GEOTECHNICAL AND GEO-ENVIRONMENTAL REPORT:

PROPOSED RESIDENTIAL DEVELOPMENT, LAND OFF HERBERT ROAD, NEWPORT

Prepared for:
GREENHILL CONSTRUCTION LIMITED

March 2013

Job No: 12032

terrafirma

REPORT TITLE	:	**Geotechnical and Geo-environmental Report: Proposed Residential Development, Land off Herbert Road, Newport**
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Executive Summary

Greenhill Construction is proposing the development of land off Herbert Road in Newport.

Historically, the site has been occupied by a clothing factory after 1937 until before 1993. Some small buildings were located across the south of the site during its history. A historic landfill site also occupies the far north of the site.

The geological map of the area shows the site to be underlain by the St Maughn's Formation of the Devonian Period. Marine and estuarine alluvium is shown to overlie the site. Made ground of variable thickness was also believed to overlie the site.

A geotechnical and geo-environmental site investigation was carried out between the 31st of October and the 8th of November 2012 comprising 19 trial pits and six cable percussive boreholes. Three in-situ soakaway tests were also undertaken during the site investigation.

The trial pits found made ground to a depth of 0.20m to 3.30m with soft grey and brown mottled clay to 3.90/10.30m. Peat; at a thickness of between 0.6m and 2.30m was found at variable depth, ranging from 3.90 and 10.3 metres depth. The peat overlies the sand and gravel, which is itself underlain by weathered mudstone (firm becoming very stiff red brown gravelly clay) to 10.0/12.7m. Competent mudstone was encountered until termination of the borehole at 10.2/12.9m.

Fifteen small disturbed representative soil samples were collected for laboratory chemical analysis. Several substances tested for were found to be above the Tier 1 threshold values for a residential development.

A number of contaminants were also found to be above EQS guidelines. However, it is interpreted that the groundwater beneath the site is isolated from the nearby River Usk and therefore not in hydrological continuity with the river. It is therefore believed that the low levels of contamination will not affect the aquatic environment.

A Radon (RPM) Report for the site states that basic radon protection measures are required for new dwellings.

Following two rounds of gas monitoring undertaken so far, it is preliminarily considered that Gas Characteristic Situation 3 prevention measures should be used at the site.

Precast concrete driven piles founded within the underlying very weak red brown and grey mudstone are recommended.

For a 275mm square precast concrete pile driven to an appropriate set within the underlying gravels a safe working load of typically 500kN should be achieved. Pile lengths should vary between 12m and 15m beneath current ground levels.

The estimated working loads, pile type and lengths should be confirmed by a specialist piling contractor. It may be prudent to test drive piles at select locations.

For the quoted pile size, founded within the competent gravels, total settlements should not exceed 10mm with differential movements between adjacent piles being less than half this value.

Floor slabs should be designed as suspended.

Network Rail may also require a bored pile solution close to the railway.

Consolidation settlements of between 100 and 200mm of settlement are estimated beneath areas that are to be raised by 1.0 and 2.0m.

As the building foundations are to be piled this will result in differential settlements between the development infrastructure and the buildings of a similar order.

Based upon the above results we recommend that all buried concrete should conform to Design Class DS-1, ACEC Class AC-1, of BRE Digest 1:2005.

Two of the soakaways tests recorded no infiltration and TP5 recorded a permeability of 8.86 x 10-5 m/s.

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SECTION 1 Introduction and Proposed Development

Greenhill Construction is proposing the development of land off Herbert Road in Newport.

Terra Firma (Wales) Limited have been commissioned to undertake a geotechnical investigation and geo-environmental assessment of the site.

The main objectives of the geotechnical site investigation were to:

- Determine the type, strength and bearing characteristics of the shallow superficial and underlying solid geology.
- Provide recommendations for a suitable and economic foundation/floor slab solution for the development.
- Provide recommendations with regard to any other geo-technical aspects pertaining to the development.
- Provide recommendations for any necessary supplementary site investigation works.

The main objectives of the geo-environmental assessment programme were to:

- Identify the potential environmental liabilities at the site associated with any soil and groundwater contamination.
- Provide a summary of the environmental conditions at the site, together with any necessary remediation works to render the site fit for its intended use.
- Provide recommendations with regard to any other geo-environmental aspects pertaining to the development.

In order to achieve the above objectives, Terra Firma (Wales) Limited carried out an assessment programme including a review of existing data, followed by a Phase I field investigation to confirm the prevailing ground conditions and also to collect and analyse soil samples from selected locations around the site.

A site investigation of an area, which encompasses the site has previously been undertaken and was reviewed by Integral Geotechnique in May 2007. A copy of the review is located in **Annex A** of the report and is discussed further in Section 2 of the report.

1.1 Limitations and Exceptions of Investigation

Greenhill Construction Ltd has requested that a Geotechnical Investigation (GI) and Geo-environmental Site Assessment (GSA) be performed in order to determine if contamination is present beneath the site and to determine a suitable foundation/floor slab solution for the development.

The GSA and GI were conducted and this report has been prepared for the sole internal reliance of Greenhill Construction Ltd and its design team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Terra Firma (Wales) Limited. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The report represents the findings and opinions of experienced geotechnical and geo-environmental consultants. Terra Firma (Wales) Limited does not provide legal advice and the advice of lawyers may also be required.

The subsurface geological profiles, any contamination and other plots are generalised by necessity and have been based on the information found at the locations of the exploratory holes and depths sampled and tested.

The site investigation was limited by the following constraints;

- Underground utilities
- Dense vegetation
- Soft and waterlogged ground surface
- Topography
- Cycle track and pedestrians

SECTION 2 Review of Existing Data

2.1 Physical Setting, Current Use and Site Conditions

The site is a field located off Herbert Road in Newport at a National Grid Reference of 331690 189280. The location of the site is displayed in **Drawing 01**.

The site is irregular in shape and covers a total area of 4.52 hectares.

The site is currently unused with dense vegetation covering the centre and much of the south of the site. A cycle track passes from north to south along the west of the site. The north of the site is undulating and covered by short grass. The south east corner of the site is covered by rough hardstanding.

A drainage channel/reen passes from east to west at the north of the site, draining into the Usk, which is located to the immediate west of the site. A railway line runs along the east boundary of the site, a school to the north and commercial land to the south. hedgerows lining the north, south west and south east boundaries of the site. The site is part of a much larger field, which lies to the north east. Beyond the hedgerow to the south east is a housing estate on Cefn Coed, the A40 is located to the south west and another field is located to the north.

The site and general surrounding area is flat but undulating.

2.2 Review of Previous Reports

A Summary Report with Proposals for Land Remediation/Reclamation Works was undertaken by Integral Geotechnique in May 2007 for an area that encompassed the site.

A human health risk assessment compiled by White Young Green in 2003 recommended that the site be remediated to current soil guideline levels. The groundwater risk assessment concluded that River Usk was not at significant risk from contaminants at the site.

A ground gas risk assessment concluded that gas prevention measures are required at the site due to elevated levels of methane and carbon dioxide.

2.3 Site History

Historical maps of the site have been obtained from the Landmark Information Group and are presented in **Annex B** with the most relevant history maps summarised below.

1883 (1:2,500)
The site locates upon field land. A railway line is located to the immediate east of the site. A brick works is located approximately 115 metres south of the site and housing located within 320 metres south east of the site boundary. A rifle range is located on the opposite site of River Usk, approximately 160 metres west of the site. Two east two west reens/drainage channels cross the north and middle of the site.

1901-02 (1:2,500)
The 1901-02 maps shows no change to the site. The brick works to the south has seen some modification, with new building on the site and houses built upon some of the land. Land to the immediate east of the railway has become densely built upon by houses, churches and schools. A large excavation is located approximately 90 metres south of the site. The excavation is probably associated with the adjacent brick works. The rifle range no longer appears to be in existence.

2.2 Site History

1920 (Scale 1:2,500)
No change to the site has been made since the previous edition apart from a small rectangular building located at the far south of the site, on the present day cycle/walk path. Three saw mills are located along the west side of the railway, the closest of which is 80 metres east of the site. More houses have been built at the former brick works and to the east of the site. Allotment gardens are located to the south of the site.

1936-37 (Scale 1:2,500)
The 1936-37 editions again show no change to the site has been made apart from a series of small buildings located on the present day cycle track. The number of buildings at the saw mills to the south/east of the site has increased.

1955-57 (Scale 1:1,250)
The 1955-57 editions record a clothing factory at the south of the main portion of the site and at the top of Herbert Road. The drainage channel at the middle of the site has been removed/culverted. Houses have been built on some of the allotment gardens to the south of the site and the small building located upon the present day cycle/walk path have been replaced by two small buildings. The surrounding area continues to expand residentially.

1966-68 and 1969-70(Scale 1:2,500)
No change to the site has been made since the previous edition apart from the construction of a rectangular building at the north east of the site. To the south of the site, the land has become increasingly industrialised with engineering works, paint works and a light engineering works amongst the units. To the immediate north of the site is a sports stadium.

1993 (Scale 1:2,500)
The factory at the south of the site has been removed. Two tanks are located at the south east of the site and the far north of the site is known as St Julian's Glebelands Recreation Ground. A new building has also been built at the north east of the site. Some alteration has been made to the industrial units to the south of the site.

2012 (Scale 1:10,000)
No buildings are currently located on the site. A primary school has replaced the sports stadium to the immediate north of the site and many of the buildings to the south of the site have been removed.

2.4 Geology

The 1:50,000 scale geological map of the area (Sheet 249) shows the site to be underlain by the St Maughn's Formation of the Devonian Period. These rocks are interbedded argillaceous rocks with subordinated sandstone.

The solid geology is shown to be overlain by marine and estuarine alluvium.

Made ground of variable thickness is expected to overlie the site.

2.5 Hydrology & Hydrogeology

Surface runoff is likely to naturally drain into the soil underlying the site and chanel/reen vrossing the site which orientates towards the river Usk. Shallow groundwater is also likely to flow to the river.

Groundwater flow through the bedrock is likely to be heavily influenced by fractures within the rock, topography and bedding planes.

The Environment Agency website illustrates the bedrock beneath the site to be a Secondary A aquifer. These aquifers are 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.

The superficial material overlying the east of the site has also been classified as a Secondary A aquifer. The west portion of the site, along the bank of the River Usk is not classified as it is considered unproductive strata.

2.6 Radon

A British Geological Survey Radon Report obtained for the site confirms that **basic** radon protection is required for any new development. The radon report is presented in **Annex B**.

2.7 Environmental

The Environment Agency online 'What's in Your Back Yard' database was consulted. The relevant information is summarised below.

2.7.1 Industrial Operator Scores

There are no sites within a 1km radius of the site where pollution is regulated.

2.7.2 Industrial Pollution

There are no industrial pollution scores within a 1km radius of the site where pollution is regulated.

2.7.3 Pollution Incidents

There is one pollution incident within close proximity of the site. The incident took place in February 2004 approximately 250 metres south of the site. The incident caused a significant impact to land and involved 'specific waste materials'.

2.7.4 Landfills

Two historical landfill facilities are located within influencing distance of the site; one of which encroaches into the far north of the site.

Glebelands South is located at the far north of the site and beneath the school and playing fields to the north. The Environment Agency does not have any information in relation to the material disposed of, or the date that the facility was active.

Shaftsbury Park historic landfill is located approximately 120 metres west of the site. No information is provided regarding the date at which the landfill was active. Shaftsbury Park received industrial and household waste.

2.7.5 Flooding

The Environment Agency database confirms that the site is at risk from flooding from rivers, sea and reservoirs. The site does however benefit from flood defences.

2.7.6 Groundwater Source Protection Zones

The site does not locate within a groundwater protection zone.

SECTION 3 Preliminary Risk Assessment

The following sub-sections detail a preliminary risk assessment, based upon the desk study information.

3.1 General

The contaminated land regime is set out in Part IIA of the Environmental Protection Act (EPA) 1990 and was introduced on the 1st April 2000 in England and 1st July 2001 in Wales. A similar regime was introduced in Scotland on 14th July 2000.

Part IIA was introduced to achieve two aims:

(1) The identification of contaminated land
(2) The remediation of contaminated land that poses an unacceptable risk to human health and/or the environment

Under Part IIA the statutory definition of 'contaminated land' is:

"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."

For land to be classified as 'Contaminated Land' there must be a 'pollutant linkage'.

For our definitions of pollution linkage and how we define risk please refer to **Annex C** which includes our classifications of consequence and probability and risk assessment matrix.

3.2 Potential Sources of Contamination

The potential contamination beneath the site, whether in the matrix of soil or groundwater is related to the sites past use.

As identified on historical plans, the site has been occupied by a clothing factory after 1937 until before 1993. Some small buildings were located across the south of the site during its history. The demolished buildings may be a source of asbestos.

A historic landfill site also occupies the far north of the site.

Peat or organic clay/silt may be found within the alluvium beneath the site, potentially the source of ground gas.

3.3 Qualitative Preliminary Human Health and Environmental Risk Assessment

The qualitative preliminary Human Health and Environmental Risk Assessment and site conceptual model are based on findings of the desk study and site walk over and include all potential sources, pathways and receptors that may be present on site.

The risk assessment and site conceptual model will be evaluated and modified in accordance with the findings from the site investigation and chemical testing.

Table 3.1 - Qualitative Preliminary Human Health Risk and Environmental Risk Assessment

Source	Pathway	Receptor During Construction	Level of Risk	Receptor Post Construction	Level of Risk
Made Ground /Natural Soil	Ingestion, inhalation and dermal contact with soil and soil dust	Construction Workers Neighbouring Site Users	Very low to low	Residents, workers, neighbours and visitors	Medium to high
Made Ground /Natural Soil	Ingestion of site grown vegetables	N/A	N/A	Residents and visitors	Medium to high
Radon Gas	Inhalation	N/A	N/A	Residents, workers, neighbours and visitors	Negligible
Drinking water	Ingestion	Construction workers	Medium to high	Residents, workers, and visitors	Medium to high
Surface Water	Run-off Accidental spillage	Adjacent Sites	Medium	Adjacent Sites River Usk	Medium
Groundwater	Leaching and groundwater leaching	Bedrock: St Maughn's Group (Secondary A)	Medium	Bedrock: St Maughn's Group (Secondary A)	Medium
Made Ground /Natural Soil	Absorption and uptake of contaminated soil	Vegetation	Medium	Vegetation	Medium
Made Ground /Natural Soil	Aggressive Ground Conditions	Building materials	Low to medium	Building materials	Low to medium
Ground gases – No landfills, made ground and peat not expected	Gas migration into houses and inhalation of gas	N/A	N/A	Residents, workers, neighbours and visitors	Medium to high

3.4 Qualitative Preliminary Geotechnical Risk Assessment

Table 3.2 Preliminary Geotechnical Risk Assessment

Potential Hazard	Level of Risk
Made Ground	**Medium Risk** Made ground is anticipated beneath the site. Significant thickness of loose/soft or variable made ground may lead to differential or excessive settlement.
Former basements and old foundations	**Low Risk** Excavations may be troublesome following demolition of the existing buildings if the foundations are not completely removed. Basements may also be located beneath the existing buildings adding greater costs from infilling.
Problem Soils	**Medium Risk** Estuarine alluvium deposits are present beneath the entire site. These sediments are very soft and can give unacceptable settlements for structures founded upon it.

3.5 Preliminary Site Conceptual Model

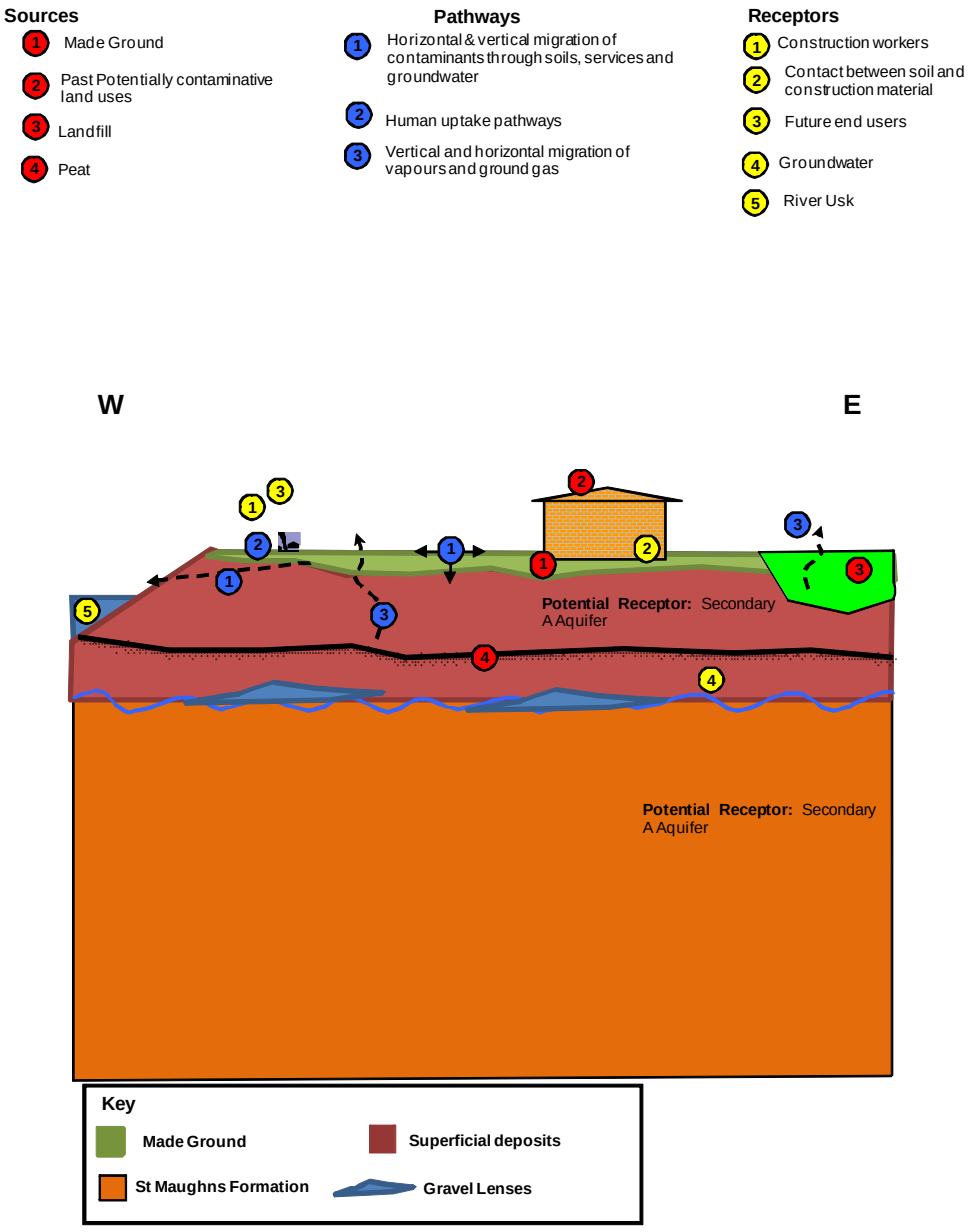

Figure 1 Preliminary Site Conceptual Model

SECTION 4 Field Investigation

4.1 Site Works

A geotechnical and geo-environmental site investigation was carried out between the 31st of October and the 8th of November 2012 comprising 19 trial pits and six cable percussive boreholes and three mini percussive boreholes. Three in-situ soakaway tests were also undertaken during the site investigation.

The trial pits were excavated using a JCB 3CX excavator.

The cable percussive boreholes, 200mm in diameter were sunk using a conventional drilling rig. Within the boreholes Standard/Cone (SPT/CPT) Tests were carried out at close and regular intervals. All of the boreholes were terminated within in-situ hard strata after a minimum of 1 hours chiselling in each hole for a nominal penetration.

The mini percussive boreholes were sunk using a Terrier 2000 mini percussive drilling rig. The mini percussive boreholes were sunk within the vicinity of the historic landfill at the north of the site. The holes were sunk for the installation of gas monitoring wells to check the ground gas potential from the landfill.

The fieldworks were supervised by Terra Firma (Wales) Limited. The trial pits and boreholes were logged to the requirements of BS5930:1999.

The trial pit logs, cable percussive logs and mini percussive borehole logs are presented in **Annex D, Annex E and Annex F** respectively and their positions are shown on **Drawing 02**.

4.2 Ground Conditions

The ground conditions encountered can in general be summarised as shown in **Table 4.1.**

Table 4.1 Summary of Ground Conditions

Depth (m)			Thickness (m)	Stratum
GL	-	0.20/3.30	0.20/3.30	**MADE GROUND**
0.30	-	3.90/10.30	2.20/8.40	Soft grey and brown mottled **CLAY**
3.90/10.30	-	4.10/8.60	0.60/2.30	**PEAT**
4.10/8.60	-	5.90/9.70	0.00/1.80	**SAND & GRAVEL (intermittent)**
5.90/10.30	-	10.00/12.70	0.50/4.10	Firm becoming very stiff red brown gravelly **CLAY**
10.00/12.70	-	>12.90	-	**MUDSTONE**

The basal Sand & Gravel layer was not encountered in BH1, BH2, BH4 and BH5.

Very loose red brown silty SAND and very soft red sandy SILT was encountered between 6.20m and 7.00m and 7.00m and 8.80m respectively.

Soft grey sandy SILT was encountered between 6.20m and 9.10m.

4.3 Summary of Groundwater/Gas Monitoring Standpipe Installations

Table 4.2 Groundwater/Gas Installations

Borehole	Full Installation Depth (m bgl)	Top of installation	Remaining installation depth (m)	Reaction Zone Strata(s)	Remainder of exploratory hole
BH1	GL – 10.6	9.0m plane pipe with bentonite surround	1.6m slotted pipe with gravel surround	Red brown gravelly **CLAY** **MUDSTONE**	Pipe to full depth, cap on base
BH2	GL – 12.9	2.5m plane pipe with bentonite surround	10.4m slotted pipe with gravel surround	Grey and brown mottled **CLAY** **PEAT** Red brown gravelly **CLAY** **MUDSTONE**	Pipe to full depth, cap on base
BH3	GL – 9.7	8.0m plane pipe with bentonite surround	1.7m slotted pipe with gravel surround	**SAND & GRAVEL**	Cap on base of standpipe, bentonite to base of borehole
BH4	GL – 10.2	9.2m plane pipe with bentonite surround	1.0m slotted pipe with gravel surround	**MUDSTONE**	Pipe to full depth, cap on base
BH5	GL – 8.0	4.6m plane pipe with bentonite surround	3.4m slotted pipe with gravel surround	Grey and brown mottled **CLAY** **PEAT**	Cap on base of standpipe, bentonite to base of borehole
BH6	GL – 10.3	7.0m plane pipe with bentonite surround	2.3m slotted pipe with gravel surround	**MUDSTONE**	Pipe to full depth, cap on base
WS1	GL – 3.0	1.0m plane pipe with bentonite surround	2.0m slotted pipe with gravel surround	**MADE GROUND**	Pipe to full depth, cap on base
WS2	GL – 3.0	1.0m plane pipe with bentonite surround	2.0m slotted pipe with gravel surround	**MADE GROUND**	Pipe to full depth, cap on base
WS3	GL – 3.0	1.0m plane pipe with bentonite surround	2.0m slotted pipe with gravel surround	**MADE GROUND**	Pipe to full depth, cap on base

4.4 Groundwater Strikes

A summary of groundwater strikes is presented below.

Table 4.3 Summary of Groundwater Strikes

Depth (m)	Description
BH1	Groundwater (medium) inflow at 3.70m rising to 3.00m after 20 min
BH3	Groundwater (slow) inflow at 2.60m rising to 2.40m after 20 mins
BH3	Groundwater (slow) inflow at 9.50m rising to 9.30m after 20 mins
BH4	Groundwater (medium) inflow at 5.80m rising to 4.30m after 20 mins
BH4	Groundwater (fast) inflow at 10.00m rising to 5.10m after 20 mins
BH5	Groundwater (medium) inflow at 4.00m rising to 3.80m after 20 mins
BH6	Groundwater (fast) inflow at 7.00m rising to 3.80m after 20 mins

Seasonal variability in the presence of groundwater can be expected.

Water levels may be shallower with proximity to the river and drainage channels.

4.5 Laboratory Soil Chemical Testing

4.5.1 Exploratory Strategy and Sampling Regime

During the intrusive investigation, small disturbed soil samples were collected. The sampling regime was conducted in accordance with BS5930: 1999. The methodology used is given in **Annex C**.

The sample locations and depths are listed in the following table.

Table 4.4 Soil Chemical Test Sample Locations and Depths

Sample	Depth (m)	MCerts Sample Description
TP2	0.90	Dark brown gravelly sandy CLAY
TP4	0.70	Dark brown gravelly sandy CLAY
TP5	1.30	Dark brown clayey gravelly SAND
TP6	0.60	Brown clayey gravelly SAND
TP6	1.80	Dark brown gravelly sandy CLAY with odd rootlets
TP7	0.20	Dark brown gravelly sandy CLAY with odd rootlets
TP8	0.50	Dark brown clayey gravelly SAND
TP9	1.00	Dark brown gravelly sandy CLAY
TP10	0.80	Dark brown gravelly sandy CLAY
TP12	0.40	Brown very gravelly SAND
TP13	0.60	Brown very gravelly SAND
TP14	0.40	Dark brown clayey gravelly SAND
TP15	0.40	Brown gravelly sandy CLAY with odd rootlets
TP17	0.15	Dark brown gravelly sandy CLAY with odd rootlets
TP18	0.50	Dark brown clayey gravelly SAND with odd rootlets

4.5.2 Laboratory Analysis of Soil

The soil samples taken were despatched to the laboratories of Derwentside Environmental Testing Services Limited for laboratory chemical testing. The following soil chemical tests were undertaken:

Metals and Metalloids
Lead
Arsenic
Mercury
Chromium
Copper
Nickel
Zinc
Selenium

In-Organics
Cyanide
Sulphate
Cadmium

Others
pH (acidity)
Organic Matter
Asbestos

Organic Chemicals
Phenols
Polycyclic Aromatic Hydrocarbons
Aromatic & Aliphatic Hydrocarbons
Polychlorinated Biphenyls

The laboratory soil chemical test results are presented in **Annex G**.

4.5.3 Laboratory Analysis of Groundwater

Samples of groundwater were collected from the boreholes and dispatched to the laboratories of Derwentside Environmental Testing Services Ltd. The following chemical testing was undertaken;

Metals and Metalloids
Lead
Arsenic
Mercury
Cadmium
Chromium
Copper
Nickel
Zinc
Selenium

In-Organics
Cyanide
Sulphate
Sulphide

Organic Chemicals
Phenols
Aromatic Petroleum Hydrocarbons (PAH)
Petroleum Hydrocarbons (aromatic/aliphatic split)
Polychlorinated Biphenyls

Others
pH (acidity)
Chemical Oxygen Demand
Biological Oxygen Demand
Conductivity
Hardness

The laboratory chemical test results are presented in **Annex G**.

4.6 In-Situ Soakaway Testing

During the site investigation, three in-situ soakaway tests were undertaken within TP2, TP2, and TP5. One fill was carried out per test.

The results of the tests are discussed further in Section 8.6 of the report and the results are presented in **Annex H**.

4.7 In-situ Gas Monitoring

Following the site investigation, to date, two rounds of gas monitoring have been undertaken. A further four gas monitoring visits will be undertaken on a roughly fortnightly basis.

The results of this monitoring are presented in **Annex I** of the report.

SECTION 5 Soil Analytical Results

5.1 General

See **Annex C** for the tiered approach to chemical testing methodology. All soil test results have been compared to thresholds for residential development as these are the most stringent guidelines. A summary of the soil chemical test results, which include the regulatory guidelines used in the Tier 1 assessment, are given in the tables on the following pages.

5.2 Soil Chemical Test Results

Table 5.1 Summary of Soil Chemical Test Results Standard Suite

Substance	SGV/ GAC (mg/kg)	Source	Measured Concentrations of Tested Substances (mg/kg)		95% UCL	Number of exceedences
			Minimum	Maximum		
Arsenic	32	CLEA	5.7	40	19.63	1
Cadmium	10	CLEA	0.4	6.2	1.82	0
Chromium III	3000	CIEH	7.9	100	46.45	0
Chromium	130	CLEA	7.9	100	46.45	0
Chromium VI	4.3	CIEH	1	1	1.00	0
Copper	2330^	CLEA	8.8	950	235.05	0
Lead	450	CLEA	10	290	132.69	0
Mercury	170	CLEA	0.05	1.9	0.65	0
Nickel	130	CLEA	7.7	69	39.82	0
Selenium	350	CLEA	0.5	1.4	0.71	0
Zinc	3750^	CIEH	45	440	256.17	0
Cyanide total	8	CLEA	0.1	10	2.49	1
Organic matter	-	-	0.8	23	8.64	-
Total Sulphate as SO_4	2400	BRE	200	2500	1500	1
Sulphate Aqueous Extract**	2400	BRE	160	160	-	-
pH	-	-	8.2	11.8	9.88	-
PAH	1.6*	-	<1.6	130	29.9	-
Phenol - Monohydric	420	CLEA	<0.3	0.5	0.35	0
Asbestos	-	-	Chrysotile – Loose Bundles		-	2

5.2 Soil Chemical Test Results (Continued)

Notes:

- CLEA - Soil Guideline Values for residential development
- CIEH - Generic Assessment Criteria for a residential setting, developed as Land Quality Management by the Chartered Institute of Environmental Health
- BRE - British Research Establishment (buried concrete risk assessment only, not human health related)
- A total of 15 samples were tested
- ^ CIEH copper and zinc thresholds based on 6% organic matter
- *Based upon laboratory detection limits for total PAH
- **One sample tested for Sulphate Aqueous Extract (mg/litre) in TP12 at 0.40m due to elevated level of Total Sulphate as SO_4

5.2 Soil Chemical Test Results (Continued)

TABLE 5.2 Summary of Soil Chemical Test Results Petroleum Hydrocarbons and PCBs

Substance	GAC (mg/kg)	Source	Measured Concentrations of Tested Substances (mg/kg)		95% UCL	Number of exceedences
			Minimum	Maximum		
Aliphatic						
PH C5 – C6 Ali	30	CEIH	<0.01	0.01	0.01	0
PH C6 – C8 Ali	73	CEIH	<0.01	0.01	0.01	0
PH C8 – C10 Ali	19	CEIH	<0.01	0.02	0.01	0
PH C10 – C12 Ali	93	CEIH	<1.5	<1.5	1.50	0
PH C12 – C16 Ali	740	CEIH	<1.2	16	4.76	0
PH C16 – C21 Ali	45000**	CEIH	<1.5	120	29.82	0
PH C21 – C35 Ali	45000**	CEIH	<3.4	340	88.23	0
Aromatic						
PH C5 – C7 Arom	0.33	CLEA	<0.01	<0.01	0.01	0
PH C7 – C8 Arom	610	CLEA	<0.01	<0.01	0.01	0
PH C8 – C10 Arom	27	CEIH	<0.01	0.05	0.02	0
PH C10 – C12 Arom	69	CEIH	<0.9	<0.9	0.90	0
PH C12 – C16 Arom	140	CEIH	<0.5	9.1	2.92	0
PH C16 – C21 Arom	250	CEIH	<0.6	50	19.67	0
PH C21 – C35 Arom	890	CEIH	<1.4	210	76.20	0
PCB	0.01	-	<0.01	0.16	0.06	2
2,4,4'-Trichlorobiphenyl	0.01	-	<0.01	0.12	0.03	1
2,2',5,5'-Tetrachlorobiphenyl	0.01	-	<0.01	0.05	0.02	1
2,2',4,5,5'-Pentachlorobiphenyl	0.01	-	<0.01	<0.01	0.01	0
2,3',4,4',5-Pentachlorobiphenyl	0.01	-	<0.01	0.02	0.01	1
2,2',4,4',5,5'-Hexachlorobiphenyl	0.01	-	<0.01	0.02	0.01	1
2,2',3,4,4',5'-Hexachlorobiphenyl	0.01	-	<0.01	0.05	0.02	1
2,2',3,4,4',5,5'-Heptachlorobiphenyl	0.01	-	<0.01	0.04	0.02	1

Notes:

- LQM/CIEH - Soil Guideline based upon 1% soil organic matter and residential land use
- CLEA - Soil Guideline Values (SGV) developed by the Contaminated Land Exposure Assessment - Residential with plant uptake
- * - Value used for Aromatic >5-7 (benzene)
- ** - Value used for Aromatic >7-8 (toluene)
- ***- Long term health advisory limit for a child based upon taste and odour (Environment Canada)
- Guidelines for PCBs based upon laboratory detection limits
- a soil organic matter content of 1%
- A total of 10 sample was tested for PCBs
- A total of 13 samples were tested for aromatic/aliphatic hydrocarbons

5.2 Soil Chemical Test Results (Continued)

Table 5.3 Summary of Soil Chemical Test Results Speciated Polycyclic Aromatic Hydrocarbons

Substance	GAC (mg/kg)	Source	Measured Concentrations of Tested Substances (mg/kg)		95% UCL	Number of exceedences
			Minimum	Maximum		
Acenaphthene	210	LQM/CIEH	<0.1	1.5	0.44	0
Acenaphthylene	170	LQM/CIEH	<0.1	1.4	0.51	0
Anthracene	2300	LQM/CIEH	<0.1	5.6	1.38	0
Benzo(a)anthracene	3.1	LQM/CIEH	<0.1	13	3.45	1
Benzo(a)pyrene	0.83	LQM/CIEH	<0.1	11	2.94	5
Benzo(b)fluoranthene	5.6	LQM/CIEH	<0.1	9	2.45	1
Benzo(k)fluoranthene	8.5	LQM/CIEH	<01	4.5	1.20	0
Benzo(g,h,i)perylene	44	LQM/CIEH	<0.1	8.7	2.23	0
Chrysene	6	LQM/CIEH	<0.1	13	3.45	1
Dibenzo(a,h)anthracene	0.76	LQM/CIEH	<0.1	1.6	0.48	1
Fluoranthene	260	LQM/CIEH	<0.1	22	5.65	0
Fluorene	160	LQM/CIEH	<0.1	2	0.52	0
Indeno(1,2,3-c,d)pyrene	3.2	LQM/CIEH	<0.1	7.5	2.07	1
Naphthalene	1.5	LQM/CIEH	<0.1	0.7	0.28	0
Phenanthrene	92	LQM/CIEH	<0.1	16	3.94	0
Pyrene	560	LQM/CIEH	<0.1	17	4.53	0

Notes:

- CIEH - Chartered Institute of Environmental Health Generic Assessment Criteria for a residential development
- A total of one sample was tested for Speciated PAH
- PAH - Polycyclic Aromatic Hydrocarbons
- Guidelines are based upon 1% soil organic matter
- Insufficient samples to form a statistical analysis

5.3 Groundwater Chemical Test Results

Two rounds of groundwater sampling have been carried out at the site on 08/01/2013 and 30/01/2013. Laboratory testing results for the first round of water sampling is presented below in **Table 5.4** to **5.7**.

Table 5.4 Summary of Groundwater Chemical Test Results – Standard Suite (dated 08/01/2013)

Substance	Thres-hold (mg/l)	Source	Measured Concentrations of Tested Substances (mg/l)		US95	Number of Exceedences
			Minimum	Maximum		
Arsenic	0.05	EQS (1)	0.00058	0.0054	0.0040	0
Cadmium	0.00008	EQS (2)	0.00003	0.00003	0.0000	0
Chromium	0.0034	EQS (3)	0.00039	0.001	0.0009	0
Copper	0.028	EQS (4)	0.0004	0.0018	0.0011	1
Lead	0.0072	EQS (2)	0.00009	0.0004	0.0003	0
Mercury	0.00005	EQS (2)	0.00001	0.00001	0.0000	0
Nickel	0.02	EQS (2)	0.0005	0.0049	0.0033	0
Selenium	0.01	EQS (5)	0.00025	0.0031	0.0018	BLDL
Zinc	0.008	EQS (4)	0.0013	0.0085	0.0049	1
Sulphate as SO4	250	EQS (5)	4.4	120	85.3729	0
BOD	-	-	4.9	22	14.4301	-
COD	-	-	10	160	137.8399	-
Cyanide total	0.05	EQS (6)	0.04	0.04	0.04	0
Conductivity	-	-	0.7	4.19	2.9425	-
Hardness	-	-	315	555	527.8708	-
Sulphide	0.00025	EQS (7)	0.01	0.01	0.01	BLDL
pH	-	EQS	0.0069	0.0074	0.0073	0
Phenol	0.0077	EQS (1)	0.0001	0.0001	0.0001	0

5.3 Groundwater Chemical Test Results (Continued)

Notes

- Twelve samples of perched water were tested.
- (1) Protection for Surface Water Quality (Good Standard for Rivers & Freshwater Lakes – Annual Mean)
- (2) Protection of Surface Water Quality (Inland Surface Water Environmental Quality Standard expressed as an annual average)
- (3) Protection for Surface Water Quality (Good Standard for Rivers & Freshwater Lakes – Annual Mean) – For Chromium VI
- (4) Protection of Surface Water Quality (Inland Surface Water Environmental Quality Standard expressed as an annual average for a water hardness $CaCO_3$ annual mean of >250mg)
- (5) Protection of Surface Waters Intended for the Abstraction of Drinking Water (A3 Waters – water needing intensive physical & chemical treatment, extended treatment & disinfection).
- (6) Protection of Surface Waters Intended for the abstraction of drinking water – Standard Value
- (7) Protection of Aquatic Life – Standard Value for Freshwater National Average (based upon Hydrogen Sulphide)
- BLDL - Below Laboratory Detection Limit

5.3 Groundwater Chemical Test Results (Continued)

Laboratory testing of a Speciated PAH was undertaken, the results of which are presented below in **Table 5.5**.

Table 5.5 Summary of Groundwater Chemical Test Results – Speciated PAH (dated 08/01/2013)

Substance	Thres-Hold (mg/l)	Source	Measured Concentrations of Tested Substances (mg/l)		US95	No. of exceedences
			Minimum	Maximum		
Acenaphthene	0.0002	TC	<0.00001	<0.00001	0.000010	0
Acenaphthylene	0.0002	TC	<0.00001	<0.00001	0.000010	0
Anthracene	0.0001	AA-EQS	<0.00001	<0.00001	0.000010	0
Benzo(a)anthracene	0.0002	TC	<0.00001	0.00007	0.000024	0
Benzo(a)pyrene	0.00005	AA-EQS	<0.00001	<0.00001	0.000010	0
Benzo(b)fluoranthene	0.00003	AA-EQS	<0.00001	<0.00001	0.000010	0
Benzo(k)fluoranthene	0.00003	AA-EQS	<0.00001	<0.00001	0.000010	0
Benzo(g,h,i)perylene	0.000002	AA-EQS	<0.00001	<0.00001	0.000010	BLDL
Chrysene	0.0002	TC	<0.00001	0.00002	0.000012	0
Dibenzo(a,h)anthracene	0.0002	TC	<0.00001	<0.00001	0.000010	0
Fluoranthene	0.0001	AA-EQS	<0.00001	<0.00001	0.000010	0
Fluorene	0.0002	TC	<0.00001	0.00001	0.000010	0
Indeno(1,2,3-c,d)pyrene	0.0002	TC	<0.00001	<0.00001	0.000010	0
Naphthalene	0.0024	AA-EQS	<0.00001	<0.00001	0.000010	0
Phenanthrene	0.0002	TC	<0.00001	0.00002	0.000012	0
Pyrene	0.0002	TC	<0.00001	0.00001	0.000010	0
Total PAH	-	-	<0.0002	<0.0002	0.0002	-

Notes:

- AA - EQS Annual Average Environmental Quality Standard. UK Standard, Protection of Surface Water Quality. Water Framework Directive.
- TC - Suggested Target concentration in absence of other standards.
- BLDL - Below Laboratory Detection Limit
- 6 samples were analysed

5.3 Groundwater Chemical Test Results (Continued)

Laboratory testing of Polychlorinated Biphenyls was undertaken, the results of which are presented below in **Table 5.6**.

Table 5.6 Summary of Groundwater Test Results – Petroleum Hydrocarbons with Aliphatic and Aromatic Split (dated 08/01/2013)

Substance	Thres-hold (mg/l)	Source EQS	Measured Concentrations of Tested Substances (mg/l)		95% UCL	Number of Exceedences
			Minimum	Maximum		
Aliphatic C5-C6	0.01	EQS	<0.0001	<0.0001	0.0001	0
Aliphatic C6-C8	0.01	EQS	<0.0001	<0.0001	0.0001	0
Aliphatic C8-C10	0.01	EQS	<0.0001	<0.0001	0.0001	0
Aliphatic C10-C12	0.01	EQS	<0.001	0.0035	0.0016	0
Aliphatic C12-C16	0.01	EQS	<0.001	0.017	0.0072	1
Aliphatic C16-C21	0.01	EQS	<0.001	0.037	0.0186	4
Aliphatic C21-C35	0.01	EQS	<0.001	0.42	0.1310	4
Aromatic C5-C7	0.03*	EQS	<0.0001	<0.0001	0.0001	0
Aromatic C7-C8	0.05**	EQS	<0.0001	<0.0001	0.0001	0
Aromatic C8-C10	0.03***	EQS	<0.0001	<0.0001	0.0001	0
Aromatic C10-C12	0.01	EQS	<0.001	0.0015	0.0011	0
Aromatic C12-C16	0.01	EQS	<0.001	0.014	0.0045	1
Aromatic C16-C21	0.01	EQS	<0.001	0.0024	0.0014	0
Aromatic C21-C35	0.01	EQS	<0.001	<0.001	0.001	0

Notes:

- A total of 6 samples were tested
- EQS – environmental quality standards – in the absence of actual guidelines, 0.01 mg/l has been used as a conservative assumption.
- * value used for benzene
- ** value used for toluene
- *** value used for xylene

5.3 Groundwater Chemical Test Results (Continued)

Laboratory testing of a petroleum hydrocarbons was undertaken, the results of which are presented below in **Table 5.6**.

Table 5.7 Summary of Groundwater Test Results – Polychlorinated Biphenyls and Phenol (08/01/2013)

Substance	Thres-hold (mg/l)	Source	Measured Concentrations of Tested Substances (mg/l)		95% UCL	Number of Exceedences
			Minimum	Maximum		
PCB	0.001	*	<0.001	<0.001	0.001	0
PCB 101	0.0003		<0.0003	0.0003	0.0003	0
PCB 138	0.0002		<0.0002	<0.0002	0.0002	0
PCB 153	0.0002		<0.0002	<0.0002	0.0002	0
PCB 180	0.0002		<0.0002	<0.0002	0.0002	0
PCB 28	0.0003		<0.0003	<0.0003	0.0003	0
PCB 52	0.0002		<0.0002	<0.0002	0.0002	0
PCB 118 + PCB 123	0.0006		<0.0006	<0.0006	0.0006	0
4-Chloro-3-methylphenol	0.04		<0.0001	<0.0001	0.0001	0
2,4-Dichlorophenol	0.02		<0.0001	<0.0001	0.0001	0
2,4-Dimethylphenol	0.00025		<0.0001	<0.0001	0.0001	0
p-cresol	0.00025		<0.0001	<0.0001	0.0001	0
2,6-Dimethylphenol	0.00025		<0.0001	<0.0001	0.0001	0
2,6-Dichlorophenol	0.00025		<0.0001	<0.0001	0.0001	0
2,4,6-Trichlorophenol	0.00025		<0.0001	<0.0001	0.0001	0

Notes:

- A total of 6 samples were tested
- * In the absence of actual guidelines, laboratory detection limits have been used as a conservative assumption.

5.3 Groundwater Chemical Test Results

Laboratory testing results for the second round of water sampling dated 30/01/2013 is presented below in **Table 5.8** to **5.11**.

Table 5.8 Summary of Groundwater Test Results – Standard Suite (dated 30/01/2013)

Substance	Thres-hold (mg/l)	Source	Measured Concentrations of Tested Substances (mg/l)		US95	Number of Exceedences
			Minimum	Maximum		
Arsenic	0.05	EQS (1)	0.0011	0.0092	0.0072	0
Cadmium	0.00008	EQS (2)	0.00003	0.00021	0.0002	3
Chromium	0.0034	EQS (3)	0.00025	0.00077	0.0006	0
Copper	0.028	EQS (4)	0.0004	0.003	0.0020	2
Lead	0.0072	EQS (2)	0.00009	0.0017	0.0009	0
Mercury	0.00005	EQS (2)	0.00001	0.000025	0.0000	0
Nickel	0.02	EQS (2)	0.00067	0.0046	0.0034	0
Selenium	0.01	EQS (5)	0.00025	0.0015	0.0011	BLDL
Zinc	0.008	EQS (4)	0.0013	0.018	0.0111	1
Sulphate as SO4	250	EQS (5)	0.0055	0.12	0.0972	0
BOD	-	-	0.0028	0.0066	0.0056	-
COD	-	-	0.019	0.11	0.0902	-
Cyanide total	0.05	EQS (6)	0.04	0.04	0.04	0
Conductivity	-	-	0.955	4.07	2.8609	-
Hardness	-	-	0.194	0.494	0.4526	-
Sulphide	0.00025	EQS (7)	0.01	0.01	0.01	BLDL
pH	-	EQS	0.007	0.0073	0.0073	0
Phenol	0.0077	EQS (1)	<0.0001	<0.00025	0.000175	0

5.3 Groundwater Chemical Test Results(Continued)

Notes

- Twelve samples of perched water were tested.
- (1) Protection for Surface Water Quality (Good Standard for Rivers & Freshwater Lakes – Annual Mean)
- (2) Protection of Surface Water Quality (Inland Surface Water Environmental Quality Standard expressed as an annual average)
- (3) Protection for Surface Water Quality (Good Standard for Rivers & Freshwater Lakes – Annual Mean) – For Chromium VI
- (4) Protection of Surface Water Quality (Inland Surface Water Environmental Quality Standard expressed as an annual average for a water hardness $CaCO_3$ annual mean of >250mg)
- (5) Protection of Surface Waters Intended for the Abstraction of Drinking Water (A3 Waters – water needing intensive physical & chemical treatment, extended treatment & disinfection).
- (6) Protection of Surface Waters Intended for the abstraction of drinking water – Standard Value
- (7) Protection of Aquatic Life – Standard Value for Freshwater National Average (based upon Hydrogen Sulphide)
- BLDL - Below Laboratory Detection Limit

5.3 Groundwater Chemical Test Results (Continued)

Laboratory testing of a Speciated PAH was undertaken, the results of which are presented below in **Table 5.9**.

Table 5.9 Summary of Groundwater Test Results – Speciated PAH

Substance	Thres-Hold (mg/l)	Source	Measured Concentrations of Tested Substances (mg/l)		US95	No. of exceedences
			Minimum	Maximum		
Acenaphthene	0.0002	TC	<0.00001	<0.00001	0.00001	0
Acenaphthylene	0.0002	TC	<0.00001	<0.00001	0.00001	0
Anthracene	0.0001	AA-EQS	<0.00001	<0.00001	0.00001	0
Benzo(a)anthracene	0.0002	TC	<0.00001	<0.00001	0.00001	0
Benzo(a)pyrene	0.00005	AA-EQS	<0.00001	<0.00001	0.00001	0
Benzo(b)fluoranthene	0.00003	AA-EQS	<0.00001	<0.00001	0.00001	0
Benzo(k)fluoranthene	0.00003	AA-EQS	<0.00001	<0.00001	0.00001	0
Benzo(g,h,i)perylene	0.000002	AA-EQS	<0.00001	<0.00001	0.00001	BLDL
Chrysene	0.0002	TC	<0.00001	<0.00001	0.00001	0
Dibenzo(a,h)anthracene	0.0002	TC	<0.00001	<0.00001	0.00001	0
Fluoranthene	0.0001	AA-EQS	<0.00001	<0.00001	0.00001	0
Fluorene	0.0002	TC	<0.00001	<0.00001	0.00001	0
Indeno(1,2,3-c,d)pyrene	0.0002	TC	<0.00001	<0.00001	0.00001	0
Naphthalene	0.0024	AA-EQS	<0.00001	<0.00001	0.00001	0
Phenanthrene	0.0002	TC	<0.00001	<0.00001	0.00001	0
Pyrene	0.0002	TC	<0.00001	<0.00001	0.000010	0
Total PAH	-	-	<0.0002	<0.0002	0.0002	-

Notes:

- AA - EQS Annual Average Environmental Quality Standard. UK Standard, Protection of Surface Water Quality. Water Framework Directive.
- TC - Suggested Target concentration in absence of other standards.
- BLDL - Below Laboratory Detection Limit
- 6 samples were analysed

5.3 Groundwater Chemical Test Results (Continued)

Laboratory testing of Polychlorinated Biphenyls was undertaken, the results of which are presented below in **Table 5.10**.

Table 5.10 Summary of Groundwater Test Results – Petroleum Hydrocarbons with Aliphatic and Aromatic Split

Substance	Thres-hold (mg/l)	Source EQS	Measured Concentrations of Tested Substances (mg/l)		95% UCL	Number of Exceedences
			Minimum	Maximum		
Aliphatic C5-C6	0.01	EQS	<0.0001	<0.0001	0.0001	0
Aliphatic C6-C8	0.01	EQS	<0.0001	<0.0001	0.0001	0
Aliphatic C8-C10	0.01	EQS	<0.0001	<0.0001	0.0001	0
Aliphatic C10-C12	0.01	EQS	<0.001	<0.0001	0.0001	0
Aliphatic C12-C16	0.01	EQS	<0.001	0.0057	0.0045	0
Aliphatic C16-C21	0.01	EQS	<0.001	0.01	0.0077	0
Aliphatic C21-C35	0.01	EQS	<0.001	<0.001	0.1310	0
Aromatic C5-C7	0.03*	EQS	<0.0001	<0.0001	0.0001	0
Aromatic C7-C8	0.05**	EQS	<0.0001	<0.0001	0.0001	0
Aromatic C8-C10	0.03***	EQS	<0.0001	<0.0001	0.0001	0
Aromatic C10-C12	0.01	EQS	<0.001	0.0011	0.0011	0
Aromatic C12-C16	0.01	EQS	<0.001	0.0062	0.0036	0
Aromatic C16-C21	0.01	EQS	<0.001	0.002	0.0015	0
Aromatic C21-C35	0.01	EQS	<0.001	<0.001	0.001	0

Notes:

- A total of 6 samples were tested
- EQS – environmental quality standards – in the absence of actual guidelines, 0.01 mg/l has been used as a conservative assumption.
- * value used for benzene
- ** value used for toluene
- *** value used for xylene

5.3 Groundwater Chemical Test Results (Continued)

Laboratory testing of a petroleum hydrocarbons was undertaken, the results of which are presented below in **Table 5.11**.

Table 5.11 Summary of Groundwater Test Results – Polychlorinated Biphenyls

Substance	Thres-hold (mg/l)	Source	Measured Concentrations of Tested Substances (mg/l)		95% UCL	Number of Exceedences
			Minimum	Maximum		
PCB	0.001	TC	<0.001	<0.001	0.001	0
PCB 101	0.0003	TC	<0.0003	0.0003	0.0003	0
PCB 138	0.0002	TC	<0.0002	<0.0002	0.0002	0
PCB 153	0.0002	TC	<0.0002	<0.0002	0.0002	0
PCB 180	0.0002	TC	<0.0002	<0.0002	0.0002	0
PCB 28	0.0003	TC	<0.0003	<0.0003	0.0003	0
PCB 52	0.0002	TC	<0.0002	<0.0002	0.0002	0
PCB 118 + PCB 123	0.0006	TC	<0.0006	<0.0006	0.0006	0
4-Chloro-3-methylphenol	0.04	TC	<0.0001	<0.00025	0.000135	0
2,4-Dichlorophenol	0.02	TC	<0.0001	<0.00025	0.000135	0
2,4-Dimethylphenol	0.00025	TC	<0.0001	<0.00025	0.000135	0
p-cresol	0.00025	TC	<0.0001	<0.00025	0.000135	0
2,6-Dimethylphenol	0.00025	TC	<0.0001	<0.00025	0.000135	0
2,6-Dichlorophenol	0.00025	TC	<0.0001	<0.00025	0.000135	0
2,4,6-Trichlorophenol	0.00025	TC	<0.0001	<0.00025	0.000136	0

Notes:

- A total of 6 samples were tested
- TC - Suggested Target Concentration in absence of other standards

5.4 Contaminants of Concern in Soils

A number of substances tested for were found to be above their respective threshold levels. These exceedances are summarised in Table 5.7 below.

Table 5.12 Summary of Soil Exceedances

Hole and depth (m bgl)	Chemical	Guideline (mg/kg)	Exceedance (mg/kg)
TP5 1.30m	Arsenic	32	40
TP2 0.90m	Cyanide	8	10
TP8 0.50m	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Chrysene Dibenzo(a,h)anthracene Indeno(1,2,3-c,d)pyrene	3.1 0.83 5.6 6 0.76 3.2	13 11 9 13 1.6 7.5
TP4 0.70m	Benzo(a)pyrene	0.83	0.90
TP6 0.60m	PCB 2,3',4,4',5-Pentachlorobiphenyl 2,2',4,4',5,5'Hexachlorobiphenyl 2,2',3,4,4',5'Hexachlorobiphenyl 2,2',3,4,4',5,5'Heptachlorobiphenyl	0.01 0.01 0.01 0.01 0.01	0.15 0.02 0.02 0.05 0.04
TP6 1.80m	Chrysotile – Loose Bundles	-	-
TP7 0.20m	Benzo(a)pyrene Chrysotile – Loose Bundles	0.83 -	1.90 -
TP9 1.00m	Benzo(a)pyrene	0.83	1.30
TP10 0.80m	Benzo(a)pyrene	0.83	1.50
TP13 0.60m	PCB 2,4,4'-Trichlorobiphenyl 2,2',5,5'-Tetrachlorobiphenyl	0.01 0.01 0.01	0.16 0.12 0.05

5.5 Contaminants of Concern in Groundwater

A number of substances tested for were found to be above their respective threshold levels. These exceedances are summarised in Table 5.8 below.

Table 5.13 Summary of Groundwater Exceedances

Borehole	Chemical	Threshold (mg/l)	Exceedance (mg/l)
BH1 (08/01/2013)	Aliphatic C16-C21 Aliphatic C21-C35	0.01 0.01	0.11 0.14
BH2 (08/01/2013)	Aliphatic C16-C21 Aliphatic C21-C35	0.01 0.01	0.037 0.19
BH3 (08/01/2013)	Aliphatic C12-C16 Aliphatic C16-C21 Aliphatic C21-C35 Aromatic C12-C16	0.01 0.01 0.01 0.01	0.017 0.031 0.42 0.014
BH4 (30/01/13)	Cadmium Copper Zinc	0.00008 0.001 0.008	0.00021 0.003 0.018
BH5 (08/01/2013)	Copper Zinc	0.001 0.008	0.0018 0.0085
BH5 (30/01/2013)	Cadmium	0.00008	0.00015
BH6 (08/012013)	Aliphatic C16-C21 Aliphatic C21-C35	0.001 0.001	0.03 0.011
BH6 (30/01/2013)	Cadmium Copper	0.00008 0.001	0.00014 0.0019

SECTION 6 Quantitative Risk Assessment/Mitigation Measures

6.1 Summary of Human Health Risks

A Quantitative Risk Assessment on the potential human health effects is detailed below:

Table 6.1 - Human Health Risk Assessment

Source	Pathway	Target	Risk Assessment	Mitigation Measures
In-Situ Soils	Dermal contact with soil/dust Inhalation of soil/dust/vapours Ingestion of soil/dust	Construction workers	**Moderate to high risk** to construction workers involved in excavation phase of development	COSHH assessment and good level of PPE/ hygiene by site workers/ staff; dust suppression measures if required.
	Inhalation of fugitive soil dust/vapours Ingestion of soil dust Dermal contact with soil dust	Passersby, neighbouring site occupants	**Moderate to high risk** during construction phase	The site should be managed well including screening and dust suppression measures if required
	Dermal contact with soil dust Inhalation of soil/dust/vapours Ingestion of soil/dust	Site end users, visitors	**Moderate to high risk** to future site users in an assumed residential scenario	The site should be capped. This will be achieved by the up filling of the site by up to 2m required as part of a flood prevention scheme.
	Adsorption into potable water plastic pipes	Site end users-residents	**Moderate to high risk**	Suitable materials should be selected and used for the water supply in accordance with UKWIR guidance.
Radon Gas	Inhalation	Site end users-residents	**Moderate Risk**	Basic radon protection measures are required
Ground gases from made ground	Gas migration into houses and inhalation of gas	Site end users-residents	**Moderate Risk** Made ground is a maximum of 1.70m thickness with little organic content	Preliminary – Gas Characteristic Situation 3 (see Section 7)
Hydrocarbon Vapours	Inhalation	Site end users-residents	**Low risk**	Installation of vapour barrier beneath buildings depending due to PCB contamination

6.1 Summary of Human Health Risks (Continued)

If during the development materials are encountered that are significantly different to those encountered in the investigation, the occurrence should be reported to the Engineer and appropriate action taken prior to continuing with the works.

In accordance with EC Regulation 1272/2008 and Environment Agency Guidance WM2 (v. 2.3/2011) soils and other materials destined for off-site disposal should be classified on the basis of their hazard phrases prior to disposal. Soils are classified as a mirror entry waste and should be classified on the basis of their specific chemical properties. Terra Firma Wales Ltd offer this service if required.

All imported material should be inspected and certified as inert prior to use.

During the ground works, the contractor should comply with all current Health and Safety regulations.

6.2 Summary of Risks to the Aquatic Environment

A Quantitative Risk Assessment on the potential effects to the aquatic environment is detailed in **Table 6.2.**

Table 6.2 Risks to the Aquatic Environment

Source	Pathway	Target	Risk Assessment	Mitigation Measures
Site soils Construction materials	Surface water run-off	River Usk Neighbouring sites Existing drainage channel/reen	**Low Risk during construction**	Measures to avoid accidental spillage of materials, and to control surface run off
Petroleum Hydrocarbons and heavy metals from surrounding and past industrial processes and made ground	Leaching	Groundwater	**Negligible Risk** (see below)	No mitigation measures necessary (see below)
Groundwater	Downward migration of groundwater	Bedrock: St Maughn's Group (Secondary A Aquifer) and superficial deposits (Secondary A)		
Groundwater	Groundwater migration	River Usk, St Maughn's Group (Secondary A Aquifer) and superficial deposits (Secondary A)		

It was discussed in Section 5.4 of the report that laboratory chemical testing shows low level contamination of the groundwater by petroleum hydrocarbons and some heavy metals.

It is clear that the initial slight hydrocarbon contamination was from contamination from the drilling process. Following purging of the boreholes on the second round of water sampling all hydrocarbons were below guideline values.

The nearest river/estuarine body to the site is the River Usk, which runs along the west boundary of the site. Throughout much of Newport, the River Usk is in hydrological continuity with the water-bearing alluvial gravels, which typically underlie the alluvial clay in the area. However, only small lens of gravel was encountered during the investigation and it is considered that the small intermittent lenses will be isolated from the River Usk.

6.2 Summary of Risks to the Aquatic Environment (Continued)

The groundwater inflows encountered within the alluvial clay (generally within and around the peat layers) were also sporadic. This groundwater is also not to be considered in hydrological continuity with the nearby River Usk. Therefore it is considered that as the levels of contamination are very low and the risk of the contamination reaching the nearby river body are so remote, there is a negligible risk posed to the aquatic environment from contamination at the site.

With regards to the drainage channel/reen that crosses the site, it is considered that as the near surface contamination is low and that the site is to be raised by up to 2m of inert materials there will be no risk to the river Usk from groundwater entering the river form this source.

6.3 Refined Site Conceptual Model

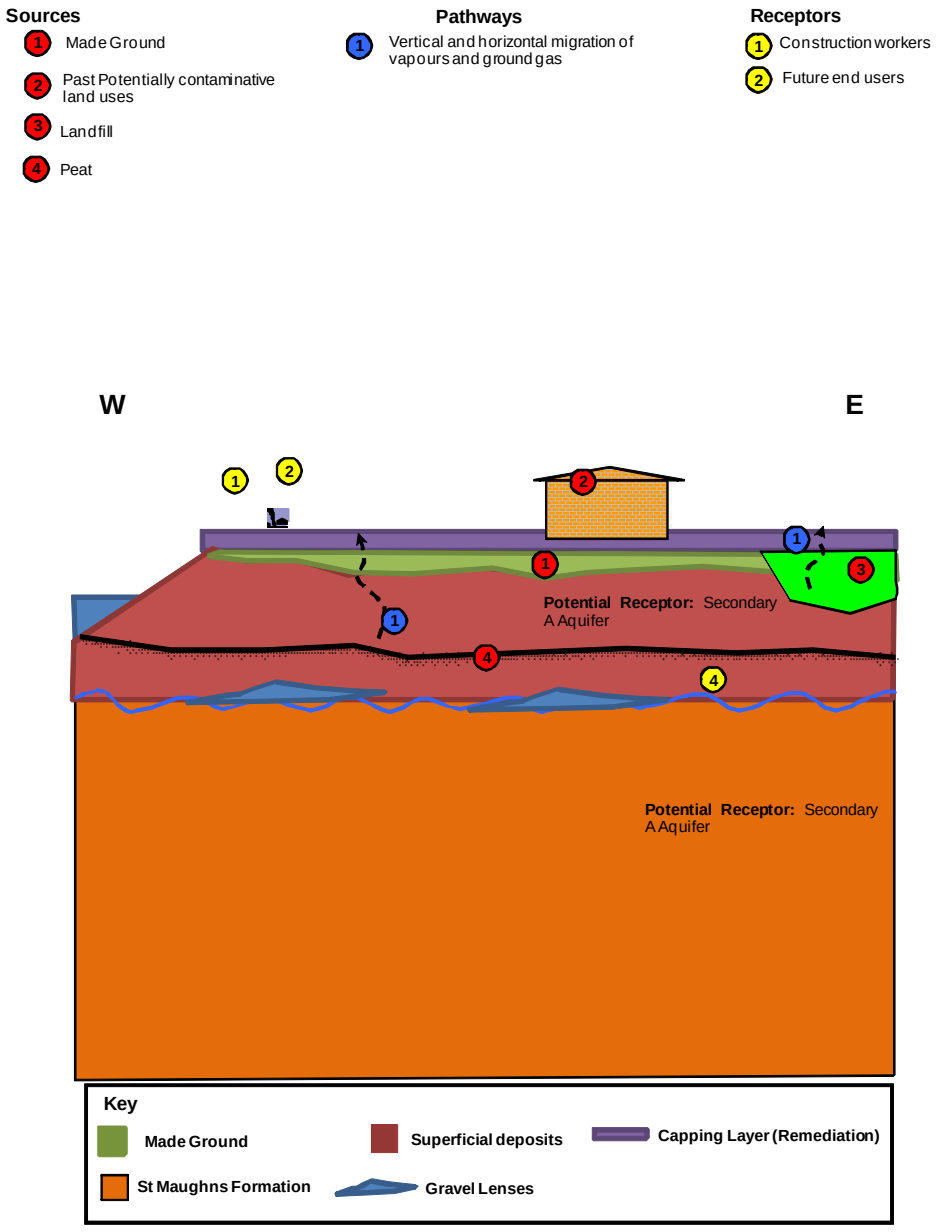

Figure 2 Refined Site Conceptual Model

SECTION 7 Evaluation of In-situ Gas Monitoring Results

Nine gas monitoring wells were installed and a programme of gas monitoring for the presence of methane, carbon dioxide and oxygen has been undertaken at the above site.

Two of the six proposed gas monitoring visits has been undertaken thus far.

No positive flow rate has been encountered.

The gas monitoring undertaken has identified a maximum methane concentration of 67.4% within the nine gas monitoring wells. The gas screening value (GSV) for Methane can thus be calculated as:

- 0.674 x 0.1 = 0.0674 litres/hour of CH_4

A maximum carbon dioxide value of 11.2% was encountered. The gas screening value (GSV) for Carbon Dioxide can thus be calculated as:

- 0.112 x 0.1 = 0.0112 litres/hour of CO_2

With reference to Table 8.5 of CIRIA Publication C665 (2007) the Gas Screening Value characterises the site as Gas Characteristic Situation 2

However, due to the methane and carbon dioxide values being so high, it is recommended that the site should be preliminarily characterised as **Characteristic Situation 3**.

The following protection measures should be undertaken;

a] Reinforced concrete cast in situ floor slab (suspended, non-suspended or raft) with at least 2000 g DPM and under-floor venting

b] Beam and block or pre-cast concrete and 2000 g DPM/reinforced gas membrane and under-floor venting

c] All joints and penetrations must be sealed with propriety gas resistant membrane and passively ventilated or positively pressurised under-floor sub-space.

The Gas Monitoring Results are located within **Annex I** of the report. An addendum letter, which includes the remainder of the gas monitoring results will be compiled following the completion of the gas monitoring programme.

SECTION 8 Engineering Recommendations

8.1 General

In the following sections a number of foundation recommendations are given. However, as the works are to be carried out in close proximity to a main line railway, the views and approval of Network Rail Engineers needs to be gained.

Should Network Rail have any objections to the foundation recommendations given in the following sections then an alternative approach may need to be considered.

It is also likely that stringent measures will be put in place by Network Rail in order to guarantee the safety and integrity of the rail operations.

8.2 Preparation of Site

All grass and surface vegetation including all roots and any trees not under a preservation order beneath the underside of the proposed building, and any hard standing areas should also be excavated and removed from the site.

Any reduced levels should be brought up to the required levels with well, compacted imported granular materials. Department of Transport (DoT) Type 2 sub-base or similar may be used and should be compacted in layers, in accordance with the Specification for Highway Works. Alternatively, appropriate selected inert imported fill could be used.

Allowances should be made for removing any ‘soft spots/area’ and their replacement with well compacted granular materials.

Contingencies should be allowed for any necessary temporary and/or permanent support works to the existing roads and services and buildings made necessary as a result of the proposed works.

Contingencies should be in place for the protection/diversion of any underground services present beneath the site brought about as a result of the proposed works.

All materials to be removed from site should be taken to an appropriately licensed tip.

As part of the preparation works in order to comply with flood prevention levels, the site is to be raised by 1 to 2m. The materials used for the raising are to be inert mainly granular materials conforming to Type 6F2 or similar and should be compacted in layers to the Specification for Highway Works.

These works should be supervised on a full time basis by a qualified geotechnical engineer situ. In-situ testing of the filling as it progresses should be carried out. These tests should include in-situ density testing and plate load tests.

Contamination testing of the materials used of the filling should also be undertaken to the Newport City Council Protocol at source and once placed.

8.3 Foundation and Floor Slab Solution

Due to the presence of soft clay bands beneath the site traditional shallow foundations are not recommended. Such foundations are likely to lead to high total and differential settlements.

A piled foundation is advised for the proposed residential properties. Precast concrete driven piles founded within the underlying very weak red brown and grey mudstone are recommended.

For a 275mm square precast concrete pile driven to an appropriate set within the underlying gravels a safe working load of typically 500kN should be achieved. Based upon the site investigation data, pile lengths should vary between 12m and 15m beneath current ground levels. Following placement of the fill piles lengths will be increase to approximately 14 and 17m.

The estimated working loads, pile type and lengths should be confirmed by a specialist piling contractor. It may be prudent to test drive piles at select locations.

For the quoted pile size, founded within the competent gravels, total settlements should not exceed 10mm with differential movements between adjacent piles being less than half this value.

Allowances should be made for re-driving piles should buried obstructions be encountered.

Floor slabs should be designed as suspended.

Measurements should be kept on pile vibrations during driving. Measures should also be taken to dampen such vibrations. If, however, vibrations exceed permissible values then consideration should be given to using a contiguous flight auger (cfa)/bored pile solution.

Network Rail may also require a bored pile solution close to the railway.

As stated in Section 8.2, the site is to be raised by between 1.0 and 2.0m. Consolidation settlements of between 100 to 200mm have been estimated.

As the building foundations are to be piled this will result in differential settlements between the development infrastructure and the buildings of a similar order.

Therefore either the development is designed to accommodate this level of differential settlement with flexible constructions and service entries into buildings or alternatively the fill is placed prior to development and allowed to settle prior to construction. The settlement process can be speeded up by surcharging the site by ‘over filling’. Should this be the desired option then appropriate instrumentation should be installed to determine when 90% consolidation has been achieved.

8.4 Excavations and Formations

All of the shallow excavations should be possible with normal soil excavating machinery. However, hydraulic breakers may be necessary when excavating hardstanding and buried objects.

The shallow excavations are likely to encounter perched water/groundwater inflows. Inflows together with rainwater infiltration should be dealt with by conventional pumping techniques. It should also be noted that during periods of heavy rainfall, a higher groundwater table may be encountered.

The sides of any excavations deeper than 1.0m should be supported by planking and strutting or other proprietary means.

Precautions should be made for running sand conditions within the superficial material.

The sub-formations/formations will be extremely susceptible to loosening, softening and deterioration by exposure to weather (rain, frost and drying conditions), the action of water (flood water or removal of groundwater) and site traffic.

Formations should never be left unprotected and continuously exposed to rain causing degradation, or left exposed/uncovered overnight, unless permitted by a qualified engineer.

Construction plant and other vehicular traffic should not be operated on unprotected formations.

As a minimum the formation/excavation surfaces must be protected by blinding concrete or a minimum thickness of 300mm of hard cover immediately after exposure.

Allowances should be made for trimming, re-trimming and re-compaction if necessary.

Allowances should be made for the removal of soft spots and their replacement with well compacted granular materials.

Allowances should be made for special precautions to prevent formation deterioration in addition to the above.

It is recommended that approval be gained from a qualified engineer of the formation condition before covering them with any subsequent construction.

8.5 Roads and Car Parking Areas

The proposed development is to include the raising of the site as part of the flood prevention measures.

Following adequate compaction of the imported fill, a California Bearing Ratio (CBR) Value of 5% is likely to be acceptable for design purposes.

It should be noted that the local Highway Authority will require field in-situ CBR tests to be carried out at formation level of the roads to be adopted.

8.6 Protection of Buried Concrete

The laboratory soil chemical analysis reported concentrations of total sulphate of between 200 and 2500 mg/kg and pH of between 8.2 and 11.8 pH units.

Due to an elevated level of total sulphate in TP12 at 0.40m below ground level, sulphate aqueous extract was undertaken. A value of 160 mg/litre was recorded.

The classification should be based upon mobile water being present.

Based upon the above results we recommend that all buried concrete should conform to Design Class DS-1, ACEC Class AC-1, of BRE Digest 1:2005.

8.7 In-situ Soakaway Testing

During the investigation three in-situ soakaway tests were undertaken. The tests were not carried out strictly to the requirements of BRE 365.

Two of the soakaways tests recorded no infiltration and TP5 recorded a permeability of 8.86 x 10^{-5} m/s.

The in-situ soakaway test results are presented in **Annex H**.

ANNEX A
Landmark Historical Maps

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
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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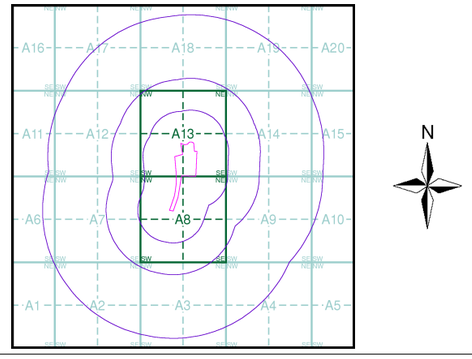
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Monmouthshire	1:10,560	1886	3
Monmouthshire	1:10,560	1902	4
Monmouthshire	1:10,560	1922	5
Monmouthshire	1:10,560	1938	6
Historical Aerial Photography	1:10,560	1947	7
Historical Aerial Photography	1:10,560	1947	8
Monmouthshire	1:10,560	1954	9
Ordnance Survey Plan	1:10,000	1964 - 1965	10
Ordnance Survey Plan	1:10,000	1972 - 1973	11
Ordnance Survey Plan	1:10,000	1981 - 1983	12
Newport	1:10,000	1983	13
Ordnance Survey Plan	1:10,000	1987	14
10K Raster Mapping	1:10,000	2006	15
10K Raster Mapping	1:10,000	2012	16

Historical Map - Slice A



Order Details

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National Grid Reference: 331690, 189280
Slice: A
Site Area (Ha): 4.52
Search Buffer (m): 1000

Site Details

., Herbert Road, NEWPORT, Gwent, NP19 7BH

Landmark Information Group
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Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Russian Military Mapping Legends

1:5,000 and 1:10,000 mapping

a. Not drawn to scale b. Drawn to scale

- Government and Administrative Buildings
- Military and Industrial Buildings
- Military and Communication Areas
- Subway Entrance
- Fireproof Building
- Prominent Fireproof Building
- Non-fireproof Building
- Non-fireproof Building (non-dwelling)
- Factory, mill, and flour mill, with chimneys
- Factory, mill, and flour mill, without chimneys
- Power Station, drawn to scale (эл.ст.)
- Hydroelectric Power Station (ГЭС)
- Radio Station, drawn to scale
- Telephone Station, drawn to scale
- Abandoned Open-pit Mine or Quarry
- Open-pit Salt Mine (сол.)
- Pit (–1,5)
- Oil Deposit or Well (нефть)
- Oil Seepage (нефть)
- Tailings Pile (+7.0 отвал)
- Fuel Storage Tanks (скл. гор.)
- Natural Gas Tank (газг.)
- Bench Mark (125.4 / 125.1)
- Drill Hole (бур.)
- Burial Mound (+2.0)
- Triangulation Point on Burial Mound (+1.2 67.8)
- Single-track Railroad (Fill, раз., платф., Cut)
- Double-track Railroad and Station Building (Small Bridge, ст., Tunnel, тун., Pipe (Culvert))
- Coniferous Forest (сосна 24 0.30)
- Deciduous Forest (клен 12 0.20)
- Mixed Forest (ель береза 20 0.25)
- Lawns
- Citrus Orchard
- Wet Ground
- Scattered Vegetation

243,8 — Values for prominent elevations

186.0 — Numbers for spot elevations, depth soundings, contour lines, etc.

0,2 — Velocity of the current, width of river bed, depth of river

180/12 180/12 — Fractional terms: length and capacity of bridges; depth of fords and condition of the river bottom; height of forest and the diameter of trees

Russian Alphabet (For reference and phonetic interpretation of map text)

А а (A)	З з (Z)	П п (P)	Ч ч (CH)
Б б (B)	И и (I)	Р р (R)	Ш ш (SH)
В в (V)	Й й (Y)	С с (S)	Щ щ (SHCH)
Г г (G)	К к (K)	Т т (T)	ъ (–)
Д д (D)	Л л (L)	У у (U)	ы (Y)
Е е (E)	М м (M)	Ф ф (F)	ь (')
Ё ё (YO)	Н н (N)	Х х (KH)	Э э (E)
Ж ж (ZH)	О о (O)	Ц ц (TS)	Ю ю (YU or IU)
			Я я (YA or IA)

1:25,000 mapping

a. Not drawn to scale b. Drawn to scale

- Government and Administrative Buildings
- Military and Industrial Buildings
- Military and Communication Areas
- Subway Entrance
- Partly Demolished Buildings
- Demolished Buildings
- Built-Up Area with Fireproof Buildings Predominant
- Built-Up Area with Non-Fireproof Buildings Predominant
- Individual Fireproof Building
- Prominent Industrial Building
- Individual Dwelling, Fireproof
- Ruins of an Individual Dwelling
- Factory or Mill Chimney
- Factory or Mill with Chimney (бум.)
- Factory or Mill without Chimney (скип.)
- Mine or Open Pit Mine (медн.)
- Operating Shaft or Mine (кам. уг.)
- Non-Operating Shaft or Mine
- Salt Mine (сол.)
- Tailings Pile
- Pit (–1.7)
- Stone Quarry (гл. пес. кам.)
- Gas Pump or Service Station
- Fuel Storage or Natural Gas Tank
- Oil or Natural Gas Derrick
- Small Hydroelectric Power Station
- Power Station
- Transformer Station (б.тр.)
- Cemetery
- Burial Mound (height in metres) (+8.1)
- Triangulation Point on Burial Mound (95.7)
- Triangulation Point (92.6)
- Bench Mark (52.1)
- Bench Mark (monumented) (71.1)
- Telegraph Office
- Telephone Station
- Radio Station
- Radio Tower
- Airfield or Seaplane Base
- Landing Strip
- Main Highway (Cut, Fill, Km Post, Plantings, Telegraph/Telephone Lines)
- Highway under Construction
- Improved Dirt Road (former truck road) (Width of Road, Steep Grade)
- Double-track Railroad with First Class Station (Small Bridge, ст., Pipe (Culvert), Tunnel)
- Dismantled Railroad
- Railroad Under Construction
- Shore Embankment
- River or Ditch with Embankment (+2.4)
- Direction and velocity of current (Water Gauge, 0.2, 135.1, Water Level Mark)
- Well (К. 125.0 гл.8м (г.-сол.))
- Water Reservoir or Rain Water Pit (вдхр.)
- Spring (156.2 кл.)
- Isobath with value (20)
- Heavy (Index) Contour Line
- Contour Line and Value (20)
- Half Contour Line
- Spot Elevation Value (347.1)
- Coniferous
- Deciduous
- Mixed
- Scrub

Key to Numbers on Mapping

ST38NW_Newport

No.	Description
15	Factory (Gas)
16	Factory (Gas)
21	Factory (Machinery)
23	Factory (Metals)
35	Factory (Non-Ferrous Metals)
40	Council/Government Buildings/Courts
44	Police Station/Headquarters
58	Post Office
59	Warehouses (Use Unknown)
63	Warehouses (Use Unknown) And Port Buildings
73	Railway Station

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Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Monmouthshire	1:10,560	1886	3
Monmouthshire	1:10,560	1902	4
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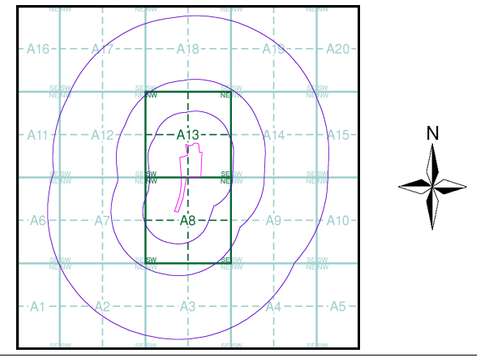
10K Raster Mapping	1:10,000	2006	15
10K Raster Mapping	1:10,000	2012	16

Russian Map - Slice A



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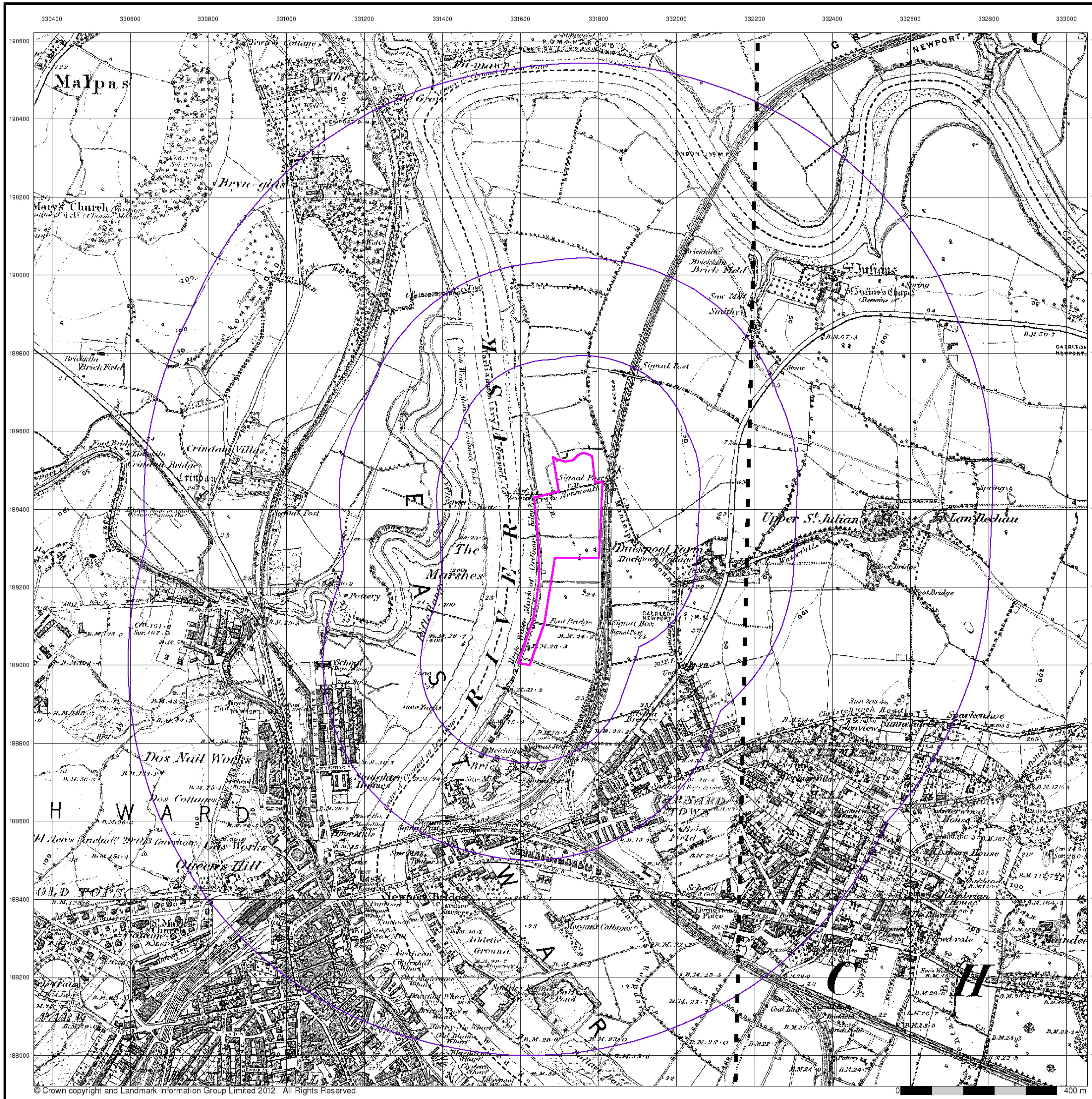

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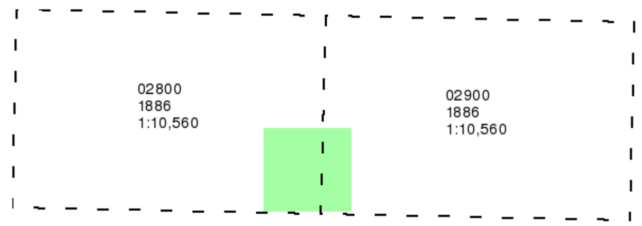
Monmouthshire

Published 1886

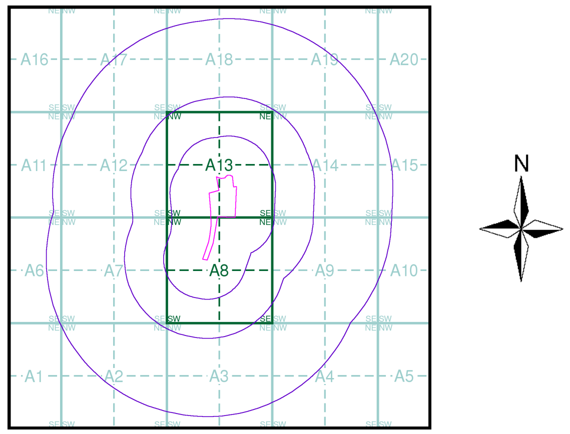
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



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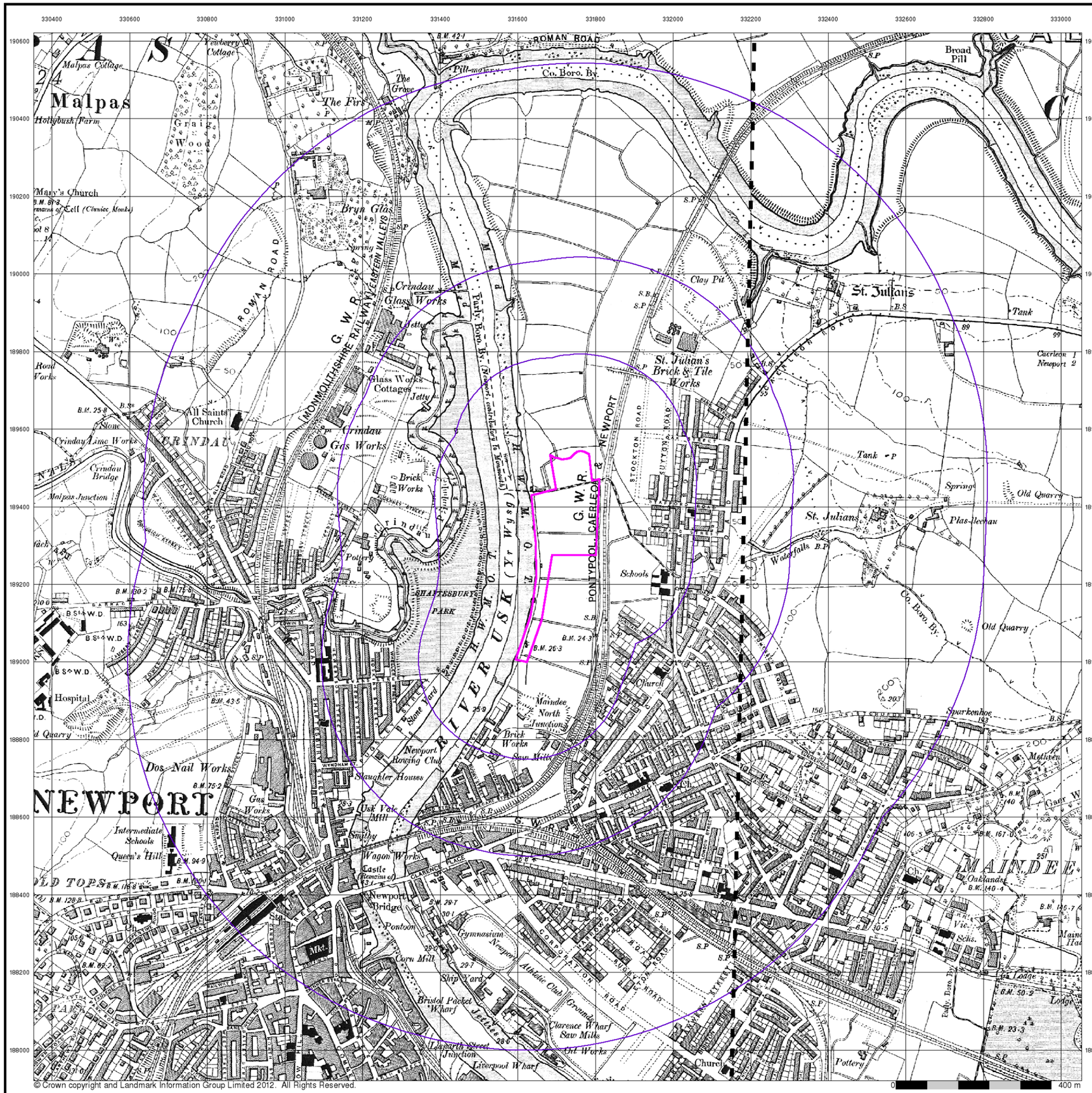

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Monmouthshire

Published 1902

Source map scale - 1:10,560

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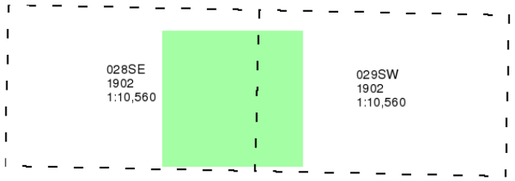
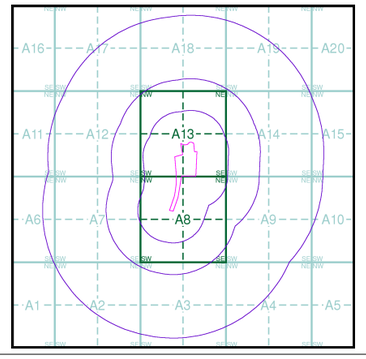
Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	41914630_1_1
Customer Ref:	12044
National Grid Reference:	331690, 189280
Slice:	A
Site Area (Ha):	4.52
Search Buffer (m):	1000

Site Details

., Herbert Road, NEWPORT, Gwent, NP19 7BH

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

Monmouthshire

Published 1922

Source map scale - 1:10,560

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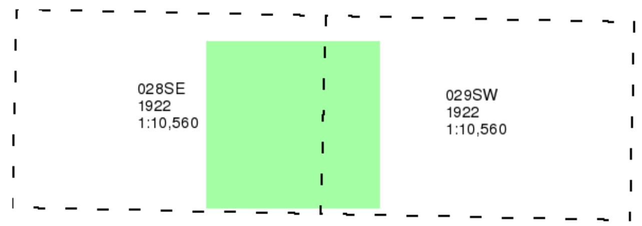
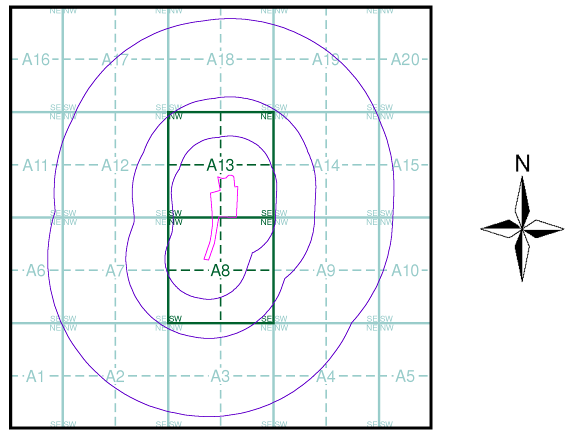


Historical Map - Slice A



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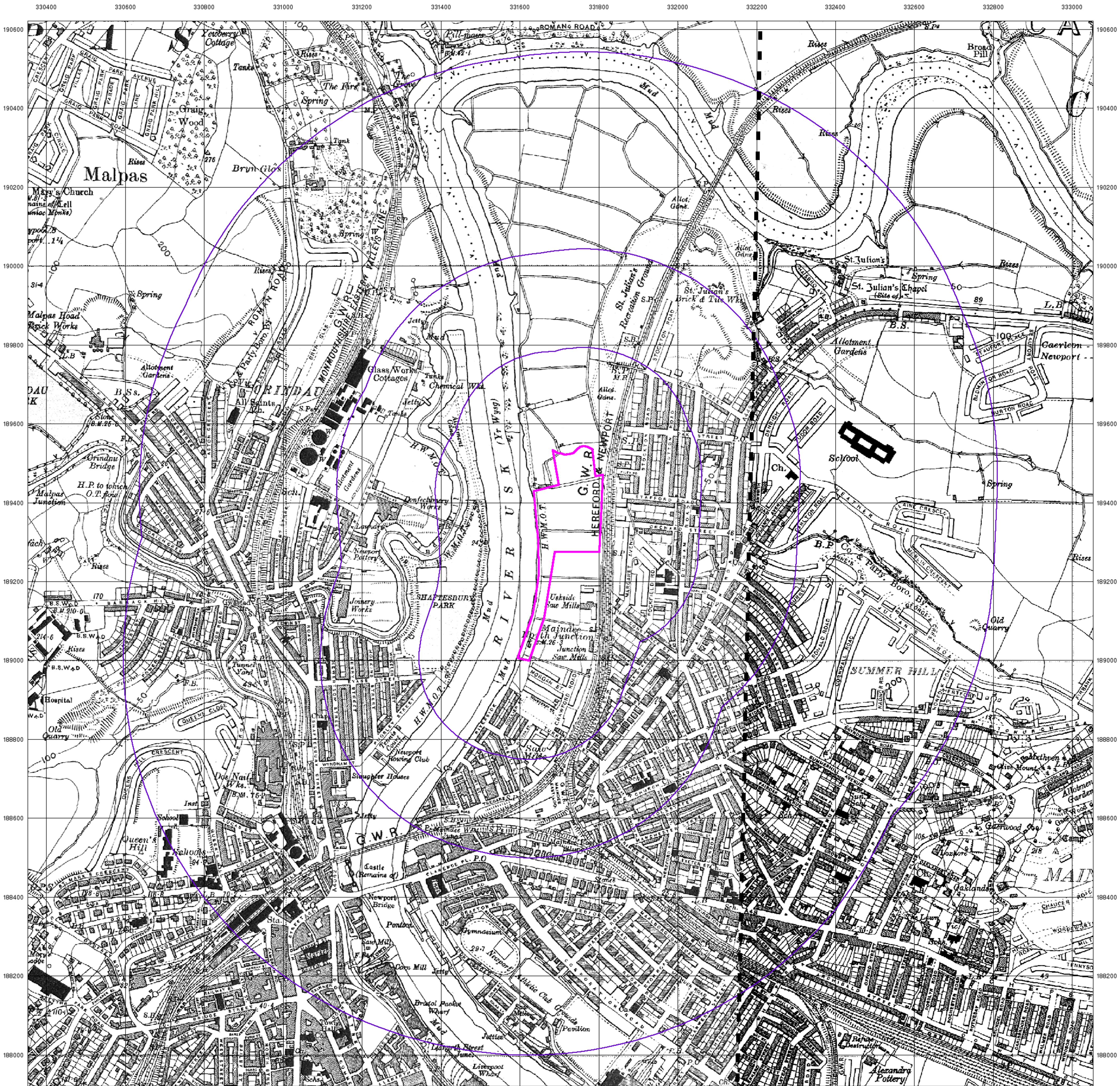

terrafirma

Monmouthshire

Published 1938

Source map scale - 1:10,560

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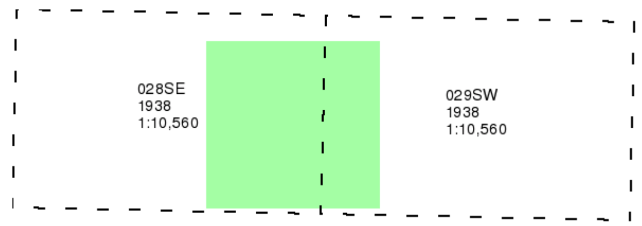
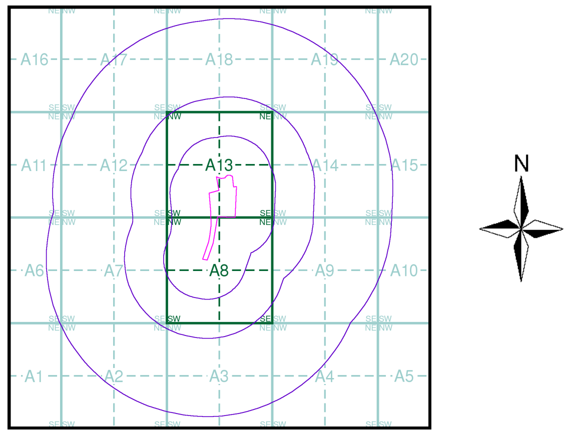
Map Name(s) and Date(s)



Historical Map - Slice A



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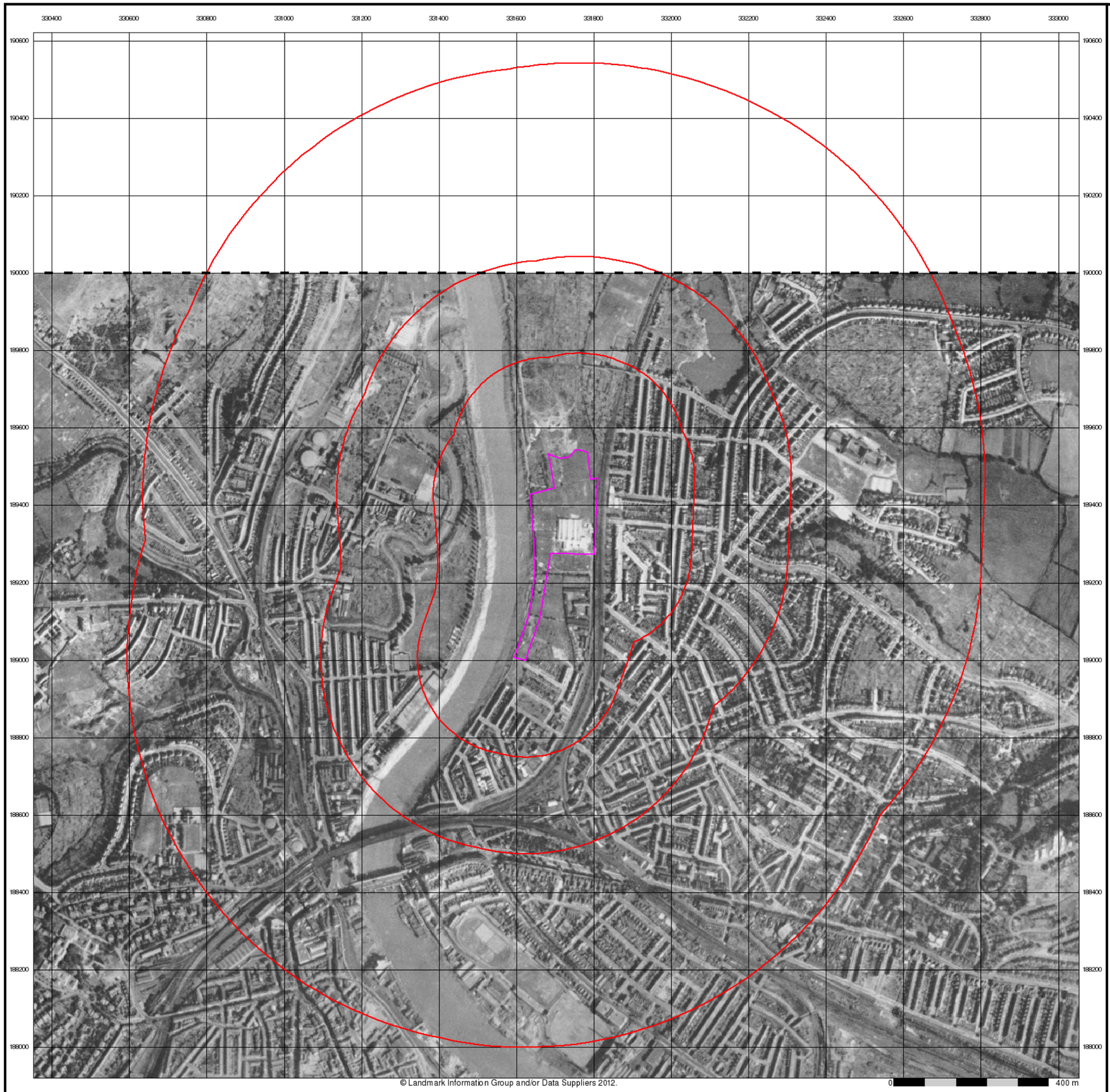


terrafirma

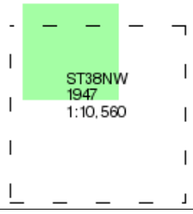
Historical Aerial Photography

Published 1947

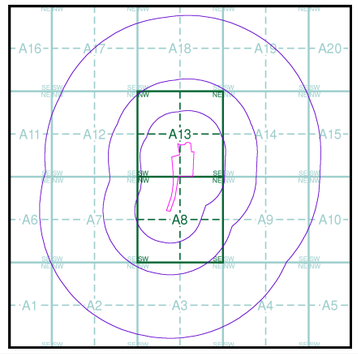
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Aerial Photography - Slice A



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Order Details

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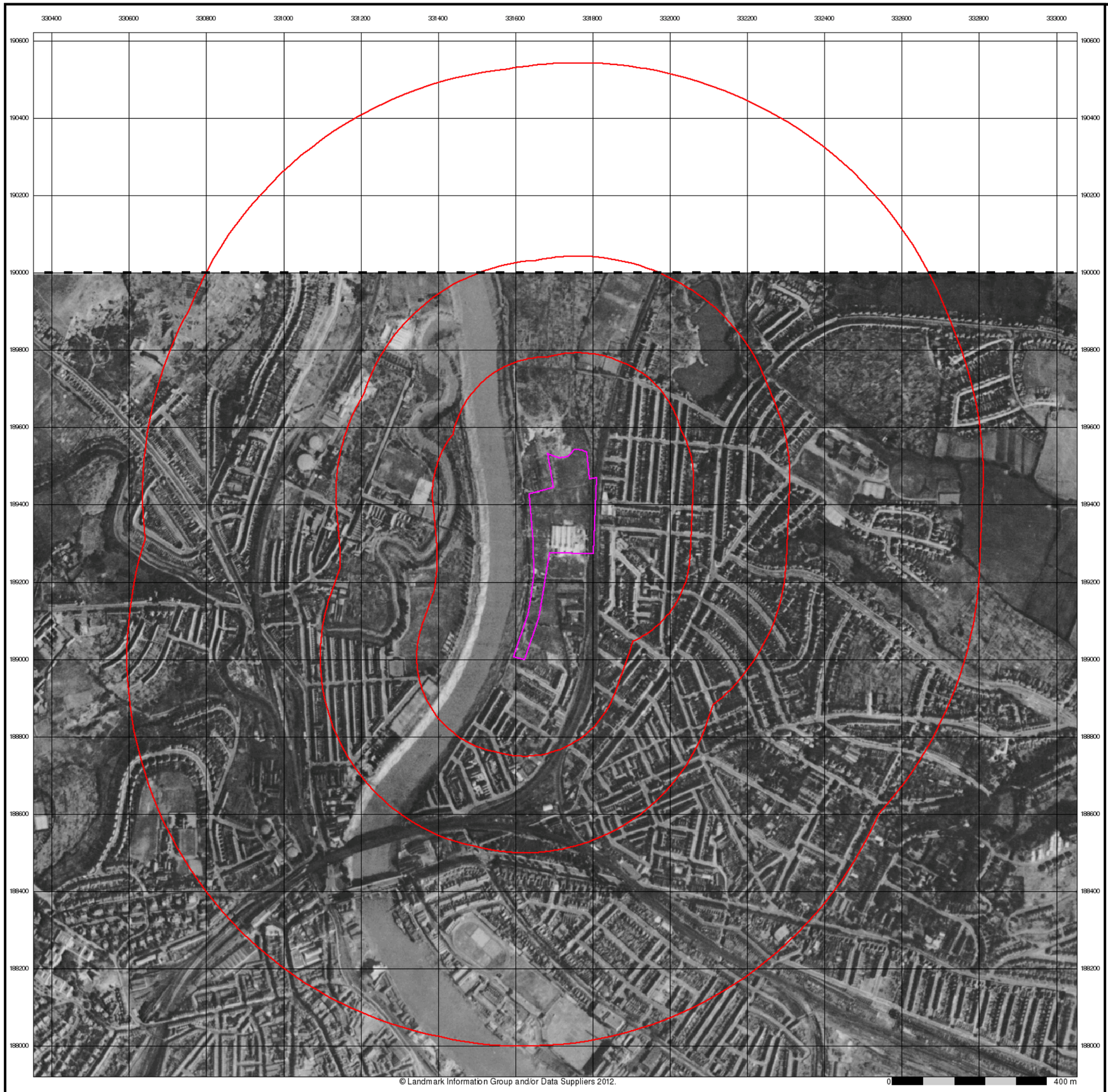

terrafirma

Historical Aerial Photography

Published 1947

Source map scale - 1:10,560

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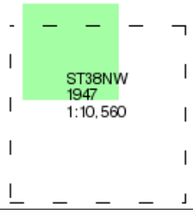
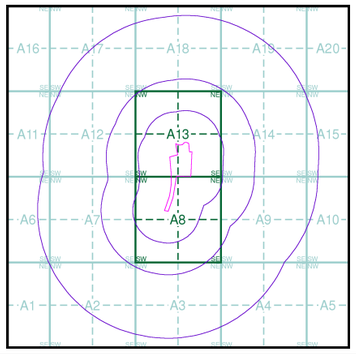


Historical Aerial Photography - Slice A



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terrafirma

Monmouthshire

Published 1954

Source map scale - 1:10,560

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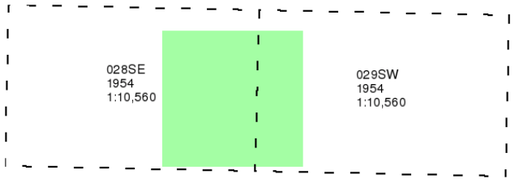
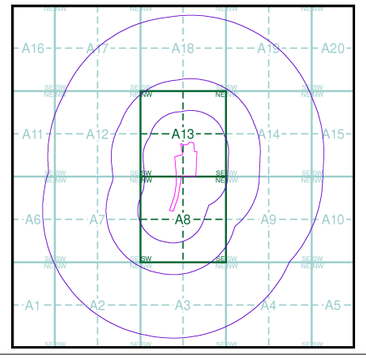


Historical Map - Slice A



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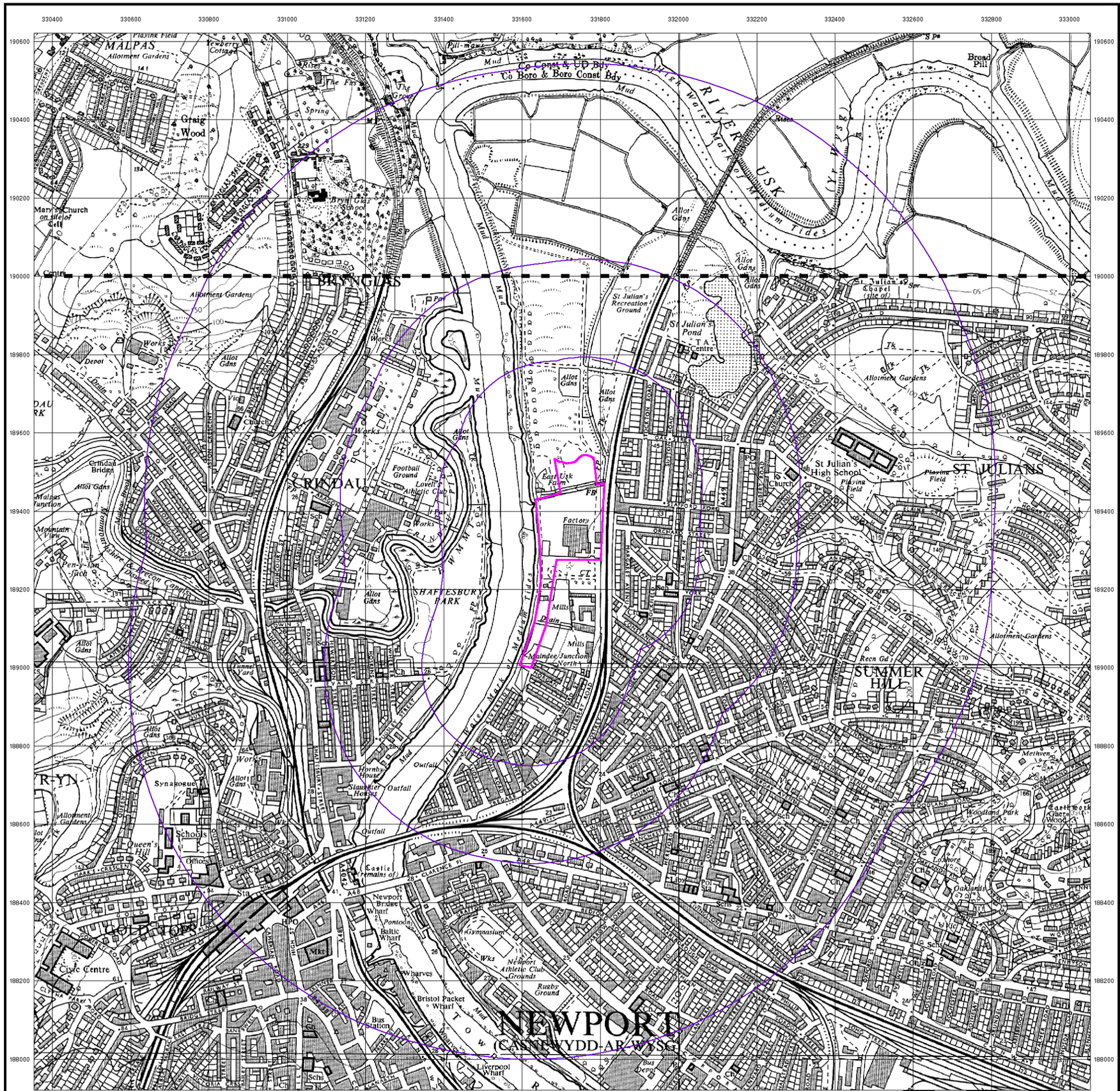

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Ordnance Survey Plan

Published 1964 - 1965

Source map scale - 1:10,000

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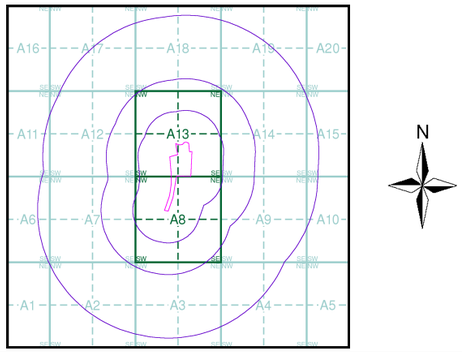
Map Name(s) and Date(s)

ST39SW
1964
1:10,560

ST38NW
1965
1:10,560

Historical Map - Slice A



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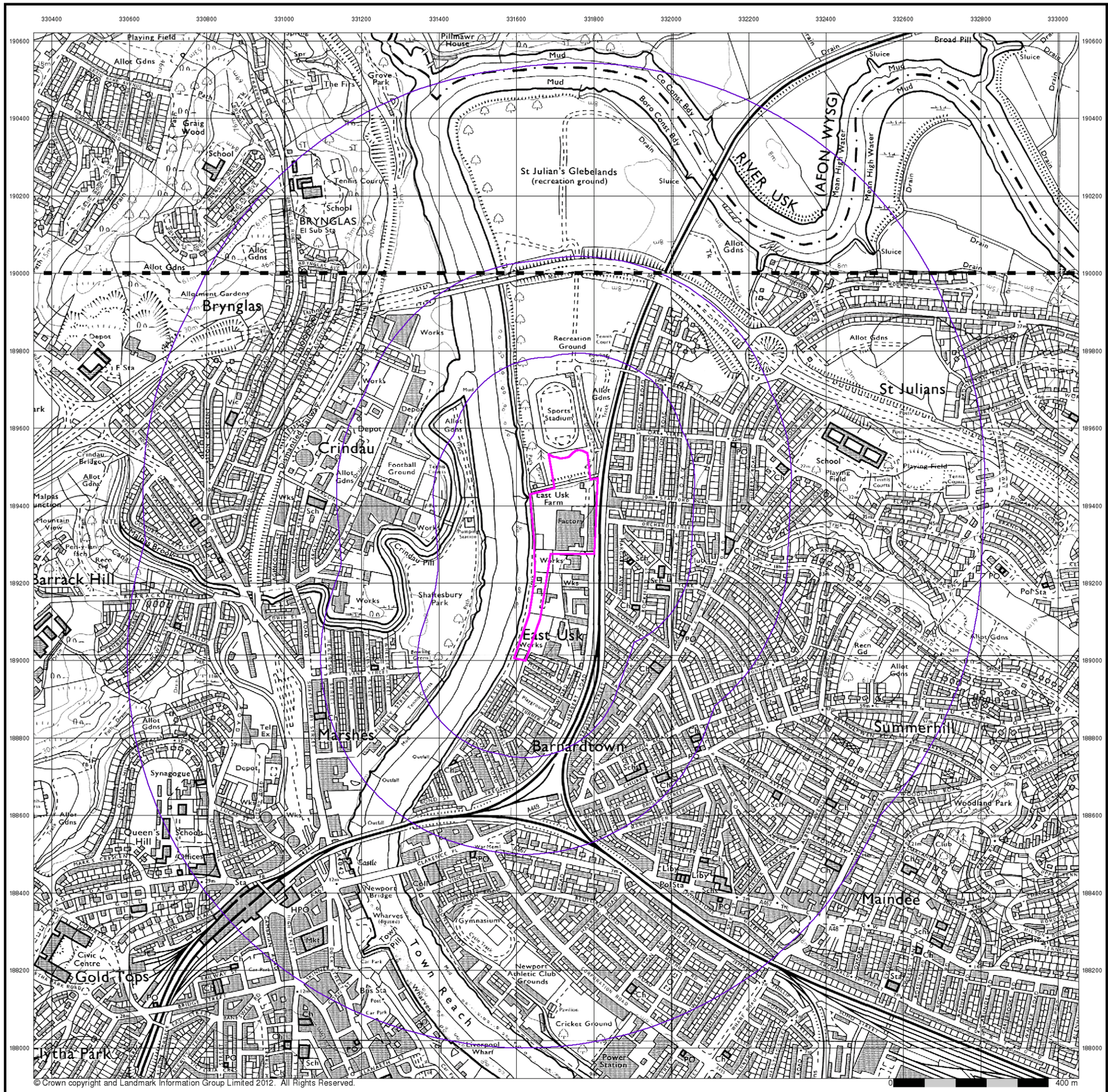

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Ordnance Survey Plan

Published 1972 - 1973

Source map scale - 1:10,000

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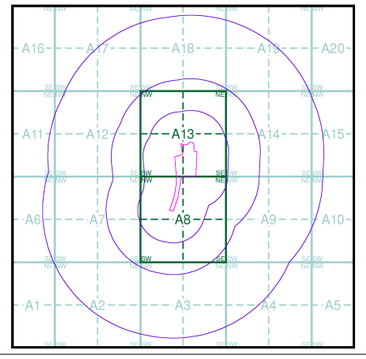
Map Name(s) and Date(s)

ST39SW
1972
1:10,000

ST38NW
1973
1:10,000

Historical Map - Slice A



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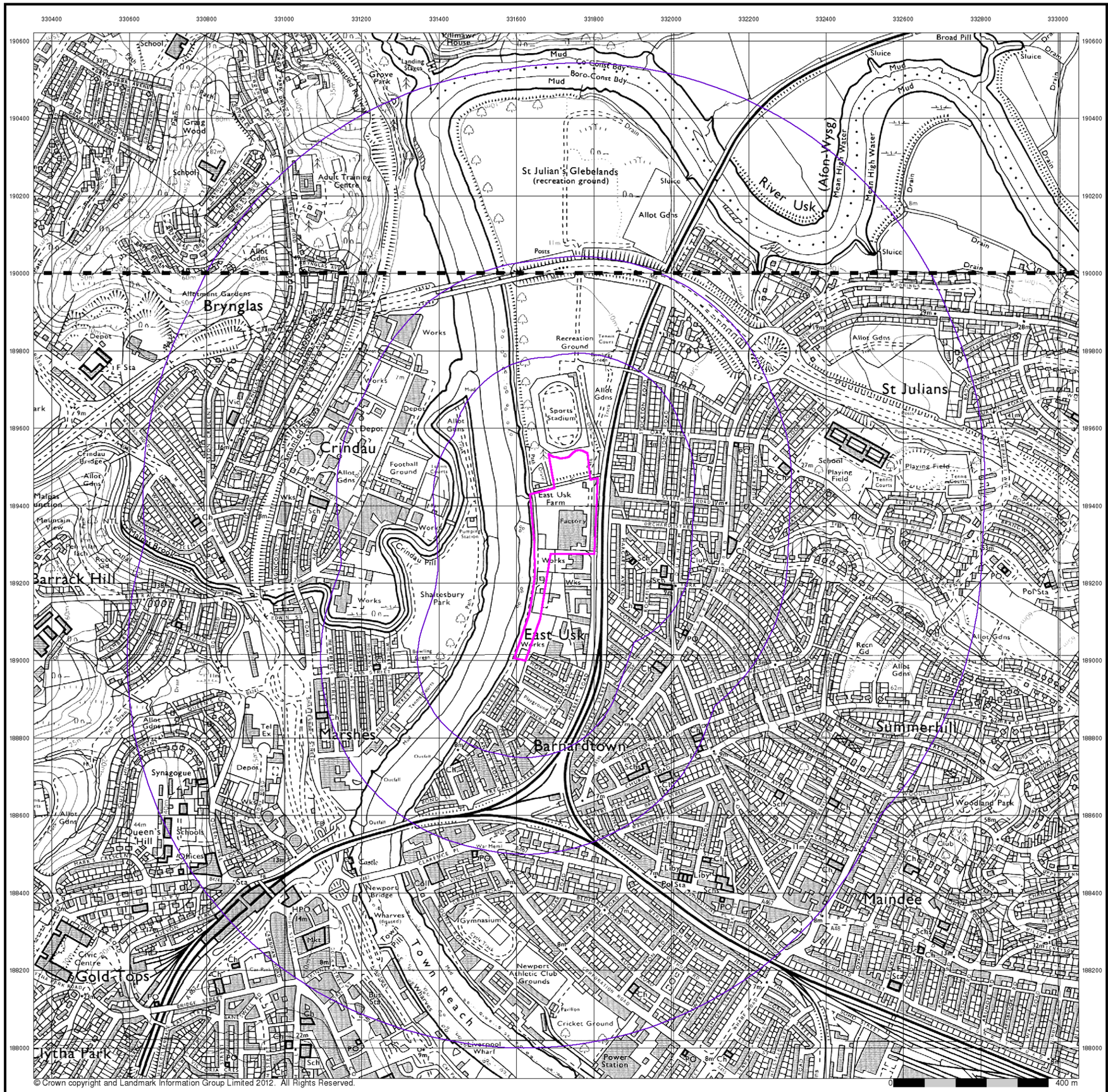

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Ordnance Survey Plan

Published 1981 - 1983

Source map scale - 1:10,000

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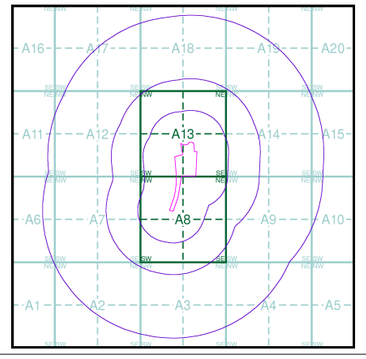
Map Name(s) and Date(s)

ST39SW
1983
1:10,000

ST38NW
1981
1:10,000

Historical Map - Slice A



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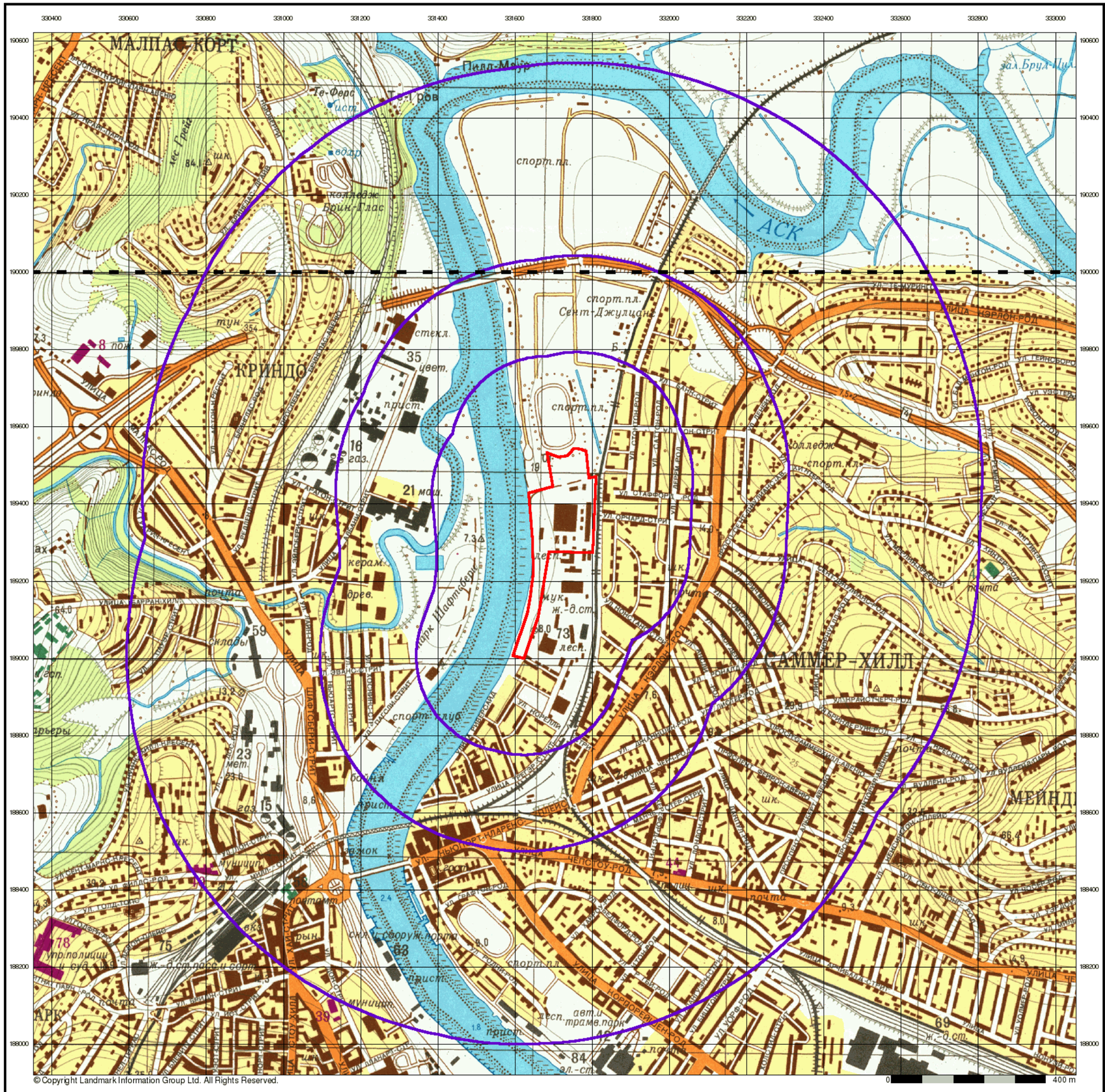

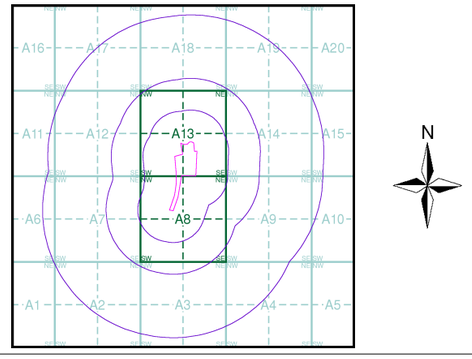

Newport

Published 1983

Source map scale - 1:10,000

These maps were produced by the Russian military during the Cold War between 1950 and 1997, and cover 103 towns and cities throughout the U.K. The maps are produced at 1:25,000, 1:10,000 and 1:5,000 scale, and show detailed land use, with colour-coded areas for development, green areas, and non-developed areas. Buildings are coloured black and important building uses (such as hospitals, post offices, factories etc.) are numbered, with a numbered key describing their use.
They were produced by the Russians for the benefit of navigation, as well as strategic military sites and transport hubs, for use if they were to have invaded the U.K. The detailed information provided indicates that the areas were surveyed using land-based personnel, on the ground, in the cities that are mapped.

Map Name(s) and Date(s)

Russian Map - Slice A

Order Details

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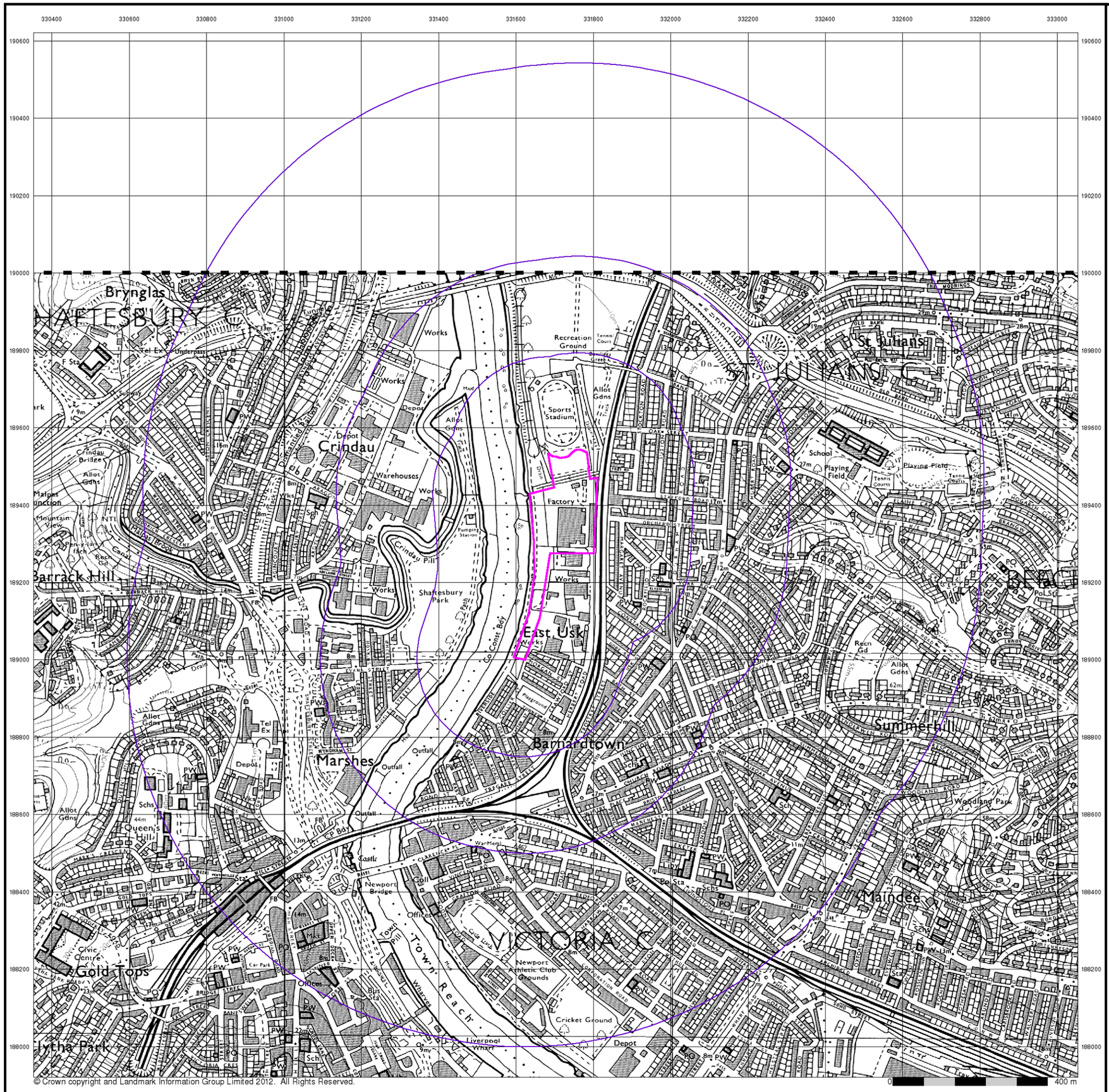

terrafirma

Ordnance Survey Plan

Published 1987

Source map scale - 1:10,000

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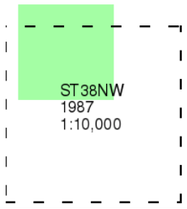
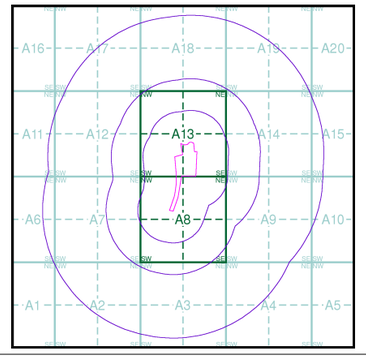


Historical Map - Slice A



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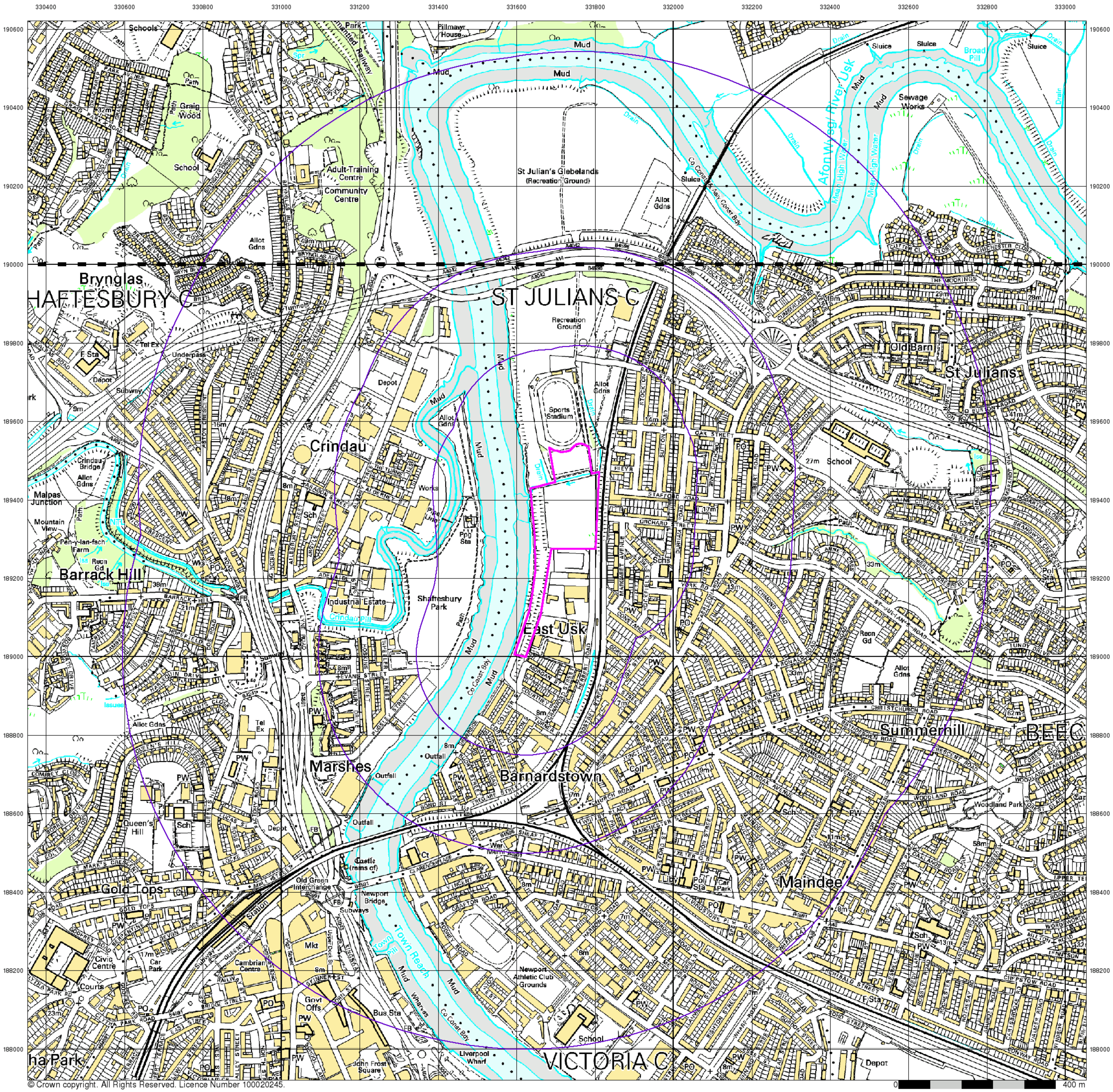

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10k Raster Mapping

Published 2006

Source map scale - 1:10,000

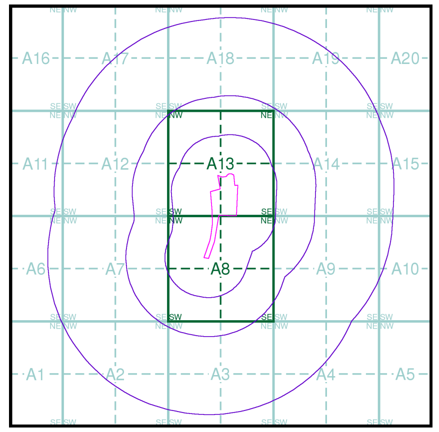
The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks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

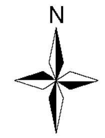
Map Name(s) and Date(s)

ST39SW
2006
1:10,000

ST38NW
2006
1:10,000

Historical Map - Slice A





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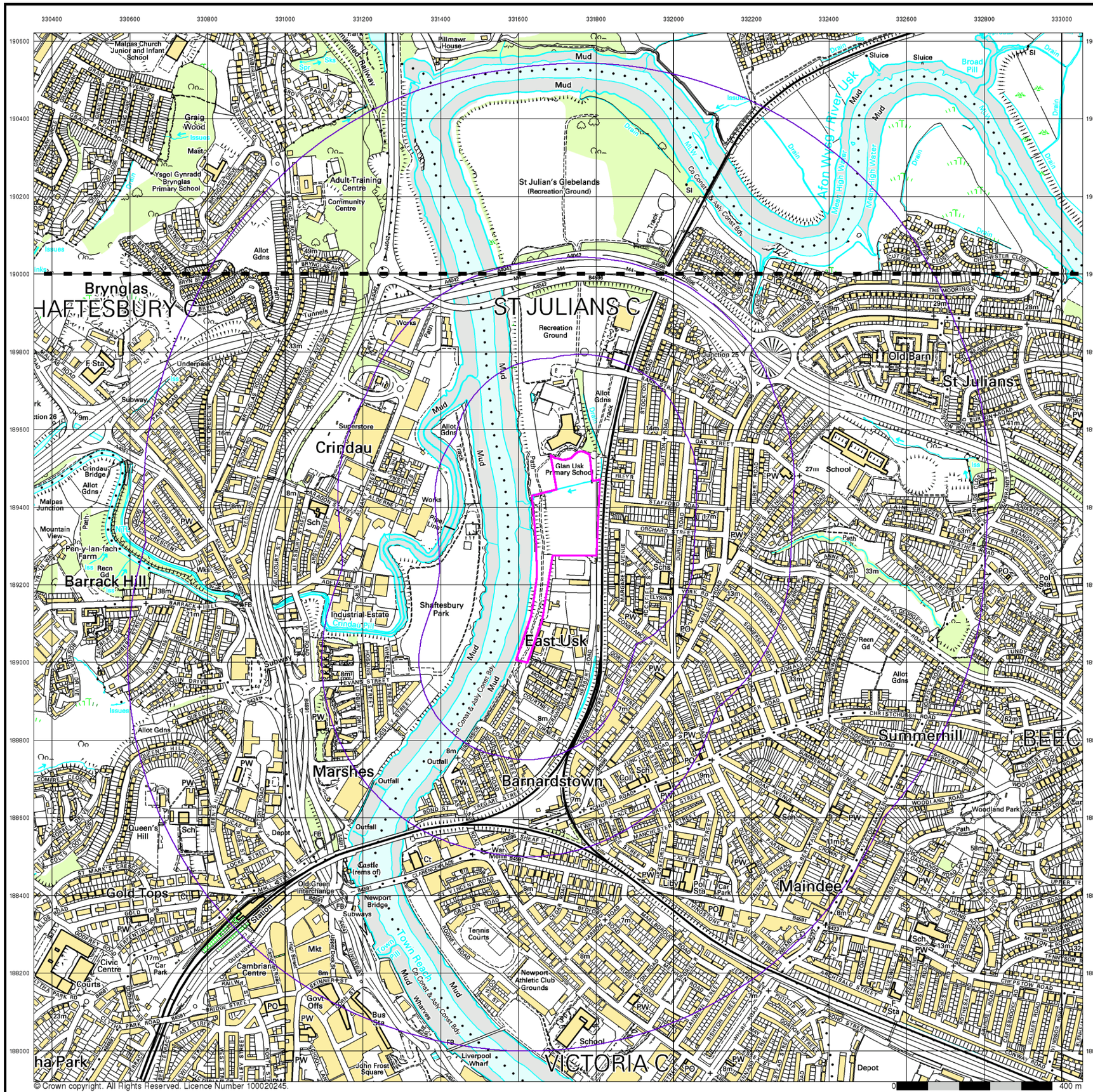


terrafirma

10k Raster Mapping

Published 2012

Source map scale - 1:10,000

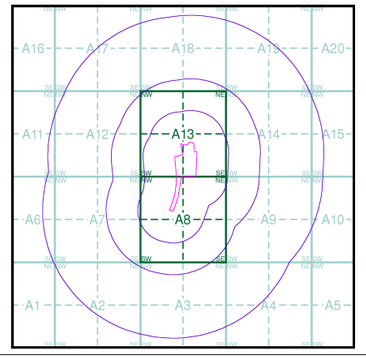
The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks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

ST39SW
2012
1:10,000

ST38NW
2012
1:10,000

Historical Map - Slice A



Order Details

Order Number:	41914630_1_1
Customer Ref:	12044
National Grid Reference:	331690, 189280
Slice:	A
Site Area (Ha):	4.52
Search Buffer (m):	1000

Site Details

., Herbert Road, NEWPORT, Gwent, NP19 7BH

Landmark Information Group

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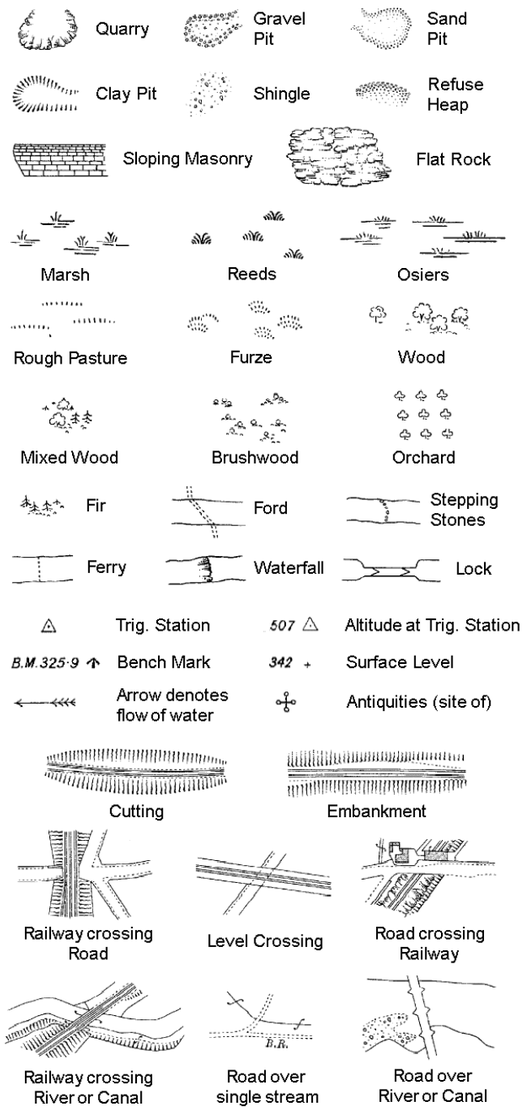
Historical Mapping Legends

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



County Boundary (Geographical)

County & Civil Parish Boundary

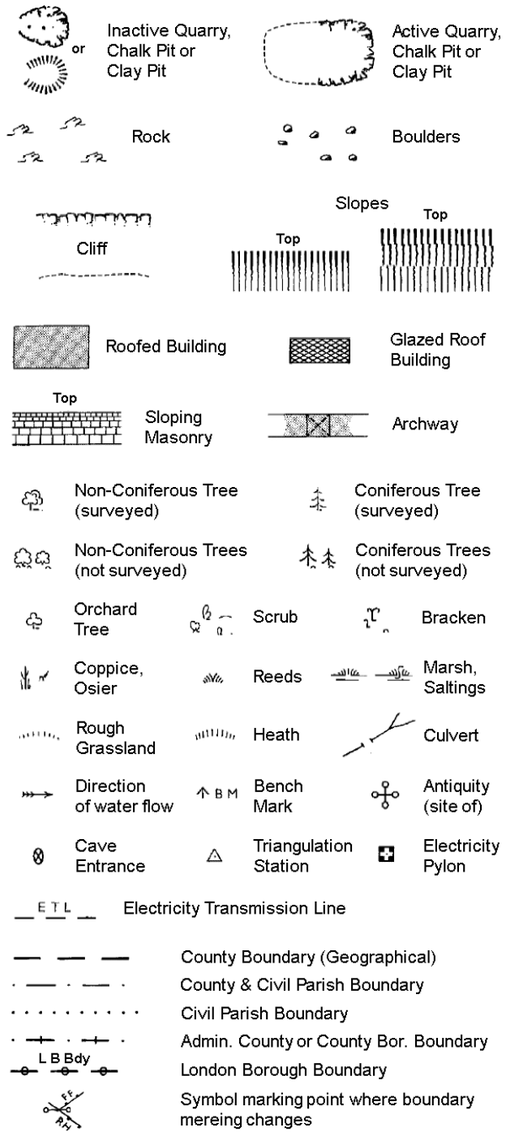
Administrative County & Civil Parish Boundary

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

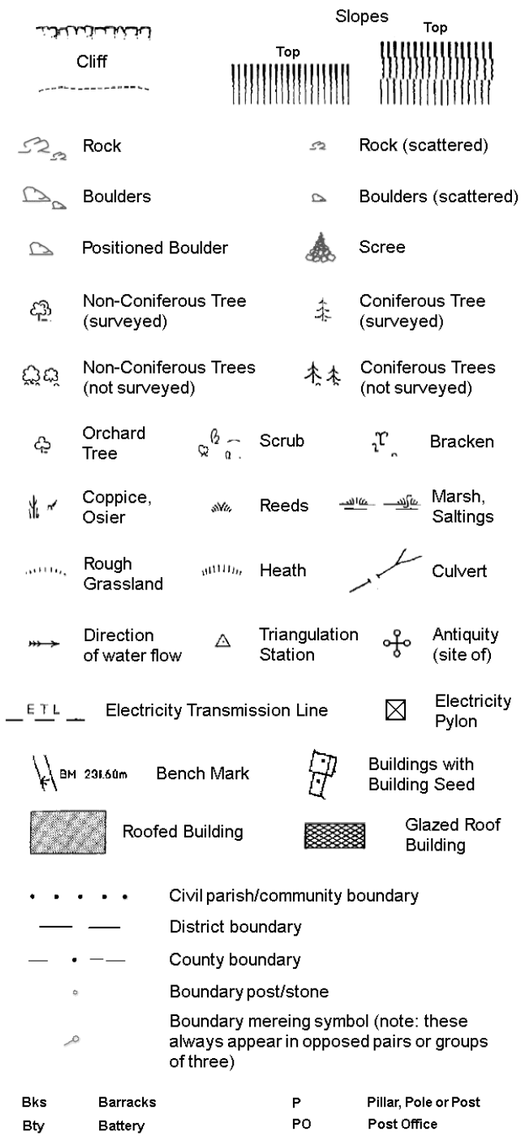
Admin. County or County Bor. Boundary

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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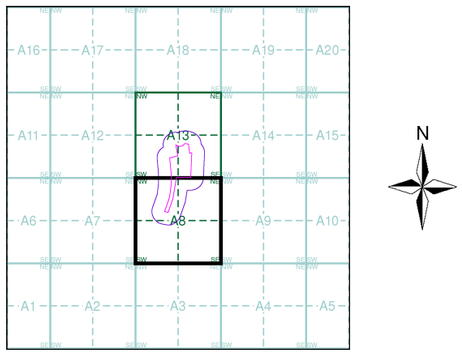
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Monmouthshire	1:2,500	1883	2
Monmouthshire	1:2,500	1902	3
Monmouthshire	1:2,500	1920	4
Monmouthshire	1:2,500	1937	5
Ordnance Survey Plan	1:1,250	1955 - 1957	6
Ordnance Survey Plan	1:2,500	1955 - 1957	7
Additional SIMs	1:1,250	1957 - 1992	8
Ordnance Survey Plan	1:1,250	1966 - 1976	9
Ordnance Survey Plan	1:2,500	1969 - 1970	10
Supply of Unpublished Survey Information	1:1,250	1974	11
Additional SIMs	1:1,250	1978 - 1991	12
Additional SIMs	1:1,250	1989	13
Large-Scale National Grid Data	1:1,250	1993	14
Large-Scale National Grid Data	1:1,250	1994 - 1997	15
Large-Scale National Grid Data	1:1,250	1997	16

Historical Map - Segment A8



Order Details

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Search Buffer (m):	100

Site Details

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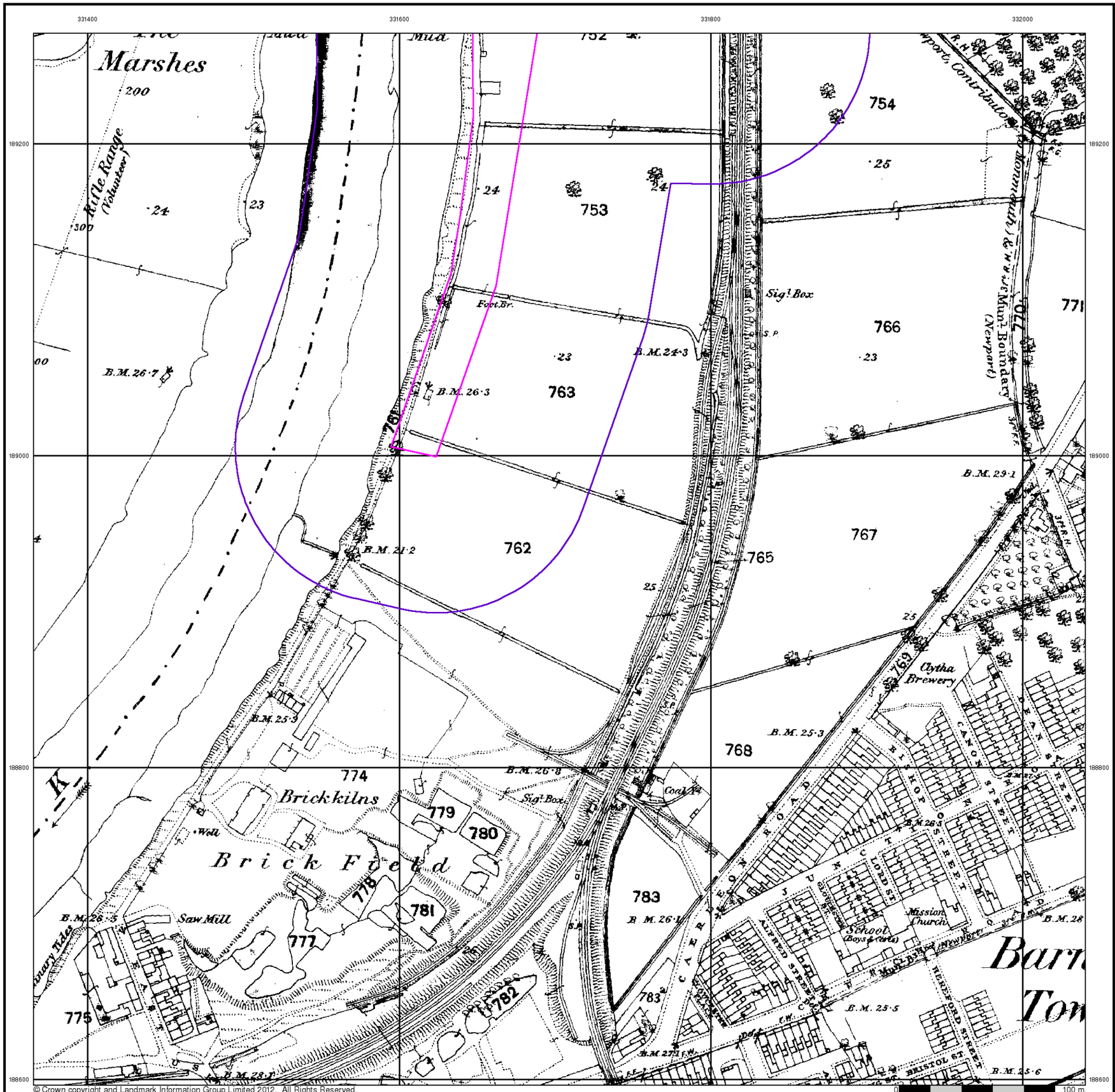

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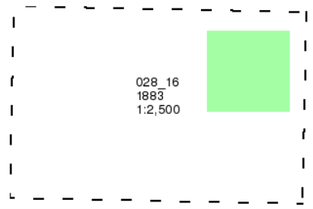
Monmouthshire

Published 1883

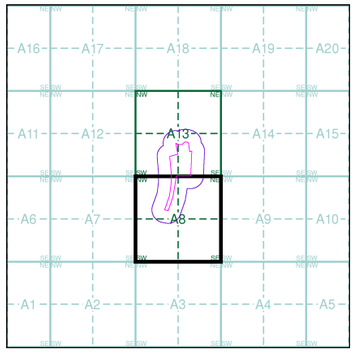
Source map scale - 1:2,500

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 A8



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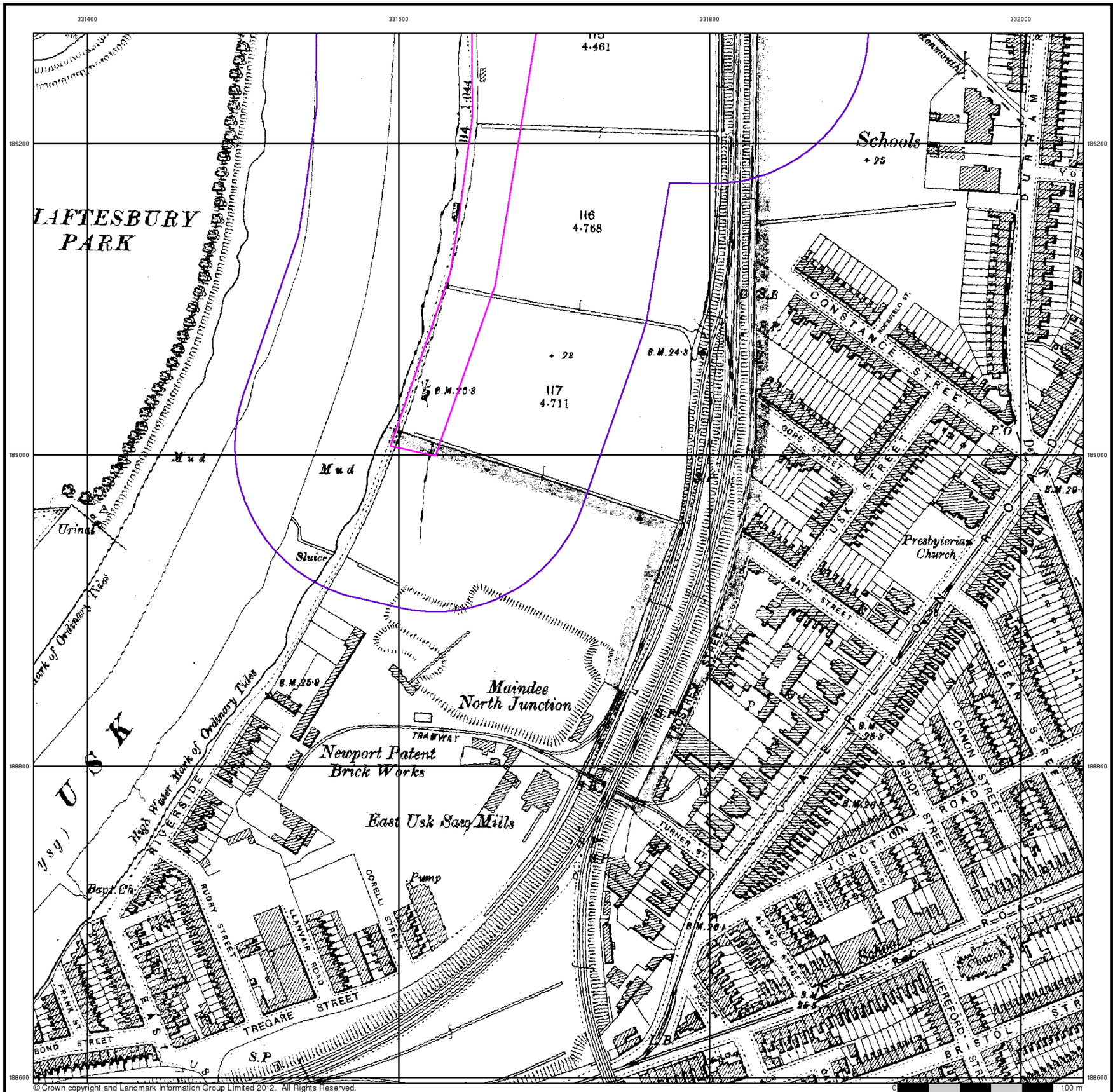

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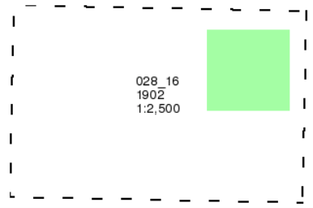
Monmouthshire

Published 1902

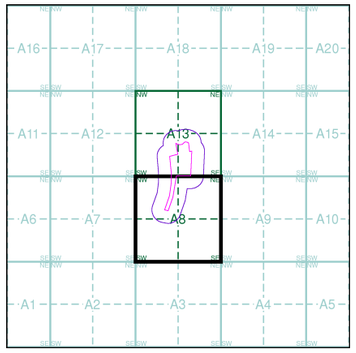
Source map scale - 1:2,500

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 A8



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Site Details

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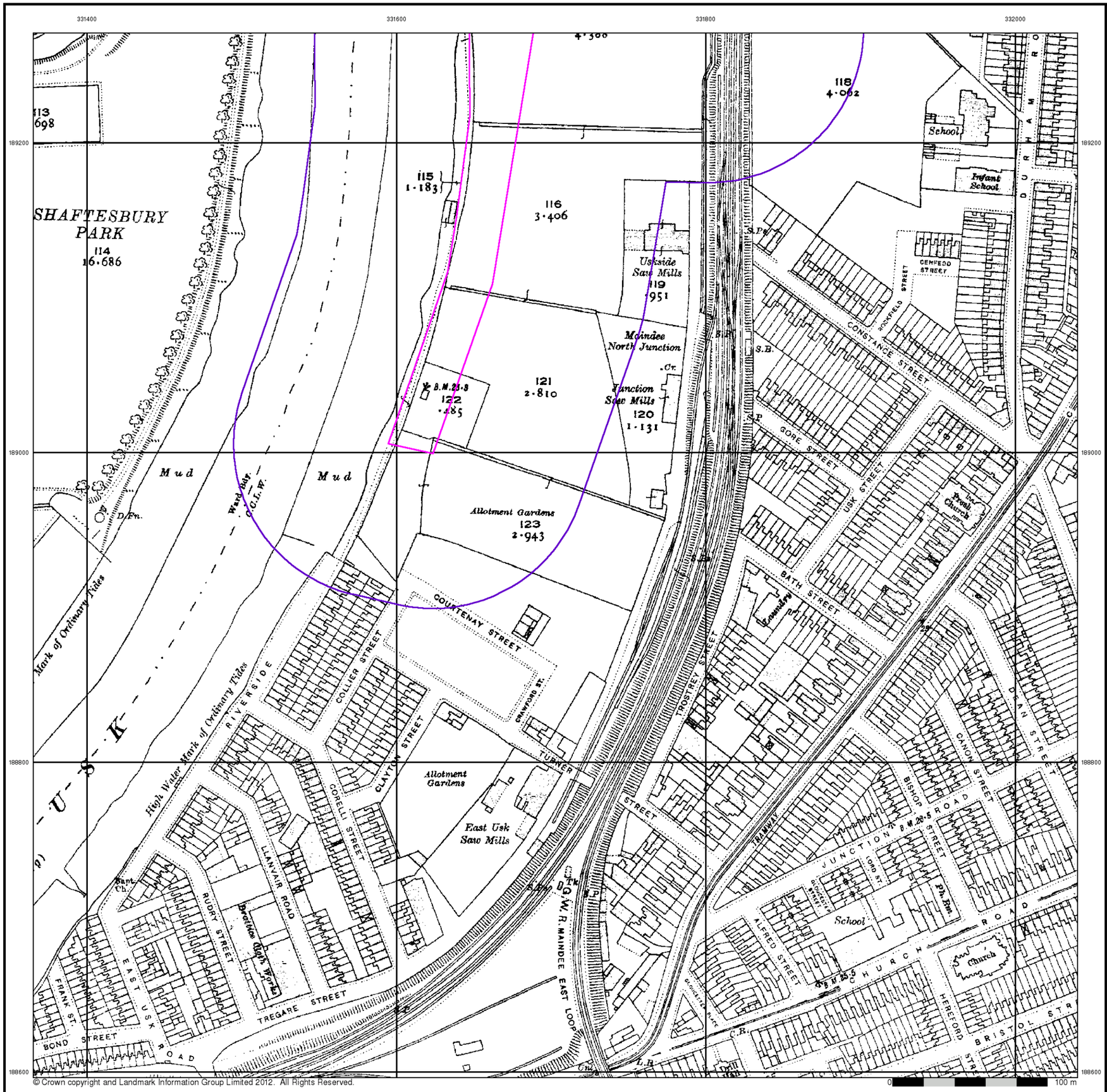

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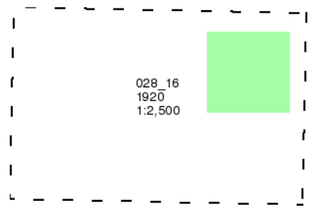
Monmouthshire

Published 1920

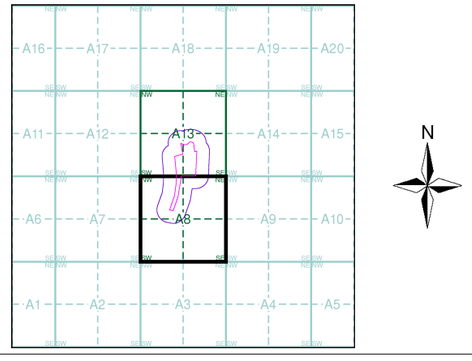
Source map scale - 1:2,500

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 A8



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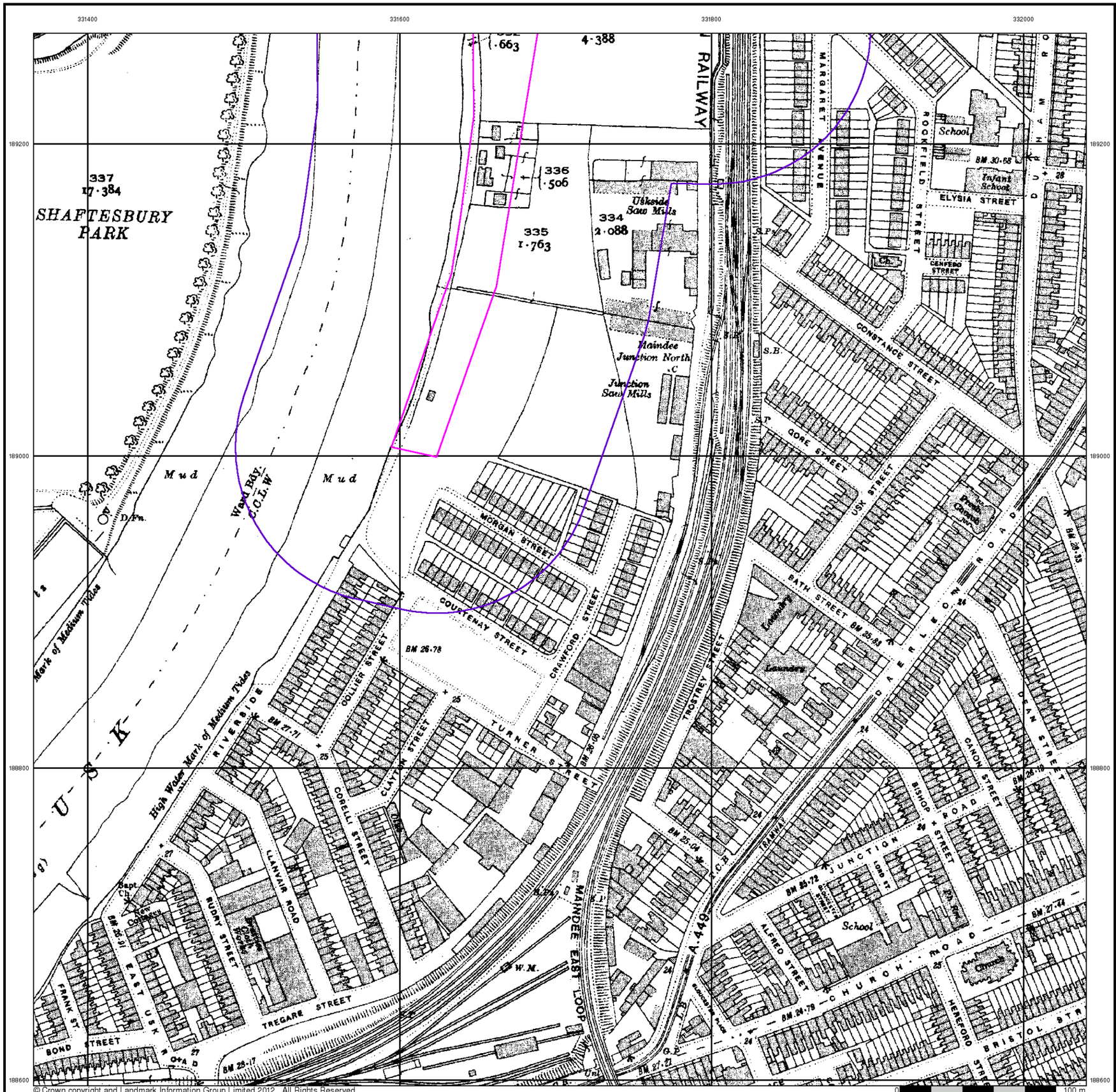

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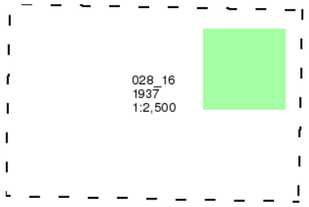
Monmouthshire

Published 1937

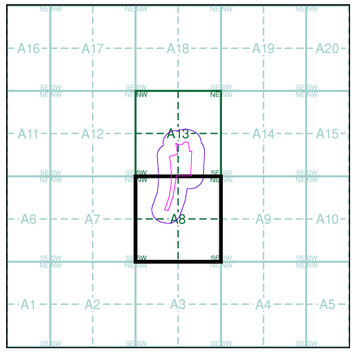
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A8



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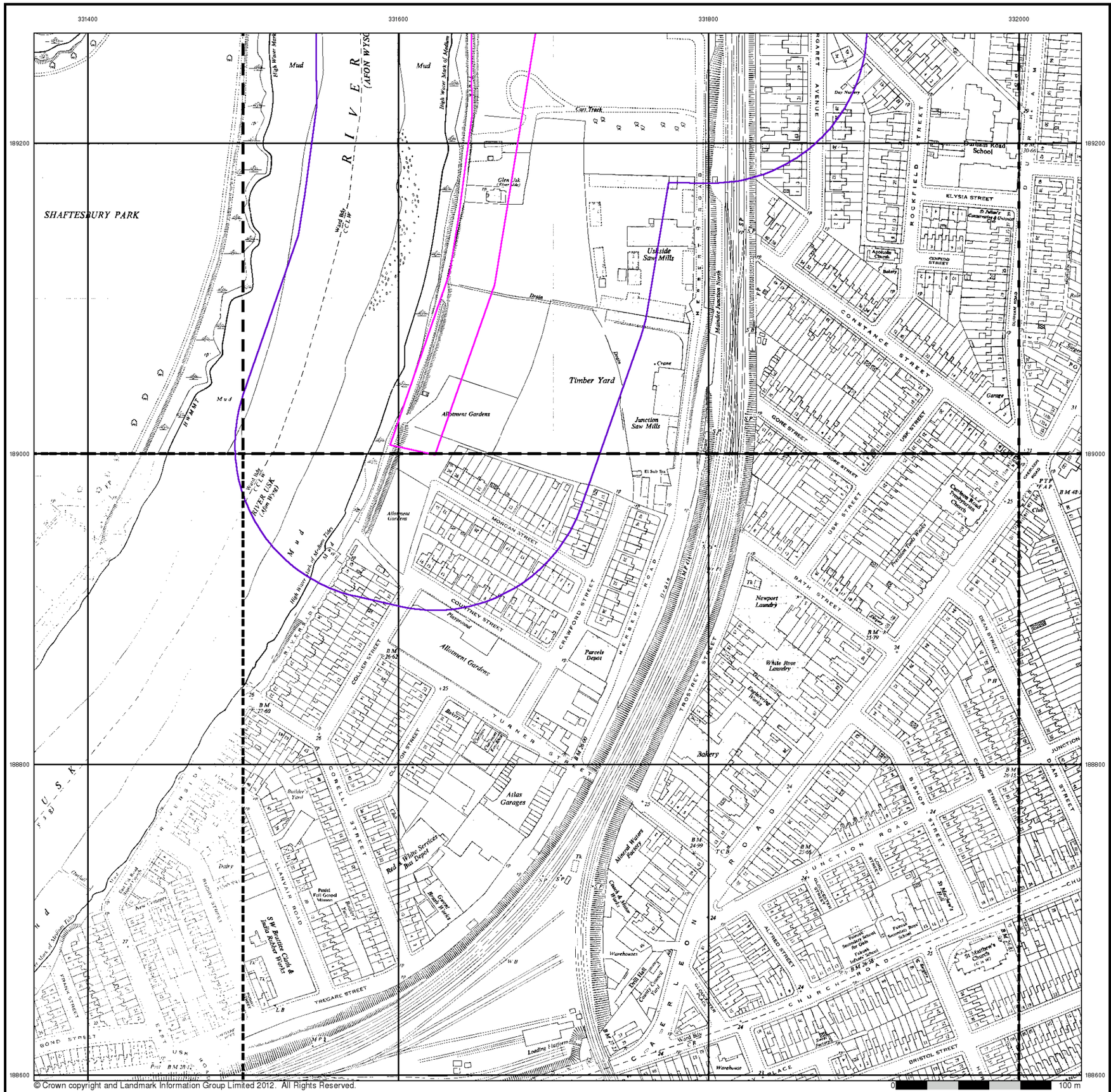

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Ordnance Survey Plan

Published 1955 - 1957

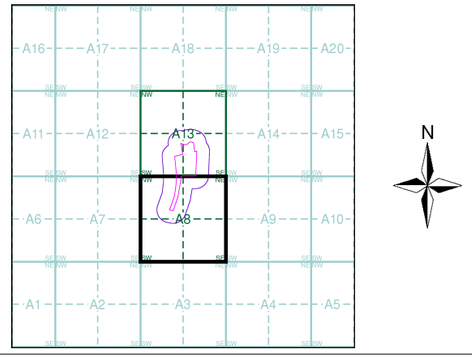
Source map scale - 1:1,250

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

Map Name(s) and Date(s)

ST3 189SW 1955 1:1,250	ST3 189SE 1955 1:1,250	ST3 289SW 1957 1:1,250
ST3 188NW 1955 1:1,250	ST3 188NE 1955 1:1,250	ST3 288NW 1956 1:1,250

Historical Map - Segment A8



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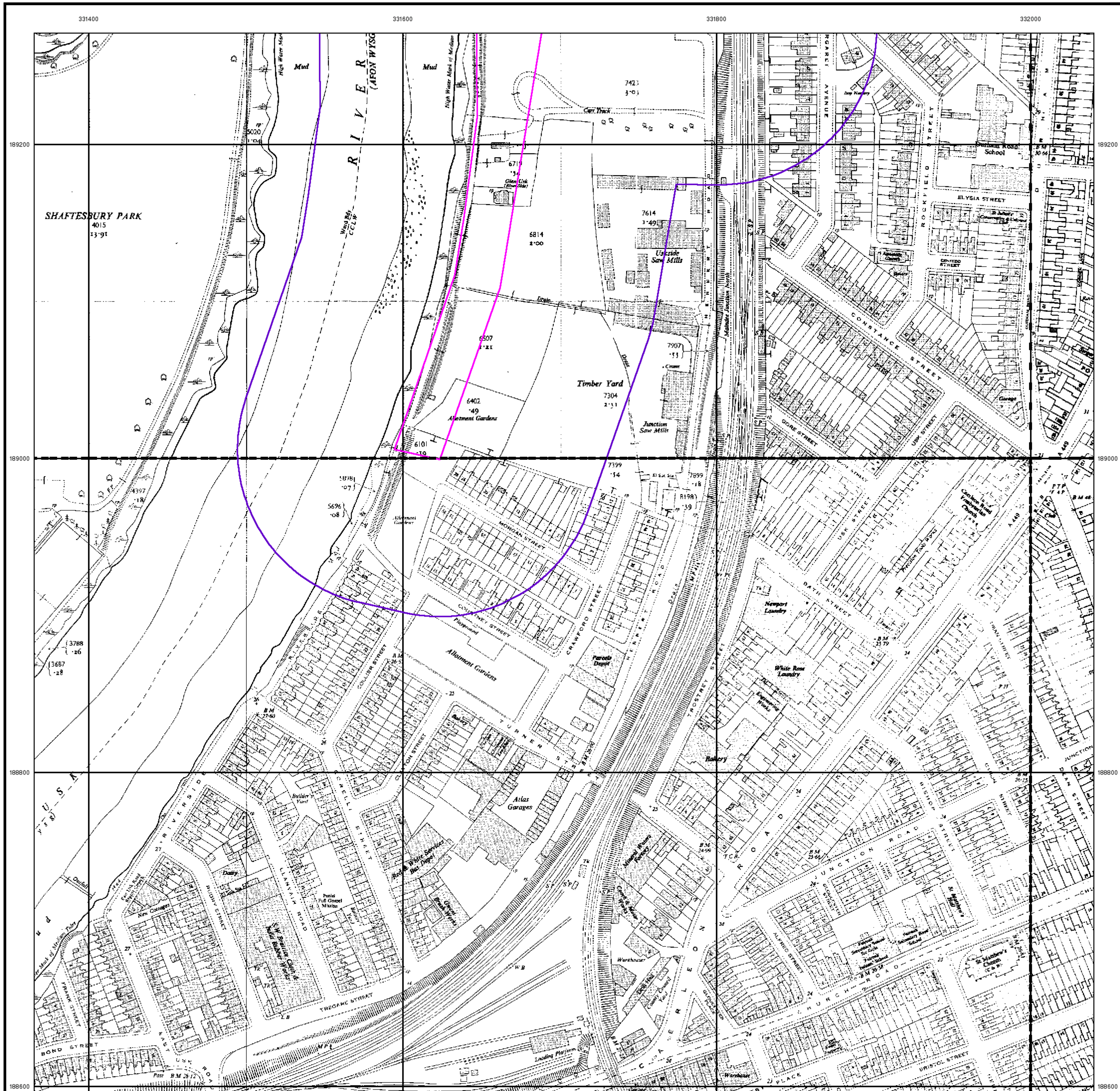

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Ordnance Survey Plan

Published 1955 - 1957

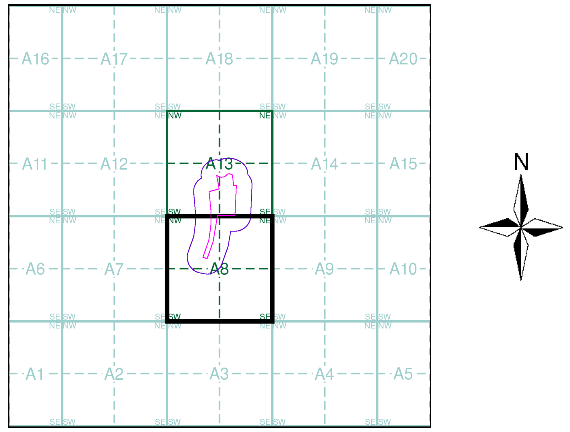
Source map scale - 1:2,500

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)

ST3189 1955 1:2,500	ST3289 1957 1:2,500
ST3188 1956 1:2,500	ST3288 1956 1:2,500

Historical Map - Segment A8



Order Details

Order Number: 41914630_1_1
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Site Details

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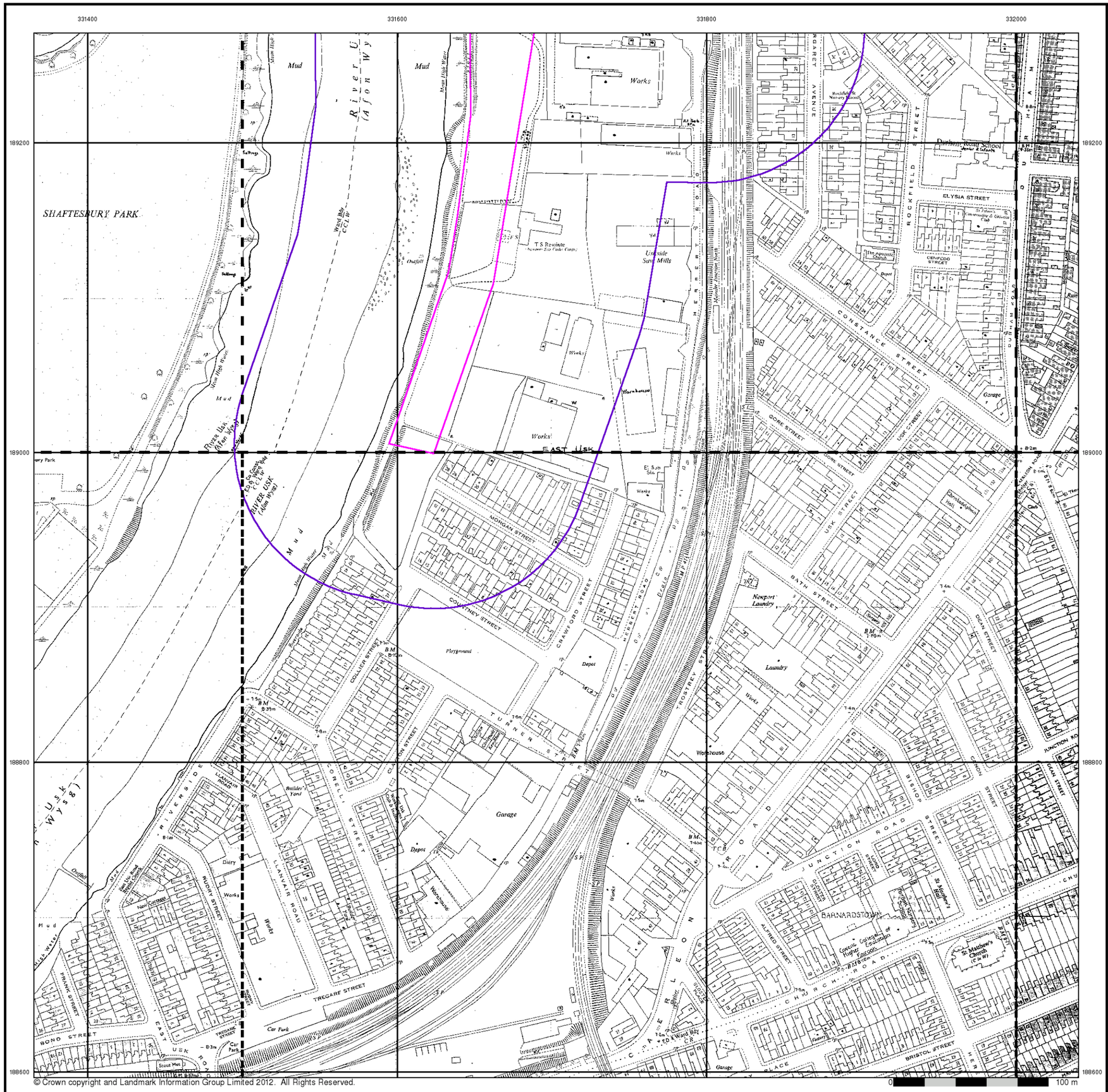

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Additional SIMs

Published 1957 - 1992

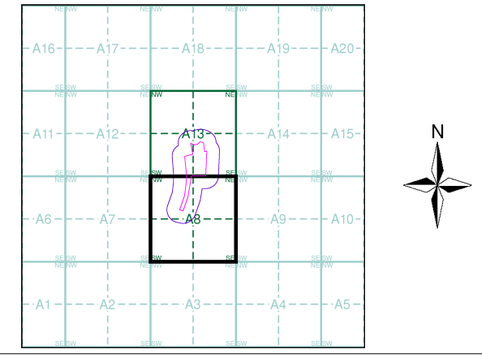
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

ST3189SW 1982 1:1,250	ST3189SE 1978 1:1,250	ST3289SW 1957 1:1,250
ST3188NW 1982 1:1,250	ST3188NE 1992 1:1,250	ST3288NW 1990 1:1,250

Historical Map - Segment A8



Order Details

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Site Details

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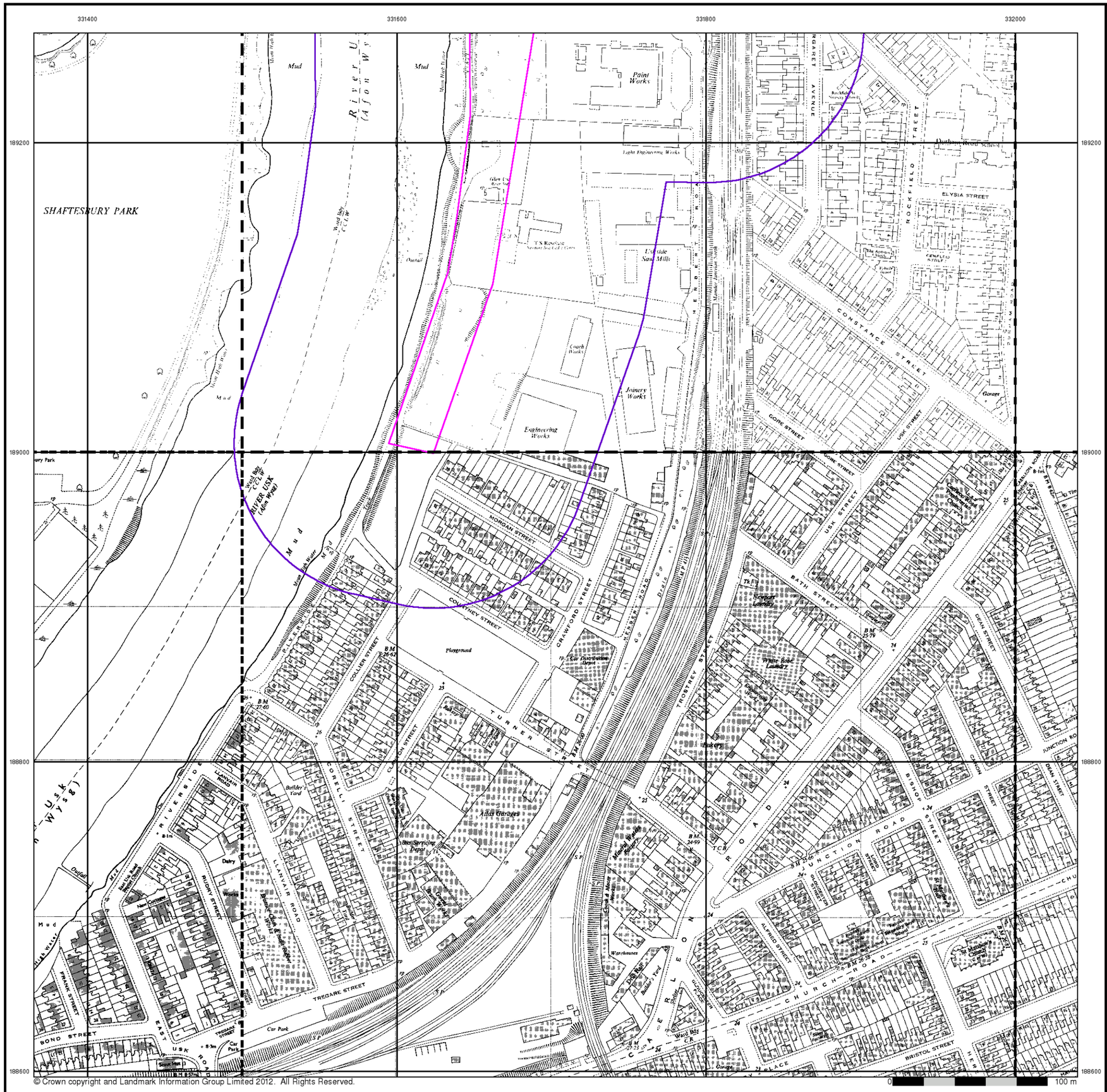

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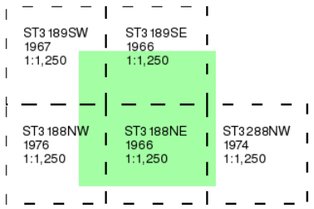
Ordnance Survey Plan

Published 1966 - 1976

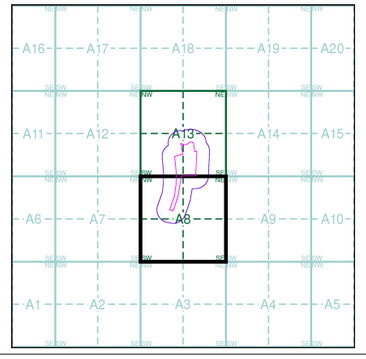
Source map scale - 1:1,250

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

Map Name(s) and Date(s)



Historical Map - Segment A8



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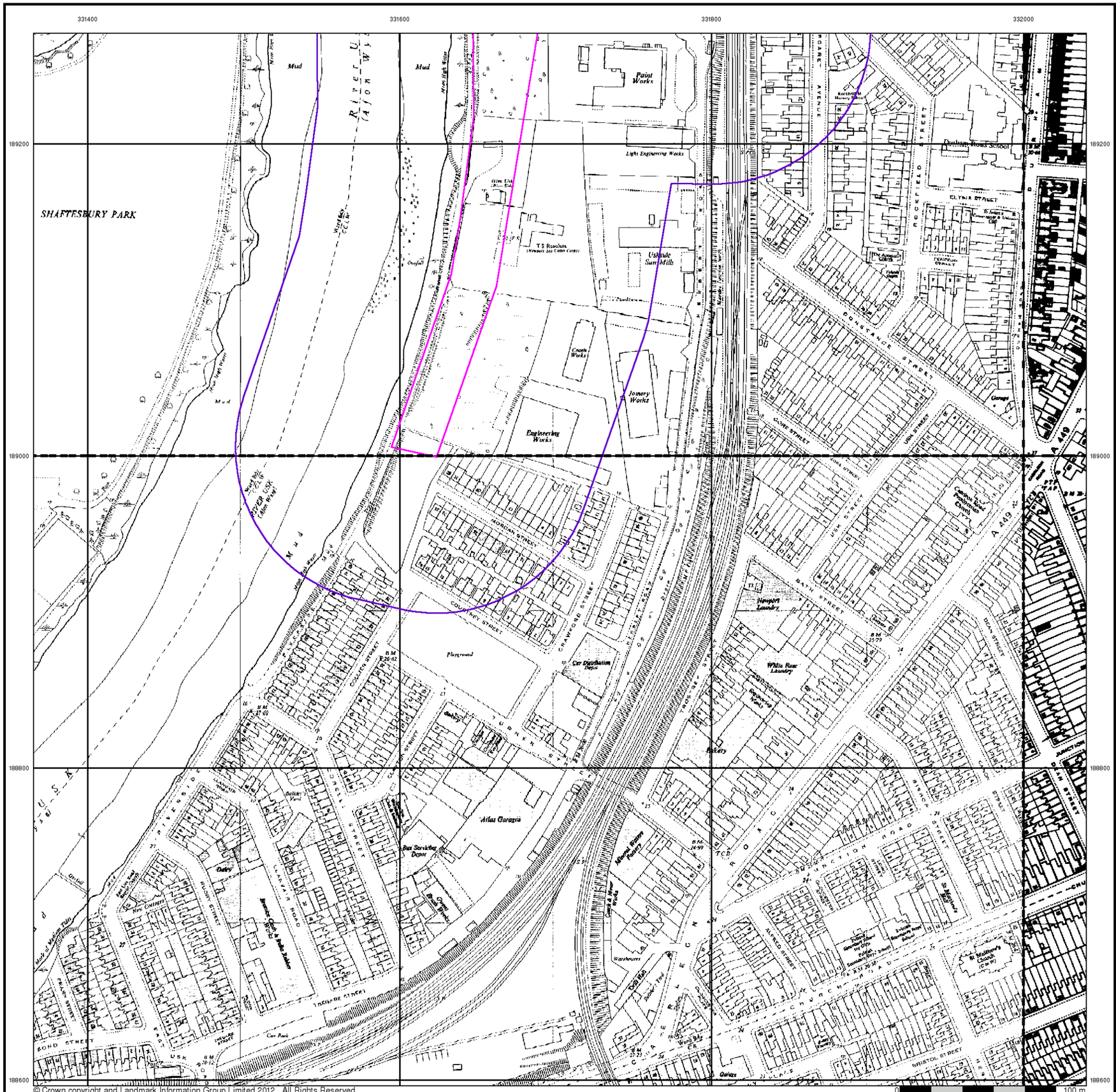

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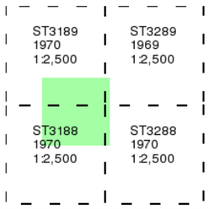
Ordnance Survey Plan

Published 1969 - 1970

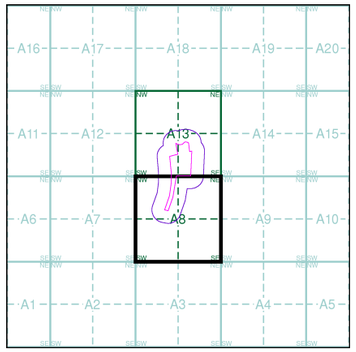
Source map scale - 1:2,500

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 A8



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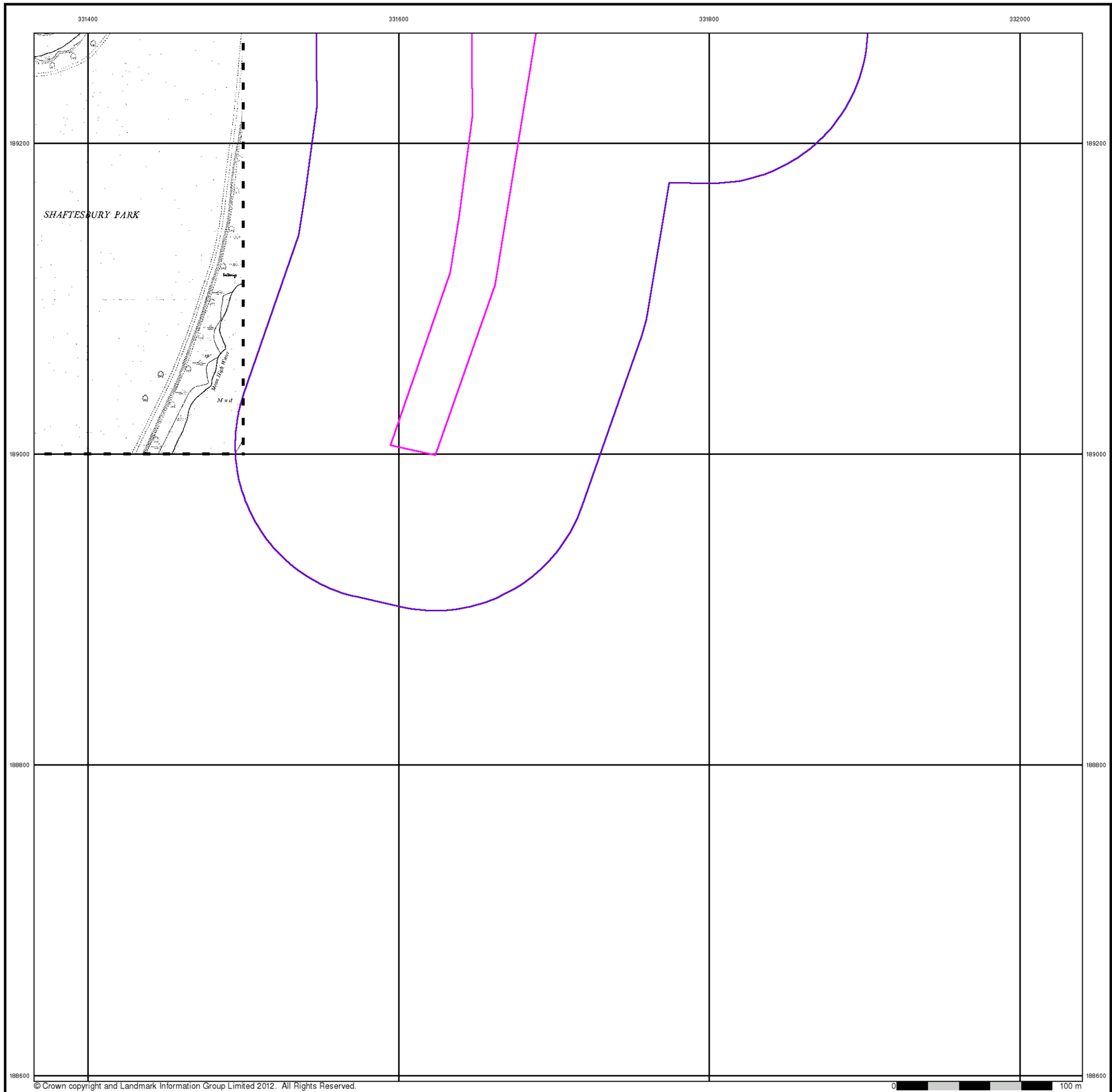

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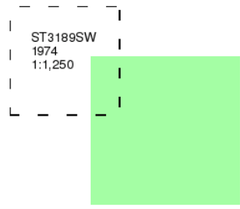
Supply of Unpublished Survey Information

Published 1974

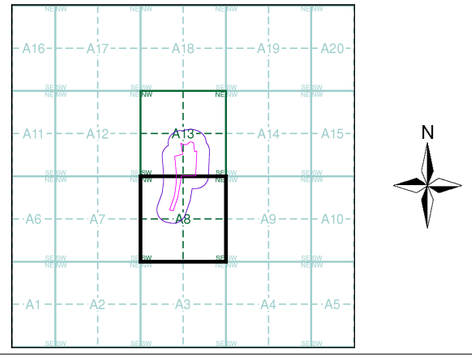
Source map scale - 1:1,250

SUSI maps (Supply of Unpublished Survey Information) were produced between 1972 and 1977, mainly for internal use at Ordnance Survey. These were more of a `work-in-progress' plan as they showed updates of individual areas on a map. These maps were unpublished, and they do not represent a single moment in time. They were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A8



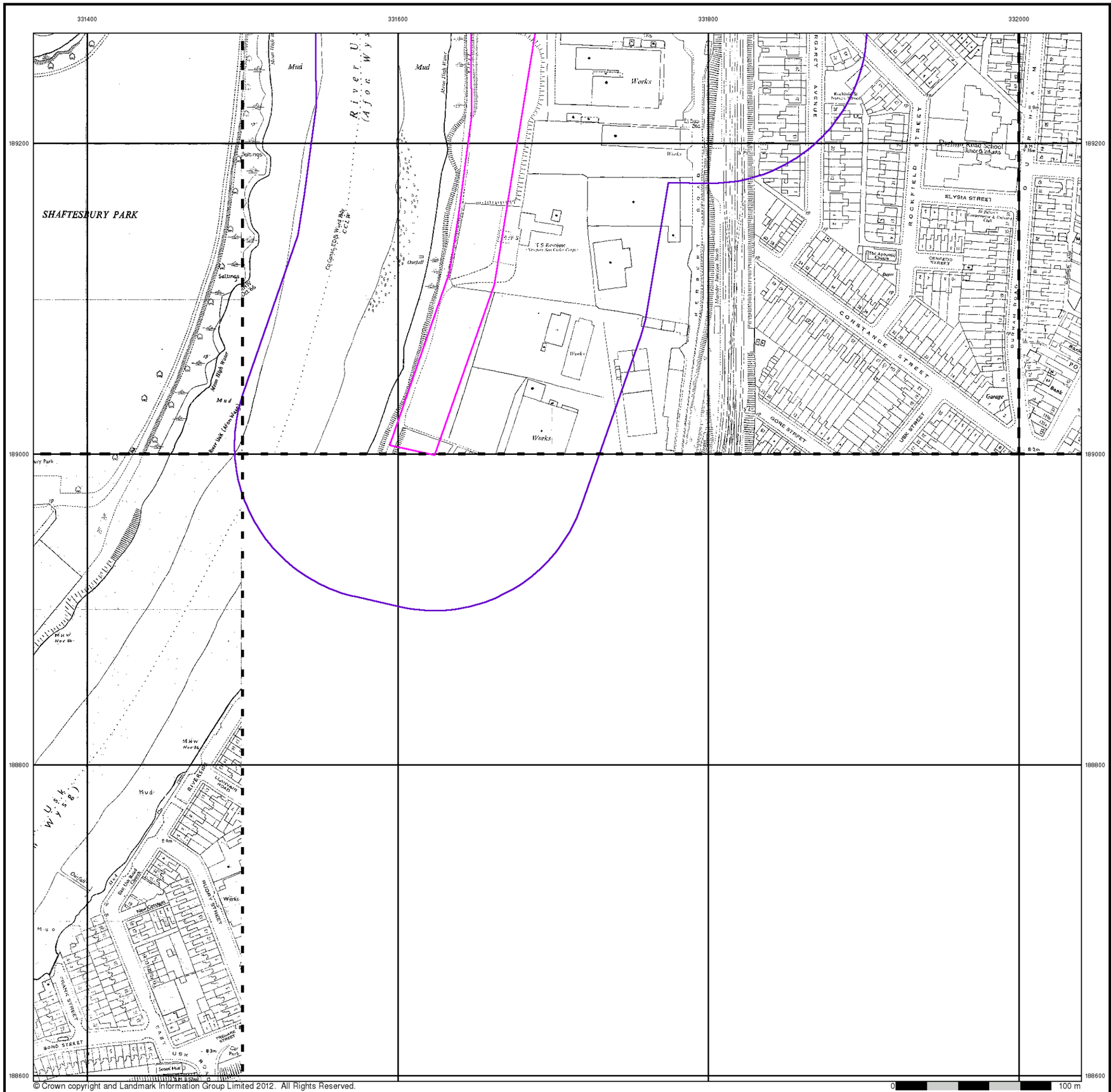
Order Details

Order Number:	41914630_1_1
Customer Ref:	12044
National Grid Reference:	331690, 189280
Slice:	A
Site Area (Ha):	4.52
Search Buffer (m):	100

Site Details

., Herbert Road, NEWPORT, Gwent, NP19 7BH

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



terrafirma

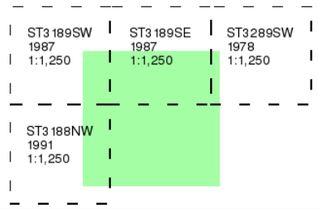
Additional SIMs

Published 1978 - 1991

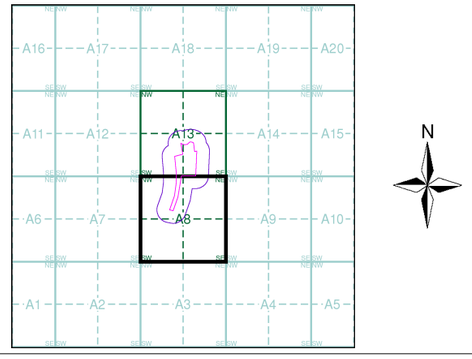
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A8



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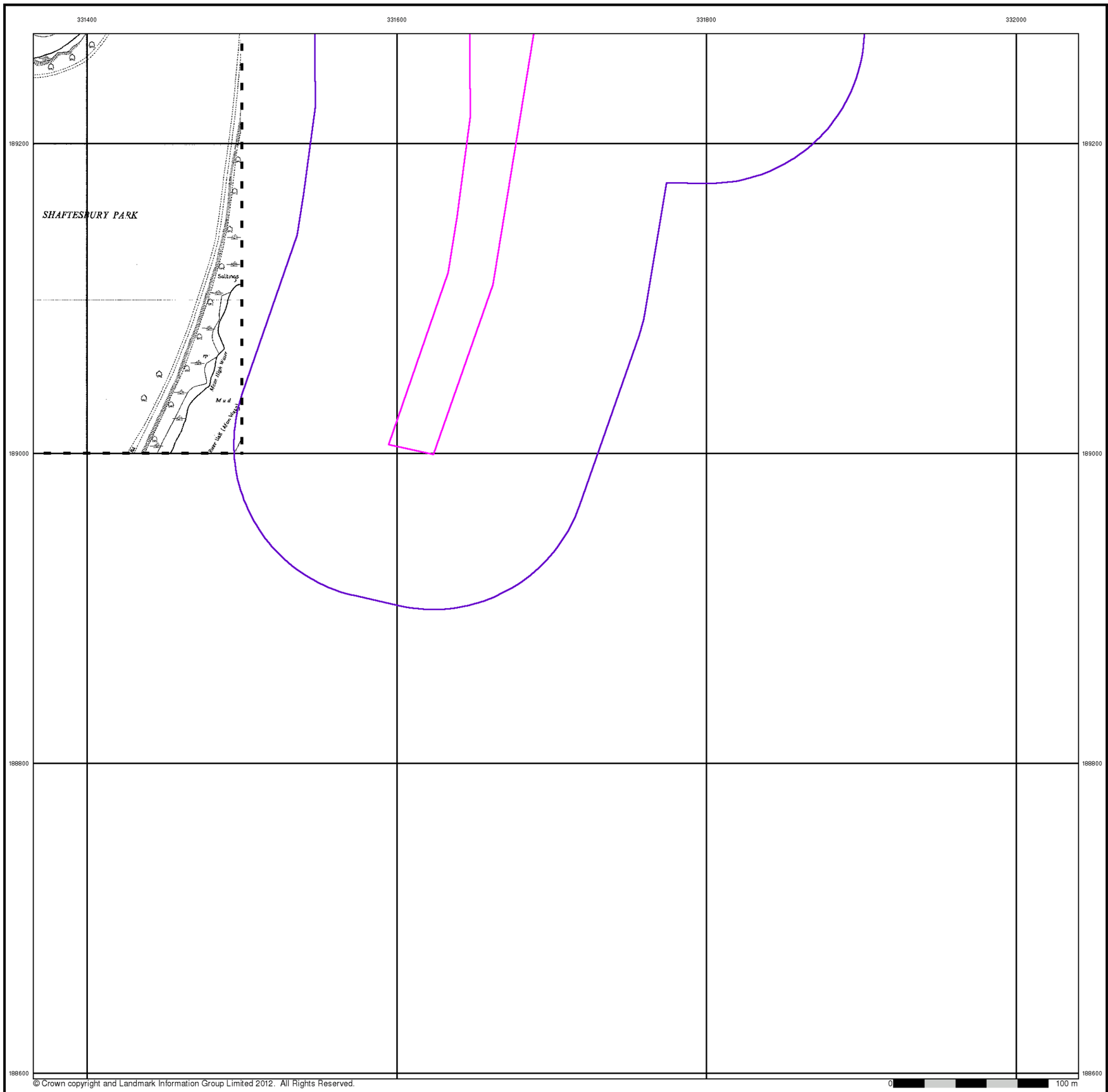


terrafirma

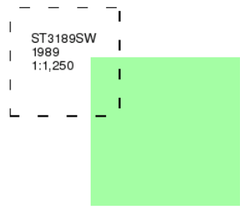
Additional SIMs

Published 1989

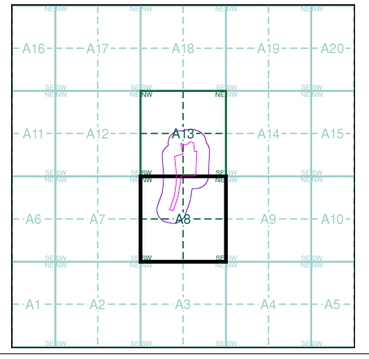
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A8



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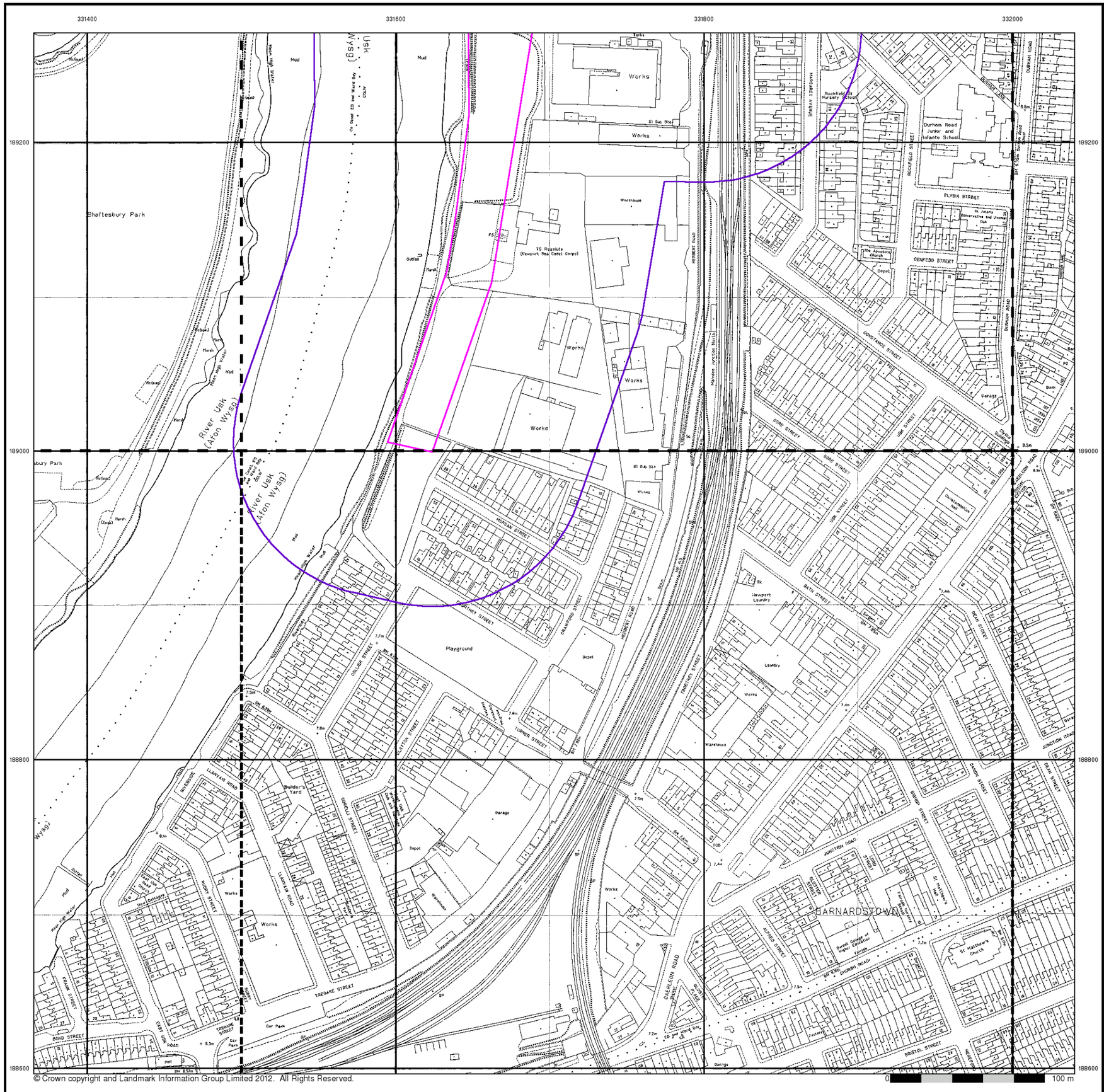

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Large-Scale National Grid Data

Published 1993

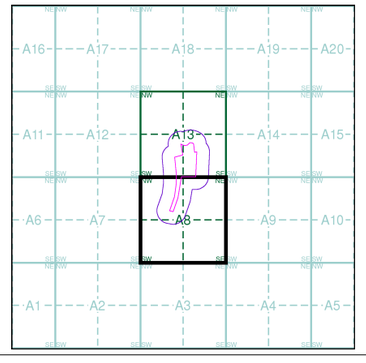
Source map scale - 1:1,250

'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)

ST3 189SW 1993 1:1,250	ST3 189SE 1993 1:1,250	ST3 289SW 1993 1:1,250
ST3 188NW 1993 1:1,250	ST3 188NE 1993 1:1,250	ST3 288NW 1993 1:1,250

Historical Map - Segment A8



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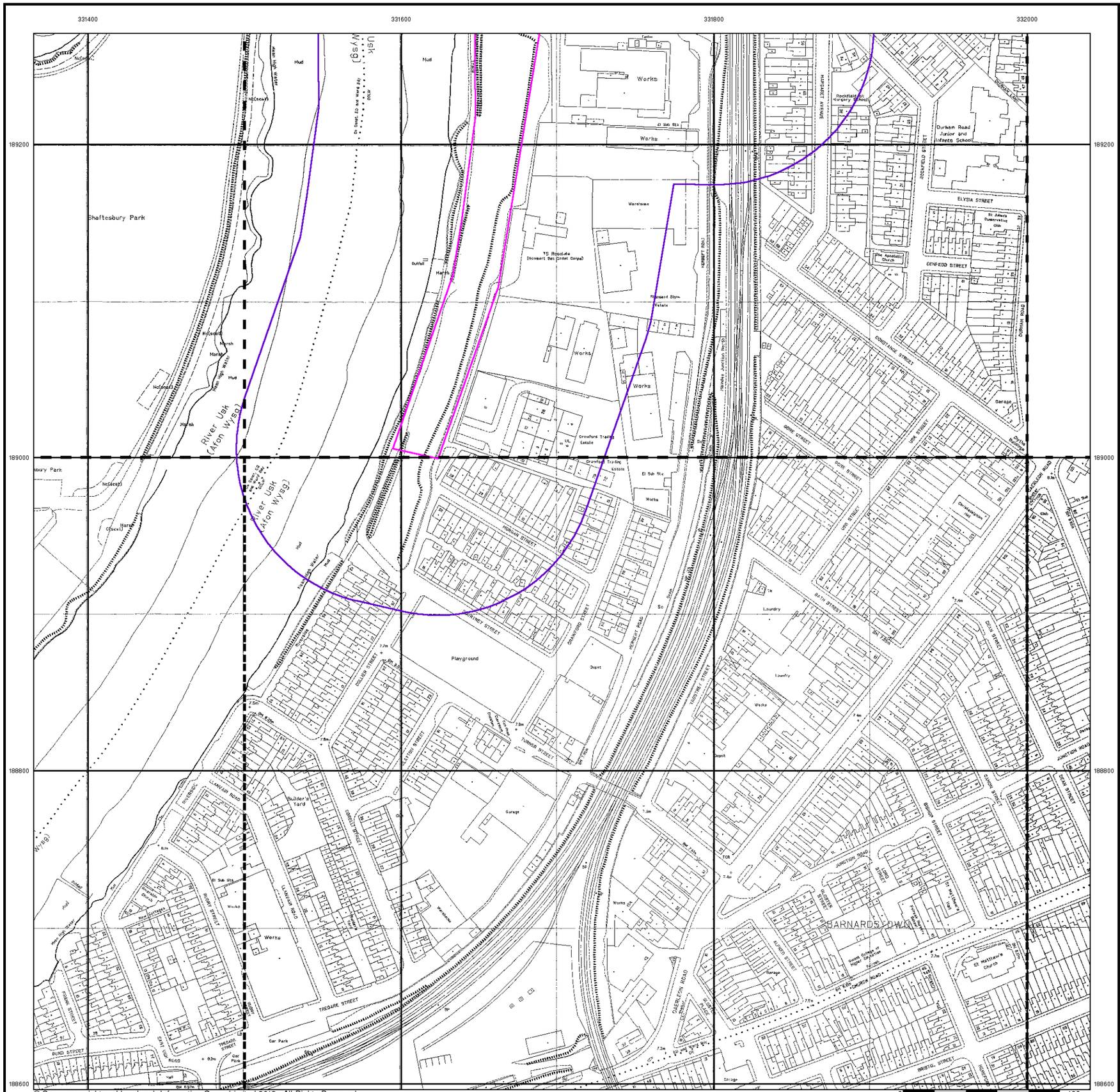


terrafirma

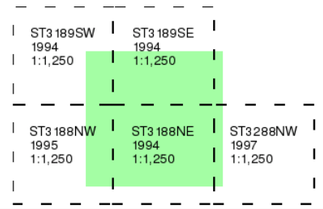
Large-Scale National Grid Data

Published 1994 - 1997

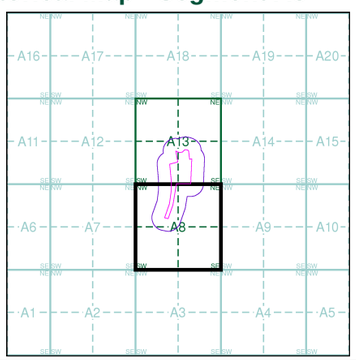
Source map scale - 1:1,250

'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 A8



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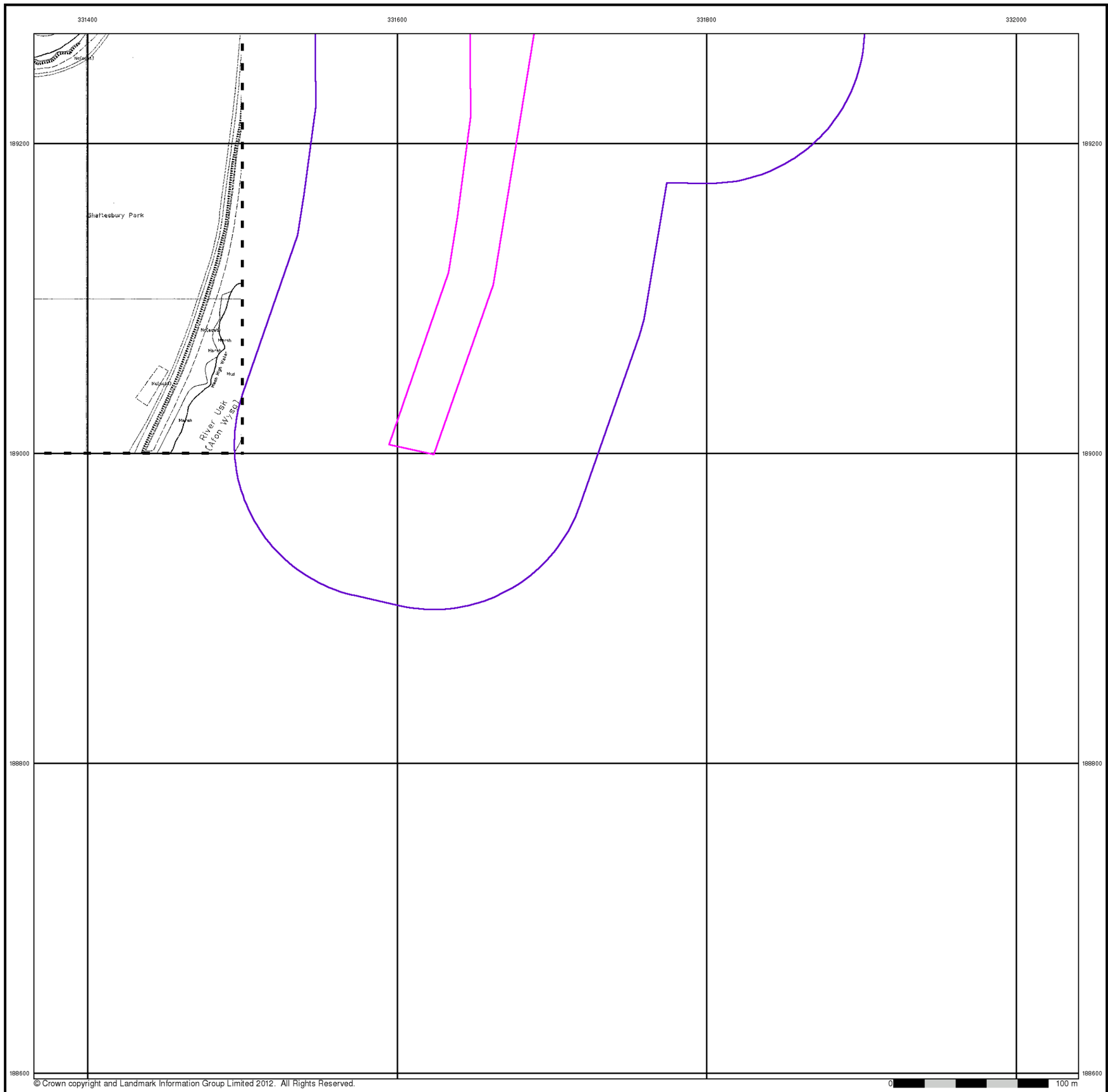


terrafirma

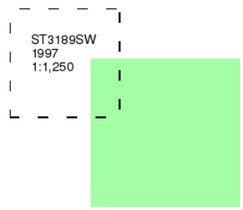
Large-Scale National Grid Data

Published 1997

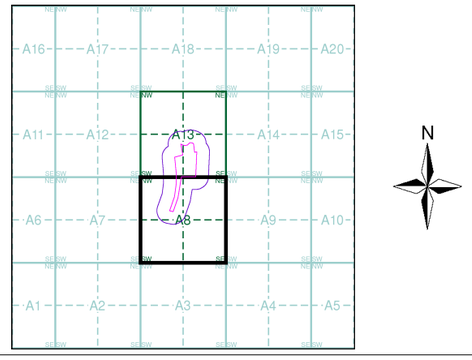
Source map scale - 1:1,250

'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 A8



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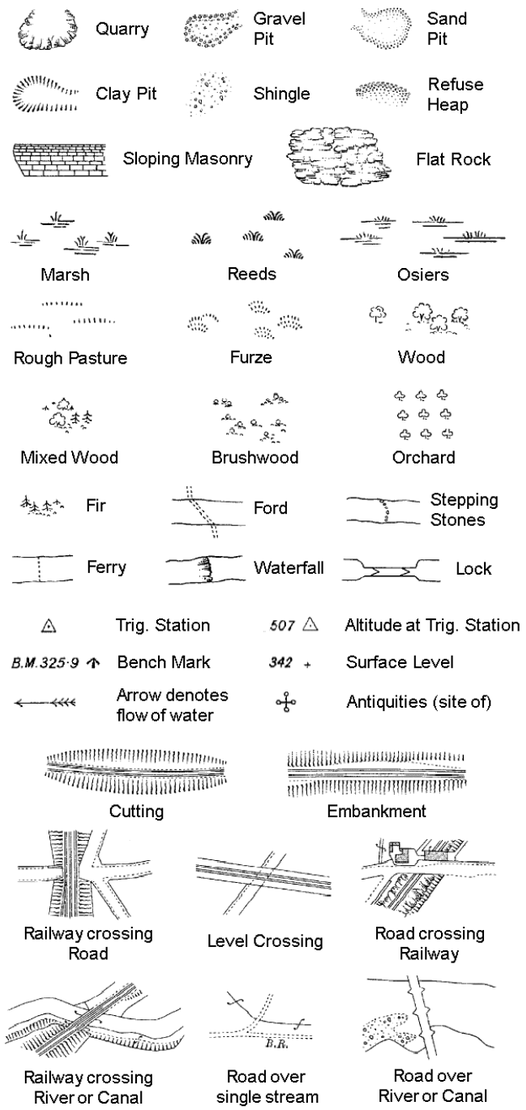
Historical Mapping Legends

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



County Boundary (Geographical)

County & Civil Parish Boundary

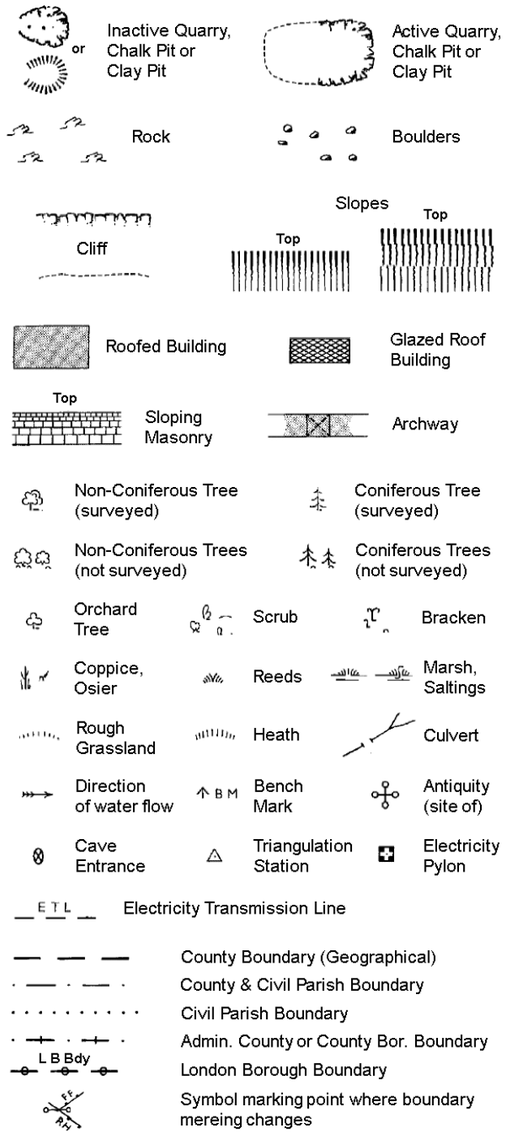
Administrative County & Civil Parish Boundary

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

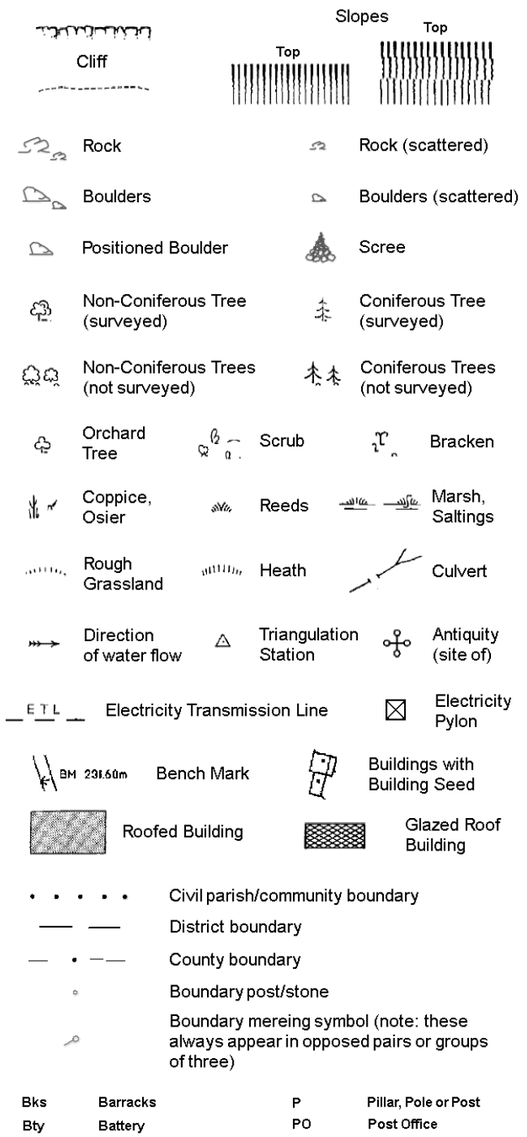
Admin. County or County Bor. Boundary

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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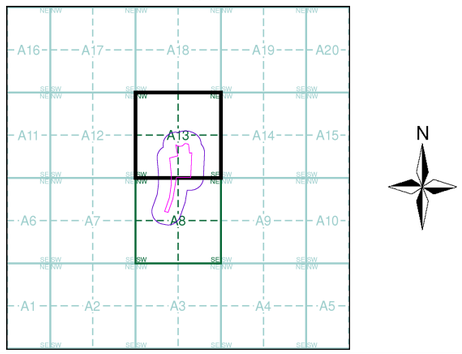
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Monmouthshire	1:2,500	1883	2
Monmouthshire	1:2,500	1901 - 1902	3
Monmouthshire	1:2,500	1920	4
Monmouthshire	1:2,500	1936 - 1937	5
Ordnance Survey Plan	1:2,500	1955 - 1957	6
Ordnance Survey Plan	1:1,250	1955 - 1957	7
Additional SIMs	1:1,250	1957 - 1989	8
Ordnance Survey Plan	1:1,250	1966 - 1968	9
Ordnance Survey Plan	1:2,500	1969 - 1970	10
Supply of Unpublished Survey Information	1:1,250	1974	11
Ordnance Survey Plan	1:1,250	1977	12
Additional SIMs	1:1,250	1978 - 1989	13
Additional SIMs	1:1,250	1989	14
Large-Scale National Grid Data	1:1,250	1993	15
Large-Scale National Grid Data	1:1,250	1994 - 1995	16
Large-Scale National Grid Data	1:1,250	1995 - 1997	17
Large-Scale National Grid Data	1:1,250	1995	18

Historical Map - Segment A13



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Site Details

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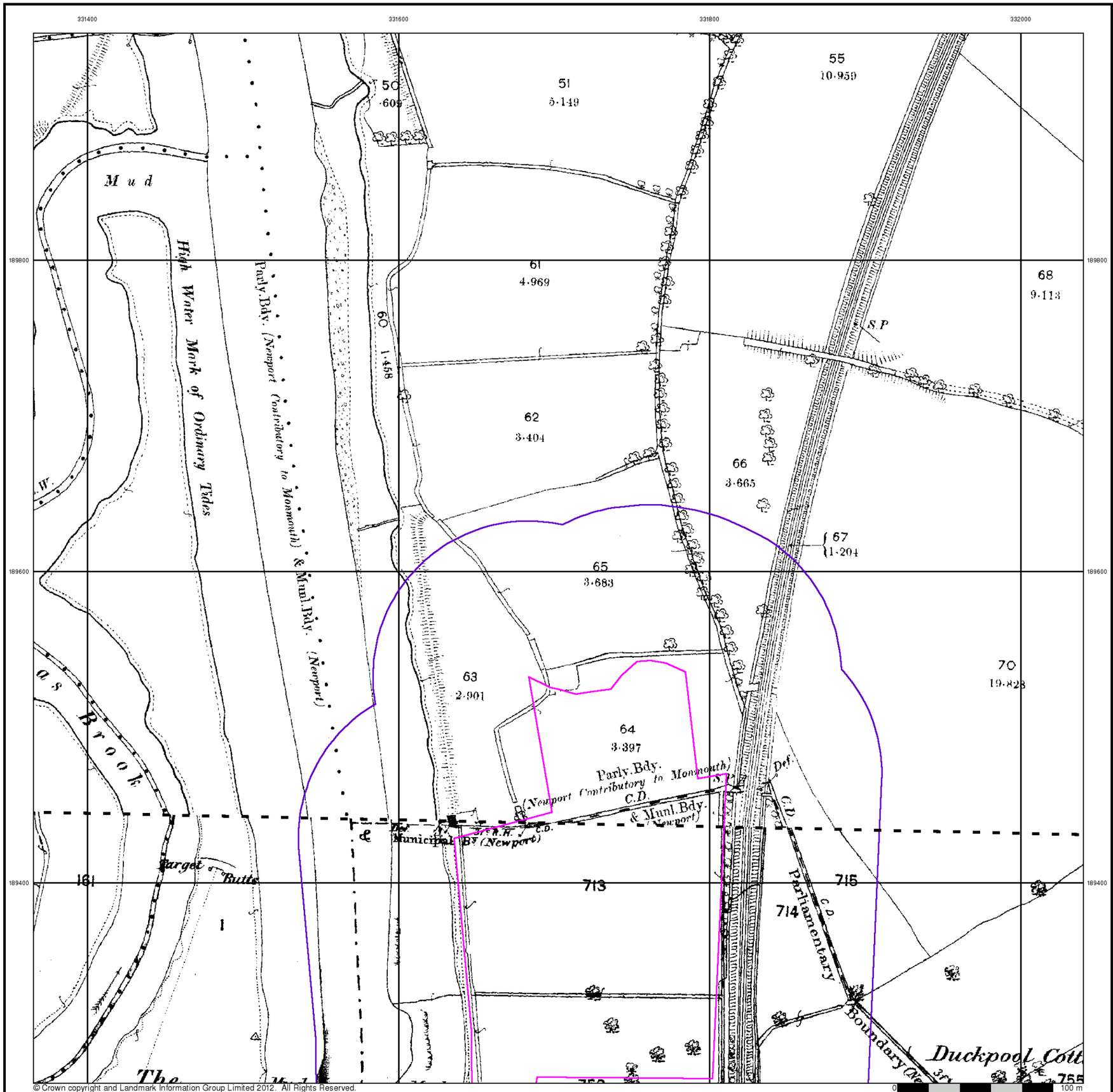

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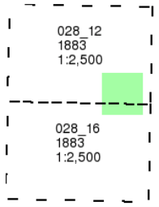
Monmouthshire

Published 1883

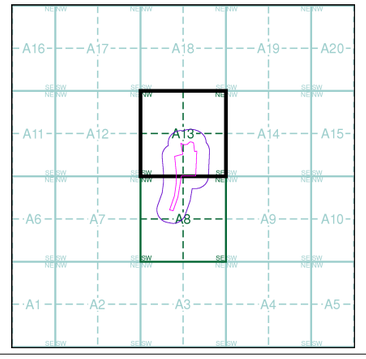
Source map scale - 1:2,500

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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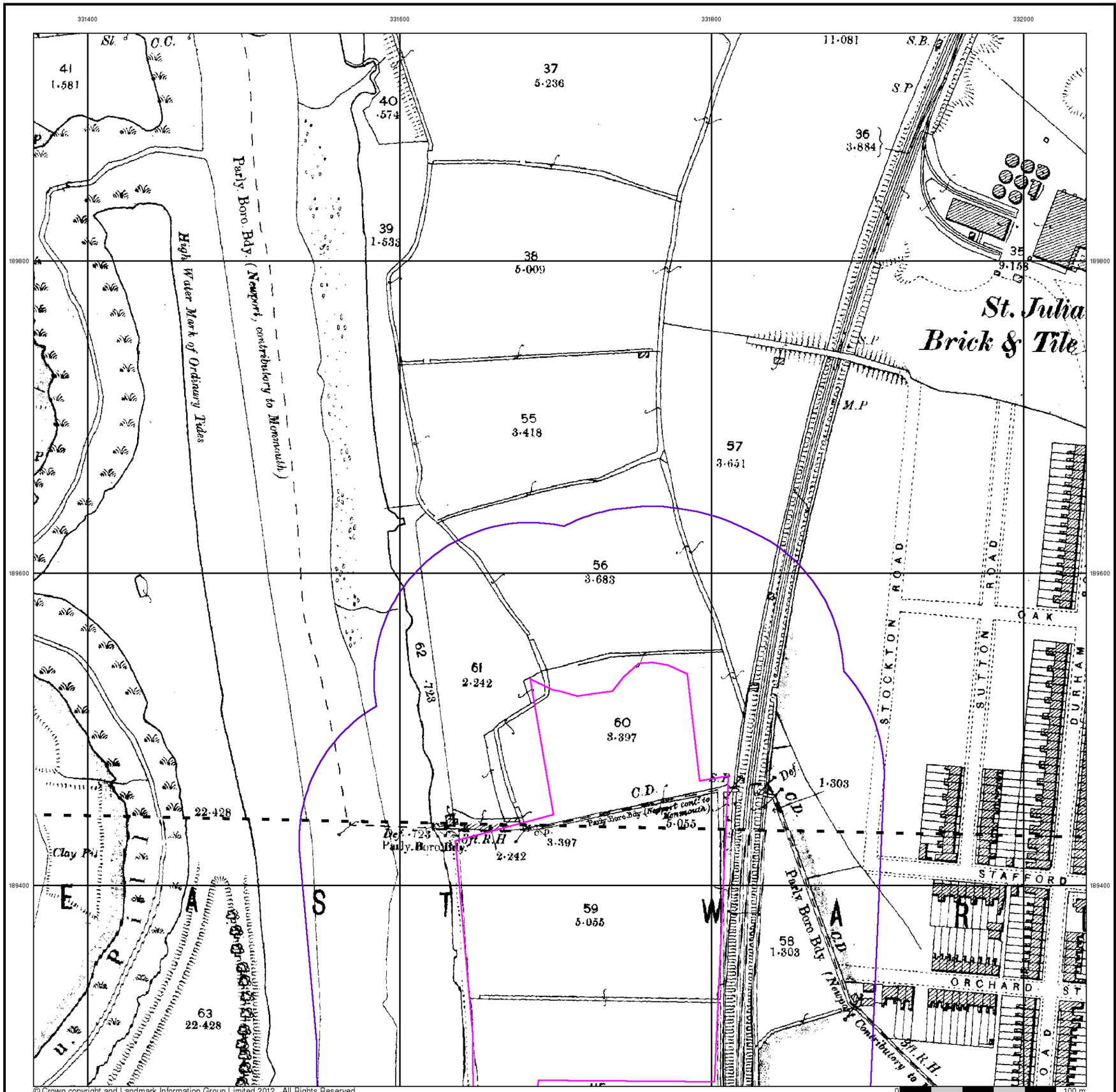

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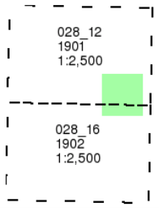
Monmouthshire

Published 1901 - 1902

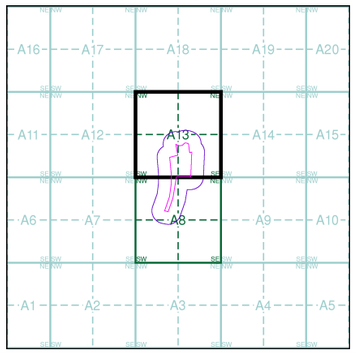
Source map scale - 1:2,500

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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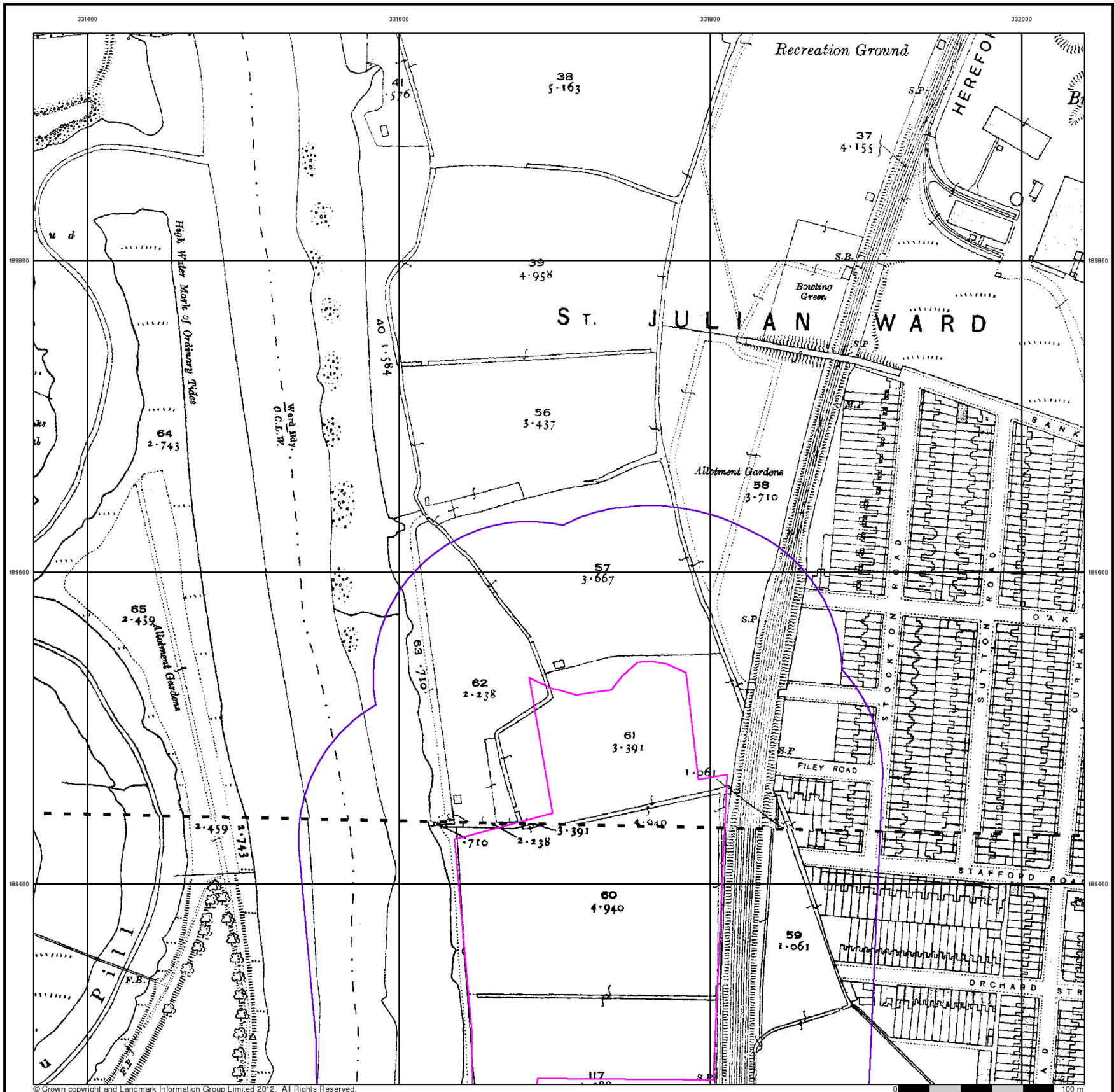

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Monmouthshire

Published 1920

Source map scale - 1:2,500

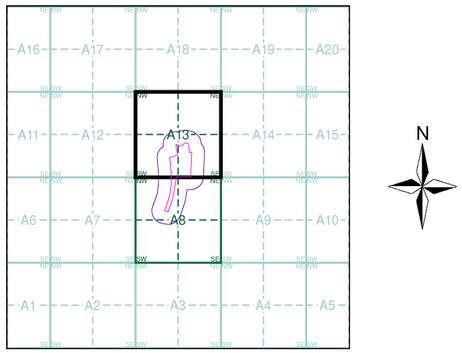
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. 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)

028_12
1920
1:2,500

028_16
1920
1:2,500

Historical Map - Segment A13



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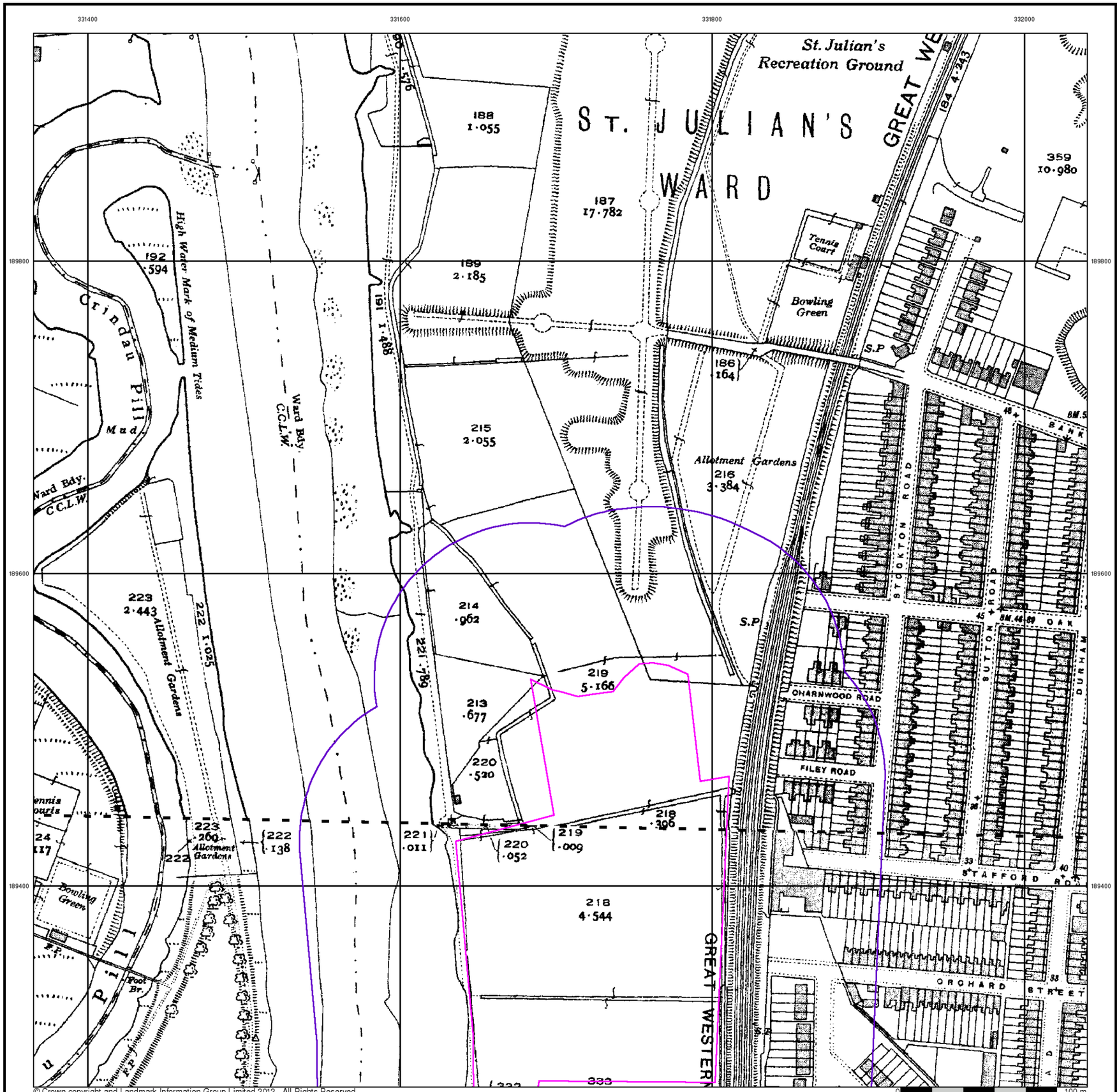

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Monmouthshire

Published 1936 - 1937

Source map scale - 1:2,500

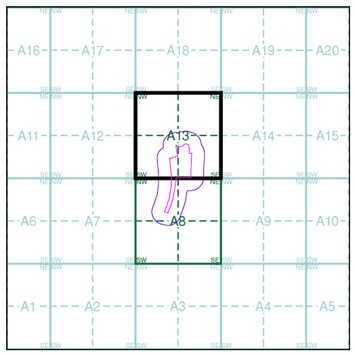
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain.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

Map Name(s) and Date(s)

028_12
1936
1:2,500

028_16
1937
1:2,500

Historical Map - Segment A13



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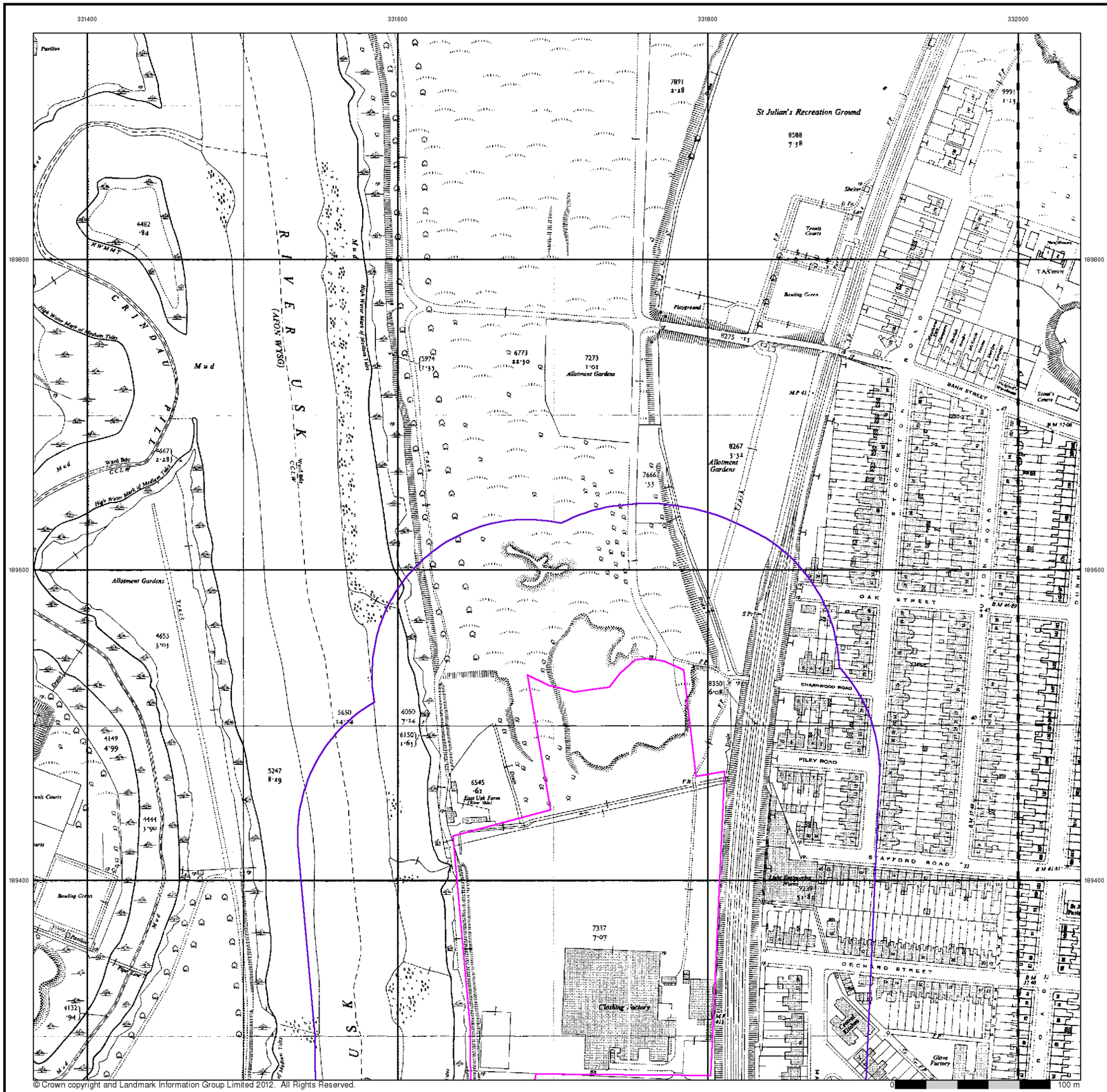

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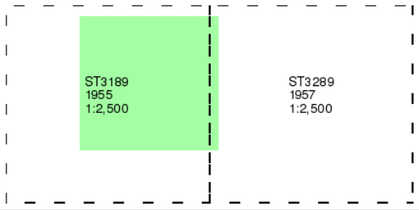
Ordnance Survey Plan

Published 1955 - 1957

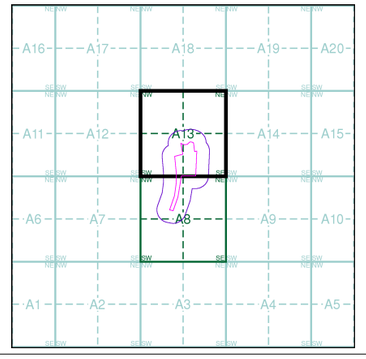
Source map scale - 1:2,500

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:	41914630_1_1
Customer Ref:	12044
National Grid Reference:	331690, 189280
Slice:	A
Site Area (Ha):	4.52
Search Buffer (m):	100

Site Details

., Herbert Road, NEWPORT, Gwent, NP19 7BH

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

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Ordnance Survey Plan

Published 1955 - 1957

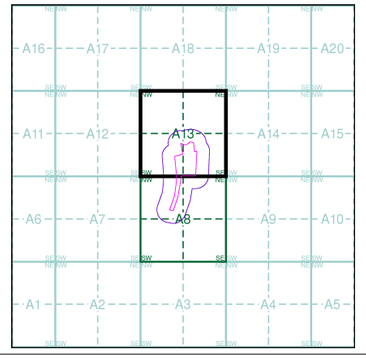
Source map scale - 1:1,250

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

Map Name(s) and Date(s)

ST3189NW 1955 1:1,250	ST3189NE 1955 1:1,250	ST3289NW 1957 1:1,250
ST3189SW 1955 1:1,250	ST3189SE 1955 1:1,250	ST3289SW 1957 1:1,250

Historical Map - Segment A13



Order Details

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National Grid Reference:	331690, 189280
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Additional SIMs

Published 1957 - 1989

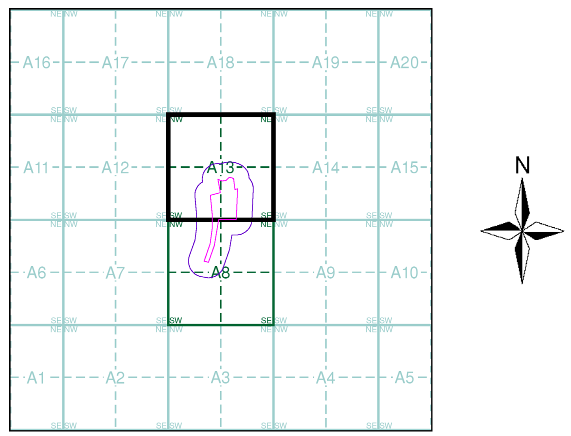
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

ST3189NW 1989 1:1,250	ST3189NE 1986 1:1,250	ST3289NW 1988 1:1,250
ST3189SW 1982 1:1,250	ST3189SE 1978 1:1,250	ST3289SW 1957 1:1,250

Historical Map - Segment A13



Order Details

Order Number: 41914630_1_1
Customer Ref: 12044
National Grid Reference: 331690, 189280
Slice: A
Site Area (Ha): 4.52
Search Buffer (m): 100

Site Details

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Ordnance Survey Plan

Published 1966 - 1968

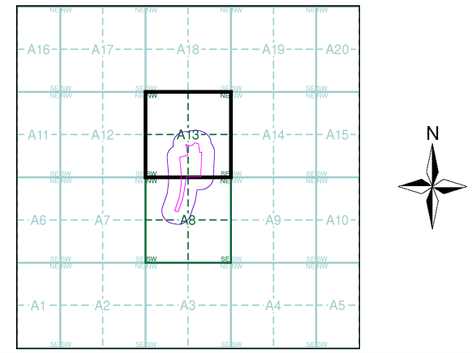
Source map scale - 1:1,250

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

Map Name(s) and Date(s)

	ST3 189NE 1968 1:1,250	ST3 289NW 1968 1:1,250
ST3 189SW 1967 1:1,250	ST3 189SE 1966 1:1,250	

Historical Map - Segment A13



Order Details

Order Number:	41914630_1_1
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National Grid Reference:	331690, 189280
Slice:	A
Site Area (Ha):	4.52
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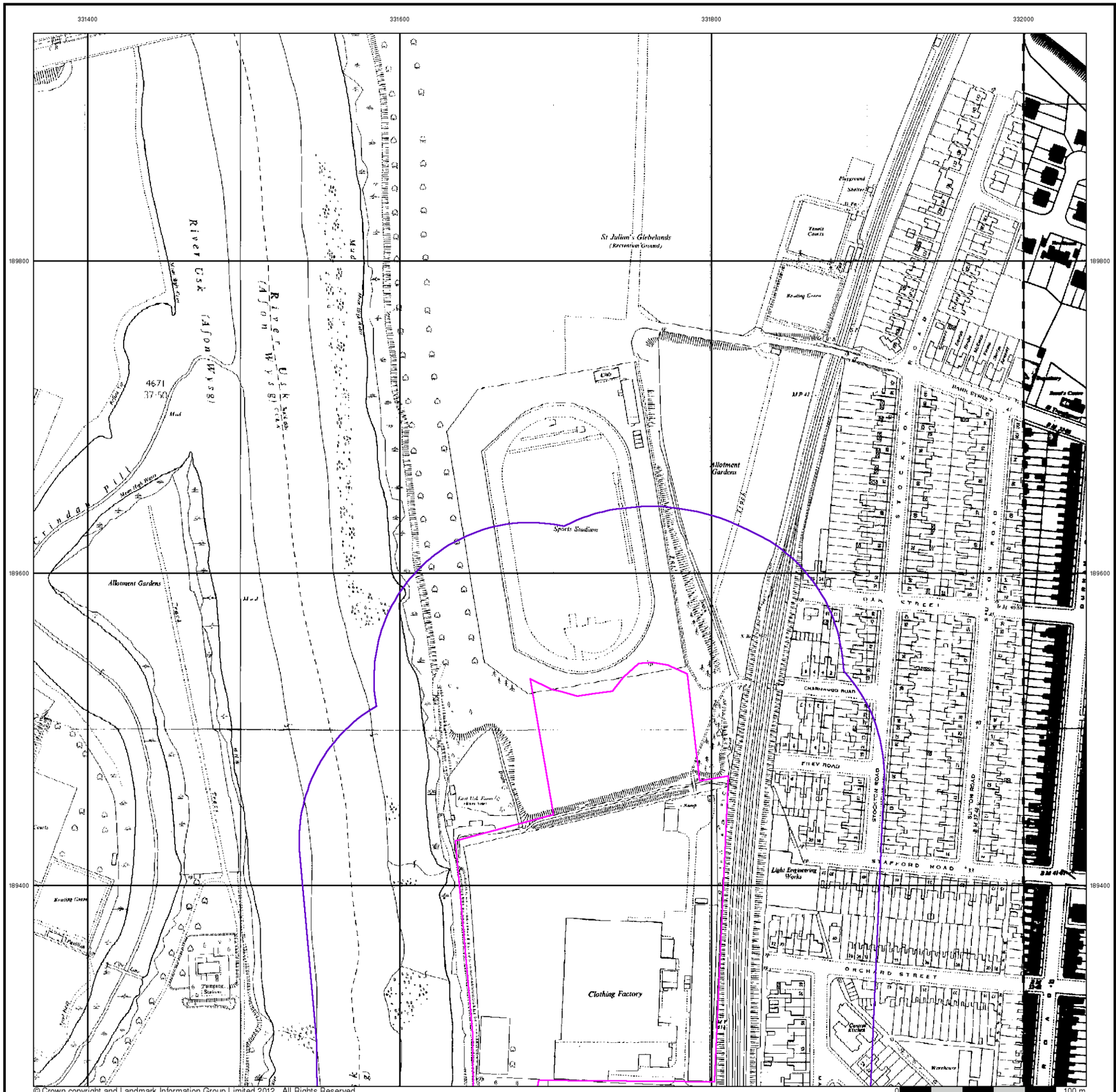

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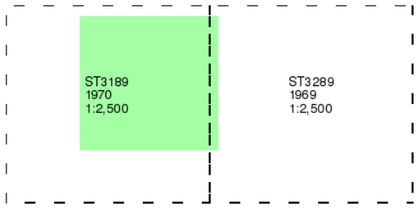
Ordnance Survey Plan

Published 1969 - 1970

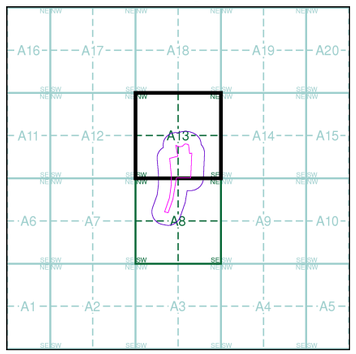
Source map scale - 1:2,500

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:	41914630_1_1
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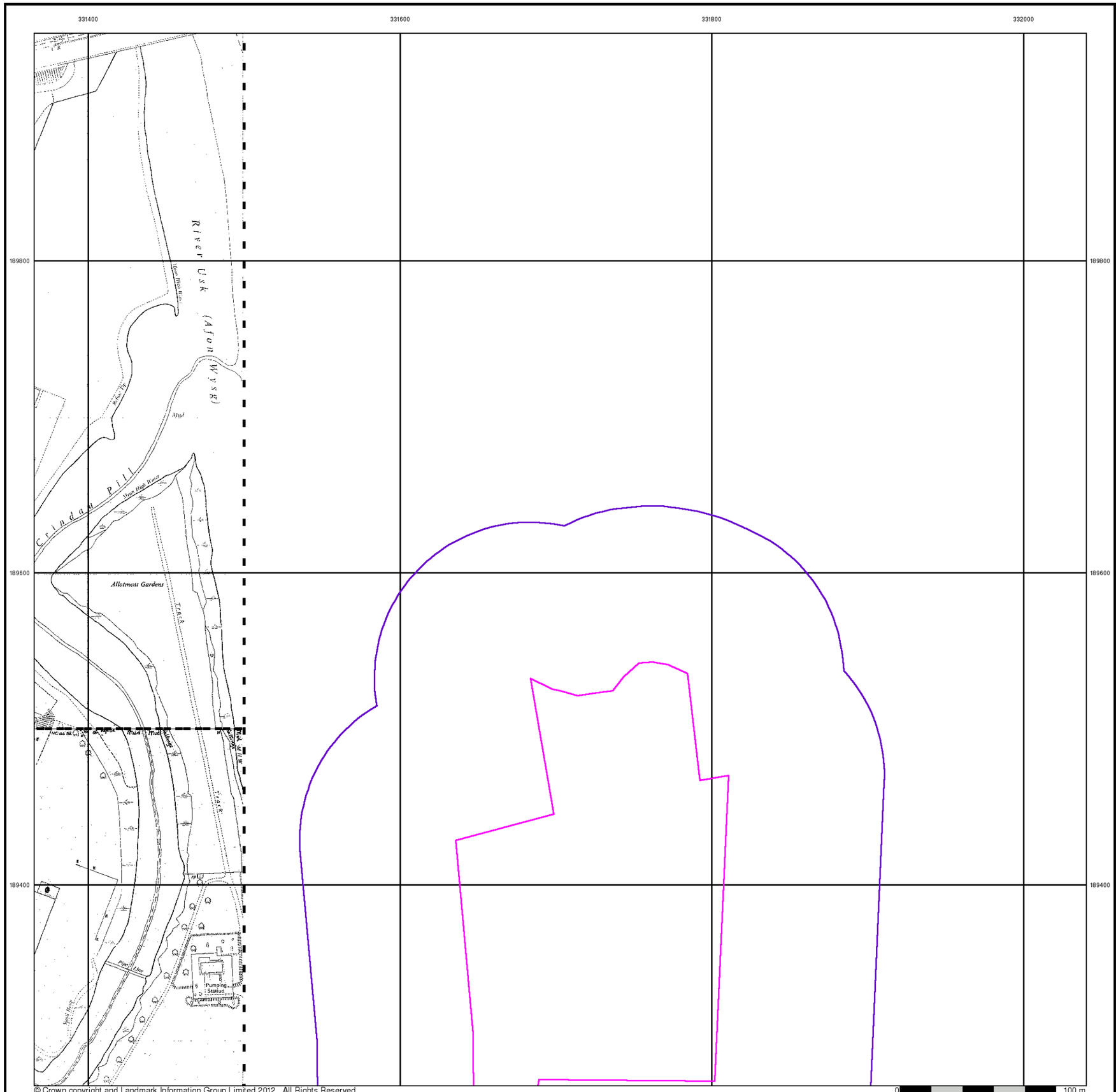

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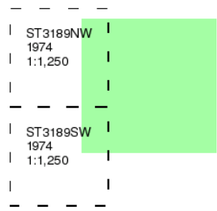
Supply of Unpublished Survey Information

Published 1974

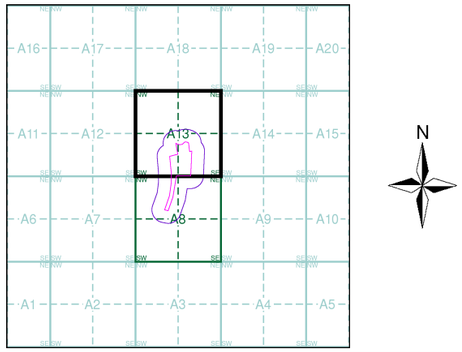
Source map scale - 1:1,250

SUSI maps (Supply of Unpublished Survey Information) were produced between 1972 and 1977, mainly for internal use at Ordnance Survey. These were more of a `work-in-progress' plan as they showed updates of individual areas on a map. These maps were unpublished, and they do not represent a single moment in time. They were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	41914630_1_1
Customer Ref:	12044
National Grid Reference:	331690, 189280
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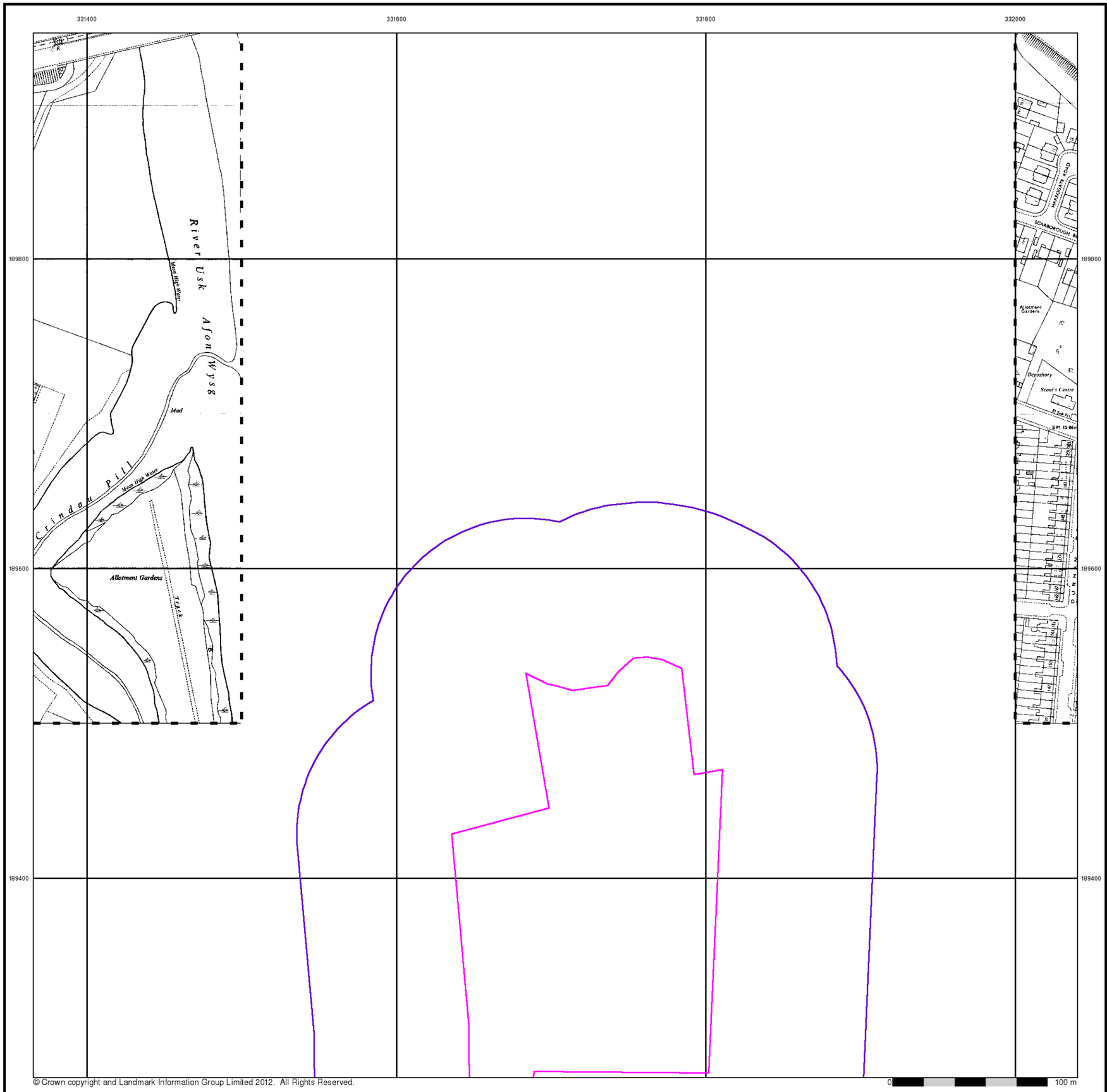

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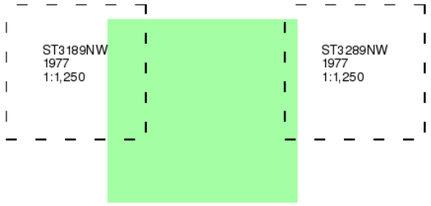
Ordnance Survey Plan

Published 1977

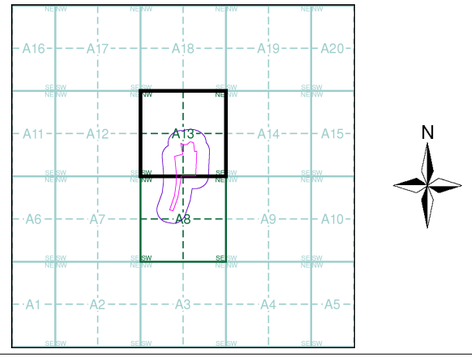
Source map scale - 1:1,250

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

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

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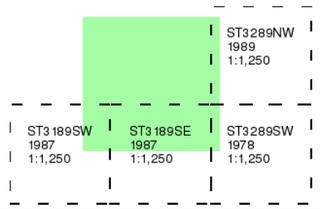
Additional SIMs

Published 1978 - 1989

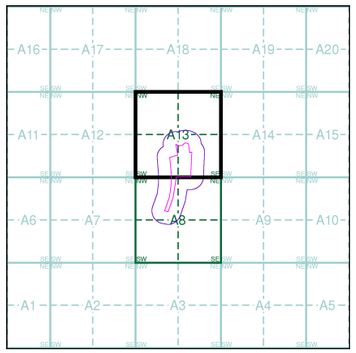
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

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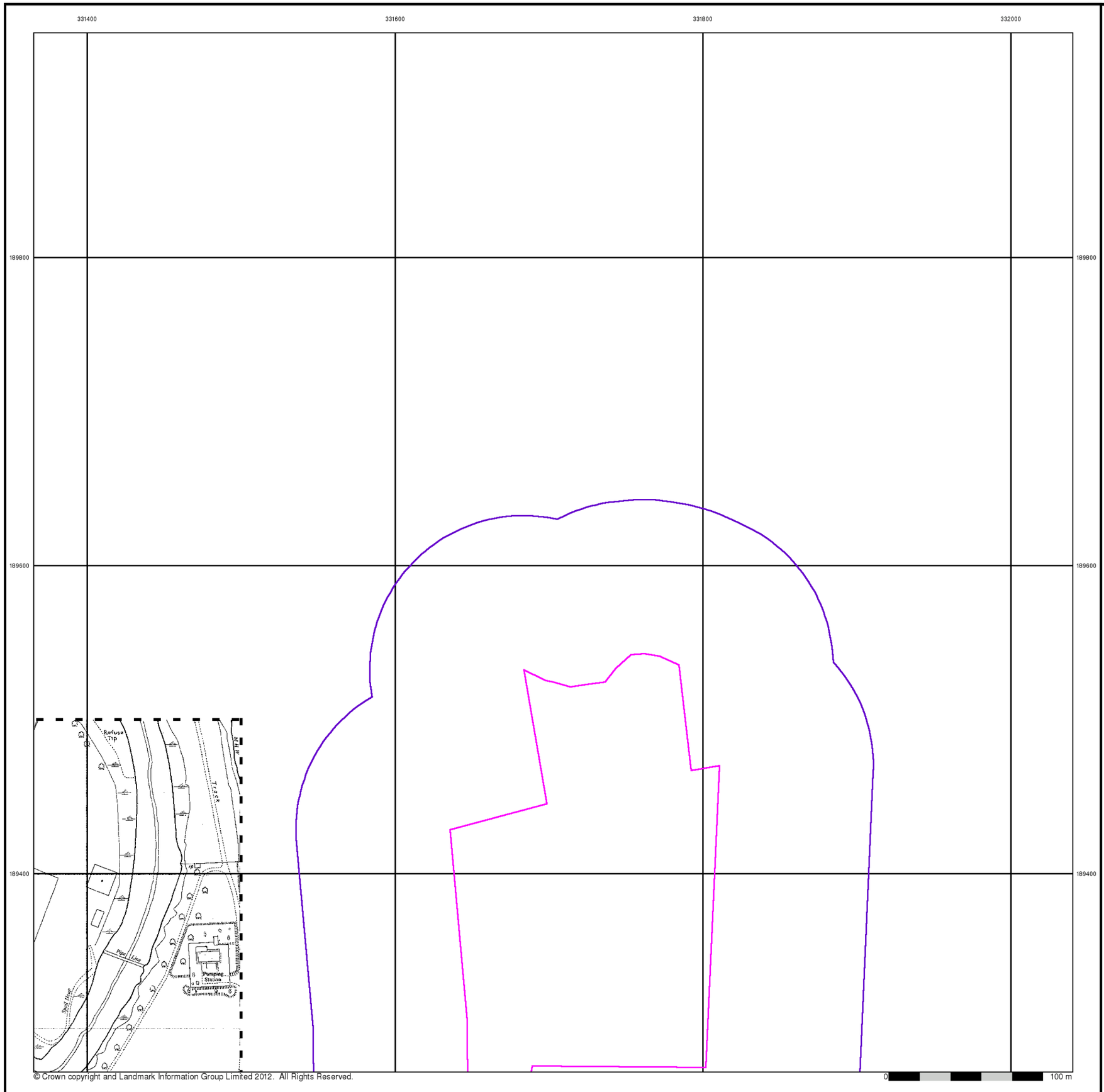


terrafirma

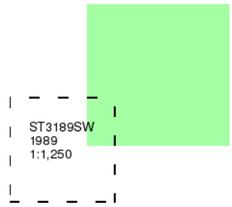
Additional SIMs

Published 1989

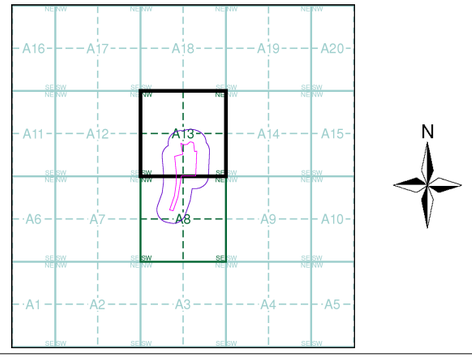
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	41914630_1_1
Customer Ref:	12044
National Grid Reference:	331690, 189280
Slice:	A
Site Area (Ha):	4.52
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Site Details

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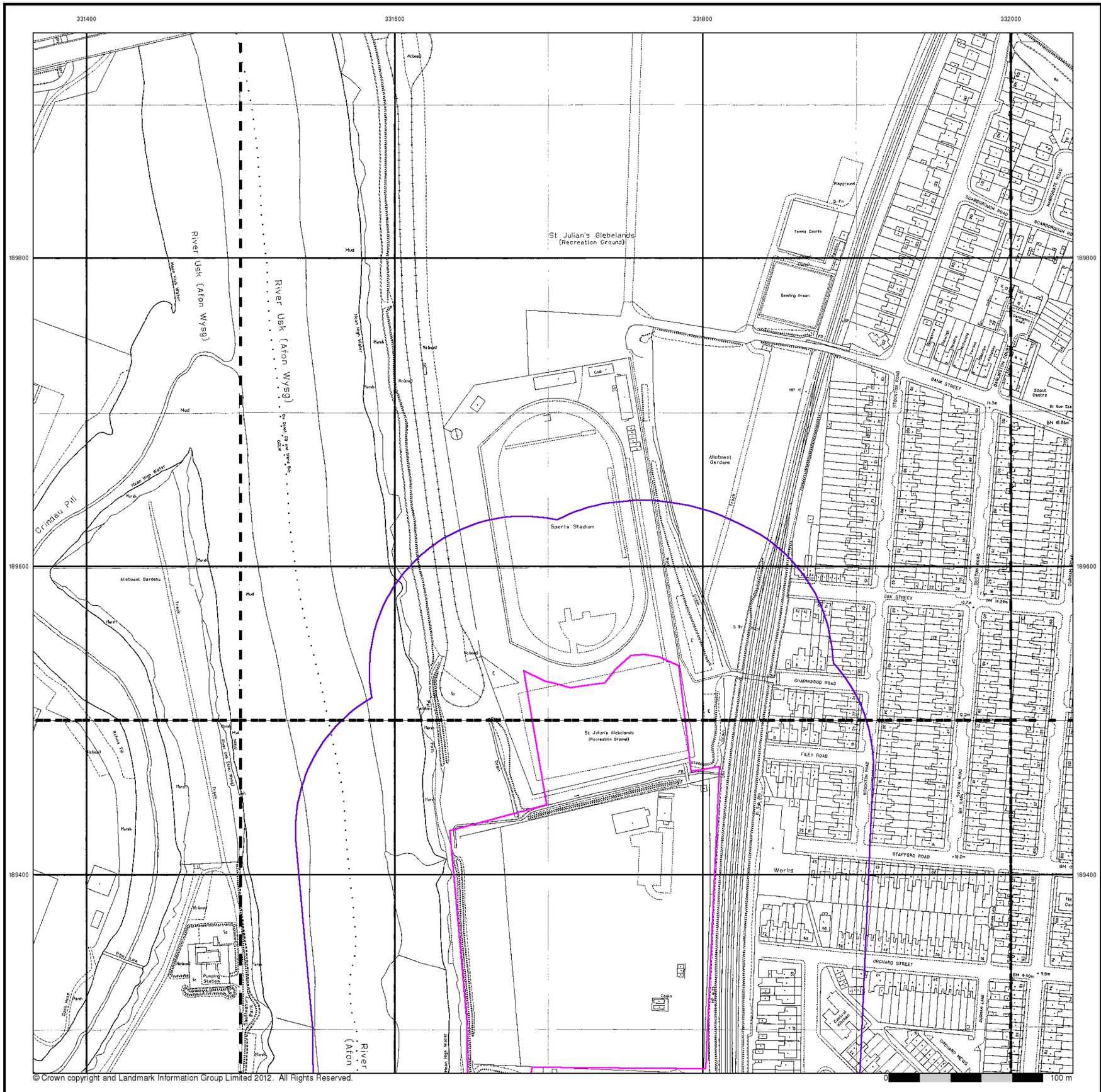

0 100 m

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Large-Scale National Grid Data

Published 1993

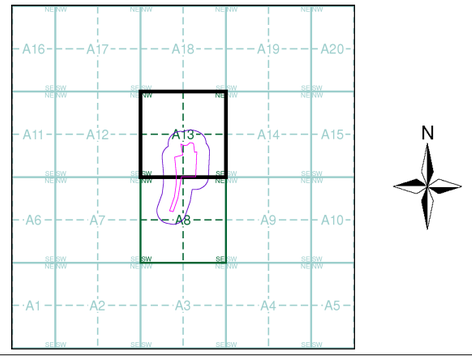
Source map scale - 1:1,250

'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)

ST3189NW 1993 1:1,250	ST3189NE 1993 1:1,250	ST3289NW 1993 1:1,250
ST3189SW 1993 1:1,250	ST3189SE 1993 1:1,250	ST3289SW 1993 1:1,250

Historical Map - Segment A13



Order Details

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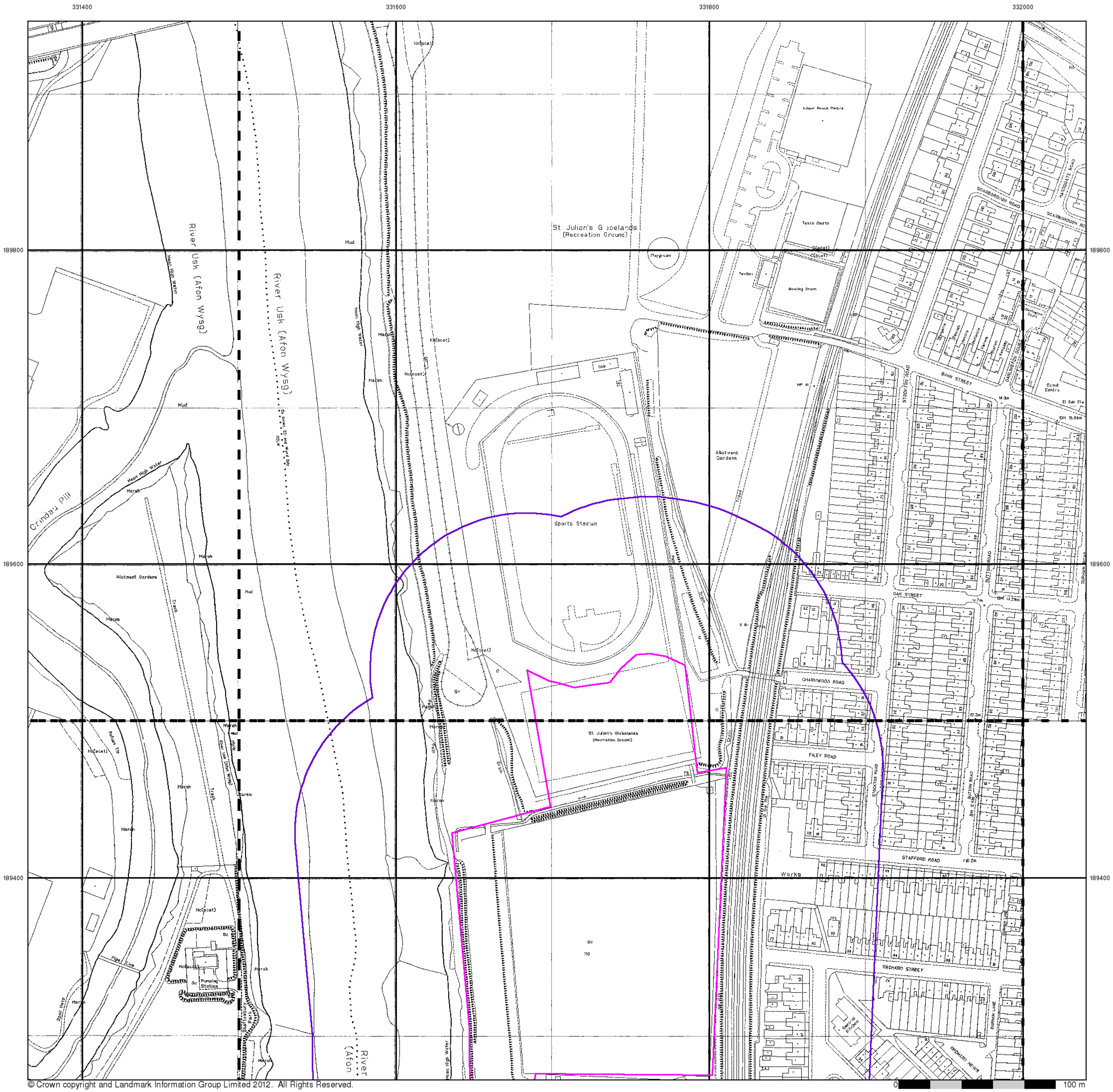

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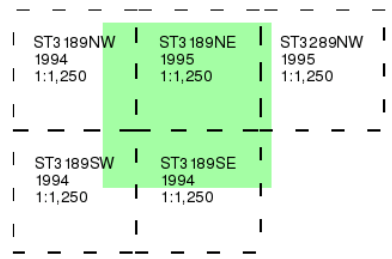
Large-Scale National Grid Data

Published 1994 - 1995

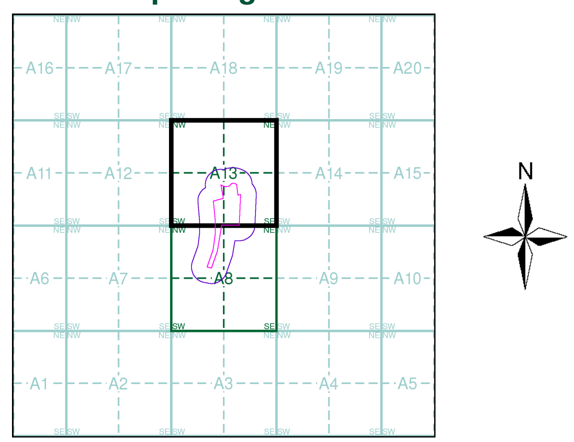
Source map scale - 1:1,250

'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



Order Details

Order Number: 41914630_1_1
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National Grid Reference: 331690, 189280
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Site Details

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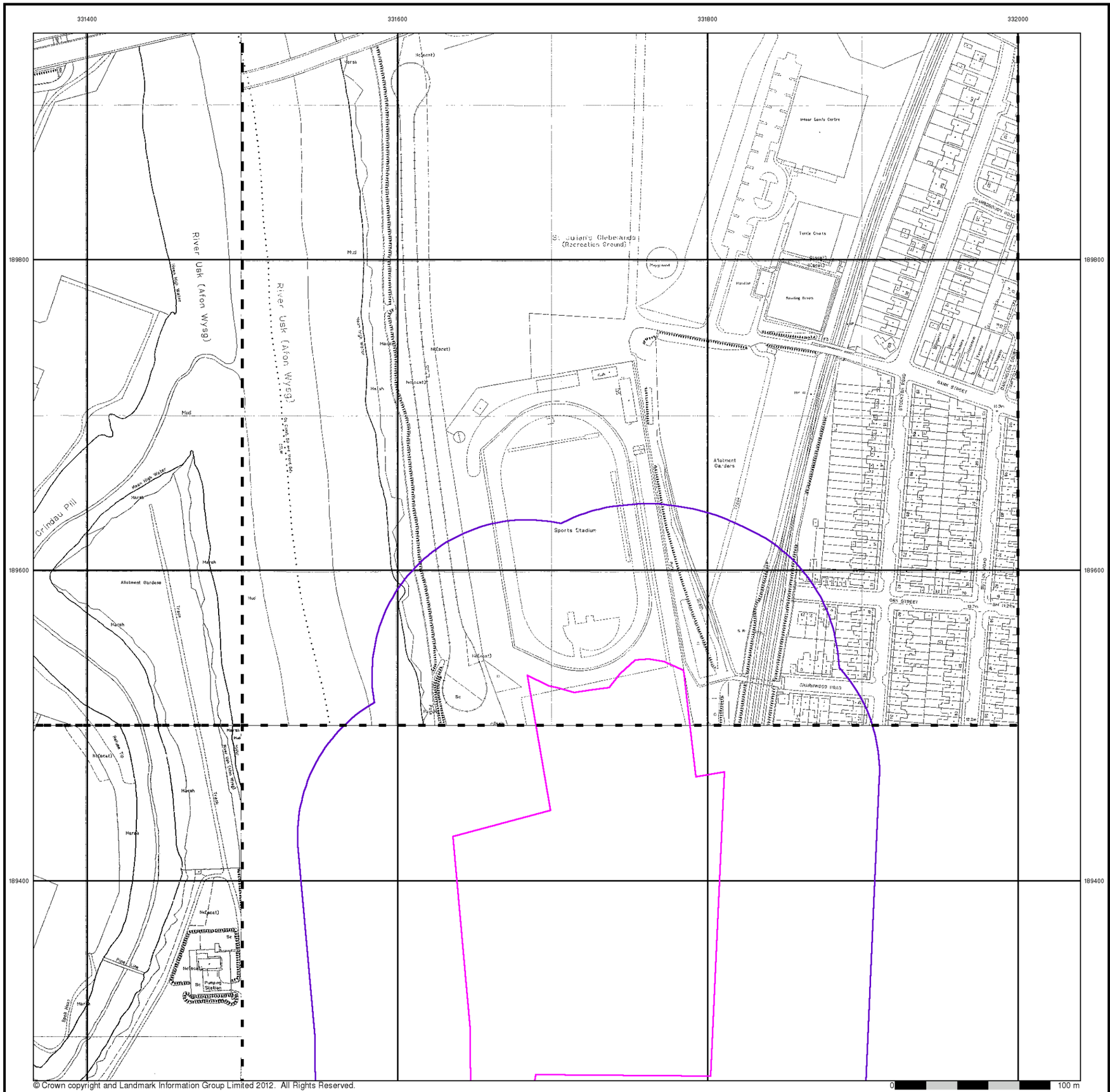

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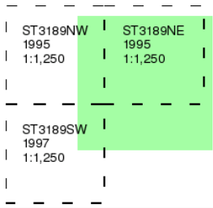
Large-Scale National Grid Data

Published 1995 - 1997

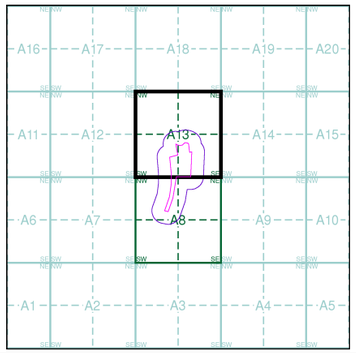
Source map scale - 1:1,250

'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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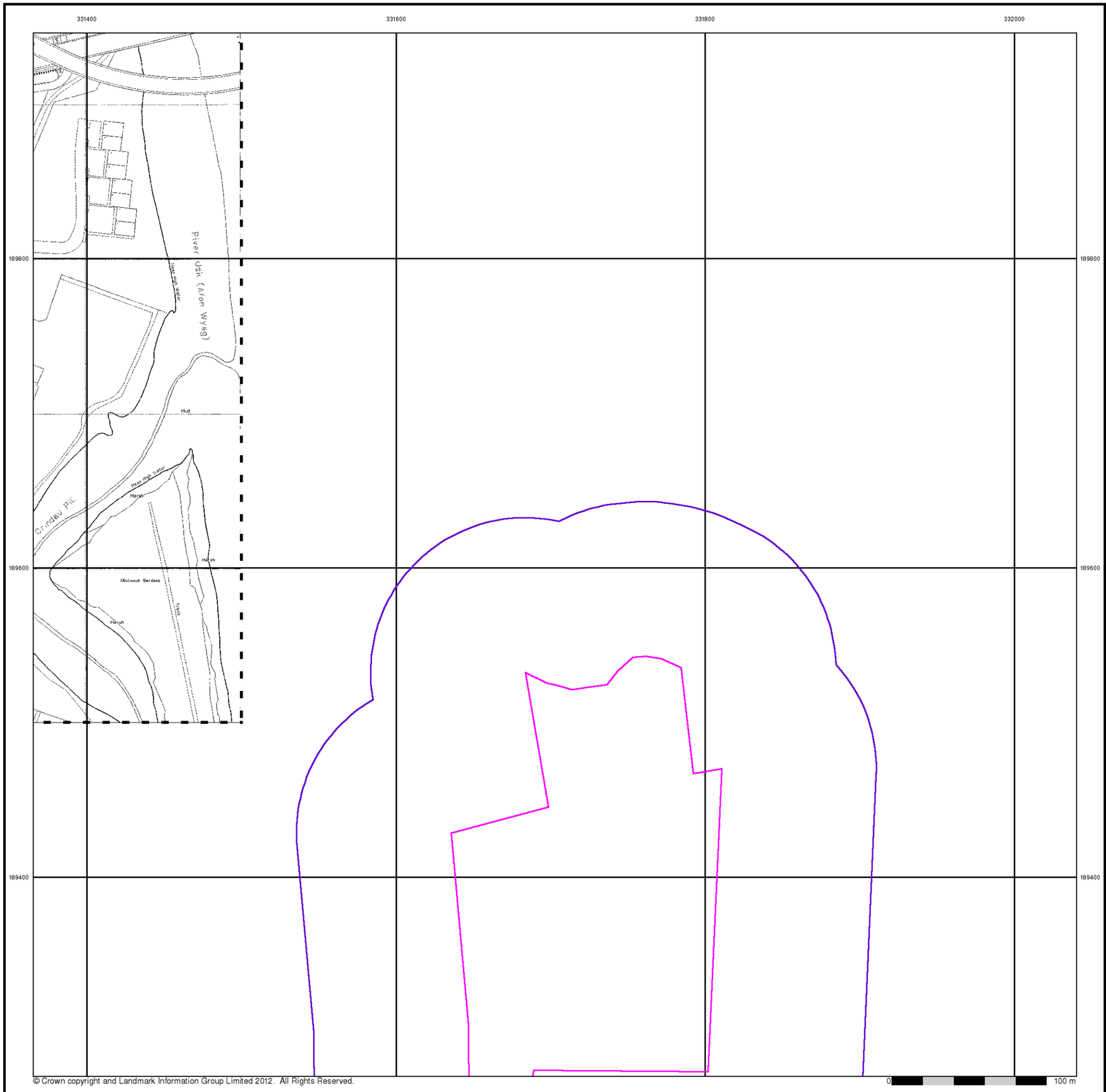

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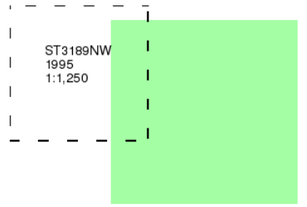
Large-Scale National Grid Data

Published 1995

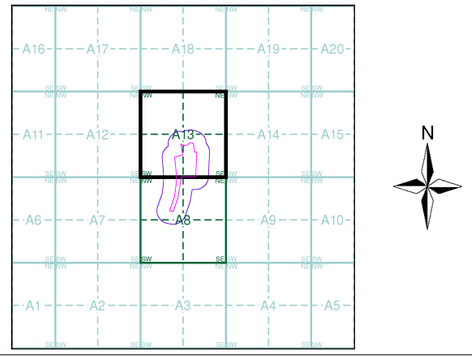
Source map scale - 1:1,250

'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



Order Details

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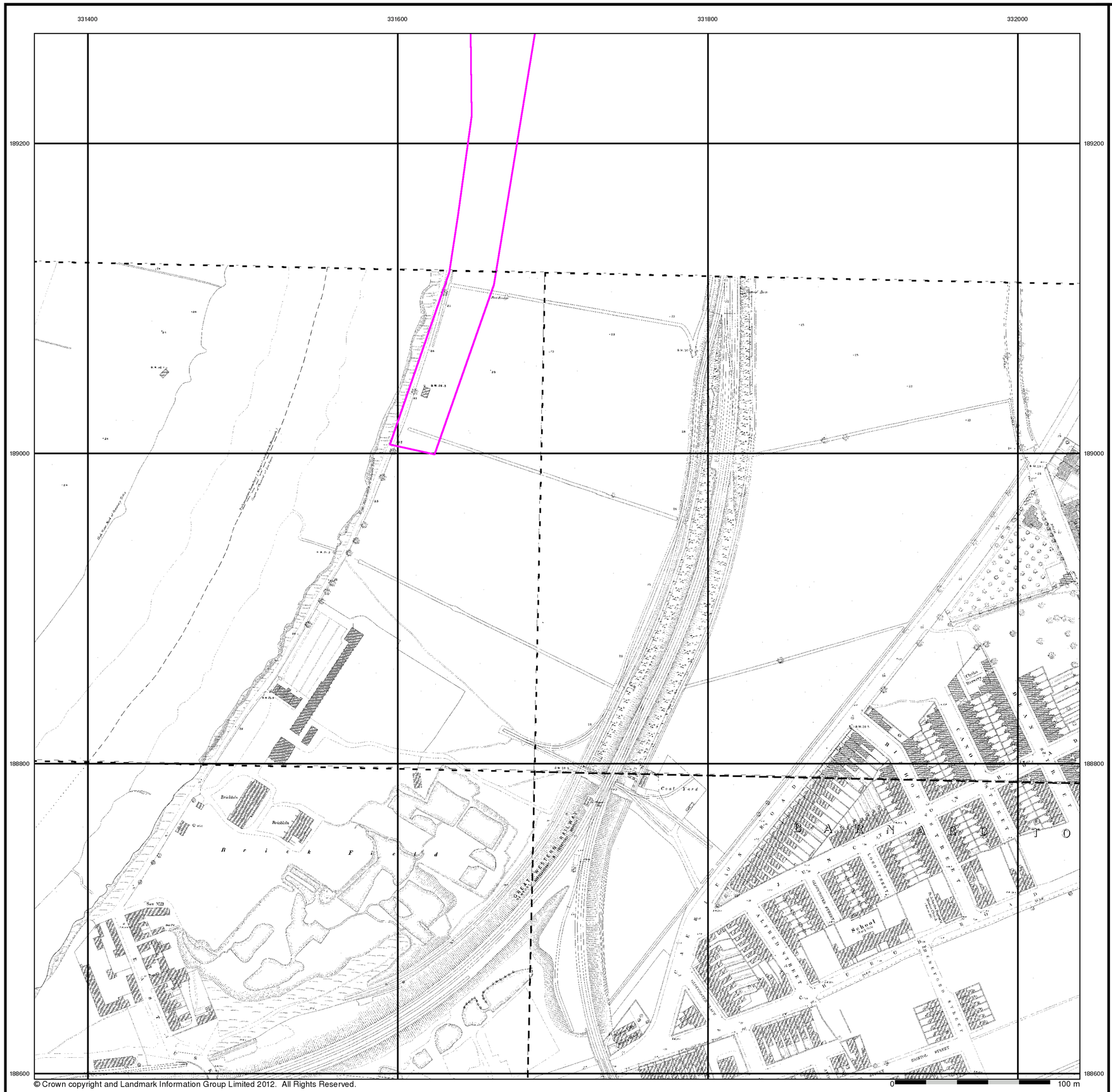

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Monmouthshire

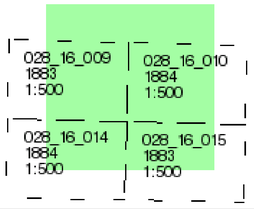
Published 1883 - 1884

Source map scale - 1:500

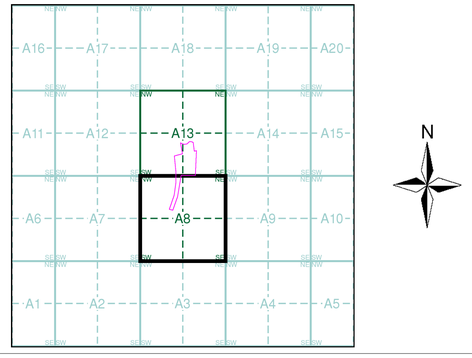
The 1:500 scale Ordnance Survey mapping was introduced in 1855 as a replacement for the 1:528 scale and to compliment the 1:2500 scale that had been implemented in 1853. By 1895, the 1:500 scale covered most towns over a population of about 4000 at the time of survey, although very few towns were mapped more than once at this scale, and none have been since 1910. The 1:500 scale gives particular emphasis to such features as lamp posts, man holes, arched passages and minor building projections. Also often featured are divisions between tenements, interior ground floor layouts of public buildings, and on earlier plans, the functions of the various parts of larger industrial premises are also indicated. Content of the plans does vary however, from one town to the next in terms of, for example, the completeness of railway tracks and the coverage of public buildings.

Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

Map Name(s) and Date(s)



Historical Town Plan - Segment A8



Order Details

Order Number:	41914630_1_1
Customer Ref:	12044
National Grid Reference:	331690, 189280
Slice:	A
Site Area (Ha):	4.52
Search Buffer (m):	0

Site Details

., Herbert Road, NEWPORT, Gwent, NP19 7BH

Landmark Information Group

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

ANNEX B
Radon Report

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

GeoReports

Helen Eddy
Terra Firma Wales Ltd
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Cardiff
CF38 1AA

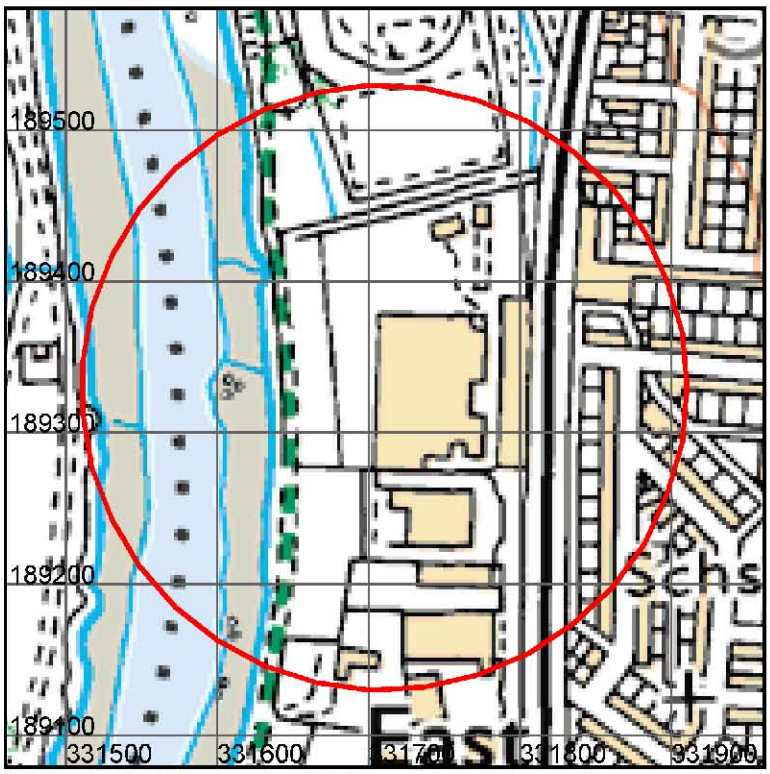
Radon Report: England and Wales

Advisory report on the requirement for radon protective measures in new buildings, conversions and extensions to existing buildings. The report also indicates whether a site is located within a radon Affected Area

Report Id: *GR_205477/1*

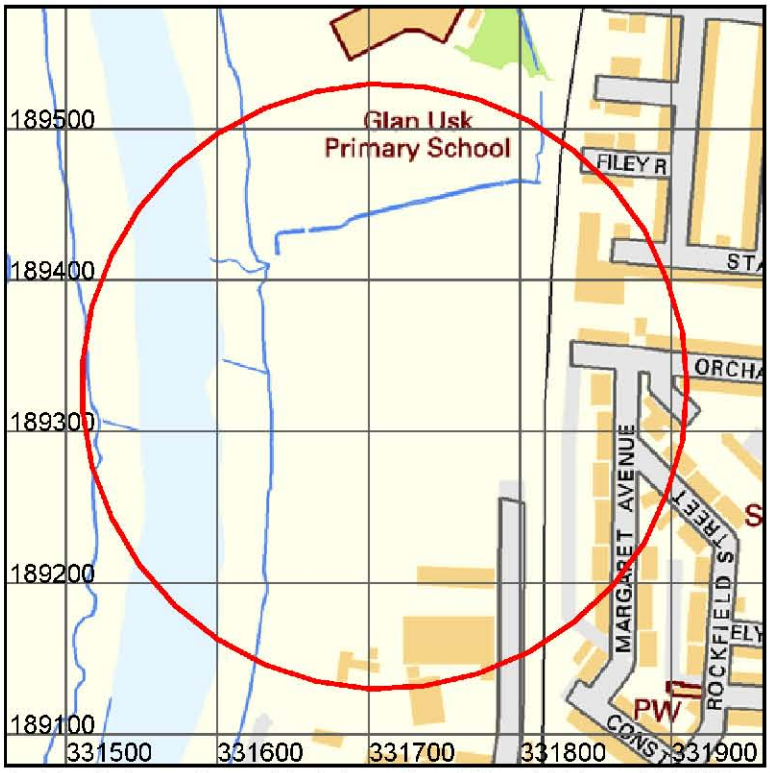
Client reference: 12044

Search location



This product includes mapping data licensed from Ordnance Survey.

Scale: 1:5 000 (1cm = 50 m)



Contains Ordnance Survey data © Crown Copyright and database right 2012
OS Street View: Scale: 1:5 000 (1cm = 50 m)

This report describes a site located at National Grid Reference 331710, 189330. Note that for sites of irregular shape, this point may lie outside the site boundary. Where the client has submitted a site plan the assessment will be based on the area given.

Search location indicated in red

Radon Report: England and Wales

This is an advisory report on the requirement for radon protective measures in new buildings, conversions and extensions. The report also indicates whether a site is located within a radon Affected Area

Requirement for radon protective measures
The determination below follows advice in *BR211 Radon: Guidance on protective measures for new buildings (2007 edition)*, which also provides guidance on what to do if the result indicates that protective measures are required.

BASIC RADON PROTECTIVE MEASURES ARE REQUIRED FOR THE REPORT AREA.

The BGS is not able to provide advice on the technical specifications of 'basic' and 'full' radon protective measures. This information is detailed in **BRE Report BR211 Radon: guidance on protective measures for new buildings** which may be purchased from **brebookshop.com**. This report offers guidance on the technical solutions that are required to satisfy Building Regulations requirements.

Technical solutions to radon protection in new build and existing dwellings in radon affected areas are available on the BRE web site at:
http://www.bre.co.uk/page.jsp?id=1626 and http://www.bre.co.uk/radon/ and in a range of technical reports available from **brebookshop.com**; Tel: 01923 664262, email: bookshop@bre.co.uk.
Summary guidance is available on the web at:
http://www.bre.co.uk/radon/protect.html.

If you require further information or guidance, you should contact your local authority building control officer or approved inspector.

Radon in existing buildings

Is this property in a radon affected area – YES

The answer to the standard enquiry on house purchase known as **CON29 Standard Enquiry of Local Authority 3.13 Radon Gas: Location of the Property in a radon Affected Area is YES** this property is in a Radon Affected Area as defined by the Health Protection Agency (HPA).

The estimated probability of the property being above the Action Level for radon is: 5-10% (INTERMEDIATE PROBABILITY).

The result informs you of the estimated probability that this particular property is above the Action Level for radon. This does not necessarily mean there is a radon problem in the property. The only way to determine whether it is above or below the Action Level is to carry out a radon measurement within the existing property.

Radon Affected Areas are designated by the HPA. They advise that radon gas should be measured in all properties within Radon Affected Areas.

If you are buying a new build property in a Radon Affected Area, you should ask the builder whether radon protective measures were incorporated in the construction of the property.

If you are buying a currently occupied property in a Radon Affected Area you should ask the present owner whether radon levels have been measured in the property. If they have, ask whether the results were above the Radon Action Level and if so whether remedial measures were installed, radon levels were retested, and the that the results of re-testing confirmed the effectiveness of the measures.

In radon affected homes, the problem of radon can usually be tackled with simple, effective and relatively inexpensive measures. These measures are comparable in cost to work such as damp-proofing and timber treatment. You can get practical advice about construction work to reduce radon levels from the Building Control Officer at your local council.

For further information, advice about radon, its health risks and details of how to order the radon test, please contact the HPA Radon Helpline on 01235 822622 or go online at www.ukradon.org or write to Radon Survey, Health Protection Agency, Centre for Radiation, Chemical and Environmental Hazards, Chilton, Didcot, Oxon, OX11 0RQ, email: radon@hpa.org.uk. You can obtain an information pack from the HPA free Radon answerphone on 0800 614529

What is radon?

Radon is a naturally occurring radioactive gas, which is produced by the radioactive decay of radium which, in turn, is derived from the radioactive decay of uranium. Uranium is found in small quantities in all soils and rocks, although the amount varies from place to place. Radon released from rocks and soils is quickly diluted in the atmosphere. Concentrations in the open air are normally very low and do not present a hazard. Radon that enters enclosed spaces such as some buildings (particularly basements), caves, mines, and tunnels may reach high concentrations in some circumstances. The construction method and degree of ventilation will influence radon levels in individual buildings. A person's exposure to radon will also vary according to how particular buildings and spaces are used.

Inhalation of the radioactive decay products of radon gas increases the chance of developing lung cancer. If individuals are exposed to high concentrations for significant periods of time, there may be cause for concern. In order to limit the risk to individuals, the Government has adopted an Action Level for radon in homes of 200 becquerels per cubic metre (Bq m^{-3}). The Government advises householders that, where the radon level exceeds the Action Level, measures should be taken to reduce the concentration.

Radon in workplaces

The Ionising Radiation Regulations, 1999, require employers to take action when radon is present above a defined level in the workplace. Advice may be obtained from your local Health and Safety Executive Area Office or the Environmental Health Department of your local authority. The BRE publishes a guide (BR293)**: Radon in the workplace.** BRE publications may be obtained from the BRE Bookshop, Tel: 01923 664262, email: bookshop@bre.co.ukwebsite: www.brebookshop.com

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Terms and Conditions

General Terms & Conditions

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- The data, information and related records supplied in this Report by BGS can only be indicative and should not be taken as a substitute for specialist interpretations, professional advice and/or detailed site investigations. You must seek professional advice before making technical interpretations on the basis of the materials provided.
- Geological observations and interpretations are made according to the prevailing understanding of the subject at the time. The quality of such observations and interpretations may be affected by the availability of new data, by subsequent advances in knowledge, improved methods of interpretation, and better access to sampling locations.
- Raw data may have been transcribed from analogue to digital format, or may have been acquired by means of automated measuring techniques. Although such processes are subjected to quality control to ensure reliability where possible, some raw data may have been processed without human intervention and may in consequence contain undetected errors.
- Detail, which is clearly defined and accurately depicted on large-scale maps, may be lost when small-scale maps are derived from them.
- Although samples and records are maintained with all reasonable care, there may be some deterioration in the long term.
- The most appropriate techniques for copying original records are used, but there may be some loss of detail and dimensional distortion when such records are copied.
- Data may be compiled from the disparate sources of information at BGS's disposal, including material donated to BGS by third parties, and may not originally have been subject to any verification or other quality control process.
- Data, information and related records, which have been donated to BGS, have been produced for a specific purpose, and that may affect the type and completeness of the data recorded and any interpretation. The nature and purpose of data collection, and the age of the resultant material may render it unsuitable for certain applications/uses. You must verify the suitability of the material for your intended usage.
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- The topography shown on any map extracts is based on the latest OS mapping and is not necessarily the same as that used in the original compilation of the BGS geological map, and to which the geological linework available at that time was fitted.
- Note that for some sites, the latest available records may be quite historical in nature, and while every effort is made to place the analysis in a modern geological context, it is possible in some cases that the detailed geology at a site may differ from that described.

Report issued by
BGS Enquiry Service

ANNEX C
Terra Firma Definitions and Methodologies

A pollutant linkage requires three essential elements:

(1) A **CONTAMINANT** (hazard) - a substance that is in, on or under the land and has the potential to cause harm or to cause pollution of **controlled waters**

(2) A **RECEPTOR** (target) - something which could be adversely affected by a contaminant

(3) A **PATHWAY** - a route or means which either allows the contaminant to cause significant harm to that receptor, or that there is a significant possibility of such harm being caused to the receptor, or that pollution of controlled waters is being or likely to be caused.

The term 'Risk' is widely used in different contexts and situations, but a prescriptive definition is given by the Guidelines for Environmental Risk Assessment and Management (DEFRA *et al*, 2000):

'Risk is a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence'.

A 'Hazard' is defined as '*a property or situation that in particular circumstances could lead to harm'.*

The classification of consequences and probability and determining the risk category are defined in the following sections.

Table 3.1 Classification of Consequence

Classification	Definition
Severe	• Short term (acute) risk to human health likely to result in significant harm • Short term risk to controlled waters • Catastrophic damage to buildings/structures • Short term risk to an ecosystem or organism within the particular ecosystem
Medium	• Chronic damage to human health (long term risk) • Pollution of a sensitive water resource • A significant change in an ecosystem or organism within the ecosystem
Mild	• Pollution of non-sensitive water resources • Significant damage to buildings/structures
Negligible	• Harm (not necessarily significant) which may result in financial loss • Non permanent health effects to humans (easily prevented by PPE for example) • Easily repairable effects of structural (building) damage

Table 3.2 Classification of Probability	
Classification	**Definition**
High	• There is a complete pollution linkage and an event appears very likely to occur in the short term and is inevitable in the long term. • Evidence of harm to the receptor
Medium	• There is a complete pollution linkage which means that is it probable that an event will occur • The event is not inevitable but possible in short term and likely in the long term
Low	• There is a complete pollution linkage and circumstances are possible under which an event could occur • It is not certain that an event will occur in the long term, and it is less likely to occur in the short term
Negligible	• There is a complete pollution linkage but circumstances are such that it is improbable that an event would occur even in the long term

By comparing the consequences of a risk and the probability of the risk of a pollution linkage, the likely risk category can be determined as shown in **Table 3.3** below.

Table 3.3 Risk Assessment Matrix					
Increasing acceptability →		**Consequence**			
		Severe	**Medium**	**Mild**	**Negligible**
Probability	**High**	High	High	Medium / Low	Near zero
	Medium	High	Medium	Low	Near zero
	Low	High / medium	Medium / Low	Low	Near zero
	Negligible	High / medium / Low	Medium / Low	Low	Near zero

High Risk
There is a high probability that severe harm could risk a receptor, or there is evidence that a receptor is being harmed. The risk if realised is likely to result in liability, and urgent investigation or remediation will be required.

Medium Risk
It is probable that harm will arise to a receptor. However it is relatively unlikely that such harm would be severe, or if harm does occur the harm is likely to be relatively mild. Investigation will be required to determine the liability, and some remedial works may be required in the long term.

Low Risk
It is possible that harm may arise to a receptor, but it is likely that the harm would be mild.

Near Zero Risk
There is a very low risk of harm to the receptor. In the event of harm being realised the harm is not likely to be severe.

Methodology

Environmental risk assessment evaluates the risk to receptors via an analysis of the 'source-pathway-receptor' linkage. In order for a risk to be present, there must be a contaminant source capable of causing a health risk, a vulnerable receptor, and a pathway linking the two.

This sort of risk assessment is usually conducted using a tiered approach. Tier 1 consists of a comparison of the analytical results obtained from the site investigation with Soil Guideline Values (SGV's) specific to the type of development obtained from The Environment Agency Contaminated Land Exposure Assessment (CLEA) Guidelines.

Where SGV values are not available reference has been made to Generic Assessment Criteria (GAC) provided by Land Quality Management Limited (LQM) and the Chartered Institute of Environmental Health (CIEH).

At each tier, the amount and detail of investigation work increases as more site-specific data are needed to refine the characterisation of the site. Conversely, as site conditions are better understood, a more site-specific remediation strategy can be determined.

Should Tier 1 levels be exceeded, a choice is made either to remediate the site to conservative Tier 1 levels, or proceed to Tier 2. Tier 2 makes use of site-specific data to evaluate acceptable concentrations of chemicals for the particular conditions present at the site.

For Tier 1, the site itself is considered to be the receptor. Therefore, attenuation of contaminants between the source and receptor is not considered.

All soil test results have therefore been compared to thresholds for residential development.

A summary of the soil and groundwater chemical test results, which include the regulatory guidelines used in the Tier 1 assessment, are given in the tables on the following pages.

ANNEX D
Trial Pit Logs

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Trialpit No
TP1
Sheet 1 of 1

Project Name: Herbert Road	Project No.: 12032	Co-ords: - Level: -	Date: 06/11/2012
Location: Newport		Dimensions: 2.20m Depth 3.00m 0.70m	Scale: 1:25
Client: Greenhill Construction			Logged By: MW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND. Soft to firm brown organic rich slightly gravelly clay with occasional cobbles of angular brick and concrete. Occasional boulders of angular concrete. Gravel is fine to coarse angular concrete and brick.
			2.50			Firm grey mottled CLAY
			3.00			Trialpit Complete at 3.00 m

Remarks: Unstable

Groundwater: Groundwater inflow at 2.50m

AGS

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Trialpit No
TP2
Sheet 1 of 1

Project Name: Herbert Road	Project No.: 12032	Co-ords: - Level: -	Date: 06/11/2012
Location: Newport		Dimensions: 2.20m Depth 2.50m 0.70m	Scale: 1:25
Client: Greenhill Construction			Logged By: MW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND. Soft to firm brown organic rich slightly gravelly clay with occasional cobbles of angular brick and concrete. Occasional boulders of angular concrete. Gravel is fine to coarse of angular concrete and brick.
			0.90			Firm to stiff grey and red CLAY with occasional organic matter
			2.50			Trialpit Complete at 2.50 m

Remarks: Stable

Groundwater: Groundwater inflow at 2.50m

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Trialpit No
TP3
Sheet 1 of 1

Project Name: Herbert Road	Project No.: 12032	Co-ords: - Level: -	Date: 06/11/2012
Location: Newport		Dimensions: 2.40m Depth 1.80m 0.70m	Scale: 1:25
Client: Greenhill Construction			Logged By: MW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND. Long grass over soft brown organic rich clay with many rootlets and roots
			0.20			Firm becoming soft to firm at 1.0m grey and red brown CLAY
			1.80			Trialpit Complete at 1.80 m

Remarks: Stable

Groundwater: Groundwater inflow at 1.80m

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Trialpit No
TP4
Sheet 1 of 1

Project Name: Herbert Road	Project No.: 12032	Co-ords: - Level: -	Date: 06/11/2012
Location: Newport		Dimensions: 2.20m Depth 2.00m 0.70m	Scale: 1:25
Client: Greenhill Construction			Logged By: MW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.20			MADE GROUND. Vegetation over soft brown organic rich clay with many rootlets and roots.
						MADE GROUND. Soft to firm brown organic rich clay
			0.80			Firm grey mottled CLAY
			2.00			Trialpit Complete at 2.00 m

Remarks: Stable

Groundwater: Groundwater seepage from clay beneath 0.80m

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Trialpit No
TP5
Sheet 1 of 1

Project Name: Herbert Road	Project No.: 12032	Co-ords: - Level: -	Date: 06/11/2012
Location: Newport		Dimensions: 2.20m Depth 2.50m 0.70m	Scale: 1:25
Client: Greenhill Construction			Logged By: MW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.20			MADE GROUND. Grass over soft red brown slightly gravelly clay with many rootlets. Gravel is fine to coarse of angular mudstone. Geosynthetic membrane at 0.70m
			0.70			MADE GROUND. Dense grey very gravelly sand with some cobbles of angular sandstone.
			2.50			MADE GROUND. Loose to medium dense brown mottled gravelly sand. Some litter, bottles, jars and ceramic. Gravel is fine to coarse of angular slate, mudstone and sandstone. Occasional cobble of angular brick. Trialpit Complete at 2.50 m

Remarks: Stable

Groundwater: Standing groundwater at 2.30m

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Trialpit No
TP6
Sheet 1 of 1

Project Name Herbert Road	Project No. 12032	Co-ords: - Level: -	Date 06/11/2012
Location: Newport		Dimensions: 2.20m Depth 2.70m 0.70m	Scale 1:25
Client: Greenhill Construction			Logged By MW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND. Grass over soft red brown slightly gravelly clay with many rootlets. Gravel is fine to coarse of angular mudstone.
			0.20			MADE GROUND. Dense grey very gravelly sand with some cobbles of angular sandstone
			0.80			MADE GROUND. Firm black very gravelly clay with some cobbles of angular concrete and brick. Many litter including bottles, rubber, plastic and ceramic. Gravel is fine to coarse of angular brick, concrete and vitreous slag.
			2.50			Firm grey mottled CLAY
			2.70			Trialpit Complete at 2.70 m

1
2
3
4

Remarks: Stable

Groundwater: Dry

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Trialpit No
TP7
Sheet 1 of 1

Project Name: Herbert Road	Project No.: 12032	Co-ords: - Level: -	Date: 06/11/2012
Location: Newport		Dimensions: 2.20m Depth 2.20m 0.70m	Scale: 1:25
Client: Greenhill Construction			Logged By: MW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND. Soft to firm organic rich gravelly clay with occasional cobbles of angular concrete and brick. Gravel is fine to coarse of angular brick, concrete, sandstone and mudstone. Occasional litter
			1.20			Firm brown mottled CLAY
			1.70			Firm grey mottled CLAY
			2.20			Trialpit Complete at 2.20 m

Remarks: Stable

Groundwater: Groundwater inflow at 1.20m

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Trialpit No
TP8
Sheet 1 of 1

Project Name: Herbert Road	Project No.: 12032	Co-ords: - Level: -	Date: 06/11/2012
Location: Newport		Dimensions: 2.20m Depth 2.50m 0.70m	Scale: 1:25
Client: Greenhill Construction			Logged By: MW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND. Soft to firm black organic rich sandy gravelly clay. Gravel is fine to coarse of angular brick and concrete. Occasional cobbles of angular brick and concrete. Occasional wood fragments and ash.
			1.40			Firm brown mottled CLAY
			1.80			Firm grey mottled CLAY
			2.50			Trialpit Complete at 2.50 m

Remarks: Stable

Groundwater: Groundwater inflow at 1.80m

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Trialpit No
TP9
Sheet 1 of 1

Project Name: Herbert Road	Project No.: 12032	Co-ords: - Level: -	Date: 07/11/2012
Location: Newport		Dimensions: 2.50m Depth 2.50m 0.70m	Scale: 1:25
Client: Greenhill Construction			Logged By

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND. Soft to firm brown organic rich gravelly clay with occasional cobbles and boulders of angular concrete and brick. Gravel is fine to coarse of angular brick, concrete, sandstone and mudstone. Occasional litter, wood and peat.
			1.60			Firm brown mottled CLAY with occasional relic plant fragments
			2.00			Firm grey mottled CLAY
			2.50			Trialpit Complete at 2.50 m

Remarks: Stable

Groundwater: Slow groundwater seepage at 2.40m below ground level

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Trialpit No
TP10
Sheet 1 of 1

Project Name: Herbert Road	Project No.: 12032	Co-ords: - Level: -	Date: 07/11/2012
Location: Newport		Dimensions: 2.50m Depth 2.30m 0.70m	Scale: 1:25
Client: Greenhill Construction			Logged By: MW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND. Soft to firm brown organic rich gravelly clay with occasional cobbles and boulders of angular concrete and brick. Gravel is fine to coarse of angular brick, concrete, sandstone and mudstone. Occasional litter, wood and peat.
			1.20			Firm brown mottled CLAY
			1.90			Firm grey mottled CLAY
			2.30			Trialpit Complete at 2.30 m

Remarks: Stable

Groundwater: Slow groundwater seepage at 1.90m

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Trialpit No
TP11
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Herbert Road	12032	Level: -	07/11/2012
Location: Newport		Dimensions: 2.50m	Scale 1:25
Client: Greenhill Construction		Depth 2.00m, 0.70m	Logged By MW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND. Vegetation over firm mottled sandy gravelly clay. Gravel is fine to coarse of angular brick and concrete. Some cobbles and boulders of angular concrete and brick.
			1.60			Firm grey mottled CLAY
			2.00			Trialpit Complete at 2.00 m

Remarks: Highly unstable

Groundwater: Groundwater inflow at 1.60m below ground level

AGS

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Trialpit No
TP12
Sheet 1 of 1

Project Name: Herbert Road	Project No.: 12032	Co-ords: - Level: -	Date: 07/11/2012
Location: Newport		Dimensions: 2.50m Depth 2.00m 0.70m	Scale: 1:25
Client: Greenhill Construction			Logged By: MW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND. Dense mottled sandy gravel of angular concrete and brick. Many cobbles of angular brick and concrete. Occasional ash.
			0.80			Firm brown mottled CLAY
			1.00			Firm grey mottled CLAY
			2.00			Trialpit Complete at 2.00 m

Remarks: Highly unstable

Groundwater: Groundwater inflow at 1.60m below ground level

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Trialpit No
TP13
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Herbert Road	12032	Level: -	07/11/2012
Location: Newport		Dimensions: 2.50m	Scale 1:25
Client: Greenhill Construction		Depth 2.20m, 0.70m	Logged By MW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND. Gravel over dense dark grey clayey sandy gravel with some cobbles of angular brick and concrete. Gravel is fine to coarse of angular brick and concrete. Occasional boulder of angular concrete.
			0.70			Firm grey mottled CLAY
			2.00			Trialpit Complete at 2.20 m

Remarks: Slightly unstable

Groundwater: Groundwater seepage at 2.20m below ground level

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Trialpit No
TP14
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Herbert Road	12032	Level: -	07/11/2012
Location: Newport		Dimensions: 2.50m	Scale 1:25
Client: Greenhill Construction		Depth 2.10m, 0.70m	Logged By MW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND. Gravel over dense dark grey clayey sandy gravel with some cobbles of angular brick and concrete. Gravel is fine to coarse of angular brick and concrete. Occasional boulder of angular concrete.
			0.70			MADE GROUND. Firm to stiff brown organic rich clay (possibly reworked)
			1.20			Firm grey mottled CLAY
			2.10			Trialpit Complete at 2.10 m

Remarks: Stable

Groundwater: Groundwater inflow from 1.20m below ground level

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Trialpit No
TP15
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Herbert Road	12032	Level: -	07/11/2012
Location: Newport		Dimensions: 2.50m	Scale 1:25
Client: Greenhill Construction		Depth 2.20m, 0.70m	Logged By MW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.20			TOPSOIL. Long grass over soft brown organic rich clay with many rootlets and roots.
			0.60			MADE GROUND. Firm red brown and grey clay with occasional cobble of angular brick
			1.20			Firm red brown CLAY
			2.20			Firm grey mottled CLAY
						Trialpit Complete at 2.20 m

Remarks: Stable

Groundwater: Groundwater inflow from 1.20m below ground level

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Trialpit No
TP16
Sheet 1 of 1

Project Name: Herbert Road	Project No.: 12032	Co-ords: - Level: -	Date: 07/11/2012
Location: Newport		Dimensions: 2.50m Depth 2.00m 0.70m	Scale: 1:25
Client: Greenhill Construction			Logged By: MW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.20			TOPSOIL. Long grass over soft brown organic rich clay with many rootlets and roots
						Soft dark brown organic rich CLAY
			0.90			Firm grey mottled CLAY
			2.00			Trialpit Complete at 2.00 m

Remarks: Stable

Groundwater: Slow groundwater seepage at 1.80m below ground level

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Trialpit No
TP17
Sheet 1 of 1

Project Name Herbert Road	Project No. 12032	Co-ords: - Level: -	Date 07/11/2012
Location: Newport		Dimensions: 2.50m Depth 2.00m 0.70m	Scale 1:25
Client: Greenhill Construction			Logged By MW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						TOPSOIL. Long grass over soft brown organic rich clay with many rootlets and roots
			0.30			Firm grey mottled CLAY
			2.00			Trialpit Complete at 2.00 m

Remarks: Stable

Groundwater: Slow groundwater seepage at 1.80m below ground level

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Trialpit No
TP18
Sheet 1 of 1

Project Name: Herbert Road	Project No.: 12032	Co-ords: - Level: -	Date: 07/11/2012
Location: Newport		Dimensions: 2.50m Depth 2.00m 0.70m	Scale: 1:25
Client: Greenhill Construction			Logged By: MW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						TOPSOIL. Long grass over soft brown organic rich clay with many rootlets and roots
			0.20			MADE GROUND. Dense brown sandy gravel of angular fine to coarse limestone. Some cobbles of angular limestone.
			0.40			MADE GROUND. Soft dark brown slightly sandy slightly gravelly clay. Gravel is fine to coarse of angular concrete and brick.
			0.80			Firm grey mottled CLAY
			2.00			Trialpit Complete at 2.00 m

Remarks: Stable

Groundwater: Groundwater inflow from 0.80m below ground level

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Trialpit No
TP19
Sheet 1 of 1

Project Name Herbert Road	Project No. 12032	Co-ords: - Level: -	Date 07/11/2012
Location: Newport		Dimensions: 2.50m Depth 2.00m 0.70m	Scale 1:25
Client: Greenhill Construction			Logged By MW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						TOPSOIL. Long grass over soft brown organic rich clay with many rootlets and roots
			0.20			Firm grey and brown CLAY
			0.80			Firm grey mottled CLAY
			2.00			Trialpit Complete at 2.00 m

Remarks: Stable

Groundwater: Slow groundwater seepage from 1.80m below ground level

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ANNEX E
Cable Percussive Borehole Logs

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Borehole No **BH1** Sheet 1 of 2

Project Name	Project No.	Co-ords: -	Hole Type
Herbert Road	12032		Cable
Location: Newport		Level: -	Scale 1:50
Client: Greenhill Construction		Dates: 31/10/2012-01/11/2012	Logged By MW

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		0.00-1.20	B					MADE GROUND. Gravel over loose dark grey clayey sandy gravel with some cobbles of angular brick and concrete. Gravel is fine to coarse of angular brick and concrete. Occasional boulders of angular concrete.
		1.20	CPT	N=3				
		1.20-1.70	B	N=3 (3,2,2,1,0,0)				
					1.70			Very soft grey slightly gravelly CLAY with occasional cobbles of angular brick and concrete. Gravel is fine to coarse of angular concrete and brick.
		2.00	SPT	N=1	2.10			Very soft blue CLAY with occasional remnant root fragments.
				N=1 (1,0,0,0,1,0)				
		2.45-3.00	B					
		3.00	SPT	N=2				
				N=2 (1,0,0,1,0,1)				
					3.60			Very soft grey CLAY
		3.45-4.00	B		3.90			PEAT
		4.00	SPT	N=5				
				N=5 (1,1,1,2,1,1)				
		4.45-5.00	B					
		5.00	SPT	N=7				
				N=7 (1,1,1,2,2,2)				
					6.20			Very loose red brown silty SAND
		6.20-6.50	B					
		6.50	SPT	N=0				
				N=0 (1,0,0,0,0,0)				
					7.00			Very soft red sandy SILT
		6.95-8.00	B					
		8.00	SPT	N=1				
				N=1 (1,0,0,0,0,1)				
		8.00-8.50	B					
					8.80			Very stiff red brown and grey gravelly CLAY. Gravel is fine to coarse of angular mudstone and mudstone lithorelicts.
		8.80-9.00	B					
		9.00	SPT	N=33				
				N=33 (1,1,5,8,9,11)				
			B					
			Type	Results				

Continued next sheet

Remarks:

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Borehole No
BH1
Sheet 2 of 2

Project Name	Project No.	Co-ords: -	Hole Type
Herbert Road	12032		Cable
Location: Newport		Level: -	Scale 1:50
Client: Greenhill Construction		Dates: 31/10/2012-01/11/2012	Logged By MW

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		9.45-10.60			10.30			Very stiff red brown and grey gravelly CLAY. Gravel is fine to coarse of angular mudstone and mudstone lithorelicts.
		10.60	SPT	50/80mm 80mm (5,11,26,24)				Very weak red brown and grey MUDSTONE
					11.00			End of Borehole at 11.00 m

Type | Results

Remarks:

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Borehole No **BH2** Sheet 1 of 2

Project Name	Project No.	Co-ords: -	Hole Type
Herbert Road	12032		Cable
Location: Newport		Level: -	Scale 1:50
Client: Greenhill Construction		Dates: 02/11/2012-05/11/2012	Logged By MW

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		0.00-1.20	B					MADE GROUND. Sub-base over dense dark grey clayey sandy gravel with some cobbles of angular brick and concrete. Gravel is fine to coarse of brick and concrete. Occasional boulder of angular concrete.
		1.20	CPT	N=9				
		1.20-1.70	B	N=9 (4,5,3,2,2,2)				
		1.70-2.00	B		1.90			
		2.00	CPT	N=7				Soft becoming very soft blue grey CLAY
		2.00-2.50	B	N=7 (1,2,2,3,1,1)				
		2.45-3.00	B					
		3.00	SPT	N=7				
				N=7 (1,1,1,2,2,2)				
		3.50-4.00	B					
		4.00	SPT	N=2				
				N=2 (1,1,1,0,0,1)				
		4.45-5.00	B					
		5.00	SPT	N=3				
				N=3 (1,0,1,0,1,1)	5.20			Very soft to soft blue grey CLAY with occasional peat bands
		5.45-6.50	B					
		6.50	SPT	N=3				
				N=3 (1,1,0,0,1,2)				
		6.95-8.00	B					
		8.00	SPT	N=6				
				N=6 (1,2,2,2,1,1)				
		8.45-9.50	B					
		9.50	SPT	N=8				
				N=8 (1,1,2,2,2,2)				
			Type	Results				

Continued next sheet

Remarks:

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Borehole No
BH2
Sheet 2 of 2

Project Name	Project No.	Co-ords: -	Hole Type
Herbert Road	12032		Cable
Location: Newport		Level: -	Scale 1:50
Client: Greenhill Construction		Dates: 02/11/2012-05/11/2012	Logged By MW

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					10.30			Very soft to soft blue grey CLAY with occasional peat bands
		10.30-11.00	B					Stiff becoming very stiff red brown and grey gravelly CLAY. Gravel is fine to coarse of angular mudstone.
		11.00	SPT	N=29 N=29 (5,6,6,7,8,8)				
		11.60-12.50	B					
		12.50	SPT	50/245mm 245mm (2,4,7,11,17,15)	12.70			Very weak red brown and grey MUDSTONE
					12.90			End of Borehole at 12.90 m

Type | Results

Remarks:

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Borehole No **BH3** Sheet 1 of 2

Project Name	Project No.	Co-ords: -	Hole Type
Herbert Road	12032		Cable
Location: Newport		Level: -	Scale 1:50
Client: Greenhill Construction		Dates: 06/11/2012-07/11/2012	Logged By MW

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.20			TOPSOIL. Grass over soft red brown slightly gravelly clay with many rootlets. Gravel is fine to coarse of angular mudstone.
		0.00-1.00	B		0.70			MADE GROUND. Dense grey very gravelly sand with some cobbles of angular sandstone.
		1.00	CPT	N=4				MADE GROUND. Very loose brown mottled gravelly sand. Some litter including bottles, jars and ceramic. Gravel is fine to coarse of angular slate, mudstone, brick and sandstone. Occasional cobble of brick.
		1.00-1.50	B	N=4 (2,2,2,1,1,0)				
		2.00	CPT	N=1				
	▽	2.00-2.50	B	N=1 (1,0,0,0,1,0)				
		3.00	CPT	N=2				
		3.00-3.50	B	N=2 (1,1,0,1,0,1)	3.30			Soft becoming very soft blue grey CLAY
		3.80-4.00	B					
		4.00	SPT	N=7				
				N=7 (1,1,1,2,2,2)				
		4.45-5.00	B					
		5.00	SPT	N=2				
				N=2 (1,0,0,1,0,1)				
		5.45-6.50	B					
		6.50	SPT	N=1				
				N=1 (1,0,0,0,0,1)	7.10			Very soft grey and dark brown silty PEAT
		6.95-8.00	B					
		8.00	SPT	N=4				
				N=4 (1,2,1,1,2,0)				
		8.45-8.80	B		8.60			Dense grey sand and gravel of fine to coarse angular sandstone
	▽	8.80-9.50	B					
		9.50	CPT	N=34				
		9.50-10.00	B	N=34 (4,6,5,6,11,12)	9.70			
			Type	Results				Continued next sheet

Remarks:

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Borehole No
BH3
Sheet 2 of 2

Project Name	Project No.	Co-ords: -	Hole Type
Herbert Road	12032		Cable
Location: Newport		Level: -	Scale 1:50
Client: Greenhill Construction		Dates: 06/11/2012-07/11/2012	Logged By MW

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		10.20-10.60	B		10.20			Very stiff red brown and grey gravelly CLAY. Gravel is fine to coarse of angular mudstone.
		10.60	CPT	50/40mm 40mm (21,4,50)				Very weak red brown and grey MUDSTONE
					10.70			End of Borehole at 10.70 m

Type | Results

Remarks:

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Borehole No **BH4** Sheet 1 of 2

Project Name	Project No.	Co-ords: -	Hole Type
Herbert Road	12032		Cable
Location: Newport		Level: -	Scale 1:50
Client: Greenhill Construction		Dates: 07/11/2012-08/11/2012	Logged By MW

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		0.00-0.60	B		0.20			TOPSOIL. Soft brown organic rich clay
					0.60			MADE GROUND. Stiff brown clay
		0.60-1.20	B					MADE GROUND. Firm black very gravelly clay with some cobbles of angular concrete and brick. Many bottles, rubber, plastic, ceramic and litter. Gravel of fine to coarse angular brick, concrete, and vitreous slag.
		1.20	CPT	N=13 N=13 (2,5,4,4,3,2)				
		1.20-2.00	B					
		2.00	SPT	N=10 N=10 (1,2,2,2,3,3)	2.10			Firm becoming very soft grey CLAY
		2.00-3.00	B					
		3.00	SPT	N=9 N=9 (2,1,2,2,2,3)				
		3.00-4.50	B					
		4.00	SPT	N=5 N=5 (1,1,1,1,1,2)				
		4.50	SPT	N=4 N=4 (1,1,1,1,1,1)	4.50			Very soft dark brown peaty SILT/CLAY
		4.50-5.30	B					
		5.30	SPT	N=2 N=2 (1,0,0,1,0,1)	5.30			Very soft grey CLAY
		5.30-6.80	B					
		6.80	SPT	N=18 N=18 (1,2,4,4,4,6)	6.80			Stiff red brown and grey gravelly CLAY. Gravel is fine to coarse of angular mudstone and mudstone lithorelicts.
		6.80-8.30	B					
		8.30	CPT	N=28 N=28 (5,9,6,5,6,11)				
		8.30-9.50	B					
		9.50	CPT	50/237mm 237mm (7,10,10,13,15,12)	9.50			Very weak red brown and grey MUDSTONE
			Type	Results				Continued next sheet

Remarks:

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Borehole No
BH4
Sheet 2 of 2

Project Name	Project No.	Co-ords: -	Hole Type
Herbert Road	12032		Cable
Location: Newport		Level: -	Scale 1:50
Client: Greenhill Construction		Dates: 07/11/2012-08/11/2012	Logged By MW

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		10.00	CPT	50/11mm				Very weak red brown and grey MUDSTONE
		10.20	CPT	11mm (25,50) 0mm (25,50)	10.20			End of Borehole at 10.20 m
			Type	Results				

Remarks:

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Borehole No **BH5** Sheet 1 of 2

Project Name	Project No.	Co-ords: -	Hole Type
Herbert Road	12032		Cable
Location: Newport		Level: -	Scale 1:50
Client: Greenhill Construction		Dates: 07/11/2012-08/11/2012	Logged By MW

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		0.00-1.00	B					MADE GROUND. Soft brown organic rich gravelly clay with occasional cobbles of angular concrete and brick. Gravel is fine to coarse of angular brick, concrete, sandstone and mudstone. Occasional litter.
		1.20	CPT	N=6				
		1.20-1.70	B	N=6 (1,1,2,3,1,0)				
					1.60			Soft brown CLAY
		2.00	SPT	N=5 N=5 (1,2,2,1,2,0)				
		2.45-2.70	B					
					2.70			Very soft grey blue CLAY
		2.70-3.00	B					
		3.00	SPT	N=3 N=3 (1,0,1,0,1,1)				
		3.45-4.00	B					
		4.00	SPT	N=2 N=2 (1,1,1,0,0,1)				
		4.45-5.00	B					
		5.00	SPT	N=3 N=3 (1,1,2,0,0,1)				
					6.20			Soft grey sandy SILT
		6.20-6.50	B					
		6.50	SPT	N=5 N=5 (2,2,1,2,0,2)				
		6.95-8.00	B					
		8.00	SPT	N=6 N=6 (1,1,1,1,2,2)				
		8.45-9.10	B					
					9.10			Firm becoming stiff red brown and grey gravelly CLAY. Gravel is fine to coarse of angular mudstone.
		9.10-9.50	B					
		9.50	CPT	N=20 N=20 (2,3,4,4,5,7)				
		9.50-10.00	B					
		Type		Results				

Continued next sheet

Remarks:

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Borehole No **BH5**
Sheet 2 of 2

Project Name	Project No.	Co-ords: -	Hole Type
Herbert Road	12032		Cable
Location: Newport		Level: -	Scale 1:50
Client: Greenhill Construction		Dates: 07/11/2012-08/11/2012	Logged By MW

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		11.00 11.00-11.40	CPT B	50/285mm 285mm (6,6,9,12,14,15)	11.10 11.40			Firm becoming stiff red brown and grey gravelly CLAY. Gravel is fine to coarse of angular mudstone. Very weak red brown and grey MUDSTONE End of Borehole at 11.40 m

Type Results

Remarks:

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Borehole No **BH6** Sheet 1 of 2

Project Name	Project No.	Co-ords: -	Hole Type
Herbert Road	12032		Cable
Location: Newport		Level: -	Scale 1:50
Client: Greenhill Construction		Dates: 08/11/2012-09/11/2012	Logged By MW

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		0.00-0.30	B		0.30			TOPSOIL. Soft brown organic rich clay with many rootlets and roots.
		0.30-1.20	B		0.70			MADE GROUND. Dense grey and brown gravel with some cobbles of angular brick and concrete. Gravel is fine to coarse of angular brick and concrete.
		1.20	SPT	N=2 N=2 (1,0,0,0,1,1)				Very soft grey CLAY
		1.20-2.00	B					
		2.00	SPT	N=2 N=2 (1,1,0,1,0,1)				
		2.00-3.50	B					
		3.00	SPT	N=3 N=3 (1,0,0,1,1,1)				
		3.50	SPT	N=4 N=4 (1,0,1,1,1,1)	3.50			Very soft PEAT
		3.50-4.10	B					
					4.10			Very soft grey CLAY
		4.10-5.00	B					
		5.00	SPT	N=10 N=10 (1,3,2,2,3,3)	5.00			Medium dense grey SAND and GRAVEL of fine to coarse angular sandstone
		5.00-6.00	B					
		6.00	SPT	N=13 N=13 (2,2,3,3,3,4)	5.90			Firm becoming stiff red brown grey gravelly CLAY. Gravel is fine to coarse of angular mudstone.
		6.00-7.00	B					
		7.00	SPT	N=24 N=24 (4,6,5,7,6,6)				
		7.00-9.00	B					
		8.50	SPT	50/209mm 209mm (9,11,15,19,16)				
		9.00	CPT	N=38 N=38 (8,10,15,8,7,8)				
		9.00-10.00	B					
			Type	Results				Continued next sheet

Remarks:

AGS

terrafirma
Terra Firma (Wales) Limited
Wharfedale Road, Pentwyn
Cardiff
CF23 7HB
Tel: 029 20 735 354
Fax: 029 20 735 433
Email: info@terrafirmawales.co.uk

Borehole No
BH6
Sheet 2 of 2

Project Name	Project No.	Co-ords: -	Hole Type
Herbert Road	12032		Cable
Location: Newport		Level: -	Scale 1:50
Client: Greenhill Construction		Dates: 08/11/2012-09/11/2012	Logged By MW

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		10.00 10.00-10.30	CPT B	50/225mm 225mm (10,16,16,17,17)	10.00 10.30			Very weak red brown and grey MUDSTONE End of Borehole at 10.30 m

Type	Results

Remarks:

AGS

ANNEX F
Windowless Sample Borehole Logs

terrafirma
Terra Firma (Wales) Limited
Wharfedale Road, Pentwyn
Cardiff
CF23 7HB
Tel: 029 20 735 354
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Email: info@terrafirmawales.co.uk

Borehole No
WS1
Sheet 1 of 1

Project Name: Herbert Road	Project No.: 12032	Co-ords: -	Hole Type: WLS
Location: Newport		Level: -	Scale: 1:50
Client: Greenhill Construction		Dates: 21/01/2013	Logged By

Well	Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.20			TOPSOIL. Grass over soft red brown slightly gravelly clay with many rootlets. Gravel is fine to coarse of angular mudstone.
					0.70			MADE GROUND. Dense grey very gravelly sand with some cobbles of angular sandstone.
								MADE GROUND. Very loose brown mottled gravelly sand. Some litter including bottles, jobs and ceramic. Gravel is fine to coarse of angular slate, mudstone, brick and sandstone. Occasional cobbles of angular brick.
					3.00			End of Borehole at 3.00 m
			Type	Results				

Remarks:

AGS

terrafirma
Terra Firma (Wales) Limited
Wharfedale Road, Pentwyn
Cardiff
CF23 7HB
Tel: 029 20 735 354
Fax: 029 20 735 433
Email: info@terrafirmawales.co.uk

Borehole No
WS2
Sheet 1 of 1

Project Name: Herbert Road	Project No.: 12032	Co-ords: -	Hole Type: WLS
Location: Newport		Level: -	Scale: 1:50
Client: Greenhill Construction		Dates: 21/01/2013	Logged By

Well	Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.20			TOPSOIL. Grass over soft red brown slightly gravelly clay with many rootlets. Gravel is fine to coarse of angular mudstone.
					0.60			MADE GROUND. Stiff brown clay
								MADE GROUND. Very loose brown mottled gravelly sand. Some litter including bottles, jobs and ceramic. Gravel is fine to coarse of angular slate, mudstone, brick and sandstone. Occasional cobbles of angular brick.
					2.50			Soft blue grey CLAY
					3.00			End of Borehole at 3.00 m
			Type	Results				

Remarks:

AGS

terrafirma
Terra Firma (Wales) Limited
Wharfedale Road, Pentwyn
Cardiff
CF23 7HB
Tel: 029 20 735 354
Fax: 029 20 735 433
Email: info@terrafirmawales.co.uk

Borehole No
WS3
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
Herbert Road	12032		WLS
Location: Newport		Level: -	Scale 1:50
Client: Greenhill Construction		Dates: 21/01/2013	Logged By

Well	Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.20			TOPSOIL. Grass over soft red brown slightly gravelly clay with many rootlets. Gravel is fine to coarse of angular mudstone.
					0.60			MADE GROUND. Stiff brown clay
								MADE GROUND. Firm black very gravelly clay with some cobbles of angular concrete and brick. Many bottles, rubber, plastic, ceramic and litter. Gravel of fine to coarse of angular brick, concrete and ceramic and vitreous slag.
					2.20			Soft blue grey CLAY
					3.00			End of Borehole at 3.00 m
			Type	Results				

Remarks:

AGS

ANNEX G
Laboratory Soil & Groundwater Chemical Test Results

Certificate of Analysis

2139

Certificate Number: 12-71357-2

Date: 11/01/2013

Client:	Terra Firma (Wales) Ltd 5 Deryn Court Wharfdale Road Pentwyn Cardiff CF23 7HB
Our Reference:	12-71357-2
Client Reference:	
Contract Title:	Herbert Road
Description:	15 soil samples
Date Received:	09 November 2012
Date Started:	09 November 2012
Date Completed:	28 November 2012
Test Procedures:	Identified by prefix DETSn (details on request), Asbestos Analysis (DETS 082).
Notes:	**This report supersedes 12-71357-1, additional testing carried out** Observations and interpretations are outside the scope of UKAS accreditation
Approved By:	 Rob Brown, Business Manager

Derwentside Environmental Testing Services Limited
Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • Fax 01207 582444 • email: info@dets.co.uk • www.dets.co.uk

Information in Support of the Analytical Results

Analysis

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425um sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample.

Key

*	Denotes test not included in laboratory scope of accreditation
#	Denotes test that holds MCERTS accreditation, however, MCERTS accreditation is only implied if the report carries the MCERTS logo
$	Denotes tests completed by an approved subcontractor
I/S	Denotes insufficient sample to carry out test
U/S	Denotes that the sample is not suitable for testing

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month
Liquids - 2 weeks
Asbestos (test portion) - 6 months

Summary of Chemical Analysis
Matrix Descriptions

Our Ref: 12-71357-2
Client Ref:
Contract Title: Herbert Road

Sample ID	Depth	Sample No	Completed	Matrix Description
TP2	0.90	460753	28/11/2012	Dark brown gravelly sandy CLAY
TP4	0.70	460754	28/11/2012	Dark brown gravelly sandy CLAY
TP5	1.30	460755	28/11/2012	Dark brown clayey gravelly SAND
TP6	0.60	460756	28/11/2012	Brown clayey gravelly SAND
TP6	1.80	460757	28/11/2012	Dark brown gravelly sandy CLAY with odd rootlets
TP7	0.20	460758	28/11/2012	Dark brown gravelly sandy CLAY with odd rootlets
TP8	0.50	460759	28/11/2012	Dark brown clayey gravelly SAND
TP9	1.00	460760	28/11/2012	Dark brown gravelly sandy CLAY
TP10	0.80	460761	28/11/2012	Dark brown gravelly sandy CLAY
TP12	0.40	460762	28/11/2012	Brown very gravelly SAND
TP13	0.60	460763	28/11/2012	Brown very gravelly SAND
TP14	0.40	460764	28/11/2012	Dark brown clayey gravelly SAND
TP15	0.40	460765	28/11/2012	Brown gravelly sandy CLAY with odd rootlets
TP17	0.15	460766	28/11/2012	Dark brown gravelly sandy CLAY with odd rootlets
TP18	0.50	460767	28/11/2012	Dark brown clayey gravelly SAND with odd rootlets

Summary of Chemical Analysis
Soil Samples

Our Ref: 12-71357-2
Client Ref:
Contract Title: Herbert Road

			Lab No.	460753	460754	460755
			Sample ID	TP2	TP4	TP5
			Depth	0.90	0.70	1.30
			Sample Ref			
			Sample Type			
			Sampling Date	06/11/2012	06/11/2012	06/11/2012
			Sampling Time			
Test	**Units**	**DETSxx**	**LOD**			
Arsenic	mg/kg	DETS 042#	0.2	21	26	40
Cadmium	mg/kg	DETS 042#	0.1	1.0	0.8	1.1
Chromium III	mg/kg	DETS 042*	0.15	41	42	35
Chromium	mg/kg	DETS 042#	0.15	41	42	35
Hexavalent Chromium	mg/kg	DETSC 2204*	1	< 1.0	< 1.0	< 1.0
Copper	mg/kg	DETS 042#	0.2	230	44	950
Lead	mg/kg	DETS 042#	0.3	110	100	290
Mercury	mg/kg	DETSC 2325	0.05	0.45	0.39	0.41
Nickel	mg/kg	DETS 042#	1	45	31	69
Selenium	mg/kg	DETS 042#	0.5	0.6	< 0.5	0.9
Zinc	mg/kg	DETS 042#	1	250	150	410
Cyanide total	mg/kg	DETSC 2130#	0.1	10	1.2	2.1
Organic matter	%	DETSC 2002#	0.1	7.5	8.6	23
Total Sulphate as SO4	%	DETSC 2321#	0.01	0.10	0.09	0.24
Sulphate Aqueous Extract as SO4	mg/l	DETSC 2076#	10			
pH		DETSC 2008#		8.9	8.8	8.2
Aliphatic C5-C6	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	mg/kg	DETSC 3072#	1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	mg/kg	DETSC 3072#	1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	mg/kg	DETSC 3072#	1.5	< 1.5	< 1.5	1.7
Aliphatic C21-C35	mg/kg	DETSC 3072#	3.4	< 3.4	< 3.4	7.9
Aromatic C5-C7	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	mg/kg	DETSC 3072#	0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	mg/kg	DETSC 3072#	0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	mg/kg	DETSC 3072#	0.6	1.8	< 0.6	< 0.6
Aromatic C21-C35	mg/kg	DETSC 3072#	1.4	5.9	< 1.4	2.0
Aliphatic C5-C35	mg/kg	DETSC 3072*	10	< 10	< 10	< 10
Aromatic C5-C35	mg/kg	DETSC 3072*	10	< 10	< 10	< 10
TPH Ali/Aro	mg/kg	DETSC 3072*	10	< 10	< 10	12

Summary of Chemical Analysis
Soil Samples

Our Ref: 12-71357-2
Client Ref:
Contract Title: Herbert Road

			Lab No.	460753	460754	460755
			Sample ID	TP2	TP4	TP5
			Depth	0.90	0.70	1.30
			Sample Ref			
			Sample Type			
			Sampling Date	06/11/2012	06/11/2012	06/11/2012
			Sampling Time			
Test	**Units**	**DETSxx**	**LOD**			
Acenaphthene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	
Acenaphthylene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	
Anthracene	mg/kg	DETSC 3301	0.1	0.2	0.1	
Benzo(a)anthracene	mg/kg	DETSC 3301	0.1	0.8	0.8	
Benzo(a)pyrene	mg/kg	DETSC 3301	0.1	0.8	0.9	
Benzo(b)fluoranthene	mg/kg	DETSC 3301	0.1	0.8	0.6	
Benzo(k)fluoranthene	mg/kg	DETSC 3301	0.1	0.3	0.3	
Benzo(g,h,i)perylene	mg/kg	DETSC 3301	0.1	0.5	0.4	
Chrysene	mg/kg	DETSC 3301	0.1	0.9	0.8	
Dibenzo(a,h)anthracene	mg/kg	DESTC 3301	0.1	0.2	0.2	
Fluoranthene	mg/kg	DETSC 3301	0.1	1.2	1.2	
Fluorene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	
Indeno(1,2,3-c,d)pyrene	mg/kg	DETSC 3301	0.1	0.7	0.5	
Naphthalene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	
Phenanthrene	mg/kg	DETSC 3301	0.1	0.6	0.5	
Pyrene	mg/kg	DETSC 3301	0.1	1.1	1.0	
PAH	mg/kg	DETSC 3301	1.6	8.3	7.4	< 1.6
Phenol - Monohydric	mg/kg	DETSC 2130#	0.3	< 0.3	< 0.3	< 0.3
PCB	mg/kg	DETSC 3401#	0.01			< 0.01
2,4,4'-Trichlorobiphenyl PCB 28	mg/kg	DETSC 3401#	0.01			< 0.01
2,2',5,5'-Tetrachlorobiphenyl PCB 52	mg/kg	DETSC 3401#	0.01			< 0.01
2,2',4,5,5'-Pentachlorobiphenyl PCB 101	mg/kg	DETSC 3401#	0.01			< 0.01
2,3',4,4',5-Pentachlorobiphenyl PCB 118	mg/kg	DETSC 3401#	0.01			< 0.01
2,2',4,4',5,5'-Hexachlorobiphenyl PCB 153	mg/kg	DETSC 3401#	0.01			< 0.01
2,2',3,4,4',5'-Hexachlorobiphenyl PCB 138	mg/kg	DETSC 3401#	0.01			< 0.01
2,2',3,4,4',5,5'-Heptachlorobiphenyl PCB 180	mg/kg	DETSC 3401#	0.01			< 0.01

Summary of Chemical Analysis
Soil Samples

Our Ref: 12-71357-2
Client Ref:
Contract Title: Herbert Road

			Lab No.	460756	460757	460758
			Sample ID	TP6	TP6	TP7
			Depth	0.60	1.80	0.20
			Sample Ref			
			Sample Type			
			Sampling Date	06/11/2012	06/11/2012	06/11/2012
			Sampling Time			
Test	**Units**	**DETSxx**	**LOD**			
Arsenic	mg/kg	DETS 042#	0.2	8.1	17	19
Cadmium	mg/kg	DETS 042#	0.1	0.8	1.2	0.9
Chromium III	mg/kg	DETS 042*	0.15	19	31	42
Chromium	mg/kg	DETS 042#	0.15	19	31	42
Hexavalent Chromium	mg/kg	DETSC 2204*	1	< 1.0	< 1.0	< 1.0
Copper	mg/kg	DETS 042#	0.2	10	130	110
Lead	mg/kg	DETS 042#	0.3	10	190	93
Mercury	mg/kg	DETSC 2325	0.05	0.05	1.9	0.43
Nickel	mg/kg	DETS 042#	1	31	43	43
Selenium	mg/kg	DETS 042#	0.5	< 0.5	< 0.5	< 0.5
Zinc	mg/kg	DETS 042#	1	140	330	240
Cyanide total	mg/kg	DETSC 2130#	0.1	0.5	3.1	0.5
Organic matter	%	DETSC 2002#	0.1	1.4	5.7	4.9
Total Sulphate as SO4	%	DETSC 2321#	0.01	0.02	0.21	0.06
Sulphate Aqueous Extract as SO4	mg/l	DETSC 2076#	10			
pH		DETSC 2008#		9.0	8.7	9.0
Aliphatic C5-C6	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	mg/kg	DETSC 3321*	0.01	< 0.01	0.02	< 0.01
Aliphatic C10-C12	mg/kg	DETSC 3072#	1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	mg/kg	DETSC 3072#	1.2	< 1.2	16	< 1.2
Aliphatic C16-C21	mg/kg	DETSC 3072#	1.5	< 1.5	120	< 1.5
Aliphatic C21-C35	mg/kg	DETSC 3072#	3.4	< 3.4	340	< 3.4
Aromatic C5-C7	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	mg/kg	DETSC 3321*	0.01	< 0.01	0.05	< 0.01
Aromatic C10-C12	mg/kg	DETSC 3072#	0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	mg/kg	DETSC 3072#	0.5	< 0.5	9.1	< 0.5
Aromatic C16-C21	mg/kg	DETSC 3072#	0.6	< 0.6	45	2.0
Aromatic C21-C35	mg/kg	DETSC 3072#	1.4	< 1.4	140	12
Aliphatic C5-C35	mg/kg	DETSC 3072*	10	< 10	480	< 10
Aromatic C5-C35	mg/kg	DETSC 3072*	10	< 10	190	14
TPH Ali/Aro	mg/kg	DETSC 3072*	10	< 10	670	14

Summary of Chemical Analysis
Soil Samples

Our Ref: 12-71357-2
Client Ref:
Contract Title: Herbert Road

			Lab No.	460756	460757	460758
			Sample ID	TP6	TP6	TP7
			Depth	0.60	1.80	0.20
			Sample Ref			
			Sample Type			
			Sampling Date	06/11/2012	06/11/2012	06/11/2012
			Sampling Time			
Test	**Units**	**DETSxx**	**LOD**			
Acenaphthene	mg/kg	DETSC 3301	0.1		1.5	0.4
Acenaphthylene	mg/kg	DETSC 3301	0.1		1.4	< 0.1
Anthracene	mg/kg	DETSC 3301	0.1		0.4	0.9
Benzo(a)anthracene	mg/kg	DETSC 3301	0.1		1.8	2.4
Benzo(a)pyrene	mg/kg	DETSC 3301	0.1		0.7	1.9
Benzo(b)fluoranthene	mg/kg	DETSC 3301	0.1		0.8	1.5
Benzo(k)fluoranthene	mg/kg	DETSC 3301	0.1		0.4	0.7
Benzo(g,h,i)perylene	mg/kg	DETSC 3301	0.1		0.9	1.1
Chrysene	mg/kg	DETSC 3301	0.1		1.1	2.3
Dibenzo(a,h)anthracene	mg/kg	DESTC 3301	0.1		0.2	0.3
Fluoranthene	mg/kg	DETSC 3301	0.1		1.1	4.4
Fluorene	mg/kg	DETSC 3301	0.1		0.1	0.3
Indeno(1,2,3-c,d)pyrene	mg/kg	DETSC 3301	0.1		0.6	1.3
Naphthalene	mg/kg	DETSC 3301	0.1		0.2	0.7
Phenanthrene	mg/kg	DETSC 3301	0.1		0.5	3.3
Pyrene	mg/kg	DETSC 3301	0.1		1.3	3.8
PAH	mg/kg	DETSC 3301	1.6	< 1.6	13	25
Phenol - Monohydric	mg/kg	DETSC 2130#	0.3	< 0.3	0.5	< 0.3
PCB	mg/kg	DETSC 3401#	0.01	0.15		< 0.01
2,4,4'-Trichlorobiphenyl PCB 28	mg/kg	DETSC 3401#	0.01	< 0.01		< 0.01
2,2',5,5'-Tetrachlorobiphenyl PCB 52	mg/kg	DETSC 3401#	0.01	< 0.01		< 0.01
2,2',4,5,5'-Pentachlorobiphenyl PCB 101	mg/kg	DETSC 3401#	0.01	0.01		< 0.01
2,3',4,4',5-Pentachlorobiphenyl PCB 118	mg/kg	DETSC 3401#	0.01	0.02		< 0.01
2,2',4,4',5,5'-Hexachlorobiphenyl PCB 153	mg/kg	DETSC 3401#	0.01	0.02		< 0.01
2,2',3,4,4',5'-Hexachlorobiphenyl PCB 138	mg/kg	DETSC 3401#	0.01	0.05		< 0.01
2,2',3,4,4',5,5'-Heptachlorobiphenyl PCB 180	mg/kg	DETSC 3401#	0.01	0.04		< 0.01

Summary of Chemical Analysis
Soil Samples

Our Ref: 12-71357-2
Client Ref:
Contract Title: Herbert Road

			Lab No.	460759	460760	460761
			Sample ID	TP8	TP9	TP10
			Depth	0.50	1.00	0.80
			Sample Ref			
			Sample Type			
			Sampling Date	06/11/2012	06/11/2012	06/11/2012
			Sampling Time			
Test	**Units**	**DETSxx**	**LOD**			
Arsenic	mg/kg	DETS 042#	0.2	14	19	15
Cadmium	mg/kg	DETS 042#	0.1	6.2	1.2	0.9
Chromium III	mg/kg	DETS 042*	0.15	16	51	30
Chromium	mg/kg	DETS 042#	0.15	16	51	30
Hexavalent Chromium	mg/kg	DETSC 2204*	1	< 1.0	< 1.0	< 1.0
Copper	mg/kg	DETS 042#	0.2	48	170	95
Lead	mg/kg	DETS 042#	0.3	190	130	100
Mercury	mg/kg	DETSC 2325	0.05	0.51	1.1	0.58
Nickel	mg/kg	DETS 042#	1	16	49	36
Selenium	mg/kg	DETS 042#	0.5	< 0.5	< 0.5	< 0.5
Zinc	mg/kg	DETS 042#	1	440	280	220
Cyanide total	mg/kg	DETSC 2130#	0.1	0.5	0.8	0.4
Organic matter	%	DETSC 2002#	0.1	5.8	6.9	6.7
Total Sulphate as SO4	%	DETSC 2321#	0.01	0.15	0.08	0.10
Sulphate Aqueous Extract as SO4	mg/l	DETSC 2076#	10			
pH		DETSC 2008#		9.0	8.9	8.9
Aliphatic C5-C6	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	mg/kg	DETSC 3072#	1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	mg/kg	DETSC 3072#	1.2	1.5	< 1.2	1.8
Aliphatic C16-C21	mg/kg	DETSC 3072#	1.5	4.1	2.8	4.3
Aliphatic C21-C35	mg/kg	DETSC 3072#	3.4	29	12	24
Aromatic C5-C7	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	mg/kg	DETSC 3072#	0.9	0.9	< 0.9	< 0.9
Aromatic C12-C16	mg/kg	DETSC 3072#	0.5	4.3	0.9	< 0.5
Aromatic C16-C21	mg/kg	DETSC 3072#	0.6	50	12	5.0
Aromatic C21-C35	mg/kg	DETSC 3072#	1.4	210	33	27
Aliphatic C5-C35	mg/kg	DETSC 3072*	10	34	14	30
Aromatic C5-C35	mg/kg	DETSC 3072*	10	260	46	32
TPH Ali/Aro	mg/kg	DETSC 3072*	10	300	60	62

Summary of Chemical Analysis
Soil Samples

Our Ref: 12-71357-2
Client Ref:
Contract Title: Herbert Road

			Lab No.	460759	460760	460761
			Sample ID	TP8	TP9	TP10
			Depth	0.50	1.00	0.80
			Sample Ref			
			Sample Type			
			Sampling Date	06/11/2012	06/11/2012	06/11/2012
			Sampling Time			
Test	**Units**	**DETSxx**	**LOD**			
Acenaphthene	mg/kg	DETSC 3301	0.1	0.3	< 0.1	< 0.1
Acenaphthylene	mg/kg	DETSC 3301	0.1	1.1	0.3	< 0.1
Anthracene	mg/kg	DETSC 3301	0.1	5.6	< 0.1	0.3
Benzo(a)anthracene	mg/kg	DETSC 3301	0.1	13	1.1	1.2
Benzo(a)pyrene	mg/kg	DETSC 3301	0.1	11	1.3	1.5
Benzo(b)fluoranthene	mg/kg	DETSC 3301	0.1	9.0	1.0	1.4
Benzo(k)fluoranthene	mg/kg	DETSC 3301	0.1	4.5	0.5	0.6
Benzo(g,h,i)perylene	mg/kg	DETSC 3301	0.1	8.7	0.8	0.6
Chrysene	mg/kg	DETSC 3301	0.1	13	1.5	1.5
Dibenzo(a,h)anthracene	mg/kg	DESTC 3301	0.1	1.6	0.3	0.3
Fluoranthene	mg/kg	DETSC 3301	0.1	22	1.1	2.2
Fluorene	mg/kg	DETSC 3301	0.1	2.0	< 0.1	0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	DETSC 3301	0.1	7.5	1.1	1.3
Naphthalene	mg/kg	DETSC 3301	0.1	0.5	0.1	0.1
Phenanthrene	mg/kg	DETSC 3301	0.1	16	0.4	1.3
Pyrene	mg/kg	DETSC 3301	0.1	17	1.4	2.0
PAH	mg/kg	DETSC 3301	1.6	130	11	14
Phenol - Monohydric	mg/kg	DETSC 2130#	0.3	< 0.3	< 0.3	< 0.3
PCB	mg/kg	DETSC 3401#	0.01			< 0.01
2,4,4'-Trichlorobiphenyl PCB 28	mg/kg	DETSC 3401#	0.01			< 0.01
2,2',5,5'-Tetrachlorobiphenyl PCB 52	mg/kg	DETSC 3401#	0.01			< 0.01
2,2',4,5,5'-Pentachlorobiphenyl PCB 101	mg/kg	DETSC 3401#	0.01			< 0.01
2,3',4,4',5-Pentachlorobiphenyl PCB 118	mg/kg	DETSC 3401#	0.01			< 0.01
2,2',4,4',5,5'-Hexachlorobiphenyl PCB 153	mg/kg	DETSC 3401#	0.01			< 0.01
2,2',3,4,4',5'-Hexachlorobiphenyl PCB 138	mg/kg	DETSC 3401#	0.01			< 0.01
2,2',3,4,4',5,5'-Heptachlorobiphenyl PCB 180	mg/kg	DETSC 3401#	0.01			< 0.01

Summary of Chemical Analysis
Soil Samples

Our Ref: 12-71357-2
Client Ref:
Contract Title: Herbert Road

			Lab No.	460762	460763	460764	460765
			Sample ID	TP12	TP13	TP14	TP15
			Depth	0.40	0.60	0.40	0.40
			Sample Ref				
			Sample Type				
			Sampling Date	06/11/2012	07/11/2012	07/11/2012	07/11/2012
			Sampling Time				
Test	**Units**	**DETSxx**	**LOD**				
Arsenic	mg/kg	DETS 042#	0.2	6.0	8.6	5.7	10
Cadmium	mg/kg	DETS 042#	0.1	0.9	0.4	0.8	0.5
Chromium III	mg/kg	DETS 042*	0.15	7.9	23	100	40
Chromium	mg/kg	DETS 042#	0.15	7.9	23	100	40
Hexavalent Chromium	mg/kg	DETSC 2204*	1	< 1.0	< 1.0	< 1.0	< 1.0
Copper	mg/kg	DETS 042#	0.2	8.8	15	22	13
Lead	mg/kg	DETS 042#	0.3	51	34	64	20
Mercury	mg/kg	DETSC 2325	0.05	< 0.05	0.09	0.06	< 0.05
Nickel	mg/kg	DETS 042#	1	7.7	16	12	36
Selenium	mg/kg	DETS 042#	0.5	< 0.5	< 0.5	1.4	< 0.5
Zinc	mg/kg	DETS 042#	1	45	96	96	87
Cyanide total	mg/kg	DETSC 2130#	0.1	< 0.1	< 0.1	0.2	< 0.1
Organic matter	%	DETSC 2002#	0.1	1.2	1.5	2.3	0.8
Total Sulphate as SO4	%	DETSC 2321#	0.01	0.25	0.12	0.14	0.03
Sulphate Aqueous Extract as SO4	mg/l	DETSC 2076#	10	160			
pH		DETSC 2008#		11.8	10.9	11.6	9.3
Aliphatic C5-C6	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01	
Aliphatic C6-C8	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01	
Aliphatic C8-C10	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01	
Aliphatic C10-C12	mg/kg	DETSC 3072#	1.5	< 1.5	< 1.5	< 1.5	
Aliphatic C12-C16	mg/kg	DETSC 3072#	1.2	1.9	< 1.2	< 1.2	
Aliphatic C16-C21	mg/kg	DETSC 3072#	1.5	4.1	2.1	< 1.5	
Aliphatic C21-C35	mg/kg	DETSC 3072#	3.4	11	11	18	
Aromatic C5-C7	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01	
Aromatic C7-C8	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01	
Aromatic C8-C10	mg/kg	DETSC 3321*	0.01	< 0.01	< 0.01	< 0.01	
Aromatic C10-C12	mg/kg	DETSC 3072#	0.9	< 0.9	< 0.9	< 0.9	
Aromatic C12-C16	mg/kg	DETSC 3072#	0.5	< 0.5	< 0.5	< 0.5	
Aromatic C16-C21	mg/kg	DETSC 3072#	0.6	6.1	1.7	1.1	
Aromatic C21-C35	mg/kg	DETSC 3072#	1.4	31	17	31	
Aliphatic C5-C35	mg/kg	DETSC 3072*	10	17	13	19	
Aromatic C5-C35	mg/kg	DETSC 3072*	10	37	19	32	
TPH Ali/Aro	mg/kg	DETSC 3072*	10	54	32	50	

Summary of Chemical Analysis
Soil Samples

Our Ref: 12-71357-2
Client Ref:
Contract Title: Herbert Road

			Lab No.	460762	460763	460764	460765
			Sample ID	TP12	TP13	TP14	TP15
			Depth	0.40	0.60	0.40	0.40
			Sample Ref				
			Sample Type				
			Sampling Date	06/11/2012	07/11/2012	07/11/2012	07/11/2012
			Sampling Time				
Test	**Units**	**DETSxx**	**LOD**				
Acenaphthene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	DETSC 3301	0.1	0.5	0.3	0.2	< 0.1
Benzo(a)pyrene	mg/kg	DETSC 3301	0.1	0.3	0.2	0.3	< 0.1
Benzo(b)fluoranthene	mg/kg	DETSC 3301	0.1	0.3	0.2	0.3	< 0.1
Benzo(k)fluoranthene	mg/kg	DETSC 3301	0.1	< 0.1	0.1	0.1	< 0.1
Benzo(g,h,i)perylene	mg/kg	DETSC 3301	0.1	0.2	0.2	0.2	< 0.1
Chrysene	mg/kg	DETSC 3301	0.1	0.4	0.2	0.3	< 0.1
Dibenzo(a,h)anthracene	mg/kg	DESTC 3301	0.1	< 0.1	< 0.1	0.1	< 0.1
Fluoranthene	mg/kg	DETSC 3301	0.1	0.3	0.2	0.5	< 0.1
Fluorene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	DETSC 3301	0.1	0.2	0.2	0.2	< 0.1
Naphthalene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	DETSC 3301	0.1	0.2	0.2	0.5	< 0.1
PAH	mg/kg	DETSC 3301	1.6	2.6	2.0	2.8	< 1.6
Phenol - Monohydric	mg/kg	DETSC 2130#	0.3	< 0.3	< 0.3	< 0.3	< 0.3
PCB	mg/kg	DETSC 3401#	0.01	< 0.01	0.16	< 0.01	< 0.01
2,4,4'-Trichlorobiphenyl PCB 28	mg/kg	DETSC 3401#	0.01	< 0.01	0.12	< 0.01	< 0.01
2,2',5,5'-Tetrachlorobiphenyl PCB 52	mg/kg	DETSC 3401#	0.01	< 0.01	0.05	< 0.01	< 0.01
2,2',4,5,5'-Pentachlorobiphenyl PCB 101	mg/kg	DETSC 3401#	0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,3',4,4',5-Pentachlorobiphenyl PCB 118	mg/kg	DETSC 3401#	0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,2',4,4',5,5'-Hexachlorobiphenyl PCB 153	mg/kg	DETSC 3401#	0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,2',3,4,4',5'-Hexachlorobiphenyl PCB 138	mg/kg	DETSC 3401#	0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,2',3,4,4',5,5'-Heptachlorobiphenyl PCB 180	mg/kg	DETSC 3401#	0.01	< 0.01	< 0.01	< 0.01	< 0.01

Summary of Chemical Analysis
Soil Samples

Our Ref: 12-71357-2
Client Ref:
Contract Title: Herbert Road

			Lab No.	460766	460767
			Sample ID	TP17	TP18
			Depth	0.15	0.50
			Sample Ref		
			Sample Type		
			Sampling Date	07/11/2012	07/11/2012
			Sampling Time		
Test	**Units**	**DETSxx**	**LOD**		
Arsenic	mg/kg	DETS 042#	0.2	14	10
Cadmium	mg/kg	DETS 042#	0.1	0.6	0.4
Chromium III	mg/kg	DETS 042*	0.15	48	25
Chromium	mg/kg	DETS 042#	0.15	48	25
Hexavalent Chromium	mg/kg	DETSC 2204*	1	< 1.0	< 1.0
Copper	mg/kg	DETS 042#	0.2	23	40
Lead	mg/kg	DETS 042#	0.3	44	41
Mercury	mg/kg	DETSC 2325	0.05	0.15	0.20
Nickel	mg/kg	DETS 042#	1	31	20
Selenium	mg/kg	DETS 042#	0.5	< 0.5	< 0.5
Zinc	mg/kg	DETS 042#	1	130	92
Cyanide total	mg/kg	DETSC 2130#	0.1	0.2	0.2
Organic matter	%	DETSC 2002#	0.1	9.6	6.4
Total Sulphate as SO4	%	DETSC 2321#	0.01	0.08	0.10
Sulphate Aqueous Extract as SO4	mg/l	DETSC 2076#	10		
pH		DETSC 2008#		8.7	9.0
Aliphatic C5-C6	mg/kg	DETSC 3321*	0.01		
Aliphatic C6-C8	mg/kg	DETSC 3321*	0.01		
Aliphatic C8-C10	mg/kg	DETSC 3321*	0.01		
Aliphatic C10-C12	mg/kg	DETSC 3072#	1.5		
Aliphatic C12-C16	mg/kg	DETSC 3072#	1.2		
Aliphatic C16-C21	mg/kg	DETSC 3072#	1.5		
Aliphatic C21-C35	mg/kg	DETSC 3072#	3.4		
Aromatic C5-C7	mg/kg	DETSC 3321*	0.01		
Aromatic C7-C8	mg/kg	DETSC 3321*	0.01		
Aromatic C8-C10	mg/kg	DETSC 3321*	0.01		
Aromatic C10-C12	mg/kg	DETSC 3072#	0.9		
Aromatic C12-C16	mg/kg	DETSC 3072#	0.5		
Aromatic C16-C21	mg/kg	DETSC 3072#	0.6		
Aromatic C21-C35	mg/kg	DETSC 3072#	1.4		
Aliphatic C5-C35	mg/kg	DETSC 3072*	10		
Aromatic C5-C35	mg/kg	DETSC 3072*	10		
TPH Ali/Aro	mg/kg	DETSC 3072*	10		

Summary of Chemical Analysis
Soil Samples

Our Ref: 12-71357-2
Client Ref:
Contract Title: Herbert Road

			Lab No.	460766	460767
			Sample ID	TP17	TP18
			Depth	0.15	0.50
			Sample Ref		
			Sample Type		
			Sampling Date	07/11/2012	07/11/2012
			Sampling Time		
Test	**Units**	**DETSxx**	**LOD**		
Acenaphthene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1
Anthracene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	DETSC 3301	0.1	0.3	0.1
Benzo(a)pyrene	mg/kg	DETSC 3301	0.1	0.4	0.2
Benzo(b)fluoranthene	mg/kg	DETSC 3301	0.1	0.4	0.2
Benzo(k)fluoranthene	mg/kg	DETSC 3301	0.1	0.2	< 0.1
Benzo(g,h,i)perylene	mg/kg	DETSC 3301	0.1	0.3	0.2
Chrysene	mg/kg	DETSC 3301	0.1	0.4	0.2
Dibenzo(a,h)anthracene	mg/kg	DESTC 3301	0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	DETSC 3301	0.1	1.0	0.3
Fluorene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	DETSC 3301	0.1	0.3	0.2
Naphthalene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1
Pyrene	mg/kg	DETSC 3301	0.1	0.8	0.4
PAH	mg/kg	DETSC 3301	1.6	4.2	2.0
Phenol - Monohydric	mg/kg	DETSC 2130#	0.3	< 0.3	0.4
PCB	mg/kg	DETSC 3401#	0.01	< 0.01	< 0.01
2,4,4'-Trichlorobiphenyl PCB 28	mg/kg	DETSC 3401#	0.01	< 0.01	< 0.01
2,2',5,5'-Tetrachlorobiphenyl PCB 52	mg/kg	DETSC 3401#	0.01	< 0.01	< 0.01
2,2',4,5,5'-Pentachlorobiphenyl PCB 101	mg/kg	DETSC 3401#	0.01	< 0.01	< 0.01
2,3',4,4',5-Pentachlorobiphenyl PCB 118	mg/kg	DETSC 3401#	0.01	< 0.01	< 0.01
2,2',4,4',5,5'-Hexachlorobiphenyl PCB 153	mg/kg	DETSC 3401#	0.01	< 0.01	< 0.01
2,2',3,4,4',5'-Hexachlorobiphenyl PCB 138	mg/kg	DETSC 3401#	0.01	< 0.01	< 0.01
2,2',3,4,4',5,5'-Heptachlorobiphenyl PCB 180	mg/kg	DETSC 3401#	0.01	< 0.01	< 0.01

Summary of Asbestos Analysis
Soil Samples

Our Ref: 12-71357-2
Client Ref:
Contract Title: Herbert Road

Lab No	Sample Ref	Material Type*	Result	Comment	Analyst
460753	TP2 0.90	Soil	NAD	na	Emrhys Sheldon
460754	TP4 0.70	Soil	NAD	na	Emrhys Sheldon
460755	TP5 1.30	Soil	NAD	na	Emrhys Sheldon
460756	TP6 0.60	Soil	NAD	na	Emrhys Sheldon
460757	TP6 1.80	Soil	Chrysotile	Loose Bundles	Emrhys Sheldon
460758	TP7 0.20	Soil	Chrysotile	Loose Bundles	Emrhys Sheldon
460759	TP8 0.50	Soil	NAD	na	Emrhys Sheldon
460760	TP9 1.00	Soil	NAD	na	Emrhys Sheldon
460761	TP10 0.80	Soil	NAD	na	Emrhys Sheldon
460762	TP12 0.40	Soil	NAD	na	Emrhys Sheldon
460763	TP13 0.60	Soil	NAD	na	Emrhys Sheldon
460764	TP14 0.40	Soil	NAD	na	Emrhys Sheldon
460765	TP15 0.40	Soil	NAD	na	Emrhys Sheldon
460766	TP17 0.15	Soil	NAD	na	Emrhys Sheldon
460767	TP18 0.50	Soil	NAD	na	Emrhys Sheldon

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. NAD = No Asbestos Detected. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETS 082 using polarised light microscopy in accordance with HSG248 and documented in-house methods. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'.

Sample Comments

DETS cannot be held responsible for the integrity of sample(s) received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating.

Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note "Guidance on Deviating Samples".

All samples received are listed below. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations.

If no sampled date (soils) or date/time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters), this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Lab No.	Sample ID	Date Sampled	Containers Received	Deviating due to holding time being exceeded for test	Deviating due to inappropriate container for test
460753	TP2 0.90 SOIL	06/11/2012	Glass Jar 250ml or less (250ml) x2, Plastic Tub 1 litre (1kg)		
460754	TP4 0.70 SOIL	06/11/2012	Glass Jar 250ml or less (250ml) x2, Plastic Tub 1 litre (1kg)		
460755	TP5 1.30 SOIL	06/11/2012	Glass Jar 250ml or less (250ml) x2, Plastic Tub 1 litre (1kg)		
460756	TP6 0.60 SOIL	06/11/2012	Glass Jar 250ml or less (250ml) x2, Plastic Tub 1 litre (1kg)		
460757	TP6 1.80 SOIL	06/11/2012	Glass Jar 250ml or less (250ml) x2, Plastic Tub 1 litre (1kg)		
460758	TP7 0.20 SOIL	06/11/2012	Glass Jar 250ml or less (250ml) x2, Plastic Tub 1 litre (1kg)		
460759	TP8 0.50 SOIL	06/11/2012	Glass Jar 250ml or less (250ml) x2, Plastic Tub 1 litre (1kg)		
460760	TP9 1.00 SOIL	06/11/2012	Glass Jar 250ml or less (250ml) x2, Plastic Tub 1 litre (1kg)		

460761	TP10 0.80 SOIL	06/11/2012	Glass Jar 250ml or less (250ml) x2, Plastic Tub 1 litre (1kg)
460762	TP12 0.40 SOIL	06/11/2012	Glass Jar 250ml or less (250ml) x2, Plastic Tub 1 litre (1kg)
460763	TP13 0.60 SOIL	07/11/2012	Glass Jar 250ml or less (250ml) x2, Plastic Tub 1 litre (1kg)
460764	TP14 0.40 SOIL	07/11/2012	Glass Jar 250ml or less (250ml) x2, Plastic Tub 1 litre (1kg)
460765	TP15 0.40 SOIL	07/11/2012	Glass Jar 250ml or less (250ml) x2, Plastic Tub 1 litre (1kg)
460766	TP17 0.15 SOIL	07/11/2012	Glass Jar 250ml or less (250ml) x2, Plastic Tub 1 litre (1kg)
460767	TP18 0.50 SOIL	07/11/2012	Glass Jar 250ml or less (250ml) x2, Plastic Tub 1 litre (1kg)

Appendix A - Details of Analysis

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS.
No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Method	Name of Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic Matter	%	0.01	Air Dried	No	Yes	Yes
DETSC 2003	Loss on Ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2004	Total Sulphate	%	0.01	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate	%	0.01	Air Dried	No	Yes	Yes
DETSC 2004	Water Soluble Sulphate	mg/l	10.00	Air Dried	No	Yes	Yes
DETSC 2076	Water Soluble Sulphate	mg/l	10.00	Air Dried	No	Yes	Yes
DETSC 2006	Chloride	mg/kg	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	0.10	Air Dried	No	Yes	Yes
DETS 042	Selenium	mg/kg	0.50	Air Dried	No	Yes	Yes
DETSC 2119	Ammonia	mg/kg	0.02	Air Dried	No	Yes	Yes
DETS 020	Boron (Water Soluble)	mg/kg	0.20	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10.00	Air Dried	No	Yes	Yes
DETS 042	Antimony	mg/kg	1.00	Air Dried	No	No	No
DETS 042	Arsenic	mg/kg	0.20	Air Dried	No	Yes	Yes
DETS 042	Barium	mg/kg	1.50	Air Dried	No	Yes	Yes
DETS 042	Beryllium	mg/kg	0.20	Air Dried	No	Yes	Yes
DETS 042	Cadmium	mg/kg	0.10	Air Dried	No	Yes	Yes
DETS 042	Cobalt	mg/kg	0.70	Air Dried	No	Yes	Yes
DETS 042	Copper	mg/kg	0.20	Air Dried	No	Yes	Yes
DETS 042	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS 042	Iron	mg/kg	1.00	Air Dried	No	Yes	No

Appendix A - Details of Analysis

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS.
No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Method	Name of Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 042	Lead	mg/kg	0.30	Air Dried	No	Yes	Yes
DETS 042	Manganese	mg/kg	20.00	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 042	Molybdenum	mg/kg	0.40	Air Dried	No	Yes	Yes
DETS 042	Nickel	mg/kg	0.20	Air Dried	No	Yes	Yes
DETS 042	Thallium	mg/kg	1.00	Air Dried	No	No	No
DETS 042	Vanadium	mg/kg	0.80	Air Dried	No	Yes	Yes
DETS 042	Zinc	mg/kg	1.00	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (Free)	mg/kg	0.50	As Received	No	Yes	Yes
DETSC 3301	PAH by GC-FID	mg/kg	0.10	As Received	No	Yes	No
DETSC 3311	TPH (C10 - C40)	mg/kg	20.00	As Received	No	Yes	Yes
DETSC 3401	PCB	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Ethylbenzne	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Easily Liberatable Cyanide	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Complex Cyanide	mg/kg	0.30	Air Dried	No	Yes	No
DETSC 2130	Total Cyanide	mg/kg	0.40	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes

Appendix A - Details of Analysis

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS.
No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Method	Name of Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3431	VOC	mg/kg	0.01	As Received	No	No	No
DETSC 3303	PAH by GCMS (see list below)						
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Anthracene	mg/kg	0.03	As Received	No	Yes	No
DETSC 3303	Chrysene	mg/kg	0.03	As Received	No	Yes	No
DETSC 3303	Fluorene	mg/kg	0.03	As Received	No	Yes	No

Certificate of Analysis

2139

Date: 17/01/2013

Certificate Number: 13-73902

Client:	Terra Firma (Wales) Ltd 5 Deryn Court Wharfdale Road Pentwyn Cardiff CF23 7HB
Our Reference:	13-73902
Client Reference:	12032
Contract Title:	Herbert Road
Description:	6 water samples
Date Received:	09 January 2013
Date Started:	09 January 2013
Date Completed:	17 January 2013
Test Procedures:	Identified by prefix DETSn, details available upon request.
Notes:	Observations and interpretations are outside the scope of UKAS accreditation
Approved By:	Rob Brown, Business Manager

Information in Support of the Analytical Results

Analysis

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425um sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample.

Key

*	Denotes test not included in laboratory scope of accreditation
#	Denotes test that holds MCERTS accreditation, however, MCERTS accreditation is only implied if the report carries the MCERTS logo
$	Denotes tests completed by an approved subcontractor
I/S	Denotes insufficient sample to carry out test
U/S	Denotes that the sample is not suitable for testing

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month
Liquids - 2 weeks
Asbestos (test portion) - 6 months

Summary of Chemical Analysis
Water Samples

Our Ref: 13-73902
Client Ref: 12032
Contract Title: Herbert Road

			Lab No.	474935	474936	474937	474938	474939
			Sample ID	BH1	BH2	BH3	BH4	BH5
			Depth					
			Sample Ref					
			Sample Type					
			Sampling Date	08/01/2013	08/01/2013	08/01/2013	08/01/2013	08/01/2013
			Sampling Time					
Test	**Units**	**DETSxx**	**LOD**					
Arsenic, Dissolved	ug/l	DETSC 2306	0.16	2.2	4.0	0.74	5.4	1.7
Cadmium, Dissolved	ug/l	DETSC 2306	0.03	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030
Chromium, Dissolved	ug/l	DETSC 2306	0.25	1.0	0.93	0.57	0.41	0.49
Copper, Dissolved	ug/l	DETSC 2306	0.4	< 0.40	< 0.40	< 0.40	< 0.40	1.8
Lead, Dissolved	ug/l	DETSC 2306	0.09	< 0.090	< 0.090	< 0.090	< 0.090	0.34
Mercury, Dissolved	ug/l	DETSC 2306	0.01	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Nickel, Dissolved	ug/l	DETSC 2306	0.5	2.0	2.4	1.0	0.98	4.9
Selenium, Dissolved	ug/l	DETSC 2306	0.25	3.1	0.66	< 0.25	< 0.25	0.29
Zinc, Dissolved	ug/l	DETSC 2306	1.25	1.6	< 1.3	< 1.3	< 1.3	8.5
Sulphate as SO4	mg/l	DETSC 2055	0.1	31	4.4	8.0	86	120
Total Biochemical Oxygen Demand	mg/l	DETSC 2031	1	5.6	8.2	22	7.2	4.9
Total Chemical Oxygen Demand	mg/l	DETSC 2032	10	15	120	160	150	11
Cyanide total	ug/l	DETSC 2130	40	< 40.0	< 40.0	< 40.0	< 40.0	< 40.0
Conductivity	uS/cm	DETSC 2009	1	1340	4190	2400	1770	940
Hardness	mg/l	DETSC 2303*	0.1	315	468	453	541	555
Sulphide	ug/l	DETSC 2208	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
pH		DETSC 2008		7.1	6.9	7.1	7.0	7.2
Aliphatic C5-C6	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	ug/l	DETSC 3072*	1	< 1.0	< 1.0	3.5	< 1.0	< 1.0
Aliphatic C12-C16	ug/l	DETSC 3072*	1	< 1.0	7.9	17	< 1.0	< 1.0
Aliphatic C16-C21	ug/l	DETSC 3072*	1	11	37	31	< 1.0	< 1.0
Aliphatic C21-C35	ug/l	DETSC 3072*	1	140	190	420	< 1.0	2.2
Aromatic C5-C7	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	ug/l	DETSC 3072*	1	< 1.0	< 1.0	1.5	< 1.0	< 1.0
Aromatic C12-C16	ug/l	DETSC 3072*	1	< 1.0	< 1.0	14	< 1.0	< 1.0
Aromatic C16-C21	ug/l	DETSC 3072*	1	< 1.0	< 1.0	2.4	< 1.0	< 1.0
Aromatic C21-C35	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35	ug/l	DETSC 3072*	10	150	240	470	< 10	< 10
Aromatic C5-C35	ug/l	DETSC 3072*	10	< 10	< 10	18	< 10	< 10
TPH Ali/Aro	ug/l	DETSC 3072*	10	150	240	490	< 10	< 10
Acenaphthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	0.07	< 0.01	< 0.01
Benzo(a)pyrene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	ug/l	DETS 074*	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01

Summary of Chemical Analysis
Water Samples

Our Ref: 13-73902
Client Ref: 12032
Contract Title: Herbert Road

			Lab No.	474935	474936	474937	474938	474939
			Sample ID	BH1	BH2	BH3	BH4	BH5
			Depth					
			Sample Ref					
			Sample Type					
			Sampling Date	08/01/2013	08/01/2013	08/01/2013	08/01/2013	08/01/2013
			Sampling Time					
Test	**Units**	**DETSxx**	**LOD**					
Dibenzo(a,h)anthracene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	ug/l	DETS 074*	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Naphthalene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	ug/l	DETS 074*	0.01	0.01	< 0.01	0.02	< 0.01	< 0.01
Pyrene	ug/l	DETS 074*	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAH	ug/l	DETS 074*	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
EPH (C10-C40)	ug/l	DETSC 3311	10	100	60	250	150	110
PCB	ug/l	DETSC 3402	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PCB 101	ug/l	DETSC 3402	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
PCB 138	ug/l	DETSC 3402	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
PCB 153	ug/l	DETSC 3402	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
PCB 180	ug/l	DETSC 3402	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
PCB 28	ug/l	DETSC 3402	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
PCB 52	ug/l	DETSC 3402	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
PCB 118 + PCB 123	ug/l	DETSC 3402	0.6	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60
Phenol	ug/l	DETS 054*	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Chloro-3-methylphenol	ug/l	DETS 054*	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,4-Dichlorophenol	ug/l	DETS 054*	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,4-Dimethylphenol	ug/l	DETS 054*	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
p-cresol	ug/l	DETS 054*	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,6-Dimethylphenol	ug/l	DETS 054*	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,6-Dichlorophenol	ug/l	DETS 054*	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,4,6-Trichlorophenol	ug/l	DETS 054*	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Summary of Chemical Analysis
Water Samples

Our Ref: 13-73902
Client Ref: 12032
Contract Title: Herbert Road

			Lab No.	474940
			Sample ID	BH6
			Depth	
			Sample Ref	
			Sample Type	
			Sampling Date	08/01/2013
			Sampling Time	
Test	**Units**	**DETSxx**	**LOD**	
Arsenic, Dissolved	ug/l	DETSC 2306	0.16	0.58
Cadmium, Dissolved	ug/l	DETSC 2306	0.03	< 0.030
Chromium, Dissolved	ug/l	DETSC 2306	0.25	0.39
Copper, Dissolved	ug/l	DETSC 2306	0.4	0.64
Lead, Dissolved	ug/l	DETSC 2306	0.09	0.40
Mercury, Dissolved	ug/l	DETSC 2306	0.01	< 0.010
Nickel, Dissolved	ug/l	DETSC 2306	0.5	< 0.50
Selenium, Dissolved	ug/l	DETSC 2306	0.25	0.87
Zinc, Dissolved	ug/l	DETSC 2306	1.25	< 1.3
Sulphate as SO4	mg/l	DETSC 2055	0.1	36
Total Biochemical Oxygen Demand	mg/l	DETSC 2031	1	7.1
Total Chemical Oxygen Demand	mg/l	DETSC 2032	10	< 10
Cyanide total	ug/l	DETSC 2130	40	< 40.0
Conductivity	uS/cm	DETSC 2009	1	700
Hardness	mg/l	DETSC 2303*	0.1	317
Sulphide	ug/l	DETSC 2208	10	< 10.0
pH		DETSC 2008		7.4
Aliphatic C5-C6	ug/l	DETSC 3322	0.1	< 0.1
Aliphatic C6-C8	ug/l	DETSC 3322	0.1	< 0.1
Aliphatic C8-C10	ug/l	DETSC 3322	0.1	< 0.1
Aliphatic C10-C12	ug/l	DETSC 3072*	1	< 1.0
Aliphatic C12-C16	ug/l	DETSC 3072*	1	9.3
Aliphatic C16-C21	ug/l	DETSC 3072*	1	30
Aliphatic C21-C35	ug/l	DETSC 3072*	1	11
Aromatic C5-C7	ug/l	DETSC 3322	0.1	< 0.1
Aromatic C7-C8	ug/l	DETSC 3322	0.1	< 0.1
Aromatic C8-C10	ug/l	DETSC 3322	0.1	< 0.1
Aromatic C10-C12	ug/l	DETSC 3072*	1	< 1.0
Aromatic C12-C16	ug/l	DETSC 3072*	1	< 1.0
Aromatic C16-C21	ug/l	DETSC 3072*	1	< 1.0
Aromatic C21-C35	ug/l	DETSC 3072*	1	< 1.0
Aliphatic C5-C35	ug/l	DETSC 3072*	10	50
Aromatic C5-C35	ug/l	DETSC 3072*	10	< 10
TPH Ali/Aro	ug/l	DETSC 3072*	10	50
Acenaphthene	ug/l	DETS 074*	0.01	< 0.01
Acenaphthylene	ug/l	DETS 074*	0.01	< 0.01
Anthracene	ug/l	DETS 074*	0.01	< 0.01
Benzo(a)anthracene	ug/l	DETS 074*	0.01	< 0.01
Benzo(a)pyrene	ug/l	DETS 074*	0.01	< 0.01
Benzo(b)fluoranthene	ug/l	DETS 074*	0.01	< 0.01
Benzo(k)fluoranthene	ug/l	DETS 074*	0.01	< 0.01
Benzo(g,h,i)perylene	ug/l	DETS 074*	0.01	< 0.01
Chrysene	ug/l	DETS 074*	0.01	< 0.01

Summary of Chemical Analysis
Water Samples

Our Ref: 13-73902
Client Ref: 12032
Contract Title: Herbert Road

			Lab No.	474940
			Sample ID	BH6
			Depth	
			Sample Ref	
			Sample Type	
			Sampling Date	08/01/2013
			Sampling Time	
Test	**Units**	**DETSxx**	**LOD**	
Dibenzo(a,h)anthracene	ug/l	DETS 074*	0.01	< 0.01
Fluoranthene	ug/l	DETS 074*	0.01	< 0.01
Fluorene	ug/l	DETS 074*	0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	ug/l	DETS 074*	0.01	< 0.01
Naphthalene	ug/l	DETS 074*	0.01	< 0.01
Phenanthrene	ug/l	DETS 074*	0.01	< 0.01
Pyrene	ug/l	DETS 074*	0.01	< 0.01
PAH	ug/l	DETS 074*	0.2	< 0.20
EPH (C10-C40)	ug/l	DETSC 3311	10	11
PCB	ug/l	DETSC 3402	1	< 1.0
PCB 101	ug/l	DETSC 3402	0.3	< 0.30
PCB 138	ug/l	DETSC 3402	0.2	< 0.20
PCB 153	ug/l	DETSC 3402	0.2	< 0.20
PCB 180	ug/l	DETSC 3402	0.2	< 0.20
PCB 28	ug/l	DETSC 3402	0.3	< 0.30
PCB 52	ug/l	DETSC 3402	0.2	< 0.20
PCB 118 + PCB 123	ug/l	DETSC 3402	0.6	< 0.60
Phenol	ug/l	DETS 054*	0.1	< 0.10
4-Chloro-3-methylphenol	ug/l	DETS 054*	0.1	< 0.10
2,4-Dichlorophenol	ug/l	DETS 054*	0.1	< 0.10
2,4-Dimethylphenol	ug/l	DETS 054*	0.1	< 0.10
p-cresol	ug/l	DETS 054*	0.1	< 0.10
2,6-Dimethylphenol	ug/l	DETS 054*	0.1	< 0.10
2,6-Dichlorophenol	ug/l	DETS 054*	0.1	< 0.10
2,4,6-Trichlorophenol	ug/l	DETS 054*	0.1	< 0.10

Sample Comments

DETS cannot be held responsible for the integrity of sample(s) received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating.

Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note "Guidance on Deviating Samples".

All samples received are listed below. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations.

If no sampled date (soils) or date/time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters), this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Lab No.	Sample ID	Date Sampled	Containers Received	Deviating due to holding time being exceeded for test	Deviating due to inappropriate container for test
474935	BH1 WATER	08/01/2013	Glass Jar 1 litre (1 litre) x2, Plastic Bottle 1 litre (1 litre)		
474936	BH2 WATER	08/01/2013	Glass Jar 1 litre (1 litre) x2, Plastic Bottle 1 litre (1 litre)		
474937	BH3 WATER	08/01/2013	Glass Jar 1 litre (1 litre) x2, Plastic Bottle 1 litre (1 litre)		
474938	BH4 WATER	08/01/2013	Glass Jar 1 litre (1 litre) x2, Plastic Bottle 1 litre (1 litre)		
474939	BH5 WATER	08/01/2013	Glass Jar 1 litre (1 litre) x2, Plastic Bottle 1 litre (1 litre)		
474940	BH6 WATER	08/01/2013	Glass Jar 1 litre (1 litre) x2, Plastic Bottle 1 litre (1 litre)		

Derwentside Environmental Testing Services

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Certificate of Analysis

Date: 07/02/2013

Certificate Number: 13-75083

Client:	Terra Firma (Wales) Ltd 5 Deryn Court Wharfdale Road Pentwyn Cardiff CF23 7HB
Our Reference:	13-75083
Client Reference:	12032
Contract Title:	Herbert Road
Description:	6 water samples
Date Received:	01 February 2013
Date Started:	01 February 2013
Date Completed:	07 February 2013
Test Procedures:	Identified by prefix DETSn, details available upon request.
Notes:	Observations and interpretations are outside the scope of UKAS accreditation
Approved By:	 Rob Brown, Business Manager

Derwentside Environmental Testing Services Limited
Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • Fax 01207 582444 • email: info@dets.co.uk • www.dets.co.uk

Information in Support of the Analytical Results

Analysis

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425um sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample.

Key

*	Denotes test not included in laboratory scope of accreditation
#	Denotes test that holds MCERTS accreditation, however, MCERTS accreditation is only implied if the report carries the MCERTS logo
$	Denotes tests completed by an approved subcontractor
I/S	Denotes insufficient sample to carry out test
U/S	Denotes that the sample is not suitable for testing

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month
Liquids - 2 weeks
Asbestos (test portion) - 6 months

Summary of Chemical Analysis
Water Samples

Our Ref: 13-75083
Client Ref: 12032
Contract Title: Herbert Road

			Lab No.	480761	480762	480763	480764	480765
			Sample ID	BH1	BH2	BH3	BH4	BH5
			Depth					
			Sample Ref					
			Sample Type					
			Sampling Date	/ /	/ /	/ /	/ /	/ /
			Sampling Time					
Test	**Units**	**DETSxx**	**LOD**					
Arsenic, Dissolved	ug/l	DETSC 2306	0.16	9.2	4.1	1.8	1.4	8.0
Cadmium, Dissolved	ug/l	DETSC 2306	0.03	0.038	0.044	< 0.030	0.21	0.15
Chromium, Dissolved	ug/l	DETSC 2306	0.25	< 0.25	0.54	0.77	< 0.25	< 0.25
Copper, Dissolved	ug/l	DETSC 2306	0.4	0.91	< 0.40	0.41	3.0	< 0.40
Lead, Dissolved	ug/l	DETSC 2306	0.09	< 0.090	< 0.090	< 0.090	< 0.090	1.7
Mercury, Dissolved	ug/l	DETSC 2306	0.01	0.012	< 0.010	< 0.010	0.025	< 0.010
Nickel, Dissolved	ug/l	DETSC 2306	0.5	1.3	3.0	0.67	4.6	1.1
Selenium, Dissolved	ug/l	DETSC 2306	0.25	0.66	0.60	< 0.25	0.77	0.57
Zinc, Dissolved	ug/l	DETSC 2306	1.25	3.7	4.0	2.4	18	< 1.3
Sulphate as SO4	mg/l	DETSC 2055	0.1	14	5.5	100	120	77
Total Biochemical Oxygen Demand	mg/l	DETSC 2031	1	3.2	4.1	5.8	6.6	2.8
Total Chemical Oxygen Demand	mg/l	DETSC 2032	10	20	110	37	30	110
Cyanide total	ug/l	DETSC 2130	40	< 40.0	< 40.0	< 40.0	< 40.0	< 40.0
Conductivity	uS/cm	DETSC 2009	1	1540	4070	2160	955	1750
Hardness	mg/l	DETSC 2303*	0.1	327	194	256	492	494
Sulphide	ug/l	DETSC 2208	10	< 10	< 10	< 10	< 10	< 10
pH		DETSC 2008		7.2	7.0	7.1	7.3	7.1
Aliphatic C5-C6	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	ug/l	DETSC 3072*	1	< 1.0	3.2	3.4	5.7	3.9
Aliphatic C16-C21	ug/l	DETSC 3072*	1	< 1.0	3.4	2.7	6.4	6.6
Aliphatic C21-C35	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C5-C7	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	ug/l	DETSC 3072*	1	< 1.0	< 1.0	1.1	< 1.0	< 1.0
Aromatic C12-C16	ug/l	DETSC 3072*	1	< 1.0	< 1.0	6.2	< 1.0	< 1.0
Aromatic C16-C21	ug/l	DETSC 3072*	1	< 1.0	< 1.0	2.0	< 1.0	< 1.0
Aromatic C21-C35	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35	ug/l	DETSC 3072*	10	< 10	< 10	< 10	12	11
Aromatic C5-C35	ug/l	DETSC 3072*	10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro	ug/l	DETSC 3072*	10	< 10	< 10	15	12	11

Summary of Chemical Analysis
Water Samples

Our Ref: 13-75083
Client Ref: 12032
Contract Title: Herbert Road

			Lab No.	480761	480762	480763	480764	480765
			Sample ID	BH1	BH2	BH3	BH4	BH5
			Depth					
			Sample Ref					
			Sample Type					
			Sampling Date	/ /	/ /	/ /	/ /	/ /
			Sampling Time					
Test	**Units**	**DETSxx**	**LOD**					
Acenaphthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Naphthalene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAH	ug/l	DETS 074*	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
EPH (C10-C40)	ug/l	DETSC 3311	10	< 10	< 10	< 10	380	50
PCB	ug/l	DETSC 3402	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PCB 101	ug/l	DETSC 3402	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
PCB 138	ug/l	DETSC 3402	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
PCB 153	ug/l	DETSC 3402	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
PCB 180	ug/l	DETSC 3402	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
PCB 28	ug/l	DETSC 3402	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
PCB 52	ug/l	DETSC 3402	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
PCB 118 + PCB 123	ug/l	DETSC 3402	0.6	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60
Phenol	ug/l	DETS 054*	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.25
4-Chloro-3-methylphenol	ug/l	DETS 054*	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.25
2,4-Dichlorophenol	ug/l	DETS 054*	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.25
2,4-Dimethylphenol	ug/l	DETS 054*	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.25
p-cresol	ug/l	DETS 054*	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.25
2,6-Dimethylphenol	ug/l	DETS 054*	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.25
2,6-Dichlorophenol	ug/l	DETS 054*	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.25
2,4,6-Trichlorophenol	ug/l	DETS 054*	0.1	< 0.10	< 0.10	< 0.10	0.11	< 0.25

Summary of Chemical Analysis
Water Samples

Our Ref: 13-75083
Client Ref: 12032
Contract Title: Herbert Road

			Lab No.	480766
			Sample ID	BH6
			Depth	
			Sample Ref	
			Sample Type	
			Sampling Date	/ /
			Sampling Time	
Test	**Units**	**DETSxx**	**LOD**	
Arsenic, Dissolved	ug/l	DETSC 2306	0.16	1.1
Cadmium, Dissolved	ug/l	DETSC 2306	0.03	0.14
Chromium, Dissolved	ug/l	DETSC 2306	0.25	< 0.25
Copper, Dissolved	ug/l	DETSC 2306	0.4	1.9
Lead, Dissolved	ug/l	DETSC 2306	0.09	< 0.090
Mercury, Dissolved	ug/l	DETSC 2306	0.01	0.023
Nickel, Dissolved	ug/l	DETSC 2306	0.5	2.3
Selenium, Dissolved	ug/l	DETSC 2306	0.25	1.5
Zinc, Dissolved	ug/l	DETSC 2306	1.25	7.1
Sulphate as SO4	mg/l	DETSC 2055	0.1	31
Total Biochemical Oxygen Demand	mg/l	DETSC 2031	1	2.9
Total Chemical Oxygen Demand	mg/l	DETSC 2032	10	19
Cyanide total	ug/l	DETSC 2130	40	< 40.0
Conductivity	uS/cm	DETSC 2009	1	1030
Hardness	mg/l	DETSC 2303*	0.1	350
Sulphide	ug/l	DETSC 2208	10	< 10
pH		DETSC 2008		7.3
Aliphatic C5-C6	ug/l	DETSC 3322	0.1	< 0.1
Aliphatic C6-C8	ug/l	DETSC 3322	0.1	< 0.1
Aliphatic C8-C10	ug/l	DETSC 3322	0.1	< 0.1
Aliphatic C10-C12	ug/l	DETSC 3072*	1	< 1.0
Aliphatic C12-C16	ug/l	DETSC 3072*	1	1.7
Aliphatic C16-C21	ug/l	DETSC 3072*	1	10
Aliphatic C21-C35	ug/l	DETSC 3072*	1	< 1.0
Aromatic C5-C7	ug/l	DETSC 3322	0.1	< 0.1
Aromatic C7-C8	ug/l	DETSC 3322	0.1	< 0.1
Aromatic C8-C10	ug/l	DETSC 3322	0.1	< 0.1
Aromatic C10-C12	ug/l	DETSC 3072*	1	< 1.0
Aromatic C12-C16	ug/l	DETSC 3072*	1	< 1.0
Aromatic C16-C21	ug/l	DETSC 3072*	1	< 1.0
Aromatic C21-C35	ug/l	DETSC 3072*	1	< 1.0
Aliphatic C5-C35	ug/l	DETSC 3072*	10	12
Aromatic C5-C35	ug/l	DETSC 3072*	10	< 10
TPH Ali/Aro	ug/l	DETSC 3072*	10	12

Summary of Chemical Analysis
Water Samples

Our Ref: 13-75083
Client Ref: 12032
Contract Title: Herbert Road

			Lab No.	480766
			Sample ID	BH6
			Depth	
			Sample Ref	
			Sample Type	
			Sampling Date	/ /
			Sampling Time	
Test	**Units**	**DETSxx**	**LOD**	
Acenaphthene	ug/l	DETS 074*	0.01	< 0.01
Acenaphthylene	ug/l	DETS 074*	0.01	< 0.01
Anthracene	ug/l	DETS 074*	0.01	< 0.01
Benzo(a)anthracene	ug/l	DETS 074*	0.01	< 0.01
Benzo(a)pyrene	ug/l	DETS 074*	0.01	< 0.01
Benzo(b)fluoranthene	ug/l	DETS 074*	0.01	< 0.01
Benzo(k)fluoranthene	ug/l	DETS 074*	0.01	< 0.01
Benzo(g,h,i)perylene	ug/l	DETS 074*	0.01	< 0.01
Chrysene	ug/l	DETS 074*	0.01	< 0.01
Dibenzo(a,h)anthracene	ug/l	DETS 074*	0.01	< 0.01
Fluoranthene	ug/l	DETS 074*	0.01	< 0.01
Fluorene	ug/l	DETS 074*	0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	ug/l	DETS 074*	0.01	< 0.01
Naphthalene	ug/l	DETS 074*	0.01	< 0.01
Phenanthrene	ug/l	DETS 074*	0.01	< 0.01
Pyrene	ug/l	DETS 074*	0.01	< 0.01
PAH	ug/l	DETS 074*	0.2	< 0.20
EPH (C10-C40)	ug/l	DETSC 3311	10	130
PCB	ug/l	DETSC 3402	1	< 1.0
PCB 101	ug/l	DETSC 3402	0.3	< 0.30
PCB 138	ug/l	DETSC 3402	0.2	< 0.20
PCB 153	ug/l	DETSC 3402	0.2	< 0.20
PCB 180	ug/l	DETSC 3402	0.2	< 0.20
PCB 28	ug/l	DETSC 3402	0.3	< 0.30
PCB 52	ug/l	DETSC 3402	0.2	< 0.20
PCB 118 + PCB 123	ug/l	DETSC 3402	0.6	< 0.60
Phenol	ug/l	DETS 054*	0.1	< 0.10
4-Chloro-3-methylphenol	ug/l	DETS 054*	0.1	< 0.10
2,4-Dichlorophenol	ug/l	DETS 054*	0.1	< 0.10
2,4-Dimethylphenol	ug/l	DETS 054*	0.1	< 0.10
p-cresol	ug/l	DETS 054*	0.1	< 0.10
2,6-Dimethylphenol	ug/l	DETS 054*	0.1	< 0.10
2,6-Dichlorophenol	ug/l	DETS 054*	0.1	< 0.10
2,4,6-Trichlorophenol	ug/l	DETS 054*	0.1	< 0.10

Sample Comments

DETS cannot be held responsible for the integrity of sample(s) received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating.

Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note "Guidance on Deviating Samples".

All samples received are listed below. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations.

If no sampled date (soils) or date/time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters), this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Lab No.	Sample ID	Date Sampled	Containers Received	Deviating due to holding time being exceeded for test	Deviating due to inappropriate container for test
480761	BH1 WATER		Glass Jar 1 litre (1 litre) x2, Plastic Bottle 1 litre (1 litre)	Sample is deviating (no sampled date/time supplied)	
480762	BH2 WATER		Glass Jar 1 litre (1 litre) x2, Plastic Bottle 1 litre (1 litre)	Sample is deviating (no sampled date/time supplied)	
480763	BH3 WATER		Glass Jar 1 litre (1 litre) x2, Plastic Bottle 1 litre (1 litre)	Sample is deviating (no sampled date/time supplied)	
480764	BH4 WATER		Glass Jar 1 litre (1 litre) x2, Plastic Bottle 1 litre (1 litre)	Sample is deviating (no sampled date/time supplied)	
480765	BH5 WATER		Glass Jar 1 litre (1 litre) x2, Plastic Bottle 1 litre (1 litre)	Sample is deviating (no sampled date/time supplied)	
480766	BH6 WATER		Glass Jar 1 litre (1 litre) x2, Plastic Bottle 1 litre (1 litre)	Sample is deviating (no sampled date/time supplied)	

ANNEX H
In-Situ Soakaway Test Results

terrafirma

Terra Firma (Wales) Limited
Wharfedale Road, Pentwyn
Cardiff
CF23 7HB

Tel: 029 20 375 354
Fax: 029 20 735 433
Email: info@terrafirmawales.co.uk

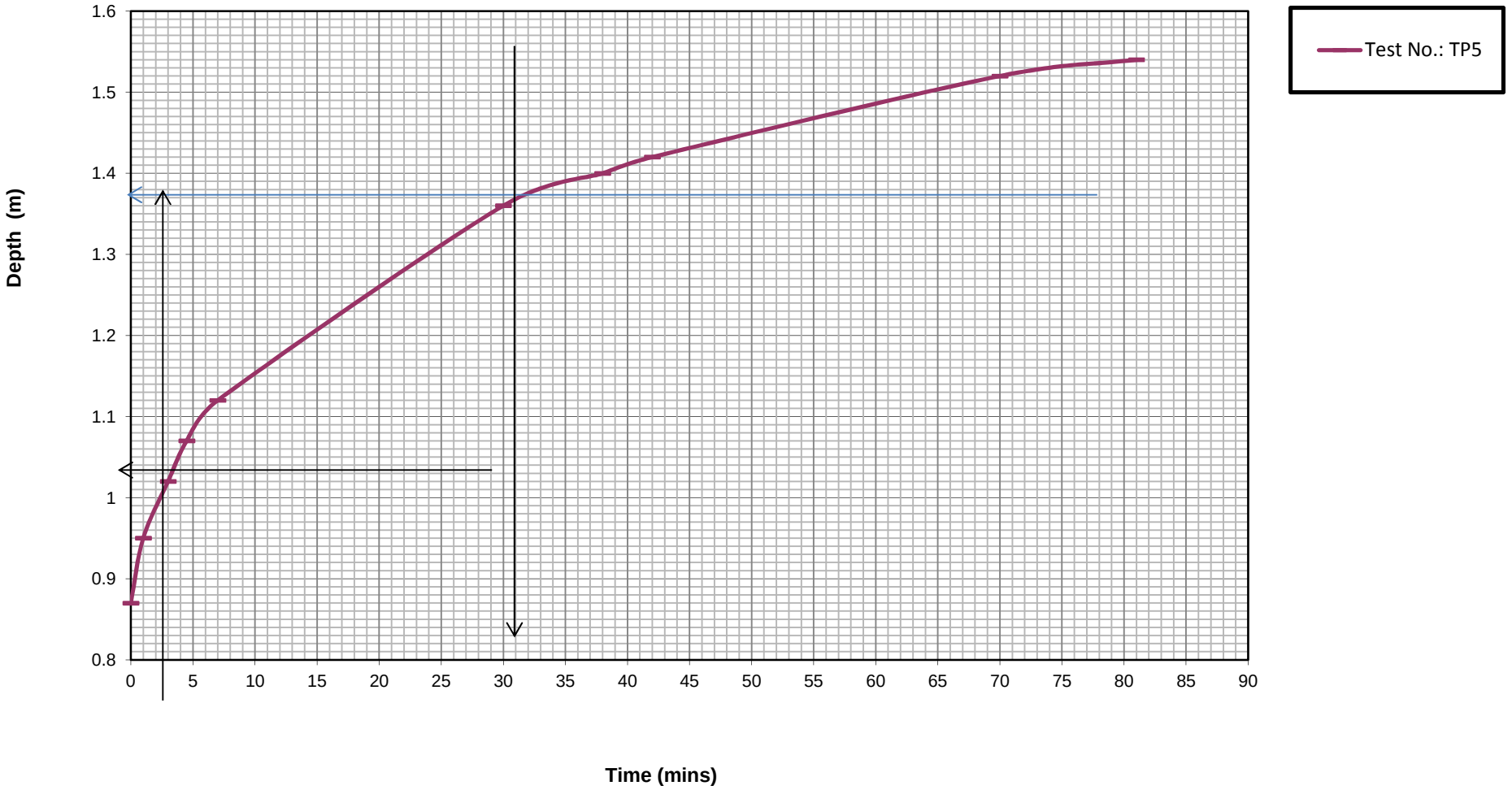
Site Name: Herbert Road
Number: 12032
Date Undertaken: 6.11.2012
Test No.: TP5

	Depth to Water (m)	Time (Mins)
(effective depth - 100%)	0.87	0
	0.95	1
	1.02	3
	1.07	4.5
	1.12	7
	1.36	30
	1.4	38
	1.42	42
	1.52	70
(effective depth - 0%)	1.540	81

Length of Trial Pit (m)	2.30	
Width of Trial Pit (m)	0.70	
Depth of Trial Pit (m)	1.70	
Effective Storage Depth (m)	0.670	
Vp25	1.0375	
Vp75	1.3725	
Vp75-25	0.539	
50% effective depth (m)	0.335	
Mean Surface area ap50 (m2)	3.620	
Time for 25% **Outflow** (t_{p25})	3.25	**From Graph**
Time for 75% **Outflow** (t_{p75})	31.25	**From Graph**
tp75 - 25	28	
Soil Infiltration Rate (m/s)	**8.86855E-05**	

Soil Infiltration Worksheet: This worksheet has been produced in combination with the document 'BRE Digest 365- September 1991'
This worksheet can be used to determine soil infiltration rates from trial pit field measurements
Worksheet options are identified by a green background

Soil Infiltration Measurements- TP5



ANNEX I
In-Situ Gas Monitoring Results

TERRA FIRMA (WALES) LIMITED

In-situ Gas Monitoring Results

Site: Herbert Road, Newport
Date Monitored: 16/01/2012
Barometric Pressure: 1014
Weather: Overcast, dry and very cold
Job No: **12032**

Gas Monitoring Well Number	Methane (CH_4) LEL(%)	Gas(%)	O_2 (%)	CO_2 (%)	Flow (litres/ hour)	CO	H_2S
BH1	0	0.0	19.8	0.3	0.0	0	0
BH2	0	0.0	19.8	0.4	0.0	0	0
BH3	>LEL	61.6	5.0	6.8	0.0	0	10
BH4	0	0.1	19.1	0.6	0.0	0	0
BH5	0	0.0	19.0	0.1	0.0	0	0
BH6	0	0.0	19.0	0.4	0.0	0	0

Notes:

1 Gas Measuring Instrument: Gas Measurement Instrument (GMI) Landsurveyor 2
2 LEL = Lower Explosive Limit
3 O_2 = Oxygen
4 CO_2 = Carbon Dioxide
5 CO = Carbon Monoxide
6 H_2S = Hydrogen Sulphide

TERRA FIRMA (WALES) LIMITED

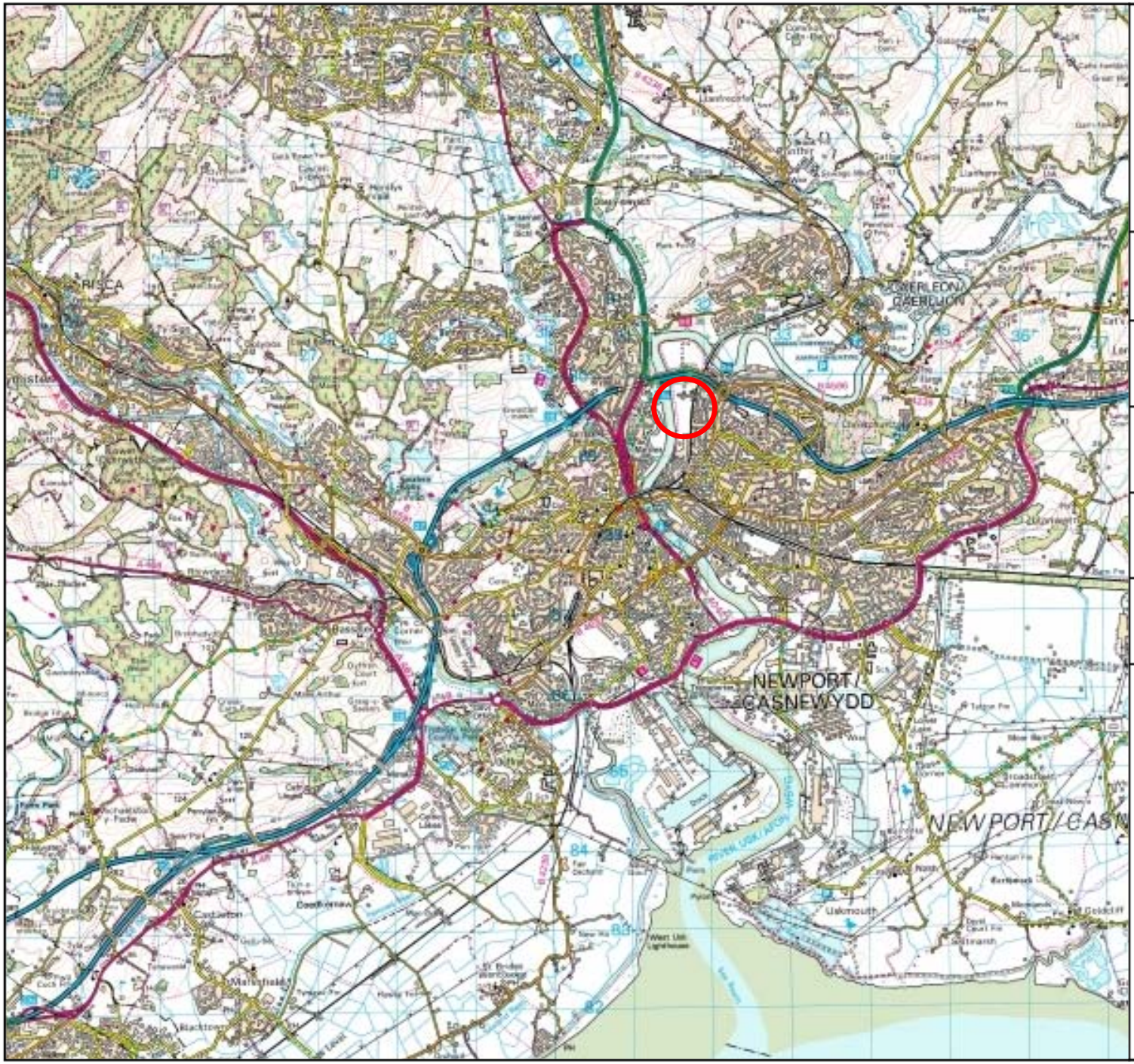
In-situ Gas Monitoring Results

Site: Herbert Road, Newport
Date Monitored: 07/02/2012
Barometric Pressure: 1020-1021
Weather: Overcast, dry and cold
Job No: **12032**

Gas Monitoring Well Number	Methane (CH_4) LEL(%)	Gas(%)	O_2 (%)	CO_2 (%)	Flow (litres/ hour)	CO	H_2S
BH1	1	13.9	21.5	0.1	0.0	0	0
BH2	5	16.2	21.2	1.6	-0.1	0	0
BH3	>LEL	67.4	2.4	6.6	0.0	0	28
BH4	0	0.0	21.4	0.1	0.0	0	0
BH5	1	0.1	21.5	0.3	0.0	0	0
BH6	0	0.0	21.4	0.3	0.0	0	0
WS1	3	4.0	2.5	11.2	0.0	0	0
WS2	29	1.5	1.2	8.3	0.0	2	0
WS3	0	0.0	10.9	3.8	0.0	0	0

Notes:

1 Gas Measuring Instrument: Gas Measurement Instrument (GMI) Landsurveyor 2
2 LEL = Lower Explosive Limit
3 O_2 = Oxygen
4 CO_2 = Carbon Dioxide
5 CO = Carbon Monoxide
6 H_2S = Hydrogen Sulphide



terrafirma

Job Number:

12032

Job Title:

Land off Herbert Road, Newport

Drawing Title:

Site Location

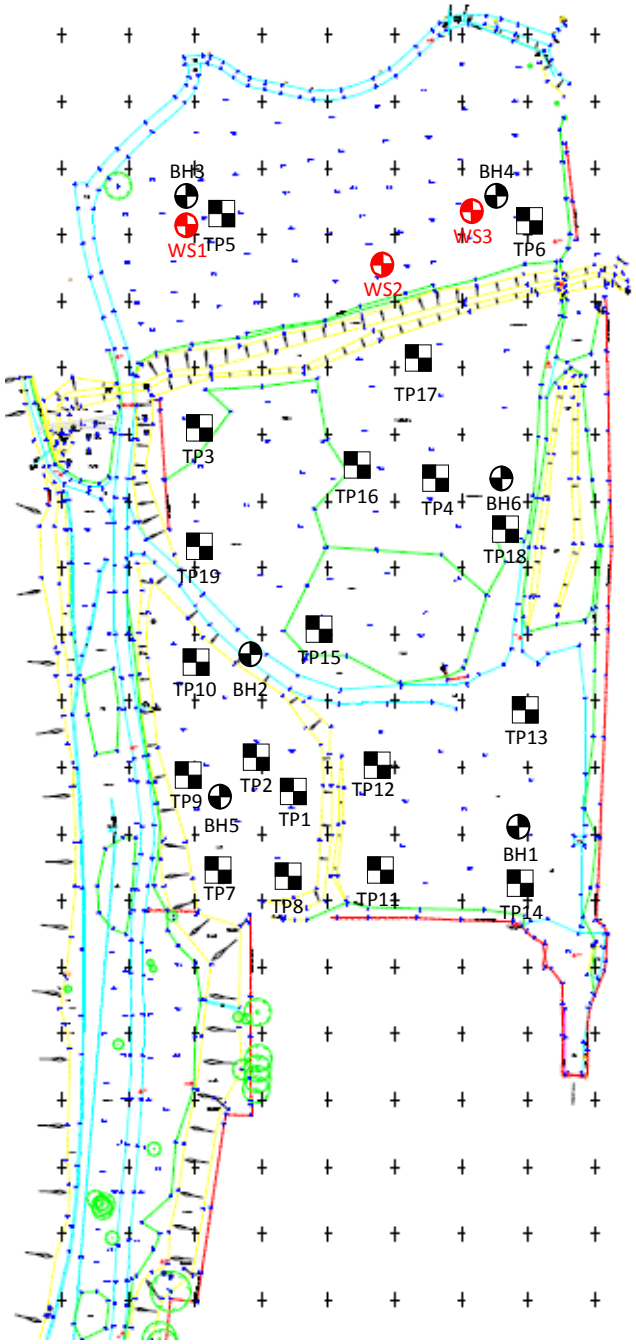
Drawing Number:

01

Scale:

Not to Scale

North



terrafirma

Job Number:

12032

Job Title:

Land off Herbert Road, Newport

Drawing Title:

Current Site Layout

Drawing Number:

02

Scale:

Not To Scale

Legend:

Trial Pit Location

Cable Percussive Borehole

Windowless Sample Borehole