting foam used during the fire at the Gateway to Wales Hotel
- Potential bulk ground gas generation from on site Made Ground.

5.1.3 Potential Pathways

- Dermal contact, ingestion and inhalation of contaminants on site.
- Lateral and/or vertical migration of mobile contaminants both within shallow groundwater and as gas.
- Migration of mobile contaminants from Made Ground soils to adjacent sites along services and conduits.
- Contaminated dust migration during construction.

5.1.4 Potential Receptors

- Future, current and adjacent users of the Site.
- Site investigation, demolition and construction staff and future underground service maintenance workers from hazardous short-term exposure.
- Buildings, hardstanding and services.
- Secondary Undifferentiated and Secondary A Aquifer beneath the Site.
- The culverted watercourse running through the northern part of the Site.

5.2 UNCERTAINTIES

The following uncertainties exist in the preliminary conceptual model.

- Any potential sources of contamination not highlighted from the historical maps during the third party investigations of the Site.
- Any unrecorded geological features.
- Any unrecorded pollution events during the Site's history.
- Any unrecorded underground storage tanks or unreported spillages/leaks.

Table 5.1. ***Preliminary Assessment of Potential Pollutant Linkages.***

Pollutant linkage				
	Source	**Pathway(s)**	**Receptor(s)**	**Qualitative risk assessment**
1	Possible asbestos, metal, PAH, phenol, petroleum hydrocarbons, sulphate, volatile and semi-volatile organic compounds, acid and alkali contamination associated with potential on site Made Ground.	Dermal contact, ingestion and inhalation of contaminants including contaminated dust migration during construction.	Future site users (commercial)	Medium x Low Likelihood = Moderate/Low Risk
			Current site users (site visitors)	Medium x Low Likelihood = Moderate/Low Risk
			Adjacent site users (commercial and residential)	Medium x Low Likelihood = Moderate/Low Risk
			Construction, site investigation, demolition and future maintenance workers	Medium x Low Likelihood = Moderate/Low Risk
		Migration of mobile contaminants from Made Ground soils to adjacent sites along services and conduits. Lateral and/or vertical migration of mobile contaminants.	Adjacent site users (commercial and residential)	Medium x Low Likelihood = Moderate/Low Risk
			Secondary Undifferentiated and Secondary A Aquifer beneath the Site. The culverted watercourse running through the northern part of the Site.	Medium x Low Likelihood = Moderate/Low Risk
2	Possible hydrocarbon contamination associated with the sites former use as a filling station, including potential hazardous vapour generation.	Migration of mobile contaminants from Made Ground soils to adjacent sites along services and conduits. Lateral and/or vertical migration of mobile contaminants.	Secondary Undifferentiated and Secondary A Aquifer beneath the Site. The culverted watercourse running through the northern part of the Site.	Severe x Low Likelihood = Moderate Risk
			Adjacent site users (commercial and residential)	Severe x Low Likelihood = Moderate Risk
		Lateral and/or vertical migration of mobile contaminants as gas.	Future site users (commercial)	Severe x Low Likelihood = Moderate Risk
			Adjacent site users (commercial and residential)	Severe x Low Likelihood = Moderate Risk
3	Possible PFAS contamination associated with firefighting foam used during the fire at the Gateway to Wales Hotel	Lateral and/or vertical migration of mobile contaminants	Secondary Undifferentiated and Secondary A Aquifer beneath the Site. The culverted watercourse running through the northern part of the Site.	Medium x Low Likelihood = Moderate/Low Risk
4	Potential bulk ground gas generation from on site Made Ground.	Lateral and/or vertical migration of mobile contaminants as gas.	Future site users (commercial)	Severe x Low Likelihood = Moderate Risk
			Current site users (site visitors)	Medium x Unlikely = Low Risk
			Construction, site investigation, demolition, and future maintenance workers	Severe x Low Likelihood = Moderate Risk
			Buildings and services	Severe x Low Likelihood = Moderate Risk

6 TERRA97 PHASE 2 INVESTIGATION WORKS

6.1 OBJECTIVES FOR GROUND INVESTIGATION WORKS

The objectives of this site investigation were to:

- Determine the ground conditions beneath the Site including:
  - The base of the Made Ground soils.
  - The nature of natural deposits
- Install mixed groundwater and ground gas monitoring wells to undertake monitoring and sampling visits.
- Undertake general contamination testing to provide site coverage primarily to determine the presence of the identified potential pollutant linkages at the site.

6.2 FIELDWORK

The investigation works were initially undertaken between 22nd to the 24th March 2021 and comprised the following:

- A total of 5 No. window sample boreholes (WS1 to WS5) were drilled to a maximum depth of 3.00m bgl to determine the depth of Made Ground soils and allow for soil sampling and to enable mixed groundwater and ground gas monitoring well installations.
- The advancement of 4 No. dynamic probes beneath the proposed building footprints to verify the findings of the SEP ltd ground investigation and provide information on deeper soil horizons.
- Logging and sampling of 13 No. machine excavated pits to a maximum depth of 2.10m bgl.
- A program of 2 No groundwater monitoring visits has been undertaken. Ground gas monitoring was also undertaken as part of these visits to support the findings of the ground gas risk assessment undertaken using the CL:AIRE RB17 method.

Terra97 borehole logs, and their respective locations, are presented in the appendices. The locations on this drawing have been placed as accurately as possible by eye, using on-site markers such as car parking bays to determine their locations.

6.3 LABORATORY TESTING

6.3.1 Chemical Analysis

Terra97 scheduled chemical laboratory testing on selected soil and groundwater samples with lateral and vertical spread across the site. The purpose of this testing was to:

- Determine the concentration and spatial distribution of potential contaminants in Made Ground.
- To determine the Design Sulphate class and Aggressive Chemical Environment for Concrete class of the soils beneath the site.
- To determine the risk to controlled waters beneath and within the vicinity of the site.

Testing of soils comprised the Terra97 standard soil suite (7 No.), VOC and SVOC (1 No.) asbestos screen (11 No.), speciated TPH testing (6 No), groundwater suite (3 No.), TPH in groundwater (3 No.) and PFAS in groundwater (1 No.). Terra97 Ltd.'s soil and groundwater suite are defined in the appendix.

All analyses were undertaken using tests accredited to UKAS and/or MCERTS standards, where available. The analytical laboratory results are presented in the appendices.

6.4 GROUND CONDITIONS

6.4.1 Made Ground

Granular Made Ground was encountered at all exploratory hole locations from ground level to depths between 0.45m and 1.90m bgl. Deeper Made Ground (1.40m to 1.90m) was encountered beneath the footprint of former hotel, particularly around the infilled basement feature (see figure C21379G2 in Appendix A). Away from the infilled basement feature, Made Ground was encountered to depths between 0.45m and 0.90m bgl.

The populations of Made Ground identified at the Site are outlined below:

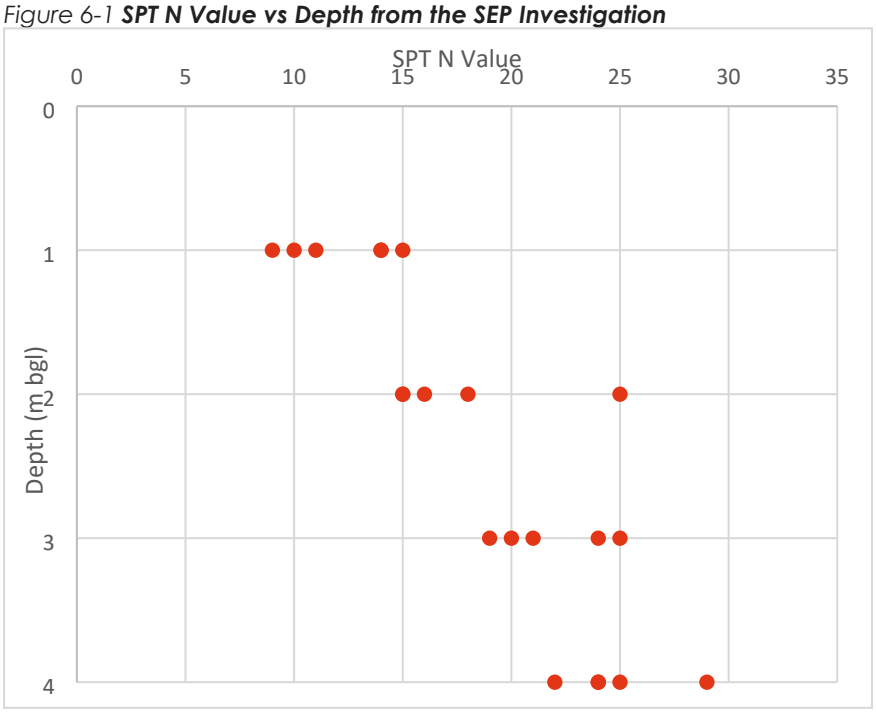
- **Subbase:** Material considered representative of subbase type material was encountered in former parking areas (where asphalt had been removed) and in the northwest portion of the Site to depths between 0.07m and 0.20m bgl. This material generally comprised sandy angular fine to coarse gravel of limestone, rare brick and macadam.
- **Reworked Topsoil:** The majority of the western part of the Site is grass covered with topsoil encountered to depths between 0.20m and 0.45m bgl. This material generally comprised gravelly clayey fine to medium organic sand.
- **Demolition Fill:** Material considered representative of demolition fill was encountered in and around the former hotel footprint from ground level to depths between 0.70m and 0.50m bgl. This material was variable but was generally recorded as cobble and boulder sized fragments of breezeblock, concrete and brick with much sandy gravel or sandy gravel/gravelly sand with variable amounts of cobble and boulder sized fragments of breeze block, concrete and brick. Other anthropogenics included reinforced concrete posts, metal, wire, plastic, geotextile, electronics, asphalt, pipe fragments and polystyrene.
- **Reworked Natural:** Material considered to be reworked natural was encountered beneath subbase, topsoil or demolition fill to depths of between 0.60m and 1.90m bgl. This material generally comprised fine to medium variably gravelly silty sand with localised cobbles. Where present, anthropogenics included brick, concrete and timber fragments.

6.4.2 Superficial Deposits

Tidal Flat Deposits were encountered from depths between 0.45m and 1.90m to a maximum proven depth of 3.00m bgl. This material was generally encountered as a fine to medium, locally slightly gravelly, silty sand

In the SEP investigation, SPT tests undertaken in this material showed that it was generally loose to medium dense from 1.0m bgl, becoming medium dense from 2.0m bgl. Dynamic probe tests undertaken by Terra97 (to a depth of 7.0m bgl) have shown that the sand is generally loose to around 1.50m bgl becoming medium dense thereafter. A profile of the SPT results in the sand is provided in Figure 6.1 below and the results of the dynamic probe tests are presented in the Appendix.

Figure 6-1 ***SPT N Value vs Depth from the SEP Investigation***



Based on the results of the SPT and dynamic probe tests, the following conservative design parameters are recommended in the Tidal Flat Deposit Sands.

Table 6-1 ***Recommended Conservative Design Values for the Tidal Flat Deposits***

Depth	Charecteristic N Value	Density	Relative Density (%)	Friction Angle (°)
1.0m bgl (where natural)	9	Loose	38	32
2.0m bgl	15	Medium Dense	45	36
3.0m bgl	20	Medium Dense	50	37
4.0m bgl	22	Medium Dense	52	38

6.4.3 Below Ground Obstructions

At the time of the Site investigation a number of below ground obstructions were observed at the Site. Table 6.2 below outlines the obstructions encountered.

Table 6-2 – ***Below Ground Obstructions***

Location	Obstruction	Obstruction Depth (m bgl)	Comments
Within the footprint of the former hotel	Widespread relict foundations and localised basement feature.	Unknown probably up to 2.0m bgl	Relict foundations and other subsurface features associated with the former hotel were avoided in choosing the location of exploratory holes; however, their presence could be observed from ground level.
TP9	Concrete obstruction at base of the pit.	1.40m bgl	Concrete obstruction. Potentially relict foundation.

6.4.4 Hydrocarbon Observations

A faint hydrocarbon odour was noted from 1.20m to 1.40m bgl at exploratory hole TP4, this is considered to be located within the smear zone and is suggestive of historical contamination that has since attenuated. A faint hydrocarbon odour was also noted from 0.20m to 0.50m at exploratory hole WS3. Samples from both of these horizons were tested for TPHs.

6.5 GROUNDWATER OBSERVATIONS

6.5.1 Groundwater Strikes during Drilling Works

All boreholes encountered groundwater. Table 6-3 below summarises the groundwater strikes encountered during the Site works.

*Table 6-3 – **Groundwater Strikes***

Exploratory Hole	Groundwater Strike (m bgl)	Strata strike encountered within	Comments
WS1	1.40	Tidal Flat Deposits	
WS2	1.50	Tidal Flat Deposits	
WS3	1.50	Tidal Flat Deposits	
WS4	1.60	Tidal Flat Deposits	
WS5	1.45	Tidal Flat Deposits	
TP3	0.45	Demolition rubble – probable infilled basement	Putrid odour. Rapid inflow
TP4	1.40	Tidal Flat Deposits	Slow seepage
TP6	1.60	Tidal Flat Deposits	Slow seepage
TP7	0.50	Demolition rubble – probable infilled basement	Putrid odour. Rapid inflow
TP8	1.50	Tidal Flat Deposits	Slow seepage
TP10	1.35	Tidal Flat Deposits	Slow seepage

6.5.2 Groundwater Monitoring

Table 6-4 below presents the groundwater monitoring results. The results show that there is a continuous groundwater body present beneath the Site at depths between 1.02m and 1.46m during the monitoring period.

*Table 6-4 – **Groundwater Monitoring Results***

Borehole ID	Response Zone	Water Depth (mbgl) Visit 1 (29/03/2021)	Water Depth (mbgl) Visit 2 (13/04/21)
WS1	0.50m to 2.50m bgl (Made Ground and Tidal Flat Deposits)	1.26m	1.37m
WS3	0.50m to 2.50m bgl (Made Ground and Tidal Flat Deposits)	1.35m	1.46m
WS4	0.60m to 2.60m bgl (Made Ground and Tidal Flat Deposits)	1.02m	1.15m
WS5	0.50m to 2.00m bgl (Made Ground and Tidal Flat Deposits)	1.14m	1.23m

7 HUMAN HEALTH AND CONTROLLED WATERS RISK ASSESSMENT

This section of the report evaluates risks to potential receptors at the site from identified chemical contamination. Potential receptors have been identified with reference to the Part 2A regime and associated DEFRA guidance. As with part of the Part 2A regime, under the planning regime all receptors (human, controlled waters, ecology, crops/livestock and buildings) have been considered for the potential to be adversely affected by exposure to contamination. The full chemical laboratory results are enclosed in the appendices. The approach and rationale to assessment criteria adoption for this site are also presented in the appendices.

This report has undertaken a human health risk assessment for the soils which are to remain on the site, but also soils currently proposed to be removed from the Site as waste in case of development plan changes.

7.1 RISKS TO HUMAN HEALTH

7.1.1 Metals/Metalloids

After initial screening against the relevant GACs, none of the samples tested were above their respective GACs for a commercial land use in respect to metals and metalloids.

It is therefore considered that Made Ground at the site should not be considered contaminated with respect to metals and metalloids, for a commercial land use.

7.1.2 PAHs

Polycyclic aromatic hydrocarbons (PAHs) are a wide range of over 200 different compounds normally associated with combustion or processing of hydrocarbons and coal. Elevated levels of PAHs can also be found in tarmac. Sixteen PAHs (usually known as the USEPA 16) comprise the more common individual carcinogenic PAH compounds with a seventeenth (Coronene) included in the assessment of soil for waste disposal at landfill sites. Each of the PAH compounds have different toxicity.

After initial screening against the relevant GACs, none of the samples tested were above their respective GACs for a commercial land use in respect to PAHs

It is therefore considered that Made Ground at the site should not be considered contaminated with respect to PAHs, for a commercial land use.

7.1.3 Total Petroleum Hydrocarbons (TPHs)

Marginal concentrations of TPHs were detected within 5 No. of the 6 No. samples submitted for analysis as summarised in Table 7.1.

The results show that the measured concentrations of TPHs were several orders of magnitude below their respective GACs. As such, it is considered that Made Ground at the site should not be considered contaminated with respect to TPH, for a commercial land use.

Table 7-1 Detectable concentrations of TPH in soils

TPH Band	GAC (mg/kg)	No of Detections	Max Concentration (mg/kg)
Aliphatics C10-C12	9700	2	7.8
Aliphatics C12-C16	59000	2	60
Aliphatics C16-C35	1600000	5	203
Aromatics EC10-EC12	16000	1	8
Aromatics EC12-EC16	36000	3	43
Aromatics EC16-EC21	28000	4	121
Aromatics EC21-EC35	28000	5	424

7.1.4 VOCs and SVOCs

A single sample (TP4 at 1.60m bgl) was analysed for concentrations of VOC/SVOCs. This sample was taken from material with a faint hydrocarbon odour. The results show that no detectable concentrations of VOC/SVOC were encountered above the laboratory limit of detection. As such, it is not considered that VOC/SVOC pose a risk to the identified receptors for a commercial land use.

7.1.5 Asbestos

Of the 11 No. samples screened for asbestos,1 No. sample was found to contain a single small bundle of chrysotile (<0.1%). The laboratory were unable to undertake quantification testing of this sample as the only bundle present in the sample was removed during the initial screen.

The sample where the asbestos bundle was encountered (TP2 at 0.05m bgl) was described as a slightly sandy angular fine to coarse gravel of limestone. This material was considered to be imported quarried material used as a subbase to the former car park. The presence of asbestos is considered unusual in this type of material and the inability of the laboratory to undertake quantification testing on the sample is extremely unusual. The potential for cross contamination of the sample at the laboratory is considered possible but unproveable.

7.2 Controlled Waters Risk Assessment

Superficial Deposits beneath the Site are classified as a Secondary Undifferentiated Aquifer and Bedrock is classified as a Secondary A Aquifer. The Site does not lie within a Source Protection Zone.

The nearest water abstraction is 300m southeast of the Site. This licence was active from 1989 from Manor Drain. It is considered probable that the licence is no longer active. No other abstraction licences are within 500m of the Site.

The nearest surface water receptor is the culverted watercourse running WNW-ESE through the northern part of the Site. The River Dee is located 760m south of the Site.

A potential risk to groundwaters was identified in relation to the sites former use as a filling station and the use of firefighting foam to extinguish a fire the former hotel in 2017. As such, 4 No. groundwater monitoring wells have been installed around the former filling station and hotel and 3 No. samples were tested for metals, PAHs and TPH and 1 No. sample was tested for PFAS. Analytical data from the results have been evaluated against GAC values appropriate to the conceptual model for the site. In accordance with Part 2A of the Environmental Protection Act 1990, Terra97 has made regard to all of the water quality standards that are relevant to the specific site and a judgment has been made against the most stringent of those relevant standards.

In accordance with best practice consideration of the following sources of water quality standards has been made:

- EQS Directive 2008/105/EC
- Priority Substances Directive 2013/39/EU
- Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015
- UK Drinking Water Standards (UKDWS)
- World Health Organisation (WHO Guidelines) for Drinking Water Quality
- Council Directive 98/83/EC on the quality of water intended for human consumption (Drinking water directive)

In some instances, the laboratory method detection limit is greater than the appropriate EQS/UKDWS value. In these instances, only measured concentrations in excess of the laboratory method detection limit have been considered likely to potentially represent a possible significant risk to controlled waters.

For those determinands where the selected water quality standard is dependent on hardness, the relevant EQS has been selected based on the hardness results of groundwater analysis at the Site.

All 3 No. samples contained at least 1 No. concentration which initially exceeded their EQS/UKDWS. Table 7.2 below presents these exceeded concentrations. Further assessment is then made on these exceedances to determine their true risk to controlled waters. This includes considerations of the groundwater regime below the site and factors such as any water abstractions and the distance to the receptors.

*Table 7.2– **Groundwater concentrations above the initial GAC***

Determinand	Units	Limit of Detection	Initial GAC	Max Recorded Concentration	No exceedances
Anthracene	ug/l	0.013	0.1	0.017	1
Fluoranthene	ug/l	0.012	0.0063	0.032	3

7.2.1 Assessment of Polycyclic Aromatic Hydrocarbon (PAHs) Groundwater Contamination

A single groundwater sample (WS1) exceeded its most stringent Environmental Quality Standard (Inland Surface Waters) for anthracene and 3 No. samples (WS1, WS3, WS4) exceeded their most stringent Environmental Quality Standard (Inland Surface Waters) for fluoranthene. These exceedances were within one order of magnitude of their respective GACs and are considered typical of groundwaters in brownfield sites.

Much of the PAH contamination in the environment can be considered as 'background' from natural sources and past industrial activity, giving rise to a legacy of contaminants already present in the soil and sediment. Given that the absence of a significant onsite source of the contamination and the fact the exceedances of the PAH groundwater contaminants at the Site were marginal, the Site is not considered to present a significant risk to controlled waters in respect to PAHs.

7.1 GROUND GAS RISK ASSESSMENT

During the Site Investigation, Made Ground was generally encountered to a depth of less than 2.0m bgl and the maximum concentration of TOC encountered in the Made Ground soils (excluding a sample of topsoil material) was 0.91%. In accordance with CL:AIRE RB17, this places the Site in Characteristic Situation 1 for which no ground gas protection measures are required.

In addition to the RB17 assessment, precautionary ground gas monitoring was undertaken during the 2 No. groundwater monitoring visits on the 29 March and 13 April 2021. During these visits no flow rate was recorded in any of the wells, no methane was recorded and the maximum carbon dioxide concentration was 0.8l/hr. This supports the RB17 assessment that the site is in Characteristic Situation 1 for which no ground gas protection measures are required.

The results of ground gas monitoring are presented in Appendix I.

8 REVISED CONCEPTUAL SITE MODEL

The preliminary conceptual model has been revised in light of the additional information obtained by Terra97 Ltd during the Phase 2 site investigation works. This Revised Conceptual Site Model (RCSM) is the basis for any required remediation works.

8.1.1 General Understanding of Revised Ground Model

In summary, the site appears to have been predominantly in use as agricultural land until the early 1950s after which several unidentified structures were shown within the Site. From the 1970s until the early 2000's a Royal British Legion Club was present in the west of the Site and from the 1970s until before the 1990s a filling station (with a footprint of approximately 108m^2) was present in the north of the site. The Gateway to Wales Hotel (shown on OS plans from 1992) was constructed over the footprint of the historical filling station. The Gateway to Wales Hotel burnt down in 2017 and has subsequently been demolished.

The Site is located in the east of Garden City in the town of Queensferry, Flintshire. The site is generally level, with the north of the site covered in subbase type material, the central part of the site covered in demolition rubble associated with the former hotel and the west of the site grass covered.

Variable Granular Made Ground was encountered at all exploratory hole locations from ground level to depths between 0.45m and 1.90m bgl. Deeper Made Ground (1.40m to 1.90m) was encountered beneath the footprint of former hotel, particularly around the infilled basement feature (see figure C21379G2 in Appendix A). Away from the infilled basement feature, Made Ground was encountered to depths of between 0.45m and 0.90m bgl.

Tidal Flat Deposits were encountered from depths between 0.45m and 1.90m to a maximum proven depth of 3.00m bgl. This material was generally encountered as a fine to medium, locally slightly gravelly, silty sand.

Superficial Deposits beneath the Site are classified as a Secondary Undifferentiated Aquifer and Bedrock is classified as a Secondary A Aquifer. The Site does not lie within a Source Protection Zone.

The nearest water abstraction is 300m southeast of the Site. This licence was active from 1989 from Manor Drain. It is considered probable that the licence is no longer active. No other abstraction licences are within 500m of the Site. The nearest surface water receptor is the culverted watercourse running WNW-ESE through the northern part of the Site. The River Dee is located 760m south of the Site.

Based on a CL:AIRE RB17 total organic carbon assessment and the results of 2 No, gas monitoring visits, the Site is classified as Characteristic Situation 1 for which no gas protection measures are required. The Site is not within an area which requires basic Radon Protection Measures

No risk to controlled waters has been identified during the exploratory works. Low level exceedances of anthracene and fluoranthene were identified in groundwater samples; however, these are considered to be within the limits of normal background levels for a typical brownfield site.

Of the 11 No. samples screened for asbestos,1 No. sample was found to contain a single small bundle of chrysotile (<0.1%). The laboratory were unable to undertake quantification testing of this sample as the only bundle present in the sample was removed during the initial screen. This is considered to represent a hotspot and not representative of a site wide asbestos contamination issue.

8.1.2 Sources

- Low level asbestos hotspot of localised subbase type material present at surface.

8.1.3 Pathways

- Inhalation of contaminants including contaminated dust migration during construction.
- Migration of contaminants from Made Ground soils to adjacent sites.

8.1.4 Receptors

- Future users of the Site (commercial).
- Site investigation, demolition and construction staff and future underground service maintenance workers from hazardous short-term exposure.
- Adjacent site users (commercial and residential)

Table 8.1. ***Revised Assessment of Potential Pollutant Linkages.***

Pollutant linkage				
	Source	**Pathway(s)**	**Receptor(s)**	**Qualitative risk assessment**
1	Hotspot of asbestos within Made Ground soils which are to remain at surface at the Site.	Inhalation of contaminants including contaminated dust migration during construction.	Current site users (site visitors)	Minor x Unlikely = Negligible Risk
			Future site users	Minor x Unlikely = Negligible Risk
			Construction, site investigation, demolition and future maintenance workers	Minor x Unlikely = Negligible Risk
		Migration of contaminants from Made Ground soils to adjacent sites.	Adjacent site users (commercial/residential)	Minor x Unlikely = Negligible Risk

9 RECOMMENDATIONS FOR DEVELOPMENT

9.1 GENERAL

It is understood the development involves the construction of 4 No. commercial units ranging from 130m^3 to 371m^3 with associated areas of parking and localised soft landscaping. The proposed site layout plan is presented on C4 Projects Drawing No 19028-C4P-AV-ZZ-DR-A-0501within Appendix A.

9.1 FOUNDATIONS

9.1.1 Summary of Ground Conditions

Variable Granular Made Ground was encountered at all exploratory hole locations from ground level to depths between 0.45m and 1.90m bgl. Deeper Made Ground (1.40m to 1.90m) was encountered beneath the footprint of former hotel, particularly around the infilled basement feature (see figure C21379G2 in Appendix A). Away from the infilled basement feature, Made Ground was encountered to depths of between 0.45m and 0.90m bgl. The untreated Made Ground would not be considered suitable for the support of the proposed structures owing to the risk of excessive and unpredictable total and differential settlements.

Tidal Flat Deposits were encountered from depths between 0.45m and 1.90m to a maximum proven depth of 3.00m bgl. This material was generally encountered as a fine to medium, locally slightly gravelly, silty sand

In the SEP investigation, SPT tests undertaken in this material showed that it was generally loose to medium dense from 1.0m bgl, becoming medium dense from 2.0m bgl. Dynamic probe tests undertaken by Terra97 (to a depth of 7.0m bgl) have shown that the sand is generally loose to around 1.50m bgl becoming medium dense thereafter. Based on the results of the SPT tests and dynamic probes, conservative design values for the Tidal Flat deposits are presented in Table 9.1below

Based on the results of groundwater monitoring, it is recommended that a bearing capacity correction factor assuming a worst case groundwater level of 1.00m bgl is used for design purposes.

Table 9-1 ***Recommended Conservative Design Values for the Tidal Flat Deposits***

Depth	Charecteristic N Value	Density	Relative Density (%)	Friction Angle (°)
1.0m bgl (where natural)	9	Loose	38	32
2.0m bgl	15	Medium Dense	45	36
3.0m bgl	20	Medium Dense	50	37
4.0m bgl	22	Medium Dense	52	38

9.1.2 Foundation Solution

Given the encountered ground conditions and anticipated loads, shallow foundations will be suitable for proposed retail units B2, B3 and B4 (as shown on the proposed layout plan in Appendix A); however, pad sizes will need to account for the presence of loose to medium dense sands and shallow groundwater.

Deeper Made Ground (up to 1.9m bgl) beneath the location of the proposed Costa Coffee unit (as shown on the proposed layout plan in Appendix A) may present difficulties in the use of shallow foundations. The installation of shallow foundations beneath this unit may require supported excavations below the groundwater level and dewatering to install.

Loads are likely to be minimal for the costa coffee unit, there will be a requirement to remove the relict foundations and structures associated the former hotel, replace the resultant voids with suitably compacted MOT type 1 material.

Ground improvement options such as CMC piles or vibro stone columns would also be suitable at the site and would have the added benefit of providing a platform for a ground bearing floor slab. It should be noted that consideration would need to be made to the impact of the vibrations on nearby structures and the culverted drain for driven foundations and vibro stone columns. It should be noted that, should CMC piles be adopted, then the contractor will require a series of CPT probeholes in order to fully design the foundations.

Portions of the Site are covered by former or existing facilities on the site, e.g. the basement, floor slab and foundations encountered during the investigation. This material is unsuitable for foundations and these relict basements, foundations and floor slabs should be removed to avoid the formation of hard spots.

9.2 FLOORS

Ground bearing floor slabs are considered suitable at the Site. It may possible to incorporate reengineered fill as the founding layer for the ground bearing floor slabs and the demolition material in the footprint of the former hotel could be crushed and reused for this purpose, as could the subbase type material present across the Site. Alternatively, imported material would be equally suitable. It is recommended that compaction of the formation level is undertaken prior to placement of any engineered fill that will support the slabs.

The long-term settlement of the floor slabs will depend on a number of factors including structural design of the slab, the duration, intensity and distribution of the applied loading. Advice should be sought from the structural engineer with regard to slab loading and plate bearing tests should be undertaken at formation level on a 10m grid within the footprint (to deflect 10% of the radius of the plate) to ensure that the granular material can support the slab. All formation levels should be proof-rolled, with any soft or otherwise unsuitable materials and replaced with well compacted, granular material.

9.3 SOIL CONTAMINATION

9.3.1 Human Health

The chemical testing has shown that limestone subbase type material in the former carparking area (in vicinity of exploratory hole TP2) is impacted by low level (<0.1%) asbestos contamination that may present a risk to human health. This is considered to represent a hotspot and not a widespread contamination issue. The hotspot should be removed from site prior to the enabling works; this work should be detailed in a remediation strategy and agreed with the local authority.

9.3.2 Controlled Waters

No risk to controlled waters has been identified during the exploratory works. Low level exceedances of anthracene and fluoranthene were identified in groundwater samples; however, these are considered to be within the limits of normal background levels for a typical brownfield site.

9.3.3 Risk to Construction Workers

9.3.3.1 Complying with Control of Asbestos Regulations (CAR): Risk Assessments, Licensing and Training

Asbestos has been encountered within subbase type material in a sample taken from exploratory hole TP2 at 0.05m bgl. Based on the results and the nature of the asbestos encountered, (i.e. a single isolated fibre bundle below a limit where quantification testing was possible) it is considered extremely unlikely that there is the potential for the airborne exposure limit (>0.1 fibres per cm^3) to be exceeded; nevertheless, it is recommended that mitigation measures are implemented to reduce the potential for the release of any fibres as a precaution.

9.3.3.2 CAR Risk Assessments

A CAR Risk Assessment is required for any work which may expose employees to asbestos. It is recommended that a precautionary approach is adopted if there is any doubt about risks associated with asbestos.

CAR risk assessments are needed at remediation stage but may be incorporated into the overarching health and safety risk assessments for the site. The CAR risk assessment must:

- Identify the type of asbestos to which employees are liable to be exposed, where possible, or assume it is present in different forms;
- Determine the type and extent of exposures to asbestos that may occur during the work
- Identify the steps to be taken to prevent exposure or reduce it to the lowest level reasonably practicable; and,
- Consider the effects of control measures that have been or will be taken.

The CAR risk assessment should include any information used to inform the risk assessment such as asbestos reports or desk study information. In the event that this information is not available, the assessor should be assumed that all forms of asbestos may be present on Site. For all investigation and remediation of ACSs, a detailed written work plan should be produced and followed as detailed on the HSE website and in the CAR. The CAR risk assessments for specific investigations or remediation projects, will determine whether or not work is 'licensable work' (LW), notifiable non-licensable work' (NNLW) or 'non-licensed work' (NLW). In addition, training requirements are also defined by the CAR risk assessment.

Some examples of control measures that apply during site reconnaissance, site investigation works and site remediation are given below and should be applied depending on the asbestos risks identified for the Site at each stage of investigation:

- Avoiding stirring up dust;
- Cleaning footwear after site works;
- Removing and bagging any overalls for disposal/laundering;
- Respirators and hygiene facilities for high risk sites;
- Segregated welfare units;
- Wetting ground
- Minimising soil disturbances;
- Implementation or retention of capping/break layers;
- Implementation of awareness training;
- Air monitoring;
- Managing stockpiles;
- Area segregation;
- Wheel washing
- Road washing/cleaning

It is important to note that during Site reconnaissance visits, Site investigation works and Site remediation that asbestos should not be considered in isolation and control measures are likely to form part of a wider health and safety precautions.

9.3.3.3 Respiratory Protective Equipment (RPE)

RPE is the last line of defence and its requirement would be defined by the CAR risk assessment. HSE (2013b) advises that RPE should have an assigned protection factor of 20 or more for all work with asbestos. In certain instances, full face-piece, positive pressure respirators with a protection factor of 40 are necessary (to EN 12942:1998, TM3).

Suitable types of RPE for most ***short*** duration non-licensed asbestos work:

- Disposable respirator to standards EN149 (type FFP3) or EN1827 (type FMP3)
- Half mask respirator (to standard EN140) with P3 filter
- Semi-disposable respirator (to EN405) with P3 filter

These filters are not suitable for people with beards/stubble or for long or continuous use.

9.3.4 Licensing

CAR defined certain types of activities involving asbestos as 'licensable work' (LW) or as 'notifiable non-licensable work' (NNLW). All other work would be 'non-licensable work' (NLW).

LW is defined as:

- work where exposure is not 'sporadic and low intensity'
- work where the risk assessment cannot demonstrate that the control limits (four hour and 10 minute limits) will not be exceeded
- work on asbestos coating
- work on AIB or insulation where risk assessment is either of first two points above or not of short duration (where short duration is defined for any work liable to disturb asbestos as taking less than two hours per week (including ancillary work) and no one person carries out that work for more than one hour').

NNLW includes work with:

- AIB or asbestos insulation of short duration that is not licensable
- fire-damaged asbestos cement or asbestos cement damaged so as to create significant dust and debris
- asbestos ropes, yarns, woven cloths in poor condition or handling cutting or breaking up the materials
- asbestos papers, felts and cardboard in poor condition, unencapsulated or not bound into another material.
- Work with weathered asbestos cement, air monitoring and collecting samples of ACM in buildings would not normally be notifiable.

It is impossible to specify definitively what activities will and will not be licensable. This decision should be made as part of the CAR risk assessment. CAR is not primarily aimed at work with ACSs and there is little published information on airborne asbestos concentrations during work with ACSs. Nevertheless, CAR will require some remediation projects, and occasionally site investigations, to be LW. Investigations on other sites may involve NNLW. The decision as to whether work is LW or NNLW should be made during the CAR risk assessment by those in charge of the brownfield site investigations and remediation projects.

9.3.5 Training Requirements

Asbestos health and safety courses are offered by a number of providers in the UK. Training courses that include the problem of identifying ACMs in soil should be undertaken at regular intervals by those involved in the investigation,

assessment and management of sites where ACs are known or suspected. It is the role of the employer to identify the level of training required for an employee based on their role, experience and duties. Reference to Regulation 10 of CAR should be referred to for more information on training requirements.

Recognising asbestos within soils is challenging due to the heterogeneity of such soils and the discolouration of asbestos by smeared soil. Specific training for ground workers should include understanding fibre release potential, potential control measures in the field, how to take representative ACSs safely, sample labelling and what analytical tests are available and when the y should be implemented.

Health and safety training required under CAR includes asbestos awareness, non-licensable work (including notifiable non-licensable work) and licensable work with asbestos.

In addition to health and safety training, some staff involved in the technical identification on site of ACMs, sampling and analysis may require technical proficiency training (competency training).

9.3.6 Training vs. Competence

HSE (2005) identifies that 'training alone does not make people competent. Training must be consolidated by practical experience so that the person becomes confident, skilful and knowledgeable in practice on the job'. It is critical that ACS surveyors demonstrate competency with details of relevant field experience alongside training and examples of previous works/references.

9.4 Aggressive Environments for Buried Concrete Structures

Representative samples of the materials encountered within the exploratory holes were tested to determine their pH and concentrations of water-soluble sulphate (SO_4^{2-}). The results are presented in the chemical results within the appendices.

The characteristic sulphate values have been derived from the soil and groundwater chemical results.

For the Made Ground soils the mean of the highest two measured sulphate concentrations (mg/l SO_4) has been taken as the characteristic value, giving a value of 1494mg/l. To determine the Aggressive Chemical Environment for Concrete (ACEC) class, characteristic values for pH were derived. The mean of the lowest two pH values (8.35) was used.

Using Table C2 of BRE SD1, by considering the TPS first a design sulphate class of **DS-2** has been derived for Made Ground soils. Using the characteristic value for pH, an ACEC class of **AC-2** has been derived.

For the groundwater results the highest sulphate value of 181.1mg/l and lowest pH of 7.61 have been used. Using Table C2 of BRE SD1, by considering the TPS first a design sulphate class of **DS-1** has been derived for structures below the groundwater table. Using the characteristic value for pH, an ACEC class of **AC-1d** has been derived.

9.5 Ground Gas Protection

No ground gas protection measures are required at the Site.

9.6 Anticipated Remedial Works

In order to make the site suitable for development, the following *outline* Remediation Strategy has been devised:

- The pumping of any stagnant water from the infilled basement feature within the footprint of the former hotel.
- General site clearance of structures not to be retained, to include relict foundations and sub surface structures.
- Earthworks to bring site to proposed levels.
- A piling mat / working platform may be required to allow the piling rig to install piles.
- Due to the presence of a low level asbestos hotspot, the limestone subbase type material within this area should be removed from site to a suitably licenced landfill facility.

The above should be detailed in a remediation strategy for the site.

9.7 CONTRACTORS RESPONSIBILITIES

The following regulations, guidance and legislation relating to the works shall be complied with at all times:

- The Construction (Design and Management) Regulations 1994;
- The Control of Substances Hazardous to Health Regulations 1994.
- The Control of Asbestos Regulations 2012.
- The Contractor shall detail in his method statement how any hazardous materials and / or situations are to be handled / managed.
- The Contractor shall also be responsible for the following:
- The provision of health and welfare facilities;
- Obtaining the relevant consents / approvals;
- Mitigation measures;
- Stability of works.

9.7.1 Health and Safety

During the reclamation and construction phases of site development, it will be necessary to protect the health and safety of the personnel. General guidance on these matters is given in the Health and Safety Executive (HSE) document "Protection of Workers and the General Public during the Redevelopment of Contaminated Land" (HS(G)66). In summary, the following measures are suggested as a minimum level of protection:

- All ground workers should be issued with protective clothing, hard hats, footwear and gloves. Personnel should be instructed as to how they are to be used;
- All personnel shall wear hard hats, high visibility clothing and protective footwear at all times;
- Hand washing and boot cleaning facilities shall be provided;
- No smoking except in designated areas;
- Good practices relating to personal hygiene shall be adopted.

Before site operations are commenced, the necessary COSHH Assessments, Method Statements and Health and Safety Plans should be completed and issued by the Principal Contractor in Accordance with the CDM regulations.

All visitors to site must enter and register at the main site office, subject to the relevant terms and conditions of entry. All site personnel shall undergo a site specific health and safety induction prior to commencement of works on site.

Suitable precautions will be implemented to prevent dust and odour emissions during all reclamation work activities. The contractor shall provide details of emergency procedures.

9.8 CONTINGENCY FOR ANY UNKNOWNS

Whilst relatively uniform ground conditions have been encountered across the site during the investigations, a small risk exists of the presence of localised unidentified contamination of Made Ground soils. Should any suspicious material be encountered during the redevelopment works, works shall be ceased within this part of the site and the area should then be investigated further by a suitably qualified geo-environmental engineer and sampled as necessary. The Environmental Health or Contaminated Land Officer at the local authority should also be notified immediately. Samples will be forwarded to a UKAS/MCERTS accredited laboratory for a suite of analytical testing deemed appropriate based upon an appraisal of the material identified. Once the results of the analysis are known and have been interpreted, the required remedial action (if any) will be determined and approved with the relevant regulatory authorities.

10 REGULATORY APPROVALS

The conclusions and recommendations presented above are considered reasonable based on the findings of the site investigation. However, these cannot be guaranteed to gain regulatory approval and, therefore, the report should be passed to the appropriate regulatory authorities and/or other organisations for their comment and approval prior to undertaking any works on site.

11 REFERENCES

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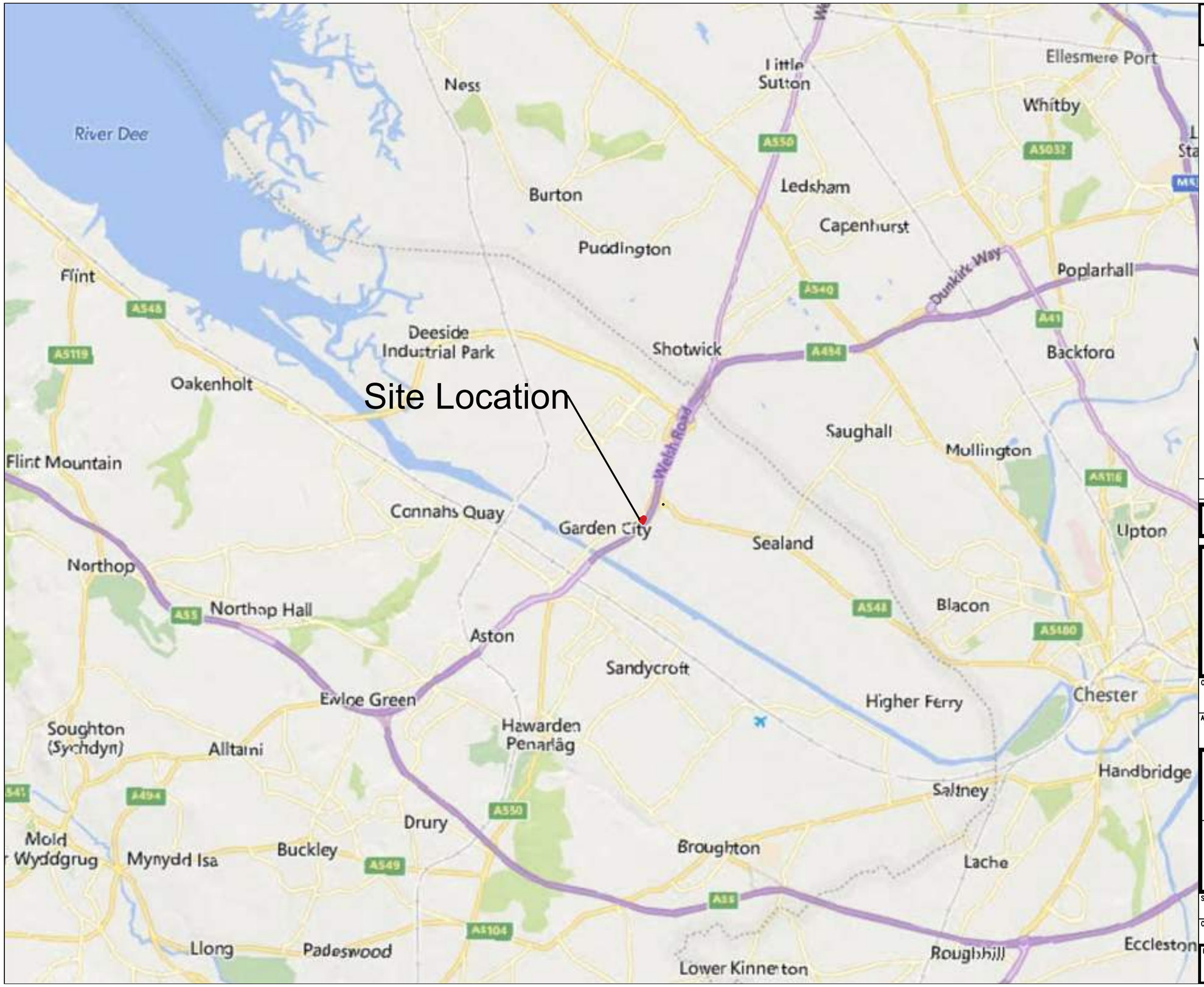
APPENDIX A – DRAWINGS



DO NOT SCALE

REV	DATE	BY	DESCRIPTION	CHK	APD
B	14/04/21	DR	Site Location Plan	JB	JB

DRAWING STATUS: First Issue

TERRA97

Terra 97 Ltd
27a Longwood Road
Trafford Park
Manchester
M17 1PZ

CLIENT: C4 Projects

ARCHITECT:

PROJECT: Gateway to Wales Hotel, Queensferry

TITLE: Site Location Plan

SCALE @ SIZE:	CHECKED:	APPROVED:
	JB	JB
CAD FILE:	DESIGN/DRAWN:	DATE:
	DR	April 2021
PROJECT No:	DRAWING No:	REV:
C21379	C21379G1	B

DO NOT SCALE

Location Trial Pit

Location of Dynamic Probe

Location Window Sample Borehole

Location of historical filling station

Location of infilled basement feature.

REV	DATE	BY	DESCRIPTION	CHK	APD
B	14/04/21	DR	Exploratory Hole Location Plan	JB	JB

DRAWING STATUS: First Issue

TERRA97

Terra 97 Ltd
27a Longwood Road
Trafford Park
Manchester
M17 1PZ

CLIENT: C4 Projects

ARCHITECT:

PROJECT: Gateway to Wales Hotel, Queensferry

TITLE: Exploratory Hole Location Plan

SCALE @ SIZE:	CHECKED:	APPROVED:
	JB	JB
CAD FILE:	DESIGN/DRAWN:	DATE:
	DR	April 2021

PROJECT No:	DRAWING No:	REV:
C21379	C21379G2	B

PROPOSED DEVELOPMENT PLAN

1 **05-00_Proposed Site Plan**
1:200

N

0m 4m 8m 12m 16m

VISUAL SCALE 1:200 @ A1

Site Area

Name	Area	Area (Acres)
Site	5159.03 m²	1.274 acres

Area Schedule (GIA)

Name	Area	
	Metric	Imperial
Costa Coffee B1		
GIA - Level 00	168.04 m²	1,808 ft²
Retail Store B2		
GIA - Level 00	371.7 m²	4,000 ft²
Food Retail Store B3		
GIA - Level 00	130 m²	1,400 ft²
Food Retail Store B4		
GIA - Level 00	130 m²	1,400 ft²
	799.74 m²	8,608 ft²

Parking Schedule

Description	Type	Count
Communal Parking		
Standard car parking bay	2500x4800mm	27
		27
B1 Costa		
Disabled parking bay	3600x5000mm	2
Standard car parking bay	2500x5000mm	4
		6
B2 Retail Store		
Disabled parking bay	3600x5000mm	2
Standard car parking bay	2500x5000mm	17
		19
B3 /B4 Food Retail Store		
Disabled parking bay	3600x4800mm	2
Standard car parking bay	2500x5000mm	9
		11
TOTAL		63

Drawing Status
PLANNING

Hazard Identification

ref	hazard	date

Finishes Key

- Communal parking
- Tarmacadam
- Paving slab
- Soft landscaping
- 2.1m feather edge boarded fence
- 0.75m high timber knee rail
- Neopolitan Bollard
- Sheffield cycle stands
- Specific Costa signage - refer to drawings 19028-C4P-AV-ZZ-DR-A-7201

Rev	Revision Details	Drawn	Date	Checked
P11	Main entrance kerbs & splays and revised. Burger King removed	C.I.H.	17.03.21	RH
P10	Burger King introduced & Costa repositioned	C.I.H.	11.03.21	RH
P9	Burger King replaced	C.I.H.	22.02.21	RH
P8	Burger King & Costa repositioned to suite existing culvert	C.I.H.	17.02.21	RH
P7	Burger King repositioned	C.I.H.	04.02.21	RH
P6	Unit B3/4 replaced by Burger King	C.I.H.	29.01.21	RH
P5	Unit B2 bollard location revised	C.I.H.	24.09.20	RH
P4	Totem sign adjacent to A494 replaced with Costa signage	C.I.H.	22.09.20	RH
P3	Site revised following comments regarding Units B2, B3 & B4	C.I.H.	17.09.20	RH
P2	Bollards to Costa front elevation removed, signage K orientation revised	C.I.H.	09.09.20	RH
P1	First issue of drawing	C.I.H.	26.08.20	DC

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Project Management • Architecture • Building Surveying • Cost Consultancy

Client
Valedown

Project
Retail Development
Queensferry By-Pass, Deeside, Wales
CH5 2HX

Drawing Title
Proposed Site Plan

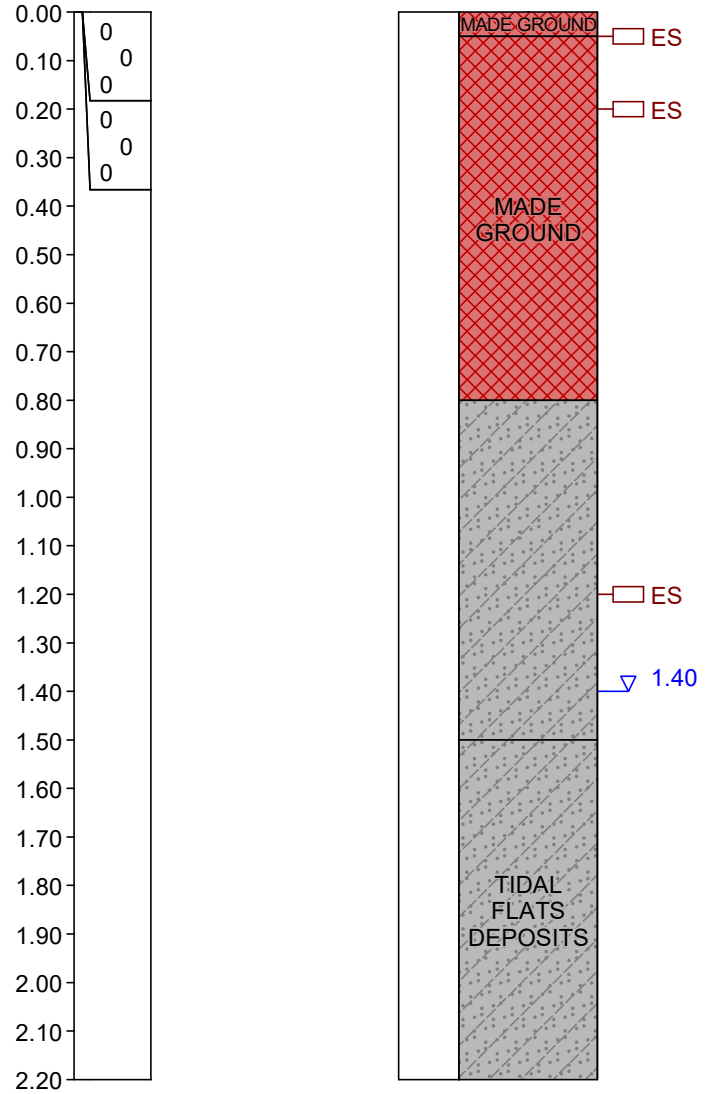
Status Purpose of Issue
S2 SUITABLE FOR INFORMATION

Drawn by	C.I.H.	Created	13/08/2020
C4 Job no.	19-028	Scale	1 : 200 @ A1
Drg no.	19028-C4P-AV-ZZ-DR-A-0501	Rev	P11

APPENDIX B – EXPLORATORY HOLE LOGS

Terra97 Ltd 27a Longwood Road, Trafford Park, Manchester, M17 1PZ	TERRA97	**Standard penetration test (SPT)**	**WS1**

Project: **Queensferry Garden Clty**				
Project ID: **C21379**		Drilling equipment:		
Location:		Method of drilling:		
Foreman:	Date start:	Overall depth: 2.20 m	Coordinate X: 0.01	
Operator:	Date end:	GWT bored: 1.40 m	Coordinate Y: 0.01	
Documented:	Scale: one page	GWT steady:	Coordinate Z:	
Processed:		Bit - type, size:		
Sampler:	Sampler hammer:	Weight:	Drop:	



From - To	Layers description	Classification according to EN ISO 14688-1
0.00 - 0.05	MADE GROUND: Grey, sandy, angular, fine to coarse GRAVEL of limestone and macadam.	
0.05 - 0.80	MADE GROUND: Reddish brown and brown, slightly gravelly, slightly clayey, slightly silty, fine grained SAND with a low proportion of angular cobbles. Gravel is sub-angular to sub-rounded, fine to coarse of mixed natural lithologies. Cobbles are angular (80-100mm) of brick.	
0.80 - 1.50	: Reddish brown, silty, fine grained SAND with a trace of rounded, fine to medium gravel of quartzite.	
1.50 - 2.20	TIDAL FLATS DEPOSITS: Yellowish brown, slightly silty, fine to medium grained SAND with occasional fragments (1-3mm) of decaying organic matter from 2.40m bgl.	

Key:

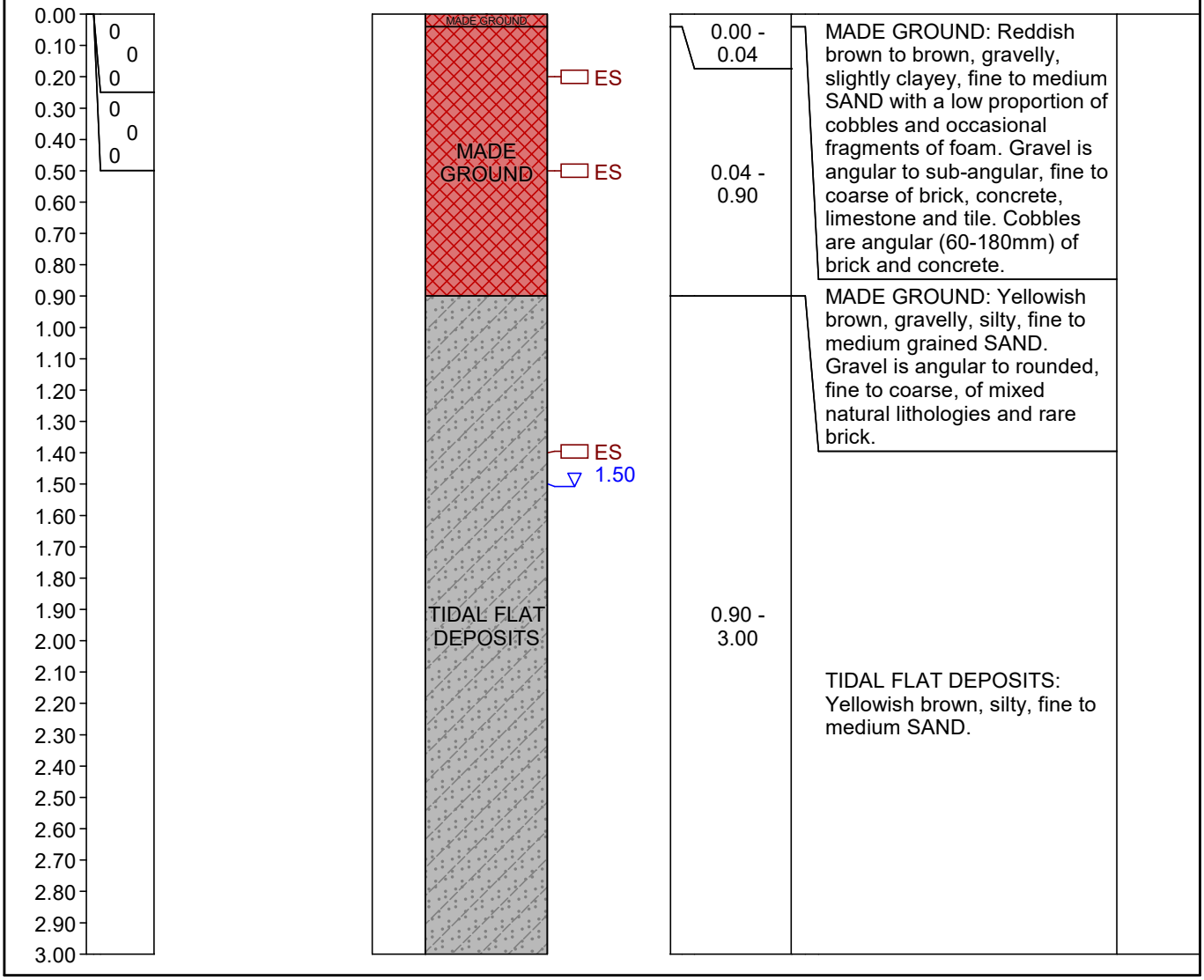
GWT bored other

Notes:

1) Hand dug pit to 1.20m bgl. 2) Terminated at 3.00m due to borehole collapse. 3) Water strike at 1.40m bgl. 4) Installed 0.50m plane piping, 2.00m slotted piping.

Terra97 Ltd 27a Longwood Road, Trafford Park, Manchester, M17 1PZ	TERRA97	**Standard penetration test (SPT)**	**WS2**

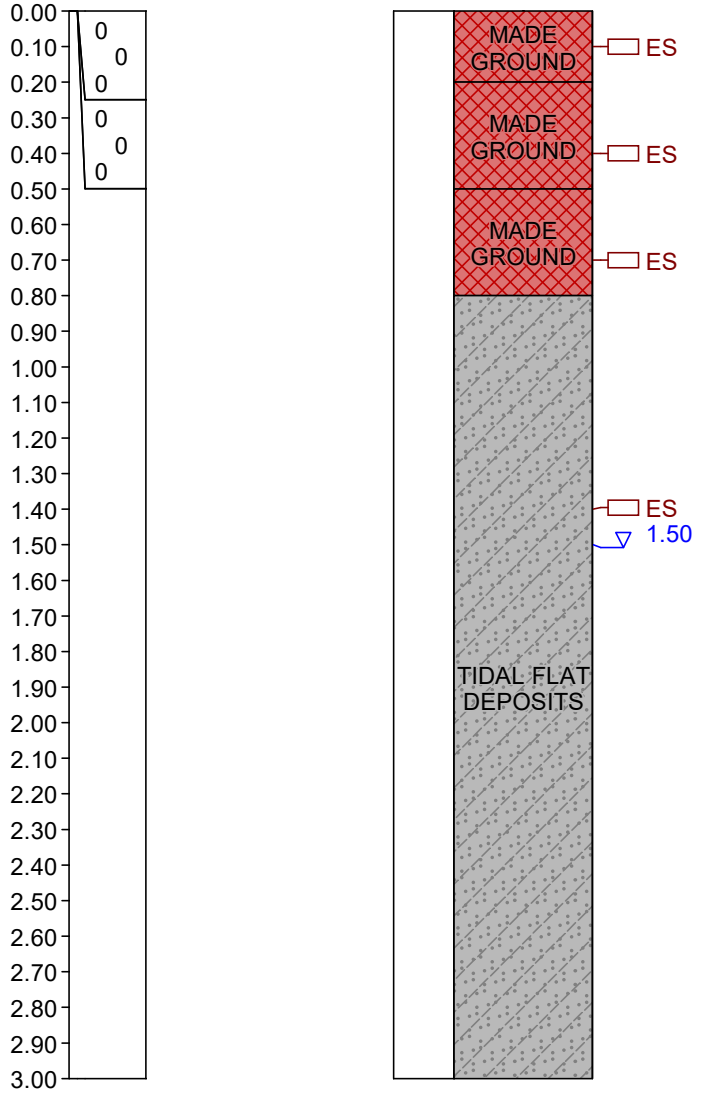
Project: **Queensferry Garden Clty**				
Project ID: **C21379**		Drilling equipment:		
Location:		Method of drilling:		
Foreman:	Date start:	Overall depth: 3.00 m	Coordinate X: 0.02	
Operator:	Date end:	GWT bored: 1.50 m	Coordinate Y: 0.02	
Documented:	Scale: one page	GWT steady:	Coordinate Z:	
Processed:		Bit - type, size:		
Sampler:	Sampler hammer:	Weight:	Drop:	



Key:	**Notes:**
GWT bored other	1) Hand dug pit to 1.20m bgl. 2) Terminated at 3.60m due to borehole collapsing. 3) Groundwater encountered at 1.50m bgl.

Terra97 Ltd 27a Longwood Road, Trafford Park, Manchester, M17 1PZ	TERRA97	**Standard penetration test (SPT)**	**WS3**

Project: **Queensferry Garden Clty**				
Project ID: **C21379**		Drilling equipment:		
Location:		Method of drilling:		
Foreman:	Date start:	Overall depth: 3.00 m	Coordinate X: 0.03	
Operator:	Date end:	GWT bored: 1.50 m	Coordinate Y: 0.03	
Documented:	Scale: one page	GWT steady:	Coordinate Z:	
Processed:		Bit - type, size:		
Sampler:	Sampler hammer:	Weight:	Drop:	



From - To	Layers description	Classification according to EN ISO 14688-1
0.00 - 0.20	MADE GROUND: Grey slightly sandy angular fine to coarse GRAVEL of limestone and macadam.	
0.20 - 0.50	MADE GROUND: Dark brown, very gravelly, slightly silty, fine to coarse grained SAND. Gravel is angular to sub-rounded, tine to coarse of brick, concrete and sandstone with a very faint hydrocarbon odour.	
0.50 - 0.80	MADE GROUND: Yellowish brown, gravelly, silty, fine to medium grained SAND. Gravel is angular to rounded, fine to coarse, of mixed natural lithologies.	
0.80 - 3.00	TIDAL FLAT DEPOSITS: Yellowish brown, silty, fine to medium grained SAND.	

Key:

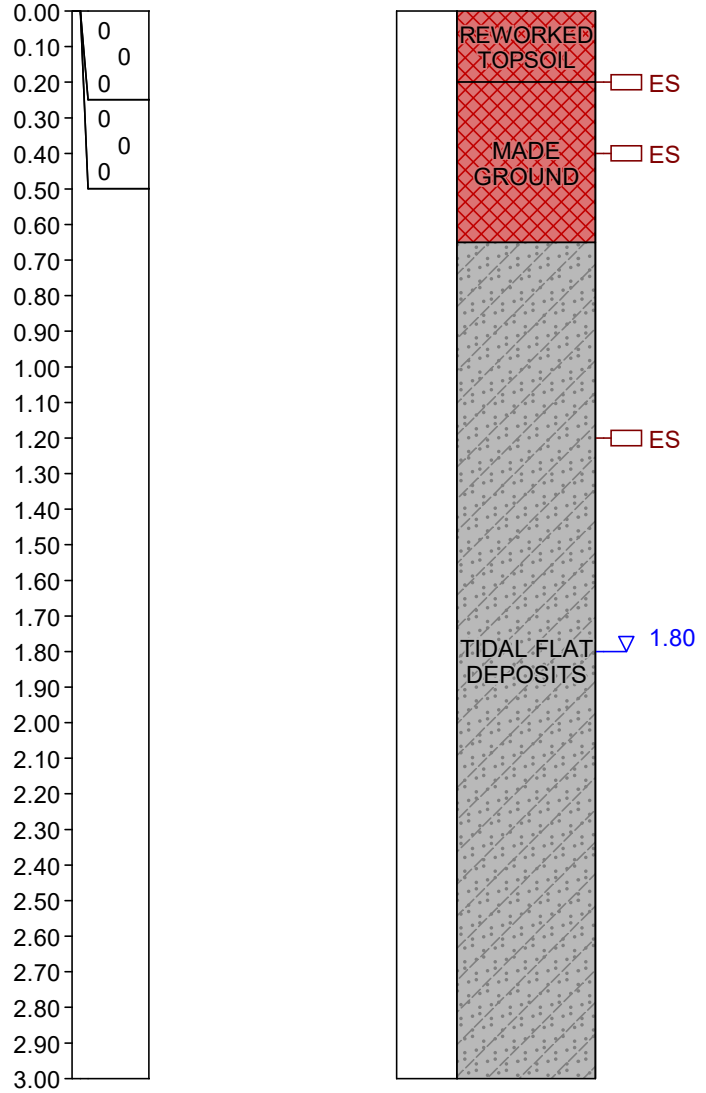
GWT bored other

Notes:

1) Hand dug pit to 1.20m bgl. 2) Terminated at 3.00m due to borehole collapsing. 3) Groundwater encountered at 1.50m bgl. 4) Installed 0.50m plane piping, 2.00m slotted piping.

Terra97 Ltd 27a Longwood Road, Trafford Park, Manchester, M17 1PZ	TERRA97	**Standard penetration test (SPT)**	**WS4**

Project: **Queensferry Garden Clty**				
Project ID: **C21379**		Drilling equipment:		
Location:		Method of drilling:		
Foreman:	Date start:	Overall depth: 3.00 m	Coordinate X: 0.04	
Operator:	Date end:	GWT bored: 1.80 m	Coordinate Y: 0.04	
Documented:	Scale: one page	GWT steady:	Coordinate Z:	
Processed:		Bit - type, size:		
Sampler:	Sampler hammer:	Weight:	Drop:	



From - To	Layers description	Classification according to EN ISO 14688-1
0.00 - 0.20	REWORKED TOPSOIL: MADE GROUND: Brown gravelly clayey fine to medium organic SAND with frequent rootlets. Gravel is angular to rounded fine to coarse of natural lithologies and rare brick.	
0.20 - 0.65	MADE GROUND: POSSIBLE MADE GROUND: Yellowish brown slightly gravelly silty fine to medium SAND. Gravel is subangular to rounded fine to medium of natural lithologies.	
0.65 - 3.00	TIDAL FLAT DEPOSITS: Yellowish brown, silty, fine to medium grained SAND.	

Key:

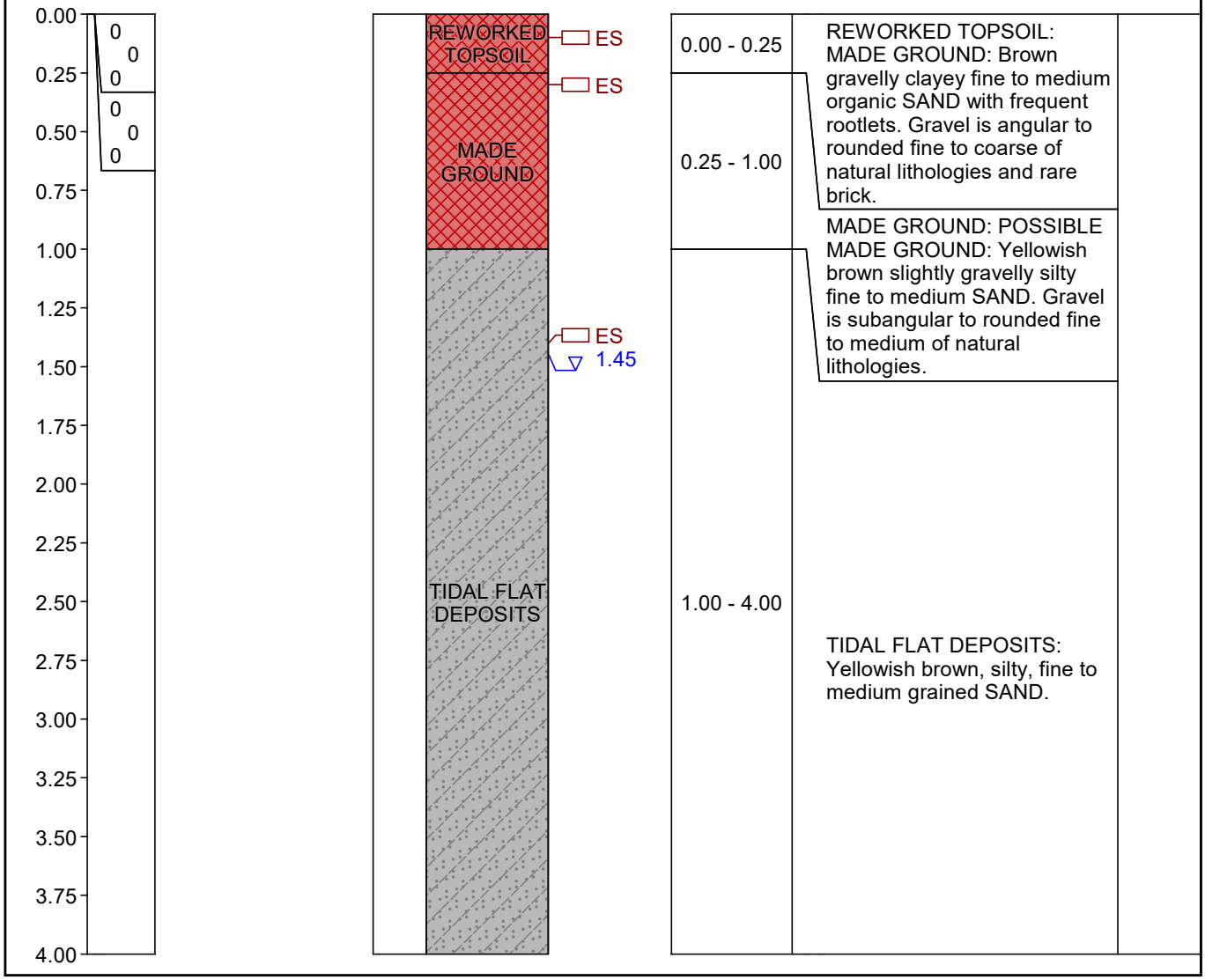
GWT bored other

Notes:

1) Hand dug pit to 1.20m bgl. 2) Terminated at 3.00m due to borehole collapsing. 3) Groundwater encountered at 1.80m bgl. 4) Installed 0.60m plain piping, 2.00m slotted piping.

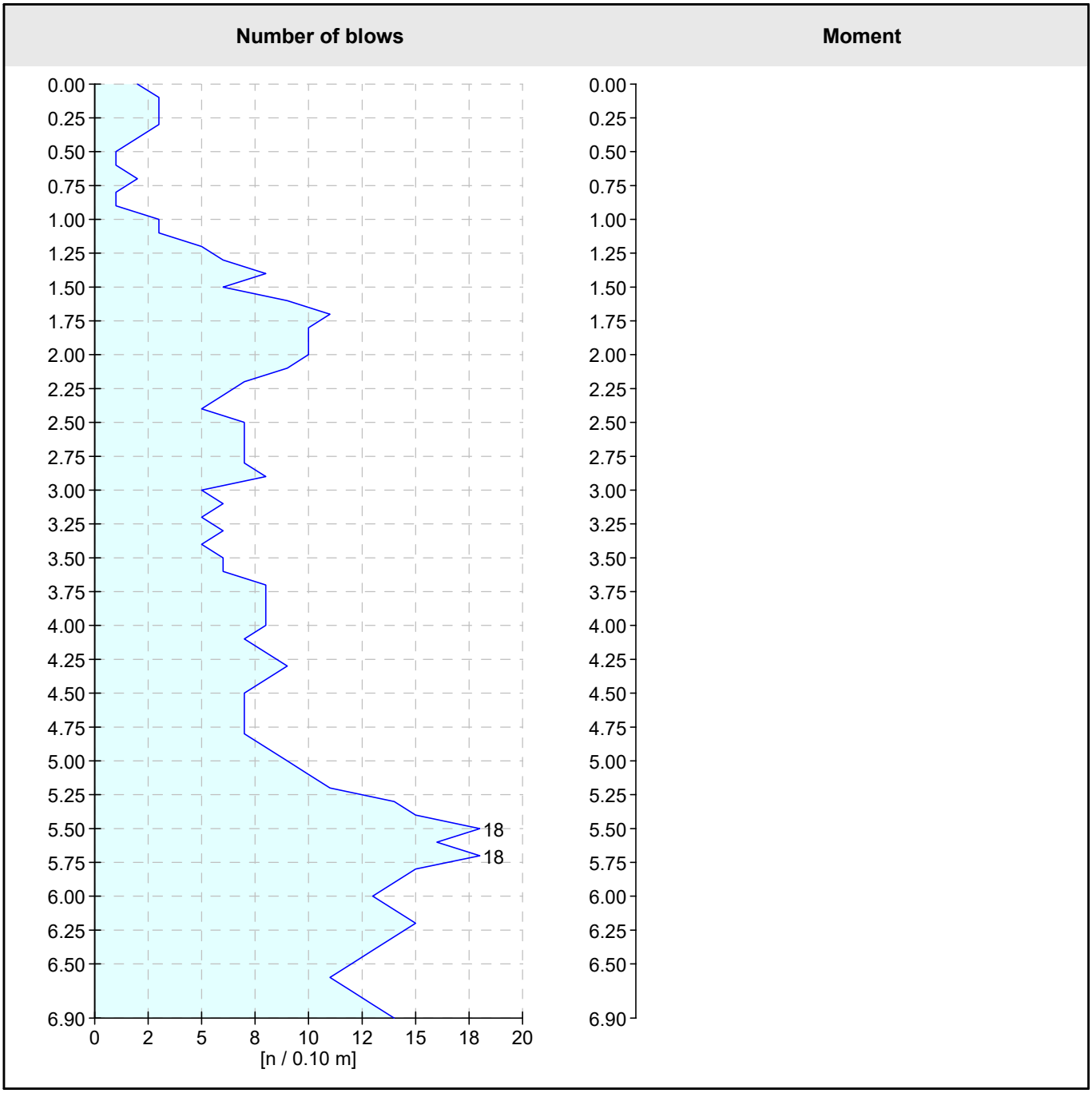
Terra97 Ltd 27a Longwood Road, Trafford Park, Manchester, M17 1PZ	TERRA97	**Standard penetration test (SPT)**	**WS5**

Project: **Queensferry Garden Clty**				
Project ID: **C21379**		Drilling equipment:		
Location:		Method of drilling:		
Foreman:	Date start:	Overall depth: 4.00 m	Coordinate X: 0.05	
Operator:	Date end:	GWT bored: 1.45 m	Coordinate Y: 0.05	
Documented:	Scale: one page	GWT steady:	Coordinate Z:	
Processed:		Bit - type, size:		
Sampler:	Sampler hammer:	Weight:	Drop:	



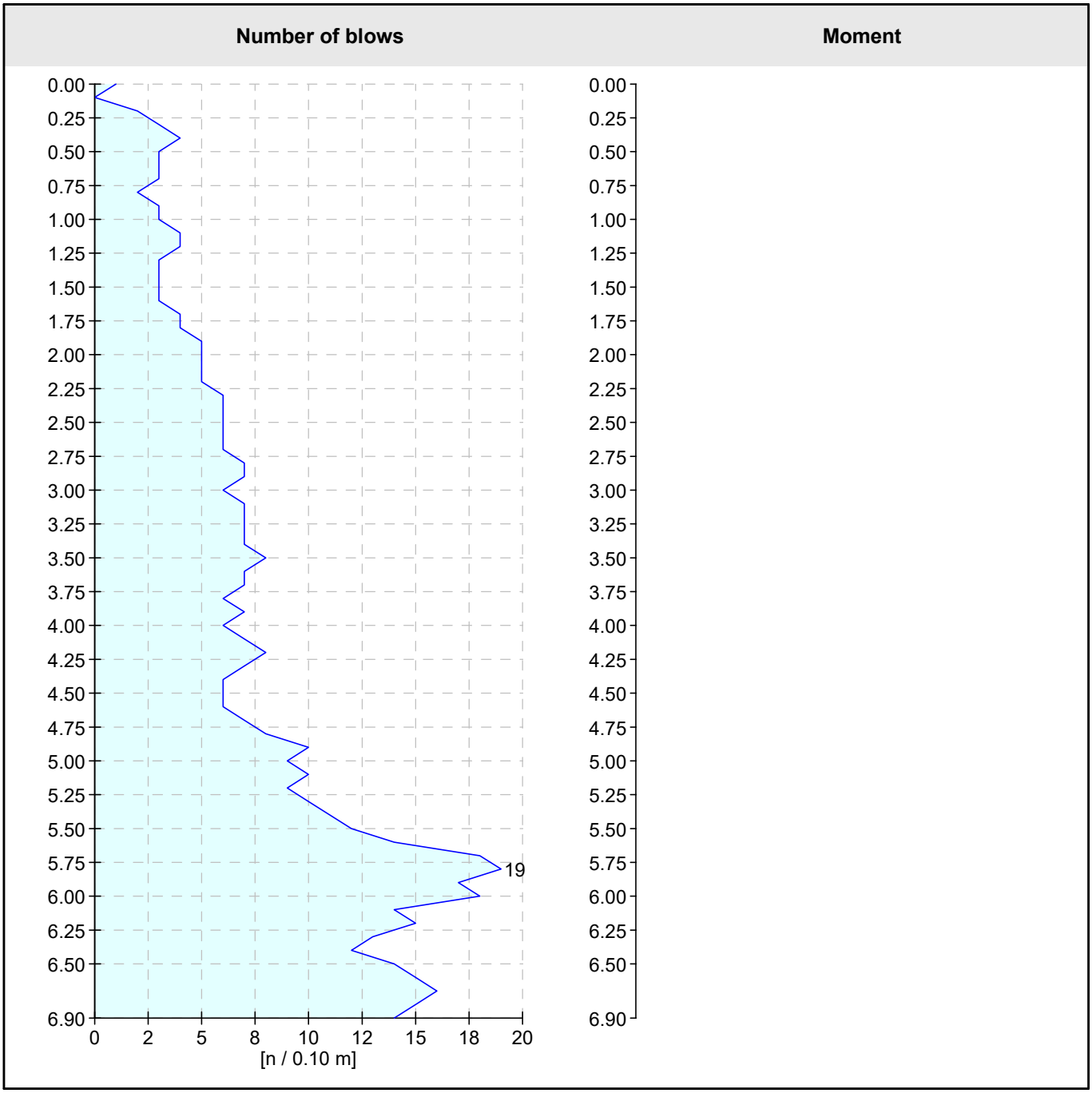
Key:	**Notes:**
GWT bored other	1) Hand dug pit to 1.20m bgl. 2) Terminated at 3.00m due to borehole collapsing. 3) Groundwater encountered at 1.45m bgl. 4) Installed 0.60m plain piping, 1.50m slotted piping.

Terra97 Ltd 27a Longwood Road, Trafford Park, Manchester, M17 1PZ		Dynamic probing (DPT)	DP1
Project:	**Queensferry Garden Clty**		
Project ID:	C21379	Annex no.:	Type of test:
Location:			Type of cone:
Measured:		Coordinate X: 0.00	Type of anvil:
Evaluated:		Coordinate Y: 0.10	Acc. to standard:
Date of test:		Coordinate Z:	Penetration depth interval: 0.10 m
Scale:	one page	GWT:	Overall depth: 6.90 m



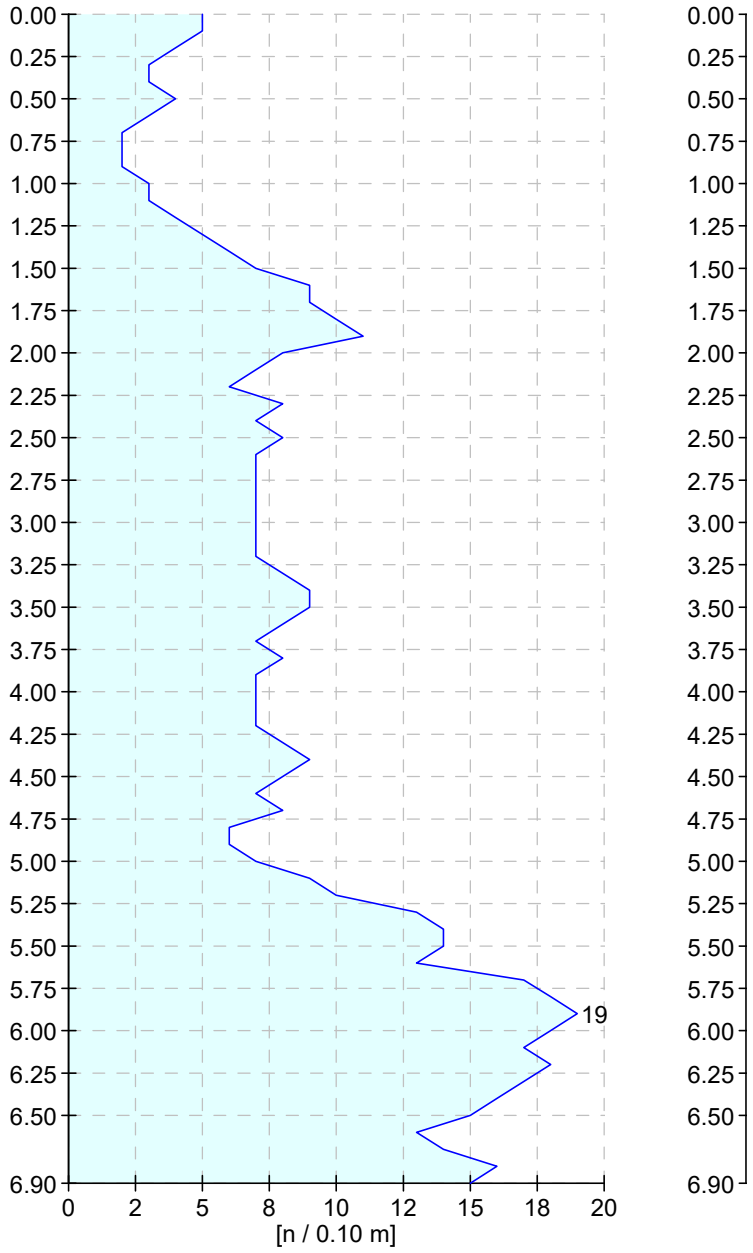
Notes:

Terra97 Ltd 27a Longwood Road, Trafford Park, Manchester, M17 1PZ		Dynamic probing (DPT)	DP2
Project:	**Queensferry Garden CIty**		
Project ID:	C21379	Annex no.:	Type of test:
Location:			Type of cone:
Measured:		Coordinate X: 0.00	Type of anvil:
Evaluated:		Coordinate Y: 0.20	Acc. to standard:
Date of test:		Coordinate Z:	Penetration depth interval: 0.10 m
Scale:	one page	GWT:	Overall depth: 6.90 m



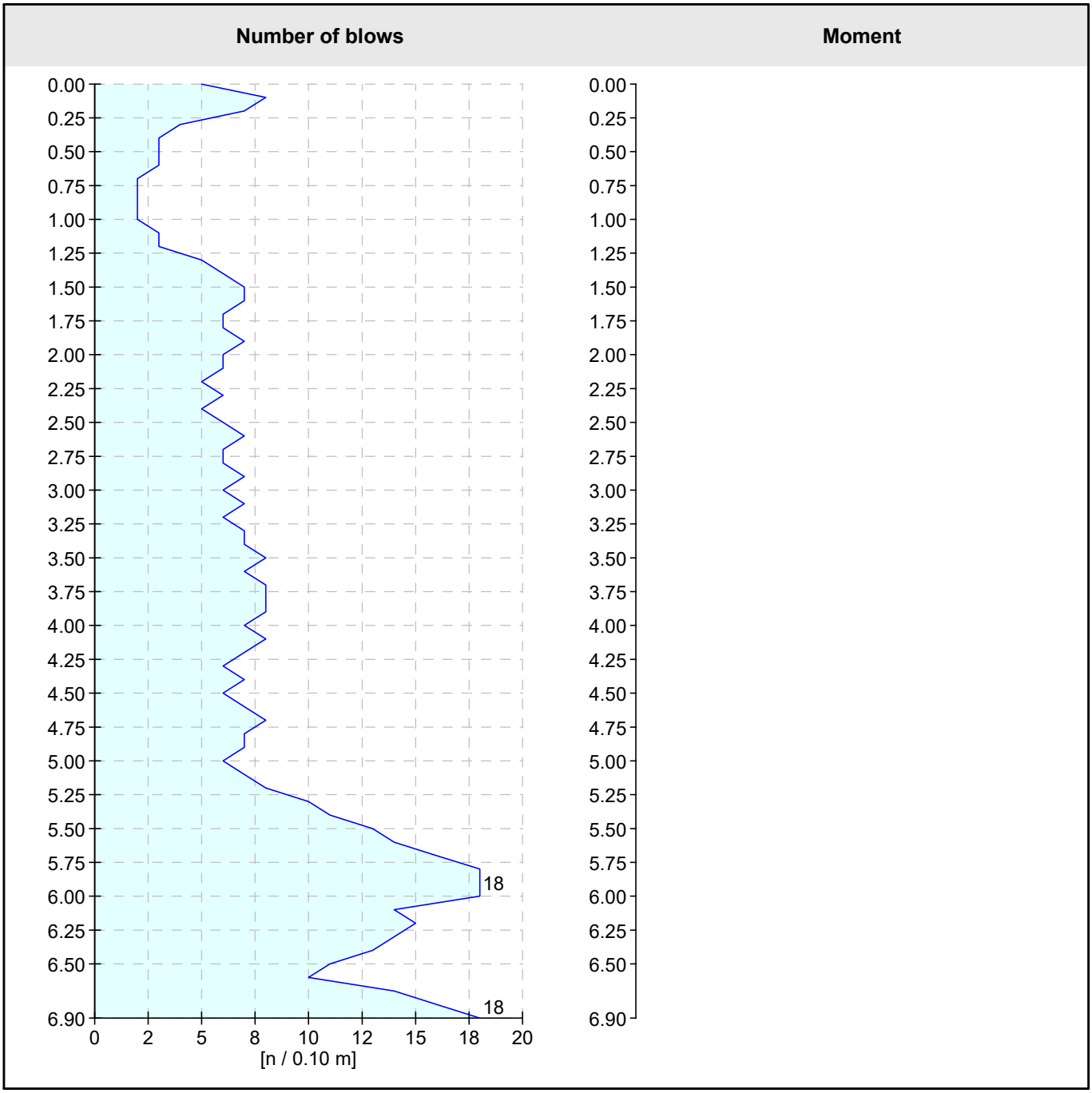
Notes:

Terra97 Ltd 27a Longwood Road, Trafford Park, Manchester, M17 1PZ		Dynamic probing (DPT)	DP3
Project:	**Queensferry Garden CIty**		
Project ID:	C21379	Annex no.:	Type of test:
Location:			Type of cone:
Measured:		Coordinate X: 0.00	Type of anvil:
Evaluated:		Coordinate Y: 0.30	Acc. to standard:
Date of test:		Coordinate Z:	Penetration depth interval: 0.10 m
Scale:	one page	GWT:	Overall depth: 6.90 m



Notes:

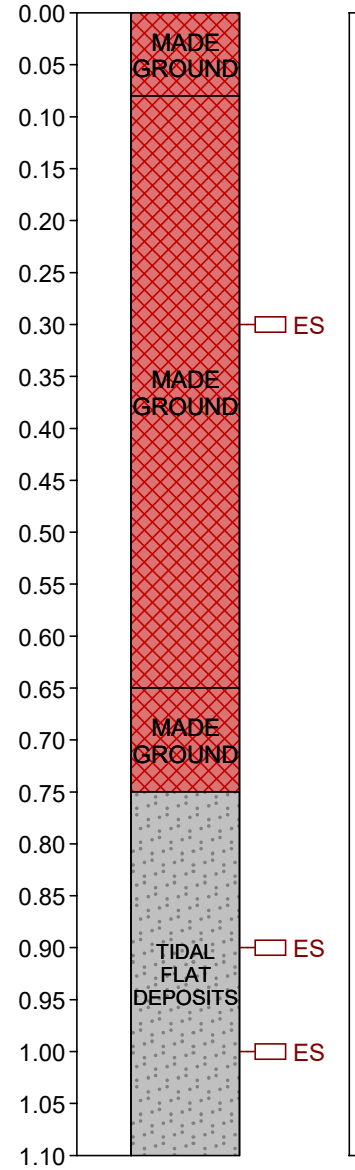
Terra97 Ltd 27a Longwood Road, Trafford Park, Manchester, M17 1PZ		Dynamic probing (DPT)	DP4
Project:	**Queensferry Garden CIty**		
Project ID:	C21379	Annex no.:	Type of test:
Location:			Type of cone:
Measured:		Coordinate X: 0.00	Type of anvil:
Evaluated:		Coordinate Y: 0.40	Acc. to standard:
Date of test:		Coordinate Z:	Penetration depth interval: 0.10 m
Scale:	one page	GWT:	Overall depth: 6.90 m



Notes:

Terra97 Ltd 27a Longwood Road, Trafford Park,Manchester,M17 1PZ	TERRA97	Log of Trial Pit	TP1

Project:	**Queensferry Garden CIty**				
Project ID:	**C21379**		Equipment:		
Location:			Overall depth:	1.10 m	Trial Pit Position:
Date start:	22/03/2021	Foreman:	Ground water table:		Coordinate X: 0.10
Date end:	22/03/2021	Documented: DR	GWT bored:		Coordinate Y: 0.10
Scale:	one page		GWT steady:		Coordinate Z:

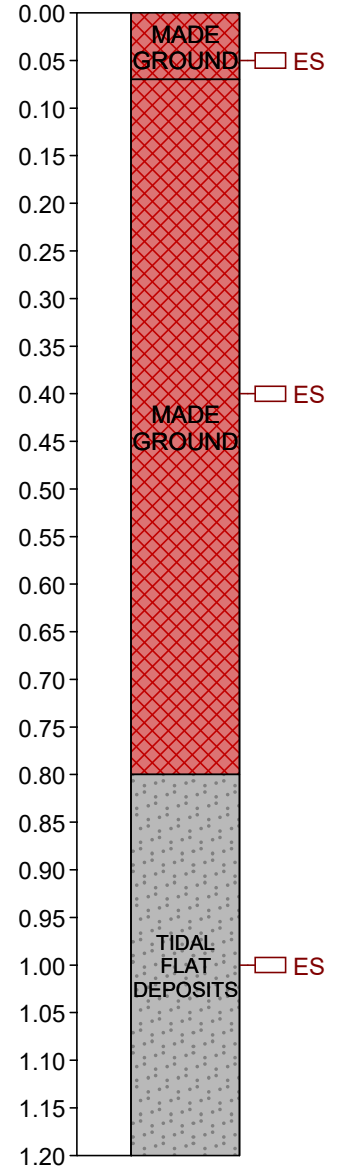


Stratigraphy	TP1	Samples and GWT	Classification according to EN ISO 14688-1	RQD [%]	From - To	Layers description	Notes
					0.00 - 0.08	MADE GROUND: Grey slightly sandy angular fine to coarse GRAVEL of limestone and macadam.	
					0.08 - 0.65	MADE GROUND: Yellowish brown slightly sandy clayey angular fine to coarse GRAVEL with a low cobble content and occasional rootlets. Cobbles are angular 60-180mm. Gravel and cobbles are of mixed metamorphic lithologies and rare brick.	
					0.65 - 0.75	MADE GROUND: Reddish brown fine to medium SAND.	
					0.75 - 1.10	TIDAL FLAT DEPOSITS: Brown silty fine to medium SAND.	

Key:	**Notes:**
other	1) Pit stable. 2) terminated at 1.10m bgl in natural sand. 3) Pit dimensions of 1.30m x 0.05m x 1.10m. 4) Pit dry.

Terra97 Ltd 27a Longwood Road, Trafford Park,Manchester,M17 1PZ	TERRA97	Log of Trial Pit	TP2

Project:	**Queensferry Garden CIty**				
Project ID:	**C21379**		Equipment:		
Location:			Overall depth:	1.20 m	Trial Pit Position:
Date start:	22/03/2021	Foreman:	Ground water table:		Coordinate X: 0.20
Date end:	22/03/2021	Documented: DR	GWT bored:		Coordinate Y: 0.20
Scale:	one page		GWT steady:		Coordinate Z:



Stratigraphy	TP2	Samples and GWT	Classification according to EN ISO 14688-1	RQD [%]	From - To	Layers description	Notes
					0.00 - 0.07	MADE GROUND: Grey slightly sandy angular fine to coarse GRAVEL of limestone.	
					0.07 - 0.80	MADE GROUND: Brown slightly silty gravelly fine to medium SAND with a low cobble content. Gravel is angular to subangular fine to coarse of mixed natural lithologies and brick. Cobbles are angular (60-170mm) of concrete and brick.	
					0.80 - 1.20	TIDAL FLAT DEPOSITS: Brown silty fine to medium SAND.	

Key:

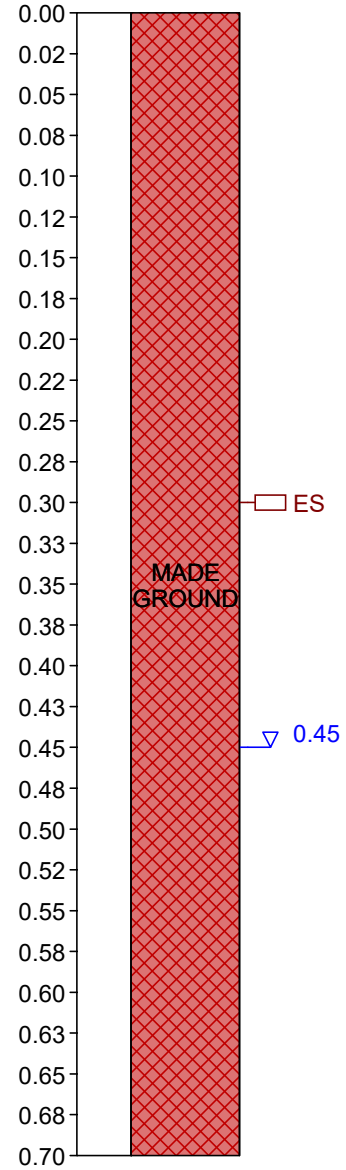
other

Notes:

1) Pit stable. 2) Terminated at 1.20m bgl in natural sand. 3) Pit dimensions of 0.80m x 2.40m x 1.20m. 4) Pit dry.

Terra97 Ltd 27a Longwood Road, Trafford Park,Manchester,M17 1PZ	TERRA97	Log of Trial Pit	TP3

Project:	**Queensferry Garden CIty**				
Project ID:	**C21379**		Equipment:		
Location:			Overall depth:	0.70 m	Trial Pit Position:
Date start:	22/03/2021	Foreman:	Ground water table:		Coordinate X: 0.30
Date end:	22/03/2021	Documented: DR	GWT bored: 0.45 m		Coordinate Y: 0.30
Scale:	one page		GWT steady:		Coordinate Z:



Stratigraphy	TP3	Samples and GWT	Classification according to EN ISO 14688-1	RQD [%]	From - To	Layers description	Notes
MADE GROUND		ES 0.45			0.00 - 0.70	MADE GROUND: Grey and greyish brown angular BOULDER AND COBBLE sized fragments (60-700mm) of breeze block, brick, concrete and reinforced concrete posts with some sandy angular fine to coarse GRAVEL of brick, concrete and occasional pieces of ceramic, pipe work, electronics and wire.	

Key:

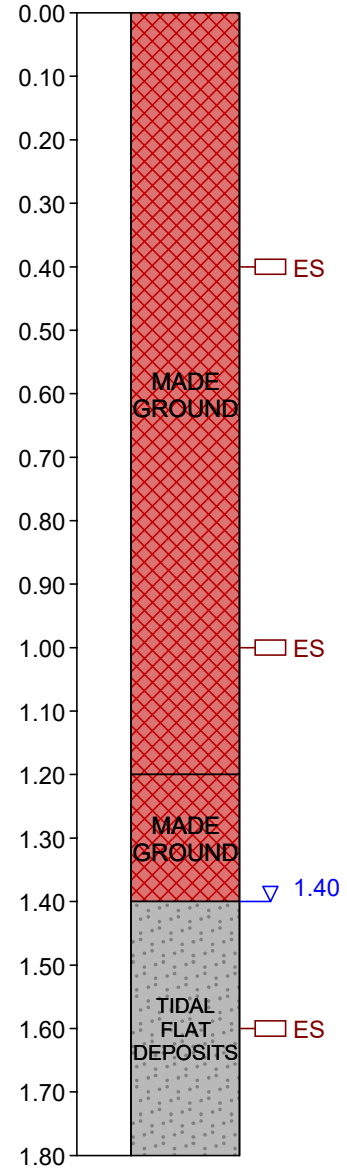
GWT bored other

Notes:

1) Pit collasing from ground level. 2) Terminated at 0.70m bgl due to pit flooding and obstructions. 3) Pit dimensions of 1.00m x 2.50m x 0.70m. 4) Groundwater from 0.45m bgl with putrid odour and globules of cooking oil on the surface.

Terra97 Ltd 27a Longwood Road, Trafford Park,Manchester,M17 1PZ	TERRA97	Log of Trial Pit	TP4

Project:	**Queensferry Garden CIty**				
Project ID:	**C21379**		Equipment:		
Location:			Overall depth:	1.80 m	Trial Pit Position:
Date start:	22/03/2021	Foreman:	Ground water table:		Coordinate X: 0.40
Date end:	22/03/2021	Documented: DR	GWT bored: 1.40 m		Coordinate Y: 0.40
Scale:	one page		GWT steady:		Coordinate Z:



Stratigraphy	TP4	Samples and GWT	Classification according to EN ISO 14688-1	RQD [%]	From - To	Layers description	Notes
		ES			0.00 - 1.20	MADE GROUND: Brown slightly silty gravelly fine to medium SAND with a low cobble content. Gravel is angular to subangular fine to coarse of mixed natural lithologies and brick. Cobbles are angular (60-170mm) of concrete and brick.	
		ES			1.20 - 1.40	MADE GROUND: Dark grey slightly gravelly silty fine to medium SAND with a very faint hydrocarbon odour and several large timber fragments.	
		ES			1.40 - 1.80	TIDAL FLAT DEPOSITS: Dark grey slightly gravelly silty fine to medium SAND with a very faint hydrocarbon odour.	

Key:

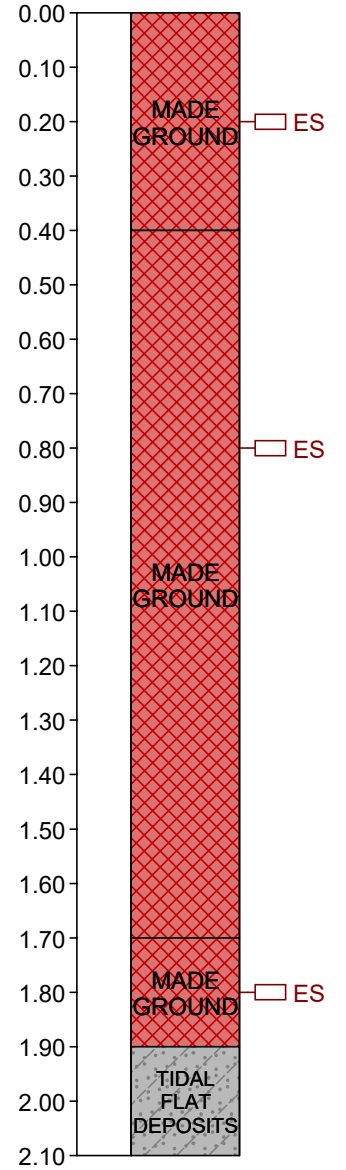
GWT bored other

Notes:

1) Pit collapse from 0.80m bgl. 2) Pit terminated at 1.80m due to pit collapse. 3) Pit dimensions of 0.80m x 2.80m x 1.80m. 4) Ground water strike at 1.40m bgl.

Terra97 Ltd 27a Longwood Road, Trafford Park,Manchester,M17 1PZ	TERRA97	Log of Trial Pit	TP5

Project:	**Queensferry Garden CIty**				
Project ID:	**C21379**		Equipment:		
Location:			Overall depth:	2.10 m	Trial Pit Position:
Date start:	22/03/2021	Foreman:	Ground water table:		Coordinate X: 0.50
Date end:	22/03/2021	Documented: DR	GWT bored:		Coordinate Y: 0.50
Scale:	one page		GWT steady:		Coordinate Z:

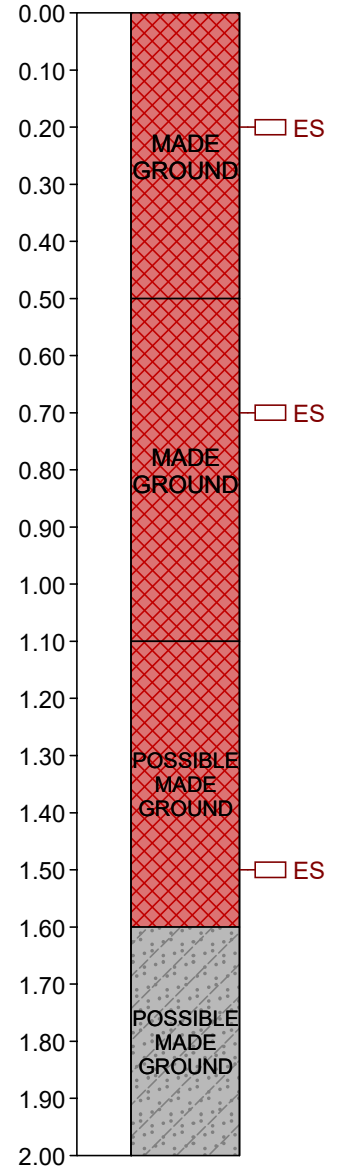


Stratigraphy	TP5	Samples and GWT	Classification according to EN ISO 14688-1	RQD [%]	From - To	Layers description	Notes
					0.00 - 0.40	MADE GROUND: Grey and greyish brown angular BOULDER AND COBBLE sized fragments (60-1500mm) of reinforced concrete posts, breeze block and brick with some sandy angular fine to coarse GRAVEL of brick, concrete and occasional pieces of ceramic, pipe work, electronics, wire, fabric and visqueen.	
					0.40 - 1.70	MADE GROUND: Brown slightly silty gravelly fine to medium SAND with a low cobble content. Gravel is angular to subangular fine to coarse of mixed natural lithologies and brick. Cobbles are angular (60-170mm) of concrete and brick.	
					1.70 - 1.90	MADE GROUND: Dark grey slightly gravelly silty fine to medium SAND with several large timber fragments.	
					1.90 - 2.10	TIDAL FLAT DEPOSITS: Dark grey slightly gravelly silty fine to medium SAND	

Key:	**Notes:**
other	1) Pit collapse from ground level. 2) Terminated at 2.10m bgl. 3) Pit dimensions of 1.00m x 3.00m x 2.10m. 4) Pit dry.

Terra97 Ltd 27a Longwood Road, Trafford Park,Manchester,M17 1PZ	TERRA97	Log of Trial Pit	TP6

Project:	**Queensferry Garden CIty**				
Project ID:	**C21379**		Equipment:		
Location:			Overall depth:	2.00 m	Trial Pit Position:
Date start:	22/03/2021	Foreman:	Ground water table:		Coordinate X: 0.60
Date end:	22/03/2021	Documented: DR	GWT bored:		Coordinate Y: 0.60
Scale:	one page		GWT steady:		Coordinate Z:



Stratigraphy	TP6	Samples and GWT	Classification according to EN ISO 14688-1	RQD [%]	From - To	Layers description	Notes
		ES			0.00 - 0.50	MADE GROUND: Grey and greyish brown angular BOULDER AND COBBLE sized fragments (60-500mm) of breeze block, brick, concrete and reinforced concrete posts with some sandy angular fine to coarse GRAVEL of brick, concrete and occasional pieces of ceramic, pipe, electronics and wire.	
		ES			0.50 - 1.10	MADE GROUND: Brown slightly silty gravelly fine to medium SAND with a low cobble content. Gravel is angular to subangular fine to coarse of mixed natural lithologies and brick. Cobbles are angular (60-170mm) of concrete and brick.	
		ES			1.10 - 1.60	POSSIBLE MADE GROUND: Yellowish brown slightly gravelly silty fine to medium SAND. Gravel is subangular to rounded fine to medium of natural lithologies.	
					1.60 - 2.00		

Key:	Notes:
other	1) Pit collapse from ground level. 2) Terminated at 2.00m bgl due to pit collapse. 3) Pit dimensions of 1.00m x 3.00m x 2.00m. 4) Pit dry.

Terra97 Ltd 27a Longwood Road, Trafford Park,Manchester,M17 1PZ	TERRA97	Log of Trial Pit	TP7

Project:	**Queensferry Garden CIty**				
Project ID:	**C21379**		Equipment:		
Location:			Overall depth:	0.60 m	Trial Pit Position:
Date start:	22/03/2021	Foreman:	Ground water table:		Coordinate X: 0.70
Date end:	22/03/2021	Documented: DR	GWT bored: 0.50 m		Coordinate Y: 0.70
Scale:	one page		GWT steady:		Coordinate Z:

Stratigraphy	TP7	Samples and GWT	Classification according to EN ISO 14688-1	RQD [%]	From - To	Layers description	Notes
0.00 – 0.60	MADE GROUND	ES; 0.50			0.00 - 0.60	MADE GROUND: Grey and greyish brown angular BOULDER AND COBBLE sized fragments (60-700mm) of breeze block, brick, concrete and reinforced concrete posts with some sandy angular fine to coarse GRAVEL of brick, concrete and occasional pieces of ceramic, pipe work, electronics and wire.	

Key:

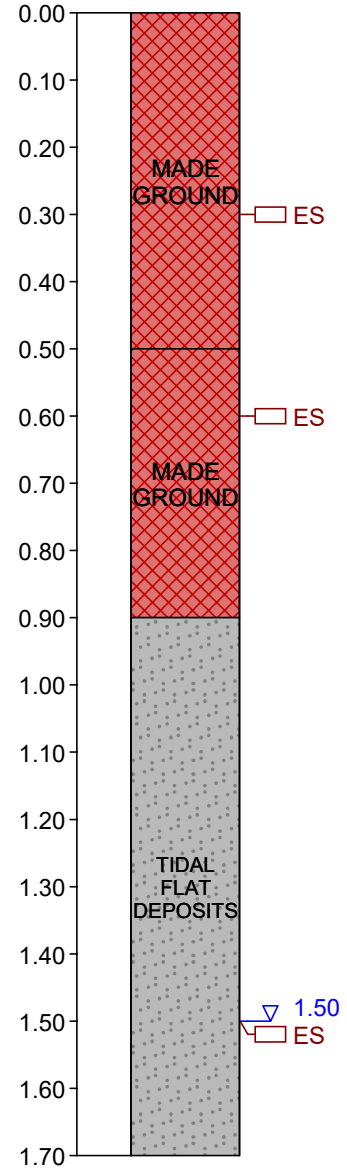
GWT bored other

Notes:

1) Pit collapsing. 2) Terminated at 0.60m bgl due to pit flooding. 3) Pit dimensions of 1.60m x 1.80m x 0.60m. 4) Groundwater encountered at 0.50m bgl.

Terra97 Ltd 27a Longwood Road, Trafford Park,Manchester,M17 1PZ	TERRA97	Log of Trial Pit	TP8

Project:	**Queensferry Garden CIty**				
Project ID:	**C21379**		Equipment:		
Location:			Overall depth:	1.70 m	Trial Pit Position:
Date start:	22/03/2021	Foreman:	Ground water table:		Coordinate X: 0.80
Date end:	22/03/2021	Documented: DR	GWT bored: 1.50 m		Coordinate Y: 0.80
Scale:	one page		GWT steady:		Coordinate Z:



Stratigraphy	TP8	Samples and GWT	Classification according to EN ISO 14688-1	RQD [%]	From - To	Layers description	Notes
					0.00 - 0.50	MADE GROUND: Yellowish brown gravelly fine SAND with a low boulder and cobble content and occasional fragments of plastic pipe, polystyrene and geotextile. Gravel is angular to subrounded fine to coarse brick, concrete and mixed natural lithologies. Cobbles and boulders and angular (60-800mm) of brick and breeze block.	
					0.50 - 0.90	MADE GROUND: Yellowish brown gravelly slightly silty fine SAND. Gravel is angular to subrounded fine to coarse of natural lithologies, brick and concrete.	
					0.90 - 1.70	TIDAL FLAT DEPOSITS: Yellowish brown silty fine SAND with a trace of subrounded fine to medium gravel of quartzite.	

Key:

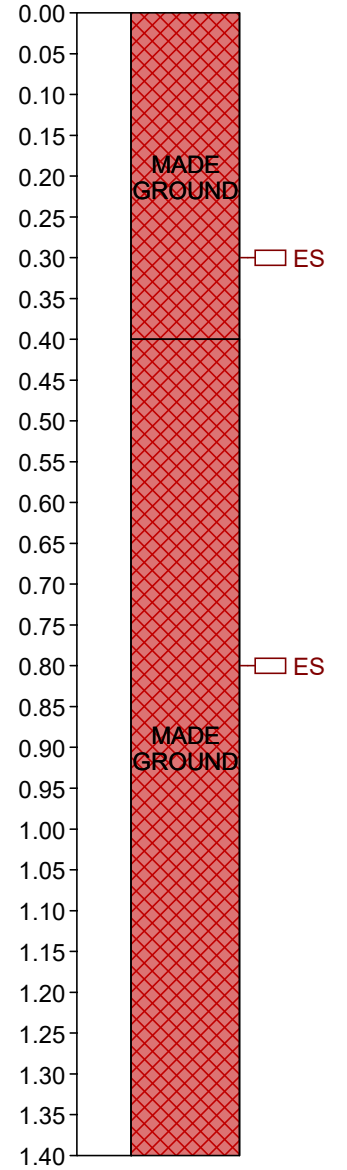
GWT bored other

Notes:

1) Pit collapsing from 0.00m - 0.60m bgl. 2) Concrete obstruction encountered at 0.40m bgl. Pit moved 2.00m east and continued. 3) Terminated at 1.70m bgl in natural sand. 4) Groundwater low seepage from 1.50m bgl.

Terra97 Ltd 27a Longwood Road, Trafford Park,Manchester,M17 1PZ	TERRA97	**Log of Trial Pit**	**TP9**

Project:	**Queensferry Garden CIty**				
Project ID:	**C21379**		Equipment:		
Location:			Overall depth:	1.40 m	Trial Pit Position:
Date start:	22/03/2021	Foreman:	Ground water table:		Coordinate X: 0.90
Date end:	22/03/2021	Documented: DR	GWT bored:		Coordinate Y: 0.90
Scale:	one page		GWT steady:		Coordinate Z:



Stratigraphy	TP9	Samples and GWT	Classification according to EN ISO 14688-1	RQD [%]	From - To	Layers description	Notes
					0.00 - 0.40	MADE GROUND: Yellowish brown gravelly fine SAND with a low boulder and cobble content and occasional fragments of plastic pipe, polystyrene, visqueen and rebar. Gravel is angular to subrounded fine to coarse brick, concrete and mixed natural lithologies. Cobbles and boulders and angular (60-800mm) of brick and breeze block.	
					0.40 - 1.40	MADE GROUND: Brown slightly silty gravelly fine to medium SAND with a low cobble content. Gravel is angular to subangular fine to coarse of mixed natural lithologies and brick. Cobbles are angular (60-170mm) of concrete and brick. Concrete obstruction at base of pit.	

Key:

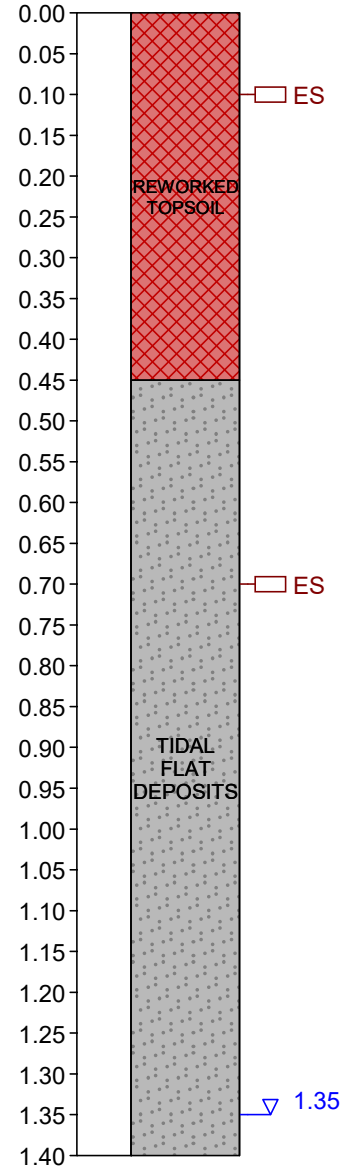
other

Notes:

1) Pit collapsing from ground level. 2) Terminated at 1.40m bgl due to concrete obstruction. 3) Pit dimensions of 1.20m x 2.70m x 1.40m. 4) Pit dry.

Terra97 Ltd 27a Longwood Road, Trafford Park,Manchester,M17 1PZ	TERRA97	Log of Trial Pit	TP10

Project:	**Queensferry Garden CIty**				
Project ID:	**C21379**		Equipment:		
Location:			Overall depth:	1.40 m	Trial Pit Position:
Date start:	22/03/2021	Foreman:	Ground water table:		Coordinate X: 1.00
Date end:	22/03/2021	Documented: DR	GWT bored: 1.35 m		Coordinate Y: 1.00
Scale:	one page		GWT steady:		Coordinate Z:



Stratigraphy	TP10	Samples and GWT	Classification according to EN ISO 14688-1	RQD [%]	From - To	Layers description	Notes
					0.00 - 0.45	REWORKED TOPSOIL: MADE GROUND: Brown gravelly clayey fine to medium organic SAND with frequent rootlets. Gravel is angular to rounded fine to coarse of natural lithologies and rare tile and concrete.	
					0.45 - 1.40	TIDAL FLAT DEPOSITS: Brown silty fine SAND.	

Key:

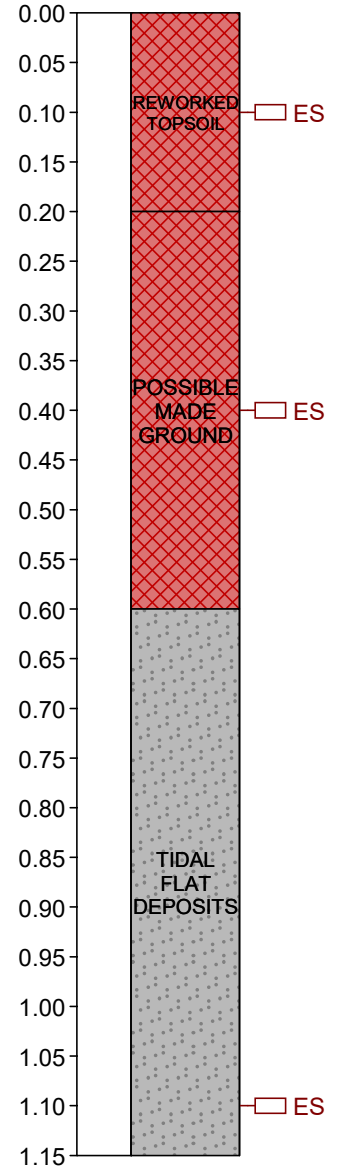
GWT bored other

Notes:

1) Pit stable. 2) Terminated at 1.40m in natural sand. 3) Pit dimensions of 0.60m x 2.40m x 1.40m. 4) Slow groundwater seepage from 1.35m bgl.

Terra97 Ltd 27a Longwood Road, Trafford Park,Manchester,M17 1PZ	TERRA97	Log of Trial Pit	TP11

Project:	**Queensferry Garden CIty**				
Project ID:	**C21379**		Equipment:		
Location:			Overall depth:	1.15 m	Trial Pit Position:
Date start:	22/03/2021	Foreman:	Ground water table:		Coordinate X: 1.10
Date end:	22/03/2021	Documented: DR	GWT bored:		Coordinate Y: 1.10
Scale:	one page		GWT steady:		Coordinate Z:

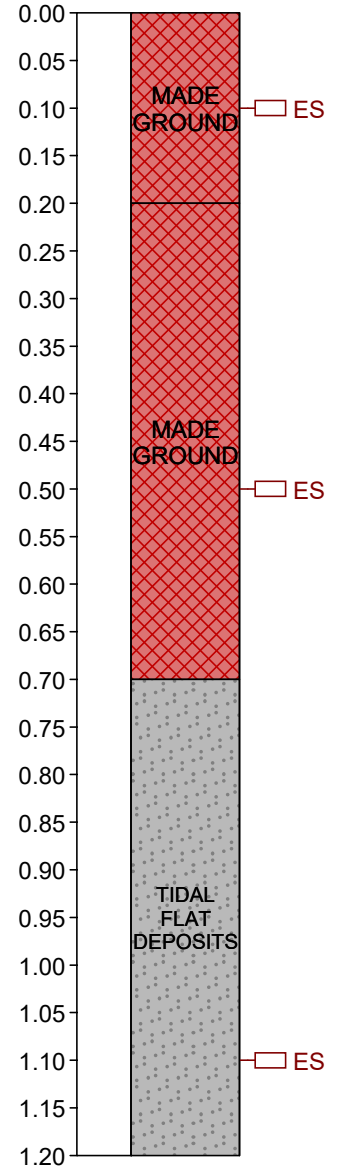


Stratigraphy	TP11	Samples and GWT	Classification according to EN ISO 14688-1	RQD [%]	From - To	Layers description	Notes
					0.00 - 0.20	REWORKED TOPSOIL: MADE GROUND: Brown gravelly clayey fine to medium organic SAND with frequent rootlets. Gravel is angular to rounded fine to coarse of natural lithologies and rare brick.	
					0.20 - 0.60	POSSIBLE MADE GROUND: Yellowish brown slightly gravelly silty fine to medium SAND. Gravel is subangular to rounded fine to medium of natural lithologies.	
					0.60 - 1.15	TIDAL FLAT DEPOSITS: Brown silty fine SAND. (becoming clayey from 1.0m bgl)	

Key:	**Notes:**
other	1) Pit stable. 2) Terminated at 1.15m bgl in natural sand. 2) Pit dimensions of 0.70m x 1.80m x 1.20m. 4) Pit dry.

Terra97 Ltd 27a Longwood Road, Trafford Park,Manchester,M17 1PZ	TERRA97	Log of Trial Pit	TP12

Project:	**Queensferry Garden CIty**				
Project ID:	**C21379**		Equipment:		
Location:			Overall depth:	1.20 m	Trial Pit Position:
Date start:	22/03/2021	Foreman:	Ground water table:		Coordinate X: 1.20
Date end:	22/03/2021	Documented: DR	GWT bored:		Coordinate Y: 1.20
Scale:	one page		GWT steady:		Coordinate Z:

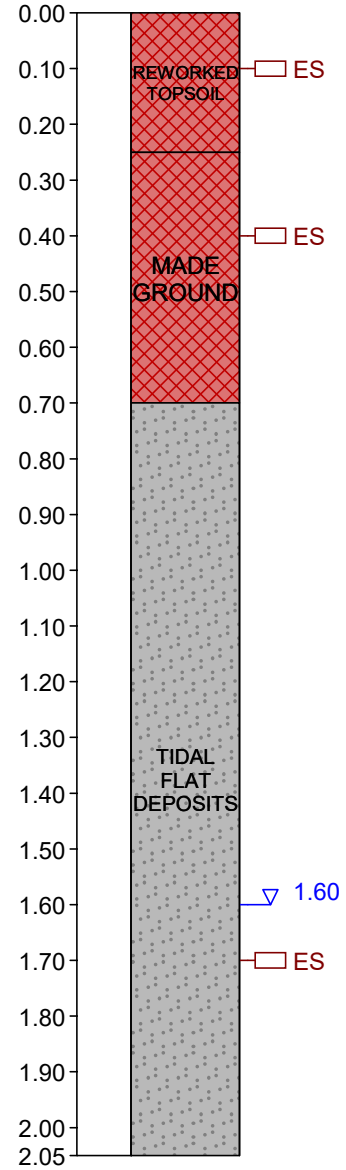


Stratigraphy	TP12	Samples and GWT	Classification according to EN ISO 14688-1	RQD [%]	From - To	Layers description	Notes
					0.00 - 0.20	MADE GROUND: Grey sandy angular fine to coarse GRAVEL of limestone.	
					0.20 - 0.70	MADE GROUND: Yellowish brown mottled brown slightly gravelly silty fine to medium SAND. Gravel is subangular to rounded fine to medium of natural lithologies.	
					0.70 - 1.20	TIDAL FLAT DEPOSITS: Brown silty fine SAND.	

Key:	**Notes:**
other	1) Pit stable. 2) Terminated at 1.20m bgl in natural sand. 3) Pit dimensions of 0.70m x 2.10m x 1.20m. 4) Pit dry.

Terra97 Ltd 27a Longwood Road, Trafford Park,Manchester,M17 1PZ	TERRA97	Log of Trial Pit	TP13

Project:	**Queensferry Garden CIty**			
Project ID:	**C21379**		Equipment:	
Location:			Overall depth: 2.05 m	Trial Pit Position:
Date start:	22/03/2021	Foreman:	Ground water table:	Coordinate X: 1.30
Date end:	22/03/2021	Documented: DR	GWT bored: 1.60 m	Coordinate Y: 1.30
Scale:	one page		GWT steady:	Coordinate Z:



Stratigraphy	TP13	Samples and GWT	Classification according to EN ISO 14688-1	RQD [%]	From - To	Layers description	Notes
					0.00 - 0.25	REWORKED TOPSOIL: MADE GROUND: Brown gravelly clayey fine to medium organic SAND with frequent rootlets. Gravel is angular to rounded fine to coarse of natural lithologies and rare brick.	
					0.25 - 0.70	MADE GROUND: Yellowish brown slightly gravelly silty fine to medium SAND. Gravel is subangular to rounded fine to medium of natural lithologies.	
					0.70 - 2.05	TIDAL FLAT DEPOSITS: Brown silty fine SAND with a trace of subrounded fine to medium gravel of quartzite.	

Key:

GWT bored other

Notes:

1) Pit collapsing from 0.5m bgl. 2) Terminated ay 2.00mm bgl in natural soil. 3) Pit dimensions of 1.00m x 3.20m x 2.05m. 4) Slow groundwater seepage from 1.60m bgl.

APPENDIX C – THIRD PARTY INFORMATION

SEP (SITE ENGINEERING PERSONNEL) LTD

SURVEY & ENGINEERING PROJECTS

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Phase 1 / Desk Study Report

For the proposed re-development of the former site of the

Gateway to Wales Hotel Deeside North Wales

May 2019

Geo-Ventures (UK) Limited
70 Riverside Close, Waterside, Howley, Warrington, WA1 2JD

Tel: 07502 437392/07502 437382
Email: paul.platt@geo-ventures.co.uk

Contract:

Phase 1 / Desk Study Report
for the
proposed re-development of land
at the former site of the
Gateway to Wales Hotel
Deeside,
North Wales.

Client:

Engineer:

SEP (Site Engineering Personnel)
Limited
33 Sandy Lane
Skelmersdale
Lancashire
WN8 8LA

Geo-Ventures (UK) Limited **May 2019**

Phase 1 / Desk Study Report
Proposed re-development of land at the former site of the Gateway to Wales Hotel, Deeside, North Wales.

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Envirocheck Report	Appendix A

1.0 INTRODUCTION

1.1 Assignment and Scope of Work

On the instructions of SEP (Site Engineering Personnel) Limited a Phase 1 Desk Study / Preliminary Risk Assessment report has been prepared by Geo-Ventures (UK) Limited for the proposed re-development of land at the former site of the Gateway to Wales Hotel at Deeside, North Wales.

This report includes a review of existing geo-environmental information together with a study of former potentially contaminative land uses to allow the production of a Conceptual Site Model and Preliminary Risk Assessment in relation to the land and its proposed re-development.

It should be noted that the Planning Authority when dealing with applications involving the re-development of land that may have past history of former potentially contaminated land uses will require a series of reports as listed below:

- Phase 1 Desk Study / Preliminary Risk Assessment.
- Phase 2 Intrusive Investigations and revised Preliminary Risk Assessment.
- Phase 3 Remediation Strategy
- Phase 4 Verification Report

1.2 Site Location

This is situated on Welsh Road, Deeside on the west side of the A494 trunk road.

It is currently a level area with a surface covering of broken brick and concrete from the demolition of the former hotel on the site.

A more detailed review of site conditions is provided in section 2.1 of this report.

1.3 Proposed Development

It is understood that it is proposed to construct a drive through restaurant facility at the site.

This will result in almost total hardcover of the site with only minimal zones of soft landscaping.

2.0 SITE CHARACTERISATION

2.1 Walkover Survey

This was undertaken on the 27th April 2019.

The site is a small approximately rectangular parcel of land at the junction of the A494 and B5441 at Welsh Road, Deeside.

Security fencing surround the site which has a surface covering of demolition type materials principally comprising broken brick and concrete.

Significant factors identified at this stage
The made ground across the site maybe potentially contaminated. **Although above ground demolition of the former hotel has been completed it is not known if all below ground obstructions such as old foundations have been removed.**

2.2 Historical Summary

In order to establish a history of land uses at and adjacent to the site an Envirocheck Report was obtained from the Landmark Information group dated 17th April 2019.

This report includes a full set of historical plans of the area from 1871 to the present day at various scales and a summary of this information is presented on the following table.

It should be noted that the historical maps do not provide a comprehensive site history but only a source of snapshots in time and that between map dates there could have been transcent land uses which have not been recorded.

In addition, not all of the uses are recorded on the maps for example small unmarked buildings.

Anecdotal information can often be a source of useful detail and if more specific particulars are needed, reference may be made to relevant trade directories.

MAP	SCALE	THE SITE	ADJACENT AREAS
Flintshire Published 1874	1:10560	The site is shown as open land to the south east of the road now numbered B5441.	All surrounding area shown as open farmland. An apparent flood defence embankment is shown aligned NW – SE adjacent to the northern corner of the site.
Flintshire Published 1899	1:2500	No change	No significant changes
Flintshire Published 1911	1:2500	No change	No significant changes
Flintshire Published 1938	1:10560	A “Club” building is shown on or directly adjacent to the south western boundary of the site.	No significant changes
Ordnance Survey Published 1954	1:2500	A rectangular building is shown on the site.	The dual carriageway A494 has been constructed to the east of the site together with the roundabout to the north..
Ordnance Survey Published 1979	1:1250	On the site is a Petrol Filling Station accessed off the northbound carriageway of the A494.	Al hotel is shown directly north of the site fronting onto the B5441.
Ordnance Survey Published 1992	1:1250	The boundaries of the site are now accurately defined and the Gateway to Wales Hotel has been built over the land previously occupied by the petrol filling station.	No significant changes
Present Day		It is understood that the Gateway to Wales Hotel was destroyed by fire in 2017 and has recently been completely demolished.	No significant changes

In summary, the first significant former use of the land was as a petrol filling station from approximately 1970 – 1990, then it was replaced by the Gateway of Wales Hotel.

At this stage the detailed layout of the former filling station is not clear and the location of any underground fuel storage tanks is not known.

Furthermore, no information is available as to whether the re-development of the site as a hotel involved the removal or treatment of any old fuel tanks or of any leakages had taken place affecting the underlying ground.

Significant factors identified on historical plans

The former use of the site as a filling station may still have implications on the re-development of the land for example if any old tanks remain in-situ or leakages have resulted in ground contamination.

2.3 Geology and Anticipated Ground Conditions

Based on information published by the British Geological Survey the site is underlain by recent superficial tidal flat deposits comprising clays, silts and sands of the Quaternary Period overlying rocks of the Pennine Middle Measures including mudstones, siltstones and sandstones of Carboniferous age.

Borehole records in the vicinity of the site indicate the drift materials are a minimum of 13m thick.

Although the geological information indicates the site to be underlain by Coal Measures, it is close to a boundary to the north east where the Sherwood Sandstones of Triassic age are thought to underlie the superficial soils.

Significant factors identified from geological data
Foundation design is likely to be influenced not only on the loadings of the proposed new buildings but also the type of superficial soils and the depth to bedrock

2.4 Ground Stability

Despite the presence of rocks of Coal Measures age beneath the site it is considered likely that no underground coal mining has taken place to affect the stability of the site.

In addition, there are no records of any other underground mineral workings in the general area of the site.

With respect to other factors that could affect ground stability, the site is categorised as at moderate hazard potential for problems related to compressible ground and running sands due to the presence of tidal flat deposits beneath the area.

Significant ground stability risks
Possible problems relating to the type of superficial soils beneath the site.

2.5 Hydrology

An open watercourse is shown aligned NW-SE on either side of the site but is approximately culverted beneath the site itself.

This drain is subject to a number of discharge consents and several cases of pollution incidents to controlled waters have been recorded although typically within Category 3 – Minor Incident.

In addition there are no nearby licensed abstractions of surface water.

The site and the general area is classified as at risk from extreme flooding from rivers or sea without defences (Zone 2) although benefitting from flood defence.

With respect to the risk of flooding from surface water a small area of land to the west of the site is gown as low risk and areas around the site have the potential for groundwater flooding to occur at the site.

Significant factors from hydrological / flood risk factors
Due to the location of the site within the floodplain of the River Dee there are potential risks due to flooding

2.6 Hydrogeology

The overall hydrogeology of the site and the general area is shown on a series of maps provided by the Environment Agency which indicate:

- Due to the presence of a Secondary Aquifer beneath the site the surface soils are classified as of “High Vulnerability”.

- The superficial deposits are classified as “Secondary Undifferentiated”.

- Bedrock beneath the site is categorised as “Secondary A Aquifer”

  in this situation it is evident that any contaminated made ground at the surface subject to circulating groundwater could have a detrimental effect on the quality of water certainly within the superficial deposits and in extreme circumstances the underlying bedrock.

  However, it is not the occurrence of potentially contaminated made ground that is likely to be most significant but the possible leakage of petroleum hydrocarbons into the ground due to the former use of the site as a filling station.

  At this stage it must be considered there is some risk to the quality of underground waters until / unless proven otherwise.

  There are no records of any nearby licensed groundwater abstractions or pollution incidents that could have had any adverse effects on the quality of groundwater in close proximity to the site.

Significant factors from hydrogeological data
Potential risks to the quality of groundwater if leakage has taken place from the underground fuel tanks within the former filling station at the site.

2.7 Landfill and Hazardous Ground Gases

Methane and carbon dioxide in particular are generated by the biodegradation of waste materials which are normally deposited at landfill sites and in certain conditions these hazardous gases can migrate laterally to affect land well beyond the actual landfill itself.

In this particular case there are no historic or currently licensed landfill sites or backfilled mineral workings within close proximity to the site.

However, if petroleum hydrocarbons have entered the ground this could have resulted in the presence of gases relating to product degradation.

With respect to radon, the site is not within an area where specific precautionary measures are deemed necessary in the construction of new buildings.

Significant risks identified
Some potential for the presence of hydrocarbons related gases in the ground.

2.8 Unexploded ordnance

A Preliminary Unexploded Ordnance (UXO) Threat Assessment has not been obtained at this stage but could be acquired if considered necessary.

Significant risk from UXO
No further action required at this stage.

2.9 Other

The following topics have not been researched at this stage

- Archaeology
- Invasive Plants
- Ecology

3.0 Conceptual Site Model and Preliminary Risk Assessment

Using the information gathered to allow compilation of this report and discussed in Section 2.0 above, a Conceptual Site Model has been prepared using the Source – Pathway – Receptor methodology as shown on the following table.

This methodology applies to potential contaminants in all three phases namely solid, liquid or gaseous.

As a starting point, there must be an identifiable SOURCE of contamination.

In this particular case it is possible that parts of the site may be underlain by potentially contaminated made ground which:

- In its solid form could cause problems to human health for site construction workers.

- If subject to leaching could potentially result in contaminated groundwater.

In addition, petroleum hydrocarbons may be present in the ground resulting in:

- A risk to underground waters.

- The presence of hydrocarbon based gases.

On the assumption that sources has been identified there must be a credible PATHWAY for the contamination to affect any designated RECEPTOR.

In this particular case the following potential pathways and receptors have been identified.

- Construction workers could be exposed to potentially contaminated made ground by dermal contact, inhalation or ingestion.

  Similarly buried concrete could require protection from potentially contaminated made ground.

- Contaminants within the made ground could be mobilised by leaching and potentially affect the quality of both surface and underground waters.

- If any hazardous gases are present in the ground these would need appropriate control in the construction of any new buildings with the incorporation of precautionary measures to protect site users from possible explosions and / or asphyxiation,

For there to be an identifiable risk then there must be clear linkage between each part of the chain otherwise there is no risk.

In terms of the potential ground contaminants that may affect the site, these include a common range of substances including metals , phenol, cyanide, pH, water soluble sulphate and polycyclic aromatic hydrocarbons and total petroleum hydrocarbons.

Also any made ground may contain asbestos fibres.

Source	Pathway	Receptor	Risk Assessment	Linkage
Contaminants in made ground including metals, PAHs TPHs and asbestos	Ingestion / dermal contact / inhalation	Current site users	The site is currently secure and no potential risks are applicable.	Not viable
		Construction workers	Any made ground at the site must be considered to be potentially contaminated with the requirement for safe working practices and protective clothing.	Viable
		Site users after re-development	As the site will be almost total hardcover there are no potential risks applicable.	Not viable
		Adjacent Land users	As significant deposits of made ground are not anticipated at the site there are no potential risks applicable.	Not viable
	Uptake in root zone	Plants	The site redevelopment does not include any soft landscaping.	Not viable
Mobile contaminants in made ground including metals and PAHs	Leaching from made ground	Groundwater	As both the superficial deposits and bedrock being classified as aquifers, there is the potential risk of adverse effects on groundwater if significant deposits of contaminated ground are present at the site.	Viable
	Off site migration in groundwater	Surface Water	The nearby surface water drain could be at risk in terms of quality if significant deposits of contaminated made ground are present at the site.	Viable
Hazardous vapours from volatile contaminants	Inhalation of vapours	Current site users	If petroleum hydrocarbons have entered the ground their degradation may have resulted in the production of hazardous vapours.	Viable
		Construction workers		
		Site Users after re–development		
		Adjacent users		
Landfill gases from the made ground	Emissions from the ground collecting in excavations / confined spaces on / off site.	Current site users	No particular problems envisaged at this stage.	Not viable
		Construction workers		
		Site Users after re–development		
		Adjacent land users		
Radon	Emissions from the ground	Construction workers	The site is in an area where no specific radon protective measures are required in the construction of new buildings.	Not viable
		Site users after re-development		

Source	Pathway	Receptor	Risk Assessment	Linkage
Ground conditions aggressive to buried concrete	Direct contact	Underground structures	Buried concrete will need appropriate protection from aggressive ground conditions	Viable
Ground instability	Differential settlements	Structures	No problems anticipated from this source.	Not Viable

From a study of the Conceptual Site Model it appears that the principal risks that need to be addressed relate to:

- Potential risk to site construction workers if made ground is identified at the site.
- Potential risks to the quality of underground waters.
- Possible risk of the presence of hazardous gases if petroleum hydrocarbons have entered the ground beneath the site.
- Aggressive ground conditions with respect to buried concrete at the site.

Appropriate chemical testing will be required particularly if any made ground is identified at the site.

As the necessary Phase 2 investigation needs to include information for foundation design for the proposed new structures it is anticipated that this work will be accomplished by sinking a number of cable percussion, window sampler boreholes and the installation of gas wells for gas and groundwater monitoring.

In addition, trial pits may be necessary if work is required to check for the presence / absence of the former underground fuel tanks beneath the site.

Appropriate sampling and in-situ testing will be carried out to evaluate any potential problems related to ground contamination and provide information for foundation design.

4.0 SUMMARY AND RECOMMENDATIONS

This report has identified that prior to the now demolished Gateway to Wales Hotel on the land the site was previously used as a petrol filing station.

A Phase 2 investigation is necessary to identify the presence of any potentially contaminated ground at the site and in particular any legacy issues due to the former occupation of the site by a filling station, for

example have the old underground fuel tanks been adequately dealt with and if any historical leakages occurred into the underlying ground.

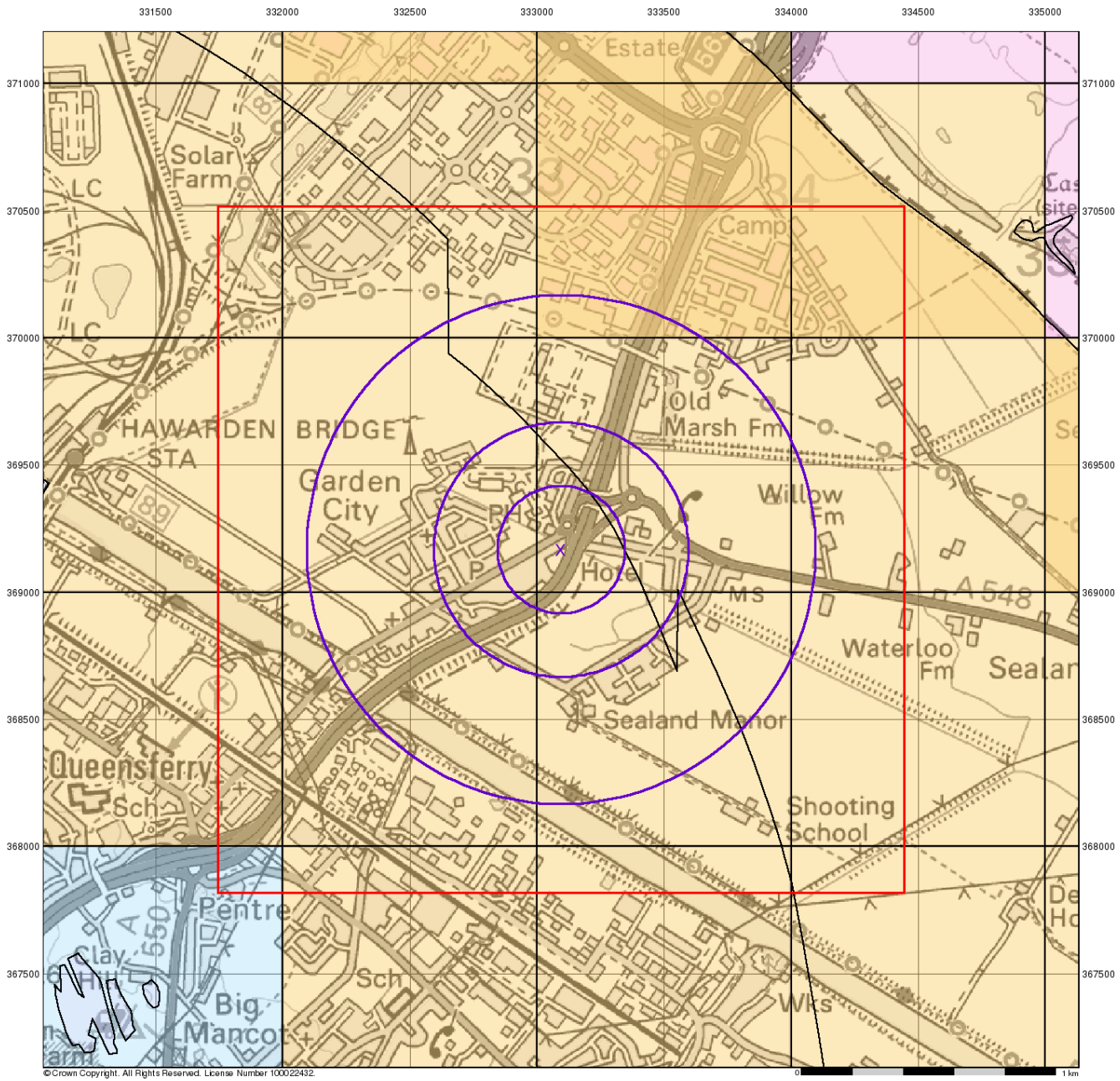
On completion of this work a Phase 2 report will be produced including a revised risk assessment as appropriate, and an assessment of geotechnical issues affecting the proposed redevelopment.

As noted previously a Phase 3 Remediation Strategy and Phase 4 Verification Report will be produced at the appropriate time.

Dr John Crook

Geo-Ventures (UK) Limited
May 2019

APPENDIX A



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Groundwater Vulnerability

General

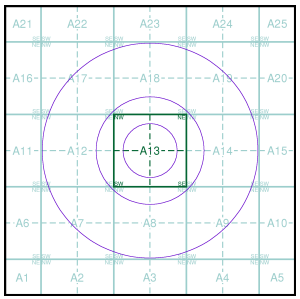
Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Agency and Hydrological

Bedrock Aquifers	Superficial Aquifers
High Vulnerability, Principal Aquifer	High Vulnerability, Principal Aquifer
High Vulnerability, Secondary Aquifer	High Vulnerability, Secondary Aquifer
Medium Vulnerability, Principal Aquifer	Medium Vulnerability, Principal Aquifer
Medium Vulnerability, Secondary Aquifer	Medium Vulnerability, Secondary Aquifer
Low Vulnerability, Principal Aquifer	Low Vulnerability, Principal Aquifer
Low Vulnerability, Secondary Aquifer	Low Vulnerability, Secondary Aquifer

Unproductive Aquifer
Soluble Rock

Site Sensitivity Context Map - Slice A



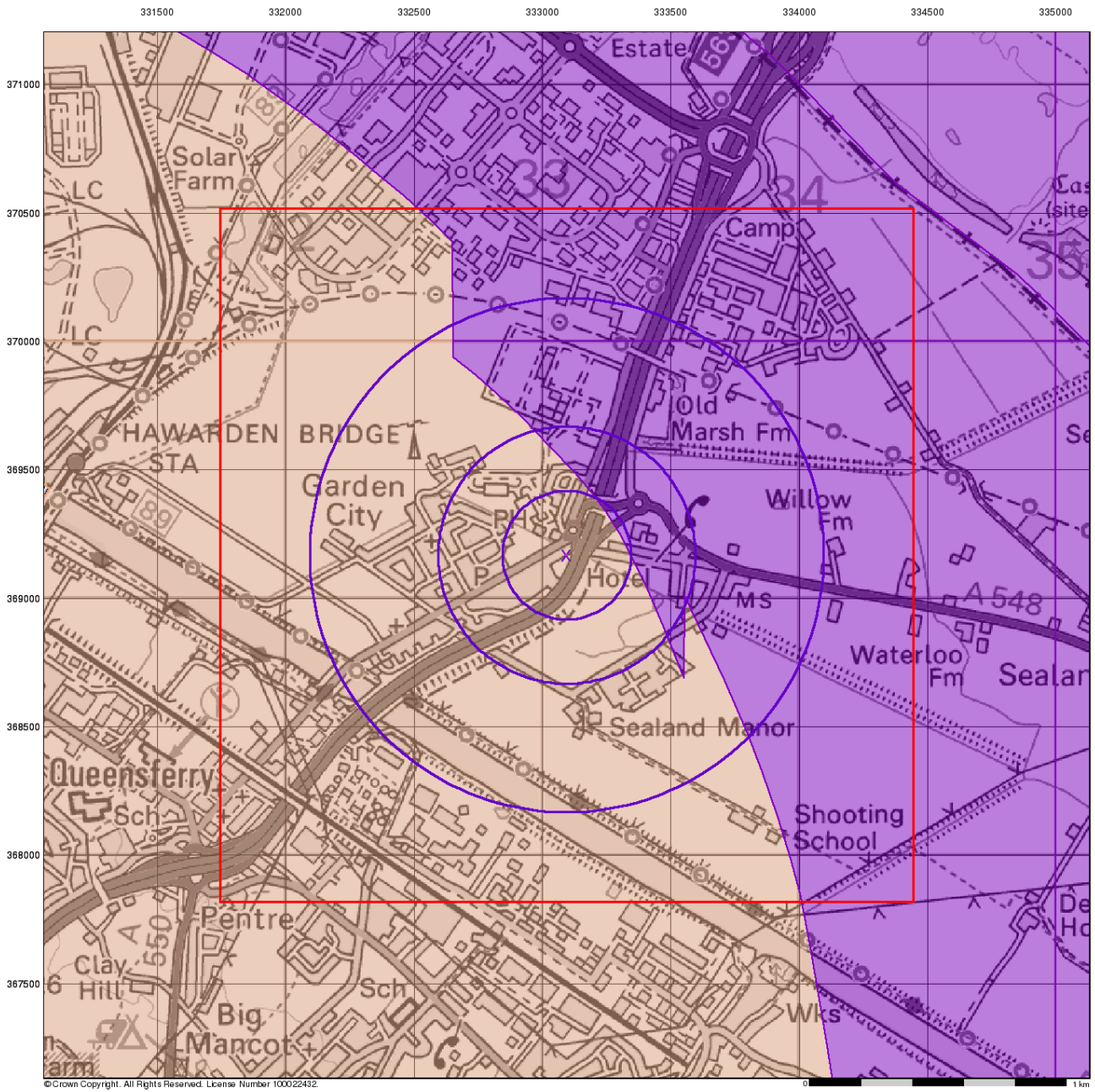
Order Details

Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

118, Welsh Road, Garden City, DEESIDE, CH5 2HX

Landmark® INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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Bedrock Aquifer Designation

General

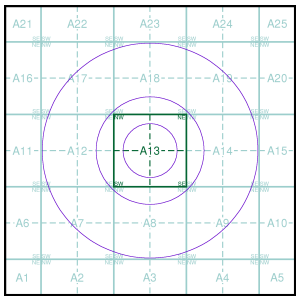
Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

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



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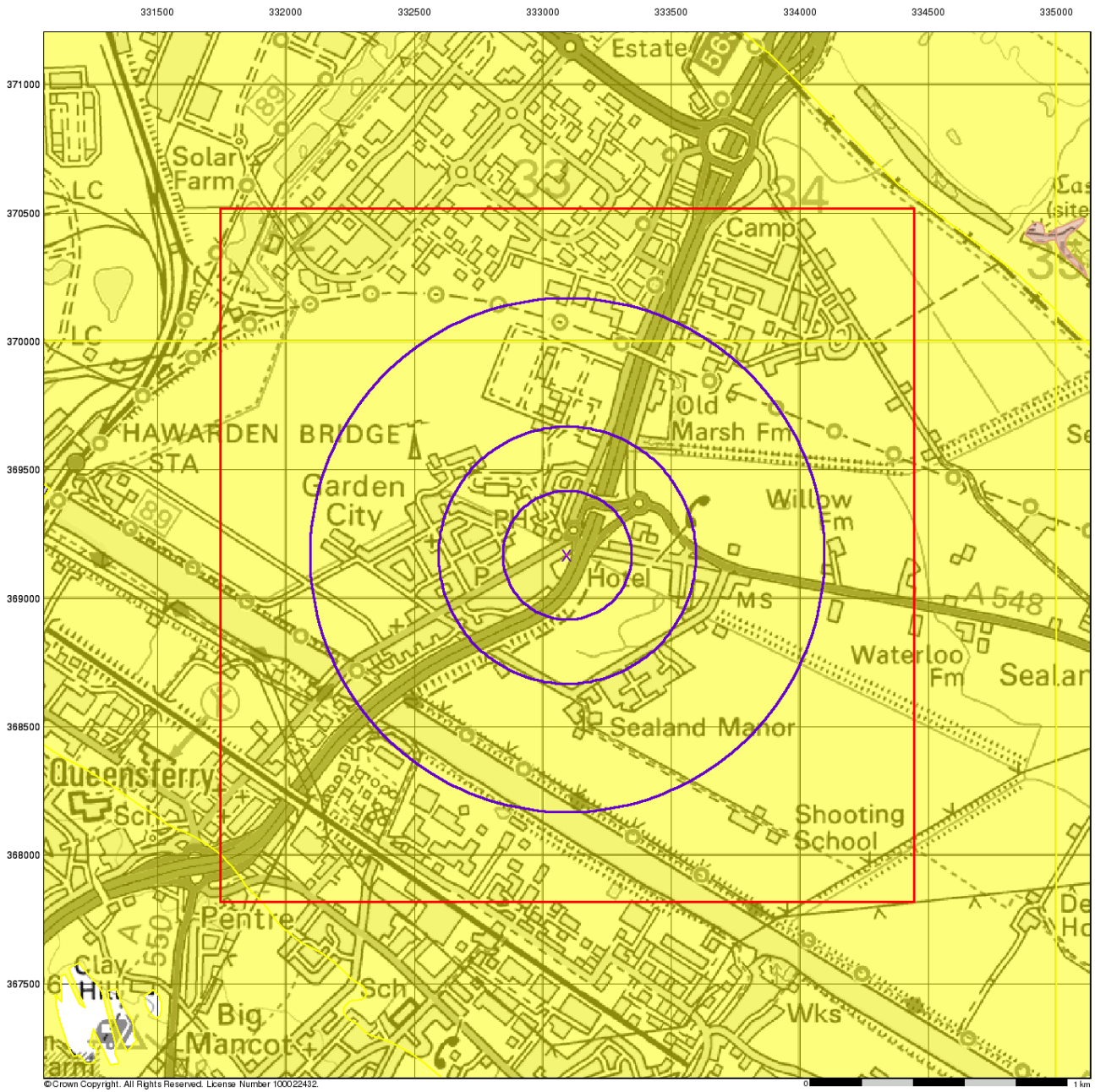

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Superficial Aquifer Designation

General

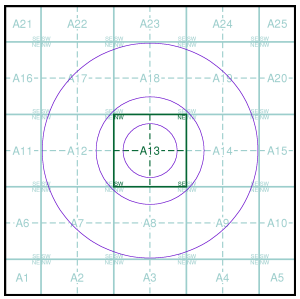
Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

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

Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

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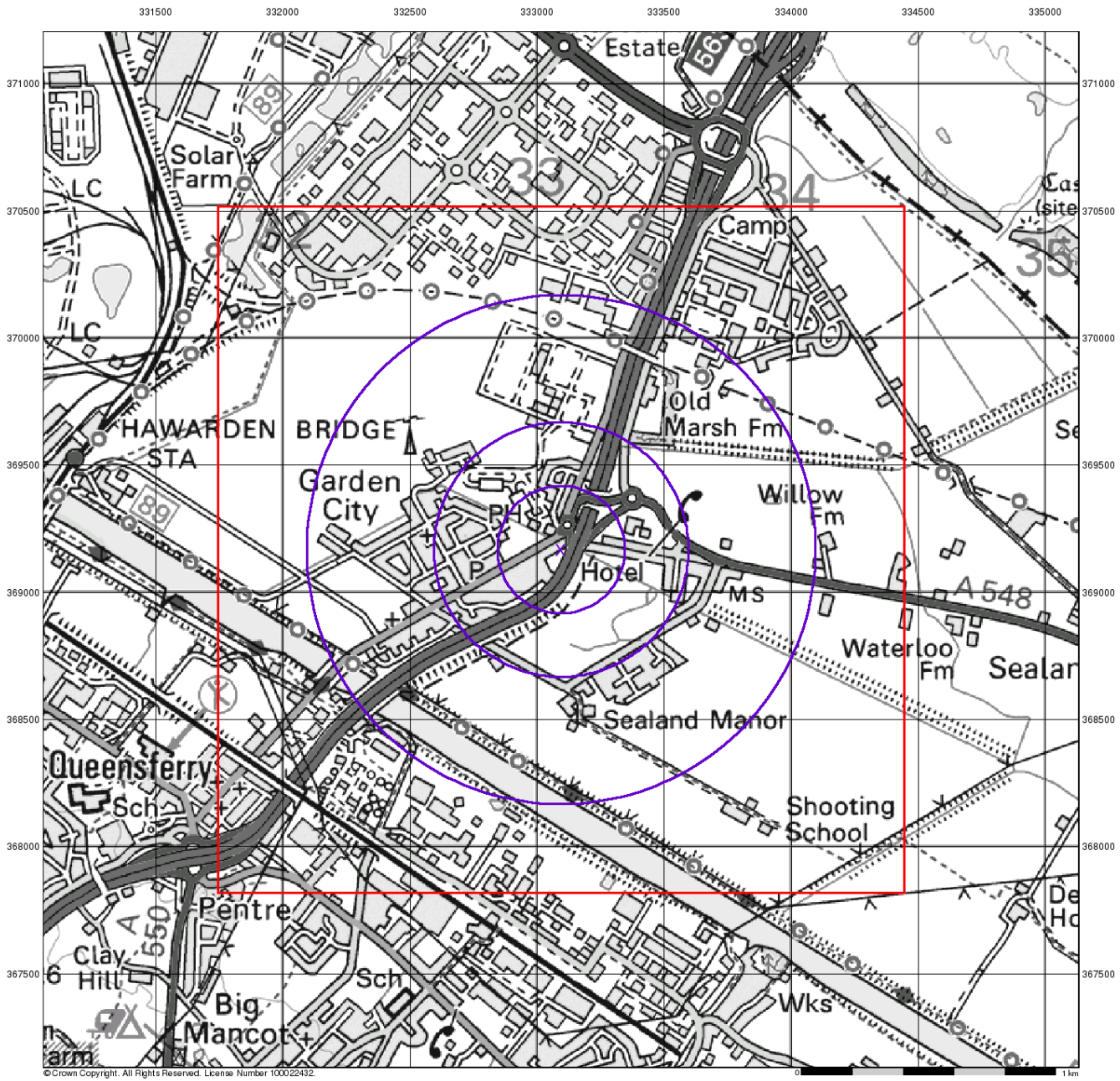

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Source Protection Zones

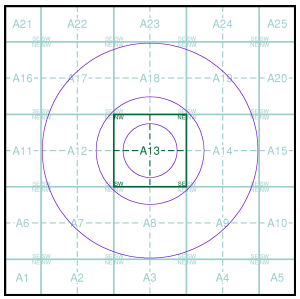
General

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)

Site Sensitivity Context Map - Slice A



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Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

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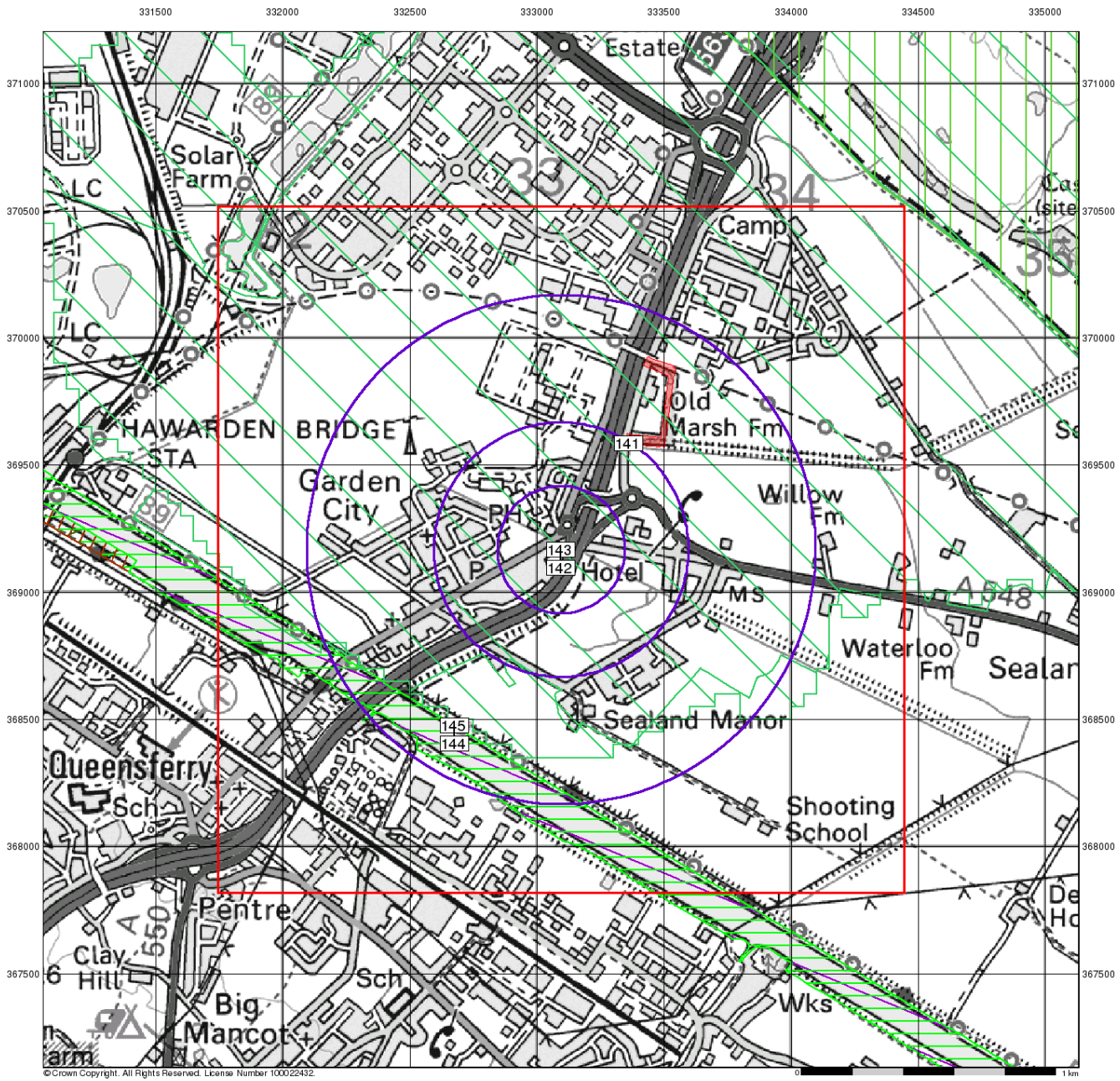

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Sensitive Land Uses

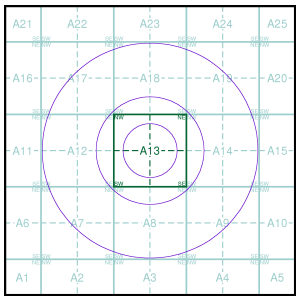
General

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



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Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

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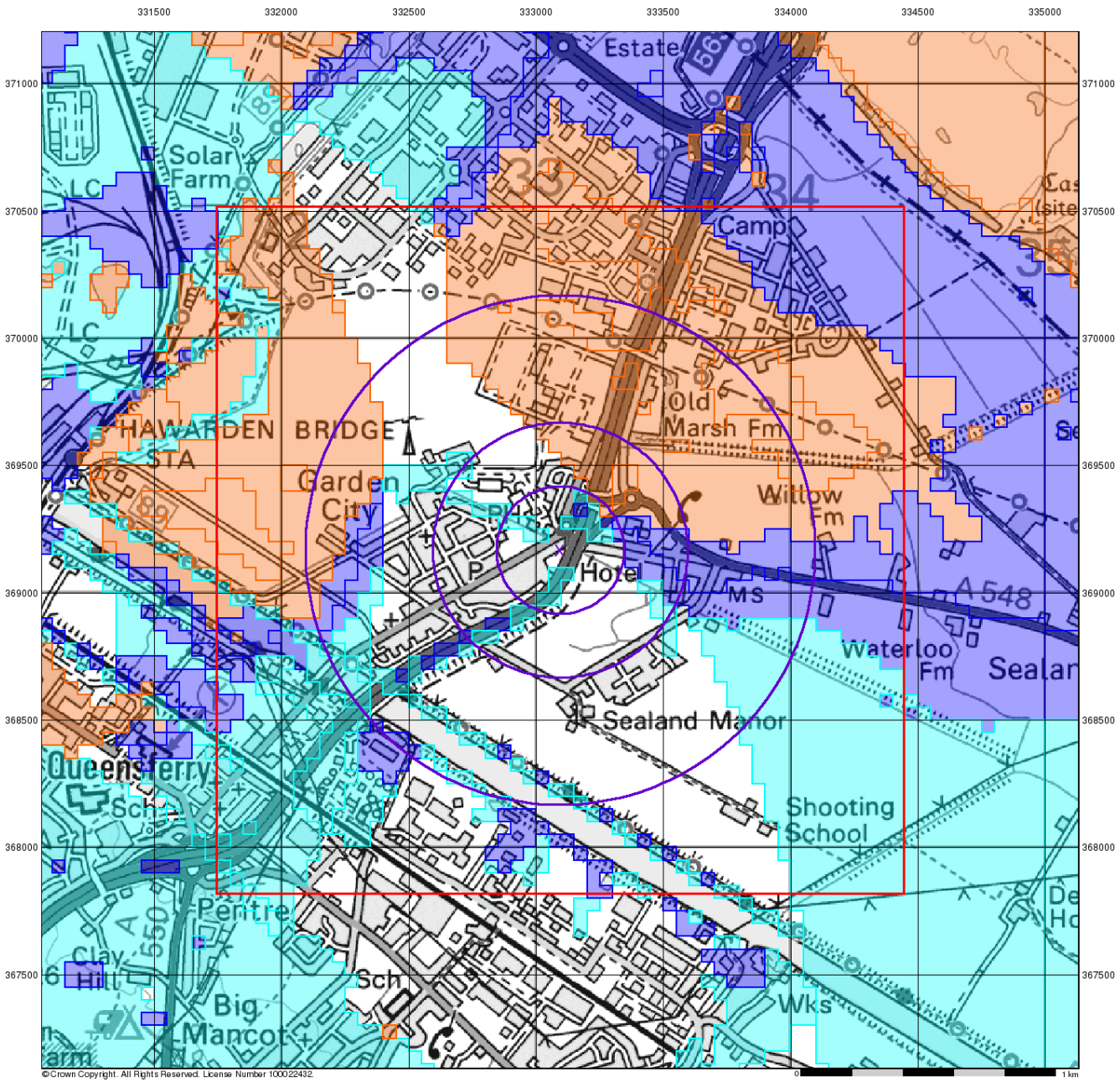

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BGS Flood GFS Data

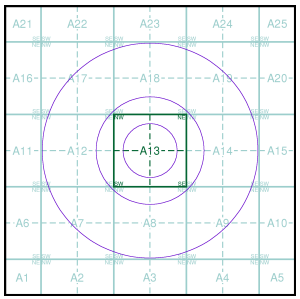
General

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:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

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Envirocheck® Report:

Datasheet

Order Details:

Order Number:
201123677_1_1

Customer Reference:
19-1790

National Grid Reference:
333090, 369170

Slice:
A

Site Area (Ha):
0.01

Search Buffer (m):
1000

Site Details:

118, Welsh Road
Garden City
DEESIDE
CH5 2HX

Client Details:

Mr J Crook
Geo-Ventures (UK) Ltd
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Manchester
Greater Manchester
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Contents

Report Section	Page Number
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Agency & Hydrological	1
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Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination.
For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency/Natural Resources Wales and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.
In this datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

Report Version v53.0

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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 2		6		14
Prosecutions Relating to Controlled Waters			n/a	n/a	n/a
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls	pg 7			1	1
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature			Yes		
Pollution Incidents to Controlled Waters	pg 7		4	4	12
Prosecutions Relating to Authorised Processes					
Registered Radioactive Substances	pg 10				3
River Quality					
River Quality Biology Sampling Points					
River Quality Chemistry Sampling Points					
Substantiated Pollution Incident Register					
Water Abstractions	pg 11			1	2 (*24)
Water Industry Act Referrals					
Groundwater Vulnerability Map	pg 17	Yes	n/a	n/a	n/a
Bedrock Aquifer Designations	pg 17	Yes	n/a	n/a	n/a
Superficial Aquifer Designations	pg 17	Yes	n/a	n/a	n/a
Source Protection Zones					
Extreme Flooding from Rivers or Sea without Defences	pg 17	Yes	Yes	n/a	n/a
Flooding from Rivers or Sea without Defences	pg 18	Yes	Yes	n/a	n/a
Areas Benefiting from Flood Defences	pg 18	Yes		n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences	pg 18		Yes	n/a	n/a
OS Water Network Lines	pg 18		4	12	32

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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					
Historical Landfill Sites					
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)	pg 25				2
Local Authority Landfill Coverage	pg 25	1	n/a	n/a	n/a
Local Authority Recorded Landfill Sites					
Potentially Infilled Land (Non-Water)					
Potentially Infilled Land (Water)	pg 25		1	7	11
Registered Landfill Sites					
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites					
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					

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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 27	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 27	Yes	Yes	Yes	Yes
BGS Recorded Mineral Sites					
BGS Urban Soil Chemistry					
BGS Urban Soil Chemistry Averages					
CBSCB Compensation District			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain	pg 28	Yes	Yes	n/a	n/a
Potential for Collapsible Ground Stability Hazards				n/a	n/a
Potential for Compressible Ground Stability Hazards	pg 28	Yes	Yes	n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 28	Yes		n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 28	Yes	Yes	n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 29	Yes		n/a	n/a
Radon Potential - Radon Affected Areas	pg 29	Yes	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 30		1	13	54
Fuel Station Entries	pg 36			1	
Points of Interest - Commercial Services	pg 36		1	6	16
Points of Interest - Education and Health					
Points of Interest - Manufacturing and Production	pg 38			1	5
Points of Interest - Public Infrastructure					
Points of Interest - Recreational and Environmental	pg 38			2	4
Gas Pipelines					
Underground Electrical Cables					

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Sensitive Land Use					
Ancient Woodland	pg 40			1	
Areas of Adopted Green Belt					
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones	pg 40	2			
Ramsar Sites					
Sites of Special Scientific Interest	pg 40				1
Special Areas of Conservation	pg 40				1
Special Protection Areas					
World Heritage Sites					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A13NW (NW)	55	1	333050 369200
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A13SE (S)	69	1	333094 369100
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A13NE (N)	82	1	333100 369250
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NE (NE)	143	1	333150 369300
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NE (NE)	176	1	333250 369250
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A13NE (N)	191	1	333150 369350
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NE (NE)	204	1	333250 369300
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NE (E)	209	1	333300 369200
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NE (NE)	211	1	333200 369350
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NE (E)	222	1	333300 369250
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A13SW (SW)	238	1	333000 368950
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NE (NE)	275	1	333300 369350
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A13SE (E)	328	1	333400 369050
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13SW (SW)	332	1	332900 368900
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A12NE (NW)	390	1	332750 369350
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A13SW (SW)	402	1	332850 368850
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A12NE (NW)	445	1	332750 369450
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A12SE (SW)	469	1	332750 368850

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	**Discharge Consents** Operator: Dwr Cymru Cyfyngedig Property Type: Sewerage Network - Sewers - Water Company Location: Garden City British Legion - Sso Authority: Natural Resources Wales Catchment Area: River Dee Reference: Cm0166001 Permit Version: 2 Effective Date: 31st March 2007 Issued Date: 8th March 2005 Revocation Date: 9th March 2007 Discharge Type: Public Sewage: Storm Sewage Overflow Discharge Environment: Freshwater Stream/River Receiving Water: Manor Drain **Status: Modified (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 100m	A13SE (S)	69	2	333100 369100
1	**Discharge Consents** Operator: Dwr Cymru Cyfyngedig Property Type: Sewerage Network - Sewers - Water Company Location: Garden City British Legion - Sso Authority: Natural Resources Wales Catchment Area: River Dee Reference: CM0166001 Permit Version: 1 Effective Date: 20th October 1989 Issued Date: 20th October 1989 Revocation Date: 30th March 2007 Discharge Type: Public Sewage: Storm Sewage Overflow Discharge Environment: Not Supplied Receiving Water: Manor Drain **Status: New Consent, by Application (Water Resources Act 1991, Section 88)** Positional Accuracy: Located by supplier to within 100m	A13SE (S)	69	2	333100 369100
2	**Discharge Consents** Operator: Dwr Cymru Cyfyngedig Property Type: Sewerage Network - Sewers - Water Company Location: Garden City British Legion - Sso Authority: Natural Resources Wales Catchment Area: SHOTWICK BROOK Reference: Cm0166001 Permit Version: 4 Effective Date: 14th September 2006 Issued Date: 14th September 2006 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge Environment: Freshwater Stream/River Receiving Water: Manor Drain **Status: Effective** Positional Accuracy: Located by supplier to within 10m	A13NW (NW)	79	2	333033 369218
2	**Discharge Consents** Operator: Dwr Cymru Cyfyngedig Property Type: Sewerage Network - Sewers - Water Company Location: Garden City British Legion - Sso Authority: Natural Resources Wales Catchment Area: River Dee Reference: Cm0166001 Permit Version: 3 Effective Date: 6th March 2005 Issued Date: 6th March 2005 Revocation Date: 13th September 2006 Discharge Type: Public Sewage: Storm Sewage Overflow Discharge Environment: Freshwater Stream/River Receiving Water: Manor Drain **Status: Modified (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 10m	A13NW (NW)	79	2	333033 369218

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
3	**Discharge Consents** Operator: Corbett William T Ltd Property Type: Undefined Or Other Location: Queensferry Drome Service Station Authority: Natural Resources Wales Catchment Area: River Dee Reference: Cm0026201 Permit Version: 1 Effective Date: 12th January 1965 Issued Date: 12th January 1965 Revocation Date: 30th January 1996 Discharge Type: Unspecified Discharge Environment: Not Supplied Receiving Water: Manor Drain **Status: Consent expired** Positional Accuracy: Located by supplier to within 10m	A13SE (E)	96	2	333190 369160
4	**Discharge Consents** Operator: Dwr Cymru Cyfyngedig Property Type: Sewerage Network - Pumping Staions Location: Sealand Ps Authority: Natural Resources Wales Catchment Area: SHOTWICK BROOK Reference: CM0118001 Permit Version: 1 Effective Date: 8th February 1967 Issued Date: 8th February 1967 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Pumping Station - Water Company Discharge Environment: Freshwater Stream/River Receiving Water: Garden City Drain **Status: Effective** Positional Accuracy: Located by supplier to within 100m	A13NW (NW)	213	2	332920 369290
5	**Discharge Consents** Operator: D Morgan Plc Property Type: Civil Engineering Location: Northern Access Road, Chester Millenium Greenway, Chester, Ch5 2rd Authority: Natural Resources Wales Catchment Area: Not Supplied Reference: Ab3295hg Permit Version: Not Supplied Effective Date: 1st November 2016 Issued Date: 1st November 2016 Revocation Date: Not Supplied Discharge Type: Trade Discharges - Site Drainage Discharge Environment: Freshwater Stream/River Receiving Water: Gb111067056960: Shotwick Brook **Status: Effective** Positional Accuracy: Located by supplier to within 10m	A12NE (NW)	505	2	332671 369443
5	**Discharge Consents** Operator: D Morgan Plc Property Type: Civil Engineering Location: Northern Access Road, Chester Millenium Greenway, Chester, Ch5 2rd Authority: Natural Resources Wales Catchment Area: SHOTWICK BROOK Reference: Ab3295hg Permit Version: 1 Effective Date: 1st November 2016 Issued Date: 1st November 2016 Revocation Date: Not Supplied Discharge Type: Trade Discharges - Site Drainage Discharge Environment: Freshwater Stream/River Receiving Water: River Dee **Status: Effective** Positional Accuracy: Located by supplier to within 10m	A12NE (NW)	505	2	332671 369443

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
6	**Discharge Consents** Operator: Alyn & Deeside District Council Property Type: Undefined Or Other Location: Deeside Garden City Authority: Natural Resources Wales Catchment Area: River Dee Reference: Cm0096201 Permit Version: 1 Effective Date: 21st October 1983 Issued Date: 21st October 1983 Revocation Date: 5th April 1995 Discharge Type: Unspecified Discharge Environment: Not Supplied Receiving Water: Garden City Drain **Status: Consent expired** Positional Accuracy: Located by supplier to within 10m	A12NE (NW)	563	2	332620 369470
7	**Discharge Consents** Operator: The Occupier Property Type: Undefined Or Other Location: Unit 53 Deeside Ind Estate Authority: Natural Resources Wales Catchment Area: River Dee Reference: Cm0188901 Permit Version: 1 Effective Date: 4th December 1989 Issued Date: 4th December 1989 Revocation Date: 6th January 1993 Discharge Type: Unspecified Discharge Environment: Not Supplied Receiving Water: Land **Status: Consent expired** Positional Accuracy: Located by supplier to within 100m	A18NE (N)	857	2	333300 370000
8	**Discharge Consents** Operator: National Grid Company Plc Property Type: OIther Wholesale Distribution Location: Queensferry Depot Factory Road, Flinshire, Wales Authority: Natural Resources Wales Catchment Area: River Dee Reference: Cm0181301 Permit Version: 1 Effective Date: 15th May 1989 Issued Date: 15th May 1989 Revocation Date: 5th April 1995 Discharge Type: Unspecified Discharge Environment: Not Supplied Receiving Water: Dee Estuary **Status: Consent expired** Positional Accuracy: Located by supplier to within 10m	A7SE (SW)	920	2	332695 368340
9	**Discharge Consents** Operator: Dwr Cymru Cyfyngedig Property Type: Sewage Disposal Works Location: Queensferry Stw (Settled Storm), Flintshire, Wales Authority: Natural Resources Wales Catchment Area: DEE (N. WALES) Reference: Cm0082301 Permit Version: 3 Effective Date: 18th December 2015 Issued Date: 18th December 2015 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge Environment: Freshwater Stream/River Receiving Water: Un-Named Watercourse **Status: Effective** Positional Accuracy: Located by supplier to within 10m	A7NW (SW)	959	2	332380 368530

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
9	**Discharge Consents** Operator: Dwr Cymru Cyfyngedig Property Type: Sewage Disposal Works - Water Company Location: Queensferry Stw (Settled Storm), Flintshire, Wales Authority: Natural Resources Wales Catchment Area: Not Supplied Reference: Cm0082201 Permit Version: 6 Effective Date: 30th November 2000 Issued Date: 29th November 2000 Revocation Date: 30th March 2005 Discharge Type: Sewage Discharges - Final/Treated Effluent - Water Company Discharge Environment: Not Supplied Receiving Water: River Dee Estuary **Status: Modified (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 10m	A7NW (SW)	959	2	332380 368530
9	**Discharge Consents** Operator: Dwr Cymru Cyfyngedig Property Type: Sewage Disposal Works - Water Company Location: Queensferry Stw (Settled Storm), Flintshire, Wales Authority: Natural Resources Wales Catchment Area: River Dee Reference: Cm0082301 Permit Version: 2 Effective Date: 30th March 1996 Issued Date: 29th March 1996 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge Environment: Freshwater Stream/River Receiving Water: Un-Named Watercourse **Status: Modified (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 10m	A7NW (SW)	959	2	332380 368530
9	**Discharge Consents** Operator: Dwr Cymru Cyfyngedig Property Type: Sewage Disposal Works - Water Company Location: Queensferry Stw (Settled Storm), Flintshire, Wales Authority: Natural Resources Wales Catchment Area: Not Given Reference: CM0082201 Permit Version: 5 Effective Date: 30th March 1996 Issued Date: 29th March 1996 Revocation Date: 29th November 2000 Discharge Type: Sewage Discharges - Final/Treated Effluent - Water Company Discharge Environment: Not Supplied Receiving Water: River Dee Estuary **Status: Modified (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 100m	A7NW (SW)	959	2	332380 368530
9	**Discharge Consents** Operator: Dwr Cymru Cyfyngedig Property Type: Sewage Disposal Works - Water Company Location: Queensferry Stw (Settled Storm), Flintshire, Wales Authority: Natural Resources Wales Catchment Area: River Dee Reference: CM0082301 Permit Version: 1 Effective Date: 15th October 1976 Issued Date: 15th October 1976 Revocation Date: 29th March 1996 Discharge Type: Unspecified Discharge Environment: Not Supplied Receiving Water: Un-Named Watercourse **Status: Authorisation revoked** Positional Accuracy: Located by supplier to within 100m	A7NW (SW)	964	2	332400 368500

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
9	**Discharge Consents** Operator: Dwr Cymru Cyfyngedig Property Type: Sewage Disposal Works Location: Queensferry Wwtw, Factory Road, Pentre, Queensferry, Flintshire, Ch5 2qt Authority: Natural Resources Wales Catchment Area: DEE (N. WALES) Reference: Cm0082201 Permit Version: 10 Effective Date: 31st March 2010 Issued Date: 31st March 2010 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Final/Treated Effluent - Water Company Discharge Environment: Freshwater Estuary Receiving Water: River Dee Estuary **Status: Effective** Positional Accuracy: Located by supplier to within 10m	A7NW (SW)	965	2	332379 368522
9	**Discharge Consents** Operator: Dwr Cymru Cyfyngedig Property Type: Sewage Disposal Works - Water Company Location: Queensferry Wwtw, Factory Road, Pentre, Queensferry, Flintshire, Ch5 2qt Authority: Natural Resources Wales Catchment Area: Not Supplied Reference: Cm0082201 Permit Version: 9 Effective Date: 1st January 2010 Issued Date: 26th June 2009 Revocation Date: 30th March 2010 Discharge Type: Sewage Discharges - Final/Treated Effluent - Water Company Discharge Environment: Freshwater Estuary Receiving Water: River Dee Estuary **Status: Modified (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 10m	A7NW (SW)	965	2	332379 368522
9	**Discharge Consents** Operator: Dwr Cymru Cyfyngedig Property Type: Sewage Disposal Works - Water Company Location: Queensferry Wwtw, Factory Road, Pentre, Queensferry, Flintshire, Ch5 2qt Authority: Natural Resources Wales Catchment Area: Not Supplied Reference: Cm0082201 Permit Version: 8 Effective Date: 31st December 2005 Issued Date: 31st December 2005 Revocation Date: 31st December 2009 Discharge Type: Sewage Discharges - Final/Treated Effluent - Water Company Discharge Environment: Freshwater Estuary Receiving Water: River Dee Estuary **Status: Modified (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 10m	A7NW (SW)	965	2	332379 368522
9	**Discharge Consents** Operator: Dwr Cymru Cyfyngedig Property Type: Sewage Disposal Works - Water Company Location: Queensferry Wwtw, Factory Road, Pentre, Queensferry, Flintshire, Ch5 2qt Authority: Natural Resources Wales Catchment Area: Not Supplied Reference: Cm0082201 Permit Version: 7 Effective Date: 31st March 2005 Issued Date: 18th March 2005 Revocation Date: 30th December 2005 Discharge Type: Sewage Discharges - Final/Treated Effluent - Water Company Discharge Environment: Freshwater Estuary Receiving Water: River Dee Estuary **Status: Varied by Application - (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 10m	A7NW (SW)	965	2	332379 368522

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
10	**Local Authority Pollution Prevention and Controls** Name: Save Service Station Location: 50 Welsh Road, Garden City, DEESIDE, Flintshire, CH5 2HT Authority: Flintshire Council, Environmental Health Department Permit Reference: S25gs250we/1 Dated: 4th September 2002 Process Type: Local Authority Pollution Prevention and Control Description: PG1/14 Petrol filling station **Status: Authorisation revoked** Positional Accuracy: Manually positioned to the address or location	A12SE (SW)	474	3	332675 368949
11	**Local Authority Pollution Prevention and Controls** Name: Ravensworth Ltd Location: 2 Deva Business Park, Welsh Road, DEESIDE, Flintshire, CH5 2LR Authority: Flintshire Council, Environmental Health Department Permit Reference: Not Given Dated: 29th January 1997 Process Type: Local Authority Air Pollution Control Description: Part B - General Metal Process (No Specific Reference) **Status: Authorised** Positional Accuracy: Manually positioned within the geographical locality	A18NE (N)	987	3	333284 370136
	Nearest Surface Water Feature	A13NW (NW)	56	-	333053 369206
12	**Pollution Incidents to Controlled Waters** Property Type: Council Premises Location: Sealand Road, Queensferry Bypass Culvert Authority: Environment Agency, Welsh Region Pollutant: Crude Sewage Note: Accidental Spillage/Leakage Incident Date: 21st May 1991 Incident Reference: 59 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Leakage Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A13SE (E)	67	4	333160 369160
13	**Pollution Incidents to Controlled Waters** Property Type: Road (Lost Load) Location: QUEENSFERRY Authority: Environment Agency, Welsh Region Pollutant: Light Oil Note: Accidental Spillage/Leakage Incident Date: 4th November 1994 Incident Reference: 21554 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Leakage Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A13SE (S)	70	4	333105 369100
13	**Pollution Incidents to Controlled Waters** Property Type: Road (Lost Load) Location: QUEENSFERRY Authority: Environment Agency, Welsh Region Pollutant: Unknown Note: Accidental Spillage/Leakage Incident Date: 4th November 1994 Incident Reference: 21554 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Leakage Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A13SE (S)	74	4	333100 369095
13	**Pollution Incidents to Controlled Waters** Property Type: Road (Lost Load) Location: QUEENSFERRY Authority: Environment Agency, Welsh Region Pollutant: Oils - Petrol Note: Accidental Spillage/Leakage Incident Date: 4th November 1994 Incident Reference: 21554 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Leakage Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A13SE (S)	75	4	333105 369095

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
14	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Near Tawe Barrage Authority: Environment Agency, Welsh Region Pollutant: Unknown Note: Emergency Overflow Incident Date: 14th October 1996 Incident Reference: 30205 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Overflow Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A13NE (NE)	310	4	333300 369400
15	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Location Description Not Available Authority: Environment Agency, Welsh Region Pollutant: Light Oil Note: Not Supplied Incident Date: 19th April 1995 Incident Reference: 23610 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Unknown Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A14SW (SE)	418	4	333450 368950
16	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Bottom Of Sealand Avenue, Garden City, Deeside Authority: Environment Agency, Welsh Region Pollutant: Light Oil Note: River Dee; Run-Off Incident Date: 16th June 1997 Incident Reference: 32626 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Weather Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A12NE (NW)	455	4	332700 369395
16	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Bottom Of Sealand Avenue, Garden City, Deeside Authority: Environment Agency, Welsh Region Pollutant: Light Oil Note: Weather Incident Date: 16th June 1997 Incident Reference: 32626 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Runoff Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A12NE (NW)	458	4	332700 369400
17	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Industrial Estate, Sealand Avenue Authority: Environment Agency, Welsh Region Pollutant: Mud/Clay/Soil Note: Not Supplied Incident Date: 17th February 1992 Incident Reference: 3451 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A12NE (NW)	527	4	332670 369480
18	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: GARDEN CITY Authority: Environment Agency, Welsh Region Pollutant: Miscellaneous - Fire water / Foam Note: Accident Incident Date: 4th February 1997 Incident Reference: 31128 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Direct Discharge Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A12NE (NW)	681	4	332500 369500

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
19	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Under Bridge, QUEENSFERRY Authority: Environment Agency, Welsh Region Pollutant: Unknown Note: Not Supplied Incident Date: 4th August 1996 Incident Reference: 29407 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Effluent Discharge Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A7NE (SW)	789	4	332500 368650
20	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Blue Bridge Near, QUEENSFERRY Authority: Environment Agency, Welsh Region Pollutant: Algae Note: Natural Occurrence Incident Date: 9th April 1997 Incident Reference: 31818 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Natural Causes Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A7NW (SW)	854	4	332350 368750
21	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Blue Bridge, QUEENSFERRY Authority: Environment Agency, Welsh Region Pollutant: Oils - Other Oil Note: River Dee Incident Date: 26th May 1998 Incident Reference: 35732 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A7NW (SW)	898	4	332300 368750
21	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Centre-a550 Road, CHESTER Authority: Environment Agency, Welsh Region Pollutant: Miscellaneous - Fire water / Foam Note: Not Supplied Incident Date: 22nd July 1995 Incident Reference: 25244 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A7NW (SW)	923	4	332300 368700
21	**Pollution Incidents to Controlled Waters** Property Type: Domestic/Residential Location: Blue Bridge, QUEENSFERRY Authority: Environment Agency, Welsh Region Pollutant: Oils - Diesel (Including Agricultural) Note: Deliberate Act Incident Date: 2nd September 1991 Incident Reference: 3219 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Direct Discharge Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A7NW (SW)	925	4	332300 368695
22	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Owens Corning Factory Authority: Environment Agency, Welsh Region Pollutant: Mining Water Note: Inadequate Design/Capacity Incident Date: 30th December 1996 Incident Reference: 30864 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Direct Discharge Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A7NW (SW)	964	4	332405 368495

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
22	**Pollution Incidents to Controlled Waters** Property Type: Water Company Sewage: Sewage Treatment Works Location: QUEENSFERRY Authority: Environment Agency, Welsh Region Pollutant: Chemicals - Detergents/Surfactant Note: Mechanical Failure Incident Date: 25th October 1995 Incident Reference: 26349 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Bypass Of Treatment Facilities Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A7NW (SW)	968	4	332400 368495
23	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Shotton Side, Of River, Between Bsc And Authority: Environment Agency, Welsh Region Pollutant: Crude Sewage Note: Not Supplied Incident Date: 17th February 1994 Incident Reference: 21454 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A7NW (W)	968	4	332200 368800
24	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: QUEENSFERRY Authority: Environment Agency, Welsh Region Pollutant: Unknown Note: Not Supplied Incident Date: 15th May 1992 Incident Reference: 4246 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A7NW (SW)	977	4	332300 368600
24	**Pollution Incidents to Controlled Waters** Property Type: Water Company Sewage: Sewage Treatment Works Location: QUEENSFERRY Authority: Environment Agency, Welsh Region Pollutant: Sewage - Septic Tank Effluent Note: Not Supplied Incident Date: 26th May 1995 Incident Reference: 24129 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Effluent Discharge Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A7NW (SW)	980	4	332300 368595
25	**Registered Radioactive Substances** Name: Ministry Of Defence Location: Raf Sealand, Welsh Road, DEESIDE, Clwyd, CH5 2LS Authority: Natural Resources Wales Permit Reference: AM1925 Dated: 31st March 1991 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Authorisation under RSA made by Ministry of Defence **Status: Authorisation either revoked or cancelled** Positional Accuracy: Manually positioned to the road within the address or location	A18SE (N)	665	2	333104 369833
26	**Registered Radioactive Substances** Name: Royal Air Force Location: Welsh Road, Sealand, DEESIDE, Clwyd, CH5 2LS Authority: Natural Resources Wales Permit Reference: AH1781 Dated: 5th March 1993 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Authorisation under RSA made by Ministry of Defence **Status: Authorisation either revoked or cancelled** Positional Accuracy: Manually positioned to the road within the address or location	A18NE (N)	840	2	333399 369951

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
26	**Registered Radioactive Substances** Name: Royal Air Force Location: Welsh Road, Sealand, DEESIDE, Clwyd, CH5 2LS Authority: Natural Resources Wales Permit Reference: AH0661 Dated: 16th December 1992 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Authorisation under RSA made by Ministry of Defence **Status: Authorisation has expired** Positional Accuracy: Manually positioned to the road within the address or location	A18NE (N)	840	2	333399 369951
27	**Water Abstractions** Operator: Jones Balers Ltd Licence Number: 24/67/10/0103 Permit Version: 100 Location: Manor Drain Point B Authority: Environment Agency, Welsh Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 27th April 1989 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A13SE (SE)	300	4	333370 369050
28	**Water Abstractions** Operator: Jones Balers Ltd Licence Number: 24/67/10/0046 Permit Version: 100 Location: Borehole Authority: Environment Agency, Welsh Region Abstraction: General Farming And Domestic Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 6th June 1967 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A8NW (SW)	516	4	332780 368760
29	**Water Abstractions** Operator: Alyn & Deeside District Council Licence Number: 24/67/10/0119 Permit Version: Not Supplied Location: Location Description Not Available Authority: Environment Agency, Welsh Region Abstraction: Unspecified Abstraction Type: Not Supplied Source: Well And Borehole Daily Rate (m3): 104 Yearly Rate (m3): 30600 Details: Borehole; 16M Deep; 250 Mm Dia Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A7SE (SW)	1000	4	332480 368380
	Water Abstractions Operator: Alyn & Deeside District Council Licence Number: 24/67/10/0119 Permit Version: Not Supplied Location: Location Description Not Available Authority: Environment Agency, Welsh Region Abstraction: Unspecified Abstraction Type: Not Supplied Source: Well And Borehole Daily Rate (m3): 104 Yearly Rate (m3): 30600 Details: Borehole 16M Deep; 250Mm Dia Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A7SE (SW)	1035	4	332430 368375

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Alyn & Deeside District Council Licence Number: 24/67/10/0119 Permit Version: Not Supplied Location: Location Description Not Available Authority: Environment Agency, Welsh Region Abstraction: Unspecified Abstraction Type: Not Supplied Source: Well And Borehole Daily Rate (m3): 104 Yearly Rate (m3): 30600 Details: 3 Boreholes; Each 16M Deep By 250Mm Dia. Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A7SW (SW)	1044	4	332400 368390
	Water Abstractions Operator: Jones Balers Ltd Licence Number: 24/67/10/0103 Permit Version: 100 Location: Manor Drain Point B Authority: Environment Agency, Welsh Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Sealand Main Drain Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 27th April 1989 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A10NW (SE)	1346	4	334300 368570
	Water Abstractions Operator: H T Howe And Sons Licence Number: 24/67/10/0022 Permit Version: 100 Location: Borehole Authority: Environment Agency, Welsh Region Abstraction: General Farming And Domestic Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st April 1975 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A15NE (E)	1366	4	334460 369190
	Water Abstractions Operator: Knauf Insulation Ltd Licence Number: 24/67/10/0106 Permit Version: 103 Location: Well A Authority: Environment Agency, Welsh Region Abstraction: Other Industrial/Commercial/Public Services: Process Water Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st January 2003 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A2NE (SW)	1419	4	332420 367920

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Owens Corning Alcopor (Uk) Ltd Licence Number: 24/67/10/0106 Permit Version: 102 Location: Well A Authority: Environment Agency, Welsh Region Abstraction: Other Industrial/Commercial/Public Services: Process Water Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Well A Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 22nd June 2000 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A2NE (SW)	1419	4	332420 367920
	Water Abstractions Operator: J Williams Licence Number: 24/67/10/0102 Permit Version: Not Supplied Location: Location Description Not Available Authority: Environment Agency, Welsh Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Not Supplied Source: Surface Daily Rate (m3): 355 Yearly Rate (m3): 12274 Details: Waterloo Drain Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A15SE (E)	1449	4	334520 368910
	Water Abstractions Operator: Knauf Insulation Ltd Licence Number: 24/67/10/0106 Permit Version: 103 Location: Well B Authority: Environment Agency, Welsh Region Abstraction: Other Industrial/Commercial/Public Services: Process Water Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st January 2003 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A2SE (SW)	1483	4	332500 367810
	Water Abstractions Operator: Owens Corning Alcopor (Uk) Ltd Licence Number: 24/67/10/0106 Permit Version: 102 Location: Well B Authority: Environment Agency, Welsh Region Abstraction: Other Industrial/Commercial/Public Services: Process Water Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 22nd June 2000 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A2SE (SW)	1483	4	332500 367810

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Wt Banks & Co (Farming) Ltd Licence Number: Wa/067/0010/011 Permit Version: 2 Location: Sealand Main Drain Authority: Natural Resources Wales Abstraction: Aquaculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a river or stream reach, or a row of wellpoints Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 30 September Permit Start Date: 26th November 2014 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A4SE (SE)	1685	2	333955 367720
	Water Abstractions Operator: Wt Banks & Co (Farming) Ltd Licence Number: Wa/067/0010/011 Permit Version: 1 Location: Sealand Main Drain Authority: Natural Resources Wales Abstraction: Agriculture: Aquaculture Plant: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a river or stream reach, or a row of wellpoints Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 30 September Permit Start Date: 30th July 2014 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A4SE (SE)	1685	2	333955 367720
	Water Abstractions Operator: Wt Banks & Co (Farming) Ltd Licence Number: Wa/067/0010/011 Permit Version: Not Supplied Location: Abstraction For Spray Irrigation At Sealand Authority: Natural Resources Wales Abstraction: Aquaculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from any point within an area Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A4SE (SE)	1685	2	333955 367720
	Water Abstractions Operator: Wt Banks & Co (Farming) Ltd Licence Number: 24/67/10/0141 Permit Version: 2 Location: Reach A-A On The Sealand Main Drain Authority: Environment Agency, Welsh Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a river or stream reach, or a row of wellpoints Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Land At Wood Farm Authorised Start: 01 April Authorised End: 30 September Permit Start Date: 19th July 2010 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A4SE (SE)	1688	4	333960 367720

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Wt Banks & Co (Farming) Ltd Licence Number: 24/67/10/0141 Permit Version: 1 Location: Reach A-A On The Sealand Main Drain Authority: Environment Agency, Welsh Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a river or stream reach, or a row of wellpoints Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Land At Wood Farm Authorised Start: 01 April Authorised End: 30 September Permit Start Date: 1st August 2003 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A4SE (SE)	1688	4	333960 367720
	Water Abstractions Operator: Messrs W Banks Licence Number: 24/67/10/0129 Permit Version: 100 Location: Reach A To A At Sealand Main Drain Authority: Environment Agency, Welsh Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a river or stream reach, or a row of wellpoints Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: River Authorised Start: 01 April Authorised End: 30 September Permit Start Date: 1st April 2001 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A4SE (SE)	1688	4	333960 367720
	Water Abstractions Operator: Jones Balers Ltd Licence Number: 24/67/10/0103 Permit Version: 100 Location: Sealand Main Drain Point C Authority: Environment Agency, Welsh Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Manor Drain Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 27th April 1989 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A5NW (SE)	1700	4	334300 367970
	Water Abstractions Operator: Messrs W.T & E Banks Licence Number: 24/67/10/0110 Permit Version: Not Supplied Location: Location Description Not Available Authority: Environment Agency, Welsh Region Abstraction: Spray Irrigation Abstraction Type: Not Supplied Source: Surface Daily Rate (m3): 0 Yearly Rate (m3): 0 Details: Sealand Main Drain Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A5SW (SE)	1828	4	334300 367795

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Archimica Limited Licence Number: 24/67/10/0154 Permit Version: 1 Location: Borehole Authority: Environment Agency, Welsh Region Abstraction: Chemicals: General Use (Medium Loss) Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Clariant Lsm (Uk) Ltd, Prince William'S Avenue, Sandycroft, Deeside, Flintshire, Ch5 2px. Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st April 2008 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(S)	1871	4	333760 367420
	Water Abstractions Operator: Archimica Limited Licence Number: 24/67/10/0112 Permit Version: 106 Location: Borehole Authority: Environment Agency, Welsh Region Abstraction: Chemicals: General Use (Medium Loss) Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Clariant Lsm (Uk) Ltd, Prince William'S Avenue, Sandycroft, Deeside, Flintshire, Ch5 2px. Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st July 2006 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(S)	1871	4	333760 367420
	Water Abstractions Operator: Clariant Life Science Molecules (Uk) Ltd Licence Number: 24/67/10/0112 Permit Version: 105 Location: Borehole Authority: Environment Agency, Welsh Region Abstraction: Chemicals: General Use (Medium Loss) Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Clariant Lsm (Uk) Ltd, Prince William'S Avenue, Sandycroft, Deeside, Flintshire, Ch5 2px. Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 11th April 2005 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(S)	1871	4	333760 367420
	Water Abstractions Operator: Clariant Life Science Molecules (Uk) Ltd Licence Number: 24/67/10/0112 Permit Version: 104 Location: Borehole Authority: Environment Agency, Welsh Region Abstraction: Chemicals: General Use (Medium Loss) Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st April 2002 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(S)	1871	4	333760 367420

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Clariant Life Science Molecules (Uk) Ltd Licence Number: 24/67/10/0112 Permit Version: 102 Location: Borehole Authority: Environment Agency, Welsh Region Abstraction: Chemicals: General Use (Medium Loss) Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Orehole Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st August 2000 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	(S)	1871	4	333760 367420
	Water Abstractions Operator: Carillion Roads Licence Number: 24/67/10/0151 Permit Version: 1 Location: Boundary Drain (Sealand / Shotwick Parish) Authority: Environment Agency, Welsh Region Abstraction: Construction: Dust Suppression Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st February 2007 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	(NE)	1910	4	333900 370900
	Water Abstractions Operator: Mr J Williams Licence Number: 24/67/10/0102 Permit Version: 100 Location: Waterloo Drain Authority: Environment Agency, Welsh Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a river or stream reach, or a row of wellpoints Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Licenced from 01-Jan to 31-Dec Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st April 2007 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(E)	1964	4	334930 368470
	Groundwater Vulnerability Map Combined Classification: Secondary Superficial Aquifer - High Vulnerability Combined Vulnerability: High Combined Aquifer: Productive Bedrock Aquifer, Productive Superficial Aquifer Pollutant Speed: High Bedrock Flow: Well Connected Fractures Dilution: 300-550 mm/year Baseflow Index: >70% Superficial Patchiness: >90% Superficial Thickness: >10m Superficial Recharge: High	A13NE (NE)	0	2	333094 369168
	Bedrock Aquifer Designations Aquifer Designation: Secondary Aquifer - A	A13NE (NE)	0	2	333094 369168
	Superficial Aquifer Designations Aquifer Designation: Secondary Aquifer - Undifferentiated	A13NE (NE)	0	2	333094 369168
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A13NE (NE)	0	2	333094 369168

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial/Tidal Models Boundary Accuracy: As Supplied	A13NE (NE)	15	2	333101 369181
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models and Fluvial Events Boundary Accuracy: As Supplied	A13SE (SE)	193	2	333253 369059
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial / Tidal Models and Fluvial Events Boundary Accuracy: As Supplied	A13SE (SE)	197	2	333276 369092
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models and Fluvial Events Boundary Accuracy: As Supplied	A13SE (E)	198	2	333278 369096
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial/Tidal Models Boundary Accuracy: As Supplied	A13SE (E)	202	2	333283 369097
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models and Fluvial Events Boundary Accuracy: As Supplied	A13SE (E)	214	2	333294 369092
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial/Tidal Models Boundary Accuracy: As Supplied	A13NE (E)	226	2	333315 369212
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial/Tidal Models Boundary Accuracy: As Supplied	A13SE (E)	239	2	333316 369080
	Flooding from Rivers or Sea without Defences Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A13NE (NE)	0	2	333094 369168
	Flooding from Rivers or Sea without Defences Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial/Tidal Models Boundary Accuracy: As Supplied	A13NE (NE)	15	2	333101 369181
	Areas Benefiting from Flood Defences Type: Area Benefiting from Flood Defences Boundary Accuracy: As Supplied	A13NE (NE)	0	2	333094 369168
	Flood Water Storage Areas None				
	Flood Defences Type: Flood Defences Reference: 0	A13NW (NW)	54	2	333054 369203
30	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 157.4 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A13NE (NE)	18	6	333102 369183
31	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 171.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A13NW (NW)	57	6	333053 369206

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
32	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 308.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A13SE (E)	105	6	333194 369136
33	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 302.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A13NW (NW)	226	6	332900 369282
34	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 233.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A13SE (SE)	371	6	333329 368881
35	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 25.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A8NE (S)	395	6	333142 368777
36	**OS Water Network Lines** Watercourse Form: Lake Watercourse Length: 74.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A14SW (SE)	407	6	333459 368987
37	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 148.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A8NE (S)	411	6	333165 368764
38	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 132.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 2	A14SW (SE)	412	6	333470 369000
39	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 7.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A14SW (SE)	412	6	333470 369000
40	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 41.5 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A8NE (SE)	456	6	333314 368769

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
41	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 675.4 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A18SE (N)	457	6	333219 369607
42	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 61.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A8NE (SE)	458	6	333349 368789
43	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 83.2 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A18SE (NE)	466	6	333278 369596
44	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 4.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A18SE (NE)	466	6	333274 369598
45	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 920.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A18SE (NE)	498	6	333361 369589
46	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 10.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A12NE (NW)	505	6	332671 369443
47	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 39.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A12NE (NW)	511	6	332662 369440
48	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 3.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A12NE (NW)	511	6	332662 369440
49	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 516.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A12NE (NW)	528	6	332630 369418

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
50	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 60.2 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 2	A14SW (SE)	544	6	333587 368939
51	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 686.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A9NW (SE)	591	6	333538 368779
52	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 232.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 2	A14SW (SE)	604	6	333642 368913
53	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 5.0 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A12SW (W)	819	6	332276 369161
54	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 382.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A12SW (W)	823	6	332272 369158
55	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 560.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A18NE (N)	826	6	333296 369968
56	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 7.7 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A9NE (SE)	835	6	333845 368804
57	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 1137.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A9NE (SE)	837	6	333850 368810
58	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 16.7 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A18NE (N)	859	6	333094 370027

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
59	**OS Water Network Lines** Watercourse Form: Lake Watercourse Length: 37.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A14NE (E)	862	6	333932 369373
60	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 466.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A18NW (N)	863	6	333078 370031
61	**OS Water Network Lines** Watercourse Form: Tidal river Watercourse Length: 551.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Afon Dyfrdwy Catchment Name: Dee Primacy: 1	A7SE (SW)	870	6	332640 368427
62	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 185.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A14NE (E)	893	6	333966 369359
63	**OS Water Network Lines** Watercourse Form: Tidal river Watercourse Length: 337.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Afon Dyfrdwy Catchment Name: Dee Primacy: 1	A7NE (SW)	906	6	332423 368561
64	**OS Water Network Lines** Watercourse Form: Tidal river Watercourse Length: 127.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A7NE (SW)	906	6	332423 368561
65	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 330.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A18NW (N)	912	6	333071 370079
66	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 224.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A19SW (NE)	916	6	333727 369830
67	**OS Water Network Lines** Watercourse Form: Tidal river Watercourse Length: 1158.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Afon Dyfrdwy Catchment Name: Dee Primacy: 1	A8SW (S)	919	6	332893 368272

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
68	**OS Water Network Lines** Watercourse Form: Tidal river Watercourse Length: 52.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Not Supplied Primacy: 1	A8SW (S)	919	6	332893 368272
69	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 211.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A9NE (SE)	928	6	333865 368651
70	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 9.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A9NE (SE)	951	6	333842 368582
71	**OS Water Network Lines** Watercourse Form: Lake Watercourse Length: 9.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A9NE (SE)	960	6	333848 368575
72	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 1.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Not Supplied Primacy: 1	A8SW (S)	963	6	332855 368236
73	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 34.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Not Supplied Primacy: 1	A8SW (S)	964	6	332854 368235
74	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 138.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A9NE (SE)	966	6	333848 368565
75	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 149.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Dee Primacy: 1	A7SE (SW)	978	6	332685 368281
76	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 1.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Not Supplied Primacy: 1	A8SW (S)	991	6	332845 368210

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
77	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 5.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Not Supplied Primacy: 1	A8SW (S)	992	6	332846 368209

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
78	**Licensed Waste Management Facilities (Locations)** Licence Number: 103384 Location: Unit 26, Zone 1, Deeside Ind Est, Deeside, CH5 2LR Operator Name: T J's Skip Hire Ltd Operator Location: Not Supplied Authority: Natural Resources Wales Site Category: HCI Waste TS + treatment **Licence Status: Issued** Issued: 20th February 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	A18NE (N)	930	2	333219 370089
78	**Licensed Waste Management Facilities (Locations)** Licence Number: CB3233AV Location: T J's Skip Hire Ltd, Unit 26, Deeside Ind Est, Deeside, Flintshire, Flintshire, CH5 2LR Operator Name: T J's Skip Hire Ltd Operator Location: Not Supplied Authority: Natural Resources Wales Site Category: Not Supplied **Licence Status: Expired** Issued: 20th February 2012 Last Modified: Not Supplied Expires: 10th April 2018 Suspended: Not Supplied Revoked: Not Supplied Surrendered: Not Supplied IPPC Reference: Not Supplied Positional Accuracy: Located by supplier to within 10m	A18NE (N)	930	2	333219 370089
	Local Authority Landfill Coverage Name: Flintshire Council - Has supplied landfill data		0	3	333094 369168
79	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1963	A13SE (SE)	167	-	333191 369033
80	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1882	A12NE (W)	374	-	332741 369290
81	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1963	A13SE (SE)	390	-	333319 368850
82	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1963	A8NE (S)	397	-	333140 368775
83	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1963	A8NW (S)	431	-	333067 368739
84	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1963	A18SW (NW)	436	-	332900 369558
85	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1914	A18SE (N)	476	-	333100 369644
86	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1963	A8NW (SW)	476	-	332837 368769
87	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1963	A8NW (S)	533	-	333041 368638
88	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1963	A8NE (S)	549	-	333199 368630
89	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1882	A18SW (N)	556	-	332912 369693

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
90	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1914	A14SW (E)	592	-	333686 369164
91	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1882	A18SE (N)	655	-	333169 369819
92	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1882	A17SE (NW)	746	-	332462 369563
93	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1914	A18NE (N)	790	-	333360 369912
94	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1882	A18NE (NE)	790	-	333408 369893
95	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1914	A18NE (N)	944	-	333420 370054
96	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1914	A19NW (NE)	948	-	333507 370022
97	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1963	A19NE (NE)	975	-	333785 369857

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: Pennine Middle Coal Measures Formation And South Wales Middle Coal Measures Formation (Undifferentiated)	A13NE (NE)	0	1	333094 369168
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 20 - 40 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: <15 mg/kg	A13NE (NE)	0	1	333094 369168
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil 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	A13SE (E)	130	1	333217 369125
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: <15 mg/kg	A13SE (S)	169	1	333094 369000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: <15 mg/kg	A13SE (SE)	370	1	333423 369000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: <15 mg/kg	A12SE (W)	468	1	332658 369000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: <15 mg/kg	A14SW (E)	495	1	333560 369000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil 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	A7NE (SW)	814	1	332637 368495
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: <15 mg/kg	A17NE (NW)	943	1	332652 370000
	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				
	Non Coal Mining Areas of Great Britain Risk: Highly Unlikely Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	333094 369168
	Non Coal Mining Areas of Great Britain Risk: Rare Source: British Geological Survey, National Geoscience Information Service	A13SE (E)	130	1	333217 369125
	Potential for Collapsible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	333094 369168
	Potential for Compressible Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	333094 369168
	Potential for Compressible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	42	1	333100 369127
	Potential for Compressible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (NW)	60	1	333056 369214
	Potential for Compressible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	94	1	333142 369249
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	333094 369168
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	333094 369168
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	333094 369168
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	42	1	333100 369127
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (NW)	60	1	333056 369214

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	94	1	333142 369249
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	333094 369168
	Radon Potential - Radon Affected Areas Affected Area: The property is in an Intermediate probability radon area (1 to 3% of homes are estimated to be at or above the Action Level). Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	333094 369168
	Radon Potential - Radon Protection Measures Protection Measure: No radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	333094 369168

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
98	**Contemporary Trade Directory Entries** Name: Hi-Q Tyre Services Location: 96, Welsh Road, Garden City, Deeside, Clwyd, CH5 2HX Classification: Tyre Dealers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (SW)	224	-	332893 369072
99	**Contemporary Trade Directory Entries** Name: Total Clean Location: Sandy La, Garden City, Deeside, Clwyd, CH5 2JQ Classification: Commercial Cleaning Services **Status: Inactive** Positional Accuracy: Manually positioned within the geographical locality	A13NW (W)	297	-	332798 369174
100	**Contemporary Trade Directory Entries** Name: Speedy Deliveries Location: A, 39, Welsh Road, Garden City, Deeside, Clwyd, CH5 2HU Classification: Road Haulage Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (W)	311	-	332791 369102
101	**Contemporary Trade Directory Entries** Name: Gemini Blinds Location: 4a, Deva Business Park, Welsh Road, Deeside, Clwyd, CH5 2HR Classification: Blinds, Awnings & Canopies **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NE (NE)	346	-	333244 369480
101	**Contemporary Trade Directory Entries** Name: Abacus Blinds Location: 4a, Deva Business Park, Welsh Road, Deeside, Clwyd, CH5 2HR Classification: Blinds, Awnings & Canopies **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13NE (NE)	346	-	333244 369480
101	**Contemporary Trade Directory Entries** Name: S I G Roofline Location: Unit 3, Deva Business Park, Welsh Road, Deeside, Clwyd, CH5 2HR Classification: PVC-U Products - Manufacturers & Suppliers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NE (NE)	371	-	333249 369505
101	**Contemporary Trade Directory Entries** Name: G E Tools Ltd Location: Unit 2, Deva Business Park, Welsh Road, Deeside, Clwyd, CH5 2HR Classification: Engineering Materials **Status: Active** Positional Accuracy: Automatically positioned to the address	A18SE (NE)	387	-	333252 369521
101	**Contemporary Trade Directory Entries** Name: The Ravensworth Laboratory Location: 2, Deva Business Park, Welsh Road, Deeside, Clwyd, CH5 2HR Classification: Coating Specialists **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A18SE (NE)	387	-	333252 369521
101	**Contemporary Trade Directory Entries** Name: Autohaus Of Chester Ltd Location: Unit 2, Deva Business Park, Welsh Road, Deeside, Clwyd, CH5 2HR Classification: Car Dealers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A18SE (NE)	387	-	333252 369521
102	**Contemporary Trade Directory Entries** Name: Oakley E M S Location: Unit 1, Deva Business Park, Welsh Road, Deeside, CH5 2HR Classification: Precision Engineers **Status: Active** Positional Accuracy: Automatically positioned to the address	A18SE (NE)	441	-	333263 369575
102	**Contemporary Trade Directory Entries** Name: Cheshire Fire Location: Unit 1, Deva Business Park, Welsh Road, Deeside, CH5 2HR Classification: Firefighting Equipment **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A18SE (NE)	441	-	333263 369575

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
103	**Contemporary Trade Directory Entries** Name: Polar Car Air Conditioning Location: 32, Garden City Industrial Estate, Sealand Avenue, Deeside, Clwyd, CH5 2HW Classification: Air Conditioning & Refrigeration Contractors **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A12NE (NW)	482	-	332743 369497
104	**Contemporary Trade Directory Entries** Name: Williams & Co Location: 31, Garden City Industrial Estate, Sealand Avenue, Deeside, Clwyd, CH5 2HW Classification: Printing Engineering Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A17SE (NW)	488	-	332744 369507
104	**Contemporary Trade Directory Entries** Name: Chester Sports Cars Ltd Location: 30, Garden City Industrial Estate, Sealand Avenue, Deeside, Clwyd, CH5 2HW Classification: Car Engine Tuning & Diagnostic Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A17SE (NW)	495	-	332740 369513
104	**Contemporary Trade Directory Entries** Name: North Wales Controls Location: 29, Garden City Industrial Estate, Sealand Avenue, Deeside, Clwyd, CH5 2HW Classification: Valve Manufacturers & Suppliers **Status: Active** Positional Accuracy: Automatically positioned to the address	A17SE (NW)	507	-	332733 369523
104	**Contemporary Trade Directory Entries** Name: Discount Pet Supplies Uk Ltd Location: 28, Garden City Industrial Estate, Sealand Avenue, Deeside, Clwyd, CH5 2HW Classification: Pet Foods & Animal Feeds **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A17SE (NW)	507	-	332733 369523
104	**Contemporary Trade Directory Entries** Name: Kudos Kleening Ltd Location: 27, Garden City Industrial Estate, Sealand Avenue, Deeside, Clwyd, CH5 2HW Classification: Commercial Cleaning Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A17SE (NW)	533	-	332704 369531
104	**Contemporary Trade Directory Entries** Name: North Wales Radiators Ltd Location: 25-26, Garden City Industrial Estate, Sealand Avenue, Deeside, CH5 2HW Classification: Car Radiator Servicing & Repairs **Status: Active** Positional Accuracy: Automatically positioned to the address	A17SE (NW)	537	-	332694 369525
105	**Contemporary Trade Directory Entries** Name: Kingsley Press Location: 21, Garden City Industrial Estate, Sealand Avenue, Deeside, Clwyd, CH5 2HW Classification: Printers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12NE (NW)	512	-	332692 369483
105	**Contemporary Trade Directory Entries** Name: Furniture Care Chester Location: 17, Garden City Industrial Estate, Sealand Avenue, Deeside, Clwyd, CH5 2HW Classification: Furniture - Repairing & Restoring **Status: Active** Positional Accuracy: Automatically positioned to the address	A12NE (NW)	515	-	332682 369476
105	**Contemporary Trade Directory Entries** Name: Specialist Supplies Location: 19, Garden City Industrial Estate, Sealand Avenue, Deeside, Clwyd, CH5 2HW Classification: Electrical Goods Sales, Manufacturers & Wholesalers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12NE (NW)	518	-	332686 369486

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
105	**Contemporary Trade Directory Entries** Name: Premier Ndt Location: Unit 18 Garden City Ind Est,Sealand Av, Deeside, Clwyd, CH5 2HW Classification: Testing, Inspection & Calibration Equipment Manufacturers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A12NE (NW)	521	-	332678 369481
105	**Contemporary Trade Directory Entries** Name: A & M Conversions Location: 14, Garden City Industrial Estate, Sealand Avenue, Deeside, CH5 2HW Classification: Garage Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A12NE (NW)	534	-	332658 369475
105	**Contemporary Trade Directory Entries** Name: Power Trucks International Location: 24, Garden City Industrial Estate, Sealand Avenue, Deeside, Clwyd, CH5 2HW Classification: Engine Rebuilding & Reconditioning **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A17SE (NW)	543	-	332679 369517
105	**Contemporary Trade Directory Entries** Name: Protectapak Europe Ltd Location: Unit 31 Garden City Industrial Estate, Sealand Avenue, Deeside, Clwyd, CH5 2HW Classification: Packaging Materials Manufacturers & Suppliers **Status: Active** Positional Accuracy: Manually positioned within the geographical locality	A17SE (NW)	550	-	332666 369512
105	**Contemporary Trade Directory Entries** Name: Cestrian Tarpaulins Location: 11, Garden City Industrial Estate, Sealand Avenue, Deeside, Clwyd, CH5 2HW Classification: Marquee Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12NE (NW)	557	-	332649 369502
105	**Contemporary Trade Directory Entries** Name: Metal Working Lubricants Ltd Location: 13, Garden City Industrial Estate, Sealand Avenue, Deeside, Clwyd, CH5 2HW Classification: Lubricant Manufacturers & Distributors **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12NE (NW)	557	-	332652 369505
105	**Contemporary Trade Directory Entries** Name: Flintshire Jag Specialists Location: 13, Garden City Industrial Estate, Sealand Avenue, Deeside, Clwyd, CH5 2HW Classification: Garage Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12NE (NW)	557	-	332652 369505
106	**Contemporary Trade Directory Entries** Name: Auto Defiance Ltd Location: 38, Welsh Road, Garden City, Deeside, CH5 2RA Classification: Car Dealers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12SE (SW)	562	-	332598 368907
106	**Contemporary Trade Directory Entries** Name: Bridge Car Sales Location: 38, Welsh Road, Garden City, Deeside, Clwyd, CH5 2RA Classification: Car Dealers - Used **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12SE (SW)	562	-	332598 368907
106	**Contemporary Trade Directory Entries** Name: Nicecar-Direct Location: 38, Welsh Road, Garden City, Deeside, Clwyd, CH5 2RA Classification: Car Dealers - Used **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12SE (SW)	562	-	332598 368907
106	**Contemporary Trade Directory Entries** Name: M & M Performance Location: 38, Welsh Road, Garden City, Deeside, Clwyd, CH5 2RA Classification: Car Dealers - Used **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12SE (SW)	562	-	332598 368907

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
106	**Contemporary Trade Directory Entries** Name: Bds Car Sales Location: 28, Welsh Road, Garden City, Deeside, Clwyd, CH5 2RA Classification: Car Dealers - Used **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12SE (SW)	592	-	332572 368889
106	**Contemporary Trade Directory Entries** Name: C M C Location: 28b, Welsh Road, Garden City, Deeside, CH5 2RA Classification: Car Dealers - Used **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12SE (SW)	593	-	332572 368889
107	**Contemporary Trade Directory Entries** Name: Dampstop Location: 5, Bridge View, Garden City, Deeside, Clwyd, CH5 2HY Classification: Damp & Dry Rot Control **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12SE (W)	580	-	332527 369051
108	**Contemporary Trade Directory Entries** Name: Auto Smart Location: Holbrook Yard,The Owl Comple,Manor Rd, Deeside, Clwyd, CH5 2SB Classification: Garage Services **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A14SW (SE)	587	-	333620 368908
109	**Contemporary Trade Directory Entries** Name: North Wales Rolling Road Centre Location: 7, Garden City Industrial Estate, Sealand Avenue, Deeside, Clwyd, CH5 2HW Classification: Car Engine Tuning & Diagnostic Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12NE (NW)	600	-	332592 369497
109	**Contemporary Trade Directory Entries** Name: John Hardman Engineering Location: 7, Garden City Industrial Estate, Sealand Avenue, Deeside, CH5 2HW Classification: Garage Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A12NE (NW)	601	-	332592 369497
110	**Contemporary Trade Directory Entries** Name: Auto Defiance Location: 24, Welsh Road, Garden City, Deeside, CH5 2RA Classification: Car Dealers - Used **Status: Active** Positional Accuracy: Automatically positioned to the address	A12SE (SW)	624	-	332547 368870
110	**Contemporary Trade Directory Entries** Name: The Main Dealer Part-Exchange Centre Location: 20, Welsh Road, Garden City, Deeside, Clwyd, CH5 2RA Classification: Car Dealers - Used **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12SE (SW)	650	-	332525 368855
110	**Contemporary Trade Directory Entries** Name: Main Dealer P X Location: 20, Welsh Road, Garden City, DEESIDE, Clwyd, CH5 2RA Classification: Car Dealers **Status: Active** Positional Accuracy: Automatically positioned to the address	A12SE (SW)	650	-	332525 368855
110	**Contemporary Trade Directory Entries** Name: Spraycraft Deeside Ltd Location: 22, Welsh Road, Garden City, Deeside, Clwyd, CH5 2RA Classification: Car Body Repairs **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12SE (SW)	650	-	332525 368855
110	**Contemporary Trade Directory Entries** Name: Q C S Car Sales Location: 24, Welsh Road, Garden City, DEESIDE, Clwyd, CH5 2RA Classification: Car Dealers **Status: Active** Positional Accuracy: Automatically positioned to the address	A12SE (SW)	650	-	332525 368855
110	**Contemporary Trade Directory Entries** Name: Riverside Motor Co Location: 22, Welsh Road, Garden City, Deeside, Clwyd, CH5 2RA Classification: Car Dealers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12SE (SW)	650	-	332525 368855

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
110	**Contemporary Trade Directory Entries** Name: Accuromm Location: 20, Welsh Road, Garden City, Deeside, Clwyd, CH5 2RA Classification: Cutting Tools & Machinery **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12SE (SW)	650	-	332525 368855
110	**Contemporary Trade Directory Entries** Name: Md Car Sales Location: 22, Welsh Road, Garden City, Deeside, Clwyd, CH5 2RA Classification: Car Dealers - Used **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A12SE (SW)	650	-	332525 368855
111	**Contemporary Trade Directory Entries** Name: Grosvenor Granite Location: Unit 2a, Owl Halt Industrial Estate, Manor Road, Sealand, CH5 2SB Classification: Kitchen Furniture Manufacturers **Status: Active** Positional Accuracy: Automatically positioned to the address	A14SW (SE)	636	-	333654 368867
111	**Contemporary Trade Directory Entries** Name: R J Parry Joinery Ltd Location: Owl Halt Industrial Estate, Manor Road, Sealand, Deeside, Clwyd, CH5 2SB Classification: Joinery Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SW (SE)	678	-	333693 368851
112	**Contemporary Trade Directory Entries** Name: Caden Radio Ltd Location: 14c Old Marsh Farm Barns, Welsh Road, Sealand, Deeside, CH5 2LY Classification: Radio Communication Equipment **Status: Active** Positional Accuracy: Automatically positioned to the address	A18SE (NE)	715	-	333413 369808
112	**Contemporary Trade Directory Entries** Name: Caden Radio Ltd Location: 14c Old Marsh Farm Barns, Welsh Road, Sealand, Deeside, CH5 2LY Classification: Radio Communication Equipment **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A18SE (NE)	715	-	333413 369808
112	**Contemporary Trade Directory Entries** Name: Furniture Medic Location: Old Marsh Farm House,Welsh Rd, Sealand, Deeside, Clwyd, CH5 2LY Classification: Furniture - Repairing & Restoring **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A18SE (NE)	717	-	333428 369802
112	**Contemporary Trade Directory Entries** Name: Premier Ndt Location: 10 Old Marsh Farm Barns, Welsh Road, Sealand, Deeside, CH5 2LY Classification: Testing, Inspection & Calibration Equipment Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A19SW (NE)	730	-	333460 369800
113	**Contemporary Trade Directory Entries** Name: Comley Building Supplies Location: Welsh Rd, Garden City, Deeside, Clwyd, CH5 2RA Classification: Builders' Merchants **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A7NW (SW)	811	-	332369 368807
114	**Contemporary Trade Directory Entries** Name: Mikes Mobile Tyre Service Location: Deeside Industrial Estate, Welsh Road, Deeside, Clwyd, CH5 2LR Classification: Tyre Dealers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A18NE (N)	857	-	333276 370006
114	**Contemporary Trade Directory Entries** Name: Deeside Engine Centre Location: Deeside Industrial Estate, Welsh Road, Deeside, Clwyd, CH5 2LR Classification: Engine Rebuilding & Reconditioning **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A18NE (N)	861	-	333304 370003
114	**Contemporary Trade Directory Entries** Name: Deeside Distribution Location: Deeside Industrial Estate, Welsh Road, Deeside, Clwyd, CH5 2LR Classification: Freight Forwarders **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A18NE (N)	861	-	333304 370003

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
115	**Contemporary Trade Directory Entries** Name: Architectural Metals Location: 50, Deeside Industrial Estate, Welsh Road, Deeside, Clwyd, CH5 2LR Classification: Metal Workers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A18NE (N)	906	-	333277 370056
116	**Contemporary Trade Directory Entries** Name: S K L Services Location: Unit A5 Evans Easy Space,Deeside Industrial Estate, Deeside, Clwyd, CH5 2LR Classification: Printers **Status: Active** Positional Accuracy: Automatically positioned to the address	A18NW (N)	953	-	333080 370121
117	**Contemporary Trade Directory Entries** Name: Phoenix Engineering Co Location: 44 Deeside Ind Est,Welsh Rd, Deeside, Clwyd, CH5 2LR Classification: Aluminium Fabricators **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A19NW (N)	954	-	333440 370057
117	**Contemporary Trade Directory Entries** Name: Gary Catton Location: 5, Deeside Industrial Estate, Welsh Road, Deeside, Clwyd, CH5 2LR Classification: Sand, Gravel & Other Aggregates **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A18NE (N)	964	-	333403 370081
117	**Contemporary Trade Directory Entries** Name: Simply Logistics Location: 5, Deeside Industrial Estate, Welsh Road, Deeside, Clwyd, CH5 2LR Classification: Road Haulage Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A18NE (N)	964	-	333403 370081
117	**Contemporary Trade Directory Entries** Name: Serck Services Location: 14, Drome Road, Deeside Industrial Park, Deeside, Clwyd, CH5 2NY Classification: Commercial Vehicle Servicing, Repairs, Parts & Accessories **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A18NE (N)	995	-	333428 370105
117	**Contemporary Trade Directory Entries** Name: Fresherhomes.Com Location: Jaguar House, Unit 14, Deeside Industrial Estate, Welsh Road, Deeside, Clwyd, CH5 2LR Classification: Carpet, Curtain & Upholstery Cleaners **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A18NE (N)	995	-	333428 370105
118	**Contemporary Trade Directory Entries** Name: Zax Designer Clothing Location: Unit B3,Harrier House,Deeside Ind Est,Welsh Rd, Deeside, Clwyd, CH5 2LR Classification: Clothing & Fabrics - Manufacturers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A18NE (N)	967	-	333310 370110
118	**Contemporary Trade Directory Entries** Name: Prime Passenger Seated Location: Deeside Ind Est,Welsh Rd, Deeside, Clwyd, CH5 2LR Classification: Seating Manufacturers **Status: Inactive** Positional Accuracy: Manually positioned within the geographical locality	A18NE (N)	981	-	333274 370132
118	**Contemporary Trade Directory Entries** Name: New Pin Cleaning Services Location: 8A Deeside Ind Est,Welsh Rd, Deeside, Clwyd, CH5 2LR Classification: Commercial Cleaning Services **Status: Inactive** Positional Accuracy: Manually positioned within the geographical locality	A18NE (N)	982	-	333281 370132
119	**Contemporary Trade Directory Entries** Name: Riverside Joinery Location: Riverside Works, By-Pass Road, Queensferry, DEESIDE, Clwyd, CH5 2DU Classification: Joinery Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A7SW (SW)	968	-	332402 368493

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
120	**Contemporary Trade Directory Entries** Name: Essential Glass Location: 20, Deeside Industrial Estate, Welsh Road, DEESIDE, Clwyd, CH5 2LR Classification: Glass Products - Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A18NE (N)	988	-	333216 370148
121	**Fuel Station Entries** Name: Save Croeso Location: Garden City , Shotton , Deeside, Flintshire, CH5 1QD Brand: Obsolete Premises Type: Not Applicable **Status: Obsolete** Positional Accuracy: Manually positioned to the address or location	A12SE (SW)	475	-	332670 368955
122	**Points of Interest - Commercial Services** Name: Smart Auto Services Location: 63 Welsh Road, Garden City, Deeside, CH5 2RF Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A13NE (N)	171	8	333118 369337
123	**Points of Interest - Commercial Services** Name: M & J Performance Engineering Location: 4 Riverside Park, Garden City, Deeside, CH5 2JR Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A13SW (SW)	375	8	332788 368954
123	**Points of Interest - Commercial Services** Name: M & J Performance Engineering Location: 4 Riverside Park, Garden City, Deeside, CH5 2JR Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A13SW (SW)	375	8	332788 368954
124	**Points of Interest - Commercial Services** Name: Group B Motorsport Location: Unit 2 Deva Business Park, Welsh Road, Deeside, CH5 2HR Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A18SE (NE)	387	8	333252 369521
125	**Points of Interest - Commercial Services** Name: North Wales Jaguar Servicing Location: 31 Garden City Industrial Estate, Sealand Avenue, Deeside, CH5 2HW Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A17SE (NW)	488	8	332744 369507
125	**Points of Interest - Commercial Services** Name: Sport Car Business Location: 30 Garden City Industrial Estate, Sealand Avenue, Deeside, CH5 2HW Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A17SE (NW)	495	8	332740 369513
125	**Points of Interest - Commercial Services** Name: Chester Sports Cars Ltd Location: 30 Garden City Industrial Estate, Sealand Avenue, Deeside, CH5 2HW Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A17SE (NW)	495	8	332739 369512
126	**Points of Interest - Commercial Services** Name: A & M Conversions Location: 14 Garden City Industrial Estate, Sealand Avenue, Deeside, CH5 2HW Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A12NE (NW)	533	8	332658 369475
126	**Points of Interest - Commercial Services** Name: A & M Conversions Location: 14 Garden City Industrial Estate, Sealand Avenue, Deeside, CH5 2HW Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A12NE (NW)	533	8	332658 369474
126	**Points of Interest - Commercial Services** Name: North Wales Radiators Ltd Location: 25-26 Garden City Industrial Estate, Sealand Avenue, Deeside, CH5 2HW Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A17SE (NW)	536	8	332694 369524

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
126	**Points of Interest - Commercial Services** Name: Chester Autotrim Location: 13 Garden City Ind Est, Sealand Av, Deeside, Clwyd, CH5 2HW Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A12NE (NW)	557	8	332651 369505
126	**Points of Interest - Commercial Services** Name: Chester Autotrim Location: 13 Garden City Industrial Estate, Sealand Avenue, Deeside, CH5 2HW Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A12NE (NW)	557	8	332651 369505
126	**Points of Interest - Commercial Services** Name: Auto Electrical Contractors Location: Unit 2 Garden City Industrial Estate, Sealand Avenue, Deeside, CH5 2HW Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A12NE (NW)	571	8	332616 369479
126	**Points of Interest - Commercial Services** Name: Auto Electrical Contractors Location: 4 Garden City Industrial Estate, Sealand Avenue, Deeside, CH5 2HW Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A12NE (NW)	590	8	332603 369494
126	**Points of Interest - Commercial Services** Name: John Hardman Engineering Location: 7 Garden City Industrial Estate, Sealand Avenue, Deeside, CH5 2HW Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A12NE (NW)	600	8	332592 369496
127	**Points of Interest - Commercial Services** Name: Car Care Auto Valet Location: 38 Welsh Road, Garden City, Deeside, CH5 2RA Category: Personal, Consumer and other Services Class Code: Vehicle Cleaning Services Positional Accuracy: Positioned to address or location	A12SE (SW)	562	8	332598 368907
127	**Points of Interest - Commercial Services** Name: Car Care Auto Valet Location: 38 Welsh Road, Garden City, Deeside, CH5 2RA Category: Personal, Consumer and other Services Class Code: Vehicle Cleaning Services Positional Accuracy: Positioned to address or location	A12SE (SW)	562	8	332598 368907
128	**Points of Interest - Commercial Services** Name: Spraycraft Ltd Location: 22 Welsh Road, Garden City, Deeside, CH5 2RA Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A12SE (SW)	650	8	332525 368855
128	**Points of Interest - Commercial Services** Name: Spraycraft Location: 22 Welsh Road, Garden City, Deeside, CH5 2RA Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A12SE (SW)	650	8	332525 368855
128	**Points of Interest - Commercial Services** Name: Spraycraft Deeside Ltd Location: 22 Welsh Road, Garden City, Deeside, CH5 2RA Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A12SE (SW)	651	8	332525 368854
129	**Points of Interest - Commercial Services** Name: Aoh Ltd Location: 5 Old Marsh Farm House, Welsh Road, Sealand, Deeside, CH5 2LY Category: Recycling Services Class Code: Recycling, Reclamation and Disposal Positional Accuracy: Positioned to address or location	A18SE (NE)	670	8	333408 369760
130	**Points of Interest - Commercial Services** Name: Architectural Metals Location: 50 Deeside Industrial Estate, Welsh Road, Deeside, CH5 2LR Category: Construction Services Class Code: Metalworkers Including Blacksmiths Positional Accuracy: Positioned to address or location	A18NE (N)	906	8	333277 370056

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
131	**Points of Interest - Commercial Services** Name: Serck Services Location: 14 Drome Road, Deeside Industrial Park, Deeside, CH5 2NY Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A18NE (N)	995	8	333428 370105
132	**Points of Interest - Manufacturing and Production** Name: Deva Business Park Location: CH5 Category: Industrial Features Class Code: Business Parks and Industrial Estates Positional Accuracy: Positioned to an adjacent address or location	A13NE (N)	346	8	333225 369488
133	**Points of Interest - Manufacturing and Production** Name: Garden City Industrial Estate Location: CH5 Category: Industrial Features Class Code: Business Parks and Industrial Estates Positional Accuracy: Positioned to an adjacent address or location	A12NE (NW)	538	8	332665 369492
134	**Points of Interest - Manufacturing and Production** Name: Jones Balers Farms Ltd Location: Sealand Manor, Manor Road, Sealand, Deeside, CH5 2SB Category: Farming Class Code: Arable Farming Positional Accuracy: Positioned to address or location	A8NE (S)	642	8	333207 368537
135	**Points of Interest - Manufacturing and Production** Name: The Owl Industrial Estate Location: CH5 Category: Industrial Features Class Code: Business Parks and Industrial Estates Positional Accuracy: Positioned to an adjacent address or location	A14SW (SE)	731	8	333746 368839
136	**Points of Interest - Manufacturing and Production** Name: F Irving Location: Farm Road, Garden City, Deeside, CH5 2HJ Category: Farming Class Code: Livestock Farming Positional Accuracy: Positioned to address or location	A12NW (W)	859	8	332236 369179
137	**Points of Interest - Manufacturing and Production** Name: Tank Location: CH5 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to an adjacent address or location	A7NW (SW)	891	8	332329 368713
138	**Points of Interest - Recreational and Environmental** Name: Playground Location: Riverside Park, CH5 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to address or location	A13SW (SW)	267	8	332885 369004
138	**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	A13SW (SW)	275	8	332882 368994
139	**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	A12SE (W)	634	8	332463 369115
139	**Points of Interest - Recreational and Environmental** Name: Play Area Location: Farm Road, CH5 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to address or location	A12SE (W)	634	8	332463 369116
140	**Points of Interest - Recreational and Environmental** Name: Play Area Location: East Green, CH5 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A9NW (SE)	677	8	333487 368618

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
140	**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	A9NW (SE)	683	8	333500 368620

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
141	**Ancient Woodland** Name: Not Supplied Reference: 35862 Area(m²): 15596.45 Type: Ancient and Semi-Natural Woodland	A18SE (NE)	493	2	333359 369584
142	**Nitrate Vulnerable Zones** Name: Shotwick Brook Nvz Description: Surface Water Source: Environment Agency, Head Office	A13NE (NE)	0	5	333094 369168
143	**Nitrate Vulnerable Zones** Name: Not Supplied Description: Surface Water Source: Natural Resources Wales	A13NE (NE)	0	2	333094 369168
144	**Sites of Special Scientific Interest** Name: Afon Dyfrdwy (River Dee) Multiple Areas: Y Total Area (m2): 14914217.919999998 Source: Natural Resources Wales Reference: 255431wdw Designation Details: Mixed Biological And Geological Designation Date: 30th November 1995 Date Type: Notified	A7SE (SW)	809	2	332675 368477
145	**Special Areas of Conservation** Name: River Dee And Bala Lake / Afon Dyfrdwy A Llyn Tegid (Wales) Multiple Areas: Y Total Area (m2): 11498849.64 Source: Natural Resources Wales Reference: UK0030252 **Status: Designated**	A7SE (SW)	809	2	332675 368477

Agency & Hydrological	Version	Update Cycle
Contaminated Land Register Entries and Notices		
Flintshire Council - Environmental Health Department	April 2014	Annual Rolling Update
Chester City Council (now part of Cheshire West and Chester Council) - Environmental Health Department	August 2008	Not Applicable
Ellesmere Port And Neston Borough Council (now part of Cheshire West and Chester Council) - Environmental Health Department	March 2008	Not Applicable
Cheshire West and Chester Council - Environmental Health Department	November 2013	Annually
Discharge Consents		
Environment Agency - Welsh Region	August 2014	Quarterly
Environment Agency - North West Region	January 2019	Quarterly
Natural Resources Wales	January 2019	Quarterly
Enforcement and Prohibition Notices		
Environment Agency - North West Region	March 2013	Annual Rolling Update
Environment Agency - Welsh Region	March 2013	Annual Rolling Update
Integrated Pollution Controls		
Environment Agency - North West Region	October 2008	Variable
Environment Agency - Welsh Region	October 2008	Variable
Integrated Pollution Prevention And Control		
Environment Agency - North West Region	January 2019	Quarterly
Environment Agency - Welsh Region	January 2019	Quarterly
Natural Resources Wales	January 2019	Quarterly
Local Authority Integrated Pollution Prevention And Control		
Flintshire Council - Environmental Health Department	April 2016	Variable
Chester City Council (now part of Cheshire West and Chester Council) - Environmental Health Department	December 2008	Not Applicable
Cheshire West and Chester Council - Environmental Health Department	July 2015	Variable
Ellesmere Port And Neston Borough Council (now part of Cheshire West and Chester Council) - Environmental Health Department	May 2009	Not Applicable
Local Authority Pollution Prevention and Controls		
Flintshire Council - Environmental Health Department	April 2016	Annual Rolling Update
Chester City Council (now part of Cheshire West and Chester Council) - Environmental Health Department	December 2008	Not Applicable
Cheshire West and Chester Council - Environmental Health Department	July 2015	Annually
Ellesmere Port And Neston Borough Council (now part of Cheshire West and Chester Council) - Environmental Health Department	May 2009	Not Applicable
Local Authority Pollution Prevention and Control Enforcements		
Flintshire Council - Environmental Health Department	April 2016	Variable
Chester City Council (now part of Cheshire West and Chester Council) - Environmental Health Department	December 2008	Not Applicable
Cheshire West and Chester Council - Environmental Health Department	July 2015	Variable
Ellesmere Port And Neston Borough Council (now part of Cheshire West and Chester Council) - Environmental Health Department	May 2009	Not Applicable
Nearest Surface Water Feature		
Ordnance Survey	January 2019	
Pollution Incidents to Controlled Waters		
Environment Agency - Welsh Region	December 1998	Not Applicable
Environment Agency - North West Region	January 2000	Not Applicable
Prosecutions Relating to Authorised Processes		
Environment Agency - North West Region	March 2013	Annual Rolling Update
Environment Agency - Welsh Region	March 2013	Annual Rolling Update
Natural Resources Wales	March 2013	Annual Rolling Update
Prosecutions Relating to Controlled Waters		
Environment Agency - North West Region	March 2013	Annual Rolling Update
Environment Agency - Welsh Region	March 2013	Annual Rolling Update
Natural Resources Wales	March 2013	Annual Rolling Update

Agency & Hydrological	Version	Update Cycle
Registered Radioactive Substances		
Natural Resources Wales	January 2015	Annually
Environment Agency - North West Region	June 2016	
Environment Agency - Welsh Region	June 2016	
Substantiated Pollution Incident Register		
Environment Agency - North West Region - South Area	January 2019	Quarterly
Environment Agency Wales - North Area	January 2019	Quarterly
Natural Resources Wales	January 2019	Quarterly
Water Abstractions		
Natural Resources Wales	February 2019	Quarterly
Environment Agency - North West Region	January 2019	Quarterly
Environment Agency - Welsh Region	January 2019	Quarterly
Water Industry Act Referrals		
Natural Resources Wales	January 2019	Quarterly
Environment Agency - North West Region	October 2017	Quarterly
Environment Agency - Welsh Region	October 2017	Quarterly
Groundwater Vulnerability Map		
Environment Agency - Head Office	June 2018	Annually
Natural Resources Wales	June 2018	Annually
Bedrock Aquifer Designations		
Environment Agency - Head Office	January 2018	Annually
Natural Resources Wales	January 2018	Annually
Superficial Aquifer Designations		
Environment Agency - Head Office	January 2018	Annually
Natural Resources Wales	January 2018	Annually
Source Protection Zones		
Natural Resources Wales	November 2016	Annual Rolling Update
Extreme Flooding from Rivers or Sea without Defences		
Natural Resources Wales	February 2019	Quarterly
Flooding from Rivers or Sea without Defences		
Natural Resources Wales	February 2019	Quarterly
Areas Benefiting from Flood Defences		
Natural Resources Wales	February 2019	Quarterly
Flood Water Storage Areas		
Natural Resources Wales	February 2019	Quarterly
Flood Defences		
Natural Resources Wales	February 2019	Quarterly
OS Water Network Lines		
Ordnance Survey	October 2018	Quarterly
Surface Water 1 in 30 year Flood Extent		
Natural Resources Wales	October 2013	Annually
Surface Water 1 in 100 year Flood Extent		
Natural Resources Wales	October 2013	Annually
Surface Water 1 in 1000 year Flood Extent		
Natural Resources Wales	October 2013	Annually
Surface Water Suitability		
Natural Resources Wales	October 2013	Annually
BGS Groundwater Flooding Susceptibility		
British Geological Survey - National Geoscience Information Service	May 2013	Annually

Waste	Version	Update Cycle
BGS Recorded Landfill Sites		
British Geological Survey - National Geoscience Information Service	June 1996	Not Applicable
Historical Landfill Sites		
Natural Resources Wales	July 2017	Quarterly
Integrated Pollution Control Registered Waste Sites		
Environment Agency - North West Region	October 2008	Not Applicable
Environment Agency - Welsh Region	October 2008	Not Applicable
Licensed Waste Management Facilities (Landfill Boundaries)		
Environment Agency - North West Region - South Area	July 2018	Quarterly
Environment Agency Wales - North Area	July 2018	Quarterly
Natural Resources Wales	July 2018	Quarterly
Licensed Waste Management Facilities (Locations)		
Environment Agency - North West Region - South Area	January 2019	Quarterly
Environment Agency Wales - North Area	January 2019	Quarterly
Natural Resources Wales	January 2019	Quarterly
Local Authority Landfill Coverage		
Cheshire County Council (now part of Cheshire East Council) - Environmental Planning Department	May 2000	Not Applicable
Chester City Council (now part of Cheshire West and Chester Council) - Environmental Health Department	May 2000	Not Applicable
Ellesmere Port And Neston Borough Council (now part of Cheshire West and Chester Council) - Planning Department	May 2000	Not Applicable
Flintshire Council - Environmental Health Department	May 2000	Not Applicable
Local Authority Recorded Landfill Sites		
Cheshire County Council (now part of Cheshire East Council) - Environmental Planning Department	February 2005	Not Applicable
Chester City Council (now part of Cheshire West and Chester Council) - Environmental Health Department	May 2000	Not Applicable
Ellesmere Port And Neston Borough Council (now part of Cheshire West and Chester Council) - Planning Department	May 2000	Not Applicable
Flintshire Council - Environmental Health Department	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 - North West Region - South Area	March 2003	Not Applicable
Environment Agency Wales - North Area	March 2003	Not Applicable
Registered Waste Transfer Sites		
Environment Agency - North West Region - South Area	March 2003	Not Applicable
Environment Agency Wales - North Area	March 2003	Not Applicable
Registered Waste Treatment or Disposal Sites		
Environment Agency - North West Region - South Area	March 2003	Not Applicable
Environment Agency Wales - North Area	March 2003	Not Applicable

Hazardous Substances	Version	Update Cycle
Control of Major Accident Hazards Sites (COMAH)		
Health and Safety Executive	April 2018	Bi-Annually
Explosive Sites		
Health and Safety Executive	March 2017	Annually
Notification of Installations Handling Hazardous Substances (NIHHS)		
Health and Safety Executive	November 2000	Not Applicable
Planning Hazardous Substance Enforcements		
Cheshire West and Chester Council - Planning Department	April 2016	Variable
Ellesmere Port And Neston Borough Council (now part of Cheshire West and Chester Council) - Planning Department	December 2008	Not Applicable
Flintshire Council	January 2016	Variable
Cheshire County Council (now part of Cheshire East Council) - Planning Department	July 2008	Annual Rolling Update
Chester City Council (now part of Cheshire West and Chester Council)	October 2008	Not Applicable
Planning Hazardous Substance Consents		
Cheshire West and Chester Council - Planning Department	April 2016	Variable
Ellesmere Port And Neston Borough Council (now part of Cheshire West and Chester Council) - Planning Department	December 2008	Not Applicable
Flintshire Council	January 2016	Variable
Cheshire County Council (now part of Cheshire East Council) - Planning Department	July 2008	Annual Rolling Update
Chester City Council (now part of Cheshire West and Chester Council)	October 2008	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	November 2018	Bi-Annually
CBSCB Compensation District		
Cheshire Brine Subsidence Compensation Board (CBSCB)	August 2011	Not Applicable
Coal Mining Affected Areas		
The Coal Authority - Property Searches	March 2014	Annual Rolling Update
Mining Instability		
Ove Arup & Partners	October 2000	Not Applicable
Non Coal Mining Areas of Great Britain		
British Geological Survey - National Geoscience Information Service	May 2015	Not Applicable
Potential for Collapsible Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Compressible Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Ground Dissolution Stability Hazards		
British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Landslide Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Running Sand Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	January 2019	Annually
Radon Potential - Radon Affected Areas		
British Geological Survey - National Geoscience Information Service	July 2011	Annually
Radon Potential - Radon Protection Measures		
British Geological Survey - National Geoscience Information Service	July 2011	Annually

Industrial Land Use	Version	Update Cycle
Contemporary Trade Directory Entries Thomson Directories	January 2019	Quarterly
Fuel Station Entries Catalist Ltd - Experian	March 2019	Quarterly
Gas Pipelines National Grid	July 2014	
Points of Interest - Commercial Services PointX	November 2018	Quarterly
Points of Interest - Education and Health PointX	November 2018	Quarterly
Points of Interest - Manufacturing and Production PointX	November 2018	Quarterly
Points of Interest - Public Infrastructure PointX	November 2018	Quarterly
Points of Interest - Recreational and Environmental PointX	November 2018	Quarterly
Underground Electrical Cables National Grid	December 2015	

Sensitive Land Use	Version	Update Cycle
Ancient Woodland		
Natural England	August 2018	Bi-Annually
Natural Resources Wales	August 2018	Bi-Annually
Areas of Adopted Green Belt		
Chester City Council (now part of Cheshire West and Chester Council)	March 2019	As notified
Ellesmere Port And Neston Borough Council (now part of Cheshire West and Chester Council) - Planning Department	March 2019	As notified
Areas of Unadopted Green Belt		
Chester City Council (now part of Cheshire West and Chester Council)	March 2019	As notified
Ellesmere Port And Neston Borough Council (now part of Cheshire West and Chester Council) - Planning Department	March 2019	As notified
Areas of Outstanding Natural Beauty		
Natural England	August 2018	Bi-Annually
Natural Resources Wales	August 2018	Bi-Annually
Environmentally Sensitive Areas		
Natural England	January 2017	
The National Assembly for Wales - GI Services (Department of Planning & Countryside)	January 2017	
Forest Parks		
Forestry Commission	April 1997	Not Applicable
Local Nature Reserves		
Flintshire Council	August 2018	Bi-Annually
Natural England	March 2019	Bi-Annually
Marine Nature Reserves		
Natural Resources Wales	August 2018	Bi-Annually
National Nature Reserves		
Natural Resources Wales	August 2018	Bi-Annually
National Parks		
Natural England	April 2017	Bi-Annually
Natural Resources Wales	August 2018	Annually
Nitrate Vulnerable Zones		
Environment Agency - Head Office	December 2017	Bi-Annually
Natural Resources Wales	July 2017	Bi-Annually
The National Assembly for Wales - GI Services (Department of Planning & Countryside)	October 2005	
Ramsar Sites		
Natural Resources Wales	February 2019	Bi-Annually
Sites of Special Scientific Interest		
Natural Resources Wales	March 2019	Bi-Annually
Special Areas of Conservation		
Natural Resources Wales	August 2018	Bi-Annually
Special Protection Areas		
Natural Resources Wales	August 2018	Bi-Annually

Data Suppliers

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	

Useful Contacts

Contact	Name and Address	Contact Details
1	**British Geological Survey - Enquiry Service** British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
2	**Natural Resources Wales** Ty Cambria, 29 Newport Road, Cardiff, CF24 0TP	Telephone: 0300 065 3000 Email: enquiries@naturalresourceswales.gov.uk
3	**Flintshire Council - Environmental Health Department** County Hall, Mold, Flintshire, CH7 6NF	Telephone: 01352 703413 Fax: 01352 703441 Website: www.flintshire.gov.uk
4	**Environment Agency - National Customer Contact Centre (NCCC)** PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 03708 506 506 Email: enquiries@environment-agency.gov.uk
5	**Environment Agency - Head Office** Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, Avon, BS32 4UD	Telephone: 01454 624400 Fax: 01454 624409
6	**Ordnance Survey** Adanac Drive, Southampton, Hampshire, SO16 0AS	Telephone: 03456 05 05 05 Email: customerservices@ordnancesurvey.co.uk Website: www.ordnancesurvey.gov.uk
7	**The Coal Authority - Property Searches** 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG	Telephone: 0345 762 6848 Fax: 01623 637 338 Email: groundstability@coal.gov.uk Website: www2.groundstability.com
8	**PointX** 7 Abbey Court, Eagle Way, Sowton, Exeter, Devon, EX2 7HY	Website: www.pointx.co.uk
9	**Chester City Council (now part of Cheshire West and Chester Council)** 58 Nicholas Street, Chester, Cheshire, CH1 2NP	Telephone: 0300 123 8123 Email: enquiries@cheshirewestandchester.gov.uk Website: www.cheshirewestandchester.gov.uk
-	**Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards** Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org
-	**Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

Please note that the Environment Agency / Natural Resources Wales / SEPA have a charging policy in place for enquiries.

Historical Mapping Legends

Ordnance Survey County Series 1:10,560

Gravel Pit
Sand Pit
Other Pits
Quarry
Shingle
Orchard
Osiers
Reeds
Marsh
Mixed Wood
Deciduous
Brushwood
Fir
Furze
Rough Pasture
Arrow denotes flow of water
Trigonometrical Station
Site of Antiquities
Bench Mark
Pump, Guide Post, Signal Post
Well, Spring, Boundary Post
285 Surface Level
Sketched Contour
Instrumental Contour
Main Roads
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
Pylon
Electricity Transmission Line
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
Mud
Sand
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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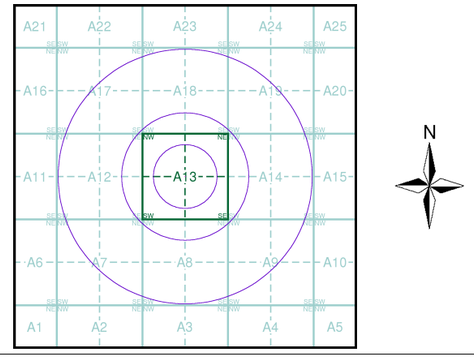
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Flintshire	1:10,560	1871	2
Cheshire	1:10,560	1900	3
Flintshire	1:10,560	1900	4
Flintshire	1:10,560	1913	5
Cheshire	1:10,560	1914	6
Flintshire	1:10,560	1938	7
Flintshire	1:10,560	1954	8
Ordnance Survey Plan	1:10,000	1954	9
Ordnance Survey Plan	1:10,000	1963 - 1966	10
Ordnance Survey Plan	1:10,000	1967	11
Ordnance Survey Plan	1:10,000	1969	12
Ordnance Survey Plan	1:10,000	1970 - 1978	13
Ordnance Survey Plan	1:10,000	1983	14
Ordnance Survey Plan	1:10,000	1992 - 1994	15
10K Raster Mapping	1:10,000	1999 - 2000	16
10K Raster Mapping	1:10,000	2006	17
VectorMap Local	1:10,000	2019	18

Historical Map - Slice A



Order Details

Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

118, Welsh Road, Garden City, DEESIDE, CH5 2HX

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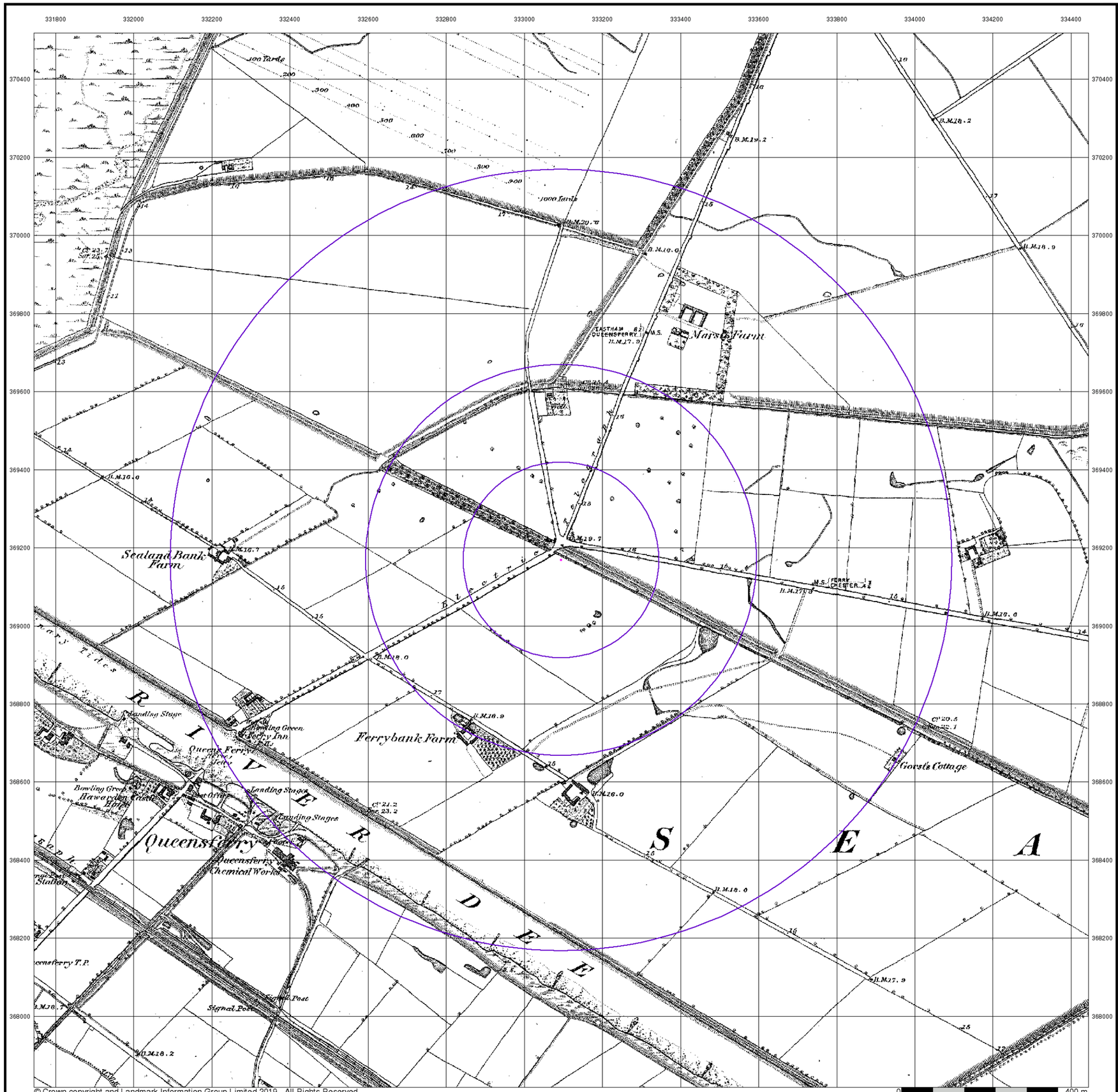
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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Flintshire

Published 1871

Source map scale - 1:10,560

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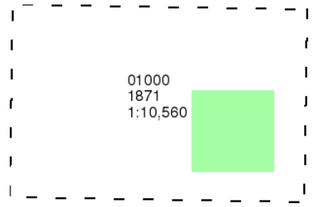
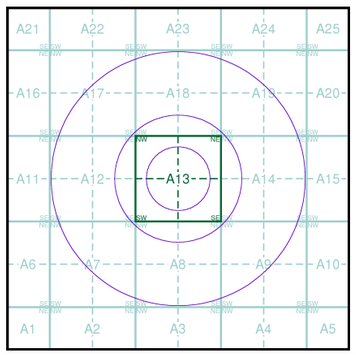
Map Name(s) and Date(s)



Historical Map - Slice A



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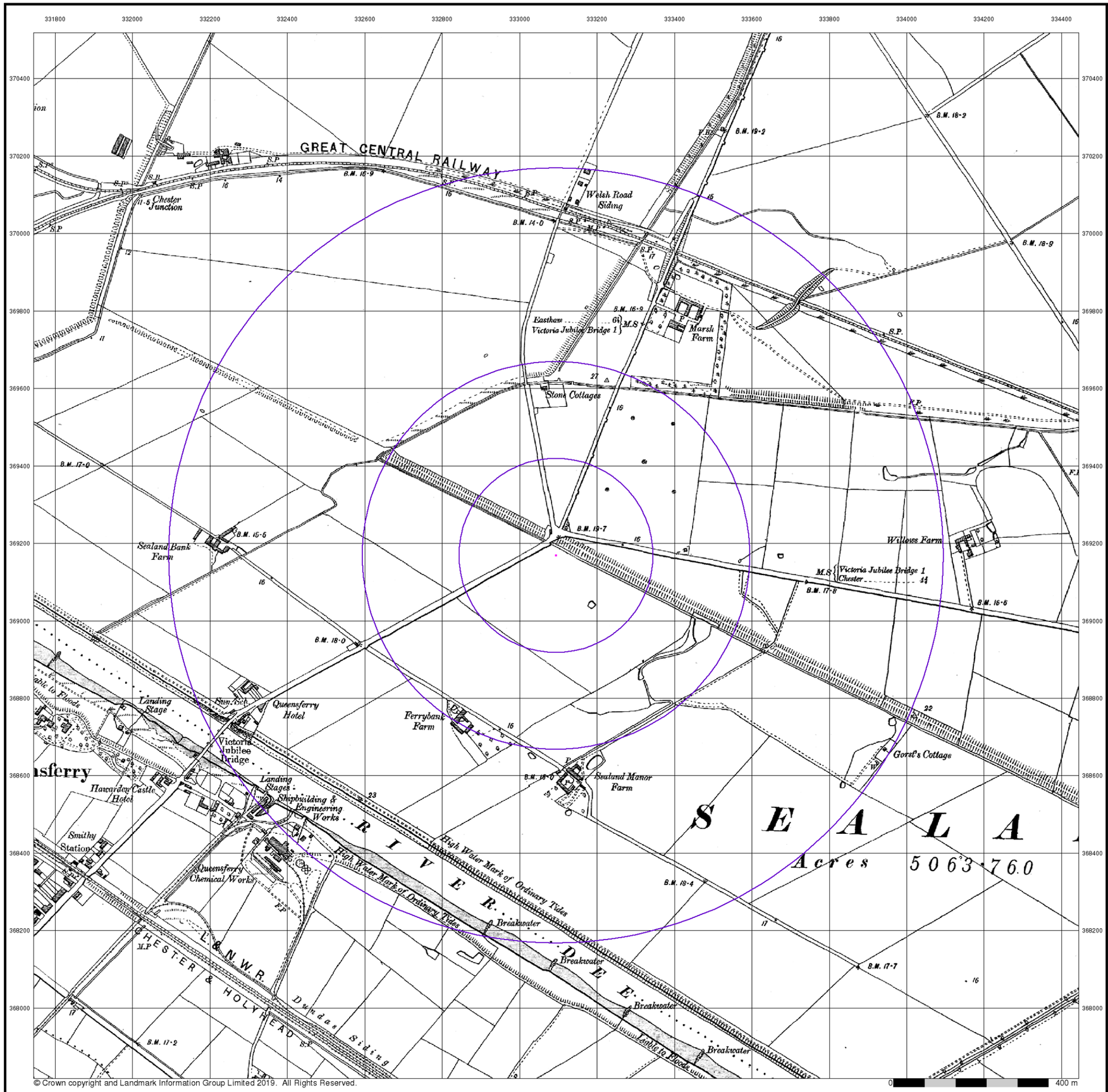

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Cheshire

Published 1900

Source map scale - 1:10,560

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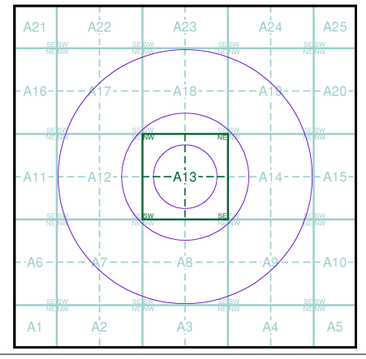
Map Name(s) and Date(s)

038ANE
1900
1:10,560

Historical Map - Slice A



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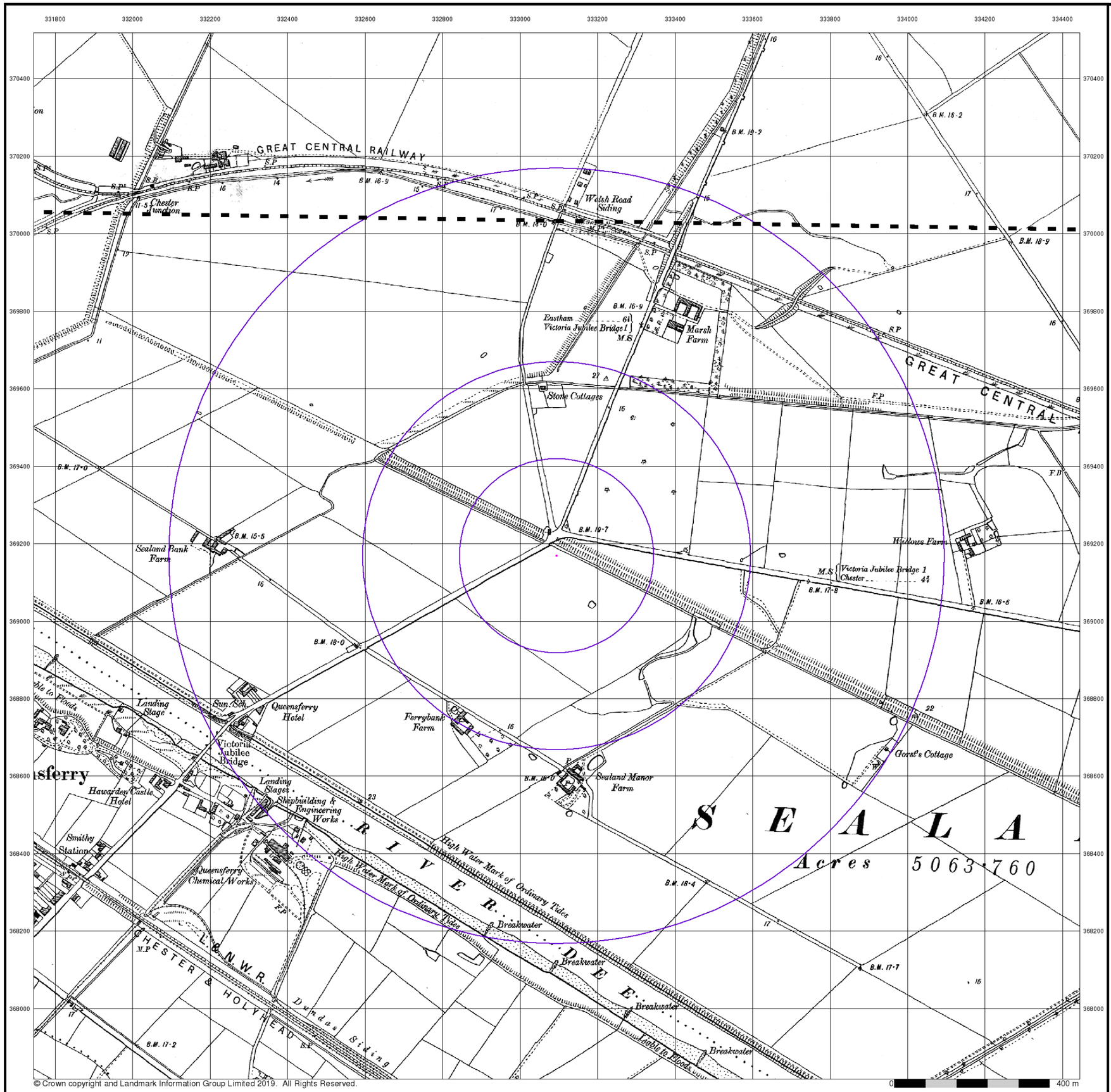

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Flintshire

Published 1900

Source map scale - 1:10,560

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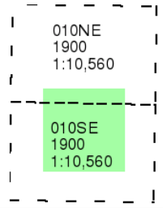
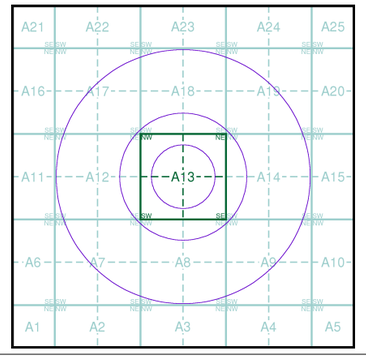


Historical Map - Slice A



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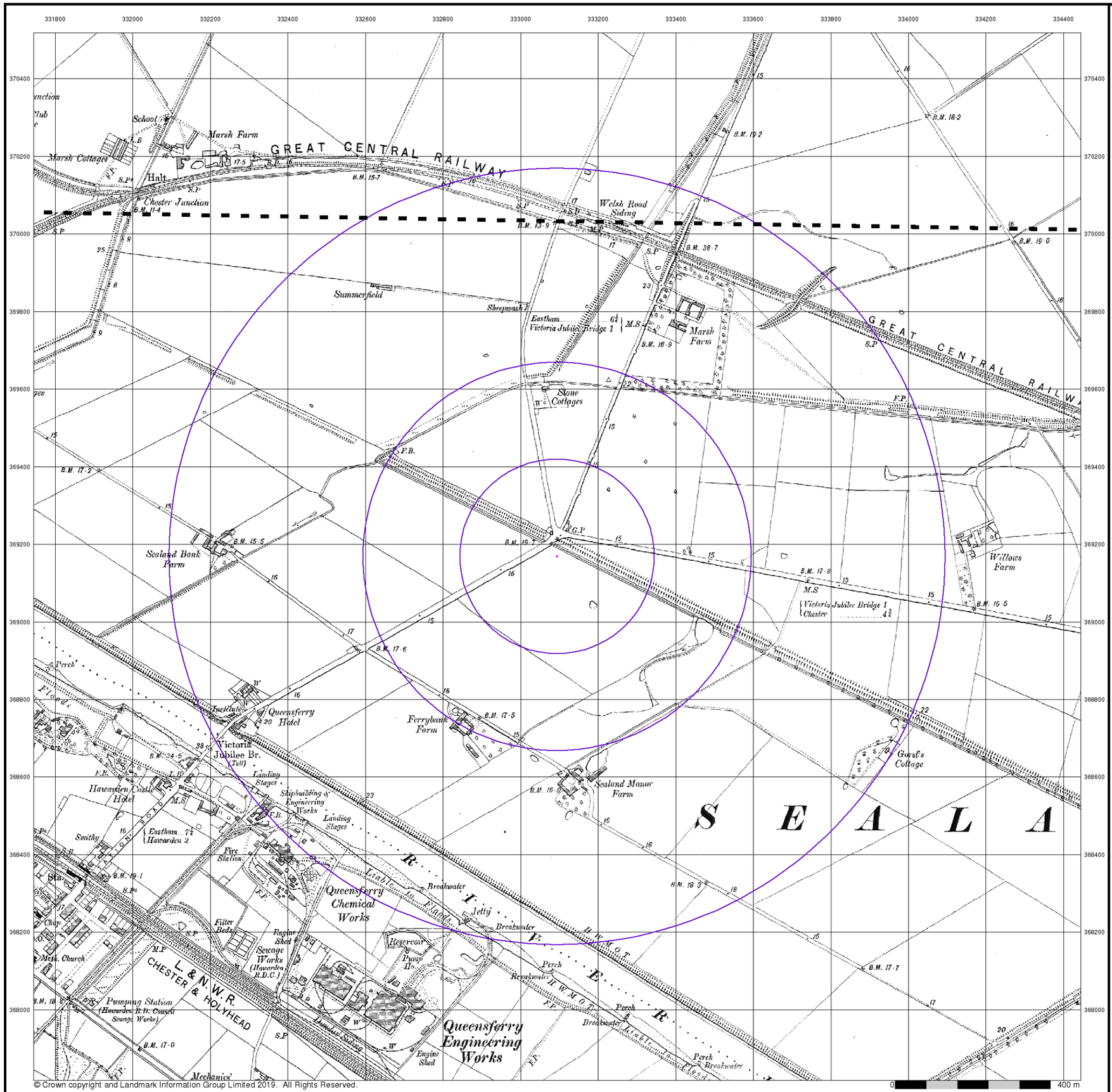

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Flintshire

Published 1913

Source map scale - 1:10,560

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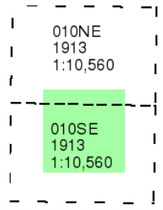
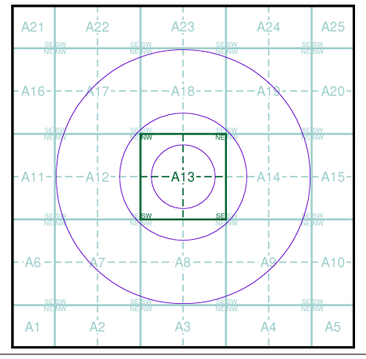


Historical Map - Slice A



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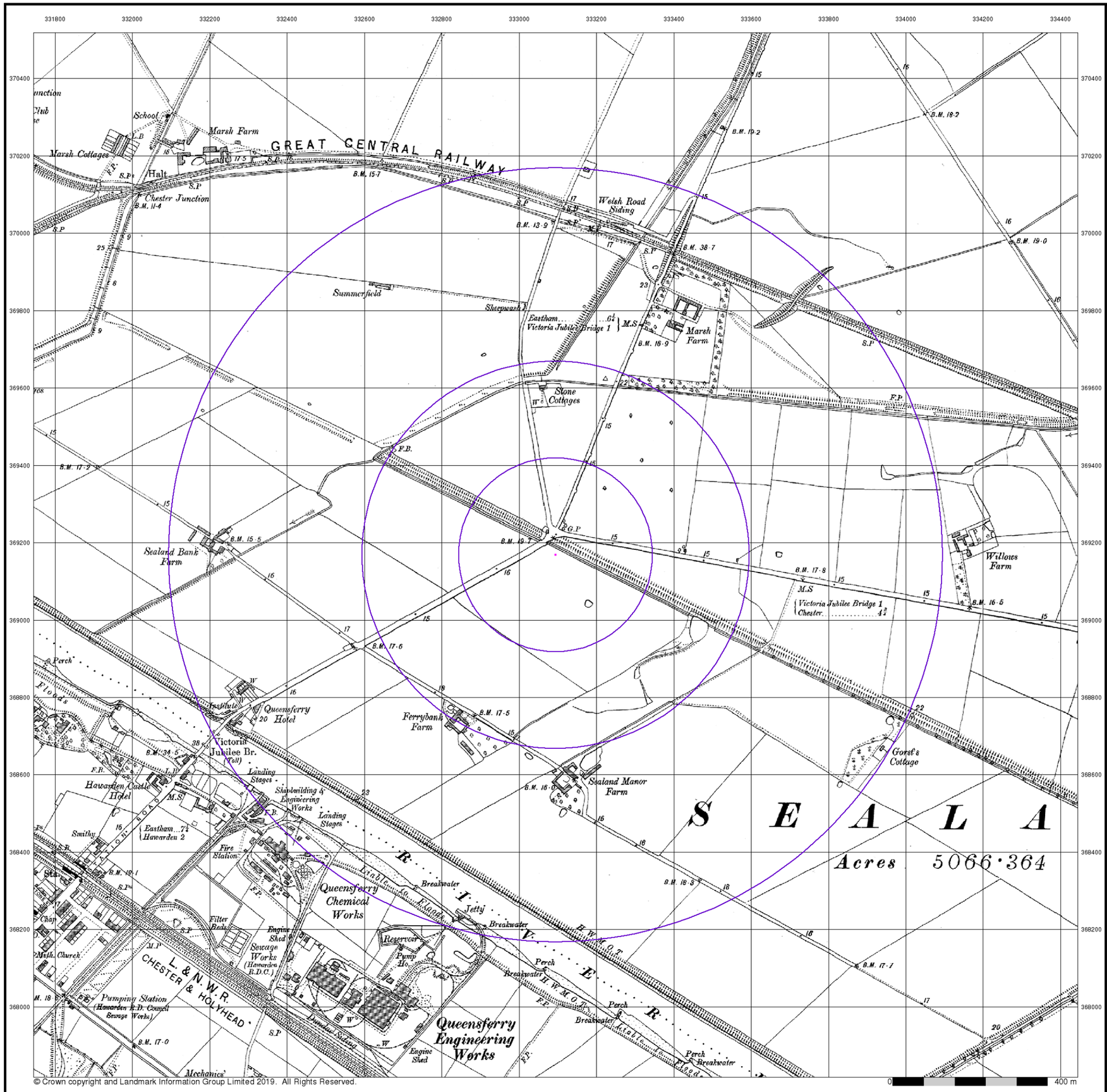

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Cheshire

Published 1914

Source map scale - 1:10,560

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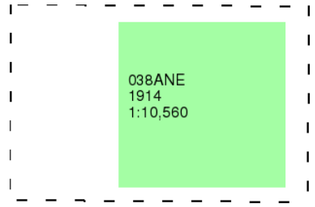
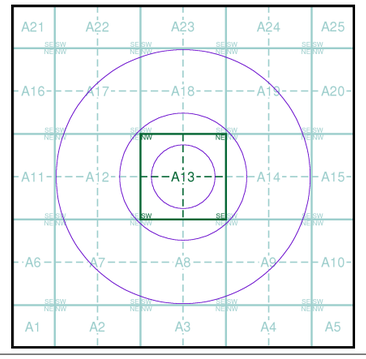
Map Name(s) and Date(s)



Historical Map - Slice A



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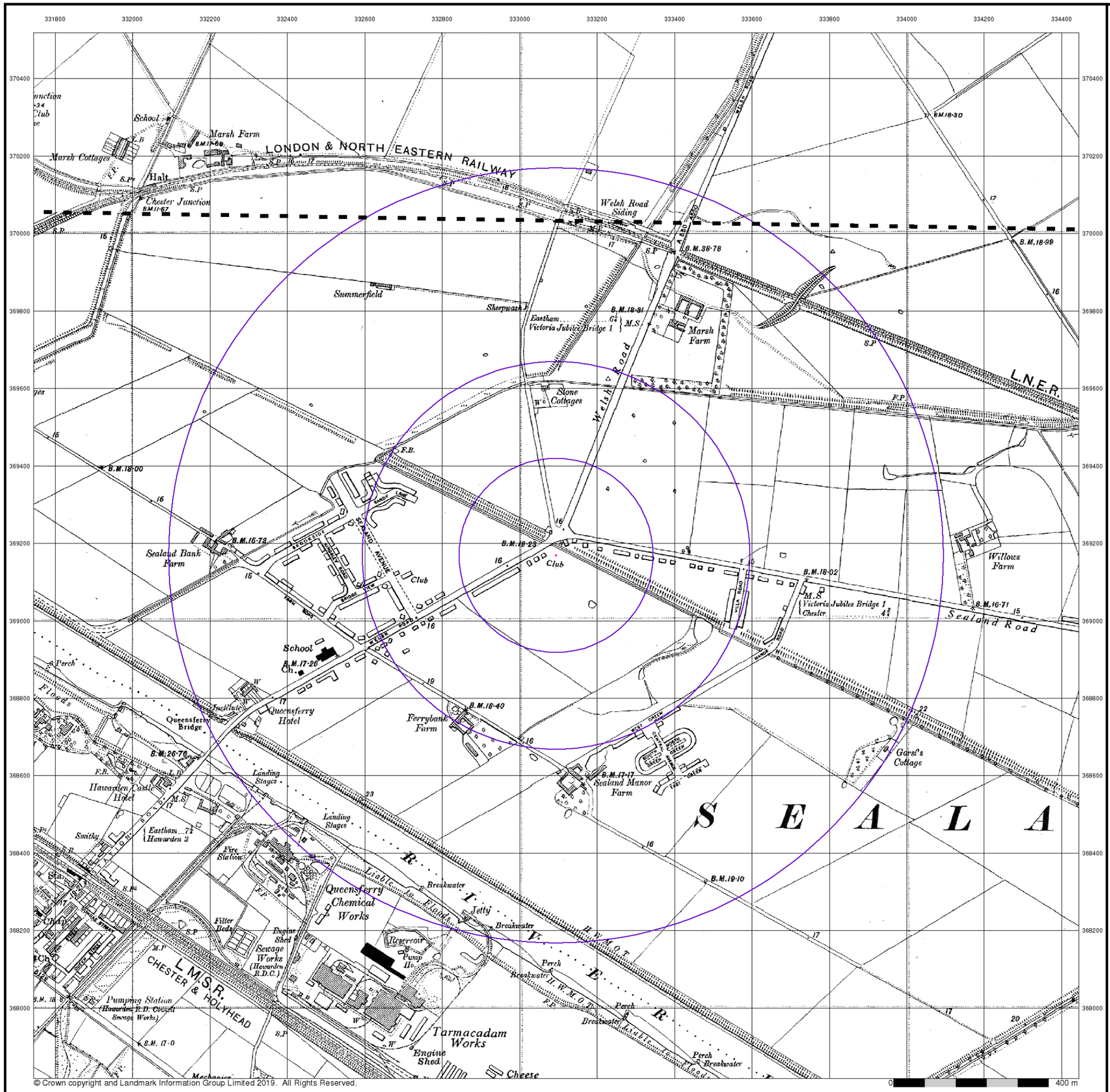

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Flintshire

Published 1938

Source map scale - 1:10,560

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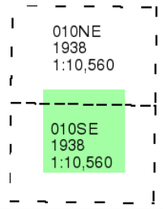
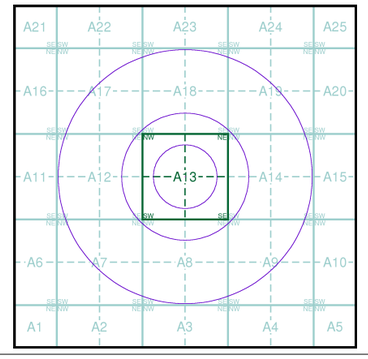


Historical Map - Slice A



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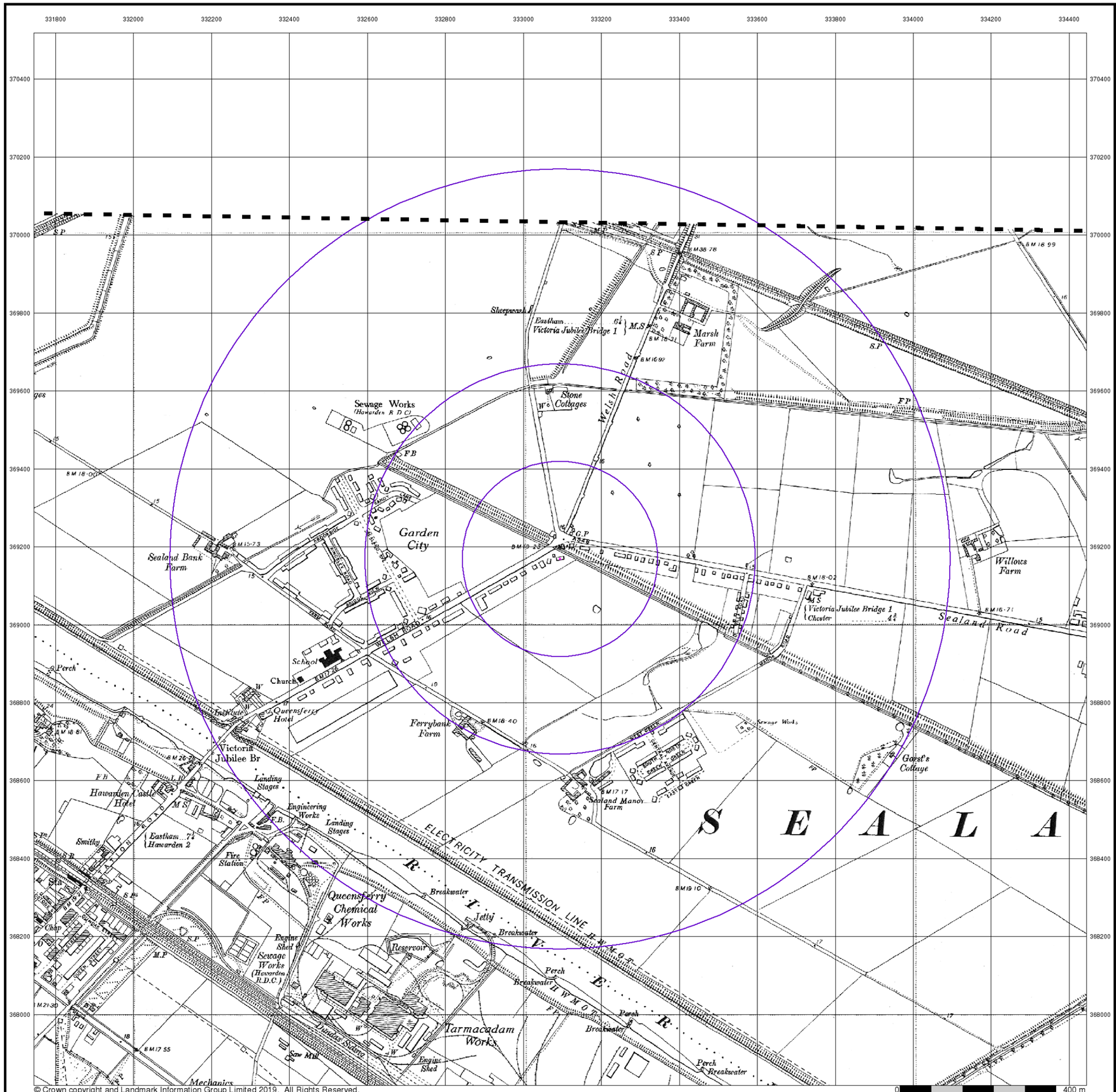

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Flintshire

Published 1954

Source map scale - 1:10,560

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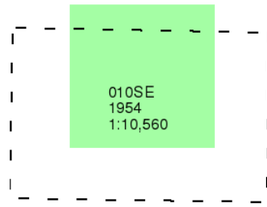
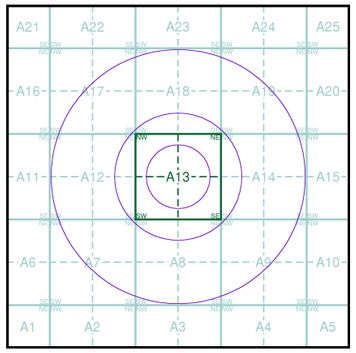


Historical Map - Slice A



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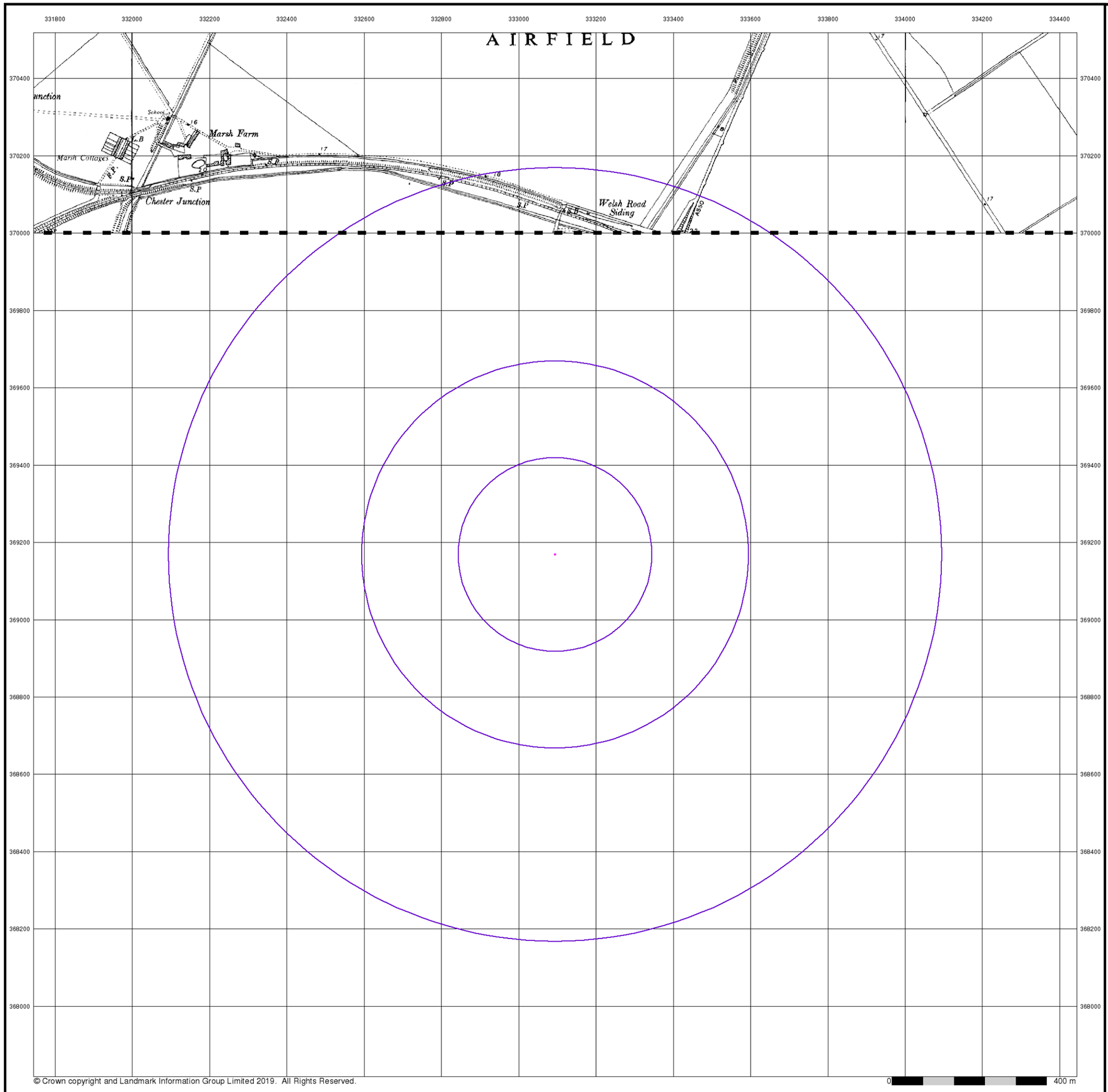

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Ordnance Survey Plan

Published 1954

Source map scale - 1:10,000

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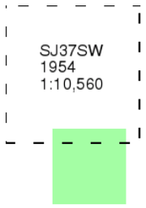
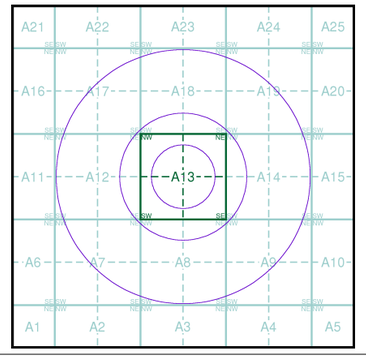
Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

118, Welsh Road, Garden City, DEESIDE, CH5 2HX

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Ordnance Survey Plan

Published 1963 - 1966

Source map scale - 1:10,000

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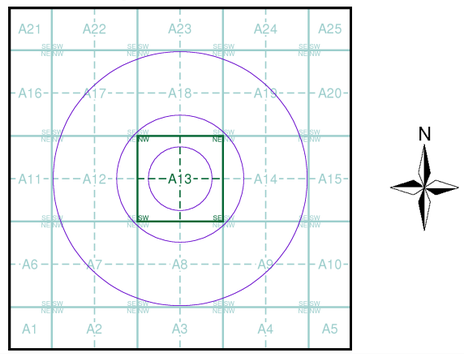
Map Name(s) and Date(s)

SJ37SW
1966
1:10,560

SJ36NW
1963
1:10,560

Historical Map - Slice A



Order Details

Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

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Published 1967

Source map scale - 1:10,000

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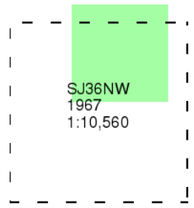
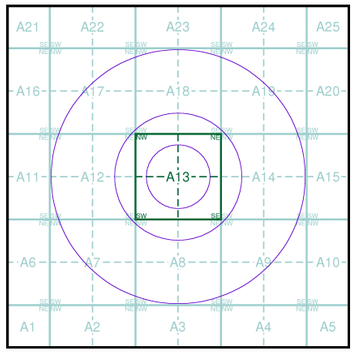
Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

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Ordnance Survey Plan

Published 1969

Source map scale - 1:10,000

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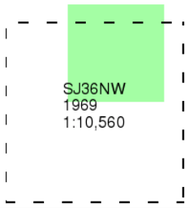
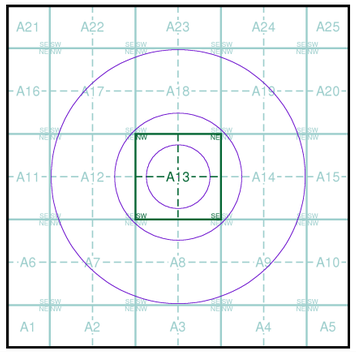
Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

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Ordnance Survey Plan

Published 1970 - 1978

Source map scale - 1:10,000

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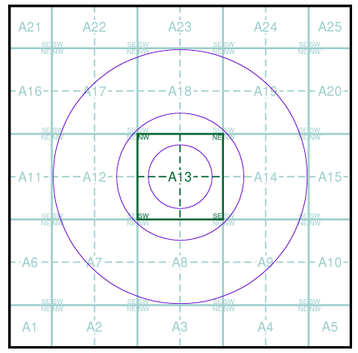
Map Name(s) and Date(s)

SJ37SW
1970
1:10,560

SJ36NW
1978
1:10,000

Historical Map - Slice A



Order Details

Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

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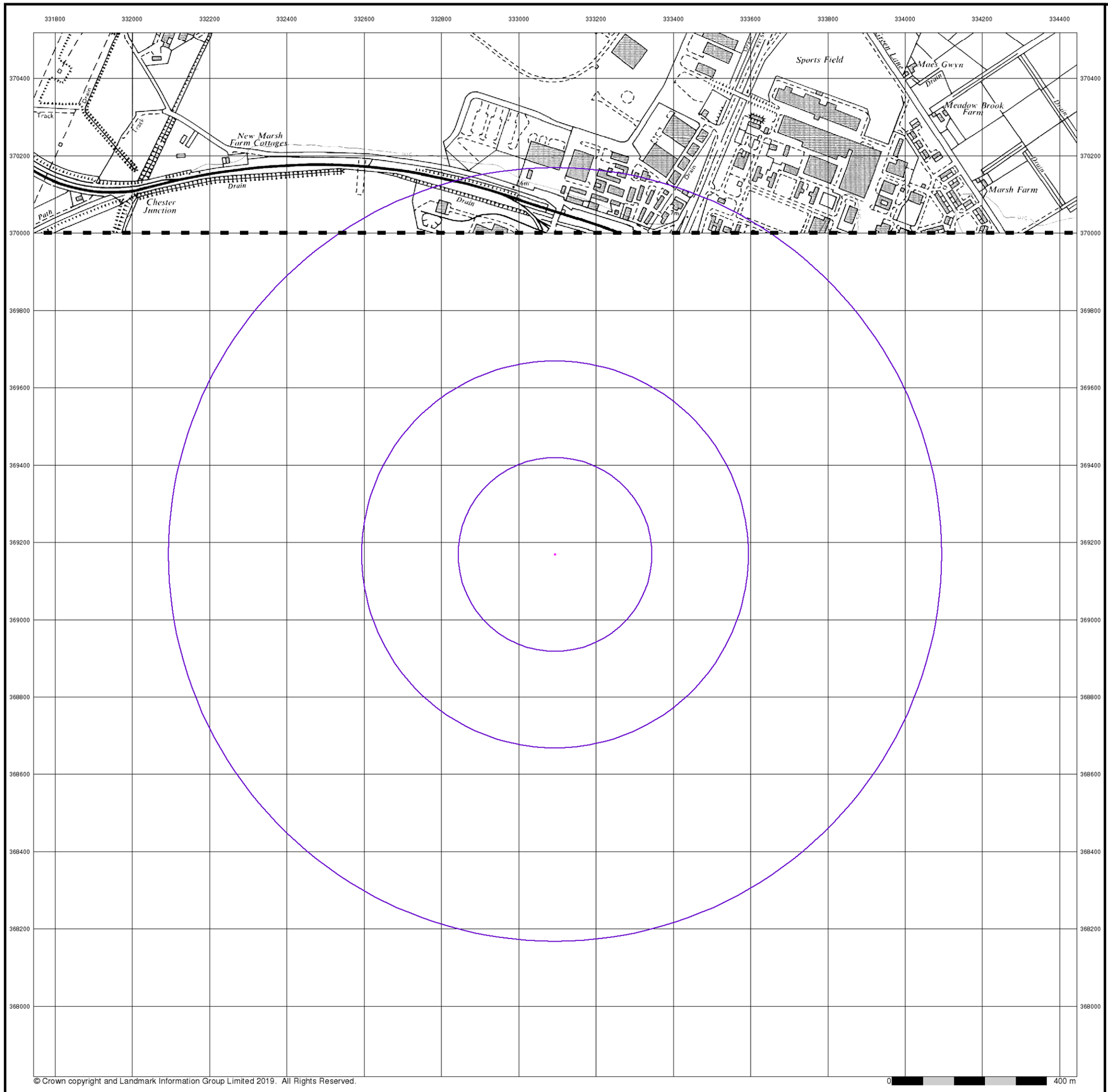

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Ordnance Survey Plan

Published 1983

Source map scale - 1:10,000

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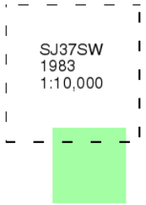
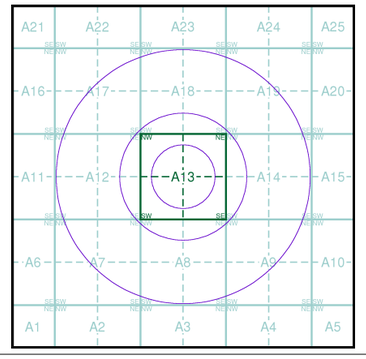
Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

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Ordnance Survey Plan

Published 1992 - 1994

Source map scale - 1:10,000

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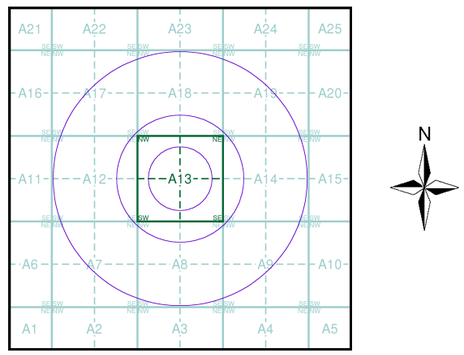
Map Name(s) and Date(s)

SJ37SW
1994
1:10,000

SJ36NW
1992
1:10,000

Historical Map - Slice A



Order Details

Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

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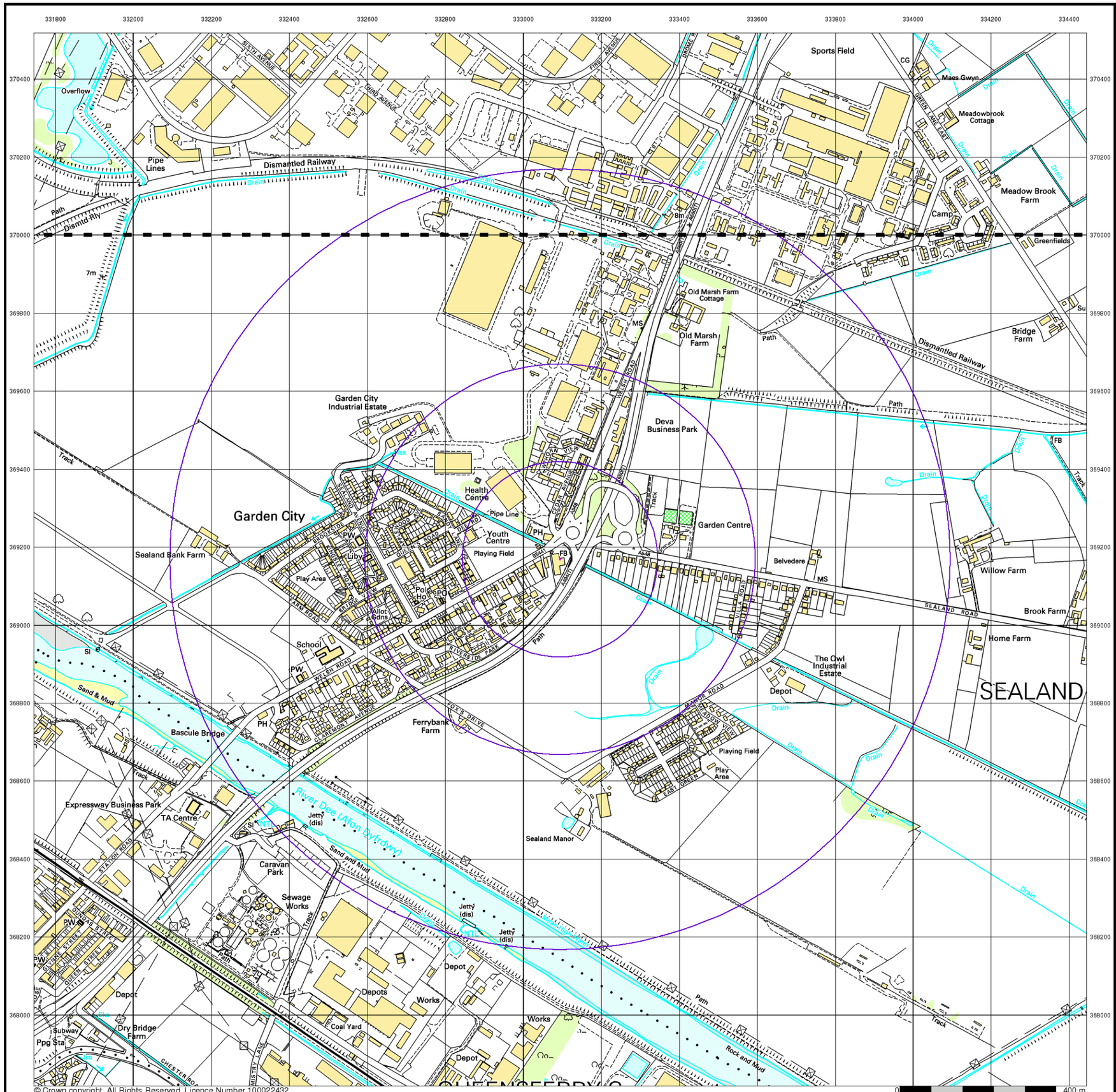

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10k Raster Mapping

Published 1999 - 2000

Source map scale - 1:10,000

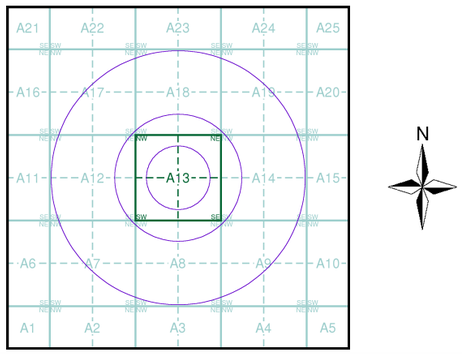
The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks 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)

SJ37SW
1999
1:10,000

SJ36NW
2000
1:10,000

Historical Map - Slice A



Order Details

Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

118, Welsh Road, Garden City, DEESIDE, CH5 2HX

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10k Raster Mapping

Published 2006

Source map scale - 1:10,000

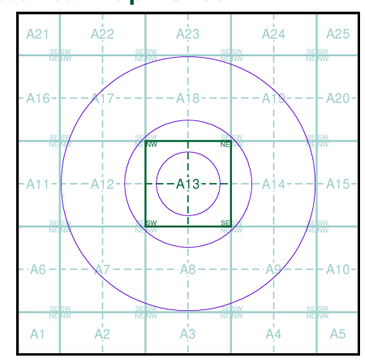
The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks 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)

SJ37SW
2006
1:10,000

SJ36NW
2006
1:10,000

Historical Map - Slice A



Order Details

Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

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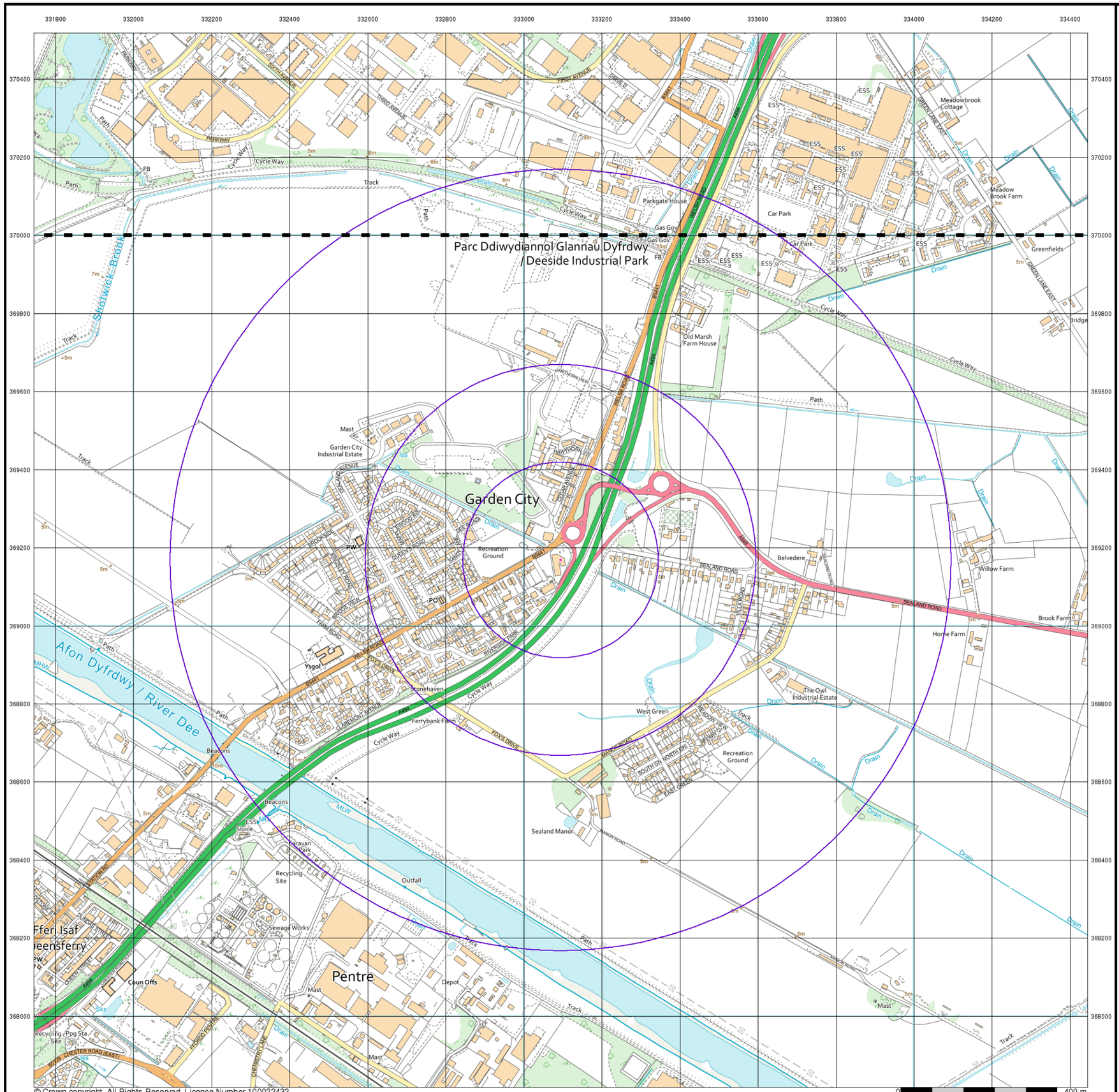

0 400 m

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VectorMap Local

Published 2019

Source map scale - 1:10,000

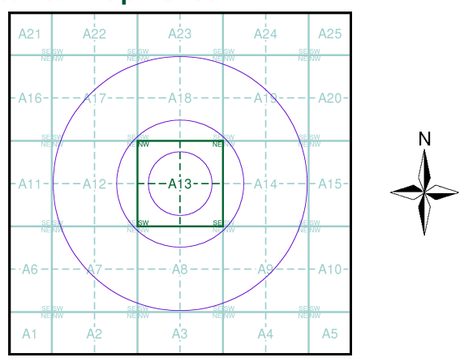
VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap 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)

SJ37SW
2019
Variable

SJ36NW
2019
Variable

Historical Map - Slice A



Order Details

Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

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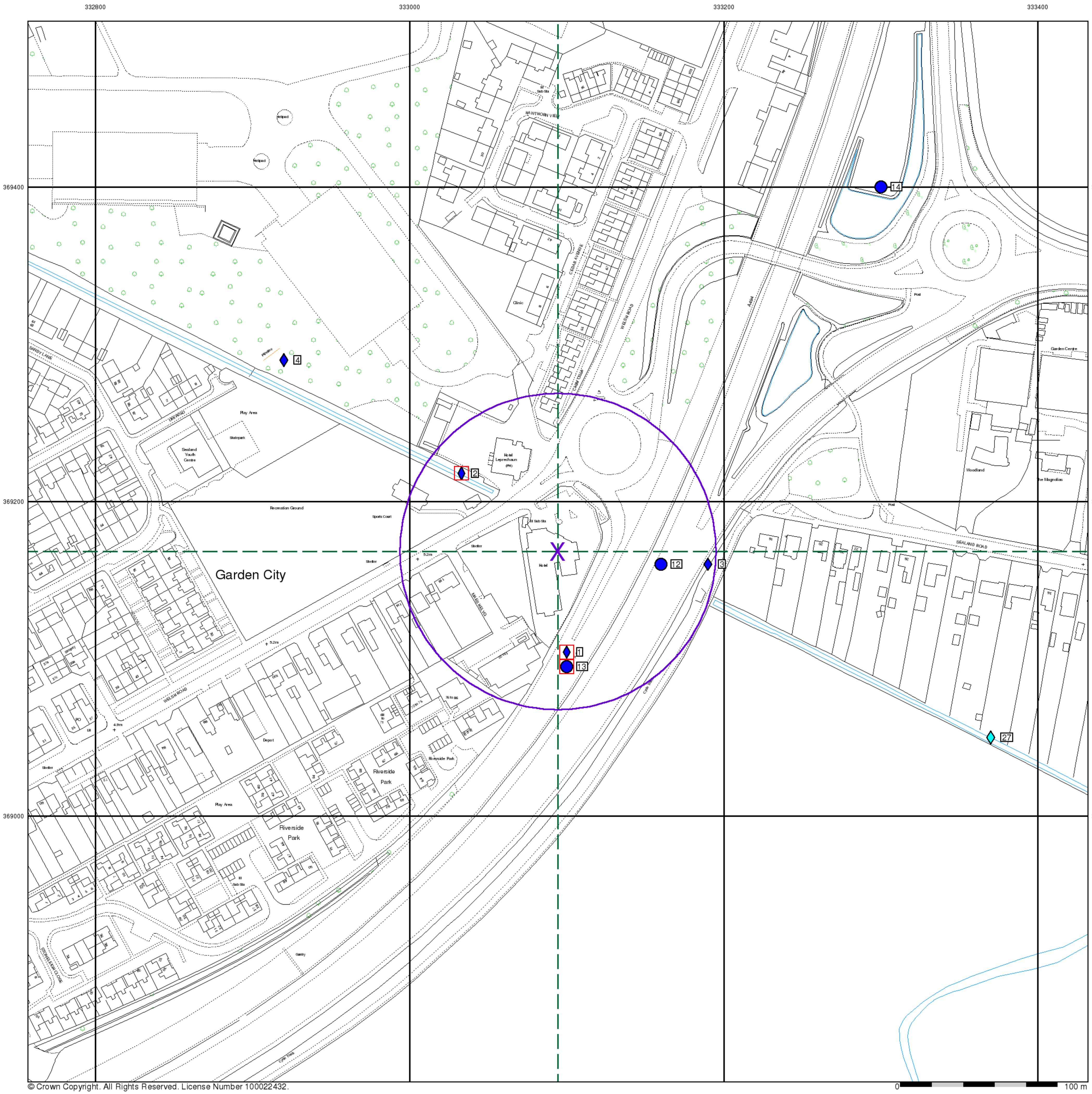

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General

- 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

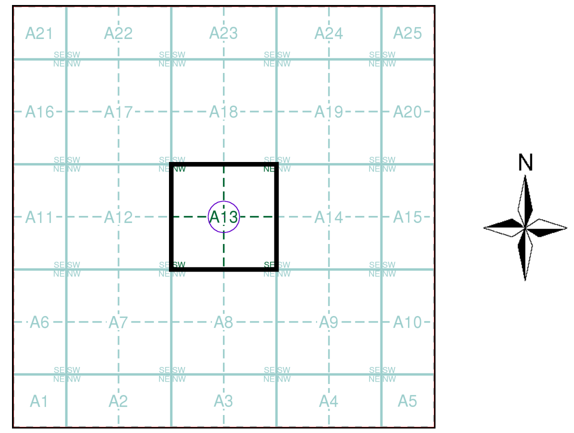
Geological

- 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 A13



Order Details

Order Number: 201123677_1_1
Customer Ref: 19-1790
National Grid Reference: 333090, 369170
Slice: A
Site Area (Ha): 0.01
Plot Buffer (m): 100

Site Details

118, Welsh Road, Garden City, DEESIDE, CH5 2HX

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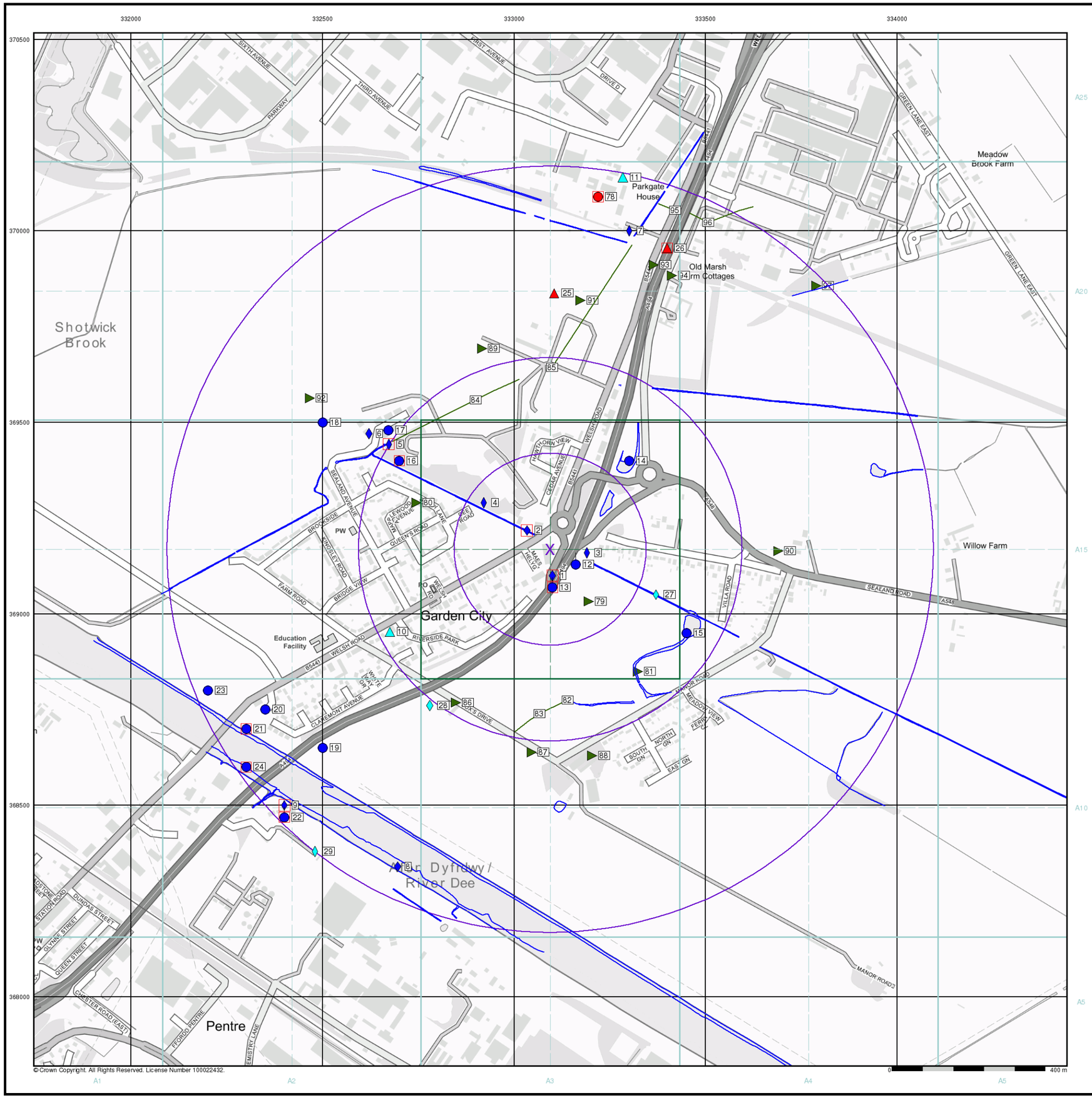

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General

- 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

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)
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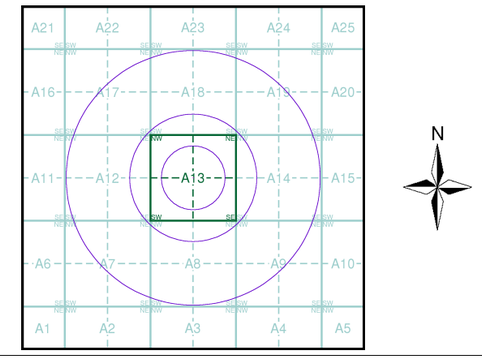
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered 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 - Slice A



Order Details

Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

118, Welsh Road, Garden City, DEESIDE, CH5 2HX

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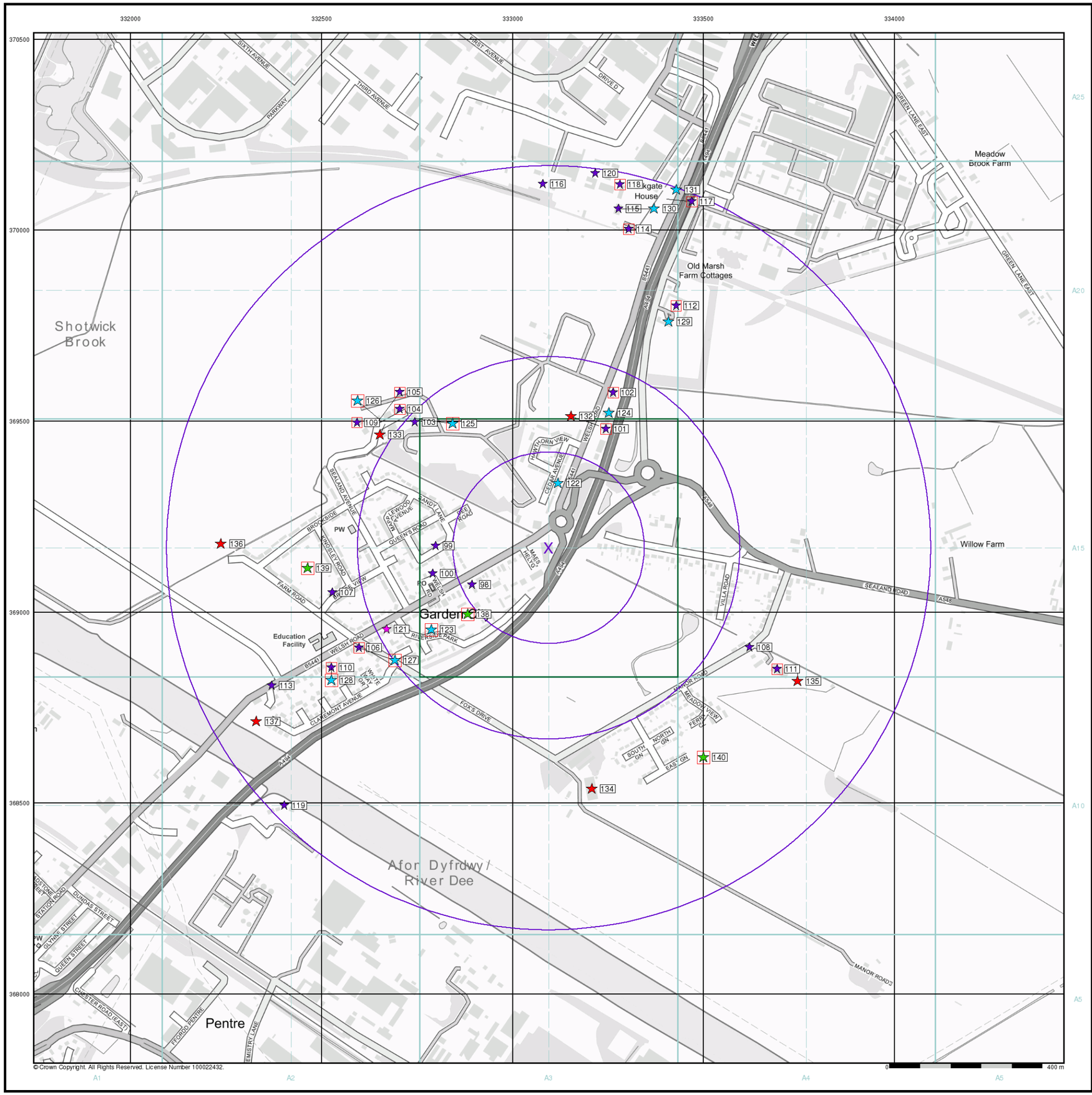

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Industrial Land Use Map

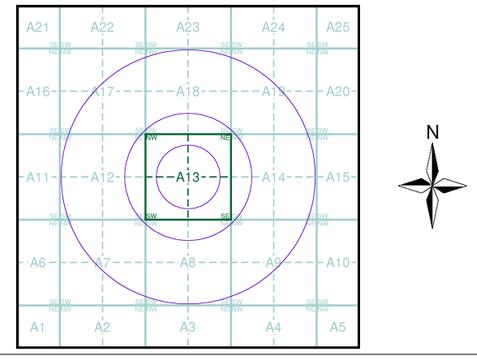
General

- 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

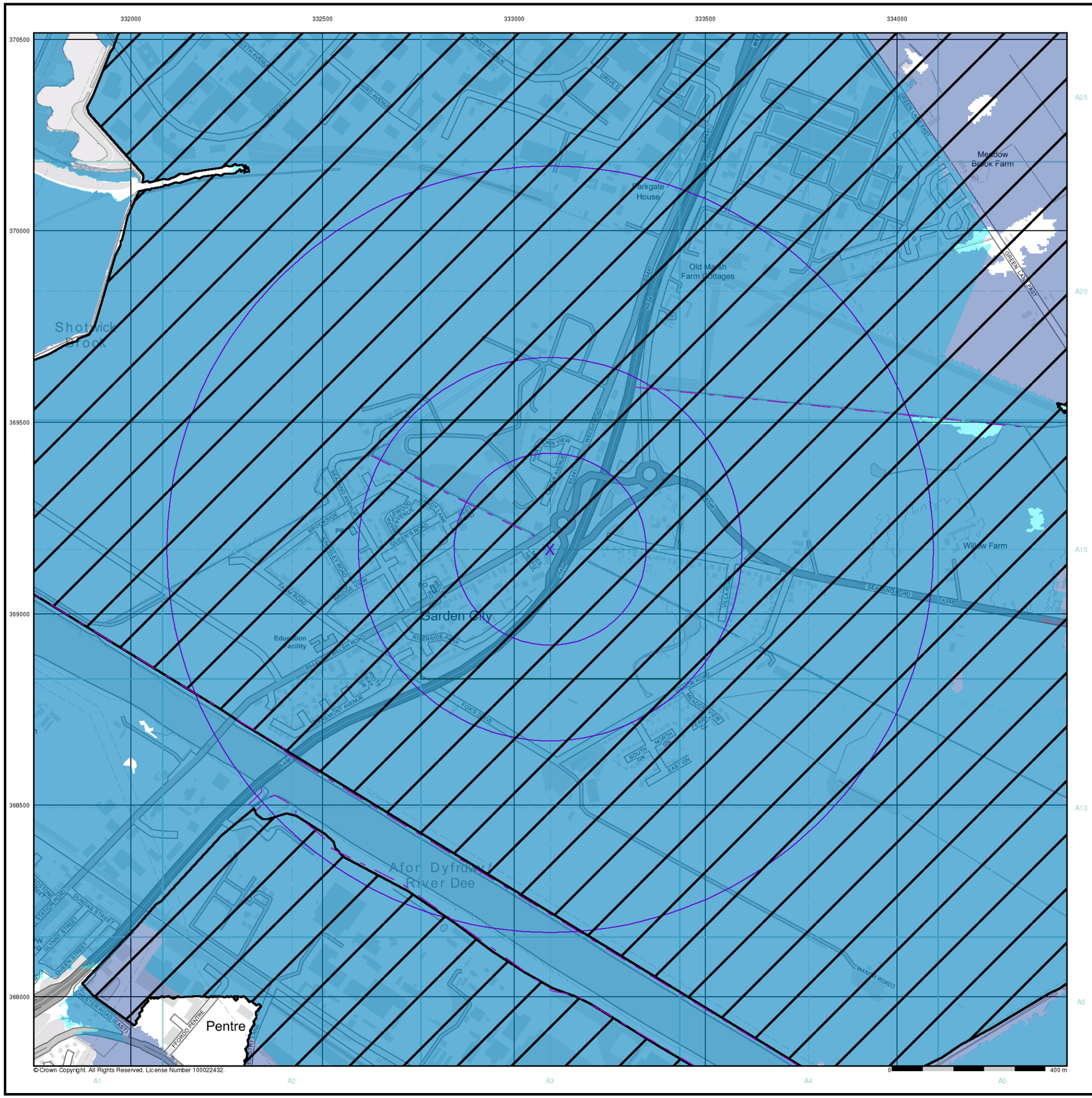
Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

118, Welsh Road, Garden City, DEESIDE, CH5 2HX

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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LANDMARK INFORMATION GROUP®

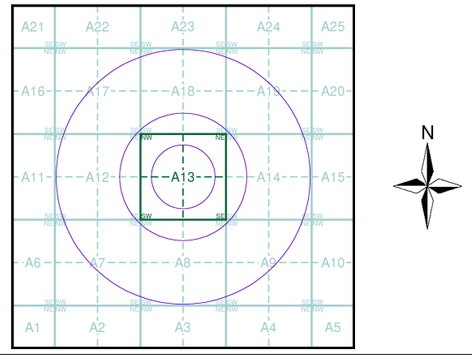
General

- 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



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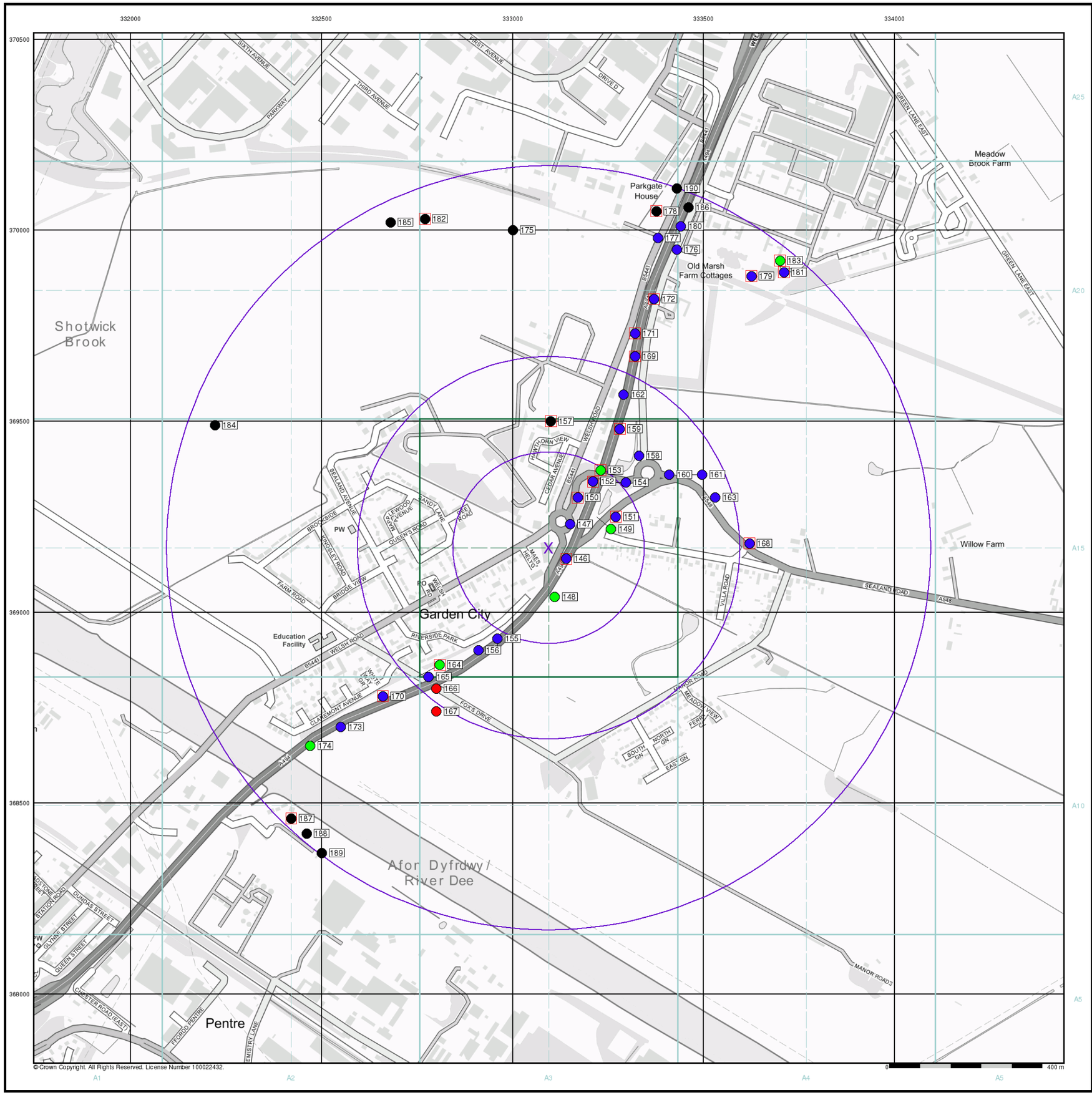

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LANDMARK INFORMATION GROUP®

General

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

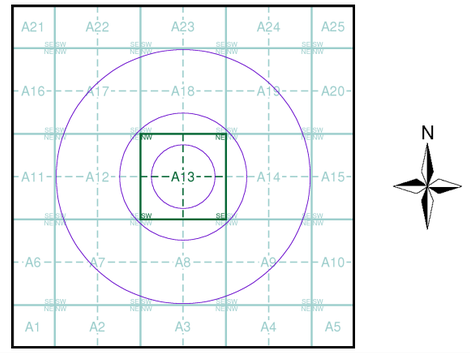
Agency and Hydrological (Boreholes)

- 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



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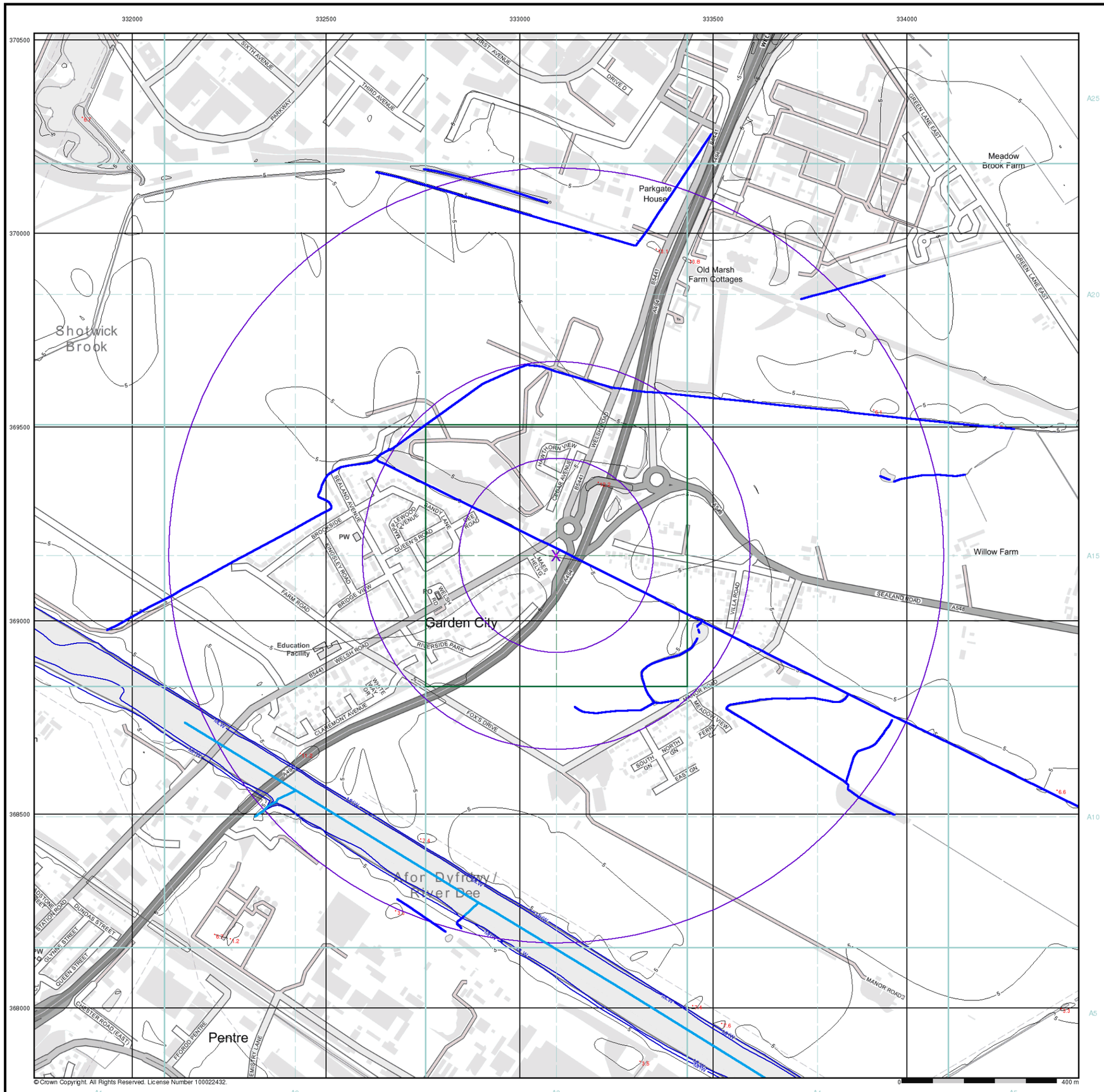

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LANDMARK INFORMATION GROUP®

General

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

OS Water Network Data

- Canal
- Reservoir
- Foreshore
- Marsh
- Tidal River
- Inland River
- Drain
- Other
- Lake
- Transfer
- Lock Or Flight Of Locks
- Sea

Contours (height in meters)

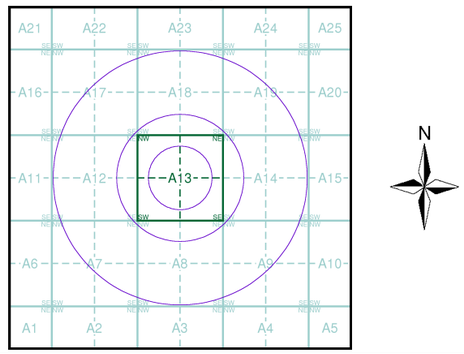
Standard Contour 105 100 95

Master Contour

Spot Height 167.3

- MLW Mean Low Water
- MHW Mean High Water

OS Water Network Map - Slice A



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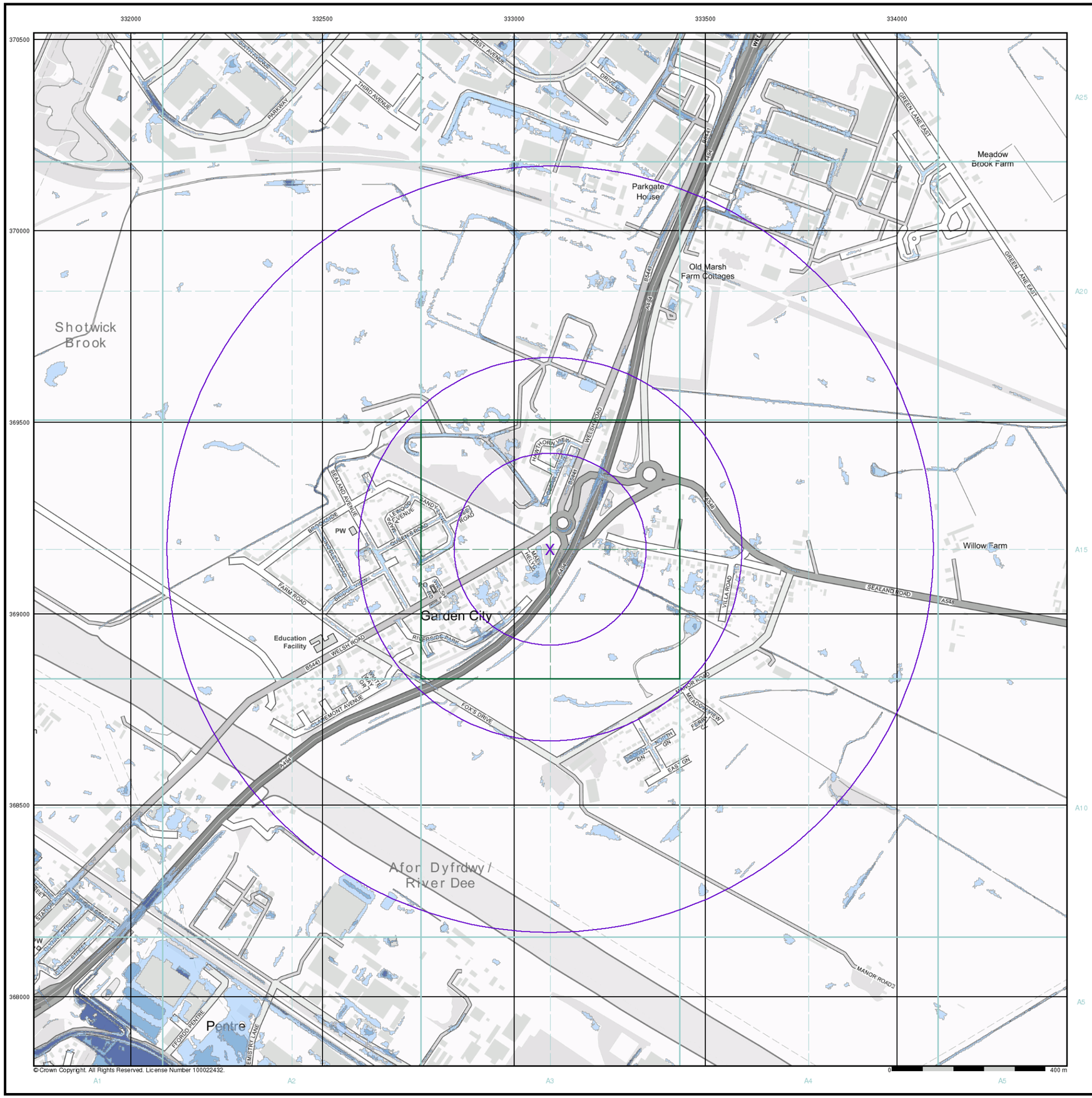

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LANDMARK INFORMATION GROUP®

General

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

Risk of Flooding from Surface Water

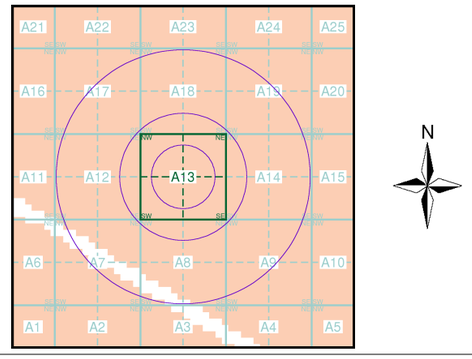
- High - 30 Year Return
- Medium - 100 Year Return
- Low - 1000 Year Return

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



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LANDMARK INFORMATION GROUP®

General

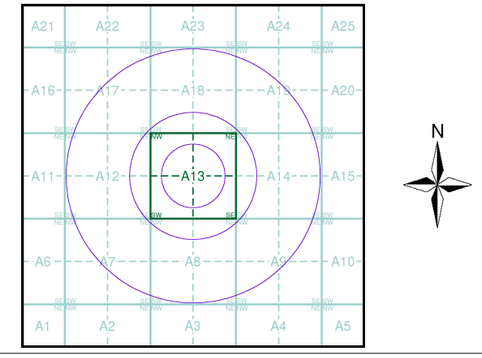
Specified Site Specified Buffer(s) X Bearing Reference Point

Estimated Soil Chemistry Arsenic

Arsenic Concentrations mg/kg

- < 15
- 15 - 25
- 25 - 35
- 35 - 45
- 45 - 60
- 60 - 120
- > 120

Estimated Soil Chemistry Arsenic - Slice A



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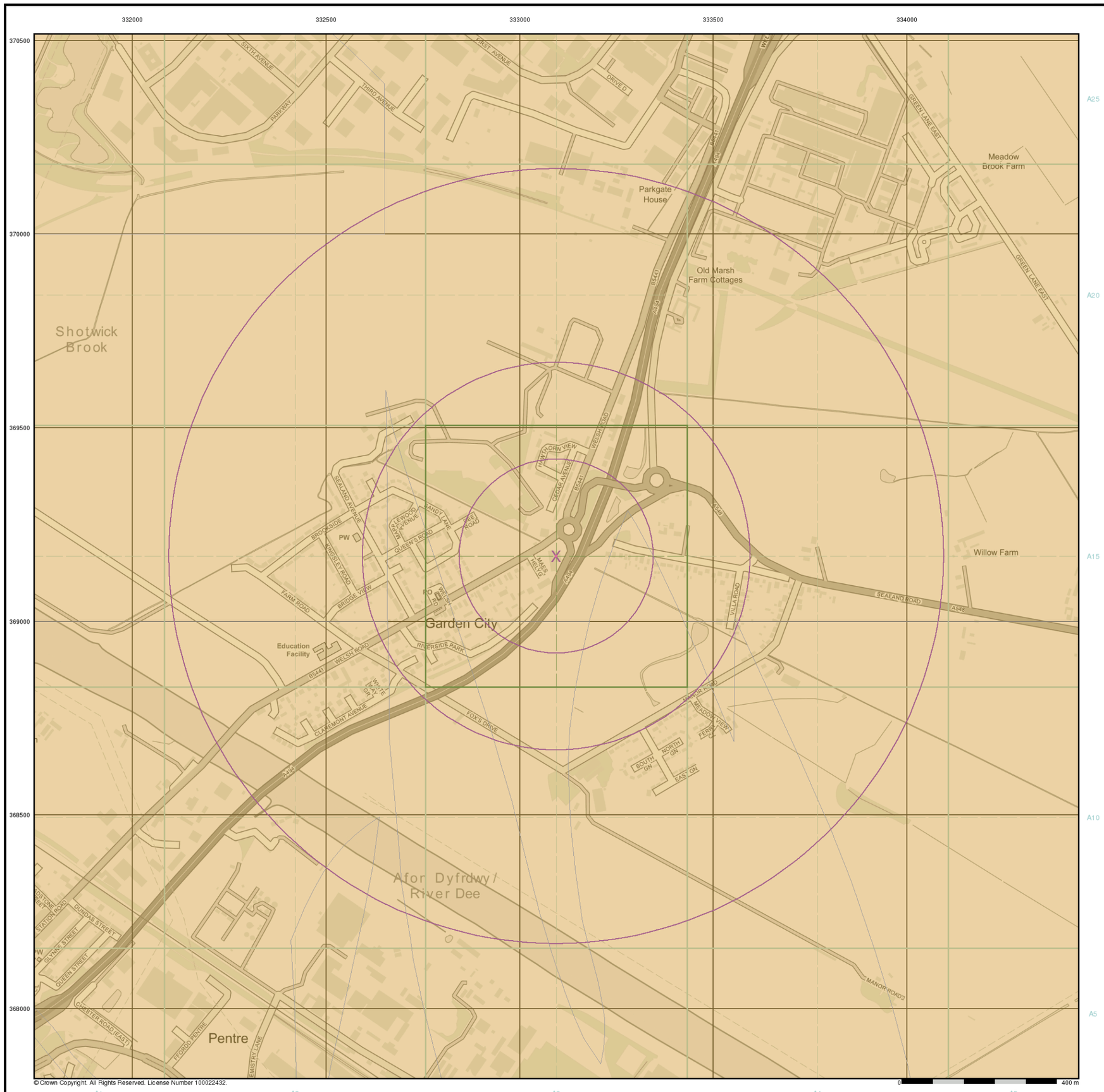

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LANDMARK INFORMATION GROUP®

General

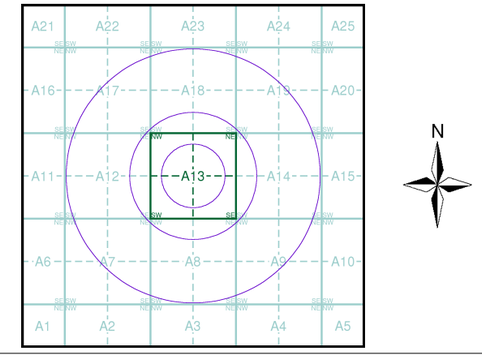
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Cadmium

Cadmium Concentrations mg/kg

- < 1.8
- 1.8 - 2.2
- 2.2 - 3.0
- > 3.0

Estimated Soil Chemistry Cadmium - Slice A



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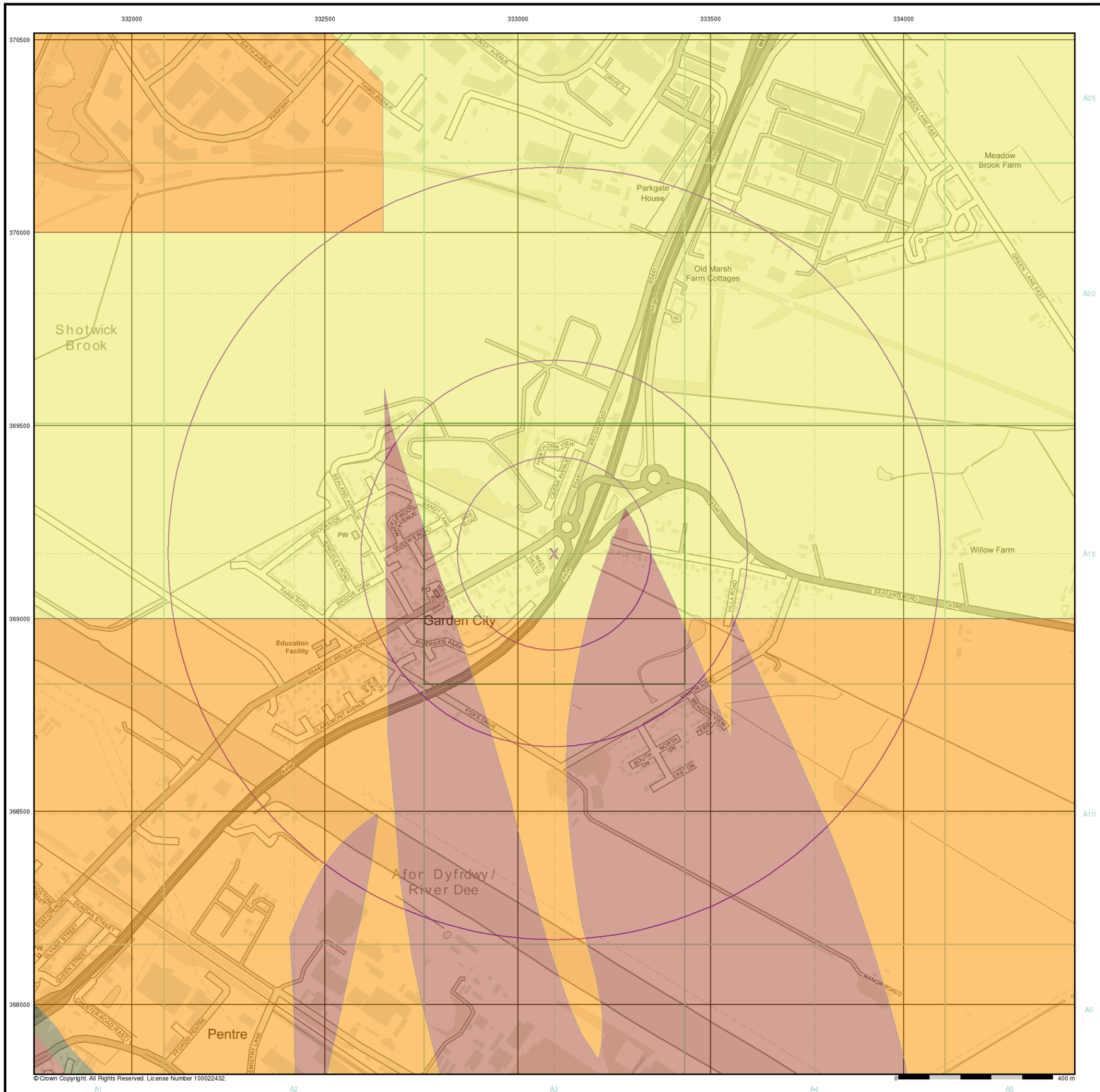

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LANDMARK INFORMATION GROUP®

General

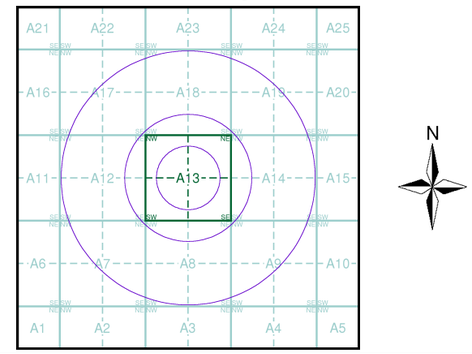
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Chromium

Chromium Concentrations mg/kg

- < 20
- 20 - 40
- 40 - 60
- 60 - 90
- 90 - 120
- 120 - 180
- > 180

Estimated Soil Chemistry Chromium - Slice A



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A1 A2 A3 A4 A5

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General

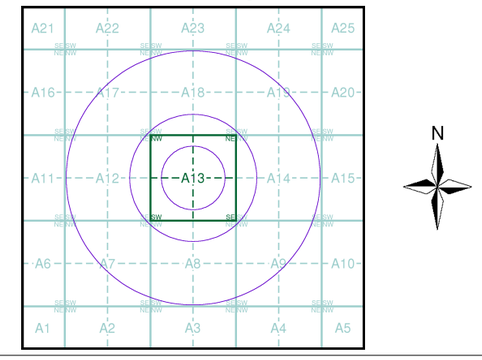
Specified Site Specified Buffer(s) X Bearing Reference Point

Estimated Soil Chemistry Lead

Lead Concentrations mg/kg

- <100 mg/kg
- 100 - 200
- 200 - 300
- 300 - 600
- 600 - 1200
- >1200

Estimated Soil Chemistry Lead - Slice A



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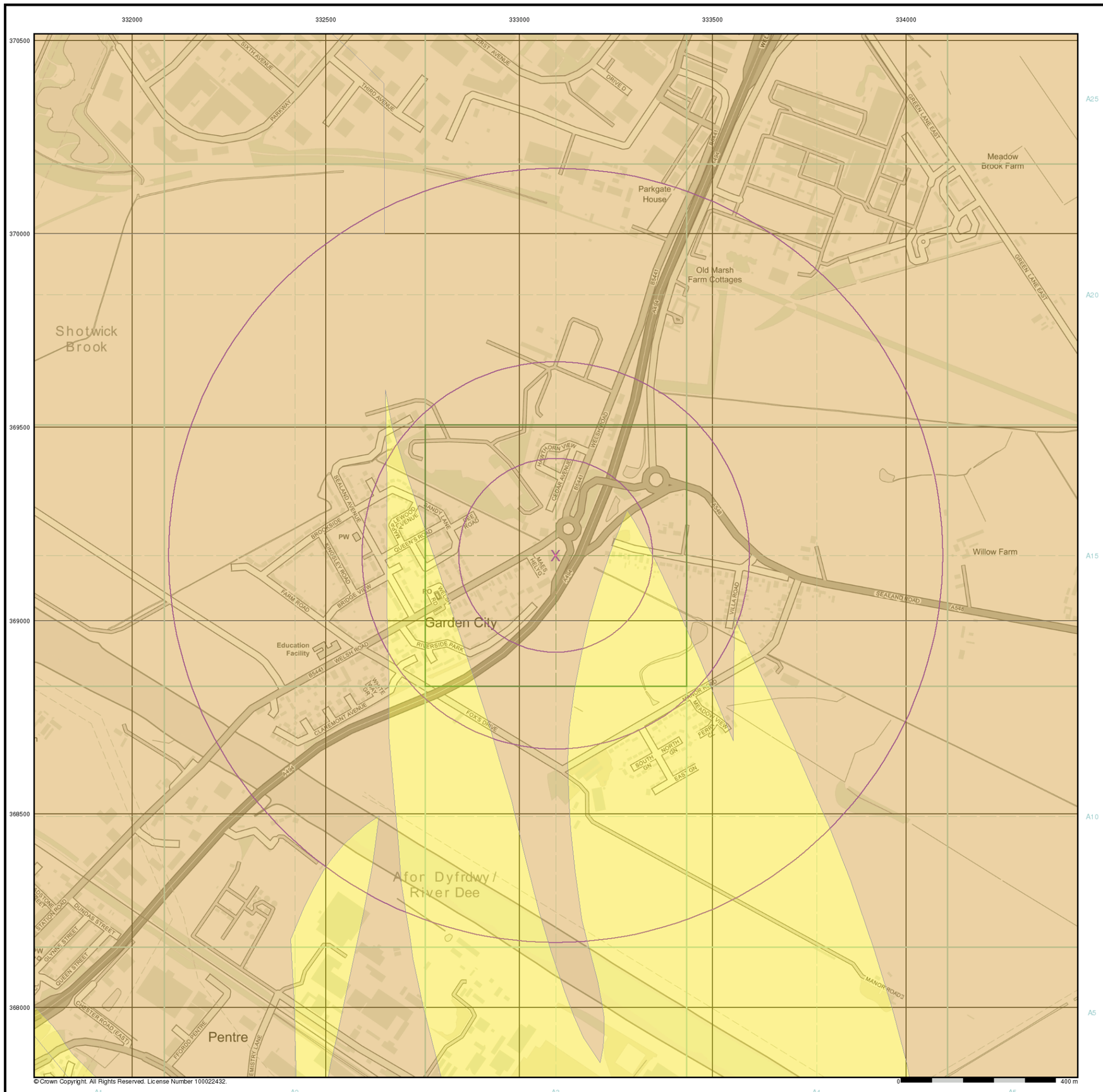

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LANDMARK INFORMATION GROUP®

General

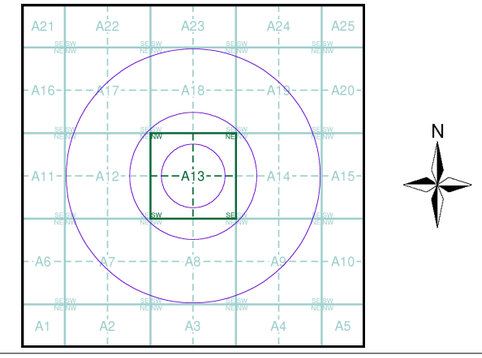
Specified Site Specified Buffer(s) X Bearing Reference Point

Estimated Soil Chemistry Nickel

Nickel Concentrations mg/kg

- < 15
- 15 - 30
- 30 - 45
- 45 - 60
- 60 - 80
- 80 - 100
- > 100

Estimated Soil Chemistry Nickel - Slice A



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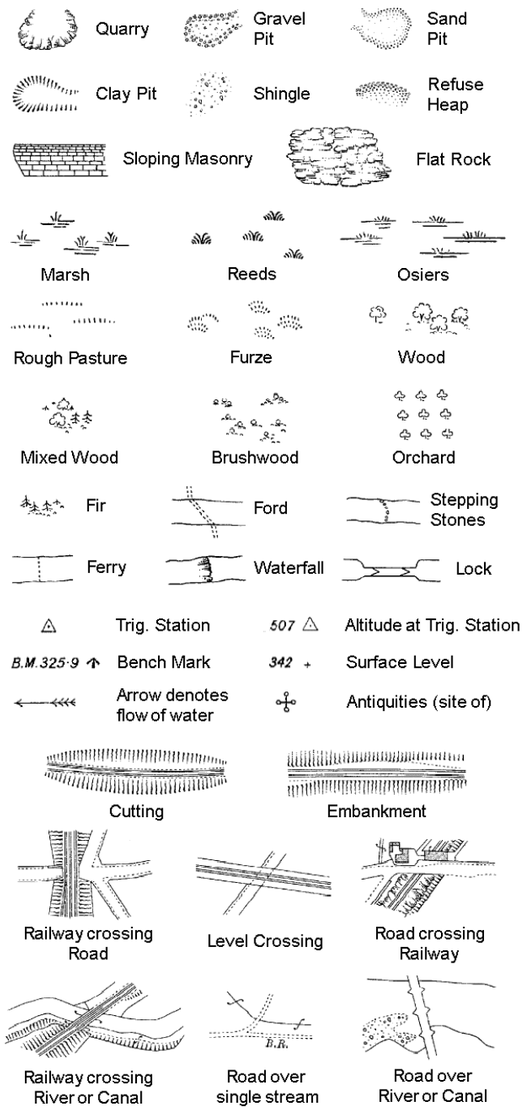
Historical Mapping Legends

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



County Boundary (Geographical)

County & Civil Parish Boundary

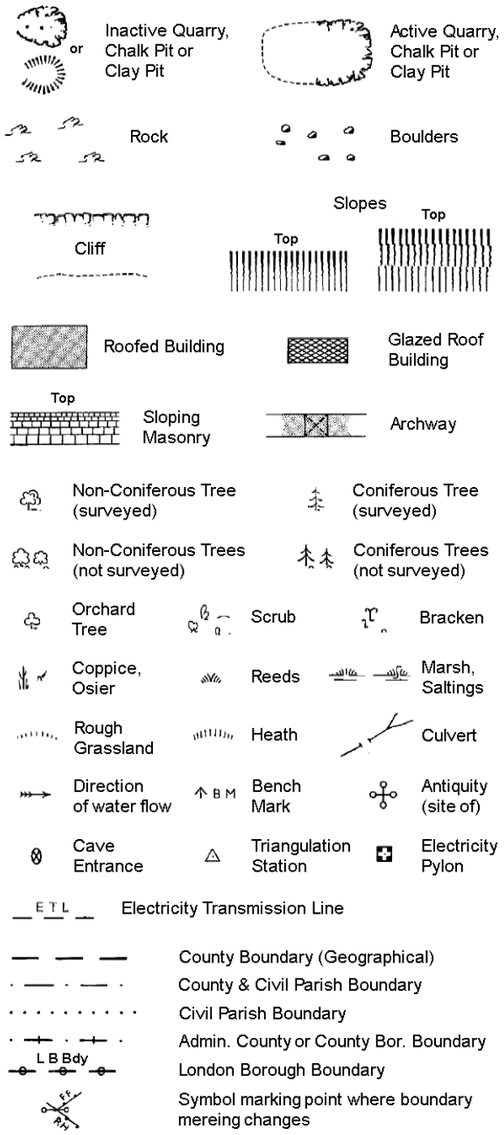
Administrative County & Civil Parish Boundary

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

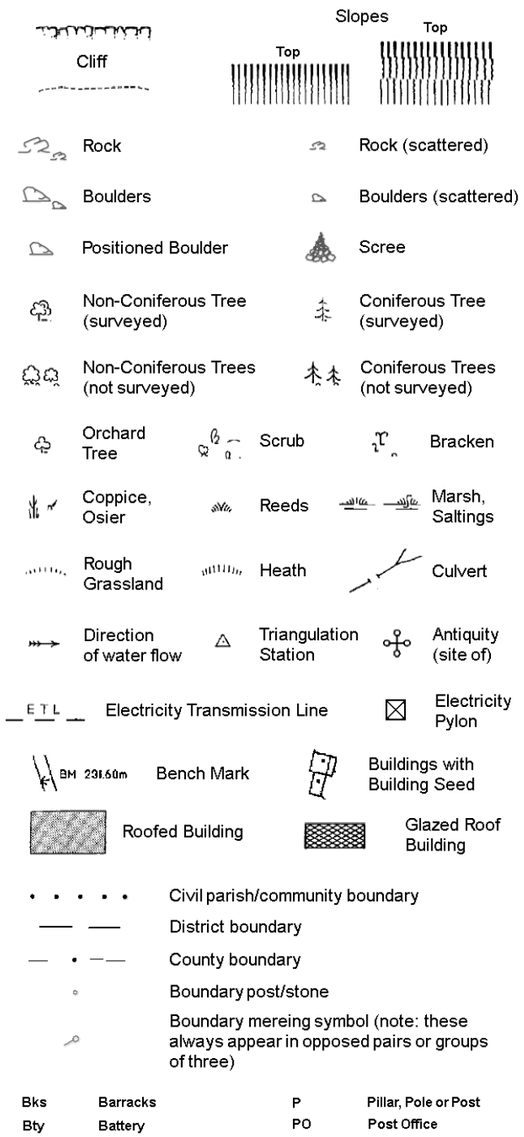
Admin. County or County Bor. Boundary

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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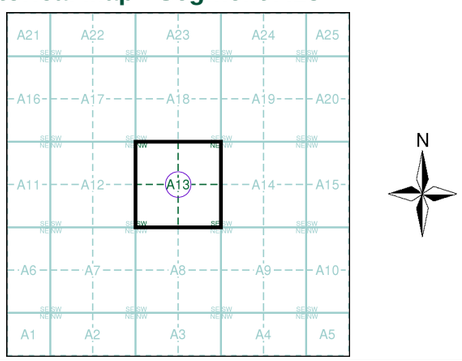
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Flintshire	1:2,500	1870	2
Cheshire	1:2,500	1874	3
Flintshire	1:2,500	1899	4
Cheshire	1:2,500	1899	5
Cheshire	1:2,500	1911	6
Flintshire	1:2,500	1911	7
Ordnance Survey Plan	1:2,500	1964	8
Supply of Unpublished Survey Information	1:2,500	1975 - 1976	9
Supply of Unpublished Survey Information	1:2,500	1976	10
Additional SIMs	1:2,500	1977 - 1978	11
Ordnance Survey Plan	1:1,250	1979 - 1980	12
Additional SIMs	1:2,500	1988	13
Large-Scale National Grid Data	1:1,250	1992	14
Large-Scale National Grid Data	1:2,500	1992	15
Large-Scale National Grid Data	1:1,250	1993	16
Historical Aerial Photography	1:2,500	2001	17

Historical Map - Segment A13



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Site Details

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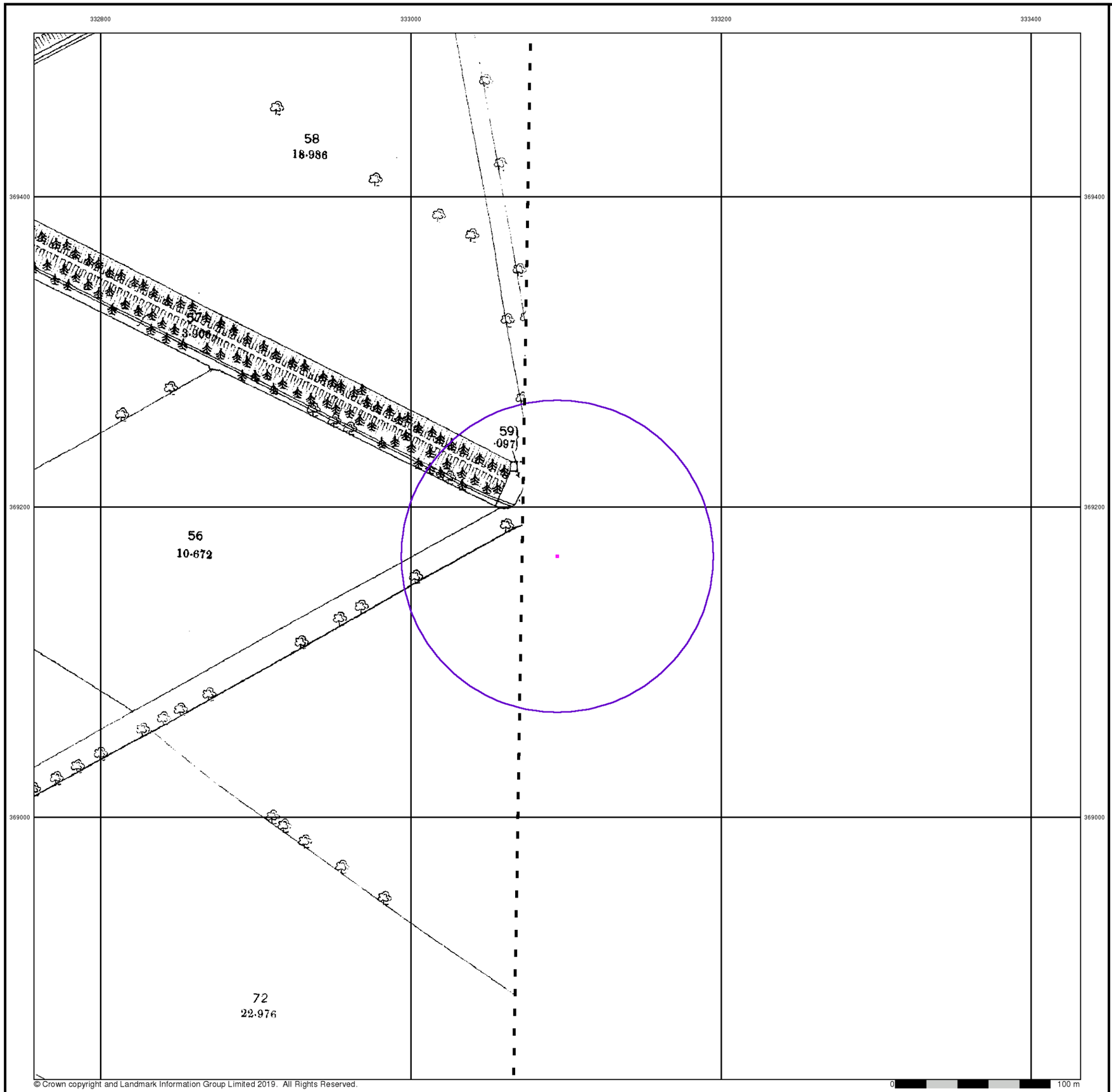

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LANDMARK INFORMATION GROUP®

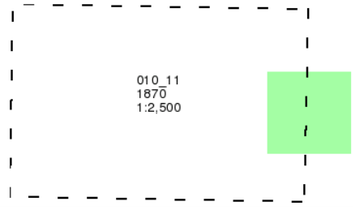
Flintshire

Published 1870

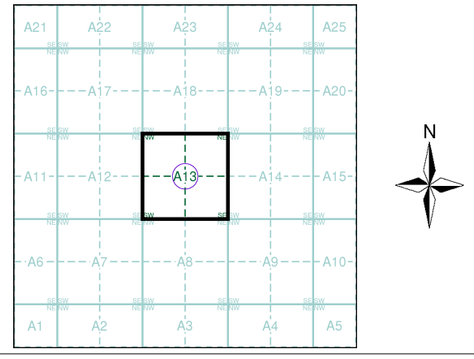
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



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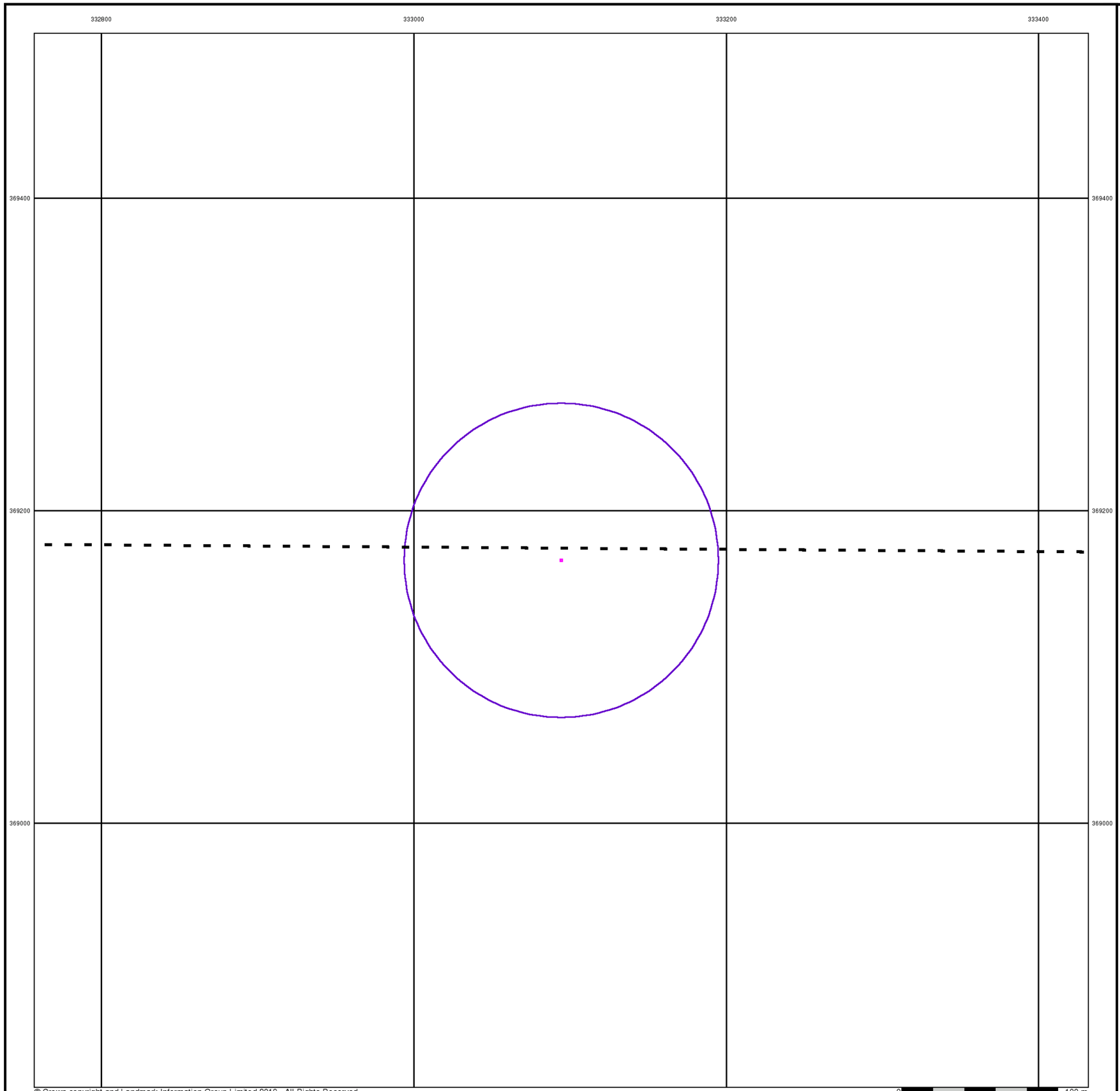

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LANDMARK INFORMATION GROUP®

Cheshire

Published 1874

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.

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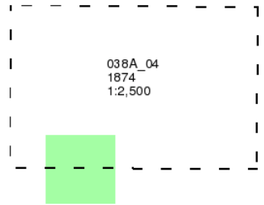
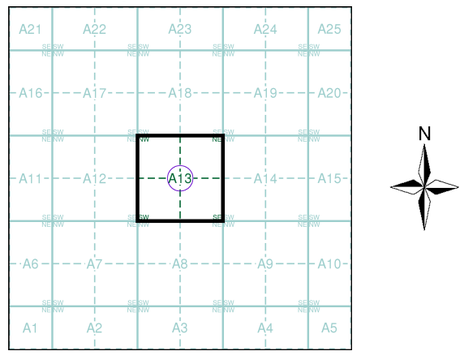


Historical Map - Segment A13



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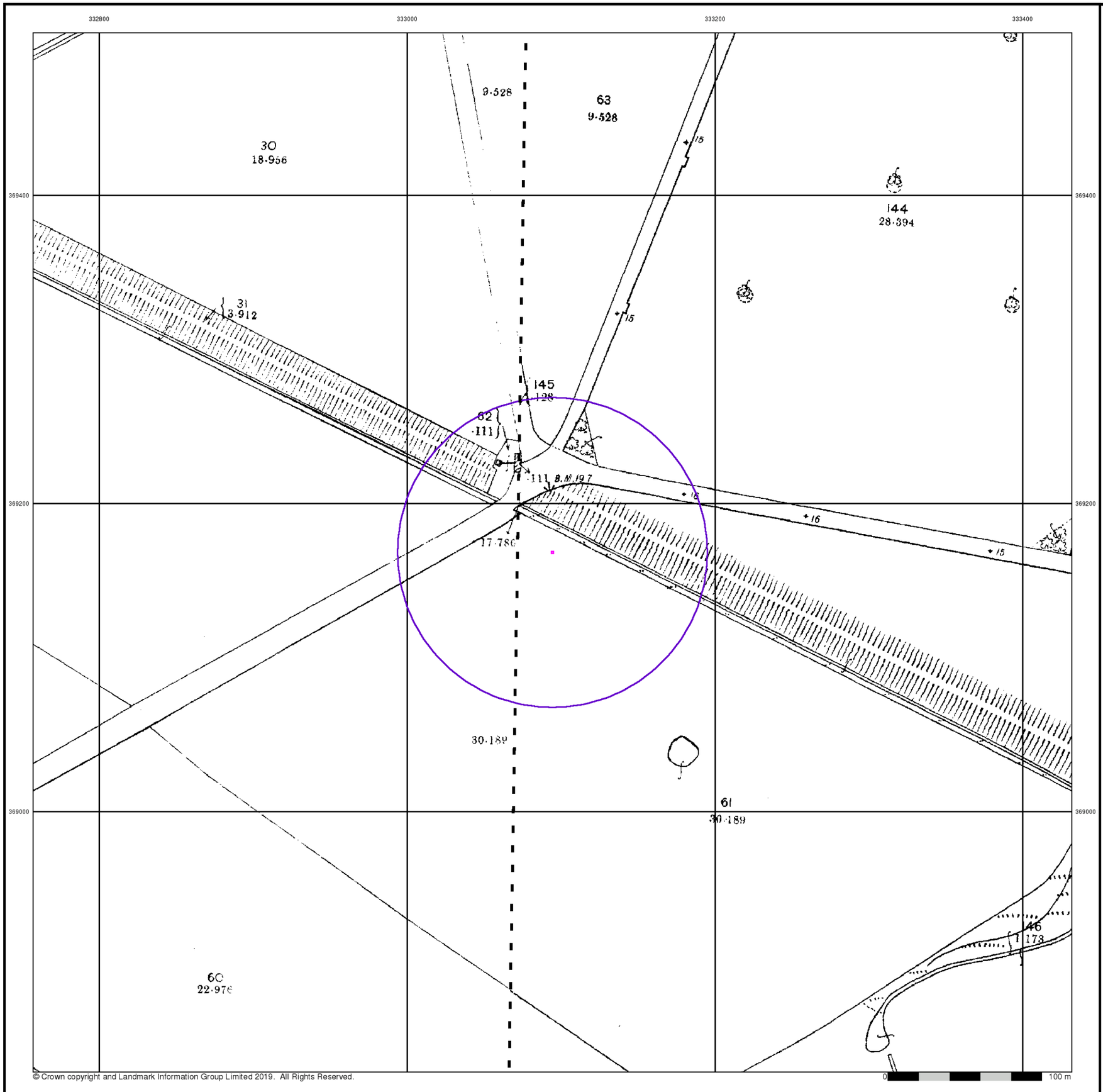


0 100 m

Envirocheck®

LANDMARK INFORMATION GROUP®

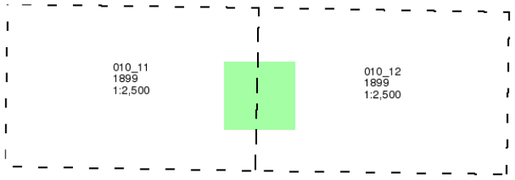
Flintshire

Published 1899

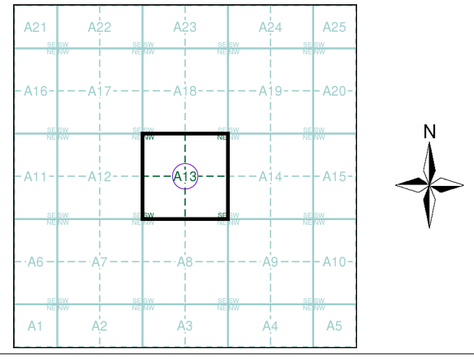
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	100

Site Details

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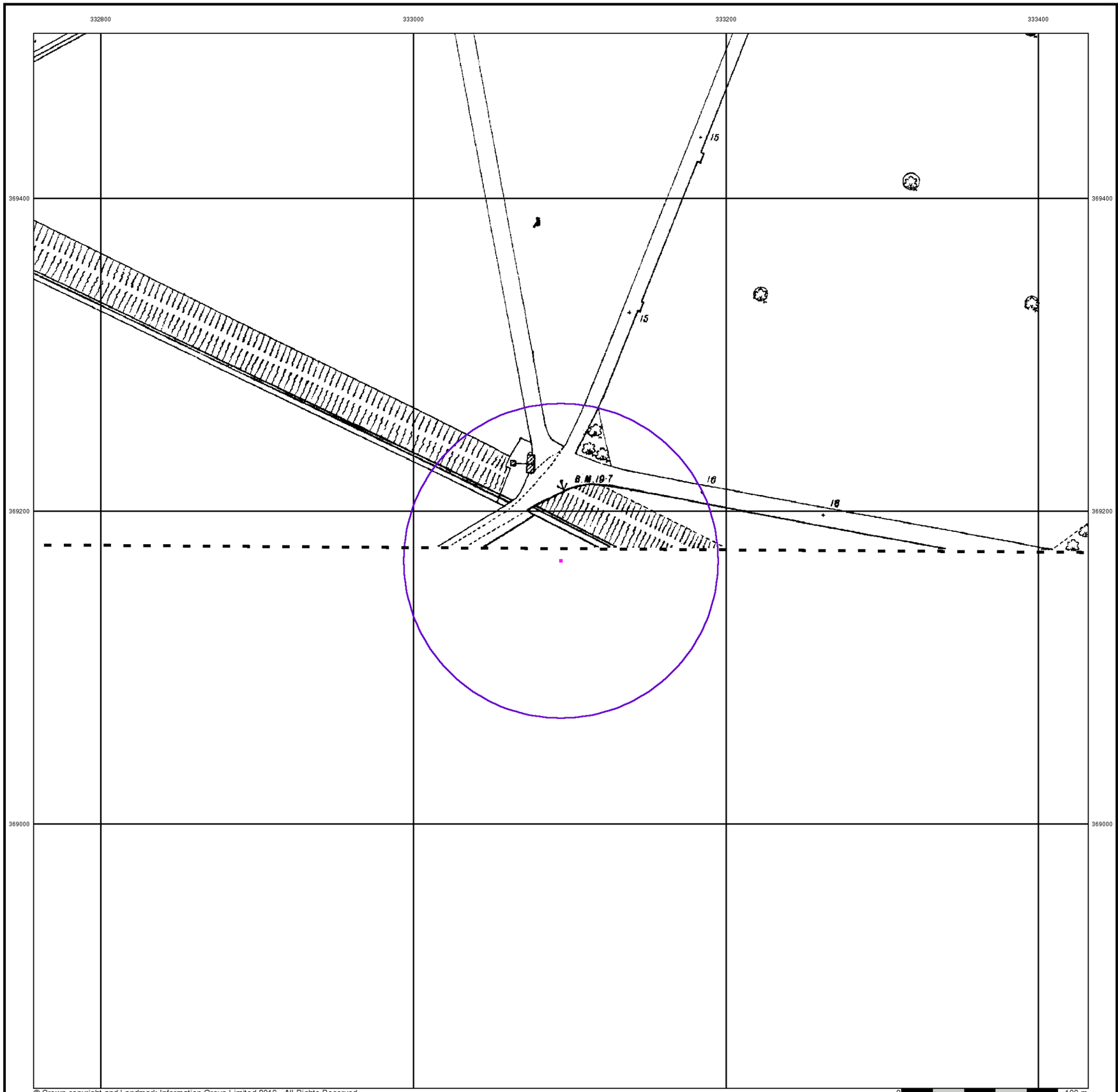

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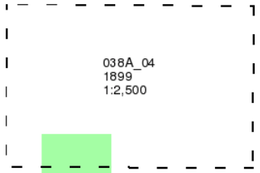
Cheshire

Published 1899

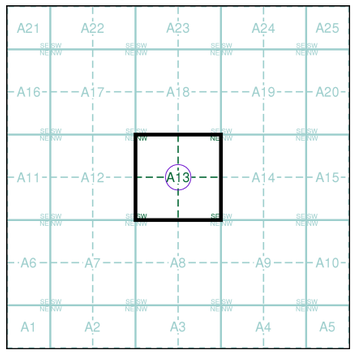
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



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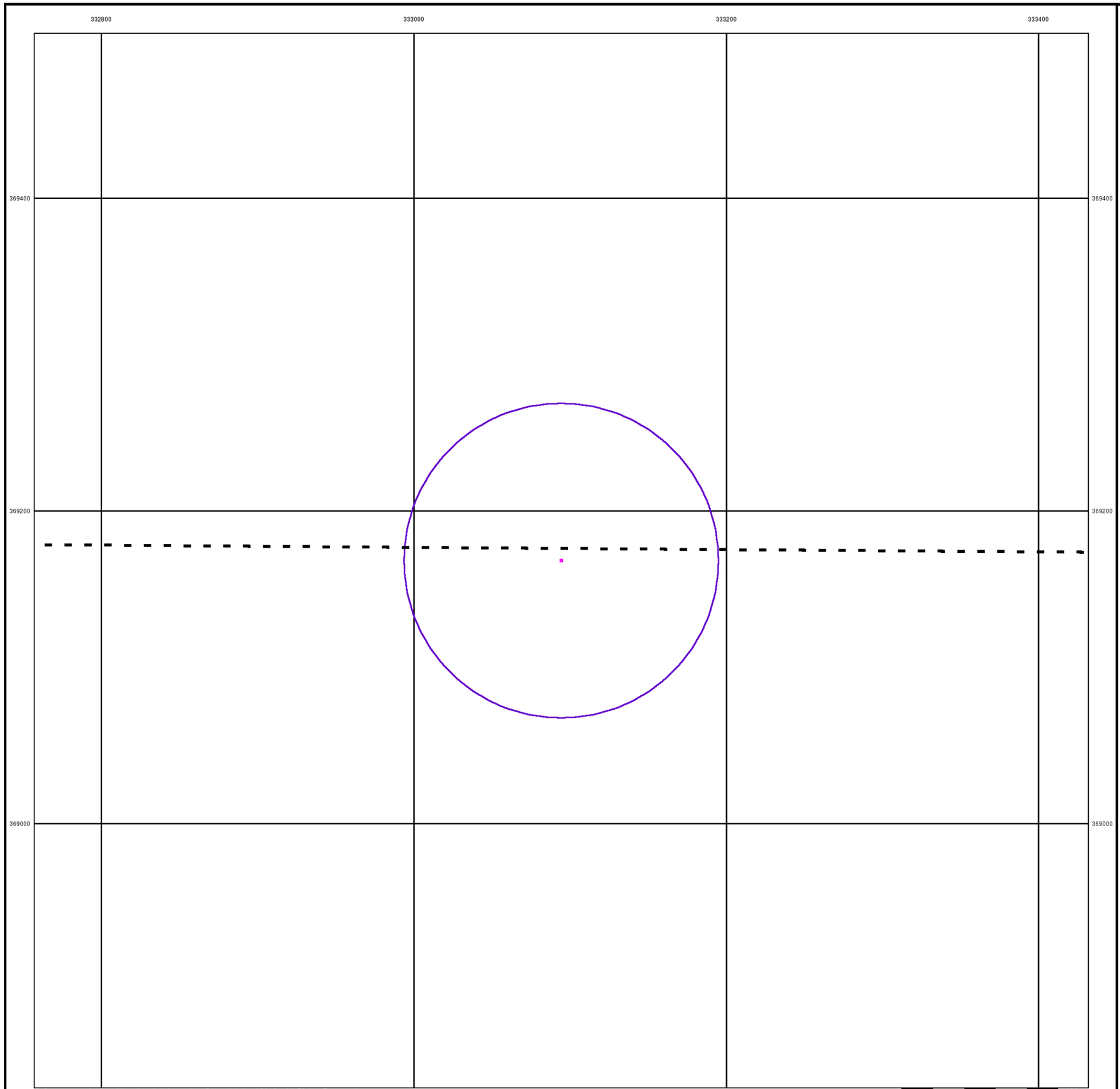

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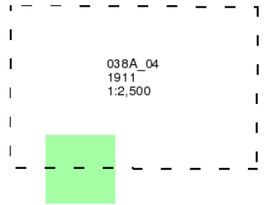
Cheshire

Published 1911

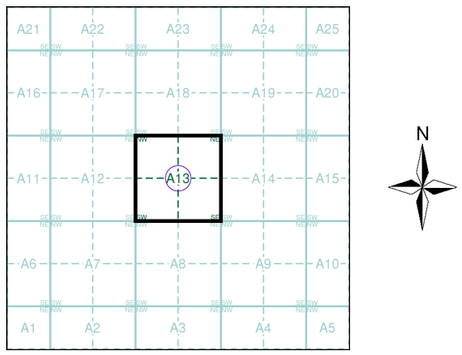
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



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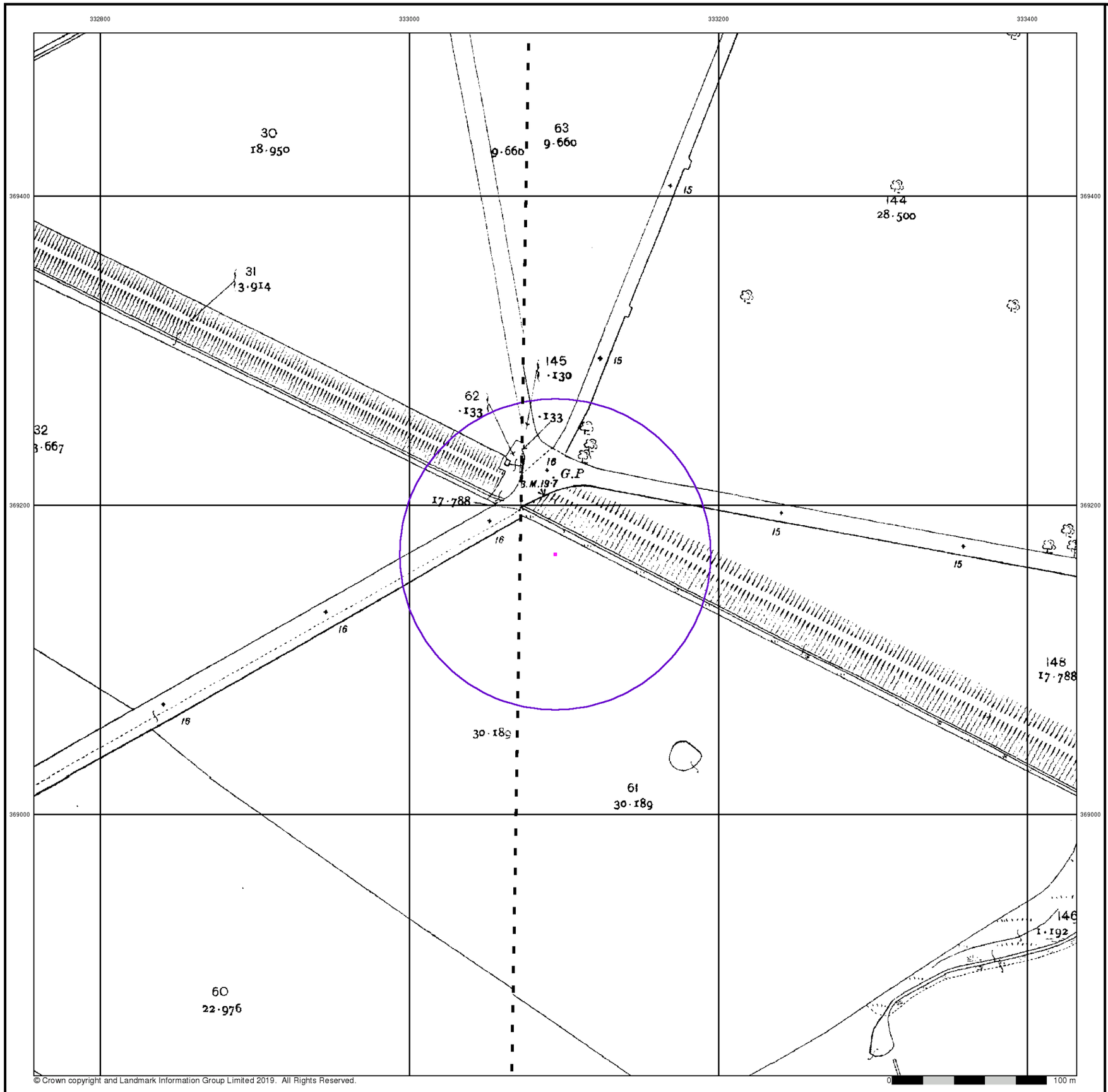

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Flintshire

Published 1911

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.

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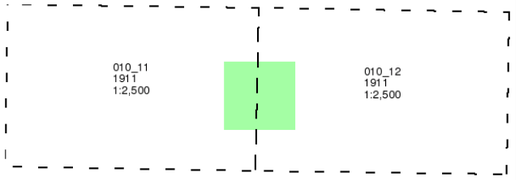
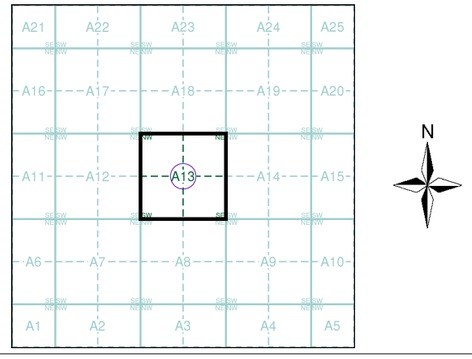


Historical Map - Segment A13



Order Details

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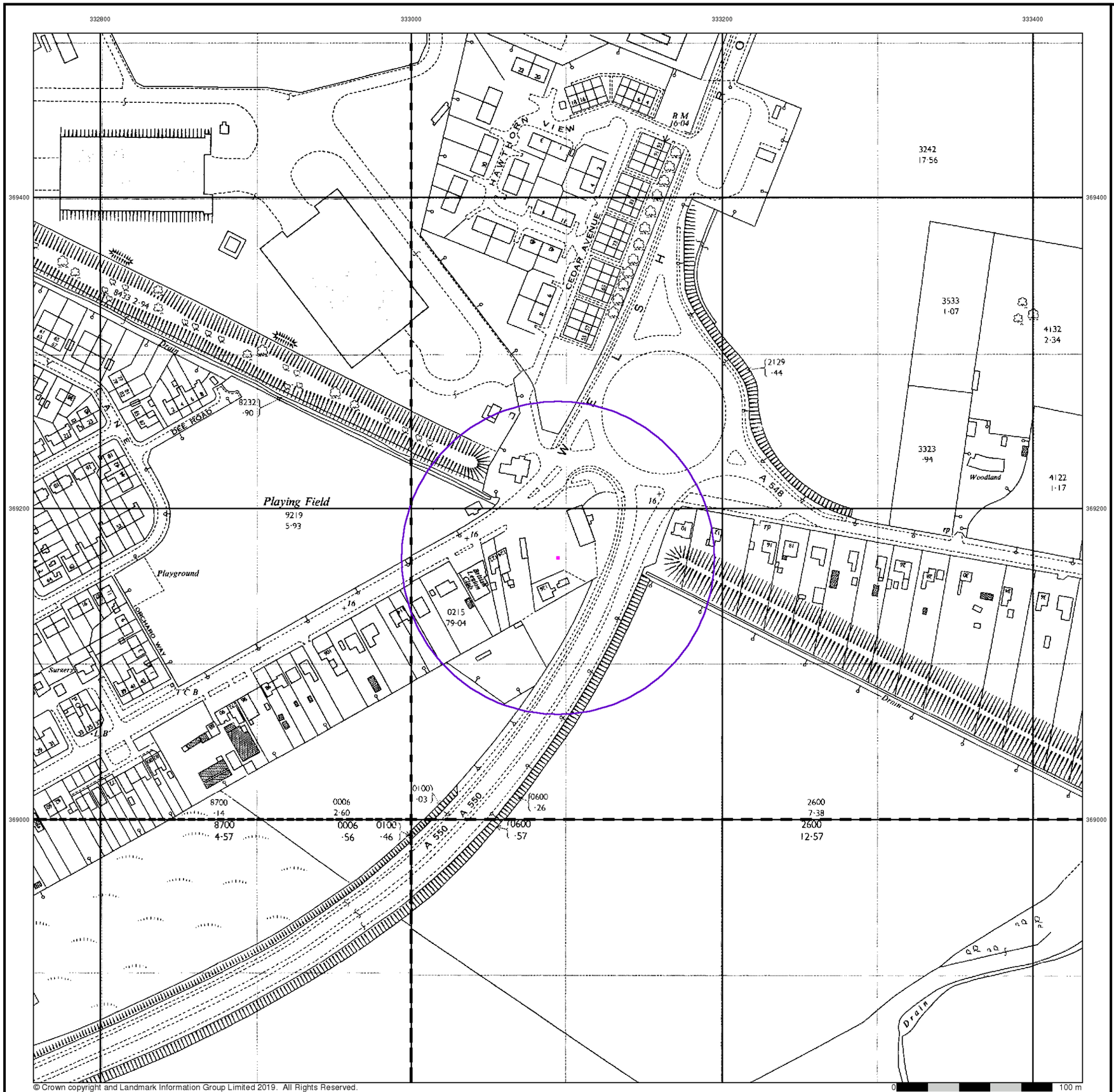

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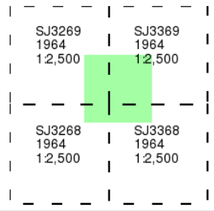
Ordnance Survey Plan

Published 1964

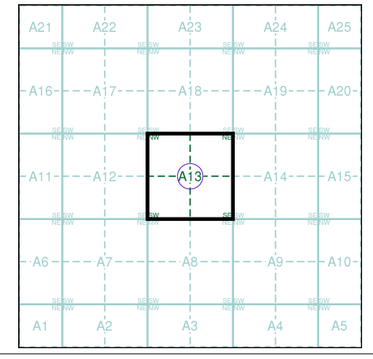
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



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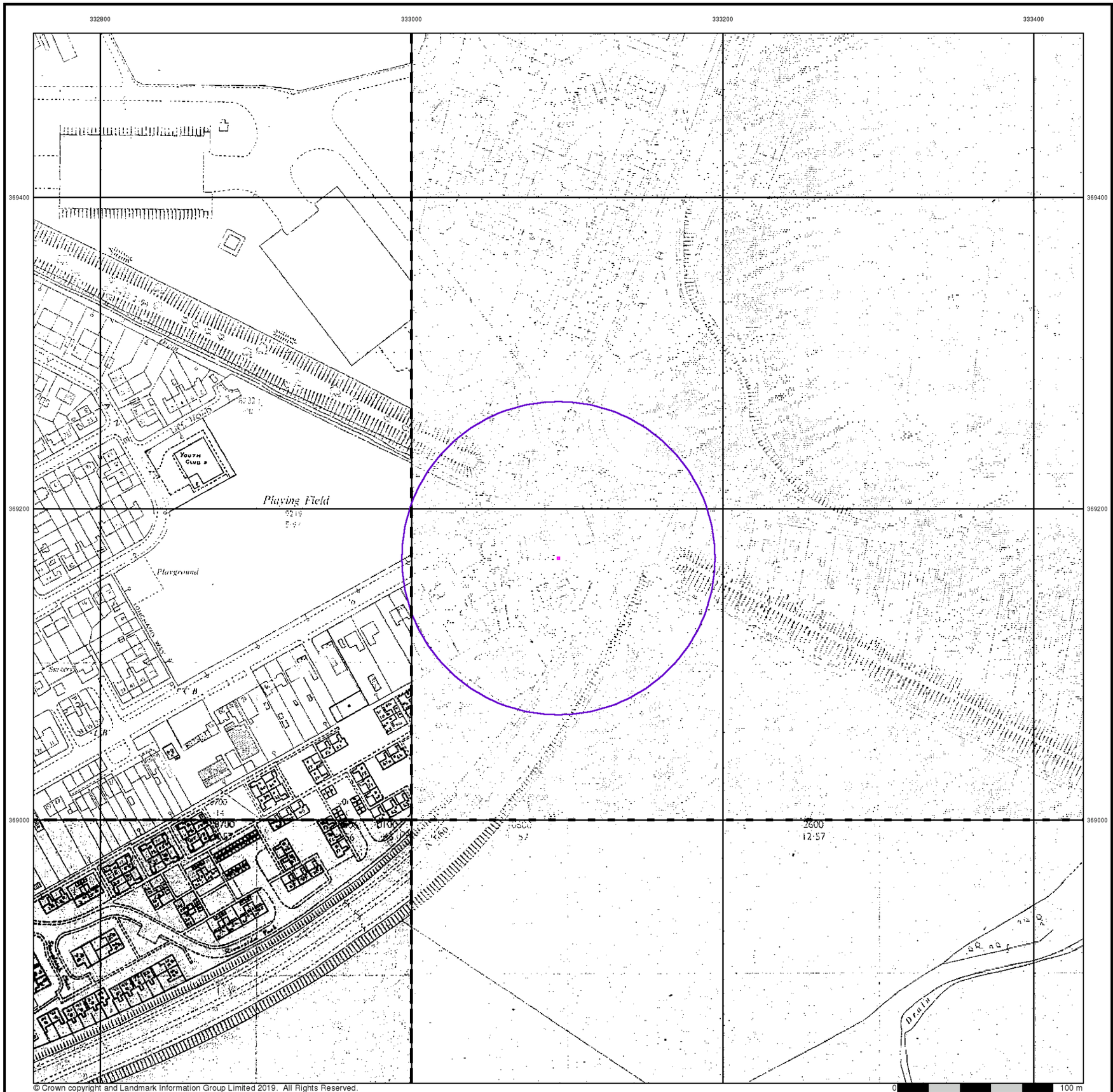

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Supply of Unpublished Survey Information

Published 1975 - 1976

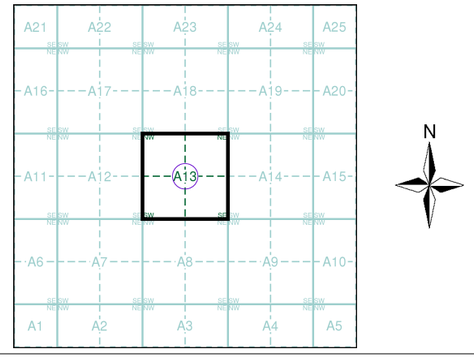
Source map scale - 1:2,500

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)

SJ3269 1975 1:2,500
SJ3369 1976 1:2,500
SJ3268 1975 1:2,500
SJ3368 1976 1:2,500

Historical Map - Segment A13



Order Details

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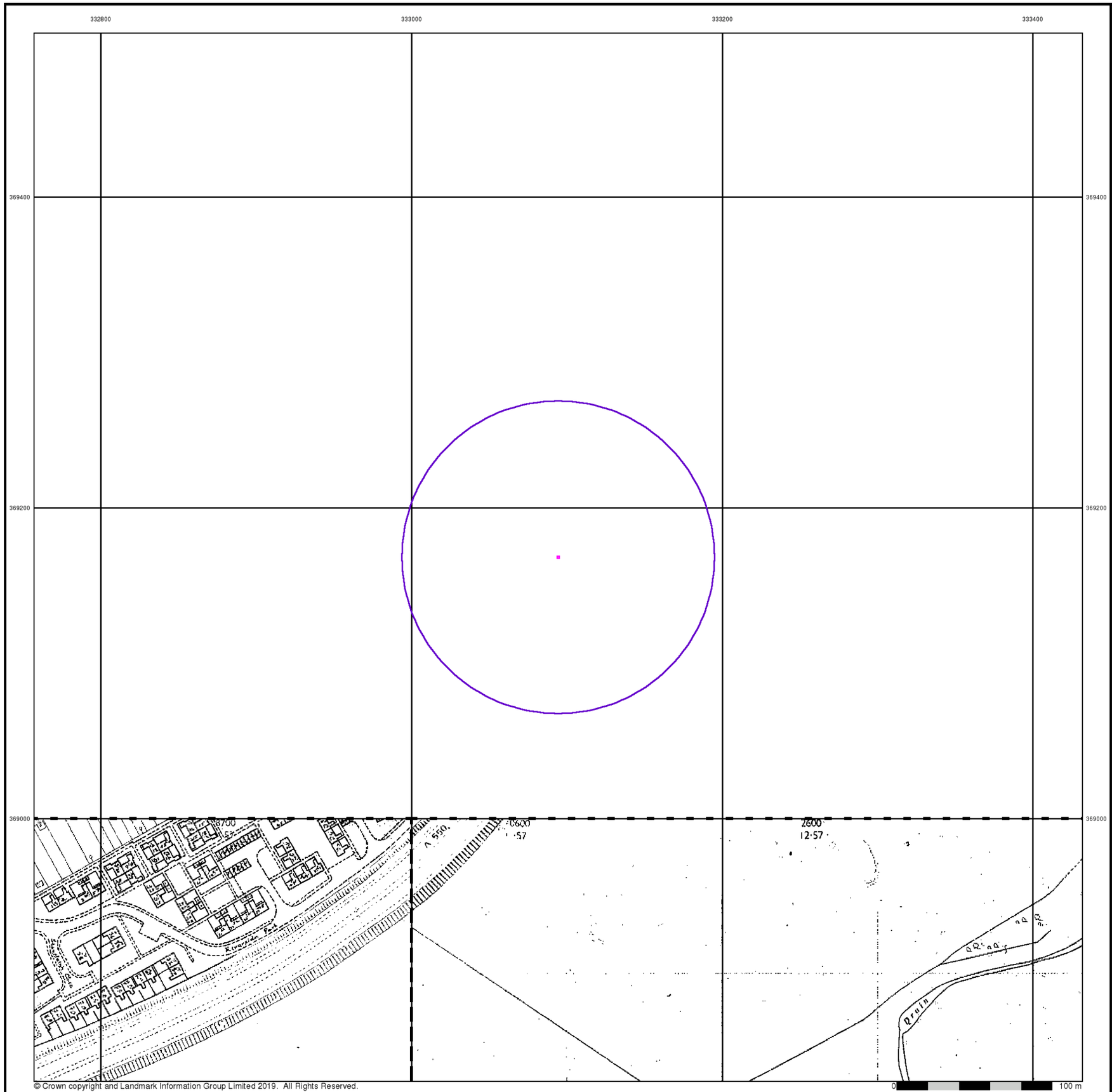

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LANDMARK INFORMATION GROUP®

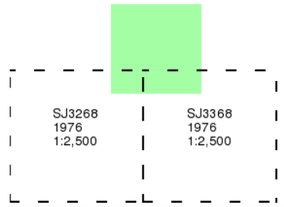
Supply of Unpublished Survey Information

Published 1976

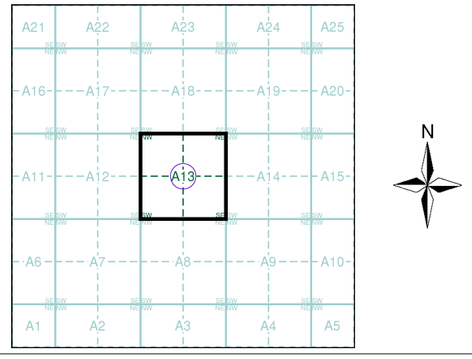
Source map scale - 1:2,500

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 A13



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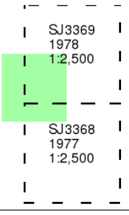
Additional SIMs

Published 1977 - 1978

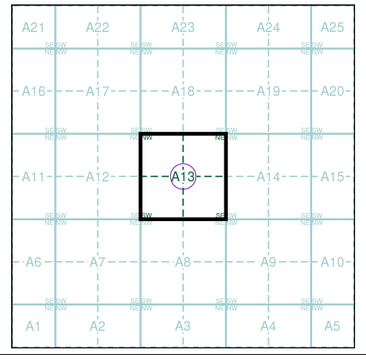
Source map scale - 1:2,500

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 A13



Order Details

Order Number:	201123677_1_1
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Slice:	A
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Site Details

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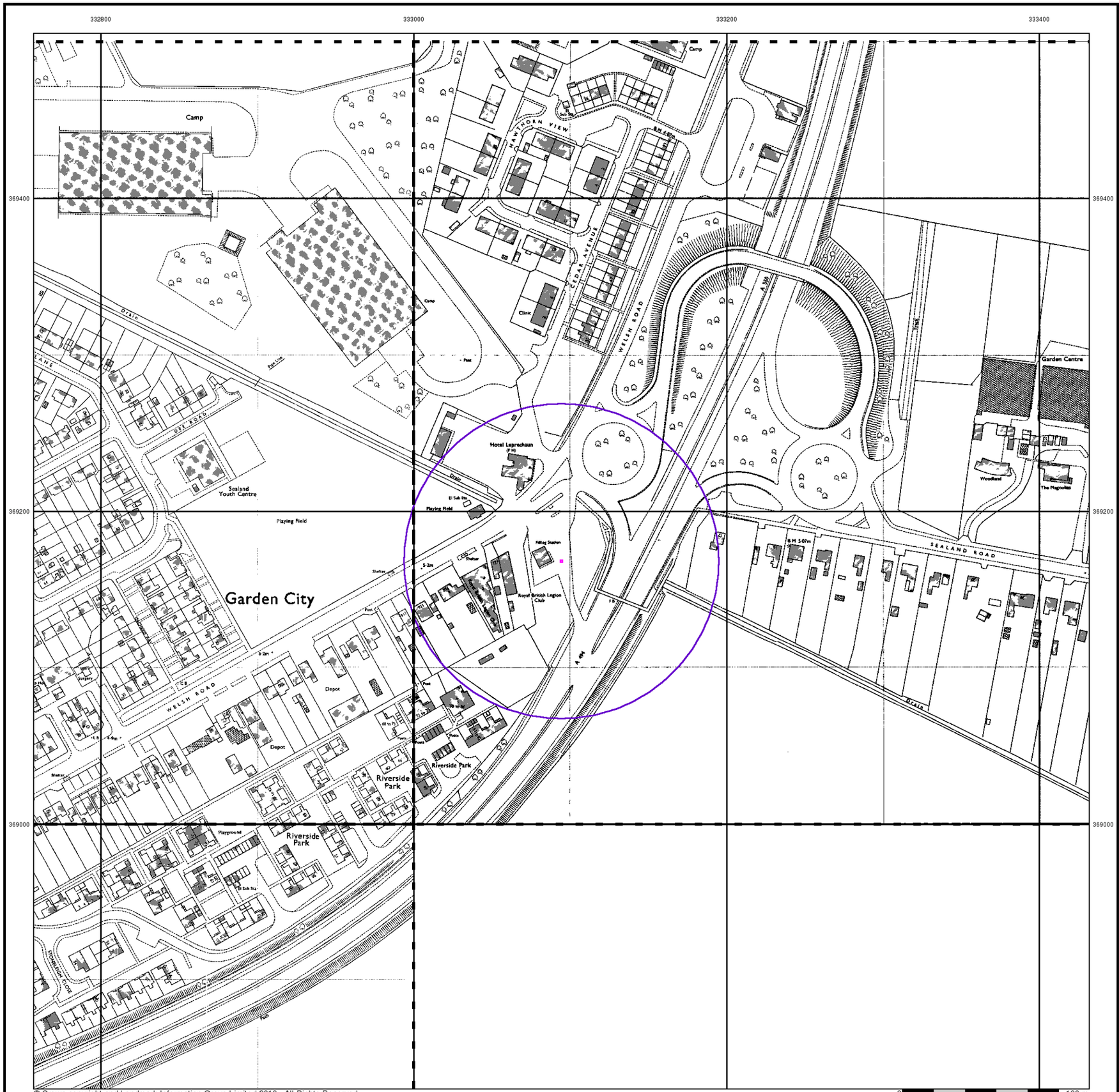

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Ordnance Survey Plan

Published 1979 - 1980

Source map scale - 1:1,250

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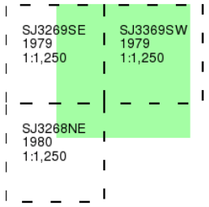
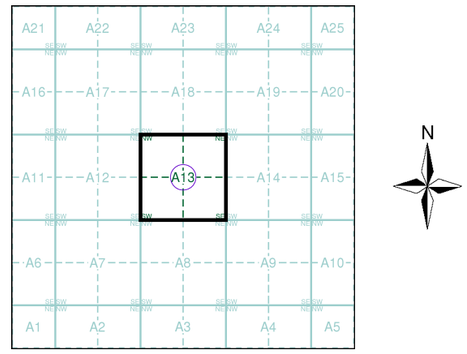
Map Name(s) and Date(s)



Historical Map - Segment A13



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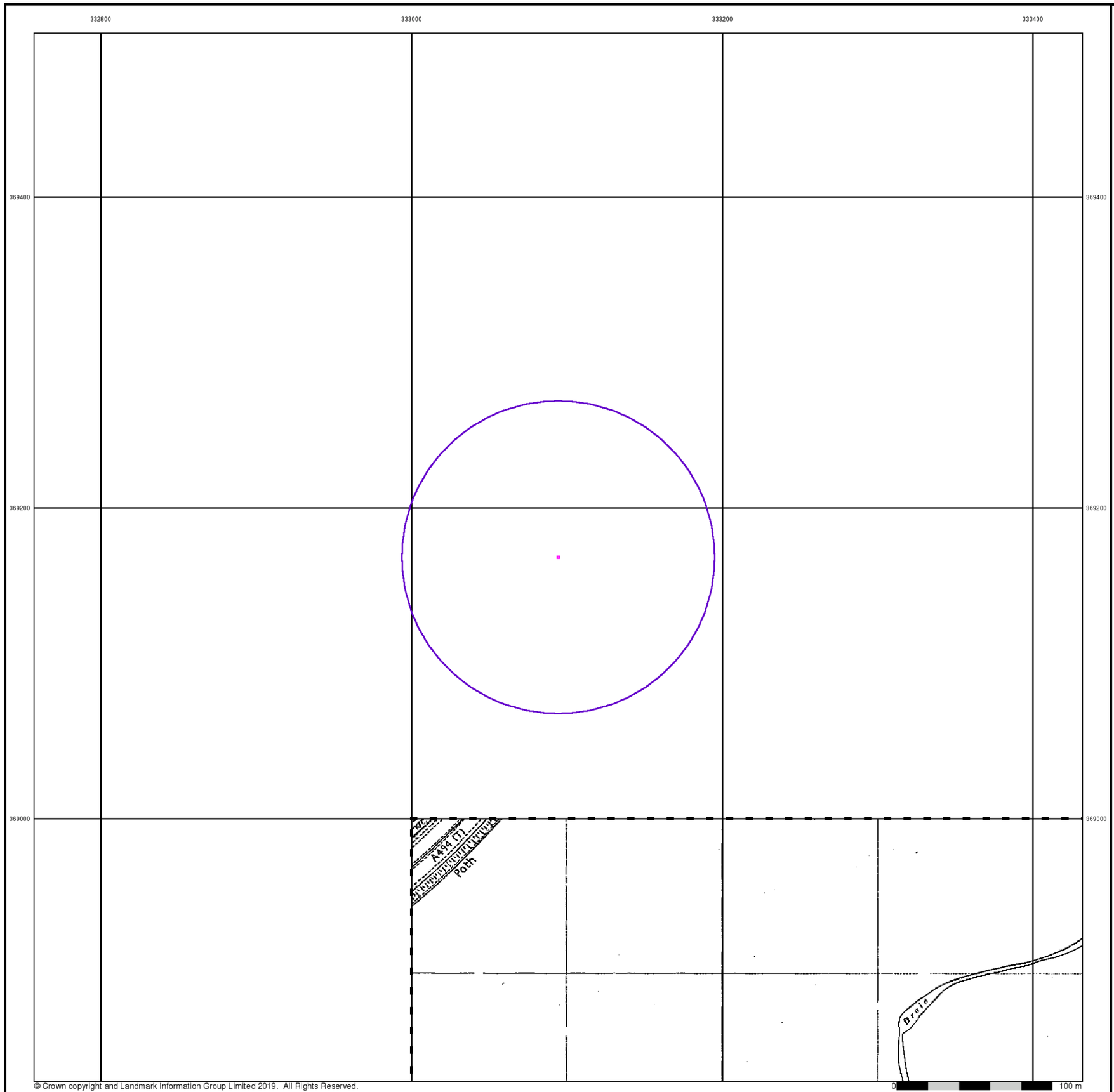

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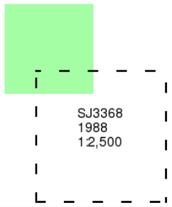
Additional SIMs

Published 1988

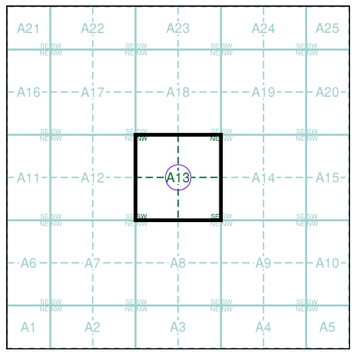
Source map scale - 1:2,500

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 A13



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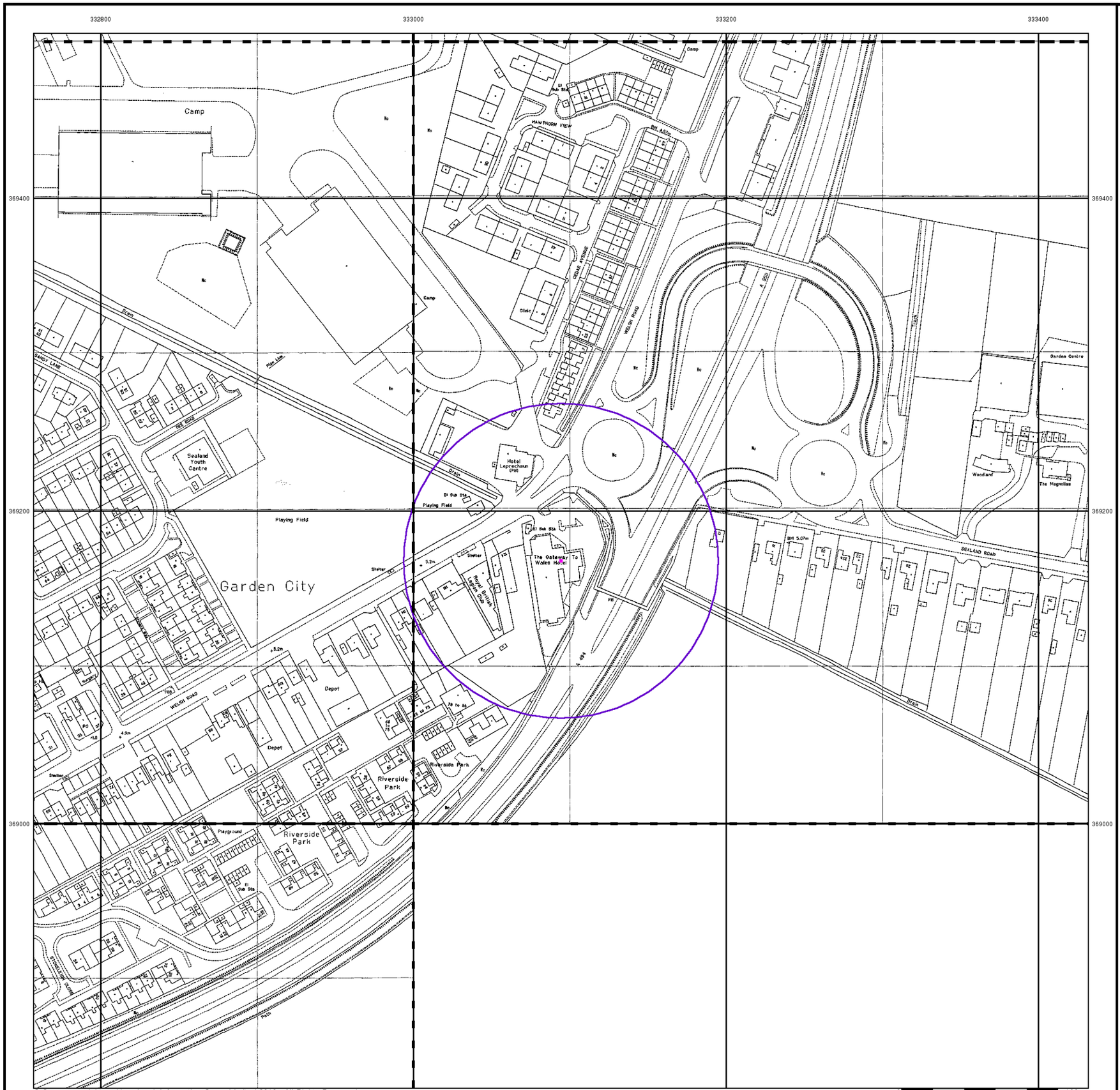

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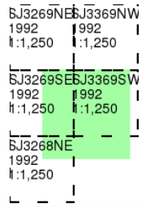
Large-Scale National Grid Data

Published 1992

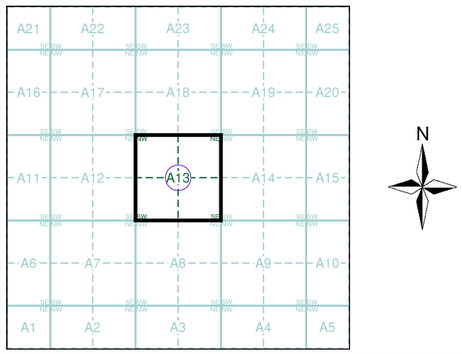
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



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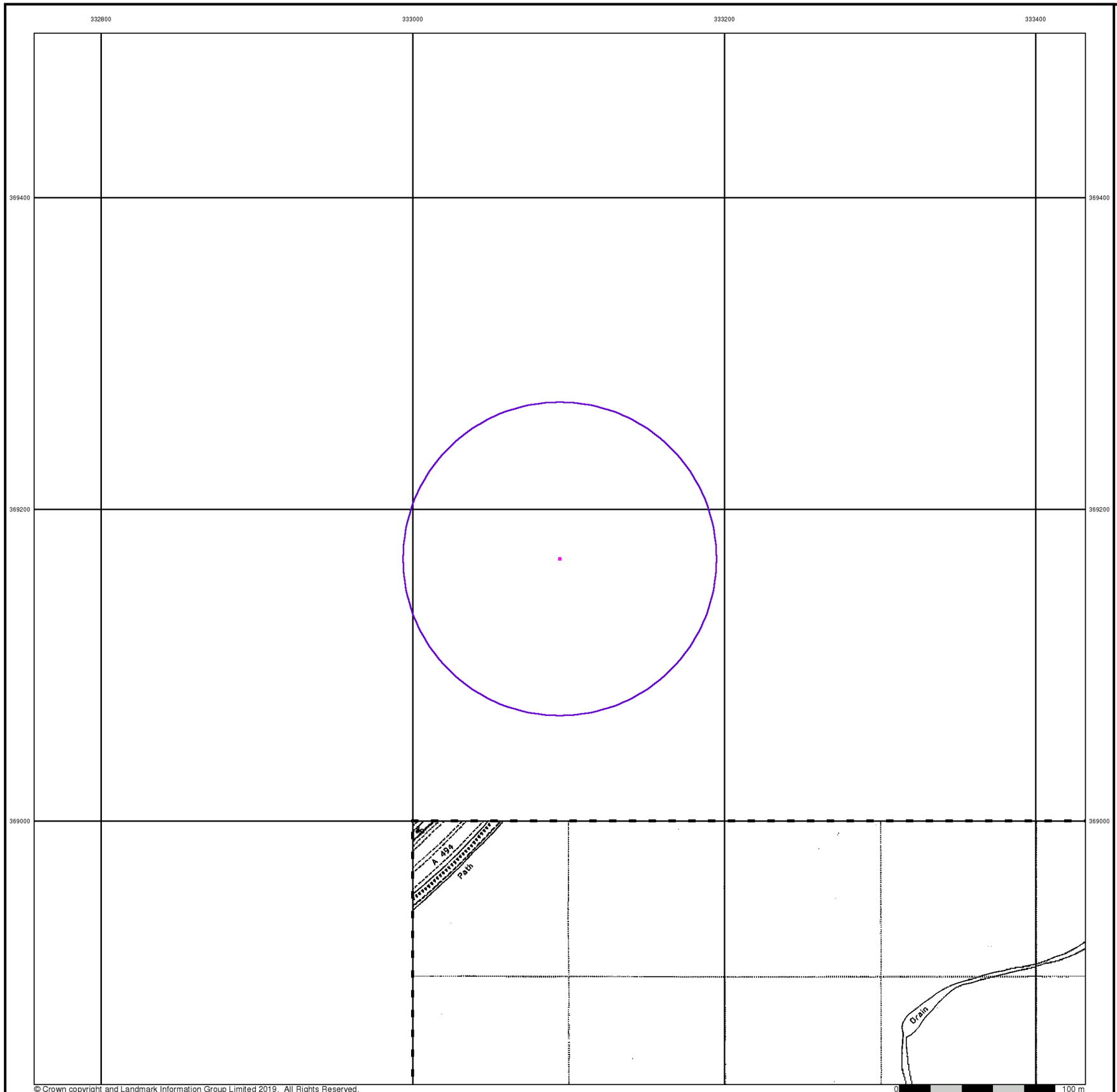

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LANDMARK INFORMATION GROUP®

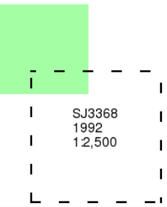
Large-Scale National Grid Data

Published 1992

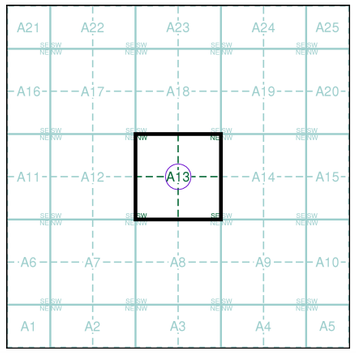
Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



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Published 1993

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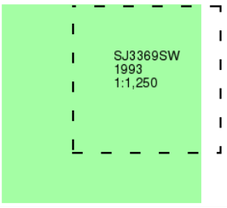
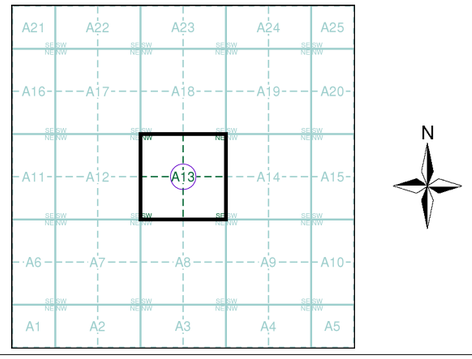


Historical Map - Segment A13



Order Details

Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	100

Site Details

118, Welsh Road, Garden City, DEESIDE, CH5 2HX

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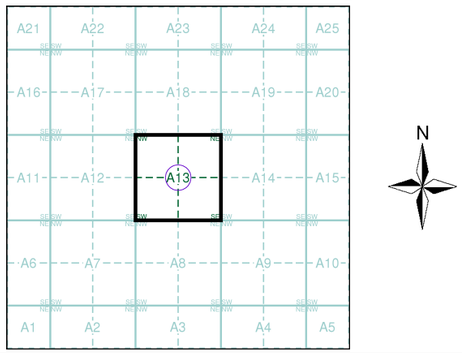
Web: www.envirocheck.co.uk

Historical Aerial Photography

Published 2001

This aerial photography was produced by Getmapping, these vertical aerial photographs provide a seamless, full colour survey of the whole of Great Britain

Historical Aerial Photography - Segment A13



Order Details

Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	100

Site Details

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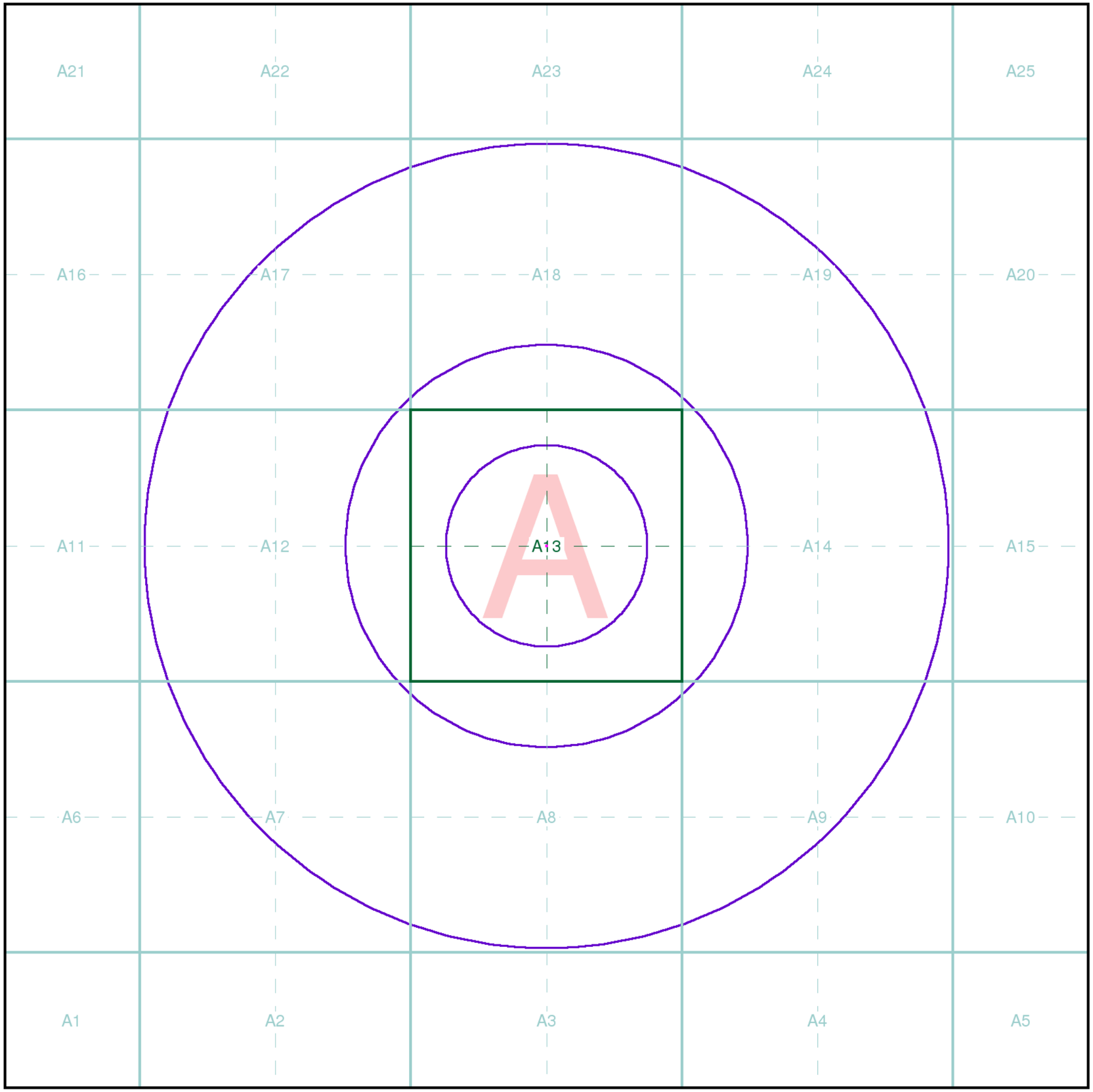

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Index Map

For ease of identification, your site and buffer have been split into Slices, Segments and Quadrants. These are illustrated on the Index Map opposite and explained further below.

Slice
Each slice represents a 1:10,000 plot area (2.7km x 2.7km) for your site and buffer. A large site and buffer may be made up of several slices (represented by a red outline), that are referenced by letters of the alphabet, starting from the bottom left corner of the slice "grid". This grid does not relate to National Grid lines but is designed to give best fit over the site and buffer.

Segment
A segment represents a 1:2,500 plot area. Segments that have plot files associated with them are shown in dark green, others in light blue. These are numbered from the bottom left hand corner within each slice.

Quadrant
A quadrant is a quarter of a segment. These are labelled as NW, NE, SW, SE and are referenced in the datasheet to allow features to be quickly located on plots. Therefore a feature that has a quadrant reference of A7NW will be in Slice A, Segment 7 and the NW Quadrant.

A selection of organisations who provide data within this report:

Map data

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Cyfoeth Naturiol Cymru
Natural Resources Wales

Envirocheck reports are compiled from 136 different sources of data.

Client Details

Mr J Crook, Geo-Ventures (UK) Ltd, 7 Ellenor Drive, Astley, Manchester, Greater Manchester, M29 7NN

Order Details

Order Number:	201123677_1_1
Customer Ref:	19-1790
National Grid Reference:	333090, 369170
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

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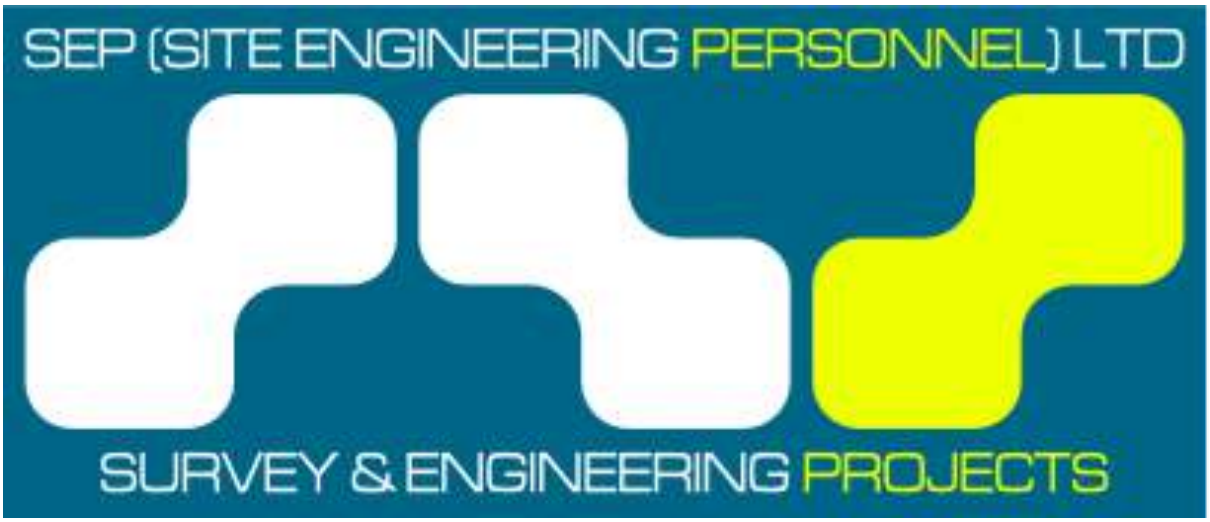


BH / TP Location Plan

Site:

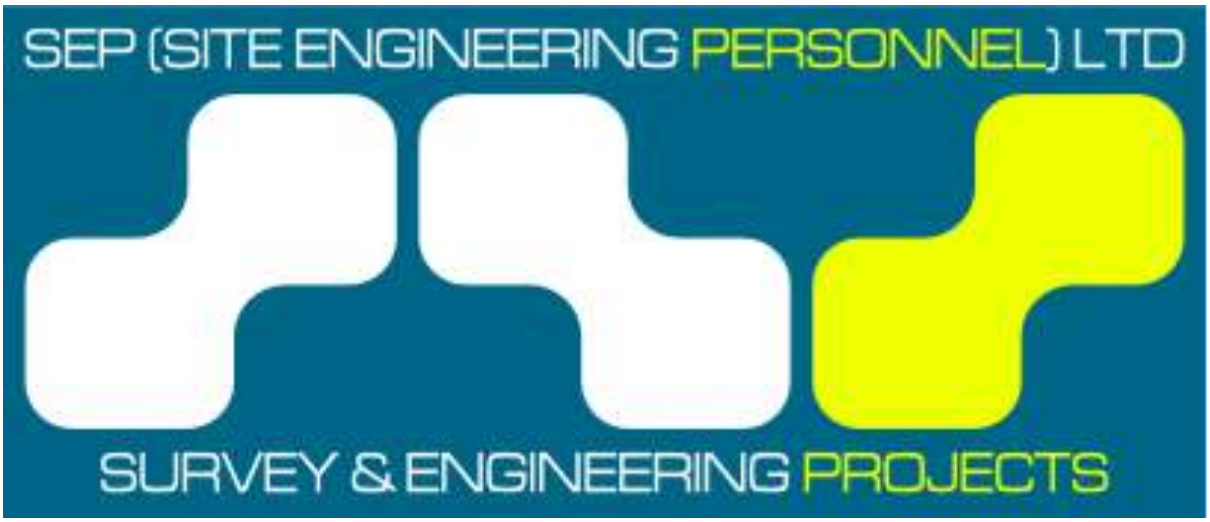
Former Gateway to Wales Hotel

Queensferry

North Wales

Contract :	Scale:
Gateway to Wales	Not to Scale

Borehole Location Plan	Fig 1



Window Sample Borehole Logs

Site:

Former Gateway to Wales Hotel

Queensferry

North Wales

Geo-Ventures (UK) Limited
Geotechnical and Environmental Services

Site	Number
Gateway to Wales	WS 1

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler				19-1790
	Location	**Dates** 03/04/2019	**Engineer** SEP Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					0.10	MADE GROUND : tarmac		
					(0.20)			
0.20	D				0.30	MADE GROUND : brown sand, soil and angular gravel fill		
0.50	D				(0.50)	MADE GROUND : brown gravelly fine sand with pieces of broken brick		
					0.80			
1.00-1.45	SPT(C) N=11		2,2/2,3,3,3			Medium dense brown fine SAND		
1.00	D							
2.00-2.45	SPT(C) N=25		1,1/5,6,6,8					
2.00	D							▽1
			Seepage(1) at 2.50m.		(3.65)			
3.00-3.45	SPT(C) N=24		2,3/4,6,7,7					
3.00	D							
4.00-4.45	SPT(C) N=25		3,4/5,6,7,7					
4.00	D							
					4.45	Complete at 4.45m		

Remarks
Services inspection pit excavated by hand

Scale (approx)	Logged By
1:50	Dr J Crook

Figure No. 19-1790.WS 1

Geo-Ventures (UK) Limited
Geotechnical and Environmental Services

Site	Number
Gateway to Wales	WS 2

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler				19-1790
	Location	**Dates** 03/04/2019	**Engineer** SEP Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					0.10	MADE GROUND : concrete and broken brick fill		
					(0.20)			
0.20	D				0.30	MADE GROUND : brown gravelly fine sand fill		
0.50	D				(0.50)	MADE GROUND : brown sandy angular fine to coarse gravel fill		
					0.80			
1.00-1.45 1.00	SPT(C) N=10 D		2,2/2,3,3,2			Medium dense brown fine SAND		
2.00 2.00-2.45	D SPT(C) N=15		Seepage(1) at 2.00m. 2,3/3,4,4,4					▽1
					(3.65)			
3.00-3.45 3.00	SPT(C) N=25 D		3,4/6,6,6,7					
4.00-4.45 4.00	SPT(C) N=29 D		4,5/7,7,7,8					
					4.45	Complete at 4.45m		

Remarks
Services inspection pit excavated by hand

Scale (approx)	Logged By
1:50	Dr J Crook

Figure No. 19-1790.WS 2

Geo-Ventures (UK) Limited
Geotechnical and Environmental Services

Site	Number
Gateway to Wales	WS 3

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler				19-1790
	Location	**Dates** 03/04/2019	**Engineer** SEP Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15) 0.15	MADE GROUND : concrete breeze block fill		
0.20	D				(0.65)	Brown SILT		
					0.80 (0.30)	Brown fine SAND		
1.00-1.45	SPT(C) N=14		2,3/3,3,4,4		1.10	Medium dense brown fine SAND		
1.00	D							
1.20	D							
1.50	D							
2.00	D		Seepage(1) at 2.00m.					▽1
2.00-2.45	SPT(C) N=15		3,3/3,3,4,5					
					(3.35)			
3.00-3.45	SPT(C) N=20		3,4/4,5,5,6					
3.00	D							
4.00-4.45	SPT(C) N=24		4,4/5,6,6,7					
4.00	D							
					4.45	Complete at 4.45m		

Remarks
Services inspection pit excavated by hand

Scale (approx)	Logged By
1:50	Dr J Crook

Figure No. 19-1790.WS 3

Geo-Ventures (UK) Limited
Geotechnical and Environmental Services

Site	Number
Gateway to Wales	WS 4

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler				19-1790
	Location	**Dates** 03/04/2019	**Engineer** SEP Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D				(1.10)	MADE GROUND : black ash, gravel, broken brick and concrete fill		
1.00-1.45	SPT(C) N=9		1,1/2,2,2,3		1.10	Medium dense brown fine SAND		
1.00	D							
1.30	D							
			Seepage(1) at 1.50m.					▽1
2.00-2.45	SPT(C) N=16		2,3/3,4,4,5					
2.00	D				(3.35)			
3.00-3.45	SPT(C) N=19		3,4/4,5,5,5					
3.00	D							
4.00-4.45	SPT(C) N=22		4,4/5,5,6,6					
4.00	D				4.45	Complete at 4.45m		

Remarks
Services inspection pit excavated by hand

Scale (approx)	Logged By
1:50	Dr J Crook

Figure No. 19-1790.WS 4

Geo-Ventures (UK) Limited
Geotechnical and Environmental Services

Site	Number
Gateway to Wales	WS 5

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler				19-1790
	Location	**Dates** 03/04/2019	**Engineer** SEP Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D				(0.50)	MADE GROUND : black ash, gravel, broken brick and concrete fill		
0.60	D				0.50	Medium dense brown fine SAND		
1.00	D		Damp(1) at 1.00m.					▽1
1.00-1.45	SPT(C) N=15		2,3/3,4,4,4		(1.70)			
2.00-2.20	SPT(C) 6/50		2,3/6		2.20			
2.00	D							
2.20	D					Complete at 2.20m		

Remarks
Unable to advance borehole beond 2.20m, obstruction
Services inspection pit excavated by hand

Scale (approx)	Logged By
1:50	Dr J Crook

Figure No. 19-1790.WS 5

Geo-Ventures (UK) Limited
Geotechnical and Environmental Services

Site	Number
Gateway to Wales	WS 6

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler				19-1790
	Location	**Dates** 03/04/2019	**Engineer** SEP Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D				(0.50)	MADE GROUND : brown sand, gravel, broken brick and concrete fill		
0.50	D				0.50	Medium dense brown fine SAND		
1.00-1.45 1.00	SPT(C) N=14 D		2,2/3,3,4,4					▽1
			Seepage(1) at 1.50m.					
2.00-2.45 2.00	SPT(C) N=18 D		3,4/4,4,5,5		(3.95)			
3.00-3.45 3.00	SPT(C) N=21 D		3,4/5,5,5,6					
4.00-4.45 4.00	SPT(C) N=24 D		4,5/6,6,6,6		4.45	Complete at 4.45m		

Remarks
Services inspection pit excavated by hand

Scale (approx)	Logged By
1:50	Dr J Crook

Figure No. 19-1790.WS 6

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SPT Results

Site:

Former Gateway to Wales Hotel

Queensferry

North Wales

Geo-Ventures (UK) Limited
Geotechnical and Environmental Services

Standard Penetration Test Results

Site : Gateway to Wales

Client :

Engineer : SEP Limited

Job Number 19-1790

Sheet 1 / 1

Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
WS 1	1.00	1.15	1.45	CPT	2	2	2	3	3	3	N=11	
WS 1	2.00	2.15	2.45	CPT	1	1	5	6	6	8	N=25	
WS 1	3.00	3.15	3.45	CPT	2	3	4	6	7	7	N=24	
WS 1	4.00	4.15	4.45	CPT	3	4	5	6	7	7	N=25	
WS 2	1.00	1.15	1.45	CPT	2	2	2	3	3	2	N=10	
WS 2	2.00	2.15	2.45	CPT	2	3	3	4	4	4	N=15	
WS 2	3.00	3.15	3.45	CPT	3	4	6	6	6	7	N=25	
WS 2	4.00	4.15	4.45	CPT	4	5	7	7	7	8	N=29	
WS 3	1.00	1.15	1.45	CPT	2	3	3	3	4	4	N=14	
WS 3	2.00	2.15	2.45	CPT	3	3	3	3	4	5	N=15	
WS 3	3.00	3.15	3.45	CPT	3	4	4	5	5	6	N=20	
WS 3	4.00	4.15	4.45	CPT	4	4	5	6	6	7	N=24	
WS 4	1.00	1.15	1.45	CPT	1	1	2	2	2	3	N=9	
WS 4	2.00	2.15	2.45	CPT	2	3	3	4	4	5	N=16	
WS 4	3.00	3.15	3.45	CPT	3	4	4	5	5	5	N=19	
WS 4	4.00	4.15	4.45	CPT	4	4	5	5	6	6	N=22	
WS 5	1.00	1.15	1.45	CPT	2	3	3	4	4	4	N=15	
WS 5	2.00	2.15	2.20	CPT	2	3	6				6/50mm	Refusal
WS 6	1.00	1.15	1.45	CPT	2	2	3	3	4	4	N=14	
WS 6	2.00	2.15	2.45	CPT	3	4	4	4	5	5	N=18	
WS 6	3.00	3.15	3.45	CPT	3	4	5	5	5	6	N=21	
WS 6	4.00	4.15	4.45	CPT	4	5	6	6	6	6	N=24	

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APPENDIX D – CONTROLLED WATERS RISK ASSESSMENTS

Regulatory Context

Government policy is based upon a "suitable for use approach," which is relevant to both the current use of land and also to any proposed future use. When considering the current use of land, Part IIA of the Environment Protection Act 1990 (EPA 1990) provides the regulatory regime, which was introduced by Section 57 of the Environment Act 1995, which came into force in England on 1 April 2000. The main objective of introducing the Part IIA regime is to provide an improved system for the identification and remediation of land where contamination is causing unacceptable risks to human health, controlled waters or the wider environment given the current use and circumstances of the land. Part IIA provides a statutory definition of contaminated land under Section 78A(2) as:

"any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on, or under the land, that:

(a) Significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) Pollution of controlled waters is being, or is likely to be, caused."

Part IIA provides a statutory definition of the pollution of controlled waters under Section 78A(9) as:

"the entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter"

Controlled Waters are defined Section 104 of the Water Resources Act 1991. They include in summary: Relevant territorial waters which extend seaward for three miles from the low-tide limit from which the territorial sea adjacent to England and Wales is measured.

The Environment Agency has powers under Part 7 of The Water Resources Act (1991) to take action to prevent or remedy the pollution of controlled waters, including circumstances where the pollution arises from contamination in the land. This is reinforced in The Contaminated Land (England) (Amendment) Regulations 2012 and Contaminated Land Statutory Guidance (DEFRA, 2012) which came into force in early April 2012.

Part IIA introduces the concept of a contaminant linkage; where for potential harm to exist there must be a connection between the source of the hazard and the receptor via a pathway. Risk assessment in contaminated land is therefore directed towards identifying the contaminants, pathways and receptors that can provide contaminant linkages. This is known as the contaminant-pathway-receptor link (CPR or contaminant linkage).

Part IIA places contaminated land responsibility as a part of the planning and redevelopment process, rather than Local Authority or Environment Agency directly, except in cases of very high pollution risk or where harm is occurring. In the planning process, guidance is provided by National Planning Policy Framework (NPPF) of March 2012. The NPPF requires that a site which has been developed shall not be capable of being determined "contaminated land" under Part IIA. Therefore, appropriate risk-based investigation is required to identify the contaminant linkages that can then be assessed, and then mitigated using methods that can be agreed with the planners.

Environment Agency Guidance

The Environment Agency's stance on groundwater resources is:

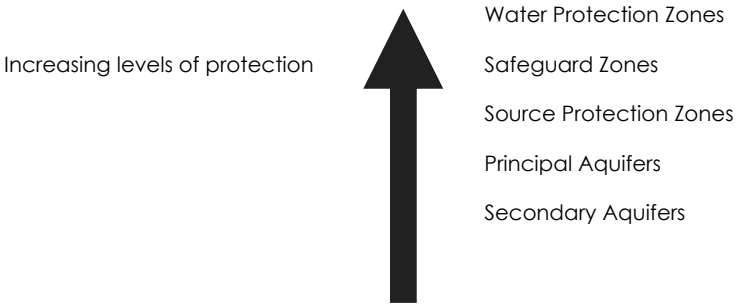
"to protect and manage groundwater resources for present and future generations in ways that are appropriate for the risks we identify" (Groundwater Protection: Policy and Practice GP3, 2012).

At present, the legislation and guidance pertaining to the protection of controlled waters in the UK is complex; however, the core objectives seek to enforce the position given above.

In 1992, the National Rivers Authority published their Policy and Practice for the Protection of Groundwater (PPPG), this document introduced areas of focus for developments such as Source Protection Zones (SPZs) and Groundwater Vulnerability Maps. The Policy was revised in 1998, since which there have been substantial changes in legislation, driven by key European Directives relating to groundwater include the Groundwater Directive (80/68/EEC) and the Water Framework Directive (2000/60/EC). Aspects of these directives are controlled by primary UK legislation such as the Water Resources Act 1991 as amended by the Water Act 2003. Gaps in the 1998 PPPG that emerged as the result of further legislative changes were addressed in the Environment Agency Policy document *Groundwater Protection: Policy and Practice (GP3), Version 1* of November 2012. The three main parts of GP3 were:

- Groundwater principals;
- Position statements and legislation; and
- Technical information.

The Environment Agency has a tiered risk based approach to drinking water protection as summarised below:



Controlled Waters Risk Assessment

A number of tools are available (as detailed in GP3) in order for a developer of a potentially contaminated site to fulfil their obligations under the legislation. A site assessment would be required in order to identify any potential risks to controlled waters and to derive suitable clean up criteria, if required, to ensure the protection of controlled waters.

There are three main stages to any risk assessment of controlled waters:

1) Risk Screening (devise Conceptual Site Model, making reference to groundwater vulnerability maps, site setting, controlled waters context etc)

2) Generic Risk Assessment (EA Remedial Targets Methodology Tier 1 / Comparison of groundwater data with relevant standards)

3) Detailed Quantitative Risk Assessment (Consideration of aquifer properties and site specific parameters, EA Remedial Targets Methodology Tiers 2 & 3)

Risk Screening

Here, the Conceptual Site Model (CSM) is a critical tool to assessing any potentially contaminated site. The information from a robust CSM can be used to establish any pathways or receptors that do not require further assessment at an early stage. For example, it may be possible to confirm the absence of a particular sensitive controlled water receptor (such as a surface water feature) within the vicinity of the Site thereby breaking the associated source-pathway-receptor pollutant linkage. Information from subsequent tiers of risk assessment, such as following intrusive investigations, are used to update the CSM accordingly.

Generic Risk Assessment - England and Wales

When undertaking the Generic Hydrogeological Risk Assessment (EA Remedial Targets Methodology Tier 1), comparison of chemical analytical results is made with those screening criteria. Values of screening criteria with which chemical test results can be compared are published in the following:

- EQS Directive 2008/105/EC
- Priority Substances Directive 2013/39/EU
- Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015
- UK Drinking Water Standards (UK DWS)
- World Health Organisation (WHO Guidelines) for Drinking Water Quality
- Council Directive 98/83/EC on the quality of water intended for human consumption (Drinking water directive)

Generic Risk Assessment is generally undertaken via comparison of reported leachate and/or groundwater concentrations against selected assessment criteria for the potential contaminants of concern identified for the Site from a preliminary desk based assessment.

The selected Generic Assessment Criteria (GAC) derived from a Water Quality Standard (WQS) for any specific substance may not necessarily be a simple number and can often be found to be expressed as:

- Annual mean concentration;
- Maximum allowable concentration;
- 95th percentile concentration for *n* samples;
- Total concentration;
- Dissolved concentration (applicable to filtered samples)

The values may sometimes be expressed for individual substances (e.g. arsenic or for groups of substances e.g. total xylenes or sums of certain PAHs).

Environmental Quality Standards (EQS) have been used where available for Priority Substances and Priority Hazardous Substances set at a European level:

- Priority Substances Directive 2013/39/EU;
- Amending 2008/105 and 2000/118/EC

In addition, EQS values derived for Specific Pollutants have been used as presented in The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

For assessing risks to potable water abstraction supplies, UK Drinking Water Standards presented in the Water Supply (Water Quality) Regulations 2000 (SI/2000/3184) (as amended) have been applied.

In selecting a GAC for a particular Site, Terra97 considers the following factors:

- Current use/function of the groundwater (e.g. drinking water, irrigation water, industrial use, base-flow to rivers and streams);
- Plausible, proposed or planned future uses of the water and nearby waters;
- Sensitivity of the critical receptor (e.g. human health, aquatic life); and,
- Requirements to trigger action under the legal context

In accordance with Part 2A:

"in deciding whether pollution of controlled waters is occurring, the assessor will have regard to all of the water quality standards that are relevant to the specific site and make a judgment against the most stringent of those relevant standards".

Please note that there is no quantitative criterion for total petroleum hydrocarbons (TPH), or speciated TPH fractions. Historically, standards provided for petroleum hydrocarbons ranges from 10µg/l (Private Water Supply Regulations 1991, removed from the 2009 regulations) to 50µg/l-1000µg/l (Surface Waters (Abstraction for Drinking Water) Regulations 1989) which related to the degree of treatment of water prior to use as drinking water. Over time, the legislative standards have been rescinded and no alternative standard provided, although the Environment Agency planned to release speciated TPH criteria (Fretwell et al., 2009). In the absence of suitable criteria, Terra97 adopts a value of 10 µg/l for more sensitive locations (e.g. Principal Aquifer, drinking water abstraction), and a value of 50µg/l for locations considered less sensitive (e.g. low permeability aquifers) or where a site is located in close proximity to a surface watercourse.

Should the Level 1 or 2 assessments indicate threshold levels to be exceeded, then there are three alternative ways in which to proceed:

- To devise suitable remedial solutions;
- To carry out more investigation, sampling and analysis;
- To conduct a site-specific Detailed Quantitative Risk Assessment (DQRA) to whether or not the soil materials are suitable for their site-specific intended use or to devise a site-specific clean-up level.

Detailed Quantitative Risk Assessment (DQRA)

The decision to carry out a DQRA will be informed by the initial qualitative and generic assessment. The scope of any such assessment will be accurately defined by the outcomes of the former two stages. The robust CSM will be

sufficiently refined by this stage that only certain contaminants of concern, certain pathways and certain receptors will require further assessment.

Additional site specific data is normally required for this stage of assessment, as explained above, more processes that are capable of affecting contaminant concentrations are considered (such as dilution and attenuation).

Remediation criteria derived will therefore be specific to each site and will be based on a detailed assessment of the potential impact at the identified receptor or compliance point. A greater level of confidence can be placed on the predicted impact on the compliance point following a DQRA.

Aquifer Designations

The Environment Agency have classified different types of aquifer from which groundwater can be extracted. The aquifer designations reflect the importance of aquifers in terms of groundwater as a resource (drinking water supply) but also their role in supporting surface water flows and wetland ecosystems. The aquifer designation data is based on geological mapping provided by the British Geological Survey. It is updated regularly to reflect their ongoing programme of improvements to these maps. The maps are split into two different type of aquifer designation:

- Superficial (Drift) - permeable unconsolidated (loose) deposits. For example, sands and gravels.
- Bedrock -solid permeable formations e.g. sandstone, chalk and limestone.

The maps display the following aquifer designations:

Classification	Definition
Principal Aquifers (Highly Permeable)	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 A Aquifers	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.
Secondary B Aquifers	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 Aquifers	This 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.

Hazardous and Non Hazardous Substances

The Groundwater (England and Wales) Regulations 2009 control the disposal to the hydrogeological environment of potentially polluting substances which are divided into Hazardous Substances and Non-hazardous Contaminants (this roughly approximates to the former List 1 and List 2 substances).

Hazardous Substances are the most damaging and toxic and must be prevented from directly or indirectly entering the groundwater environment. Hazardous Substances include mineral oils and hydrocarbons, pesticides, biocides, herbicides, solvents and some metals. Discharge of Hazardous Substances to Controlled Waters must be prevented.

Non-hazardous Pollutants are any contaminants other than Hazardous Substances. Non-hazardous Pollutants are potentially toxic but are less harmful than Hazardous Substances, but their direct discharge to groundwater is generally not permitted and any indirect discharge to groundwater must be limited and be controlled by technical precautions in order to prevent pollution. Non-hazardous Pollutants include ammonia and nitrites, many metals and fluorides

Source Protection Zones

Source Protection Zones (SPZs) are defined by the Environment Agency (for England and Wales), SEPA (Scotland) and the Environment and Heritage Service (Northern Ireland) for groundwater sources such as wells, boreholes and springs that are used for public drinking water supply. The zones show the risk of contamination from activities that might cause groundwater pollution in the area. The size and shape of a zone depends upon subsurface conditions, how the groundwater is removed, and other environmental factors.

SPZs are classified into four categories:

- **Zone 1 (Inner protection zone).** Any pollution that can travel to the abstraction point within 50 days from any point within the zone is classified as being inside Zone 1. This applies at and below the groundwater table. This zone also has a minimum 50 m protection radius around the abstraction point. These criteria are designed to protect against the transmission of toxic chemicals and water-borne disease.

- **Zone 2 (Outer protection zone).** The outer zone covers pollution that takes up to 400 days to travel to the abstraction point, or 25% of the total catchment area, whichever area is the largest. This travel time is the minimum period over which the Environment Agency considers that pollutants need to be diluted, reduced in strength or delayed by the time they reach the abstraction point.

- **Zone 3 (Total catchment).** This is the total area needed to support removal of water from the abstraction point, and to support any discharge from this.

- **Zone of special interest.** This may occasionally be defined as a special case. This is usually where local conditions mean that industrial sites and other potential sources of contamination could affect the groundwater source, even though they are outside the normal catchment area.

- **Groundwater Vulnerability Assessments**

From 1 April 2010 The Environment Agency Groundwater Protection Policy began to use aquifer designations which are consistent with the Water Framework Directive. These designations reflect the importance of aquifers in terms of groundwater as a resource (drinking water supply) but also their role in supporting surface water flows and wetland ecosystems. The aquifer designation data is based on geological mapping provided by the British Geological Survey. It is updated regularly to reflect their ongoing programme of improvements to these maps. The maps are split into two different type of aquifer designation:

- Superficial (Drift) - permeable unconsolidated (loose) deposits. For example, sands and gravels.

- Bedrock -solid permeable formations e.g. sandstone, chalk and limestone.

The maps display the following aquifer designations:

Table 1. Aquifer Classification ("Geological Classification").

Classification	Definition
Principal Aquifers (Highly Permeable)	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 A Aquifers	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.
Secondary B Aquifers	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 Aquifers	This 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.

APPENDIX E – QUALITATIVE AND QUANTITATIVE RISK ASSESSMENTS

For the qualitative and quantitative assessment of risks posed by potential pollutant linkages have been undertaken using the risk matrix adapted from CIRIA C552 and outlined in the table below.

	Category	Definition
Potential severity	Severe	Acute (short term) risk to human health, Major pollution of sensitive controlled waters, ecosystems or habitat. Catastrophic damage to buildings or property or crops.
	Medium	Chronic (Medium / long term) risk to human health Pollution of sensitive controlled waters, ecosystems or species, Significant damage to crops, buildings or structures
	Mild	Easily preventable permanent health effects on humans. Pollution of non-sensitive controlled waters. Minor damage to buildings or structures.
	Minor	Easily preventable non-permanent health effects on humans, or no effects. Minor, low level and localised contamination of on-site soil. Easily repairable damage to buildings or structures.
Probability of risk	High Likelihood	Pollutant linkage may be present and the risk is almost certain to occur , or there is evidence of harm already occurring.
	Likely	Pollutant linkage may be present and it is probable that the risk will occur over the long term.
	Low Likelihood	Pollutant linkages may be present and there is a possibility of the risk occurring, although there is no certainty that it will do so.
	Unlikely	Pollutant linkage may be present but the circumstances under which harm would occur are improbable.

		Potential Severity			
		Severe	Medium	Mild	Minor
Probability of risk	High Likelihood	Very high	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/Low	Low
	Low Likelihood	Moderate	Moderate/Low	Low	Negligible
	Unlikely	Moderate/Low	Low	Negligible	Negligible

APPENDIX F – GROUND GAS

Monitoring for the following is generally performed as part of ground gas assessment:

- Methane (CH_4): an odourless, flammable gas. Mixtures of methane with air containing between 5 and 15% v/v methane are explosive.

- Carbon dioxide (CO_2): an asphyxiant at elevated concentrations. Denser than air, it can accumulate in excavations, and within low points inside buildings

- Oxygen (O_2): important in the assessment of the potential formation of explosive mixtures with methane. Monitoring normally measures both methane and oxygen concentrations in ground gas to derive an indication of the risk of explosive mixture formation, expressed as a percentage of the Lower Explosive Limit (LEL). Low concentrations of oxygen in ground gas can also exacerbate the risk of CO_2 asphyxiation.

- Hydrogen sulphide (H_2S): odorous and toxic, capable of forming flammable mixtures with air.

- Volatile Organic Compounds (VOCs): present as chemical contaminants of soil and sometimes also biologically produced in low concentrations.

- **Assessment of methane (CH_4) and carbon dioxide (CO_2)**

Methane and CO_2 can arise from natural geological sources, mine workings, rotting organic matter (peat, landfilled materials, etc.) and/or contaminant biodegradation. Assessment of ground gas composition and flows is therefore an essential part of site assessment. The need to adequately address potential risks from ground gas on development sites is therefore required under the planning regime.

In order to appropriately assess the site risks, the Construction Industry Research and Information Association (CIRIA) and others have issued several guidance documents on landfill and ground gas that are intended to provide advice on how to investigate and deal with gas contaminated ground with respect to development. These are:

- Report 149: 'Protecting Development from Methane' (CIRIA, 1995a)

- Report 150: 'Methane Investigation Strategies' (CIRIA, 1995b)

- Report 151: 'Interpreting Measurement of Gas in the Ground' (CIRIA, 1995c)

- Report 152: 'Risk Assessment for Methane and Other Gases from the Ground' (CIRIA, 1995d)

More recent guidance has been published to update the documents detailed above to collaborate and promote industry 'good practice'. These are:

- CIRIA Report 665: 'Assessing risks posed by hazardous ground gases to buildings (CIRIA, 2008)

- NHBC: 'Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present' (NHBC, 2007)

- •BS8485: Code of Practice for the characterisation and remediation from ground gas in affected developments (BSI Group, 2007)

The earlier CIRIA 149 approach is now considered to be too conservative. A more realistic measure of the risk posed by methane and CO_2 in ground gas can be established by determining an appropriate Gas Screening Value (GSV), using the methods described in the NHBC and CIRIA 659 documents. These values are based upon earlier work undertaken by Wilson and Card (1999).

GSVs are calculated by multiplying the borehole flow rate (l/hr) by the percentage (% v/v) concentration in the gas stream of the specific component, i.e.:

GSV = (Concentration / 100) x Flow rate.

A risk-based methodology for deriving GSVs is defined for two situations (designated A and B), which are adequate for the great majority of site cases:

- Situation A: All development types except low rise housing with gardens

- Situation B: Low rise housing with gardens.

Under Situation A, classification of the scope of protection required is determined from the site GSV, summarised in Table 1. For Situation B, GSVs derived are used in a 'Traffic Light' classification (summarised in Table 2) which determines the required level and scope of protection measures. Tables 1 and 2 are summaries only: the details provided in the body text, footnotes and appendices of the above-referenced documents should be read in conjunction with the results to determine the appropriate level of protection.

For conservatism, Terra97 uses the maximum concentration and gas flow rate of methane detected in any borehole during all of the monitoring visits in deriving recommendations on appropriate protection measures. This represents the worst-case risk of forming an explosive mixtures. For CO_2, steady state concentrations and flow data are applied, as these determine the development of an asphyxiating mixture. All values are selected whether or not they occurred in the same borehole or during the same monitoring event.

Exceedences of the maximum concentrations used in a Tier 1 Gas Risk Assessment can be tolerated, when the conceptual model indicates that it is safe to do so. However, GSV values must never be exceeded - where site-specific circumstances permit the derivation of alternative GSVs according to the defined conceptual model, then the appropriate GSV values should be applied.

Table 1. GSV Categories Defined for Situation A (Summarised from CIRIA Report 665).

Risk classification	GSV (CH_4 or CO_2; l/hr)	Additional factors	Characteristic situation
Very low	<0.07	Typically methane <=1% and/or CO_2 <=5%, otherwise consider increase to Low Risk.	1
Low	<0.7	Typically borehole ground gas flow rate <=70 l/hr; otherwise consider increase to Moderate Risk.	2
Moderate	<3.5	---	3
Moderate to high	<15	QRA required to evaluate scope of remediation measures.	4
High	<70	---	5
Very high	>70	---	6

Table **2.** GSV Categories Defined for Situation B (Summarised from NHBC, 2007).

Methane		**CO_2**		**"Traffic light" classification**
Typical max. conc. (% v/v)	**GSV (l/hr)**	**Typical max. conc. (% v/v)**	**GSV (l/hr)**	
				Green
1	0.13	5	0.78	
5	0.63	10	1.60	Amber 1
20	1.60	30	3.10	Amber 2
				Red

- **Assessment of hydrogen sulphide (H_2S)**

H_2S is toxic and highly odorous ("rotten eggs") gas. It is often a minor component within mine gases, in ground gas within or overlying strata rich in pyrites or other sulphide-rich ores, and in most natural gas fields.

H_2S can be generated biologically in significant concentrations by the decomposition by sulphate-reducing bacteria of natural or anthropogenic organic matter under oxygen-free conditions. Its potential generation will be greater in environments containing elevated sulphate concentrations (including sea water). H_2S is therefore common within the gas arising from estuarine and marine sediments, pond sediment, stagnant water bodies, bogs and marshlands and landfilled waste, for example.

It must be noted that H_2S normally occurs together with other potentially hazardous ground gases. The measures adopted for protection against these will prove equally protective against H_2S.

There are no standards by which H_2S concentrations in ground gas can be assessed directly. Therefore, the significance of measured H_2S concentrations in ground gas must be evaluated on a case-by-case basis, taking into account the measured concentrations of other components and the specific conceptual site and exposure models. To assist in this process, the following standards and guidance may be applied.

General protection of land users

There are no UK air quality standards for general exposure to H_2S. The World Health Organisation has derived ambient air quality standards (WHO, 2000) for this gas, which may be used to inform risk assessment and decision-making:

- The 24 hour average exposure guideline value for ambient air: 0.15 mg/m^3 (0.1 ppmv, approx.; this was derived by the application of a 100x safety factor to the LOAEL for long-term exposure).

- This is significantly above the odour threshold, which is typically around 0.01 mg/m^3. To avoid substantial nuisance odour complaints, WHO (2000) recommends that the 30 minute average H_2S concentration in ambient air should not exceed: 0.007 mg/m^3 (0.005 ppmv, approx.).

Occupational exposures

For occupational exposure, the HSE (2005) limits for H_2S are applicable:

- 8 hour time weighted average occupational exposure limit: 5 ppmv (7 mg/m^3).

- Short-term exposure limit (15 minute reference period): 10 ppmv (14 mg/m^3).

- **Assessment of VOC data**

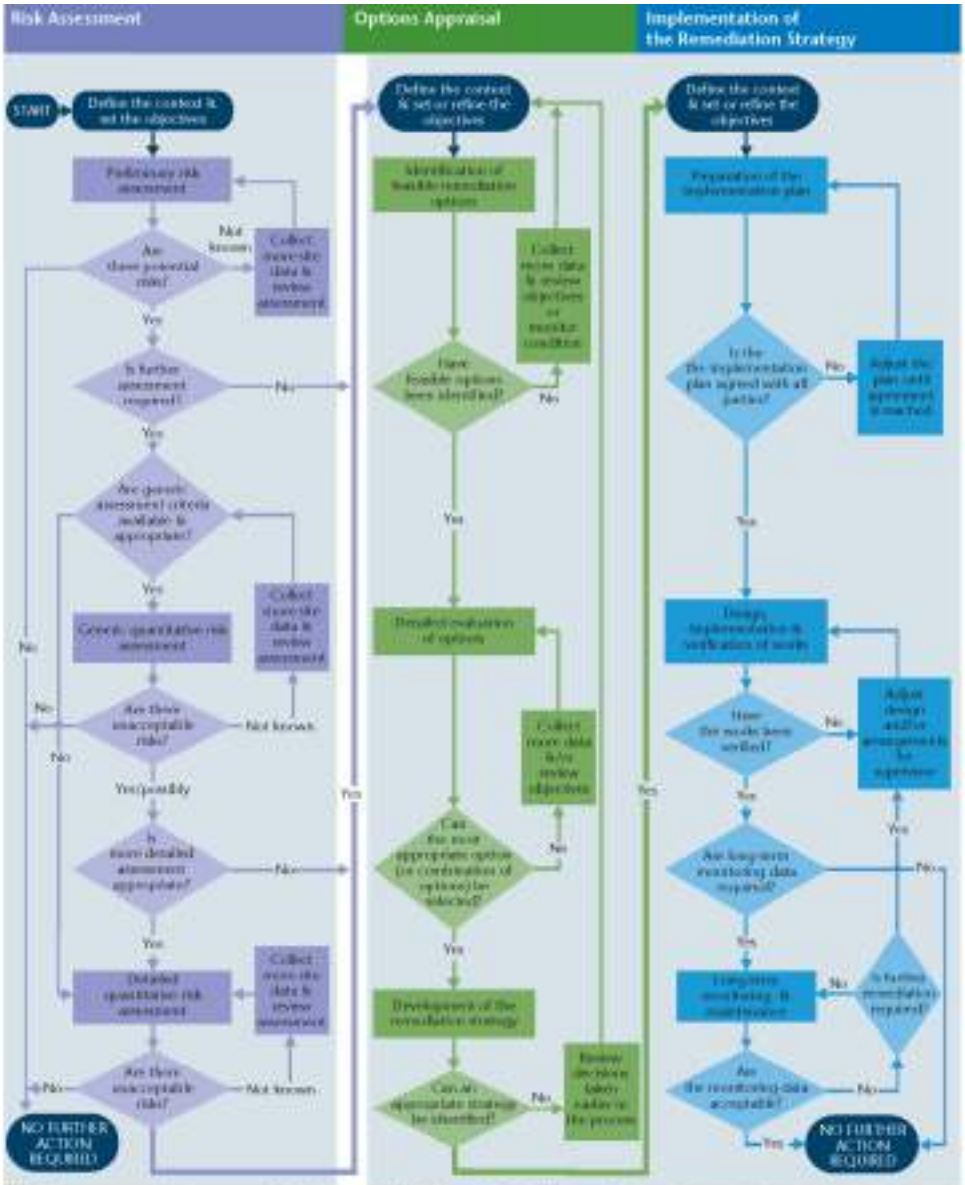
The assessment of VOC concentrations is not covered by above-referenced reports. These data can be used to inform the human health risk assessment for site occupants but should not be relied upon to assess human health risk due to uncertainties in the ground gas flow regime, variability in the (generally low) contaminant concentrations measured and inaccuracies in the concentrations measured by PID instruments.

Data on the VOC concentration in ground gas can also help inform potential occupational exposure risks to construction and similar workers. For this purpose, the measured values can be compared to the relevant occupational exposure limit (OEL) for the contaminant(s) of concern, as given in HSE (2005). In cases of doubt as to the identity of the organic contaminants within the ground gas or when these are present as a complex mixture, then the 8 hour time-weighted average (TWA) exposure limit for benzene (1 ppmv) will be applied for screening purposes. This is a reasonably conservative approach since the OEL for benzene is lower than that for the great majority of organic contaminants commonly encountered in soil and groundwater at contaminated sites

APPENDIX G – HUMAN HEALTH RISK ASSESSMENTS

Contaminated Land is defined under law through Part IIA of the Environmental Protection Act 1990, implemented through Section 57 of the Environment Act 1995 and associated guidance ("Part IIA"). These specify that a "suitable for use" approach is to be applied in the assessment of potentially contaminated land, implemented through a phased programme of site investigation and risk assessment appropriate to the site under consideration.

The assessment of potential risks posed by contaminated land is based upon the assessment of plausible contaminant source - pathway - receptor linkages ("pollutant linkages") for the current and/or proposed future use of the site. The process for the assessment of contaminated land adopted in this report is in line with guidance issued by DEFRA and Environment Agency (EA) 2004: "Model Procedures for the Management of Contaminated Land (CLR11)". The overall process for the management of land contamination is shown Figure 1 of CLR11 and reproduced below:



The risk assessment and subsequent investigation, remediation and verification must address all potential sources of pollutants that may be present on the site (the "hazards"), all receptors that may be harmed by these (e.g. human health, controlled waters, ecological receptors) and the pathways by which the contamination may be transported from the contaminant source(s) to the receptor(s). This is defined within the conceptual model for the site, which represents the characteristics of the site in a form that shows the possible pollutant linkages. As further information becomes available (for example, through site investigation), so the conceptual model will be refined.

Remedial action can be specified at any phase within this assessment process to break the identified pollutant linkage In determining whether or not to undertake further assessment or to undertake remediation, the potential cost-savings arising from a more thorough assessment of the pollutant linkages and more tightly defined remedial strategy must be considered against the direct costs involved in the work and the time that this will take to execute and gain regulatory approval.

A different approach to the statistical appraisal of data is required depending on whether the assessment is being undertaken to assess land as Contaminated Land in accordance with the regulations or whether the assessment is to assess whether the site is suitable for new development in accordance with the Planning regime. The statistical approach to assessment is discussed further in CL:AIRE:2009 "Guidance on Comparing Data with a Critical Concentration".

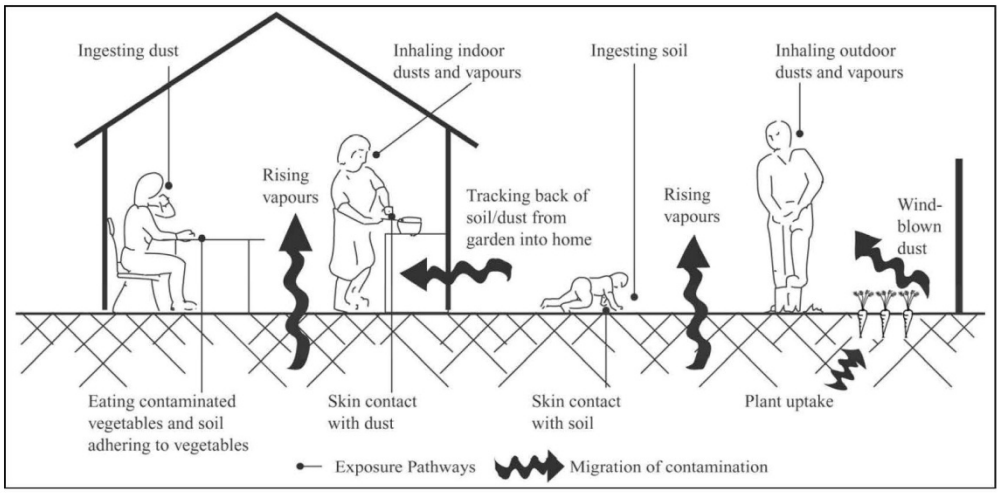
Some form of Detailed Quantitative Risk Assessment (DQRA) will be essential for those cases where appropriate GAC values cannot be established for the contaminant linkages under consideration.

Generic Assessment Criteria for Human Health Risk Assessment

In March 2002, the Department for Environment, Food and Rural Affairs (DEFRA) and the Environment Agency (EA) published the Contaminated Land Exposure Assessment (CLEA) Model and a series of related reports and guidance. These were designed to provide a scientifically based framework for the assessment of chronic risks to human health from contaminated land. The initial documents (CLR7 – 10) were withdrawn and replaced with revised guidance issued by the Environment Agency including:

- "Using Soil Guideline Values"; SC050021/SGV Introductions, EA,2009;
- "Human Health toxicology assessment of contaminants in soil"; SC050021/SR2, EA, 2009;
- "Update technical background to the CLEA model"; SC050021/SR3, EA, 2009;
- CLEA Software (Version) Handbook; SC050021/SR4; EA, 2008;
- Compilation of Data for priority Organic Contaminants for Derivation of Soil Guideline Values; Science Report SC050021/SR7, 2008; and,
- Guidance on Comparing Data with a Critical Concentration; CL:AIRE, 2009.

The CLEA model and associated guidance was developed to calculate an estimated tolerable daily intake (TDI) of contaminants for site users given a set of 'typical' human health exposure pathways which are detailed in "SR3: Updated technical background to the CLEA model" (Science Report SC050021/SR3, EA, 2009) and reproduced below.



- **Ingestion**
  - Outdoor soil;
  - Indoor dust;
  - Home grown produce;
  - Soil attached to home grown produce.
- **Dermal Contact**
  - Outdoor soil;
  - Indoor dust.
- **Inhalation**
  - Outdoor dust;
  - Indoor dust;

- Outdoor vapour;
- Indoor vapour.

It should be noted that the CLEA model does not include an exhaustive list of potential exposure pathways, e.g. certain compounds can pass through plastic water pipes into drinking water supply.

The potential significance of each of the exposure pathways is dependant upon the type of land use and the nature of the contaminant being considered. The CLEA model considers principal 'default' land use scenarios and makes a series of assumptions with regards to building type (where applicable), identification of the critical human receptor group, exposure frequency and duration. The definitions of the principal land use types given in SR3 (EA, 2009) are:

- **Residential land use;**
  A typical residential property consisting of a two story terraced house built on a ground-bearing slab of 0.15m thickness with a private garden consisting of lawn, flowerbeds, and a small fruit and vegetable patch. The occupants are assumed to be parents with young children, who make regular use of the garden. The critical receptor is a 0 – 6 year old female.

  Active exposure pathway are: ingestion of outdoor soil, ingestion of indoor dust, ingestion of home grown produce and soil adhering to home grown produce; direct dermal contact with outdoor soil and indoor dust; inhalation of outdoor dust and vapour and indoor dust and vapour.

- **Allotments**
  A plot of open space commonly made available by the Local Authority to tenants to grow fruit and vegetables for their own consumption. There are usually several plots to a site and the overall site area may cover more than one hectare. The tenants are assumed to be the parents or grandparents and that young children make occasional accompanied visits to the plots. The critical receptor is a 0 – 6 year old female and there is no building present on Site.

  Active exposure pathways are ingestion of outdoor soil, ingestion of home grown produce and soil adhering to home grown produce; direct dermal contact with outdoor soil; inhalation of outdoor vapour.

- **Commercial and industrial land use.**
  A typical commercial or light industrial property consisting of a three-story office building (pre-1970) with a ground bearing floor slab at which employees spend most time indoors and are involved in office based or related light physical work. The critical receptor is a working female adult aged 16 – 65 years.

  Active exposure pathway are ingestion of outdoor soil, ingestion of indoor dust; direct dermal contact with outdoor soil and indoor dust; inhalation of outdoor dust and vapour and inhalation of indoor dust and vapour.

Soil Guideline Values

Based on the assumption of each land use type, the EA and DEFRA developed and published Soil Guideline Value (SGV) using the CLEA model for a number of principal contaminants and 'default' end-use scenarios of residential, allotments and commercial/industrial use. The primary purpose of the SGVs are as trigger value for the tolerable daily intake (TDI), below which it can be assumed that the soil does not pose an unacceptable risk to the identified receptor. Where soils contamination is present above this level further assessment may be required. SGVs were developed for the following contaminants:

- Heavy metals and other inorganic compounds: arsenic, cadmium, chromium, cyanide, lead (now withdrawn), mercury, nickel and selenium;
- Benzene, ethylbenzene, toluene and xylenes;
- Phenol;
- Dioxins and dioxin-like polychlriniated biphenyls (PCBs)
- Polycyclic aromatic hydrocarbons (PAHs) – 11 substances

LQM/CIEH Generic Assessment Criteria of Human Health Risk Assessment

In addition, in 2009 CIEH through LQM and EIC published generic assessment criteria (GACs) for 82 substances including metals, petroleum hydrocarbons, PAHs and explosive substances for a variety of soil types and the three 'default' land uses – (residential, allotments and commercial end-uses) as described in SR3 (EA, 2009). These have been superseded as described below.

Category 4 Screening Values

In 2013 "SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination" (CL:AIRE 2013) was issued which detailed findings of a research project undertaken by CL:AIRE to set out the framework by which potential Category 4 Screening Levels (pC4SL) may be derived. This was supplemented in 2014 by "SP1010: Development of Category 4 Screening Levels for the Assessment of Land Affected by Contamination – Policy Companion Document" (DEFRA, 2014). SP1010 proposed several updated toxicology information relating to contaminant behaviour updated assumptions relating to the modelling of human exposure to soil contaminants, derivation of separate C4SLs for residential with the consumption of home grown produce, residential without the consumption of home grown produce, and two new land uses: public open spaces near residential housing (POS resi) and public parks (POS park).

- **Public Open Space: Residential**
  For public open space in close proximity to residential housing and the central green area around which houses are located, as on many housing estates from the 1930s to 1970s. It is also applicable for smaller areas commonly incorporated in newer 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 generally grassed area up to 0.5ha with up to 50% bare soil. The land use is an important resource for children and the area is near the homes. The critical receptor is a female child age >3 - <9 years old (CLEA age class 4 – 9) as younger children are unlikely to play outdoors unsupervised.

  Active exposure pathways are: ingestion of outdoor soil, ingestion of indoor dust; direct dermal contact with outdoor soil and indoor soil derived dust; inhalation of outdoor and indoor dust and inhalation of outdoor vapour.

- **Public Open Space: Park**
  A public park is defined as an area of open space provided for recreational use and usually owned and maintained by the Local Authority. It is anticipated the park could be used for a wide range of activities, including the following:
  - Family visits and picnics;
  - Children's play area;
  - Sporting activities such as football on an informal basis (i.e no a dedicated sports pitch); and
  - Dog walking.

  The park is modelled as an area >0.5 ha of predominantly grasses open space with no more than 25% of exposed soil.
  The critical receptor is a female child with CLEA age classes 1 – 6.

  Active exposure pathway are: ingestion of outdoor soil; direct dermal contact with outdoor soil; inhalation of outdoor dust and inhalation of outdoor vapour.

Furthermore the C4SLs are based on a different toxicological benchmark, the 'low level of toxicological concern' (LLTC). This difference in approach was adopted because the C4SLs were primarily intended for use under Part2A of the EPA 1990 to quickly screen out Category 4 sites where there is "*no risk or that the level of risk posed is low*". SGVs and LQM GACs are based on the more conservative 'minimal or tolerable level of risk' as defined in SR2 (EA, 2009) and were derived for assessment of contamination for the Planning process.

Lead

The SGV for lead was withdrawn in 2011 and is not used in this report. The C4SL for lead provides a technically robust and conservative assessment tool using significantly updated toxicological modelling than the withdrawn SGV and derived in line with current science of lead toxicology.

LQM/CIEH Suitable 4 Use Levels (S4ULs)

The publication of the C4SLs resulted in considerable and inconclusive debate about the applicability of the lower level of protection of the C4SL, which are underlain by the LLTC, outside of the Part 2A context for which they were derived. In 2014 LQM/CIEH presented a Suitable 4 Use Levels (S4ULs), which incorporate the updated assumption exposure derived for the production of the C4SLs but within the context of deriving screening criteria above which further assessment of the risks or remedial action may be needed. The S4ULs replace the 82 substances, species and fractions and congeners contained in the previous LQM/CIEH GACs issued in 2009. Additionally, following changes and new land uses proposed in the C4SL research project, S4ULs have also been derived for the majority of substances for which the EA derived SGVs in 2009.

The GAC values adopted in this report are summarised in Table 1, below.

Parameter	Residential with homegrown produce			Residential without homegrown produce			Allotment			Commercial / Industrial			Public Open Space near Residential			Public Open Space - Park			Source
	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			
SOM	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	
Metals/metalloids																			
Arsenic	37			40			43			640			79			170			LQM (2014)
Beryllium	1.7			1.7			35			12			2.2			63			LQM (2014)
Boron	290			11000			45			240000			21000			46000			LQM (2014)
Cadmium	11			85			1.9			190			120			532			LQM (2014)
Chromium III	910			910			18000			8600			1500			33000			LQM (2014)
Chromium VI	6			6			1.8			33			7.7			220			LQM (2014)
Copper	2400			7100			520			68000			12000			44000			LQM (2014)
Lead	200			310			80			2330			630			1300			C4SL
Mercury (elemental)	1.2			1.2			21			58 (25.8)			16			30 (25.8)			LQM (2014)
Mercury (Inorganic)	40			56			19			1100			120			240			LQM (2014)
Methylmercury	11			15			6			320			40			68			LQM (2014)
Nickel	180			180			230			980			230			3400			LQM (2014)
Selenium	250			430			88			12000			1100			1800			LQM (2014)
Vanadium	410			1200			91			9000			2000			5000			LQM (2014)
Zinc	3700			40000			620			730000			81000			170000			LQM (2014)
Other																			
Total Sulphate	2,400			2,400			2,400			2,400			2,400			2,400			BRE (2005)
Water Soluble Sulphate (g/l)	0.5			0.5			0.5			0.5			0.5			0.5			BRE (2005)
PAHs																			

Acenaphthene	210	510	1100	3000 (57)	4700(141)	6000 (336)	34	85	200	84000 (57)	97000 (141)	100000	15000	15000	15000	29000	30000	30000	LQM (2014)
Acenaphthylene	170	420	920	2900 (86.1)	4600 (212)	6000 (506)	28	69	160	8300 (86.1)	97000 (212)	100000	15000	15000	15000	29000	30000	30000	LQM (2014)
Anthracene	2400	5400	11000	31000 (1.17)	35000	37000	380	950	2200	520000	540000	540000	74000	74000	74000	150000	150000	150000	LQM (2014)
Benzo(a)anthracene	7.2	11	13	11	14	15	2.9	6.5	13	170	170	180	29	29	29	49	56	62	LQM (2014)
Benzo(a)pyrene	2.2	2.7	3	3.2	3.2	3.2	0.97	2	3.5	35	35	36	5.7	5.7	5.7	11	12	13	LQM (2014)
Benzo(b)fluoranthene	2.6	3.3	3.7	3.9	4	4	0.99	2.1	3.9	44	44	45	7.1	7.1	7.1	13	15	16	LQM (2014)
Benzo(g,h,i)perylene	320	340	350	360	360	360	290	470	640	3900	4000	4000	640	640	640	1400	1500	1600	LQM (2014)
Benzo(k)fluoranthene	77	93	100	110	110	110	37	75	130	1200	1200	1200	190	190	190	370	410	440	LQM (2014)
Chrysene	15	22	27	30	31	32	4.1	9.4	19	350	350	350	57	57	57	93	110	120	LQM (2014)
Dibenz(a,h)anthracene	0.24	0.28	0.3	0.31	0.32	0.32	0.14	0.27	0.61	3.5	3.6	3.6	0.57	0.57	0.58	1.1	1.3	1.4	LQM (2014)
Fluoranthene	280	560	890	1500	1600	1600	52	130	290	23000	23000	23000	3100	3100	3100	63	6300	6400	LQM (2014)
Fluorene	170	400	860	2800 (30.9)	3800 (76.5)	4500 (183)	27	67	160	63000 (30.9)	68000	71000	9900	9900	9900	20000	20000	20000	LQM (2014)
Indeno(1,2,3-cd)pyrene	27	36	41	45	46	46	9.5	21	39	500	510	510	82	82	82	150	170	180	LQM (2014)
Naphthalene	2.3	5.6	13	2.3	5.6	13	4.1	10	24	190 (76.4)	460 (183)	1100 (432)	4900	4900	4900	1200 (76.4)	1900 (183)	3000	LQM (2014)
Phenanthrene	95	220	440	1300 (36)	1500	1500	15	38	90	22000	22000	23000	3100	3100	3100	6200	6200	6300	LQM (2014)
Pyrene	620	1200	2000	3700	3800	3800	110	270	620	54000	54000	54000	7400	7400	7400	15000	15000	15000	LQM (2014)
Coal Tar (BaP as surrogate marker)	0.79	0.98	1.1	1.2	1.2	1.2	0.32	0.67	1.2	15	15	15	2.2	2.2	2.2	4.4	4.7	4.8	LQM (2014)
BTEX and TPH																			

Benzene	0.087	0.17	0.37	0.38	0.7	1.4	0.017	0.034	0.075	27	47	90	72	72	73	90	100	110	LQM (2014)
Toluene	130	290	660	880 vap (869)	1900	3900	22	51	120	56000 vap (869)	110000 vap (1920)	180000 vap (4360)	56000	56000	56000	87000 vap (869)	95000 vap (1920)	100000 vap (4360)	LQM (2014)
Ethylbenzene	47	110	260	83	190	440	16	39	91	5700 vap (518)	13000 vap (1220)	27000 vap (2840)	24000	24000	25000	17000 vap (518)	22000 vap (1220)	27000 vap (2840)	LQM (2014)
Xylene - o	60	140	330	88	210	480	28	67	160	6600 (478)	15000 (1120)	33000 (2620)	41000	42000	43000	17000 (478)	24000 (1120)	33000 (2620)	LQM (2014)
Xylene - m	59	140	320	82	190	450	31	74	170	6200 (625)	14000 (1470)	31000 (3460)	41000	42000	43000	17000 (625)	24000 (1470)	32000 (3460)	LQM (2014)
Xylene - p	56	130	310	79	180	430	29	69	160	5900 (576)	14000 (1350)	30000 (3170)	41000	42000	43000	17000 (576)	23000 (1350)	31000 (3170)	LQM (2014)
Aliphatic EC 5-6	42	78	160	42	78	160	730	1700	3900	3200 (304)	5900 (558)	12000 (1150)	570000 (304)	590000	600000	95000 (304)	130000 (558)	180000 (1150)	LQM (2014)
Aliphatic EC >6-8	100	230	530	100	230	530	2300	5600	13000	7800 (144)	17000 (322)	40000 (736)	600000	610000	620000	150000 (144)	220000 (322)	320000 (736)	LQM (2014)
Aliphatic EC >8-10	27	65	150	27	65	150	320	770	1700	2000 (78)	4800 (190)	11000 (451)	13000	13000	13000	14000 (78)	18000 (190)	21000 (451)	LQM (2014)
Aliphatic EC >10-12	130 (48)	330 (118)	760 (283)	130 (48)	330 (118)	760 (283)	2200	4400	7300	9700 (48)	23000 (118)	47000 (283)	13000	13000	13000	21000 (48)	23000 (118)	24000(283)	LQM (2014)
Aliphatic EC >12-16	1100 (24)	2400 (59)	4300 (142)	1100 (24)	2400 (59)	4300 (142)	11000	13000	13000	59000 (24)	82000 (59)	90000 (142)	13000	13000	13000	25000 (24)	25000 (59)	26000 (142)	LQM (2014)
Aliphatic EC >16-35	65000 (8.48)	92000 (21)	110000	65000 (8.48)	92000 (21)	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	LQM (2014)
Aliphatic EC >35-44	65000 (8.48)	92000 (21)	110000	65000 (8.48)	92000 (21)	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	LQM (2014)
Aromatic EC 5-7	70	140	300	370	690	1400	13	27	57	26000 (1220)	46000 (2260)	86000 (4710)	56000	56000	56000	76000 (1220)	84000 (2260)	92000 (4710)	LQM (2014)
Aromatic EC >7-8	130	290	660	860	1800	3900	22	51	120	56000 (869)	110000 (1920)	180000 (4360)	56000	56000	56000	87000 (869)	95000 (1920)	100000	LQM (2014)

																		(4360)	
Aromatic EC >8-10	34	83	190	47	110	270	8.6	21	51	3500 (613)	8100 (1500)	17000 (3580)	5000	5000	5000	7200 (613)	8500 (1500)	9300 (3580)	LQM (2014)
Aromatic EC >10-12	74	180	380	250	590	1200	13	31	74	16000 (364)	28000 (899)	34000 (2150)	5000	5000	5000	9200 (364)	9700 (899)	10000	LQM (2014)
Aromatic EC >12-16	140	330	660	1800	2300 (419)	2500	23	27	130	36000 (169)	37000	38000	5100	5100	5000	10000	10000	10000	LQM (2014)
Aromatic EC >16-21	260	540	930	1900	1900	1900	46	110	260	28000	28000	28000	3800	3800	3800	7600	7700	7800	LQM (2014)
Aromatic EC >21-35	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	LQM (2014)
Aromatic EC >35-44	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	LQM (2014)
Aromatic EC >44-75	1600	1800	1900	1900	1900	1900	1200	2100	3000	28000	28000	28000	3800	3800	3800	7800	7800	7900	LQM (2014)
VOCs																			
1,2-dichloroethane (1,2-DCA)	0.0071	0.011	0.019	0.0092	0.013	0.023	0.0046	0.0083	0.016	0.67	0.97	1.7	29	29	29	21	24	28	LQM (2014)
1,1,1-trichloroethane	8.8	18	39	9	18	40	48	110	240	660	1300	3000	140000	140000	140000	57000 (1425)	76000 (2915)	100000 (6392)	LQM (2014)
1,1,2,2,tetrachloroethane	1.6	3.4	7.5	3.9	8	17	0.41	0.89	2	270	550	1100	1400	1400	1400	1800	2100	2300	LQM (2014)
tetrachloroethene	0.18	0.39	0.9	0.18	0.4	0.92	0.65	1.5	3.6	19	45	95	1400	1400	1400	810 (424)	1100 (951)	1500	LQM (2014)
tetrachloromethane (Carbon tetrachloride)	0.026	0.056	0.13	0.026	0.056	0.13	0.45	1	2.4	2.9	6.3	14	890	920	950	190	270	400	LQM (2014)
Trichloroethene	0.016	0.034	0.075	0.017	0.036	0.08	0.041	0.091	0.21	1.2	2.6	5.7	120	120	120	70	91	120	LQM (2014)
Trichloromethane (chloroform)	0.91	1.7	3.4	1.2	2.1	4.2	0.42	0.83	1.7	99	170	350	2500	2500	2500	2600	2800	3100	LQM (2014)

Chloroethene (Vinyl chloride)	0.00064	0.00087	0.0014	0.00077	0.001	0.0015	0.00055	0.001	0.0018	0.059	0.077	0.12	3.5	3.5	3.5	4.8	5	5.4	LQM (2014)
2,4,6 Trinitrotoluene (TNT)	1.6	3.7	8.1	65	66	66	0.24	0.58	1.4	1000	1000	1000	130	130	130	260	270	270	LQM (2014)
RDX	120	250	540	13000	13000	13000	17	38	85	210000	210000	210000	26000	26000	27000	49000 (18.7)	51000	53000	LQM (2014)
HMX	5.7	13	26	6700	6700	6700	0.86	1.9	3.9	110000	110000	110000	13000	13000	13000	23000 (0.35)	23000 (0.39)	24000 (0.48)	LQM (2014)
Aldrin	5.7	6.6	7.1	7.3	7.4	7.5	3.2	6.1	9.6	170	170	170	18	18	18	30	31	31	LQM (2014)
Dieldrin	0.97	2	3.5	7	7.3	7.4	0.17	0.41	0.96	170	170	170	18	18	18	30	30	31	LQM (2014)
Atrazine	3.3	7.6	17.4	610	620	620	0.5	1.2	2.7	9300	9400	9400	1200	1200	1200	2300	2400	2400	LQM (2014)
Dichlovos	0.032	0.066	0.014	6.4	6.5	6.6	0.0049	0.01	0.022	140	140	140	16	16	16	26	26	27	LQM (2014)
Alpha-Endosulfan	7.4	18	41	160 (0.003)	280 (0.007)	410 (0.016)	1.2	2.9	6.8	5600 (0.003)	7400 (0.007)	8400 (0.016)	1200	1200	1200	2400	2400	2500	LQM (2014)
alpha-Hexachlorocyclohexane	0.23	0.55	1.2	6.9	9.2	11	0.035	0.087	0.21	170	180	180	24	24	24	47	48	48	LQM (2014)
beta-hexachlorocyclohexanes	0.085	0.2	0.46	3.7	3.8	3.8	0.013	0.032	0.077	65	65	65	8.1	8.1	8.1	15	15	16	LQM (2014)
gamma-hexachlorocyclohexanes	0.06	0.14	0.33	2.9	3.3	3.5	0.0092	0.023	0.054	67	69	70	8.2	8.2	8.2	14	15	15	LQM (2014)
Chlorobenzene	0.46	1	2.4	0.46	1	2.4	5.9	14	32	56	130	290	11000	13000	14000	1300 (675)	2000 (1520)	2900	LQM (2014)
1,2-Dichlorobenzene	23	55	130	24	57	130	94	230	540	2000 (571)	4800 (1370)	11000 (3240)	90000	95000	98000	24000 (571)	36000 (1370)	51000 (3240)	LQM (2014)
1,3-Dichlorobenzene	0.4	1	2.3	0.44	1.1	2.5	0.25	0.6	1.5	30	73	170	300	300	300	390	440	470	LQM (2014)

1,4-Dichlorobenzene	61	150	350	61	150	350	15	37	88	4400 (224)	10000 (540)	25000 (1280)	17000	17000	17000	36000 (224)	36000 (540)	36000 (1280)	LQM (2014)
VOCs Continued																			
1,2,3-Trichlorobenzene	1.5	3.6	8.6	1.5	3.7	8.8	4.7	12	28	102	250	590	1800	1800	1800	770 (134)	1100 (330)	1600 (789)	LQM (2014)
1,2,4-Trichlorobenzene	2.6	6.4	15	2.6	6.4	15	55	140	320	220	530	1300	15000	17000	19000	1700 (318)	2600 (786)	4000 (1880)	LQM (2014)
1,3,5-Trichlorobenzene	0.33	0.81	1.9	0.33	0.81	1.9	4.7	12	28	23	55	130	1700	1700	1800	380 (36.7)	580 (90.8)	860 (217)	LQM (2014)
1,2,3,4-Tetrachlorobenzene	15	36	78	24	56	120	4.4	11	26	1700 (122)	3080 (304)	4400 (728)	830	830	830	1500 (122)	1600	1600	LQM (2014)
1,2,3,5-Tetrachlorobenzene	0.66	1.6	3.7	0.75	1.9	4.3	0.38	0.9	2.2	49 (39.4)	120 (98.1)	240 (235)	78	79	79	110 (39)	120	130	LQM (2014)
1,2,4,5-Tetrachlorobenzene	0.33	0.77	1.6	0.73	1.7	3.5	0.06	0.16	0.37	42 (19.7)	72 (49.1)	96	13	13	13	25	26	26	LQM (2014)
Pentachlorobenzene	5.8	12	22	19	30	38	1.2	3.1	7	640 (43)	770 (107)	830	100	100	100	190	190	190	LQM (2014)
Hexachlorobenzene	1.8 (0.2)	3.3 (0.5)	4.9	4.1 (0.2)	5.7 (0.5)	6.7 (1.2)	0.47	1.1	2.5	110 (0.2)	120	120	16	16	16	30	30	30	LQM (2014)
Phenol	280	550	1100	750	1300	2300	66	140	280	760 dir (31000)	1500 dir (35000)	3200 dir (37000)	760 dir (31000)	1500 dir (35000)	3200 dir (37000)	760 dir (31000)	1500 dir (35000)	3200 dir (37000)	LQM (2014)
Chlorophenols (excluding pentachlorophenol)	0.87 (g)	2	4.5	94	150	210	0.13 (g)	0.3	0.7	3500	4000	4300	620	620	620	1100	1100	1100	LQM (2014)
Pentachlorophenol	0.22	0.52	1.2	27 (16.4)	29	31	0.03	0.08	0.19	400	400	400	60	60	60	110	120	120	LQM (2014)
Carbon Disulphide	0.14	0.29	0.62	0.14	0.29	0.62	4.8	10	23	11	22	47	11000	11000	12000	1300	1900	2700	LQM (2014)
Hexachlorobutadiene	0.29	0.7	1.6	0.32	0.78	1.8	0.25	0.61	1.4	31	66	120	25	25	25	48	50	51	LQM (2014)

(g) derived based on 2,3,4,6-tetrachlorophenol; dir - based on a threshold protective of direct skin contact with phenol (guideline in brackets based on health effects following long term exposure provided for illustration only); (vap) calculated for vapour phase only. SOM – Soil Organic Matter; (4.5) solubility.

APPENDIX H – CHEMICAL LABORATORY RESULTS

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

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F: +44 (0) 1244 833781
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Terra97 Limited
27A Longwood Road
Trafford Park
Manchester
M17 1PZ

Attention :	Danny Roberts
Date :	1st April, 2021
Your reference :	C21379
Our reference :	Test Report 21/4216 Batch 1
Location :	Queensferry, Garden City
Date samples received :	22nd March, 2021
Status :	Final report
Issue :	1

Eighteen samples were received for analysis on 22nd March, 2021 of which thirteen were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

[redacted]

Bruce Leslie
Project Manager

Client Name: Terra97 Limited
Reference: C21379
Location: Queensferry, Garden City
Contact: Danny Roberts
EMT Job No: 21/4216

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	5-7	8-10	11-13	14-16	21-23	30-32	37-39				LOD/LOR	Units	Method No.
Sample ID	TP2	TP3	TP4	TP4	TP6	TP10	TP12						
Depth	0.40	0.30	0.40	1.60	0.20	0.20	0.50						
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T						
Sample Date	22/03/2021	22/03/2021	22/03/2021	22/03/2021	22/03/2021	22/03/2021	22/03/2021						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	22/03/2021	22/03/2021	22/03/2021	22/03/2021	22/03/2021	22/03/2021	22/03/2021						
Arsenic #	7.4	5.3	7.3	-	7.5	9.1	6.1				<0.5	mg/kg	TM30/PM15
Barium #	196	74	63	-	62	147	33				<1	mg/kg	TM30/PM15
Beryllium	0.8	<0.5	0.5	-	<0.5	0.7	<0.5				<0.5	mg/kg	TM30/PM15
Cadmium #	0.9	0.3	0.3	-	0.2	0.6	<0.1				<0.1	mg/kg	TM30/PM15
Chromium #	36.9	26.6	32.3	-	27.3	35.6	16.3				<0.5	mg/kg	TM30/PM15
Copper #	29	32	15	-	32	28	6				<1	mg/kg	TM30/PM15
Lead #	170	31	309	-	75	101	26				<5	mg/kg	TM30/PM15
Mercury #	0.3	0.2	<0.1	-	0.1	0.2	<0.1				<0.1	mg/kg	TM30/PM15
Nickel #	11.5	11.8	10.7	-	12.7	14.4	10.6				<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	-	<1	<1	<1				<1	mg/kg	TM30/PM15
Total Sulphate as SO4 #	965	6985	594	-	48950$_{AA}$	327	222				<50	mg/kg	TM50/PM29
Vanadium	17	14	16	-	16	23	16				<1	mg/kg	TM30/PM15
Water Soluble Boron #	0.7	4.2	1.1	-	5.6	1.0	0.4				<0.1	mg/kg	TM74/PM32
Zinc #	758	165	138	-	283	175	38				<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	0.21	<0.04	<0.04	-	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	-	<0.03	<0.03	<0.03				<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	-	<0.05	<0.05	<0.05				<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	-	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.25	<0.03	0.04	-	<0.03	0.08	<0.03				<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	-	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.46	<0.03	0.12	-	0.08	0.23	0.12				<0.03	mg/kg	TM4/PM8
Pyrene #	0.41	<0.03	0.11	-	0.08	0.21	0.12				<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.29	<0.06	0.09	-	0.09	0.16	0.09				<0.06	mg/kg	TM4/PM8
Chrysene #	0.31	<0.02	0.08	-	0.06	0.18	0.09				<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.68	<0.07	0.19	-	0.13	0.38	0.17				<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.30	<0.04	0.07	-	0.05	0.19	0.08				<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.25	<0.04	0.07	-	0.05	0.16	0.07				<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.05	<0.04	<0.04	-	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.26	<0.04	0.07	-	0.06	0.18	0.08				<0.04	mg/kg	TM4/PM8
PAH 16 Total	3.5	<0.6	0.8	-	0.6	1.8	0.8				<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.49	<0.05	0.14	-	0.09	0.27	0.12				<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.19	<0.02	0.05	-	0.04	0.11	0.05				<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	94	96	94	-	96	100	102				<0	%	TM4/PM8
Methyl Tertiary Butyl Ether #	-	-	-	<2	-	-	-				<2	ug/kg	TM15/PM10
Benzene #	-	-	-	<3	-	-	-				<3	ug/kg	TM15/PM10
Toluene #	-	-	-	<3	-	-	-				<3	ug/kg	TM15/PM10
Ethylbenzene #	-	-	-	<3	-	-	-				<3	ug/kg	TM15/PM10
m/p-Xylene #	-	-	-	<5	-	-	-				<5	ug/kg	TM15/PM10
o-Xylene #	-	-	-	<3	-	-	-				<3	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	-	-	-	94	-	-	-				<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	-	-	-	91	-	-	-				<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: Terra97 Limited
Reference: C21379
Location: Queensferry, Garden City
Contact: Danny Roberts
EMT Job No: 21/4216

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	5-7	8-10	11-13	14-16	21-23	30-32	37-39				LOD/LOR	Units	Method No.
Sample ID	TP2	TP3	TP4	TP4	TP6	TP10	TP12						
Depth	0.40	0.30	0.40	1.60	0.20	0.20	0.50						
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T						
Sample Date	22/03/2021	22/03/2021	22/03/2021	22/03/2021	22/03/2021	22/03/2021	22/03/2021						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	22/03/2021	22/03/2021	22/03/2021	22/03/2021	22/03/2021	22/03/2021	22/03/2021						
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<0.1	-	-	<0.1	<0.1	<0.1	<0.1				<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	<0.1	-	-	<0.1	<0.1	<0.1	<0.1				<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	-	-	<0.1	<0.1	<0.1	<0.1				<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	<0.2	-	-	7.8	<0.2	<0.2	<0.2				<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #	<4	-	-	60	<4	<4	<4				<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	<7	-	-	84	<7	<7	<7				<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	73	-	-	119	77	78	<7				<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35 (EH+HS_CU_1D_AL)	73	-	-	271	77	78	<19				<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Aromatics													
>C5-EC7 (HS_1D_AR) #	<0.1	-	-	<0.1	<0.1	<0.1	<0.1				<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	<0.1	-	-	<0.1	<0.1	<0.1	<0.1				<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	<0.1	-	-	<0.1	<0.1	<0.1	<0.1				<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	<0.2	-	-	8.0	<0.2	<0.2	<0.2				<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) #	8	-	-	43	<4	<4	<4				<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	107	-	-	121	<7	<7	12				<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	328	-	-	171	424	119	111				<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 (EH+HS_CU_1D_AR) #	443	-	-	343	424	119	123				<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35) (EH+HS_CU_1D_Total)	516	-	-	614	501	197	123				<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE #	<5	-	-	-	<5	<5	<5				<5	ug/kg	TM36/PM12
Benzene #	<5	-	-	-	<5	<5	<5				<5	ug/kg	TM36/PM12
Toluene #	<5	-	-	-	<5	<5	<5				<5	ug/kg	TM36/PM12
Ethylbenzene #	<5	-	-	-	<5	<5	<5				<5	ug/kg	TM36/PM12
m/p-Xylene #	<5	-	-	-	<5	<5	<5				<5	ug/kg	TM36/PM12
o-Xylene #	<5	-	-	-	<5	<5	<5				<5	ug/kg	TM36/PM12
Total Phenols HPLC	<0.15	<0.15	<0.15	-	<0.15	<0.15	<0.15				<0.15	mg/kg	TM26/PM21B
Natural Moisture Content	7.2	22.9	17.1	23.1	28.1	26.2	33.3				<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	-	<0.3	<0.3	<0.3				<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.0519	1.5384	0.1156	-	1.4510	0.0053	0.0073				<0.0015	g/l	TM38/PM20
Chromium III	36.9	26.6	32.3	-	27.3	35.6	16.3				<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	0.69	0.48	0.45	-	0.91	4.13	0.29				<0.02	%	TM21/PM24
pH #	9.04	9.52	8.84	-	8.68	8.34	8.72				<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Terra97 Limited
Reference: C21379
Location: Queensferry, Garden City
Contact: Danny Roberts
EMT Job No: 21/4216

SVOC Report : **Solid**

EMT Sample No.	14-16												
Sample ID	TP4												
Depth	1.60												
COC No / misc													
Containers	V J T												
Sample Date	22/03/2021												
Sample Type	Soil												
Batch Number	1												
Date of Receipt	22/03/2021												

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
SVOC MS													
Phenols													
2-Chlorophenol #	<10										<10	ug/kg	TM16/PM8
2-Methylphenol	<10										<10	ug/kg	TM16/PM8
2-Nitrophenol	<10										<10	ug/kg	TM16/PM8
2,4-Dichlorophenol #	<10										<10	ug/kg	TM16/PM8
2,4-Dimethylphenol	<10										<10	ug/kg	TM16/PM8
2,4,5-Trichlorophenol	<10										<10	ug/kg	TM16/PM8
2,4,6-Trichlorophenol	<10										<10	ug/kg	TM16/PM8
4-Chloro-3-methylphenol	<10										<10	ug/kg	TM16/PM8
4-Methylphenol	<10										<10	ug/kg	TM16/PM8
4-Nitrophenol	<10										<10	ug/kg	TM16/PM8
Pentachlorophenol	<10										<10	ug/kg	TM16/PM8
Phenol #	<10										<10	ug/kg	TM16/PM8
PAHs													
2-Chloronaphthalene #	<10										<10	ug/kg	TM16/PM8
2-Methylnaphthalene #	154										<10	ug/kg	TM16/PM8
Naphthalene	97										<10	ug/kg	TM16/PM8
Acenaphthylene	<10										<10	ug/kg	TM16/PM8
Acenaphthene	<10										<10	ug/kg	TM16/PM8
Fluorene	26										<10	ug/kg	TM16/PM8
Phenanthrene #	65										<10	ug/kg	TM16/PM8
Anthracene	36										<10	ug/kg	TM16/PM8
Fluoranthene #	117										<10	ug/kg	TM16/PM8
Pyrene #	230										<10	ug/kg	TM16/PM8
Benzo(a)anthracene	119										<10	ug/kg	TM16/PM8
Chrysene	106										<10	ug/kg	TM16/PM8
Benzo(bk)fluoranthene	303										<10	ug/kg	TM16/PM8
Benzo(a)pyrene	185										<10	ug/kg	TM16/PM8
Indeno(123cd)pyrene	126										<10	ug/kg	TM16/PM8
Dibenzo(ah)anthracene	41										<10	ug/kg	TM16/PM8
Benzo(ghi)perylene	187										<10	ug/kg	TM16/PM8
Benzo(b)fluoranthene	218										<10	ug/kg	TM16/PM8
Benzo(k)fluoranthene	85										<10	ug/kg	TM16/PM8
Phthalates													
Bis(2-ethylhexyl) phthalate	<100										<100	ug/kg	TM16/PM8
Butylbenzyl phthalate	<100										<100	ug/kg	TM16/PM8
Di-n-butyl phthalate	<100										<100	ug/kg	TM16/PM8
Di-n-Octyl phthalate	<100										<100	ug/kg	TM16/PM8
Diethyl phthalate	<100										<100	ug/kg	TM16/PM8
Dimethyl phthalate #	<100										<100	ug/kg	TM16/PM8

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Terra97 Limited
Reference: C21379
Location: Queensferry, Garden City
Contact: Danny Roberts
EMT Job No: 21/4216

SVOC Report : **Solid**

EMT Sample No.	14-16												
Sample ID	TP4												
Depth	1.60										Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V J T												
Sample Date	22/03/2021												
Sample Type	Soil												
Batch Number	1												
Date of Receipt	22/03/2021										LOD/LOR	Units	Method No.
SVOC MS													
Other SVOCs													
1,2-Dichlorobenzene	<10										<10	ug/kg	TM16/PM8
1,2,4-Trichlorobenzene #	<10										<10	ug/kg	TM16/PM8
1,3-Dichlorobenzene	<10										<10	ug/kg	TM16/PM8
1,4-Dichlorobenzene	<10										<10	ug/kg	TM16/PM8
2-Nitroaniline	<10										<10	ug/kg	TM16/PM8
2,4-Dinitrotoluene	<10										<10	ug/kg	TM16/PM8
2,6-Dinitrotoluene	<10										<10	ug/kg	TM16/PM8
3-Nitroaniline	<10										<10	ug/kg	TM16/PM8
4-Bromophenylphenylether #	<10										<10	ug/kg	TM16/PM8
4-Chloroaniline	<10										<10	ug/kg	TM16/PM8
4-Chlorophenylphenylether	<10										<10	ug/kg	TM16/PM8
4-Nitroaniline	<10										<10	ug/kg	TM16/PM8
Azobenzene	<10										<10	ug/kg	TM16/PM8
Bis(2-chloroethoxy)methane	<10										<10	ug/kg	TM16/PM8
Bis(2-chloroethyl)ether	<10										<10	ug/kg	TM16/PM8
Carbazole	<10										<10	ug/kg	TM16/PM8
Dibenzofuran #	25										<10	ug/kg	TM16/PM8
Hexachlorobenzene	<10										<10	ug/kg	TM16/PM8
Hexachlorobutadiene #	<10										<10	ug/kg	TM16/PM8
Hexachlorocyclopentadiene	<10										<10	ug/kg	TM16/PM8
Hexachloroethane	<10										<10	ug/kg	TM16/PM8
Isophorone #	<10										<10	ug/kg	TM16/PM8
N-nitrosodi-n-propylamine #	<10										<10	ug/kg	TM16/PM8
Nitrobenzene #	<10										<10	ug/kg	TM16/PM8
Surrogate Recovery 2-Fluorobiphenyl	137										<0	%	TM16/PM8
Surrogate Recovery p-Terphenyl-d14	119										<0	%	TM16/PM8

Client Name: Terra97 Limited
Reference: C21379
Location: Queensferry, Garden City
Contact: Danny Roberts
EMT Job No: 21/4216

VOC Report : **Solid**

EMT Sample No.	14-16												
Sample ID	TP4												
Depth	1.60												
COC No / misc													
Containers	V J T												
Sample Date	22/03/2021												
Sample Type	Soil												
Batch Number	1												
Date of Receipt	22/03/2021												

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	<2										<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<2										<2	ug/kg	TM15/PM10
Chloromethane #	<3										<3	ug/kg	TM15/PM10
Vinyl Chloride	<2										<2	ug/kg	TM15_A/PM10
Bromomethane	<1										<1	ug/kg	TM15/PM10
Chloroethane #	<2										<2	ug/kg	TM15/PM10
Trichlorofluoromethane #	<2										<2	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<6										<6	ug/kg	TM15/PM10
Dichloromethane (DCM) #	<30										<30	ug/kg	TM15/PM10
trans-1-2-Dichloroethene #	<3										<3	ug/kg	TM15/PM10
1,1-Dichloroethane #	<3										<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene #	<3										<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4										<4	ug/kg	TM15/PM10
Bromochloromethane #	<3										<3	ug/kg	TM15/PM10
Chloroform #	<3										<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane #	<3										<3	ug/kg	TM15/PM10
1,1-Dichloropropene #	<3										<3	ug/kg	TM15/PM10
Carbon tetrachloride #	<4										<4	ug/kg	TM15/PM10
1,2-Dichloroethane #	<4										<4	ug/kg	TM15/PM10
Benzene #	<3										<3	ug/kg	TM15/PM10
Trichloroethene (TCE) #	<3										<3	ug/kg	TM15/PM10
1,2-Dichloropropane #	<6										<6	ug/kg	TM15/PM10
Dibromomethane #	<3										<3	ug/kg	TM15/PM10
Bromodichloromethane #	<3										<3	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4										<4	ug/kg	TM15/PM10
Toluene #	<3										<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3										<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane #	<3										<3	ug/kg	TM15/PM10
Tetrachloroethene (PCE) #	<3										<3	ug/kg	TM15/PM10
1,3-Dichloropropane #	<3										<3	ug/kg	TM15/PM10
Dibromochloromethane #	<3										<3	ug/kg	TM15/PM10
1,2-Dibromoethane #	<3										<3	ug/kg	TM15/PM10
Chlorobenzene #	<3										<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #	<3										<3	ug/kg	TM15/PM10
Ethylbenzene #	<3										<3	ug/kg	TM15/PM10
m/p-Xylene #	<5										<5	ug/kg	TM15/PM10
o-Xylene #	<3										<3	ug/kg	TM15/PM10
Styrene	<3										<3	ug/kg	TM15_A/PM10
Bromoform	<3										<3	ug/kg	TM15/PM10
Isopropylbenzene #	<3										<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #	<3										<3	ug/kg	TM15/PM10
Bromobenzene	<2										<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane #	<4										<4	ug/kg	TM15/PM10
Propylbenzene #	<4										<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3										<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<3										<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3										<3	ug/kg	TM15/PM10
tert-Butylbenzene #	<5										<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<6										<6	ug/kg	TM15/PM10
sec-Butylbenzene #	<4										<4	ug/kg	TM15/PM10
4-Isopropyltoluene #	<4										<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #	<4										<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene #	<4										<4	ug/kg	TM15/PM10
n-Butylbenzene #	<4										<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene #	<4										<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane #	<4										<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene	<7										<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4										<4	ug/kg	TM15/PM10
Naphthalene	<27										<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene	<7										<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	94										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	91										<0	%	TM15/PM10

Client Name: Terra97 Limited
Reference: C21379
Location: Queensferry, Garden City
Contact: Danny Roberts

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
21/4216	1	TP1	0.30	3	29/03/2021	**General Description (Bulk Analysis)**	Soil/Stone
					29/03/2021	**Asbestos Fibres**	NAD
					29/03/2021	**Asbestos ACM**	NAD
					29/03/2021	**Asbestos Type**	NAD
					29/03/2021	**Asbestos Level Screen**	NAD
21/4216	1	TP2	0.05	4	29/03/2021	**General Description (Bulk Analysis)**	Soil/Stone
					29/03/2021	**Asbestos Fibres**	Fibre Bundles
					29/03/2021	**Asbestos ACM**	NAD
					29/03/2021	**Asbestos Type**	Chrysotile
					29/03/2021	**Asbestos Level Screen**	less than 0.1%
					29/03/2021	**Comments (Bulk Analysis)**	Small bundle removed for analysis
21/4216	1	TP3	0.30	10	29/03/2021	**General Description (Bulk Analysis)**	Soil/Stone
					29/03/2021	**Asbestos Fibres**	NAD
					29/03/2021	**Asbestos ACM**	NAD
					29/03/2021	**Asbestos Type**	NAD
					29/03/2021	**Asbestos Level Screen**	NAD
21/4216	1	TP5	0.20	17	29/03/2021	**General Description (Bulk Analysis)**	Soil/Stones
					29/03/2021	**Asbestos Fibres**	NAD
					29/03/2021	**Asbestos ACM**	NAD
					29/03/2021	**Asbestos Type**	NAD
					29/03/2021	**Asbestos Level Screen**	NAD
21/4216	1	TP6	0.20	23	29/03/2021	**General Description (Bulk Analysis)**	Soil/Stone
					29/03/2021	**Asbestos Fibres**	NAD
					29/03/2021	**Asbestos ACM**	NAD
					29/03/2021	**Asbestos Type**	NAD
					29/03/2021	**Asbestos Level Screen**	NAD
21/4216	1	TP6	0.70	26	29/03/2021	**General Description (Bulk Analysis)**	Soil/Stones
					29/03/2021	**Asbestos Fibres**	NAD
					29/03/2021	**Asbestos ACM**	NAD
					29/03/2021	**Asbestos Type**	NAD
					29/03/2021	**Asbestos Level Screen**	NAD
21/4216	1	TP9	0.30	29	30/03/2021	**General Description (Bulk Analysis)**	soil.stones
					30/03/2021	**Asbestos Fibres**	NAD

Client Name: Terra97 Limited
Reference: C21379
Location: Queensferry, Garden City
Contact: Danny Roberts

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
21/4216	1	TP9	0.30	29	30/03/2021	**Asbestos ACM**	NAD
					30/03/2021	**Asbestos Type**	NAD
					30/03/2021	**Asbestos Level Screen**	NAD
21/4216	1	TP10	0.20	32	29/03/2021	**General Description (Bulk Analysis)**	Soil/Stones
					29/03/2021	**Asbestos Fibres**	NAD
					29/03/2021	**Asbestos ACM**	NAD
					29/03/2021	**Asbestos Type**	NAD
					29/03/2021	**Asbestos Level Screen**	NAD
21/4216	1	TP12	0.10	36	29/03/2021	**General Description (Bulk Analysis)**	Soil/Stones
					29/03/2021	**Asbestos Fibres**	NAD
					29/03/2021	**Asbestos ACM**	NAD
					29/03/2021	**Asbestos Type**	NAD
					29/03/2021	**Asbestos Level Screen**	NAD
21/4216	1	TP12	0.50	39	29/03/2021	**General Description (Bulk Analysis)**	Soil/Stone
					29/03/2021	**Asbestos Fibres**	NAD
					29/03/2021	**Asbestos ACM**	NAD
					29/03/2021	**Asbestos Type**	NAD
					29/03/2021	**Asbestos Level Screen**	NAD

Client Name: Terra97 Limited

Matrix : Solid

Reference: C21379

Location: Queensferry, Garden City

Contact: Danny Roberts

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
21/4216	1	TP4	1.60	14-16	VOC	Analysis taken from a previously sampled container.

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 21/4216

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

All solid results are expressed on a dry weight basis unless stated otherwise.

EMT Job No: 21/4216

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes

EMT Job No: 21/4216

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	A hot hydrochloric acid digest is performed on a dried and ground sample, and the resulting liquor is analysed.	Yes		AD	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	

EMT Job No: 21/4216

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
TM15_A	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

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Terra97 Limited
27A Longwood Road
Trafford Park
Manchester
M17 1PZ

Attention :	Danny Roberts
Date :	7th April, 2021
Your reference :	C21379
Our reference :	Test Report 21/4507 Batch 1
Location :	Queensferry, Garden City
Date samples received :	26th March, 2021
Status :	Final report
Issue :	1

Three samples were received for analysis on 26th March, 2021 of which one were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

[redacted]

Phil Sommerton BSc
Senior Project Manager

Element Materials Technology

Client Name: Terra97 Limited
Reference: C21379
Location: Queensferry, Garden City
Contact: Danny Roberts
EMT Job No: 21/4507

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3										LOD/LOR	Units	Method No.
Sample ID	WS3												
Depth	0.40												
COC No / misc													
Containers	V J T												
Sample Date	24/03/2021												
Sample Type	Soil												
Batch Number	1												
Date of Receipt	26/03/2021												
Arsenic #	6.8										<0.5	mg/kg	TM30/PM15
Barium #	75										<1	mg/kg	TM30/PM15
Beryllium	0.7										<0.5	mg/kg	TM30/PM15
Cadmium #	0.6										<0.1	mg/kg	TM30/PM15
Chromium #	28.5										<0.5	mg/kg	TM30/PM15
Copper #	21										<1	mg/kg	TM30/PM15
Lead #	315										<5	mg/kg	TM30/PM15
Mercury #	0.3										<0.1	mg/kg	TM30/PM15
Nickel #	7.6										<0.7	mg/kg	TM30/PM15
Selenium #	<1										<1	mg/kg	TM30/PM15
Total Sulphate as SO4 #	429										<50	mg/kg	TM50/PM29
Vanadium	12										<1	mg/kg	TM30/PM15
Water Soluble Boron #	0.7										<0.1	mg/kg	TM74/PM32
Zinc #	210										<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04										<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03										<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05										<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04										<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.21										<0.03	mg/kg	TM4/PM8
Anthracene #	0.05										<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.51										<0.03	mg/kg	TM4/PM8
Pyrene #	0.47										<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.24										<0.06	mg/kg	TM4/PM8
Chrysene #	0.28										<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.54										<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.26										<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.19										<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04										<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.22										<0.04	mg/kg	TM4/PM8
PAH 16 Total	3.0										<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.39										<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.15										<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	102										<0	%	TM4/PM8

Please see attached notes for all abbreviations and acronyms

Client Name: Terra97 Limited
Reference: C21379
Location: Queensferry, Garden City
Contact: Danny Roberts
EMT Job No: 21/4507

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3										LOD/LOR	Units	Method No.
Sample ID	WS3												
Depth	0.40												
COC No / misc													
Containers	V J T												
Sample Date	24/03/2021												
Sample Type	Soil												
Batch Number	1												
Date of Receipt	26/03/2021												
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<0.1										<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	<0.1										<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1										<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	6.1										<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #	16										<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	42										<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	369										<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35 (EH+HS_CU_1D_AL)	433										<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Aromatics													
>C5-EC7 (HS_1D_AR) #	<0.1										<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	<0.1										<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	<0.1										<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	<0.2										<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) #	13										<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	86										<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	417										<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 (EH+HS_CU_1D_AR) #	516										<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35) (EH+HS_CU_1D_Total)	949										<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE #	<5										<5	ug/kg	TM36/PM12
Benzene #	<5										<5	ug/kg	TM36/PM12
Toluene #	<5										<5	ug/kg	TM36/PM12
Ethylbenzene #	<5										<5	ug/kg	TM36/PM12
m/p-Xylene #	<5										<5	ug/kg	TM36/PM12
o-Xylene #	<5										<5	ug/kg	TM36/PM12
Total Phenols HPLC	<0.15										<0.15	mg/kg	TM26/PM21B
Natural Moisture Content	8.3										<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3										<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.0185										<0.0015	g/l	TM38/PM20
Chromium III	28.5										<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	0.76										<0.02	%	TM21/PM24
pH #	8.38										<0.01	pH units	TM73/PM11

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Client Name: Terra97 Limited
Reference: C21379
Location: Queensferry, Garden City
Contact: Danny Roberts

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 21/4507						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
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EMT Job No.: 21/4507

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Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 21/4507

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes

EMT Job No: 21/4507

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	A hot hydrochloric acid digest is performed on a dried and ground sample, and the resulting liquor is analysed.	Yes		AD	Yes
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes

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Unit 3 Deeside Point
Zone 3
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Terra97 Limited
27A Longwood Road
Trafford Park
Manchester
M17 1PZ

Attention :	Jonny Swindells
Date :	9th April, 2021
Your reference :	C21379
Our reference :	Test Report 21/4792 Batch 1
Location :	
Date samples received :	31st March, 2021
Status :	Final report
Issue :	1

Three samples were received for analysis on 31st March, 2021 of which three were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

[redacted]

Bruce Leslie
Project Manager

Client Name: Terra97 Limited
Reference: C21379
Location:
Contact: Jonny Swindells
EMT Job No: 21/4792

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	1-5	6-10	11-15									
Sample ID	WS1	WS3	WS4									
Depth												
COC No / misc												
Containers	V HNUF P G	V HNUF P G	V HNUF P G									
Sample Date	31/03/2021	31/03/2021	31/03/2021									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1									
Date of Receipt	31/03/2021	31/03/2021	31/03/2021									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Dissolved Arsenic #	<2.5	<2.5	<2.5								<2.5	ug/l	TM30/PM14
Dissolved Barium #	59	72	46								<3	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5								<0.5	ug/l	TM30/PM14
Dissolved Boron	171	93	35								<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5								<0.5	ug/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5								<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7								<7	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5								<5	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1								<1	ug/l	TM30/PM14
Dissolved Nickel #	4	13	8								<2	ug/l	TM30/PM14
Dissolved Selenium #	<3	<3	<3								<3	ug/l	TM30/PM14
Dissolved Vanadium #	<1.5	<1.5	<1.5								<1.5	ug/l	TM30/PM14
Dissolved Zinc #	<3	<3	<3								<3	ug/l	TM30/PM14
PAH MS													
Naphthalene #	<0.1	<0.1	<0.1								<0.1	ug/l	TM4/PM30
Acenaphthylene #	0.013	<0.013	<0.013								<0.013	ug/l	TM4/PM30
Acenaphthene #	0.026	0.018	<0.013								<0.013	ug/l	TM4/PM30
Fluorene #	0.028	0.020	0.014								<0.014	ug/l	TM4/PM30
Phenanthrene #	0.096	0.074	0.047								<0.011	ug/l	TM4/PM30
Anthracene #	0.017	<0.013	<0.013								<0.013	ug/l	TM4/PM30
Fluoranthene #	0.032	0.026	0.014								<0.012	ug/l	TM4/PM30
Pyrene #	0.035	0.020	<0.013								<0.013	ug/l	TM4/PM30
Benzo(a)anthracene #	<0.015	<0.015	<0.015								<0.015	ug/l	TM4/PM30
Chrysene #	<0.011	<0.011	<0.011								<0.011	ug/l	TM4/PM30
Benzo(bk)fluoranthene #	<0.018	<0.018	<0.018								<0.018	ug/l	TM4/PM30
Benzo(a)pyrene #	<0.016	<0.016	<0.016								<0.016	ug/l	TM4/PM30
Indeno(123cd)pyrene #	<0.011	<0.011	<0.011								<0.011	ug/l	TM4/PM30
Dibenzo(ah)anthracene #	<0.01	<0.01	<0.01								<0.01	ug/l	TM4/PM30
Benzo(ghi)perylene #	<0.011	<0.011	<0.011								<0.011	ug/l	TM4/PM30
PAH 16 Total #	0.247	<0.195	<0.195								<0.195	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.01	<0.01	<0.01								<0.01	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.01	<0.01	<0.01								<0.01	ug/l	TM4/PM30
PAH Surrogate % Recovery	80	77	80								<0	%	TM4/PM30
MTBE #	<5	<5	<5								<5	ug/l	TM36/PM12
Benzene #	<5	<5	<5								<5	ug/l	TM36/PM12
Toluene #	<5	<5	<5								<5	ug/l	TM36/PM12
Ethylbenzene #	<5	<5	<5								<5	ug/l	TM36/PM12
m/p-Xylene #	<5	<5	<5								<5	ug/l	TM36/PM12
o-Xylene #	<5	<5	<5								<5	ug/l	TM36/PM12

Element Materials Technology

Client Name: Terra97 Limited
Reference: C21379
Location:
Contact: Jonny Swindells
EMT Job No: 21/4792

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	1-5	6-10	11-15									
Sample ID	WS1	WS3	WS4									
Depth												
COC No / misc												
Containers	V HNUF P G	V HNUF P G	V HNUF P G									
Sample Date	31/03/2021	31/03/2021	31/03/2021									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1									
Date of Receipt	31/03/2021	31/03/2021	31/03/2021									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10	<10								<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10	<10								<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10	<10								<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5	<5								<5	ug/l	TM5/PM16/PM30
>C12-C16 #	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 #	<10	<10	<10								<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7 #	<10	<10	<10								<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	<10								<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	<10								<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	<5								<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 #	<10	<10	<10								<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) #	<10	<10	<10								<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total Phenols HPLC	<0.15	<0.15	<0.15								<0.15	mg/l	TM26/PM0
Sulphate as SO4 #	189.1	84.8	13.4								<0.5	mg/l	TM38/PM0
Hexavalent Chromium	<6	<6	<6								<6	ug/l	TM38/PM0
Total Dissolved Chromium III	<6	<6	<6								<6	ug/l	TM0/PM0

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Element Materials Technology

Client Name: Terra97 Limited
Reference: C21379
Location:
Contact: Jonny Swindells
EMT Job No: 21/4792

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	1-5	6-10	11-15									
Sample ID	WS1	WS3	WS4									
Depth												
COC No / misc												
Containers	V HNUF P G	V HNUF P G	V HNUF P G									
Sample Date	31/03/2021	31/03/2021	31/03/2021									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1									
Date of Receipt	31/03/2021	31/03/2021	31/03/2021									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
PFAAS													
PFBA	-	-	<0.05								<0.05	ug/l	TM135/PM121
PFPeA	-	-	<0.05								<0.05	ug/l	TM135/PM121
PFBS	-	-	<0.05								<0.05	ug/l	TM135/PM121
PFHxA	-	-	<0.05								<0.05	ug/l	TM135/PM121
4:2 FTS	-	-	<0.1								<0.1	ug/l	TM135/PM121
PFPeS	-	-	<0.05								<0.05	ug/l	TM135/PM121
PFHpA	-	-	<0.05								<0.05	ug/l	TM135/PM121
PFHxS	-	-	<0.05								<0.05	ug/l	TM135/PM121
PFOA	-	-	<0.05								<0.05	ug/l	TM135/PM121
6:2 FTS	-	-	<0.2								<0.2	ug/l	TM135/PM121
PFHpS	-	-	<0.1								<0.1	ug/l	TM135/PM121
PFNA	-	-	<0.05								<0.05	ug/l	TM135/PM121
PFOSA	-	-	<1								<1	ug/l	TM135/PM121
PFOS	-	-	0.13								<0.05	ug/l	TM135/PM121
PFDA	-	-	<0.05								<0.05	ug/l	TM135/PM121
8:2 FTS	-	-	<0.05								<0.05	ug/l	TM135/PM121
PFNS	-	-	<0.05								<0.05	ug/l	TM135/PM121
PFUnA	-	-	<0.05								<0.05	ug/l	TM135/PM121
N-MeFOSAA	-	-	<1								<1	ug/l	TM135/PM121
N-EtFOSAA	-	-	<0.2								<0.2	ug/l	TM135/PM121
PFDS	-	-	<0.05								<0.05	ug/l	TM135/PM121
PFDoA	-	-	<0.05								<0.05	ug/l	TM135/PM121
PFTrDA	-	-	<0.05								<0.05	ug/l	TM135/PM121
PFTeDA	-	-	<0.05								<0.05	ug/l	TM135/PM121
Electrical Conductivity @25C #	775	726	579								<2	uS/cm	TM76/PM0
Free Ammonia as N	<0.006	<0.006	<0.006								<0.006	mg/l	TM176/PM0
pH #	7.61	7.62	7.78								<0.01	pH units	TM73/PM0

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Terra97 Limited
Reference: C21379
Location:
Contact: Jonny Swindells

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 21/4792						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 21/4792

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 21/4792

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM0	Not available	PM0	No preparation is required.				
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM0	No preparation is required.				

EMT Job No: 21/4792

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM0	No preparation is required.	Yes			
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM76	Modified US EPA method 120.1 (1982). Determination of Specific Conductance by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM135	PFAAS by LC-MS - Determination of Specific Perfluorinated Alkyl Acids and Sulfonates with Reversed Phase Liquid Chromatography and Mass Spectroscopy detection after a Solid Phase Extraction clean-up process has been performed.	PM121	Preparation of PFAAS liquid samples – As received samples are centrifuged and the supernatant is used for PFAAS analysis.				
TM176	Free ammonia based on the pH and temperature dependent equilibrium calculated in accordance with NRA Water Quality Objectives 1994 using the ammoniacal nitrogen result.	PM0	No preparation is required.				

APPENDIX I – GROUND GAS MONITORING RESULTS

GAS MONITORING ACROSS BOREHOLE LOCATIONS

JOB DETAILS:		**Job No:**	C21379		
Client:	C4 Projects	**Visit No:**	1	of	2
Site:	Gateway to Wales, Queensferry	**Operator:**	DR		
Date:	29/03/2021	**Project Manager:**	DR		

TERRA97

Monitoring Point	GAS CONCENTRATIONS												FLOW DATA		WELL AND WATER DATA					Comments
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppm)		Hydrogen sulphide (ppm)		Oxygen (%v/v)		Flow rate (l/hr)		Water Depth (mbgl)	Depth of Well (mbgl)	Ground Level (mAOD)	Water Level (mAOD)	Response Zone	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Lowest	Steady	Peak	Steady						
WS1	ND	ND	ND	ND	0.4	0,4	ND	ND	ND	ND	19.5	19.7	ND	ND	1.26	2.23				
WS3	ND	ND	ND	ND	0.8	0.8	ND	ND	ND	ND	18.9	18.9	ND	ND	1.35	1.89				
WS4	ND	ND	ND	ND	0.7	0.6	ND	ND	ND	ND	19.4	19.4	ND	ND	1.02	2.00				
WS5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20.2	20.3	ND	ND	1.14	1.83				
Max	**0.1**	**0.1**	**0.1**	**0.1**	**0.8**	**0.8**	ND	ND	ND	ND	**20.2**	**20.3**	**0.1**	**0.1**	**1.35**	**2.23**				
Min	**0.1**	**0.1**	**0.0**	**0.0**	**0.1**	**0.1**	ND	ND	ND	ND	**18.9**	**18.9**	**0.1**	**0.1**	**1.02**	**1.83**				

METEOROLOGICAL AND SITE INFORMATION:													
State of ground:	X	Dry		Moist		Wet		Snow		Frozen			
Wind:	X	Calm		Light		Moderate		Strong					
Cloud cover:		None	X	Slight		Cloudy		Overcast					
Preciptation:	X	None		Slight		Moderate		Heavy					
Barometric pressure (mbar):			1020	Before			1020	After					
Pressure trend:			X	Falling		Steady		Rising					
Ground gas meter:	**GA2000**												
Ambient Gas concentration:	**CH_4**	0.0%	**CO_2**	0.1%	**O_2**	20.3%							

GAS MONITORING ACROSS BOREHOLE LOCATIONS

JOB DETAILS:		**Job No:**	C21379		
Client:	C4 Projects	**Visit No:**	2	of	2
Site:	Gateway to Wales, Queensferry	**Operator:**	MW		
Date:	13/04/2021	**Project Manager:**	DR		

TERRA97

Monitoring Point	GAS CONCENTRATIONS												FLOW DATA		WELL AND WATER DATA					Comments
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppm)		Hydrogen sulphide (ppm)		Oxygen (%v/v)		Flow rate (l/hr)		Water Depth (mbgl)	Depth of Well (mbgl)	Ground Level (mAOD)	Water Level (mAOD)	Response Zone	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Lowest	Steady	Peak	Steady						
WS1	ND	ND	ND	ND	0.6	0,3	ND	ND	ND	ND	19.3	19.9	ND	ND	1.37	2.25				
WS3	ND	ND	ND	ND	0.5	0.5	ND	ND	ND	ND	19.1	19.1	ND	ND	1.46	1.90				
WS4	ND	ND	ND	ND	0.4	0.4	ND	ND	ND	ND	19.6	19.6	ND	ND	1.15	2.02				
WS5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20.1	20.2	ND	ND	1.23	1.82				
Max	**0.1**	**0.1**	**0.1**	**0.1**	**0.6**	**0.5**	ND	ND	ND	ND	**20.1**	**20.2**	**0.1**	**0.1**	**1.46**	**2.25**				
Min	**0.1**	**0.1**	**0.0**	**0.0**	**0.1**	**0.1**	ND	ND	ND	ND	**19.1**	**19.1**	**0.1**	**0.1**	**1.15**	**1.82**				

METEOROLOGICAL AND SITE INFORMATION:													
State of ground:	x	Dry		Moist		Wet		Snow		Frozen			
Wind:		Calm	X	Light		Moderate		Strong					
Cloud cover:		None	X	Slight		Cloudy		Overcast					
Preciptation:	x	None		Slight		Moderate		Heavy					
Barometric pressure (mbar):			1028	Before			1028	After					
Pressure trend:				Falling		Steady	X	Rising					
Ground gas meter:	**GA2000**												
Ambient Gas concentration:	**CH_4**	0.0%	**CO_2**	0.0%	**O_2**	20.1%							