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GEO-ENVIRONMENTAL ASSESSMENT REPORT

LIVIN HOUSING LIMITED / GUS ROBINSON DEVELOPMENTS LIMITED

PROPOSED RESIDENTIAL DEVELOPMENT

DOMESTIC GARAGES OFF PEASE WAY

NEWTON AYCLIFFE

DL5 5NE

Project No: 17-631(D)

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Date: 20/10/17

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Date: [redacted]20/10/17

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1.0 Introduction

October 2017

As requested by Portland consulting Engineers Limited on behalf of Livin Housing Limited / Gus Robinson Developments Limited, Ground Investigation works have been carried out at domestic 'lock-up' garages located off Pease Way within the town of Newton Aycliffe, County Durham, where it is proposed to construct a pair of semi-detached bungalows with private gardens and off-street parking in the near future.

A site reconnaissance (walkover) survey was undertaken as part of this report which involved an inspection of the site and its vicinity. Site photographs were taken during the survey and these can be seen attached in Appendix I.

Intrusive investigation works comprised 3 no. dynamic sampling boreholes, WS1 to WS3 and 2 no. concrete cores / manually excavated trial pits and the positions of the investigation locations can be seen on the Borehole Location Plan, a copy of which is included in Appendix II. It should be noted that this plan is for orientating purposes only, as the positions shown are approximate, and the scale is non-standard.

2.0 Site Details

Table 1.0

N = north, S = south, E = east, W = west

Site Name & Address:	Land off Pease Way, Newton Aycliffe, DL5 5NE.
OS Grid Reference:	427520, 524780
Description of Location	The site is a located within a residential area which includes areas of public open space. Two blocks of terraced brick built flat roofed lock-up garages are present on site along with an area of concrete hardstanding with limited tarmac hardstanding and grass.
Site boundaries:	N, E & S= Residential properties & W = Public open space

3.0 Scope of Works

Table 2.0

Client:	Livin Housing Limited.
Main Contractor:	Gus Robinson Developments Limited.
Project type:	The development will comprise 2 no. semi-detached bungalows with private gardens and off - street parking.
Site Location plan:	See Appendix I.
Layout plan (existing):	See Appendix I.
Layout plan (proposed):	See Appendix I.
Intrusive Investigation Works:	3 no. windowless sampling boreholes, WS1 to WS3 & 2 no. concrete cores / manually excavated trial pits.
Laboratory Testing:	Geotechnical & Ground Contamination.
CLEA Classification:	*Residential with home grown produce.*
Reporting:	Factual & Interpretative.
Site Observations:	The lock-up garages were in disrepair with felt missing or damaged on the roofs and localised cracking on some mortar joints. Minor fly-tipping was evident and some localised oil staining was noted on the concrete hardstanding. A slight fall in gradient was noted from SE to NW. A large mature tree located within proximity to the south.

The information contained in this report is limited to the area of the site, as indicated on the Existing Site Plan shown in Appendix I, and to those areas accessible during the ground investigation. The depths of strata on the record sheets are recorded from current ground levels.

No topographical survey or other works were requested or undertaken and therefore when considering the full scope of the development any features and / or issues not specifically mentioned in this report cannot be assumed to have been covered.

4.0 Site Setting (Desk Based Study)

4.1 Recent Site History: -

Copies of old survey plans covering this site area and adjacent land are included in Appendix I, and the relevant details from these are summarised below.

The c.1859 OS plan shows the site and surrounding areas to be undeveloped agricultural fields with a field boundary close to the southwest. Possible small pond features were evident c.200m to the east. The c.1897 plan records a watercourse / ditch along the adjacent field boundary flowing from SE to NW.

The site is developed with domestic lock-up garages and surrounding areas with housing by c.1963 which has generally remained unchanged until present day.

4.2 Site Geology: -

The geological assessment for this site has been based on records produced by the British Geological Survey (BGS). The following documents have been reviewed as part of this study: -

Stockton, England and Wales Sheet 33, Solid and Drift Editions, 1: 50,000 Series
Sheet NZ22SE 1:10,000 Series
Geology of Britain Viewer
ArcGIS Digital Mapping
BGS Borehole data

4.2.1 Made Ground

Geological maps do not record any made ground on site and when considering the lack of previous development, no significant made ground is anticipated.

4.2.1 Superficial Deposits

The superficial geology underlying the site is shown to comprise Glacial Till which typically comprises sandy gravelly clay with boulders and sand lenses.

4.2.3 Solid Geology

The solid geology underlying the site is shown to comprise the Ford Formation (Dolostone) deposited during the Period of the Earth's history known as the Permian. The solid geological deposits are anticipated to be at c.>15m depth.

4.3 Coal Mining Risk Assessment: -

In accordance with the coal authority the site is shown to lie out with s coal mining reporting area and based on the geological setting the site is not deemed to be at risk from past shallow coal mining activities.

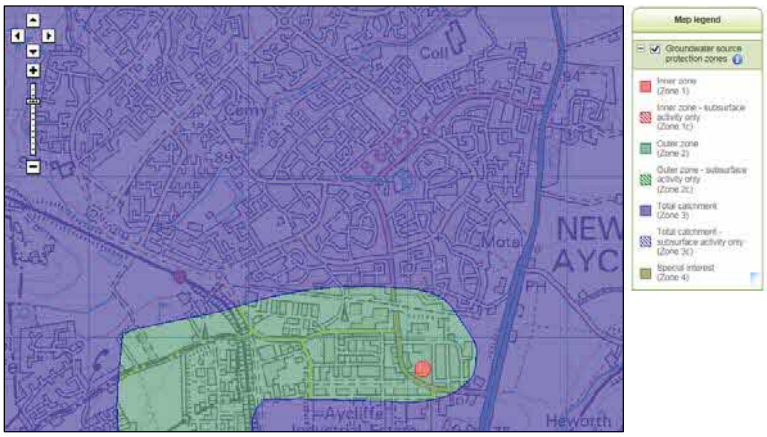
4.4 Hazardous Ground Gas Risk Assessment: -

When considering the risk of ground gas affecting the development there are no potential sources (e.g. active or historical landfill sites, areas of deep fill, shallow coal workings, etc.) within a plausible distance from the site (See Section 4.8). Similarly, the site is not in an area affected by radon gas.

4.0 Site Setting (Desk Based Study) (Cont'd)

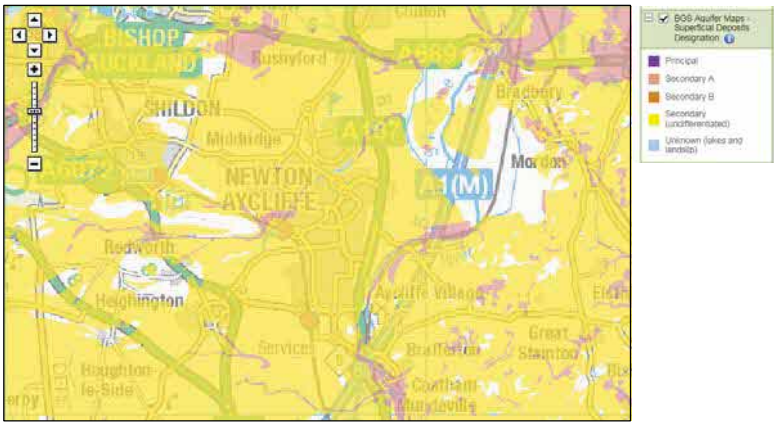
4.5 Hydrogeology: -

4.5.1 Source Protection Zones (Figure 1): -



The site lies within a Zone 3 (Total Catchment) source protection zone in relation to groundwater abstraction. These zones show the risk of contamination from any activities that might cause pollution in the area. The maps show three main zones (inner, outer and total catchment).

4.5.2 Aquifer Map –Superficial Deposits (Figure 2): -



The superficial deposits represent a Secondary (undifferentiated*) Aquifer. (* = a geological unit previously designated as both a minor and non-aquifer in different locations due to the variable characteristics of the soil type).

4.5.3 Aquifer Map –Bedrock (Figure 3): -

4.0 Site Setting (Desk Based Study) (Cont'd)

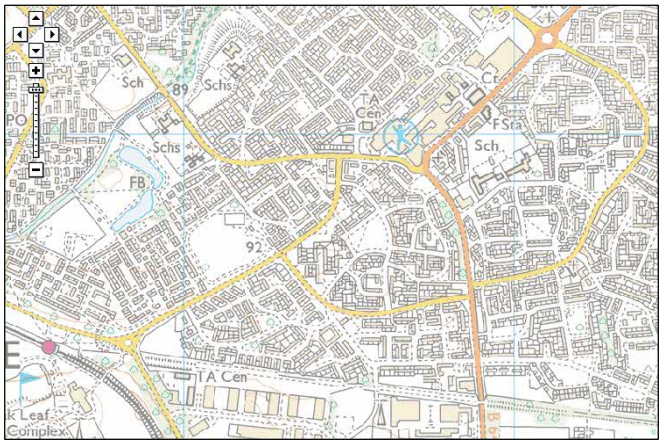
4.5 Hydrogeology (Cont'd): -

4.5.3 Aquifer Map –Bedrock (Figure 3) (Cont'd): -

The bedrock deposits represent a Principal Aquifer. These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

4.6 Hydrology: -

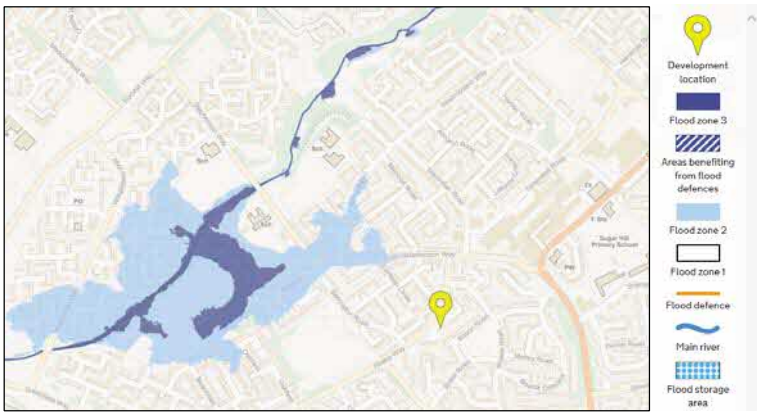
4.6.1 OS Map –Surface Water Features (Figure 4): -



There are no surface water features within c.250m of the site (see figure 4 above).

4.7 Flooding: -

4.7.1 Flood Probability (Figure 5): -

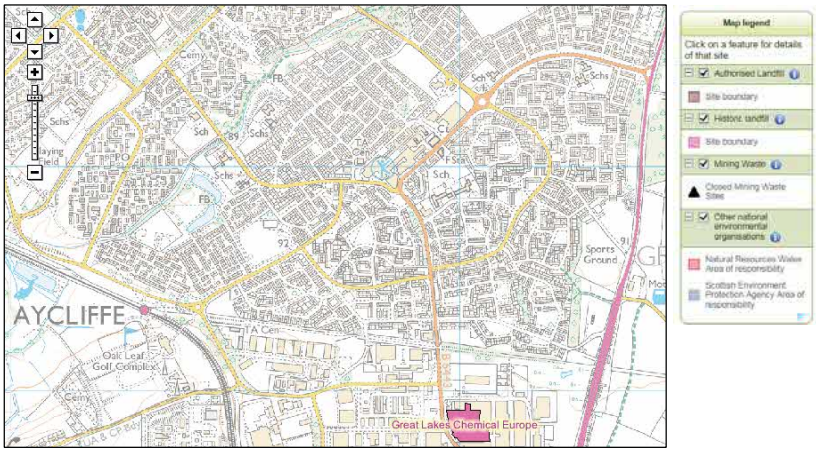


In accordance with to the EA website (Represented by Figure 5 above) the site is not considered to be at risk from flooding. The LA and EA may hold additional information relating to this site with respect to periodic flooding, standing water or poor drainage problems.

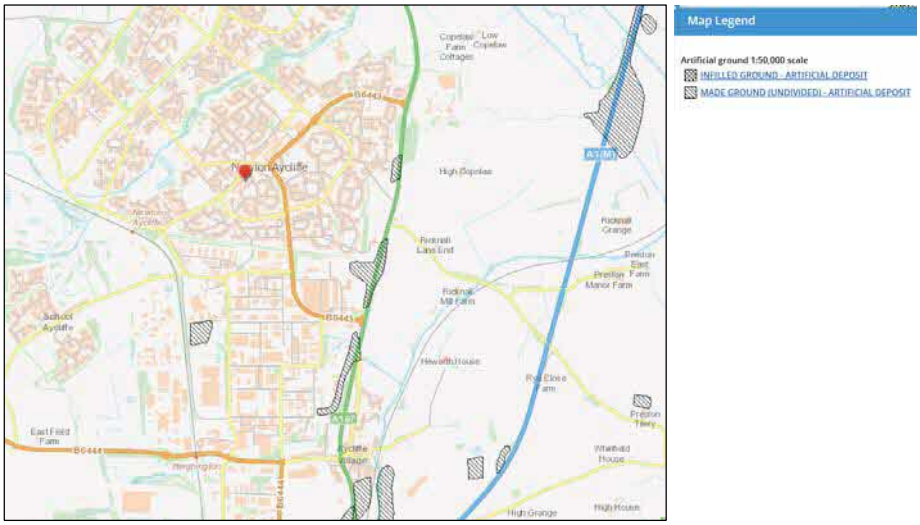
4.0 Site Setting (Desk Based Study) (Cont'd)

4.8 Landfill & Waste: -

4.8.1 Authorised Landfill, Historic Landfill & Closed Mining Waste Sites (Figure 6): -



4.8.2 Artificial Ground (Figure 7): -



The following information relating to landfill and waste has been obtained from the Environment Agency (Figure 6), BGS Geo-Index (Figure 7) and the walkover survey completed;

There are no Historical Landfill Sites, Authorised Landfill Sites or areas of artificial ground recorded within c.250m from the site.

When considering the lack of historical development and the anticipated ground conditions, it is felt that the ground conditions would not pose a risk as a source of on-site hazardous ground gas / vapour generation.

There is no risk of mine gas rise as there are no shallow coal workings.

Following a review of OS historical plans and when considering there are no potential sources of ground gas and vapour production on this site, no ground gas/vapour monitoring is required.

5.0 Investigation Rationale

This ground investigation has been designed to provide information on the general ground and groundwater conditions around the proposed development area and potential areas of geotechnical concern. The rationale behind the location of each exploratory hole is summarised in Table 5.1 below.

Table 5.1

Potential issue	Exploratory hole
Geotechnical considerations	WS1 to WS3
General contamination assessment	WS1 to WS3
Investigation of potentially deleterious sub-base materials below the garage floor slabs	Core 1 & Core 2

6.0 Ground Conditions

For an accurate description of the ground conditions encountered at each investigation position, reference should be made to the borehole record sheets in Appendix II.

6.1 Soil Profile: -

Made ground was recorded to depths of between c.0.50m to c.1.00m and comprised mixed surfacing (concrete, tarmac and grass) overlying ash and slag, soil with drainage fragments and possible asbestos tile/sheeting fragments and disturbed clay.

A 'slight' hydrocarbon odour was noted in the disturbed clays at BH2 only.

The underlying natural drift deposits comprised stiff sandy gravelly clay (Glacial Till) with some cobbles recorded to a depth of at least c.4.00m bcgl.

6.2 Garage Floor Sub-Base Assessment: -

From the concrete coring carried out within the existing garages, no evidence of red shale was noted with demolition rubble and black ash recorded. The thickness of the concrete floor slab was c.0.10m with no membrane or steel reinforcement evident.

6.3 Groundwater: -

All the borehole positions remained dry both during and on completion of the fieldworks.

7.0 Insitu Testing

7.1 Insitu Hand Shear Vane Tests: -

Insitu hand vane tests were carried out using an insitu hand vane tester on the fine soils encountered across the site. The insitu hand vane tester takes direct readings of shear strength. Three vane sizes allow for the direct determination of undrained shear strength of extremely low to high strength clays.

The peak vane value is determined by a calibrated scale ring built into the head assembly. The cross handle/dial is used both to push the vane to the desired test depth and apply the shearing torque. The results are summarised in Table 7.1 below and can also be found adjacent to the appropriate sample level, on the graphic borehole record sheets in Appendix II.

Table 7.1

Type of Strata	Range of Shear Strength Values (kN/m^2)	Result Details
Made ground – very sandy gravelly clay	28	Soft
Sandy gravelly clay	88 to >120	High strength deposits

8.0 Laboratory Testing

Geotechnical and ground contamination screening was undertaken by Professional Soils Limited of Doncaster and Chemtech Environmental Limited of Stanley, Co. Durham (UKAS & MCERTS accredited).

8.1 Determination of pH & SO_4: -

Representative samples of the made ground and natural strata were tested to determine their pH value and Soluble Sulphate (SO_4) levels. The results are shown in Table 8.1 below and are also contained in the Chemtech Analytical Reports no. 67262 a copy of which can be seen in Appendix IV.

Table 8.1 ACEC = Aggressive Chemical Environment for Concrete site classification ^= topsoil * = Superficial deposits # = Weathered sandstone/siltstone

Position	Depth (m)	pH	SO_4 (mg/l)	Design SO_4 Class	ACEC Class
BH1	0.50-1.00	8.4	10	DS-1	AC-1
BH2	0.30-0.60	7.8	1157	D S-2	AC-2
BH2	1.00-2.00	8.5	79	D S-1	AC-1
BH3	0.00-0.50	8.2	249	D S-1	AC-1

From these results, the samples tested range in pH from 7.8 to 8.5 and the amount of Soluble Sulphate present falls both outside and within the negligible range (<500mg/l). Therefore, in accordance with BRE Special Digest 1: 2005 (3rd Edition), the site should be given a classification of Class DS-2. When considering the nature of the materials tested and assuming mobile groundwater, the overall assessment of the Aggressive Chemical Environment for Concrete (ACEC) for the site overall, is AC-2.

8.2 Determination of Liquid & Plastic Limits: -

Representative samples of the fine soil (clays) recovered from the site were tested to determine their liquid and plastic limits, so that these materials could be classified. The results are summarised in Table 8.2 below and are also contained in the PSL Analytical Report (ref no.: PSL17/4510), a copy of which is contained in Appendix III.

Table 8.2 M/C = Moisture Content, LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index, CL = Clay Low, CI = Clay Intermediate, CH = Clay High.

Position	Depth (m)	M/C (%)	LL	PL	PI	Class	% Passing 425 m Sieve
BH1	1.00-2.00	12	32	16	16	CL	91
BH2	2.00-3.00	14	31	15	16	CL	97
BH3	1.00-2.00	13	28	14	14	CL	94

From these results, when plotted on the plasticity chart the samples tested fall within the low plasticity range. From the resulting plasticity indices, these clays display a low volume change (shrinkage or swelling) potential, when considering the amount passing the 425 m sieve.

Therefore, the clay soils are unlikely to undergo changes in volume, if large changes in their natural moisture content were to occur due to seasonal variations or the like. When comparing the moisture content to the plastic limits the moisture contents for the clays were recorded as being below their plastic limits i.e. the soils appear desiccated and are in a semi-plastic state.

If new foundations are to be based within these materials, it is recommended that they are taken down to a minimum depth of 0.75m below finished ground levels. An increase in this minimum depth may be required to reach competent ground and if the proposed development is within proximity to existing, envisaged or recently removed vegetation, then an increase in the minimum foundation depth may also be required to avoid the effects of future shrinkage and swelling of these materials. Reference should be made to BS5837: 2012, "Trees in Relation to Design, Demolition and Construction". A large mature tree bounds the site to the south and will need to be considered for foundation design.

8.0 Laboratory Testing (Cont'd)

8.3 Ground Contamination Risk Assessment: -

Representative samples of the made ground were passed onto Chemtech Environmental of Stanley, Co. Durham, so that contamination screening could be carried out. The catalogue of testing results can be found in the Chemtech Analytical Report (ref no. 67262) attached, with the following analysis carried out:

2 no. soil samples screened for Arsenic, Cadmium, Chromium III, Chromium VI, Copper, Lead, Mercury, Nickel, Selenium, Zinc, Cyanide, presence of Asbestos, Speciated Polycyclic Aromatic Hydrocarbons (PAH's) –based on the current USEPA 16 PAH's

1 no. soil sample screened for Speciated Total Petroleum Hydrocarbons (TPH's) –Split into 8 no. Carbon Bands.

1 no. soil sample screened for Speciated Total Petroleum Hydrocarbons (TPH's) –Split into 15 no. Aromatic and Aliphatic Carbon Bands, Benzene, Toluene, Ethylbenzene, m & p-Xylene & o-Xylene (BTEX).

These results have been used to carry out a Quantitative Human Health Risk Assessment by comparing maximum concentrations to current assessment criteria (i.e. Critical Concentration (C_C).

Table 8.3

Analyte	Critical Conc. (C_C) mg/kg	No. of Samples Screened	Max. Conc. (C_M) recorded mg/kg	Has C_M exceeded C_C	No. of Samples >C_C
Arsenic	37(1)	2	23	NO	0
Cadmium	11(1)	2	1.4	NO	0
Chromium III	910(1)	2	70	NO	0
Chromium VI	6(1)	2	<1	NO	0
Copper	2400(1)	2	93	NO	0
Lead	**200(2)**	**2**	**650**	**YES**	**1(BH3)**
Mercury	40(1)	2	<0.5	NO	0
Nickel	130(1)	2	47	NO	0
Selenium	250(1)	2	4.0	NO	0
Zinc	3700(1)	2	236	NO	0
Cyanide	34(4)	2	<1	NO	0
Asbestos	**Presence**	**2**	**Chrysotile**	**YES**	**1(BH3)**
Acenaphthene	510(1)	2	0.26	NO	0
Acenaphthylene	420(1)	2	0.02	NO	0
Anthracene	5400(1)	2	2.20	NO	0
Benzo(a)anthracene	11(1)	2	6.31	NO	0
Benzo(a)pyrene	**2.7(1)**	**2**	**4.84**	**YES**	**1(BH3)**
Benzo(b)fluoranthene	**3.3(1)**	**2**	**6.10**	**YES**	**1(BH3)**
Benzo(ghi)perylene	340(1)	2	2.90	NO	0
Benzo(k)fluoranthene	93(1)	2	2.78	NO	0
Chrysene	22(1)	2	6.03	NO	0
Dibenz(ah)anthracene	**0.28(1)**	**2**	**0.85**	**YES**	**1(BH3)**
Fluoranthene	560(1)	2	13.82	NO	0
Fluorene	400(1)	2	0.43	NO	0
Indeno(123cd)pyrene	36(1)	2	2.81	NO	0
Naphthalene	5.6(1)	2	0.04	NO	0
Phenanthrene	220(1)	2	7.12	NO	0
Pyrene	1200(1)	2	10.51	NO	0
Benzene	0.17(1)	1	<0.01	NO	0
Toluene	290(1)	1	<0.01	NO	0
Ethylbenzene	110(1)	1	<0.01	NO	0
m & p-Xylene	130(1)	1	<0.02	NO	0
o-Xylene	140(1)	1	<0.01	NO	0

(1) = LQM C4SL (Residential with home grown produce –2.5% SOM), (2) = C4SL, (3) = CL:AIRE GAC, (4) = Atkins ATRISK SOIL SSV, * = most sensitive LQM C4SL aliphatic / aromatic fraction adopted.

8.0 Laboratory Testing (Cont'd)

8.3 Ground Contamination Risk Assessment (Cont'd): -

Table 8.3 (Cont'd)

Analyte	Critical Conc. (C_C) mg/kg	No. of Samples Screened	Max. Conc. (C_M) recorded mg/kg	Has C_M exceeded C_C	No. of Samples >C_C
VPH Aliphatic (>C5-C6)	78(1)	1	<0.1	NO	0
VPH Aliphatic (>C6-C8)	230(1)	1	<0.1	NO	0
VPH Aliphatic (>C8-C10)	65(1)	1	0.4	NO	0
EPH Aliphatic (>C10-C12)	330(1)	1	10	NO	0
EPH Aliphatic (>C12-C16)	2400(1)	1	60	NO	0
EPH Aliphatic (>C16-C35)	92000(1)	1	977	NO	0
EPH Aliphatic (>C35-C44)	92000(1)	1	1016	NO	0
VPH Aromatic (>EC5-EC7)	140(1)	1	<0.01	NO	0
VPH Aromatic (>EC7-EC8)	290(1)	1	<0.01	NO	0
VPH Aromatic (>EC8-EC10)	83(1)	1	0.01	NO	0
EPH Aromatic (>EC10-EC12)	180(1)	1	<1	NO	0
EPH Aromatic (>EC12-EC16)	330(1)	1	<1	NO	0
EPH Aromatic (>EC16-EC21)	540(1)	1	2	NO	0
EPH Aromatic (>EC21-EC35)	1500(1)	1	<1	NO	0
EPH Aromatic (>EC35-EC44)	1500(1)	1	<1	NO	0
VPH (>C5-C7)	78(1)*	1	<0.1	NO	0
VPH (>C7-C8)	230(1)*	1	<0.1	NO	0
VPH (>C8-C10)	65(1)*	1	<0.1	NO	0
EPH (>C10-C12)	180(1)*	1	5	NO	0
EPH (>C12-C16)	330(1)*	1	11	NO	0
EPH (>C16-C21)	540(1)*	1	32	NO	0
EPH (>C21-C35)	1500(1)*	1	187	NO	0
EPH (>EC35-EC44)	1500(1)*	1	122	NO	0

(1) = LQM C4SL (Residential with home grown produce –2.5% SOM), (2) = C4SL, (3) = CL:AIRE GAC, (4) = Atkins ATRISK SOIL SSV, * = most sensitive LQM C4SL aliphatic / aromatic fraction adopted. * = based on most conservative aliphatic/aromatic fraction

The results are presented in Table 8.3 above and on the previous page and the findings are summarised below.

At the location of BH3 the maximum concentration (C_M) values for Lead, Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenz(ah)anthracene exceed the chosen critical concentration (C_C) values for this site.

None of the maximum concentration (C_M) values for the remaining generic analytes, remaining speciated PAHs and speciated TPH's, exceed their chosen critical concentration (C_C) values for this site.

Following on from the visual identification Asbestos Fibres have been confirmed at the location of BH3.

Based on these results the initial 0.50m thick soil layer at BH3 will required localised removal. These deposits are confined to material emplaced behind the kerbs within a small area of soft landscaping as seen in Plate 1 below.

Plate 1 –Small Area of Soft Landscaping

9.0 Conclusions & Recommendations

9.1 Ground Conditions: -

Made ground was recorded to depths of between c.0.50m to c.1.00m and comprised mixed surfacing (concrete, tarmac and grass) overlying ash and slag, soil with drainage fragments and asbestos tile/sheeting fragments and disturbed clay. A 'slight' hydrocarbon odour was noted in the disturbed clays at BH2.

The underlying natural drift deposits comprised stiff sandy gravelly clay (Glacial Till) with some cobbles recorded to a depth of at least c.4.00m bcgl.

From the concrete coring carried out within the existing garages, no evidence of red shale was noted with demolition rubble and black ash recorded.

9.2 Foundation Options: -

When considering the ground conditions identified and the nature of the proposed development it is felt that conventional strip footings should be acceptable for the proposed development, with foundations taken down through the made ground and based wholly within the natural clays at a minimum depth of c.0.75m where a maximum allowable bearing pressure of 175kN/m^2 is available.

An increase in this minimum depth may be required to reach competent ground and if the proposed development is within proximity to existing, envisaged or recently removed vegetation, then an increase in the minimum foundation depth may also be required to avoid the effects of future shrinkage and swelling of these materials. Reference should be made to BS5837: 2012, "Trees in Relation to Design, Demolition and Construction". A large mature tree bounds the site to the south and will need to be considered for foundation design.

When considering the risk to building materials, it is recommended that a concrete design class of DS-2 and ACEC class of AC-2 is used for all foundations and buried concrete.

9.3 Groundwater: -

All the exploratory positions remained dry during the fieldworks and as such shallow water ingress is unlikely to be problematic with regards to future excavations. Nonetheless, it would be prudent to allow for the introduction of adequate temporary groundwater control measures to take care of any surface water ingresses and pockets of trapped surface drainage particularly during the wetter periods of the year.

9.4 Hazardous Ground Gas Risk Assessment: -

There are no plausible sources of hazardous gas within c.250m of the site and the site is not in an area affected by naturally occurring radon gas. Therefore, no gas protection measures are required for the proposed development.

9.5 Ground Contamination & Remediation: -

From the results of the historical review other than the current use as domestic garages there were no obvious sources of ground contamination on or immediately adjacent site.

Following the results of the contamination screening the made ground materials are suitable for continued use in a residential setting except for a small area of soft landscaping (investigated by BH3 –See Plate 1 on p11) where the initial 'topsoil' materials are impacted by Lead, PAH's and asbestos. As such, there is requirement for remediation which will involve the localised removal of these materials off-site to an appropriate landfill facility.

A suitably qualified and experienced Geo-Environmental Engineer should be in attendance to witness the removal of these materials from site and produce a brief validation report.

9.0 Conclusions & Recommendations (Cont'd)

9.5 Ground Contamination (Cont'd): -

Recourse to the relevant utility suppliers should be made for their advice / comments regarding any service material precautions necessary.

When considering the risks to the construction workforce, adequate PPE will be required to provide protection against the levels of contaminants recorded during these investigation works. Similarly, the results can also be used by the Main Contractor / Project Coordinator, when devising an adequate Site Health & Safety Plan, in accordance with current CDM Regulations.

9.6 General Comments: -

If during future development works, any excavated materials are to be discarded and removed from this site as a waste to landfill, these materials will need to be classified in accordance with the 'Guidance on the Classification and Assessment of Waste (1st Edition 2015) –Technical Guidance WM3'. The attached contamination screening results can be used to aid with the off-site disposal classification. Where possible, removal of materials from site as a 'waste' should be kept to a minimum and ideally excavated materials should all be reused on site.

However, if excavated materials must be discarded it should be noted that additional analysis and screening may be required once each specific waste stream has been identified and the volume of material to be disposed of has been calculated, since the amount of screening required, including any pre-disposal WAC screening (if required), will be dependent upon the final volume of material to be disposed of.

Adequate lateral trench support will be required for excavations, to prevent trench wall collapse or over excavations, as well as to create a safe working environment below a depth of 1.20m, and any excavations on this site should remain open for as short a period as possible, since some of these materials may be susceptible to deterioration, if left open to the natural elements for any significant period.

It is also recommended for any new developments, adequate surface drainage should be designed and installed by a competent contractor, to prevent surface water 'ponding' or collection, during and post construction, particularly where the existing surface drainage system is disrupted or damaged.

In addition, for deeper excavations, drainage, service runs or the like that may pass close to or beneath any existing or proposed new foundations, these should be undertaken with care and completed prior to the preparation of any new foundations, so as not to allow any loose or granular material to move or 'flow', thus causing settlement to occur to any new or adjacent old foundation based at a higher level.

An "observational technique" can be applied to the design and construction of this site, and where ground conditions seem to vary from that indicated from the conceptual ground model derived from works to date, then advice from a suitably qualified Engineering Geologist/Geotechnical Engineer should be sought.

END OF REPORT

GENERAL REFERENCES

Stockton, England and Wales Sheet 33, Solid and Drift Editions, 1: 50,000 Series

Sheet NZ22SE 1:10,000 Series

Geology of Britain Viewer.

ArcGIS Digital Mapping.

http:/ / apps.environment-agency.gov.uk/ wiyby

http:/ / mapapps2.bgs.ac.uk/ geoindex

DoE. - Contaminated Land Reports, CLR 1-6 1994 & 1995, CLR 7-10 2002, CLR 11 2004.

BS5930:2015: Code of Practice for Site Investigations.

BS EN 1997-1: 2004: Eurocode 7 - Geotechnical design. Part 1: General rules. British Standards Institution.

BS EN 1997-2: 2007: Eurocode 7 - Geotechnical design. Part 2: Ground investigation and testing British Standards Institution.

BS EN ISO 9001: 2000: Quality Management Systems - requirements. British Standards Institution.

BS EN ISO 14689-1: 2003: Geotechnical investigation and testing - Identification and classification of rock. Identification and description. British Standards Institution. Amended 2007 (Partially supersedes BS 5930:1999).

BS EN ISO 22476-3: 2005: Geotechnical investigation and testing. Field testing. Standard penetration test. British Standards Institution.

BS EN ISO 14688-1: 2002: Geotechnical investigation and testing. Identification and classification of soil. Identification and description.

BS EN ISO 14688-2: 2004: Geotechnical investigation and testing. Identification and classification of soil. Principles for a classification.

BS10175+A1:2013: British Standard Investigation of Potentially Contaminated Sites.

BS5837: Trees in Relation to Design, Demolition and Construction (2012).

BRE Special Digest 1 2005: Concrete in Aggressive Ground 3rd Edition.

BS1377: 1990: Parts 1 –9. Methods of Test for Soils for Civil Engineering Purposes.

Asbestos in soil and made ground: a guide to understanding and managing risks, CIRIA C733, 2014.

Assessing Risks Posed by Hazardous Ground Gases to Buildings, CIRIA C665, 2007.

Methane and Associated Hazards to Construction - CIRIA Reports 149,150,151 & 152.

BS 8485: 2015: Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.

BS8576:2013: Guidance on investigations for ground gas –Permanent gases and Volatile Organic Compounds.

Category 4 Screening Levels (C4SL's) –DEFRA/CL:AIRE.

LQM/CIEH Suitable 4 Use Levels (S4UL's).

APPENDIX I

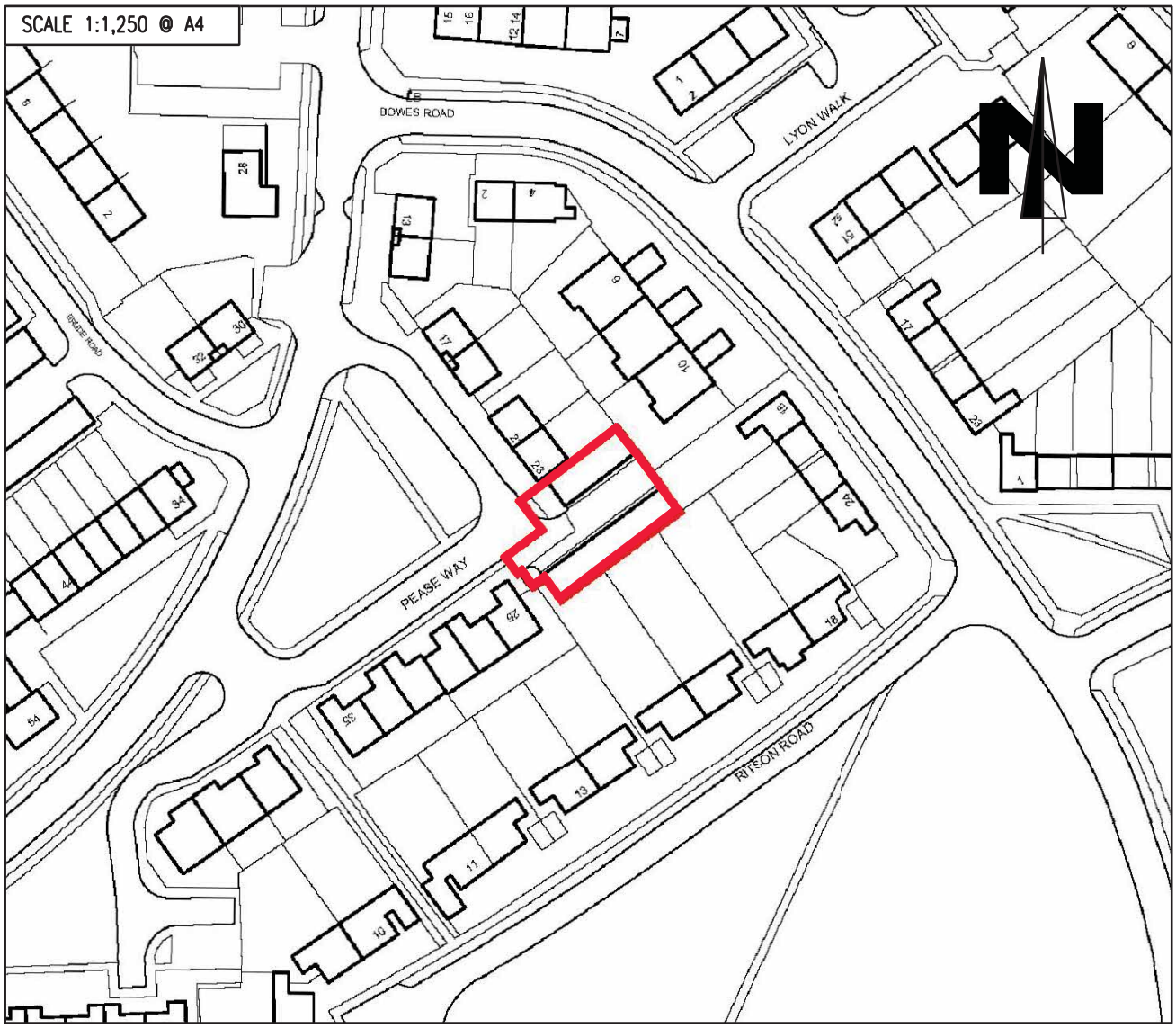
Location Plan

Aerial Photograph

Existing Site Layout Plan

Proposed Development Plan

Photographic Record Sheet



Client:	**LIVIN HOUSING LTD**
Project Title: Proposed Residential Development Pease Way Newton Aycliffe	**Drawing Title:** Location Plan
Job Reference: 17-631(D)	**Drawing Number:** -
Revision: -	
Drawn by: P.D	**Date:** 12.09.17
Scale at A4: As Shown	
Checked by: J.P.D	**Approved by:** J.P.D

The contractor shall check all dimensions on site before commencement of any works. No dimensions to be scaled off this drawing.

rev.	date	amendments	drawn	chckd

ARC ENVIRONMENTAL LTD
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Unit 1 Elliott Court
St. John's Road
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Durham
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Fax: (0191) 378 0494
e-mail: admin@arc-environmental.com
web: www.arc-environmental.com

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web: www.arc-environmental.com

LEGEND	
	APPROXIMATE SITE BOUNDARY

rev.	date	amendments	drawn	check

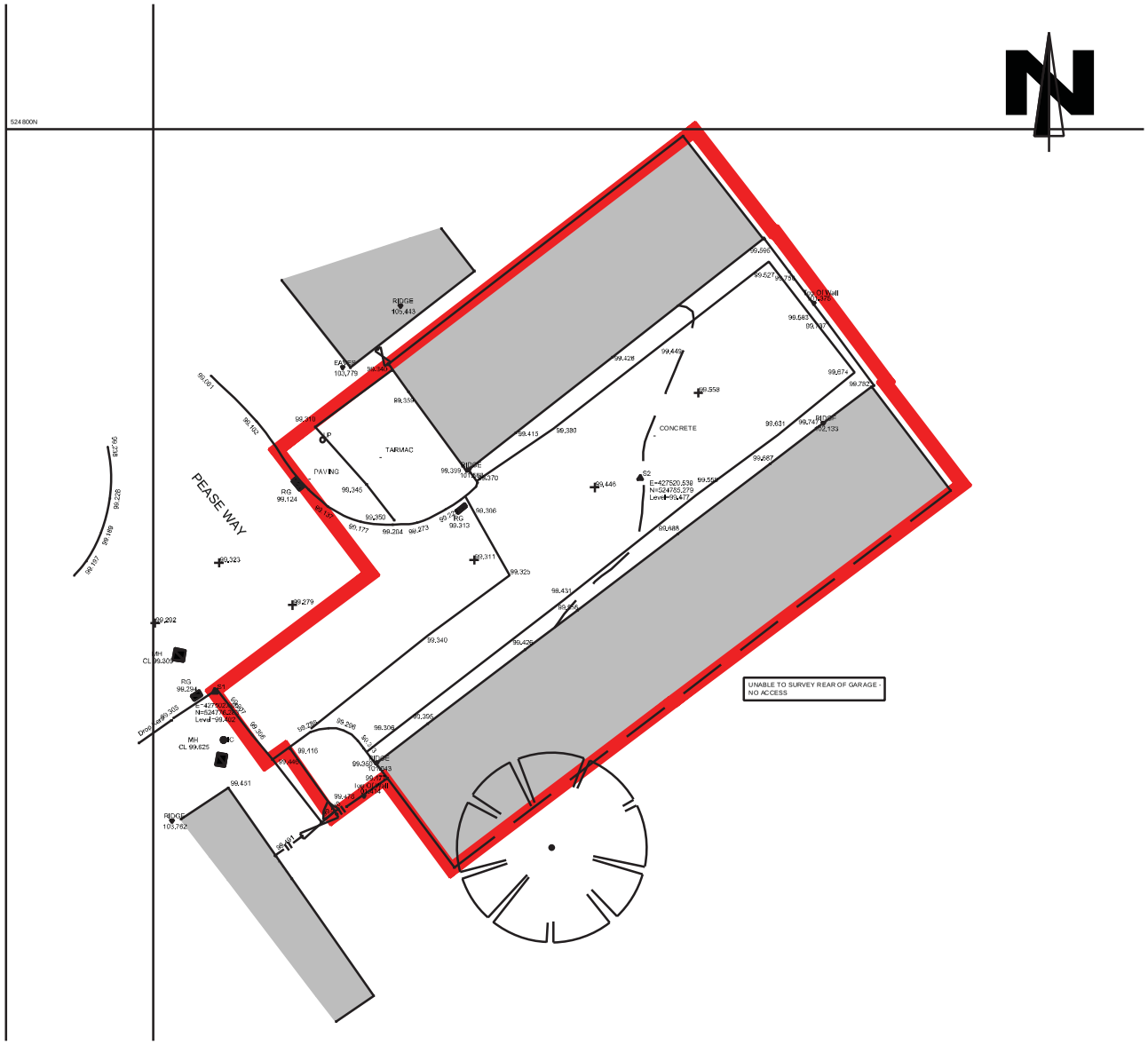
Client:
LIVIN HOUSING LTD

Project Title:
Proposed Residential Development
Pease Way
Newton Aycliffe

Drawing Title:
Aerial Photograph

Scale at A3:	Date:	Drawn by:	Approved by:
1:500 @ A3	12.09.17	P.D	J.P.D

Job Ref:	Drg no:	Rev:
17-631(D)	–	–



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web: www.arc-environmental.com

The contractor shall check all dimensions on site before commencement of any works. No dimensions to be scaled off this drawing.

LEGEND	
	APPROXIMATE SITE BOUNDARY

rev.	date	amendments	drawn	chckd

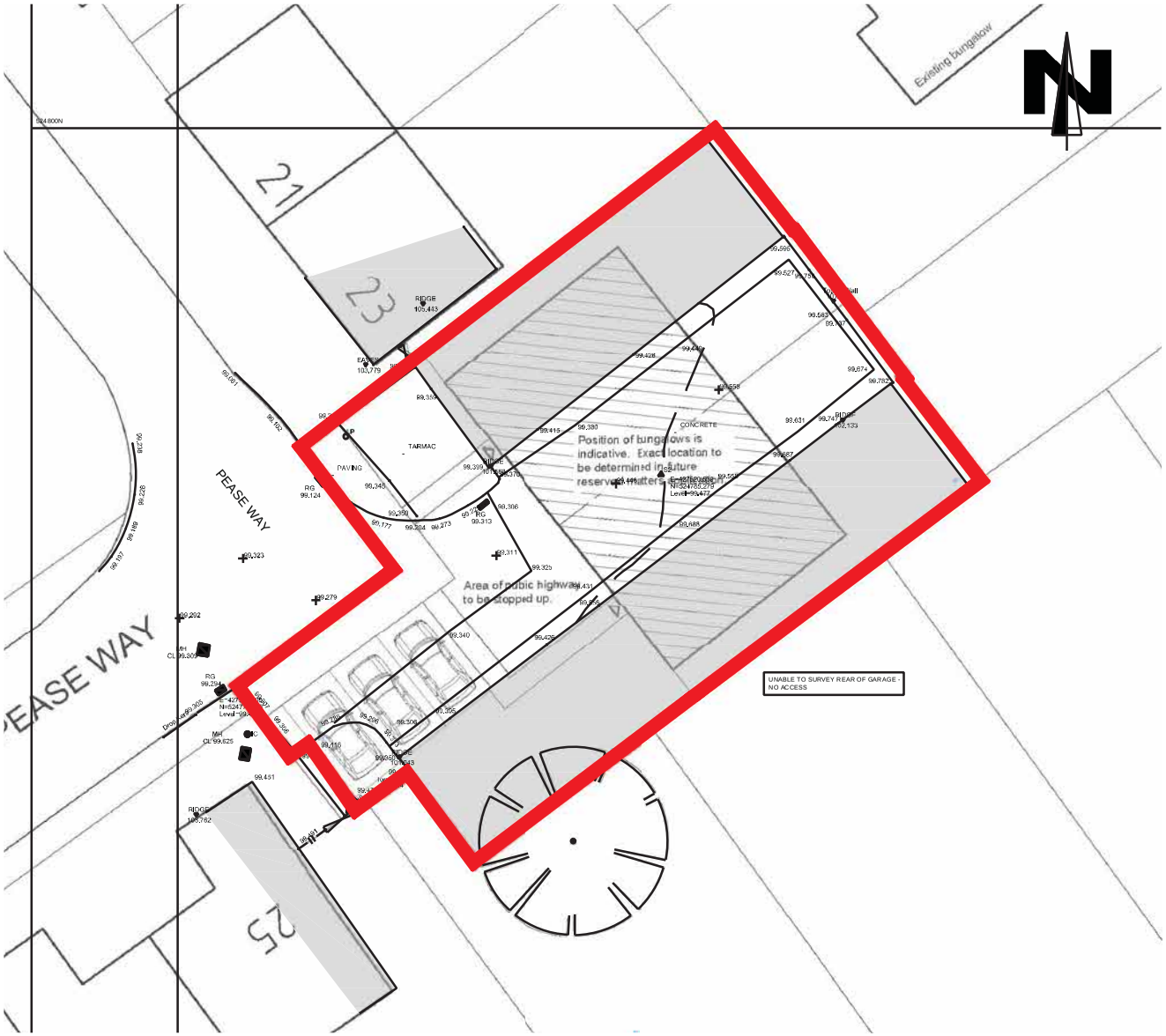
Client:
LIVIN HOUSING LTD

Project Title:
Proposed Residential Development
Pease Way
Newton Aycliffe

Drawing Title:
Existing Site Layout Plan

Scale at A3:	Date:	Drawn by:	Approved by:
1:200 @ A3	12.09.17	P.D	J.P.D

Job Ref:	Drg no:	Rev:
17-631(D)	–	–



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LEGEND	
	APPROXIMATE SITE BOUNDARY

rev.	date	amendments	drawn	chckd

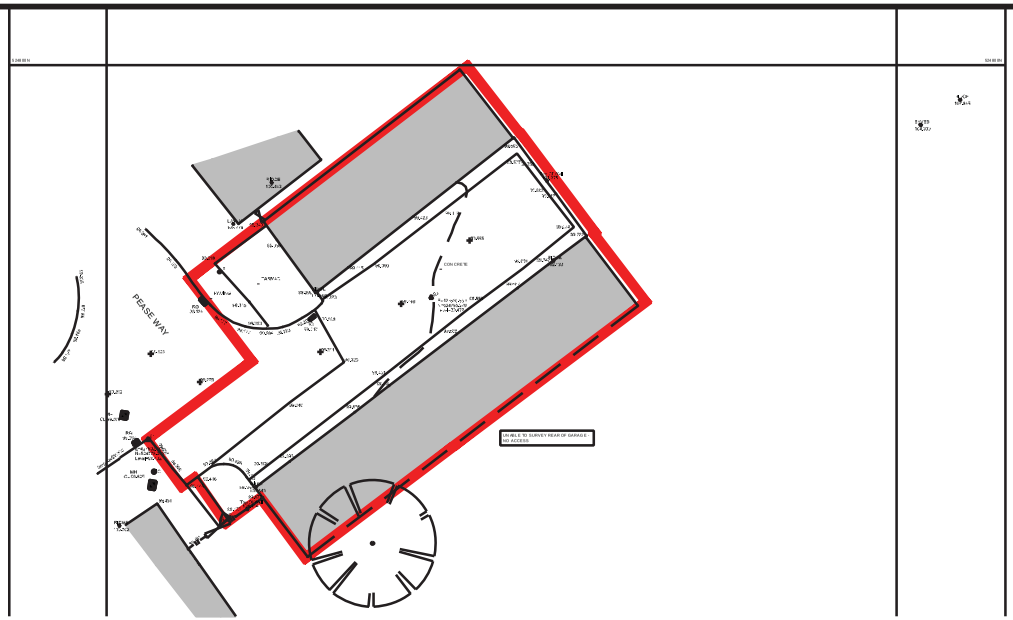
Client:
LIVIN HOUSING LTD

Project Title:
Proposed Residential Development
Pease Way
Newton Aycliffe

Drawing Title:
Proposed Development Layout Plan

Scale at A3:	Date:	Drawn by:	Approved by:
1:200 @ A3	12.09.17	P.D	J.P.D

Job Ref:	Drg no:	Rev:
17-631(D)	–	–




LOCK-UP STYLE GARAGES ALONG THE SOUTHERN SITE BOUNDARY


LOOKING WEST ALONG LOCK-UP STYLE GARAGES ALONG THE SOUTHERN SITE AREA


LOOKING EAST TOWARDS NORTHERN BLOCK OF LOCK-UP GARAGES ON SITE


MATURE TREE TO THE SOUTH OF SITE


CONCRETE SURFACING BETWEEN LOCK-UP GARAGES


PLANT (TREE) DETRITUS WITH OCCASIONAL HOUSEHOLD WASTE


LOOKING SW TOWARDS THE ENTRANCE TO THE SITE


BOUNDARY WALL TO THE EAST


LOCK-UP GARAGES ALONG THE SOUTHERN SITE BOUNDARY

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LEGEND	
	APPROXIMATE SITE BOUNDARY

rev.	date	amendments	drawn	chckd

Client:
LIVIN HOUSING LTD

Project Title:
Proposed Residential Development
Pease Way
Newton Aycliffe

Drawing Title:
Site Photographic Record Sheet

Scale at A3:	Date:	Drawn by:	Approved by:
NTS @ A3	12.09.17	P.D	J.P.D

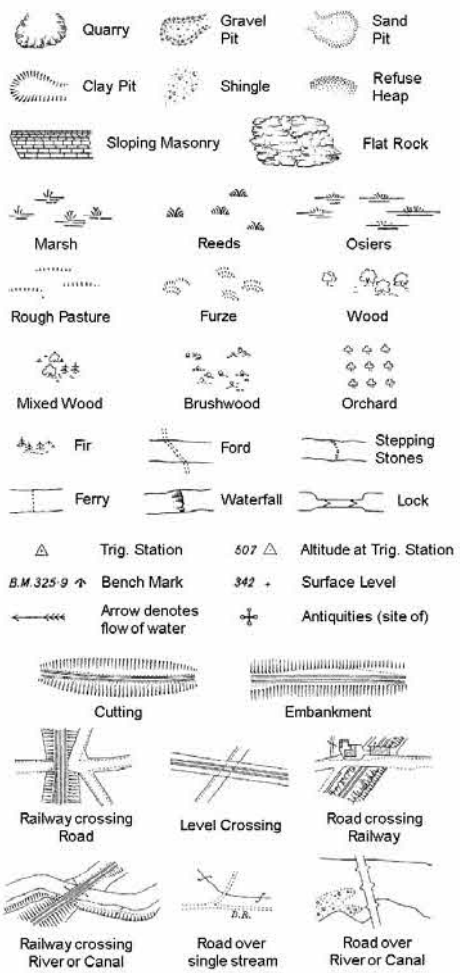
Job Ref:	Drg no:	Rev:
17-631(D)	–	–

APPENDIX II

Historical Plans

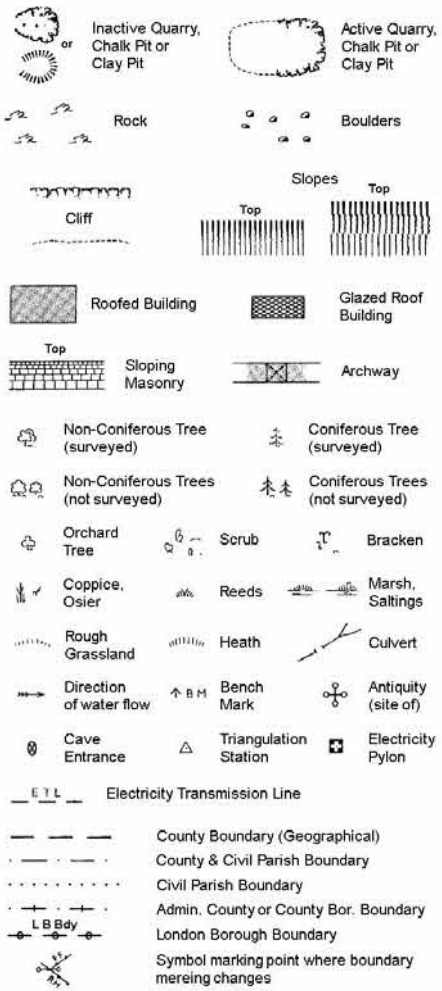
Historical Mapping Legends

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



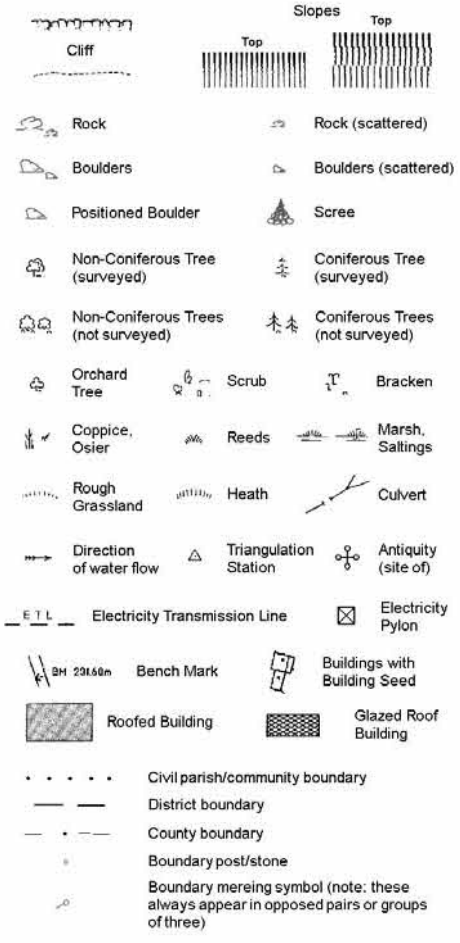
B P B S	Boundary Post or Stone	*P.C.B*	Police Call Box
B.R.	Bridle Road	*P*	Pump
E.P	Electricity Pylon	*S.P*	Signal Post
F.B.	Foot Bridge	*St.*	Sluice
F.P.	Foot Path	*Sp.*	Spring
G.P	Guide Post or Board	*T.C.B*	Telephone Call Box
M.S	Mile Stone	*Tr.*	Trough
M.P M.R	Mooring Post or Ring	*W*	Well

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



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



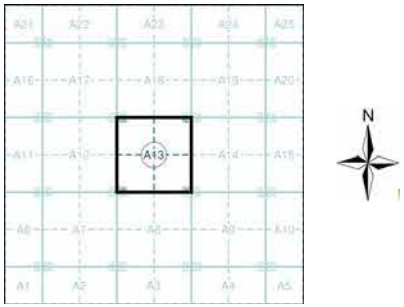
Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity 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

arc environmental

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Durham	1:2,500	1857	2
Durham	1:2,500	1895	3
Durham	1:2,500	1895	4
Durham	1:2,500	1897	5
Durham	1:2,500	1919	6
Ordnance Survey Plan	1:2,500	1963 - 1964	7
Ordnance Survey Plan	1:1,250	1972	8
Supply of Unpublished Survey Information	1:1,250	1974	9
Additional SIMs	1:1,250	1980 - 1989	10
Ordnance Survey Plan	1:1,250	1985 - 1989	11
Additional SIMs	1:1,250	1989	12
Large-Scale National Grid Data	1:1,250	1993	13
Historical Aerial Photography	1:2,500	1999	14

Historical Map - Segment A13



Order Details

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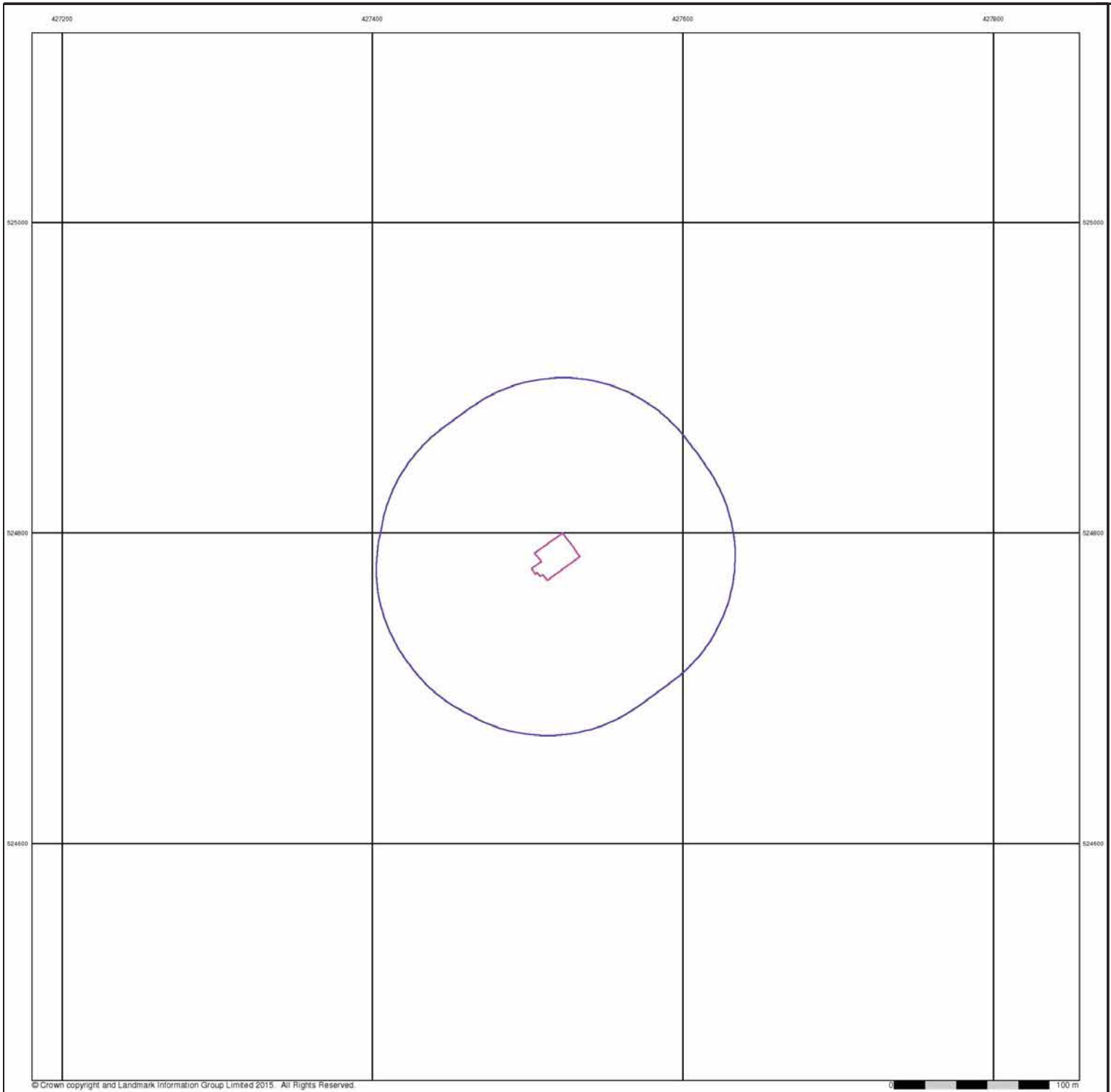
National Grid Reference: 427520, 524780
Slice: A
Site Area (Ha): 0.05
Search Buffer (m): 100

Site Details

Pease Way, Newton Aycliffe, DL5 5NE

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



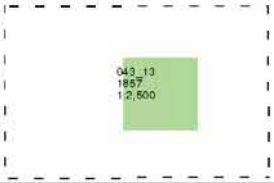
Durham

Published 1857

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)



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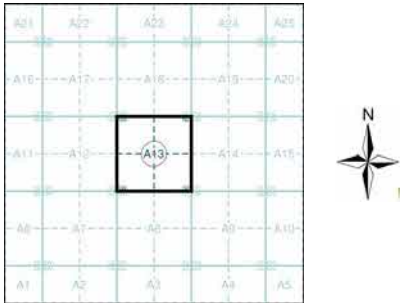

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Search Buffer (m):	100

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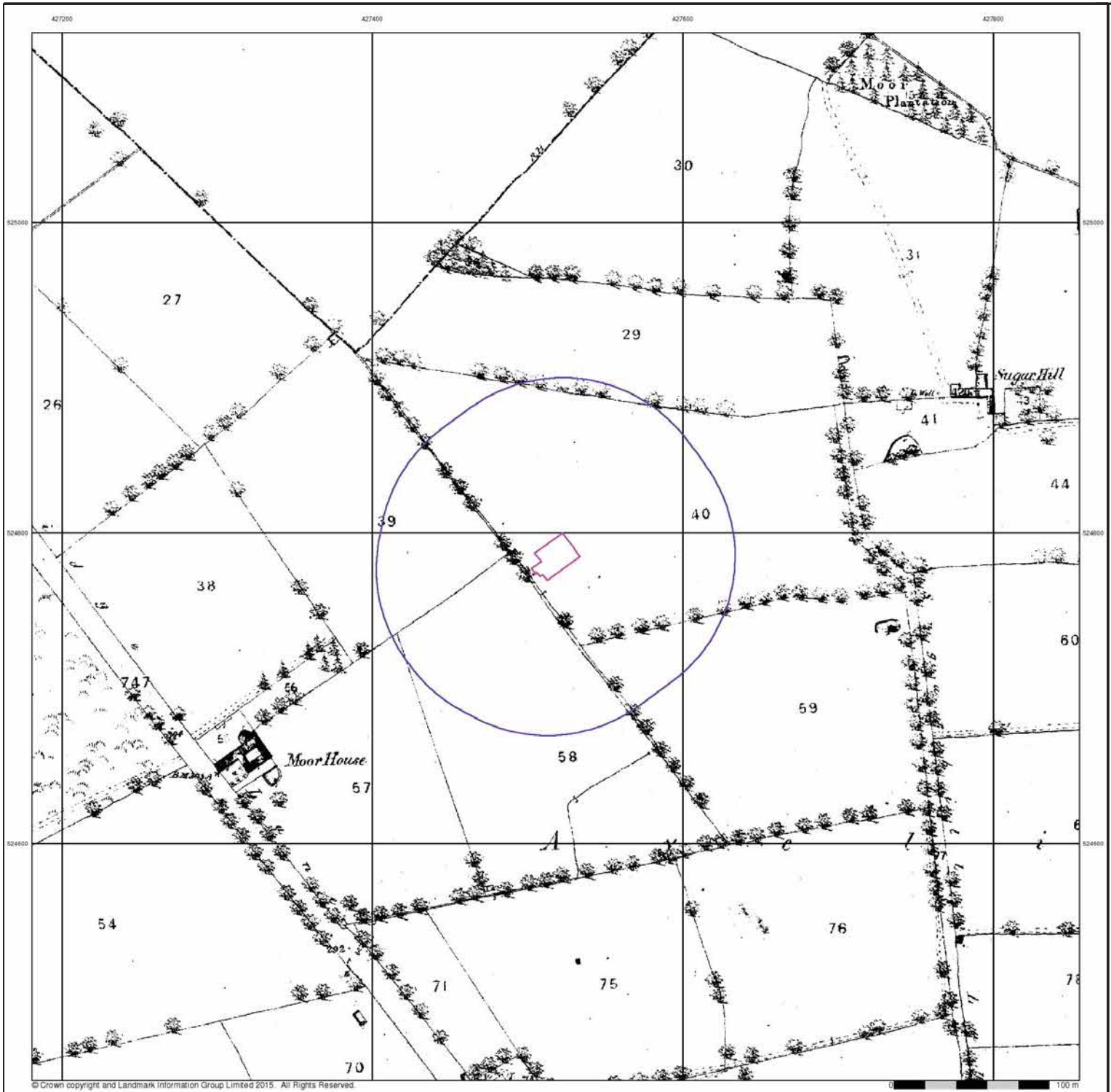


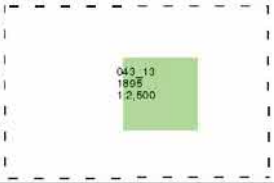
Durham

Published 1895

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)



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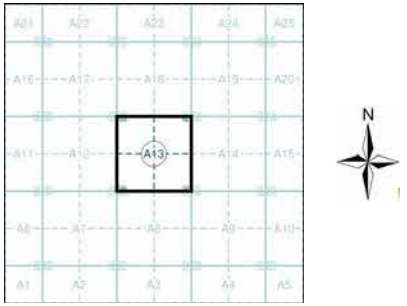

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Slice:	A
Site Area (Ha):	0.05
Search Buffer (m):	100

Site Details

Pease Way, Newton Aycliffe, DL5 5NE

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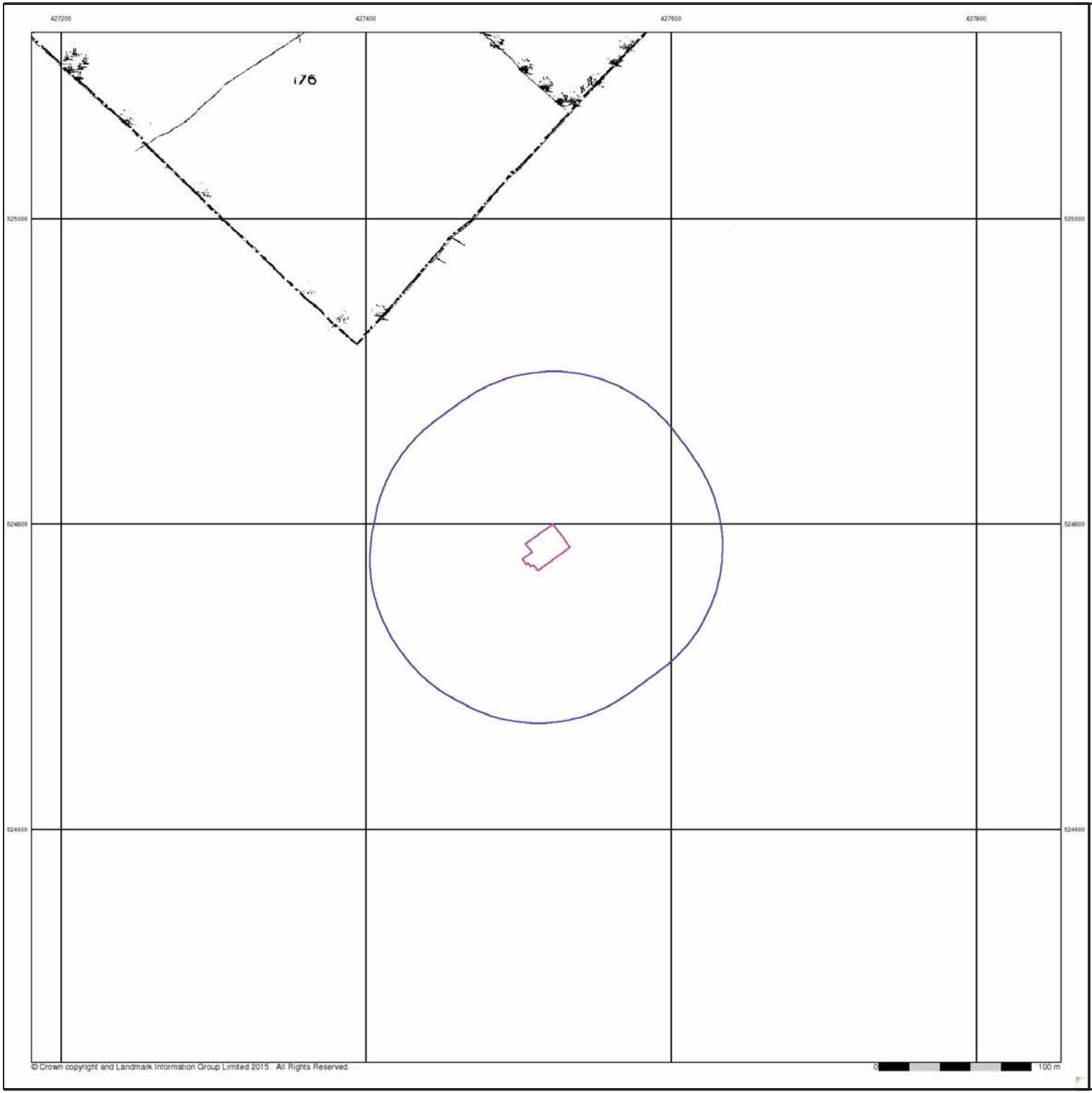

Durham

Published 1895

Source map scale - 1:2,500

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

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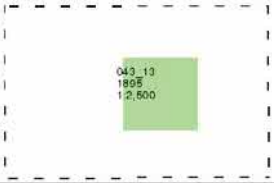

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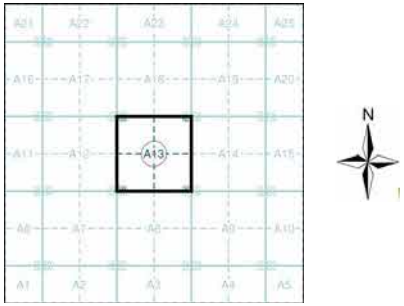

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National Grid Reference:	427520, 524780
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Search Buffer (m):	100

Site Details

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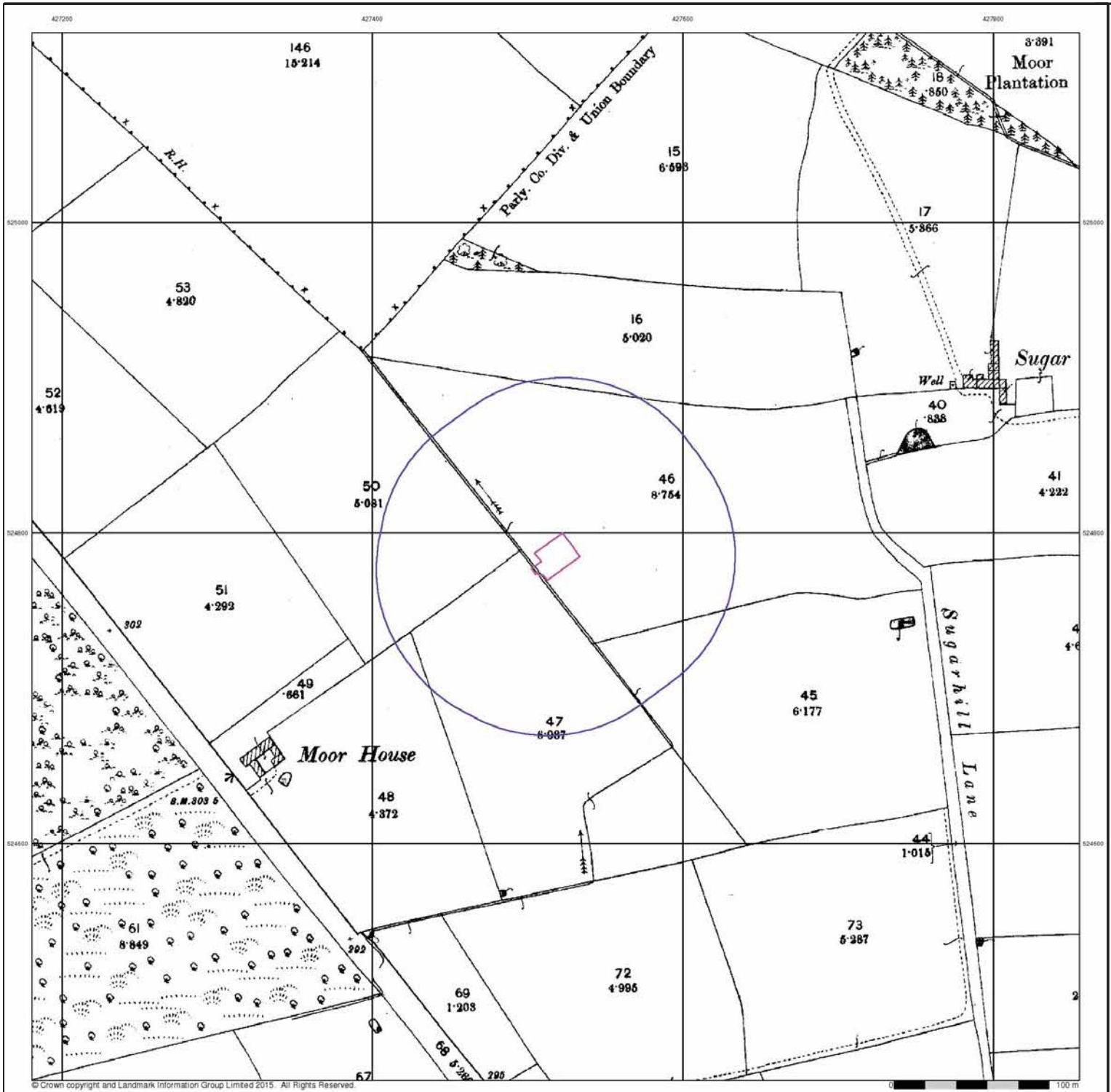

Durham

Published 1897

Source map scale - 1:2,500

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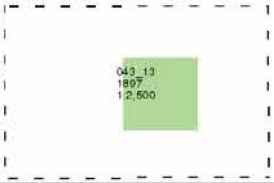
Map Name(s) and Date(s)



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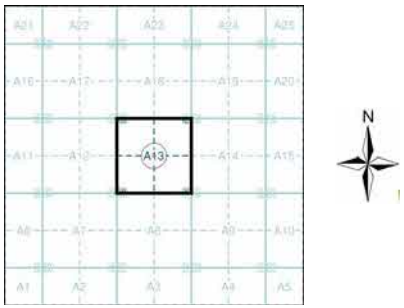

Order Details

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National Grid Reference:	427520, 524780
Slice:	A
Site Area (Ha):	0.05
Search Buffer (m):	100

Site Details

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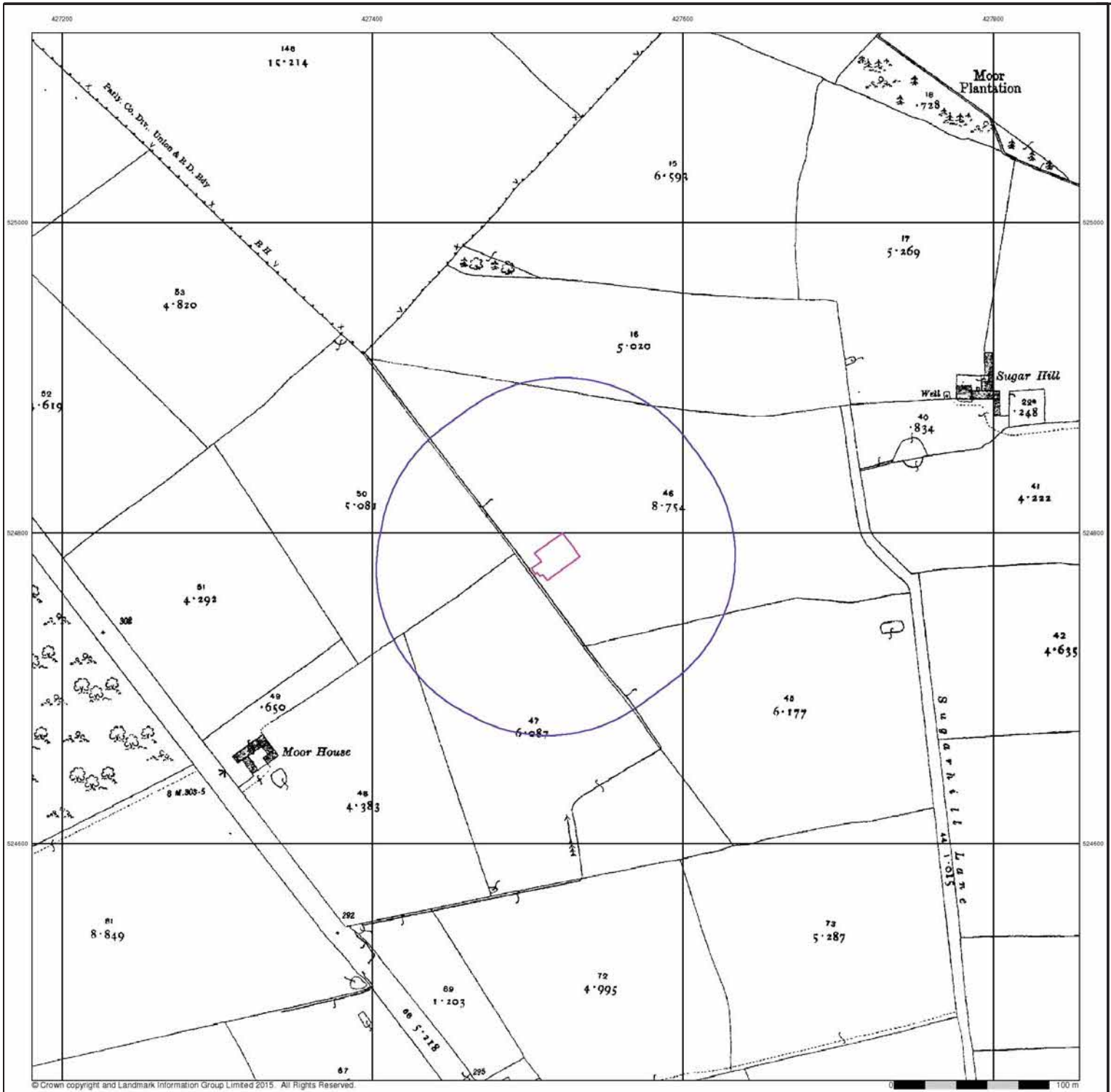

Durham

Published 1919

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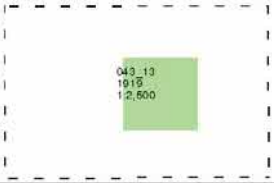
Map Name(s) and Date(s)



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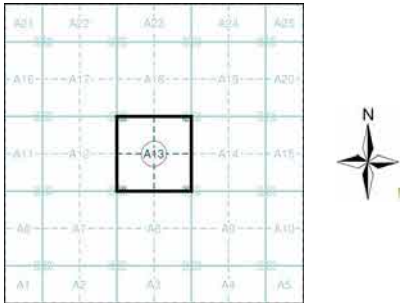
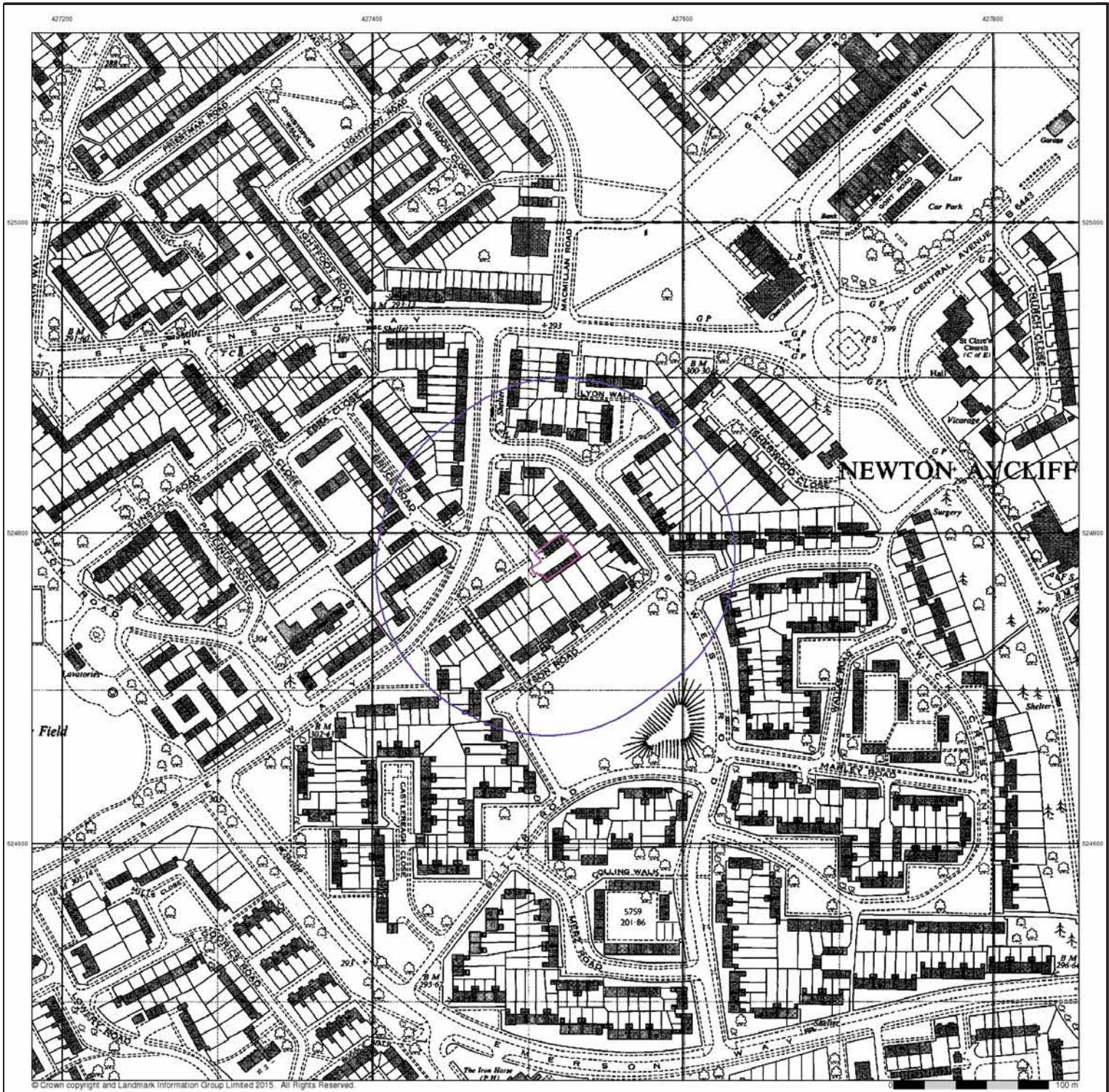


Order Details

Order Number:	136000462_1_1
Customer Ref:	17-631(D)
National Grid Reference:	427520, 524780
Slice:	A
Site Area (Ha):	0.05
Search Buffer (m):	100

Site Details

Pease Way, Newton Aycliffe, DL5 5NE



arc environmental

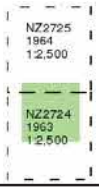
Ordnance Survey Plan

Published 1963 - 1964

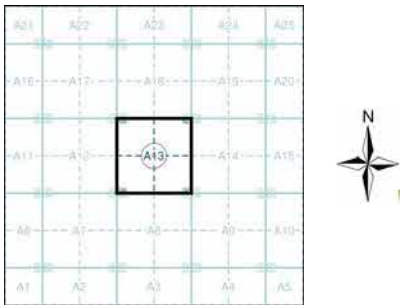
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

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Customer Ref:	17-631(D)
National Grid Reference:	427520, 524780
Slice:	A
Site Area (Ha):	0.05
Search Buffer (m):	100

Site Details

Pease Way, Newton Aycliffe, DL5 5NE

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

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Ordnance Survey Plan

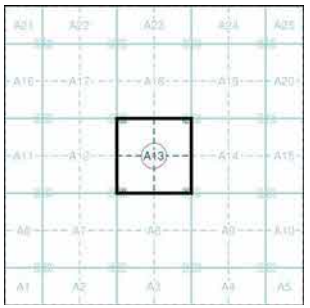
Published 1972

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

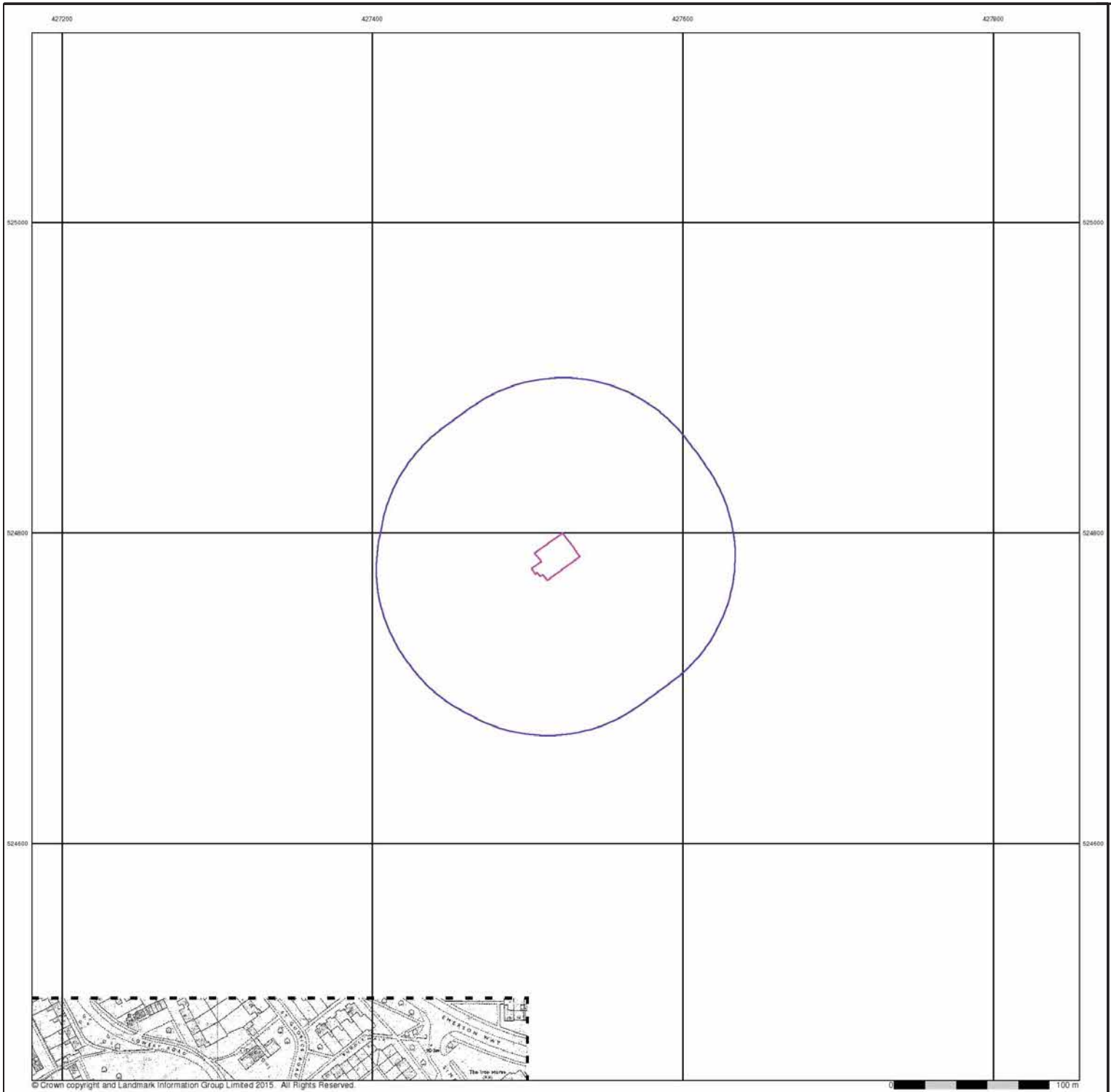
Order Number:	136000462_1_1
Customer Ref:	17-631(D)
National Grid Reference:	427520, 524780
Slice:	A
Site Area (Ha):	0.05
Search Buffer (m):	100

Site Details

Pease Way, Newton Aycliffe, DL5 5NE

Landmark INFORMATION GROUP

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



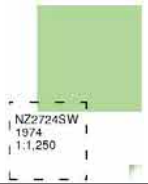
Supply of Unpublished Survey Information

Published 1974

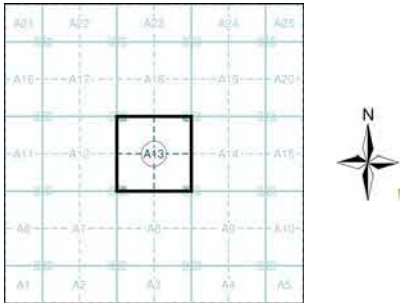
Source map scale - 1:1,250

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



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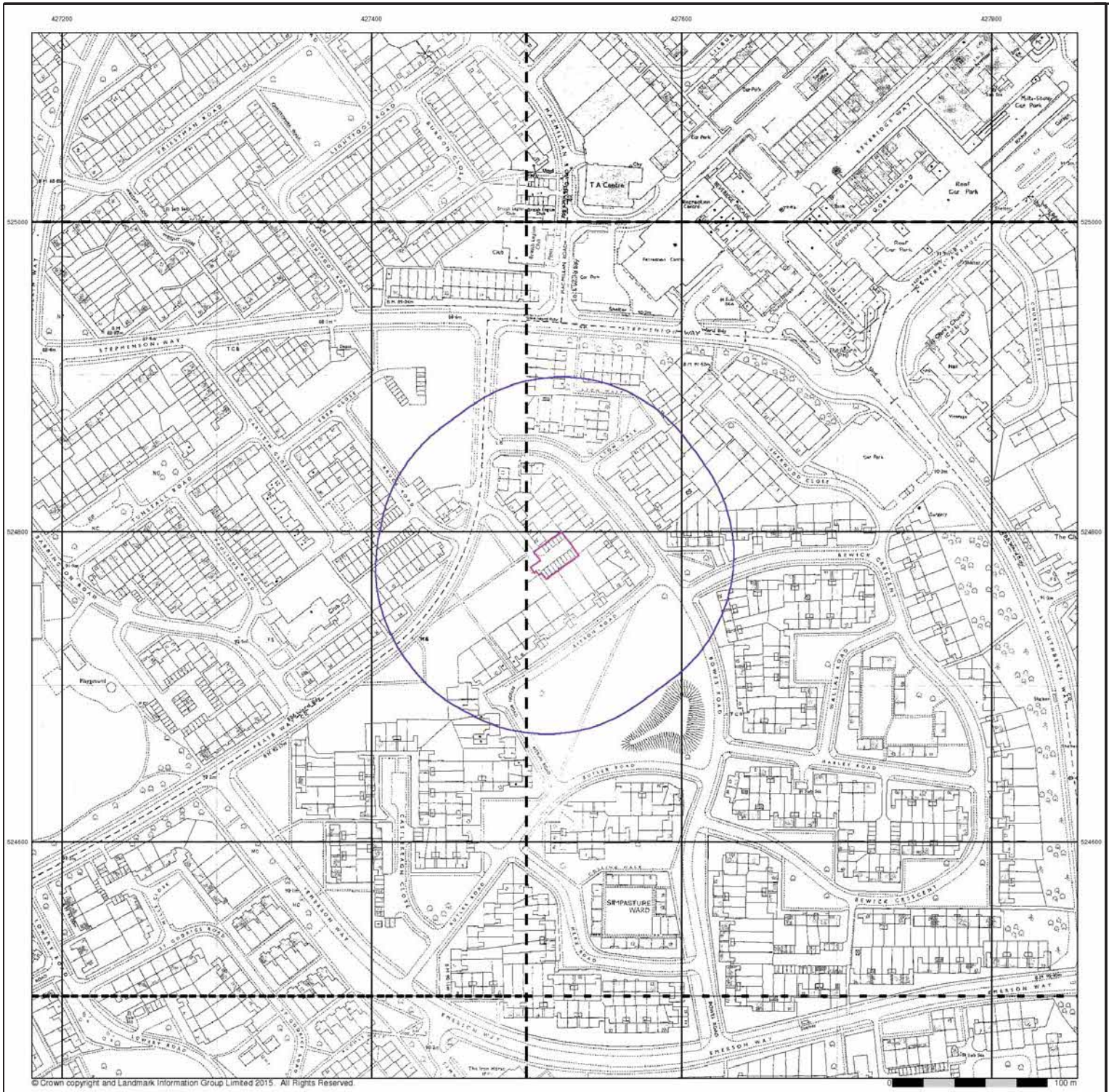


Additional SIMs

Published 1980 - 1989

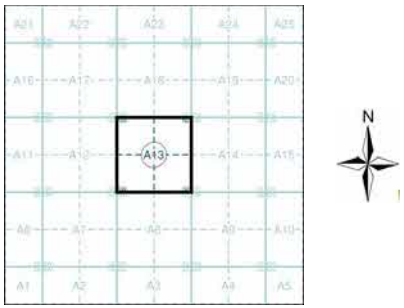
Source map scale - 1:1,250

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)

NZ2725SW 980 1:1,250	NZ2725SE 984 1:1,250
NZ2724NW 989 1:1,250	NZ2724NE 984 1:1,250
NZ2724SW 983 1:1,250	NZ2724SE 983 1:1,250

Historical Map - Segment A13



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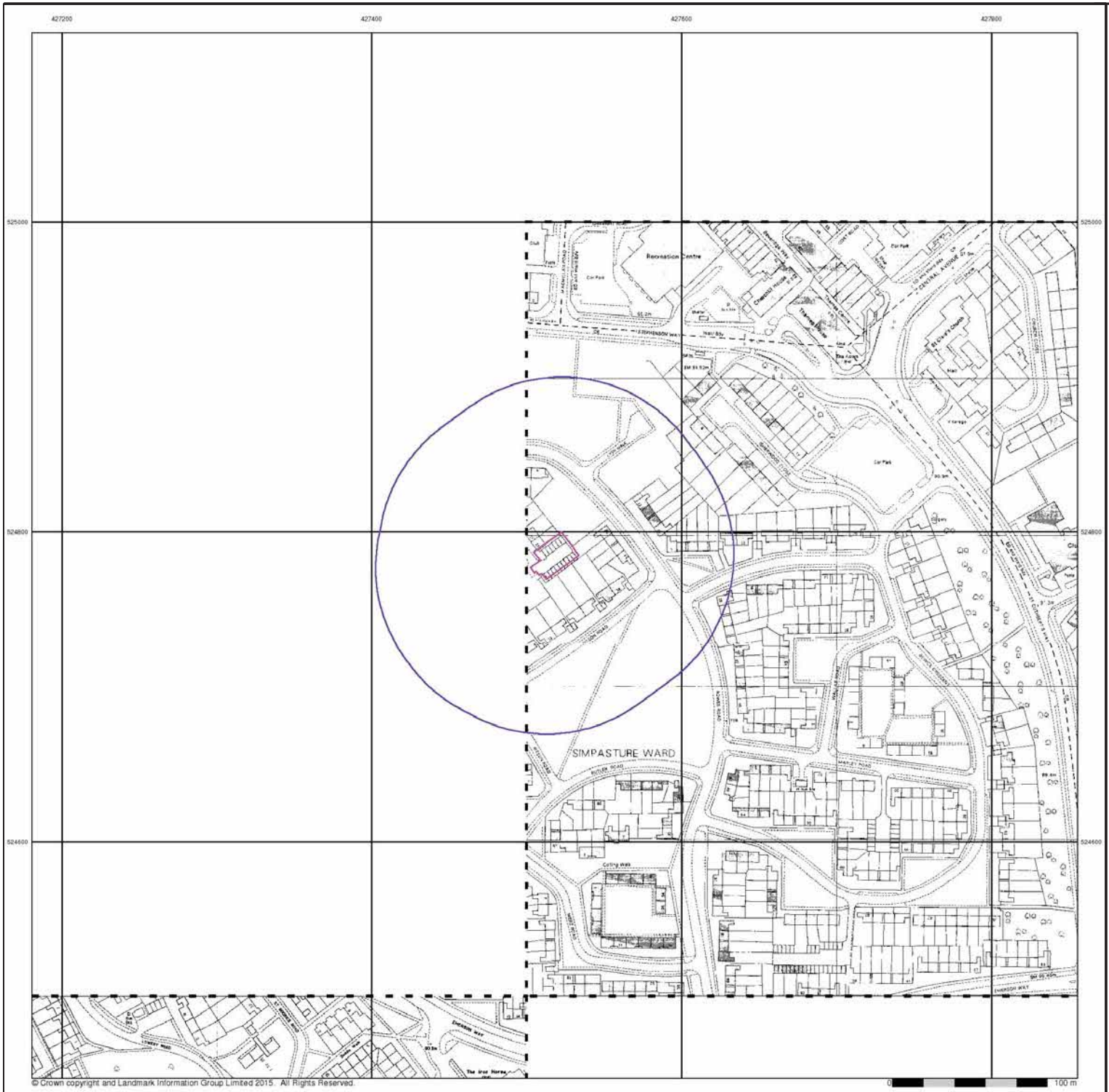

Ordnance Survey Plan

Published 1985 - 1989

Source map scale - 1:1,250

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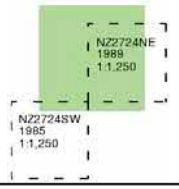
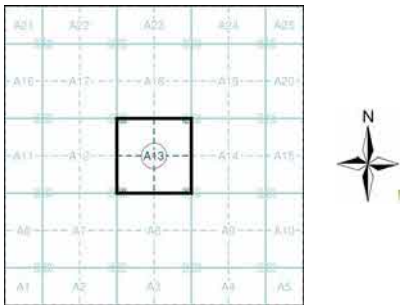


Historical Map - Segment A13



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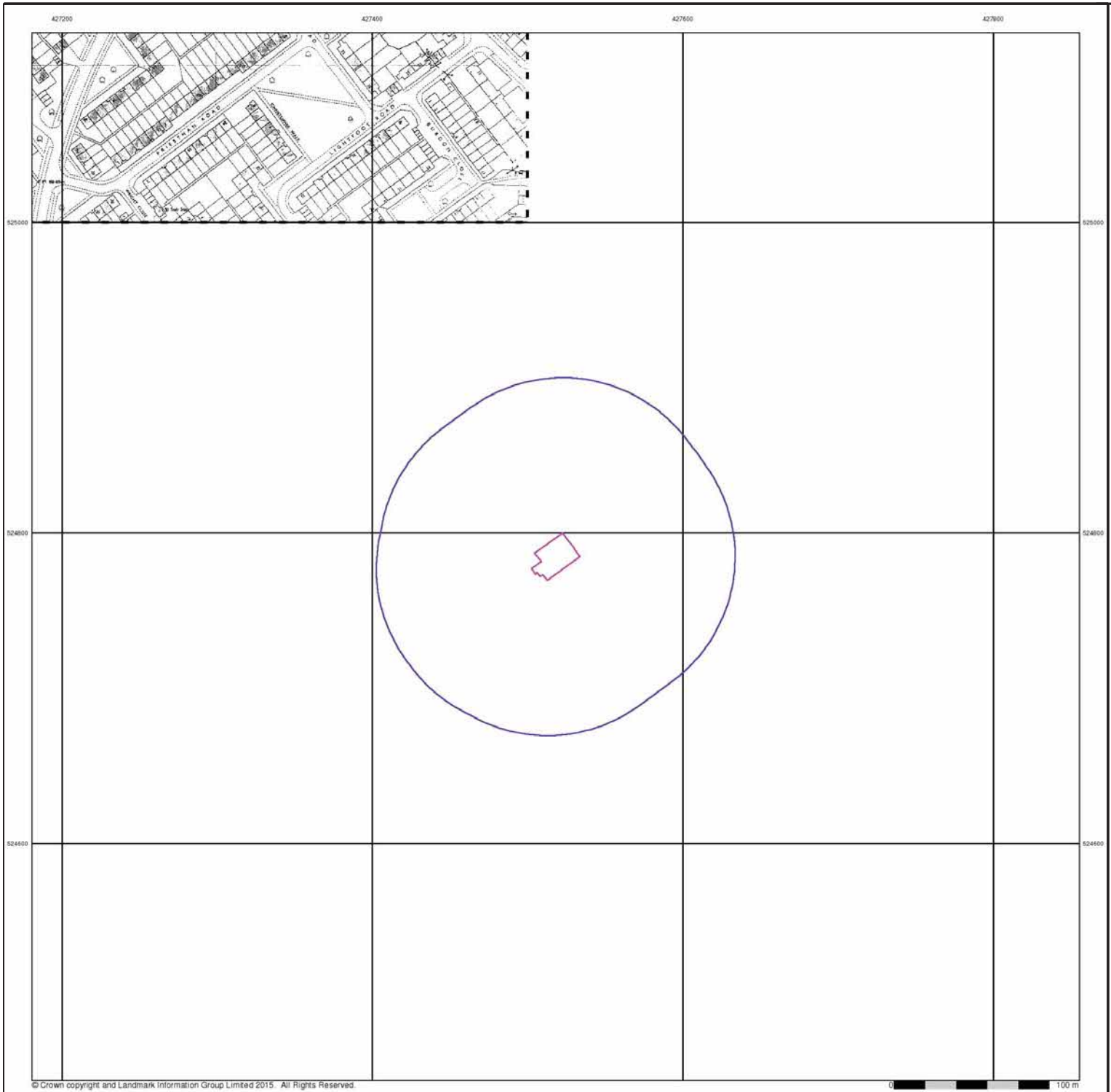

Additional SIMs

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.

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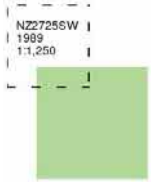
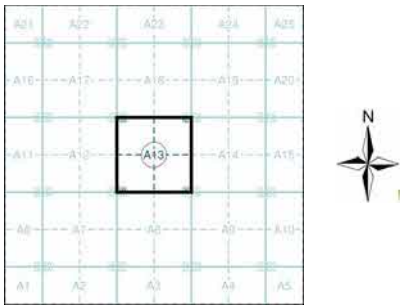


Historical Map - Segment A13



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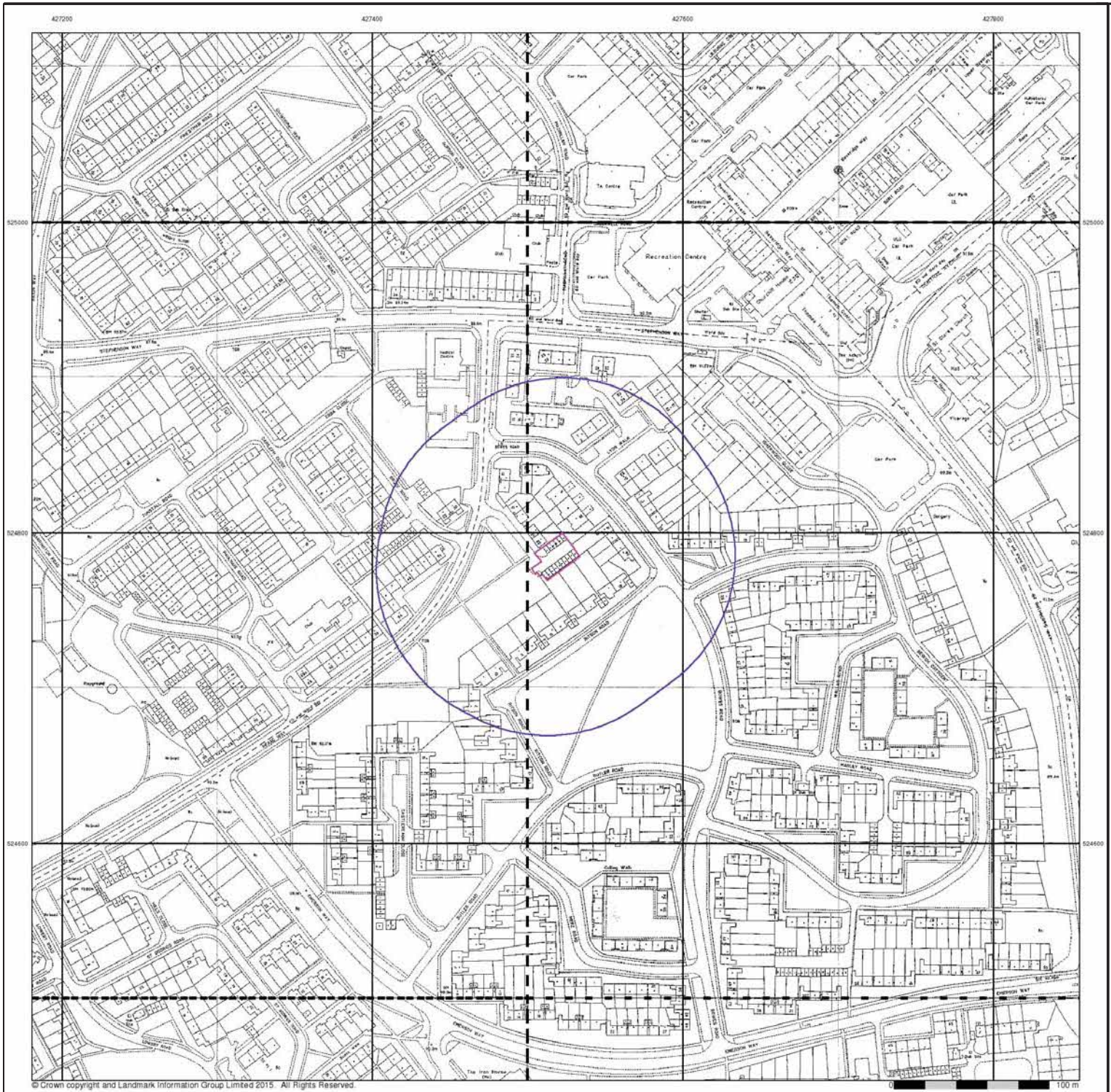

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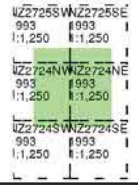
Large-Scale National Grid Data

Published 1993

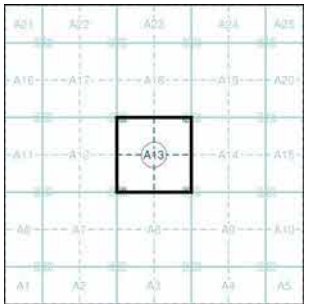
Source map scale - 1:1,250

'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)



Historical Map - Segment A13



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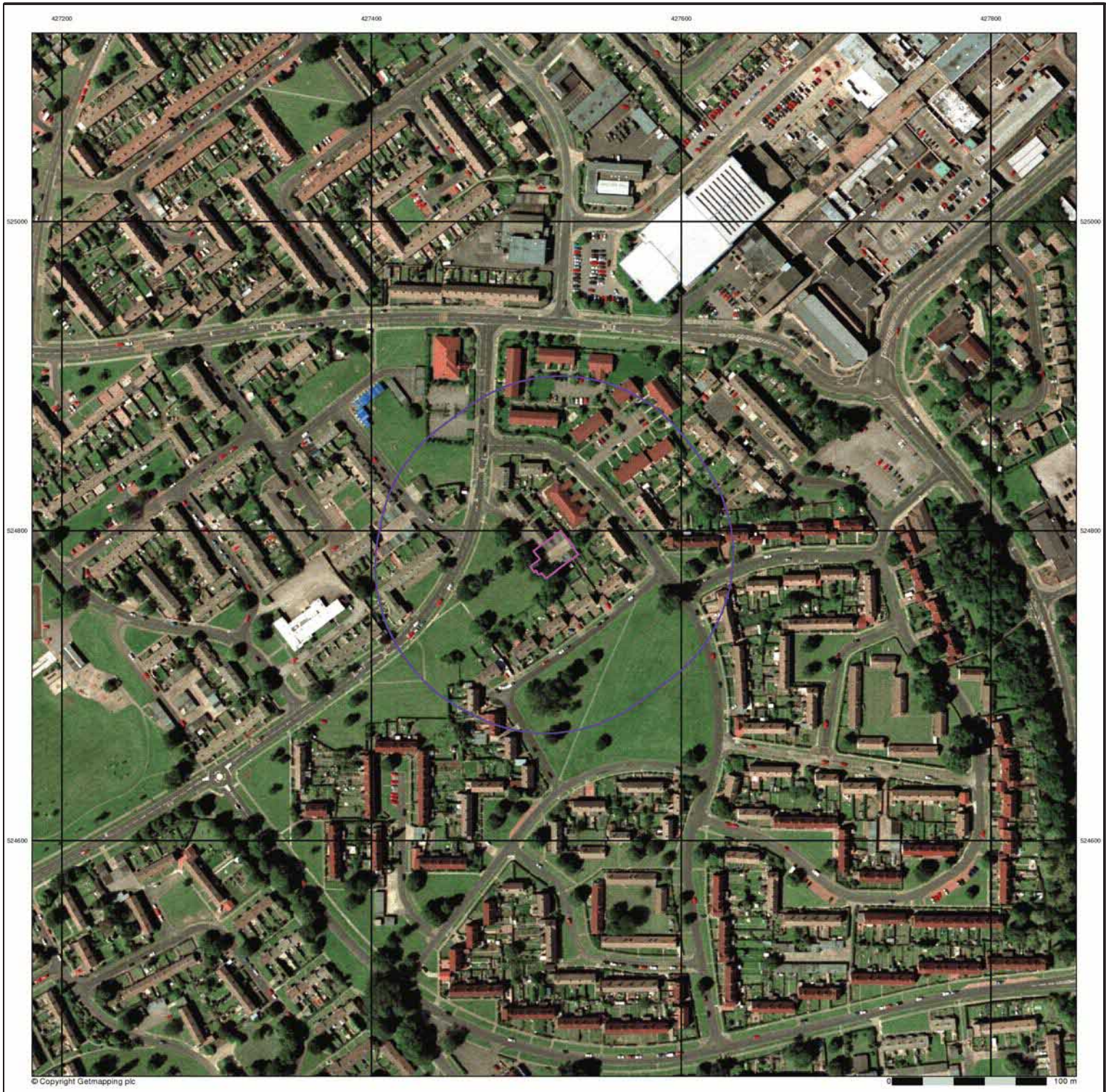
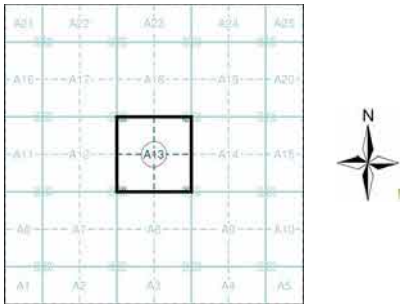


Historical Aerial Photography

Published 1999

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

Historical Aerial Photography - Segment A13



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Historical Mapping Legends

Ordnance Survey County Series 1:10,560

Gravel Pit
Sand Pit
Other Pits
Quarry
Shingle
Orchard
Osiers
Reeds
Marsh
Mixed Wood
Deciduous
Brushwood
Fir
Furze
Rough Pasture
Arrow denotes flow of water
Trigonometrical Station
Site of Antiquities
Bench Mark
Pump, Guide Post, Signal Post
Well, Spring, Boundary Post
·285 Surface Level
Sketched Contour
Instrumental Contour
Main Roads
Fenced
Un-Fenced
Minor Roads
Fenced
Un-Fenced
Sunken Road
Raised Road
Road over Railway
Railway over River
Railway over Road
Level Crossing
Road over River or Canal
Road over Stream
Road over Stream
County Boundary (Geographical)
County & Civil Parish Boundary
Administrative County & Civil Parish Boundary
Co. Boro. Bdy. County Borough Boundary (England)
Co. Burgh Bdy. County Burgh Boundary (Scotland)
R.D. Bdy. Rural District Boundary
Civil Parish Boundary

Ordnance Survey Plan 1:10,000

Chalk Pit, Clay Pit or Quarry
Gravel Pit
Sand Pit
Disused Pit or Quarry
Refuse or Slag Heap
Lake, Loch or Pond
Dunes
Boulders
Coniferous Trees
Non-Coniferous Trees
Orchard
Scrub
Coppice
Bracken
Heath
Rough Grassland
Marsh
Reeds
Saltings
Building
Direction of Flow of Water
Shingle
Sand
Glasshouse
Pylon
Electricity Transmission Line
Pole
Sloping Masonry
Cutting
Embankment
Standard Gauge Multiple Track
Road Under
Road Over
Level Crossing
Foot Bridge
Standard Gauge Single Track
Siding, Tramway or Mineral Line
Narrow Gauge
Geographical County
Administrative County, County Borough or County of City
Municipal Borough, Urban or Rural District, Burgh or District Council
Borough, Burgh or County Constituency
Shown only when not coincident with other boundaries
Civil Parish
Shown alternately when coincidence of boundaries occurs

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

1:10,000 Raster Mapping

Gravel Pit
Refuse tip or slag heap
Rock
Rock (scattered)
Boulders
Boulders (scattered)
Shingle
Mud
Sand
Sand Pit
Slopes
Top of cliff
General detail
Underground detail
Overhead detail
Narrow gauge railway
Multi-track railway
Single track railway
County boundary (England only)
Civil, parish or community boundary
District, Unitary, Metropolitan, London Borough boundary
Constituency boundary
Area of wooded vegetation
Non-coniferous trees
Non-coniferous trees (scattered)
Coniferous trees
Coniferous trees (scattered)
Positioned tree
Orchard
Coppice or Osiers
Rough Grassland
Heath
Scrub
Marsh, Salt Marsh or Reeds
Water feature
Flow arrows
MHW(S) Mean high water (springs)
MLW(S) Mean low water (springs)
Telephone line (where shown)
Electricity transmission line (with poles)
BM 123.45 m Bench mark (where shown)
Triangulation station
Point feature (e.g. Guide Post or Mile Stone)
Pylon, flare stack or lighting tower
Site of (antiquity)
Glasshouse
General Building
Important Building

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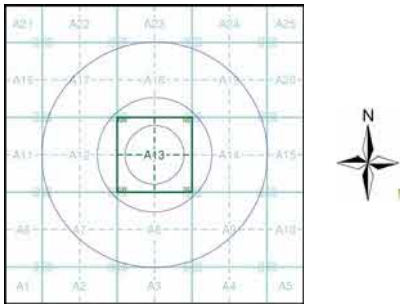
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Durham	1:10,560	1858 - 1859	2
Durham	1:10,560	1898	3
Durham	1:10,560	1923	4
Ordnance Survey Plan	1:10,000	1954	5
Ordnance Survey Plan	1:10,000	1965 - 1966	6
Ordnance Survey Plan	1:10,000	1968	7
Ordnance Survey Plan	1:10,000	1976 - 1979	8
Ordnance Survey Plan	1:10,000	1983	9
Ordnance Survey Plan	1:10,000	1990 - 1992	10
10K Raster Mapping	1:10,000	2000	11
10K Raster Mapping	1:10,000	2006	12
VectorMap Local	1:10,000	2017	13

Historical Map - Slice A



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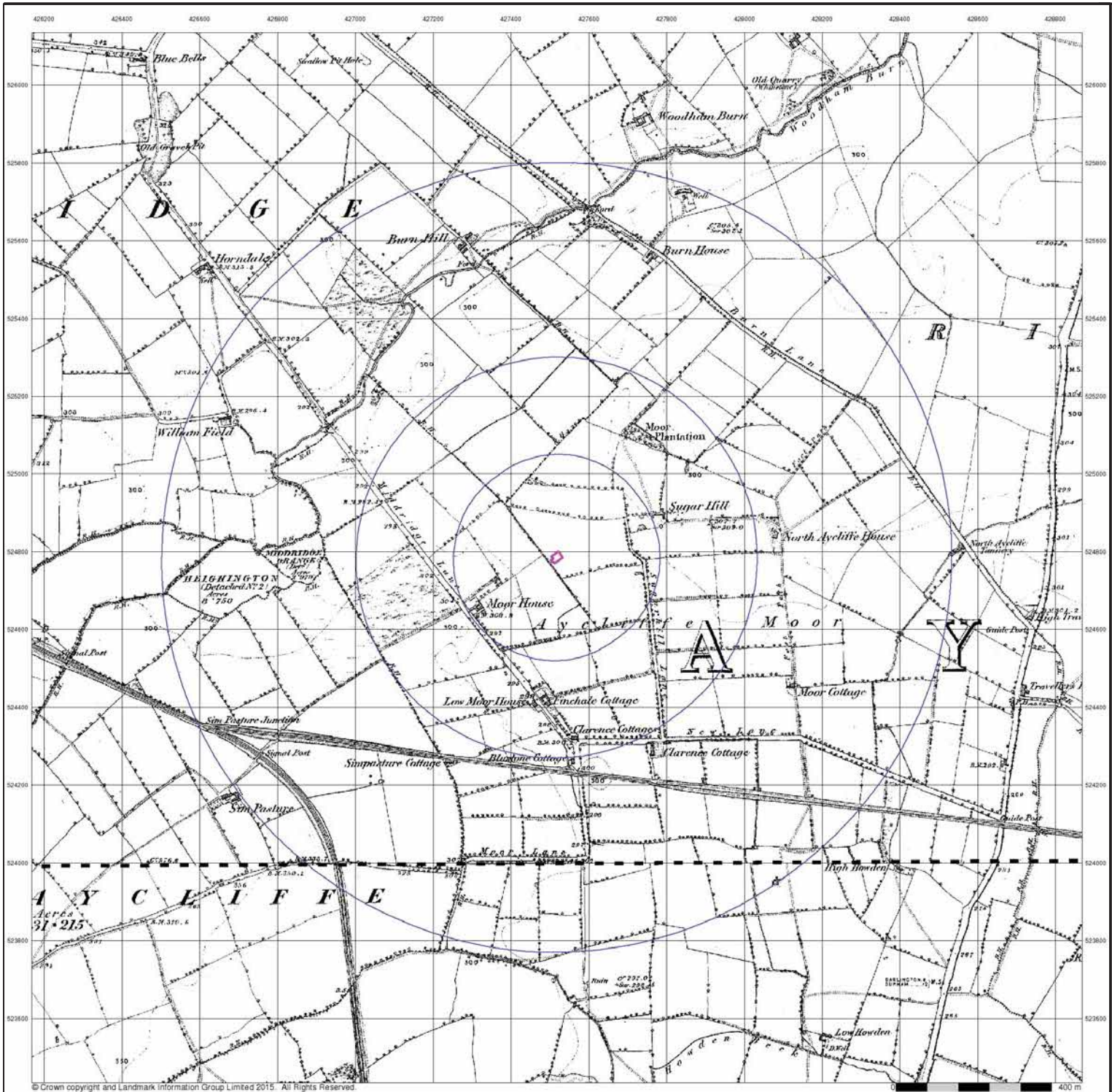

Durham

Published 1858 - 1859

Source map scale - 1:10,560

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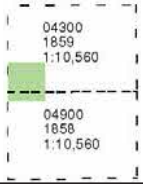
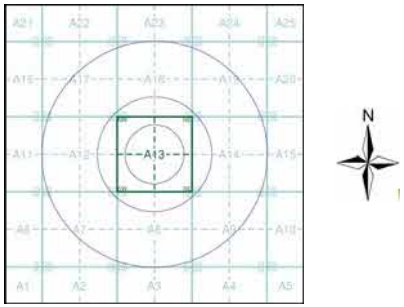
Map Name(s) and Date(s)



Historical Map - Slice A



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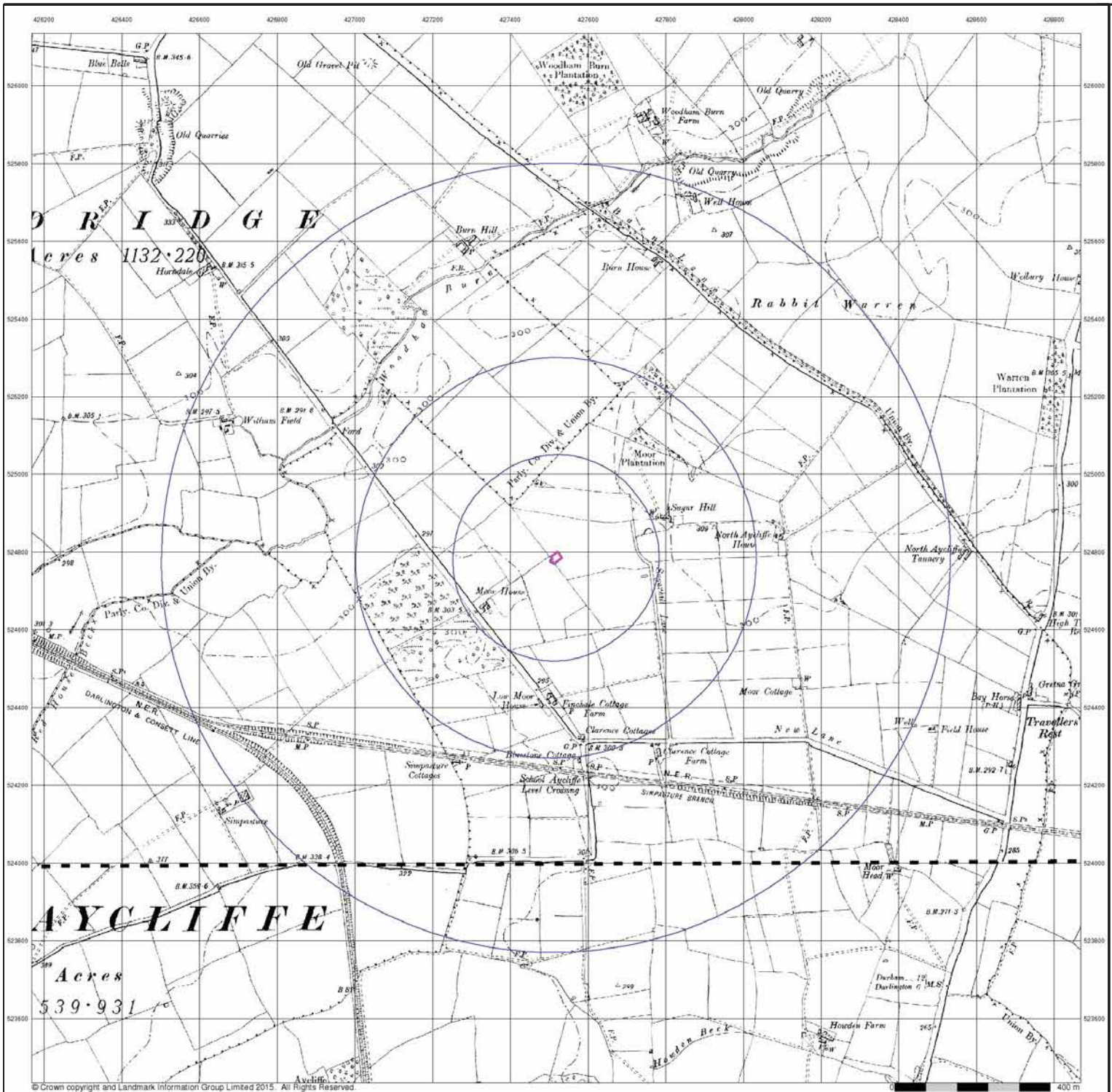

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Durham

Published 1898

Source map scale - 1:10,560

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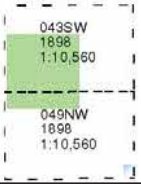
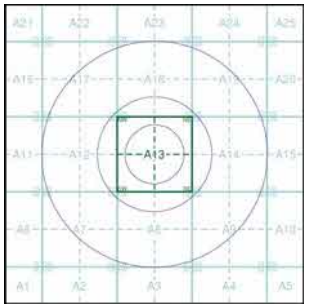


Historical Map - Slice A



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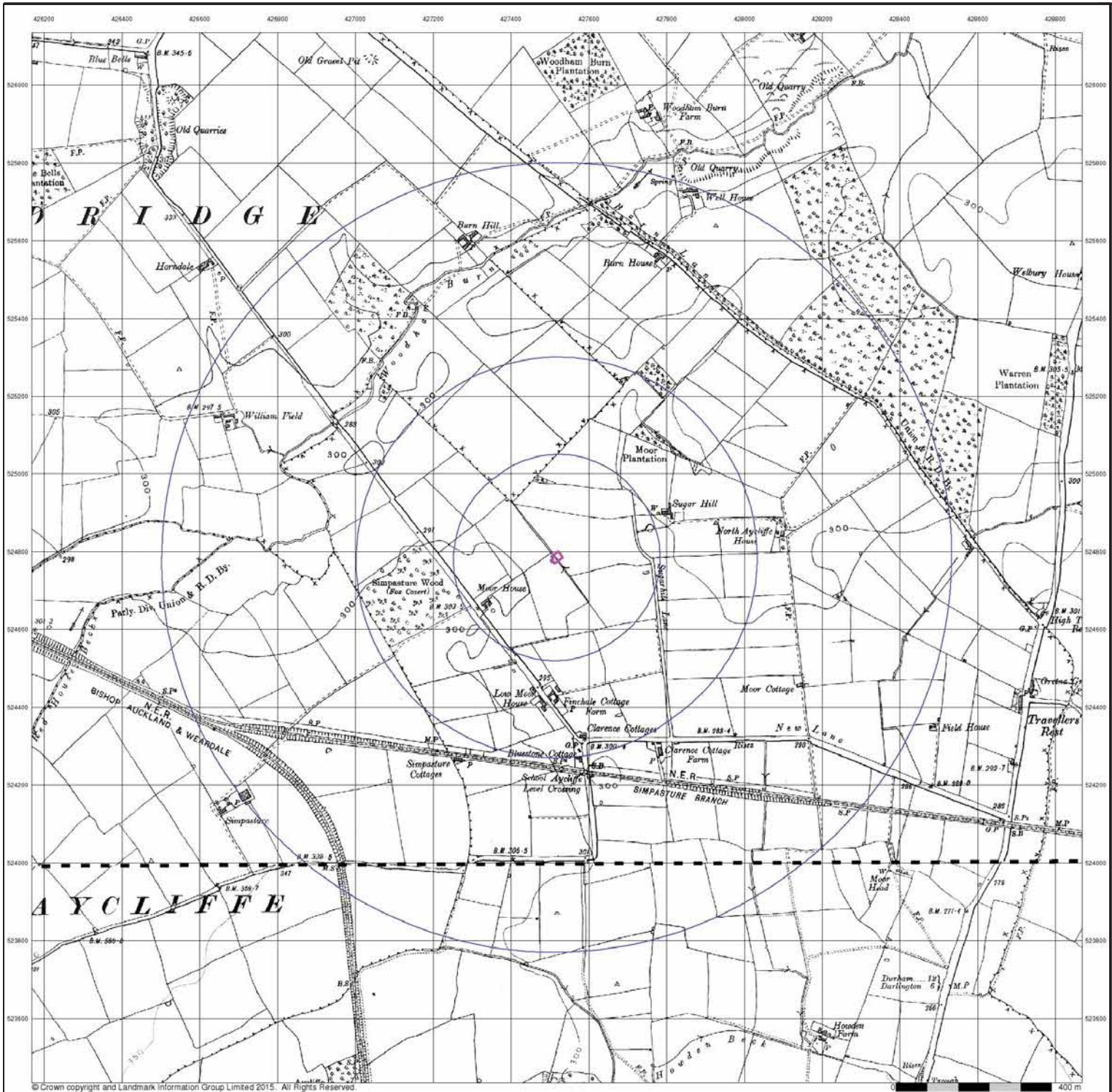

Durham

Published 1923

Source map scale - 1:10,560

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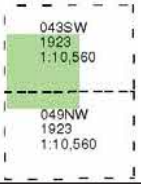

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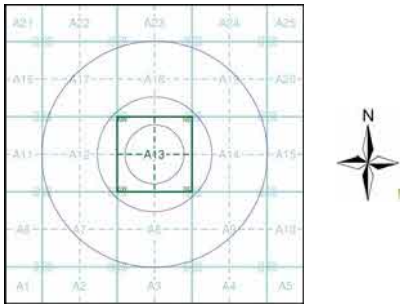

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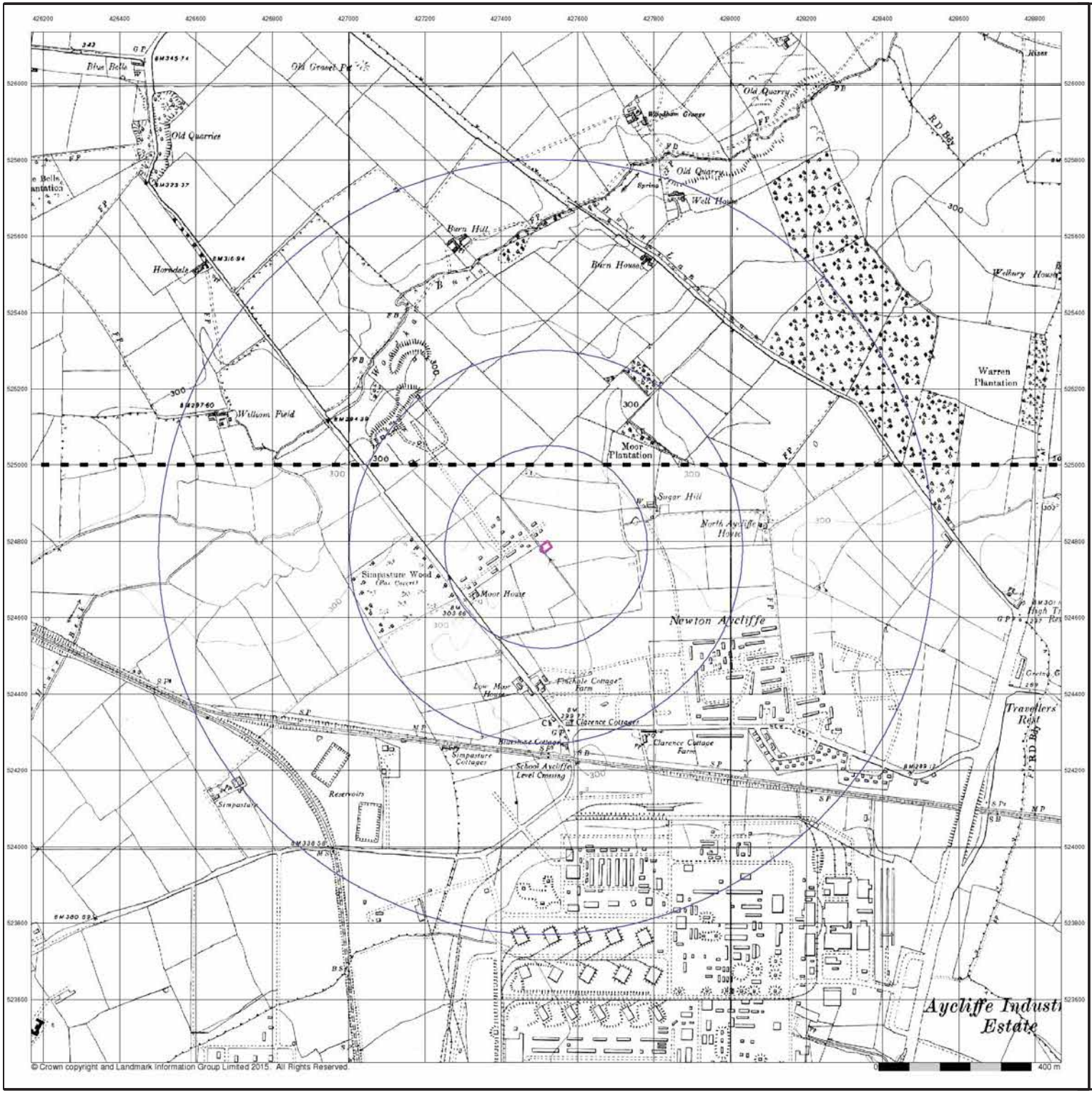


Ordnance Survey Plan

Published 1954

Source map scale - 1:10,000

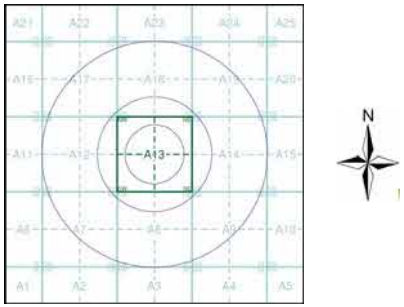
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some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

Map Name(s) and Date(s)

NZ22NE
1954
1:10,560

NZ22SE
1954
1:10,560

Historical Map - Slice A



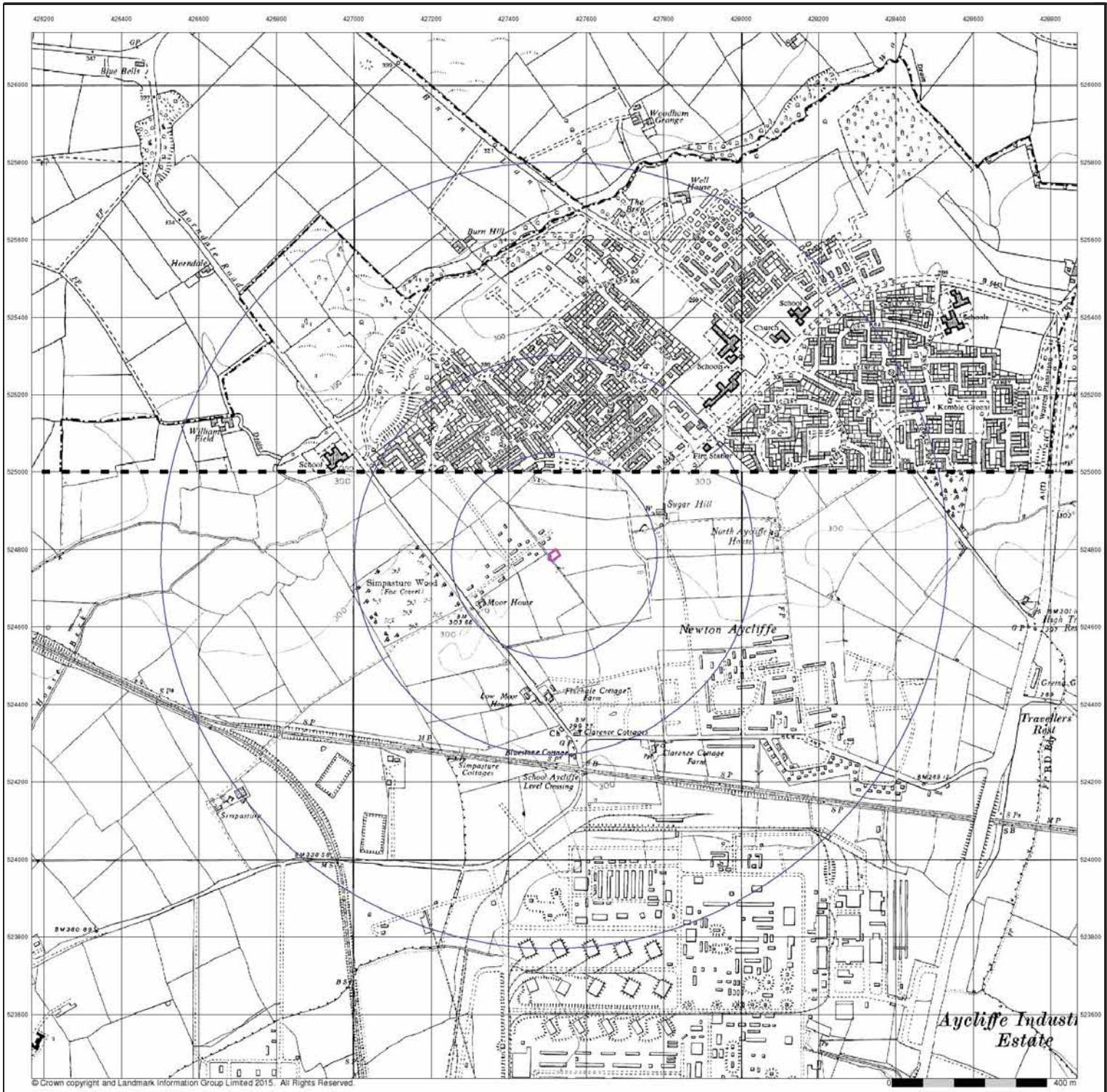
Order Details

Order Number:	136000462_1_1
Customer Ref:	17-631(D)
National Grid Reference:	427520, 524780
Slice:	A
Site Area (Ha):	0.05
Search Buffer (m):	1000

Site Details

Pease Way, Newton Aycliffe, DL5 5NE

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



Ordnance Survey Plan

Published 1965 - 1966

Source map scale - 1:10,000

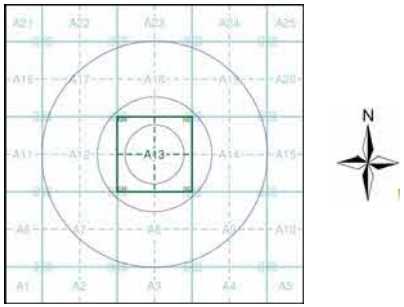
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some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

Map Name(s) and Date(s)

NZ22NE
1965
1:10,560

NZ22SE
1966
1:10,560

Historical Map - Slice A



Order Details

Order Number:	136000462_1_1
Customer Ref:	17-631(D)
National Grid Reference:	427520, 524780
Slice:	A
Site Area (Ha):	0.05
Search Buffer (m):	1000

Site Details

Pease Way, Newton Aycliffe, DL5 5NE

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

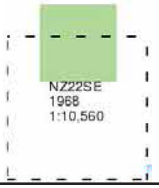
Ordnance Survey Plan

Published 1968

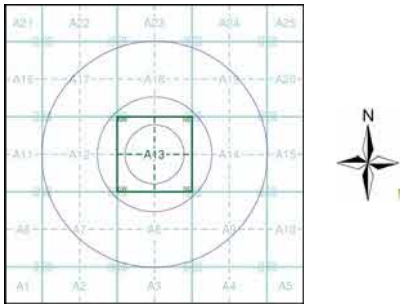
Source map scale - 1:10,000

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

Map Name(s) and Date(s)



Historical Map - Slice A



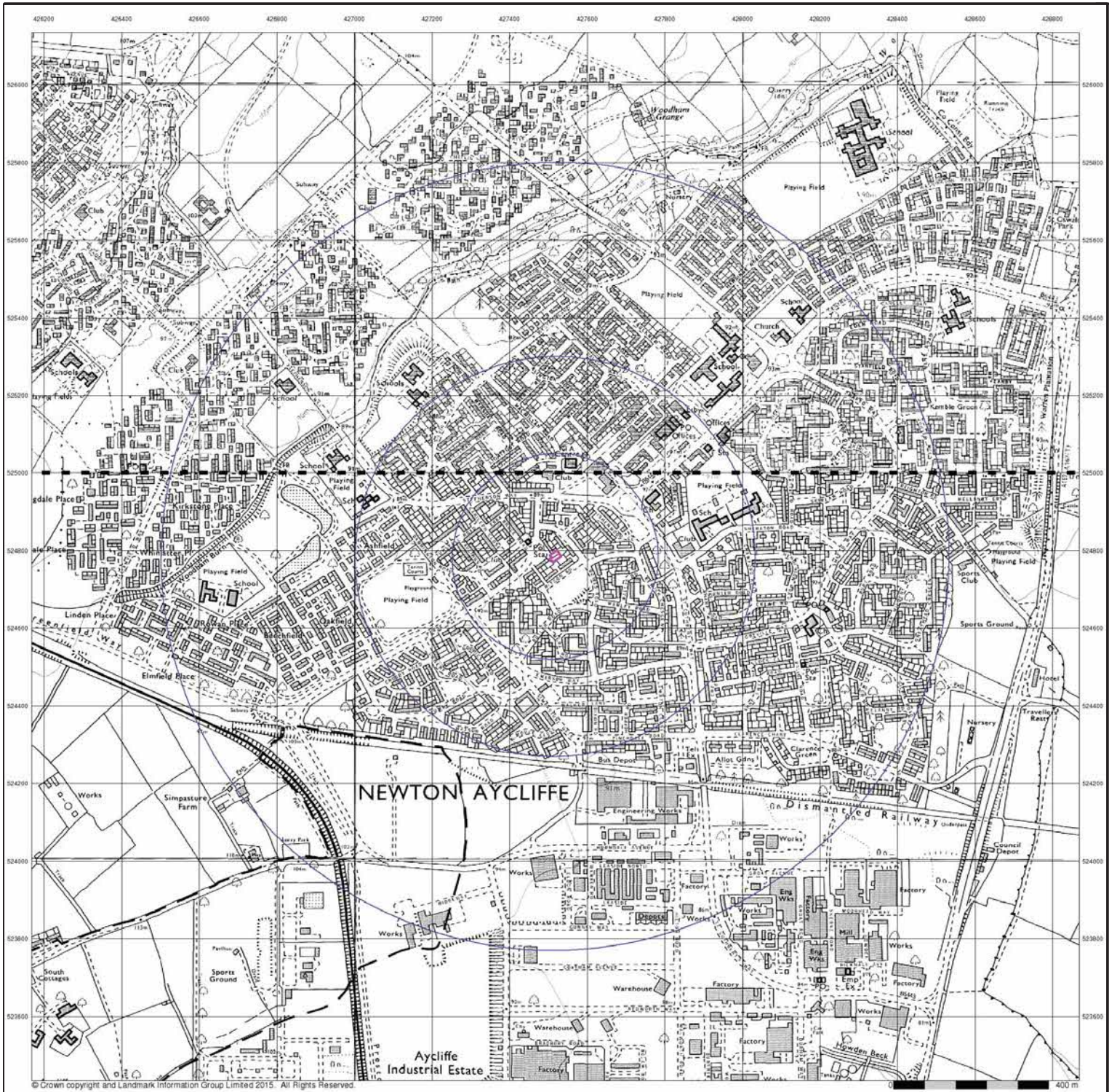
Order Details

Order Number:	136000462_1_1
Customer Ref:	17-631(D)
National Grid Reference:	427520, 524780
Slice:	A
Site Area (Ha):	0.05
Search Buffer (m):	1000

Site Details

Pease Way, Newton Aycliffe, DL5 5NE

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



arc environmental

Ordnance Survey Plan

Published 1976 - 1979

Source map scale - 1:10,000

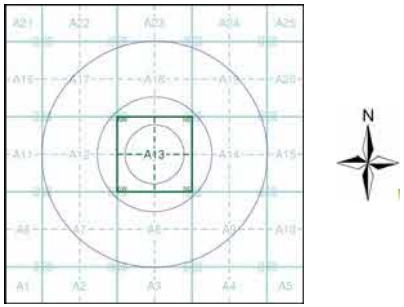
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some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

Map Name(s) and Date(s)

NZ22NE
1979
1:10,000

NZ22SE
1976
1:10,000

Historical Map - Slice A



Order Details

Order Number:	136000462_1_1
Customer Ref:	17-631(D)
National Grid Reference:	427520, 524780
Slice:	A
Site Area (Ha):	0.05
Search Buffer (m):	1000

Site Details

Pease Way, Newton Aycliffe, DL5 5NE

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

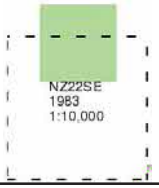
Ordnance Survey Plan

Published 1983

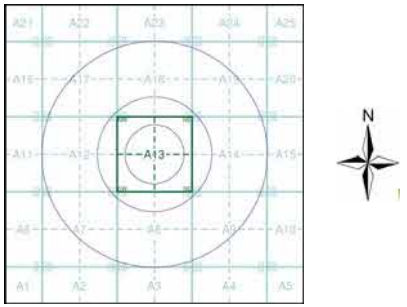
Source map scale - 1:10,000

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

Map Name(s) and Date(s)



Historical Map - Slice A



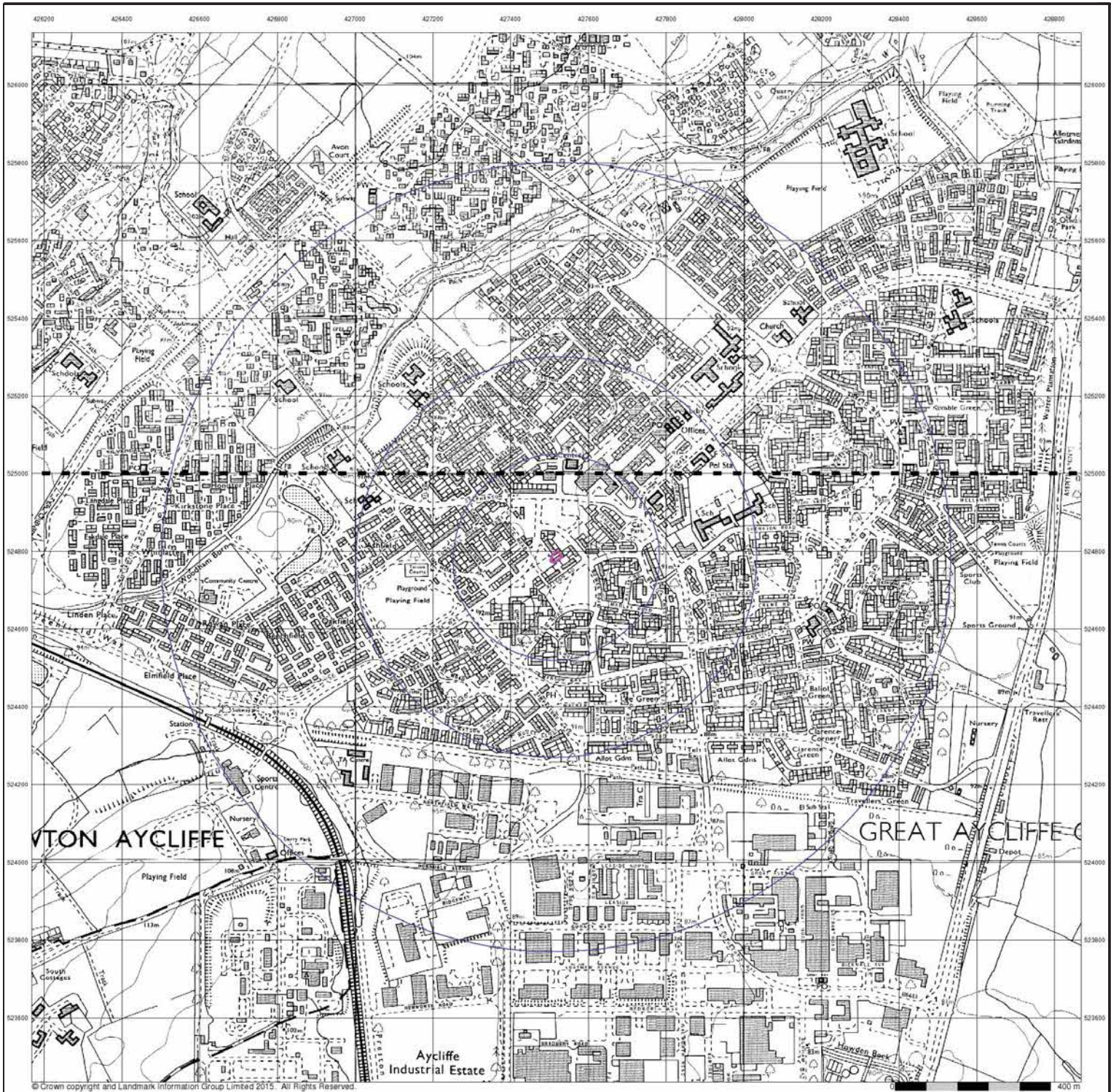
Order Details

Order Number:	136000462_1_1
Customer Ref:	17-631(D)
National Grid Reference:	427520, 524780
Slice:	A
Site Area (Ha):	0.05
Search Buffer (m):	1000

Site Details

Pease Way, Newton Aycliffe, DL5 5NE

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



Ordnance Survey Plan

Published 1990 - 1992

Source map scale - 1:10,000

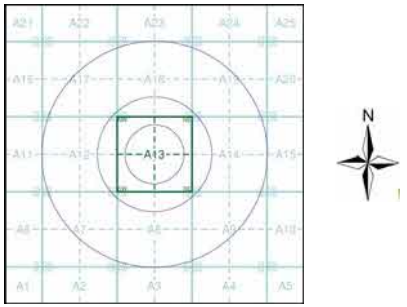
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some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

Map Name(s) and Date(s)

NZ22NE
1990
1:10,000

NZ22SE
1992
1:10,000

Historical Map - Slice A



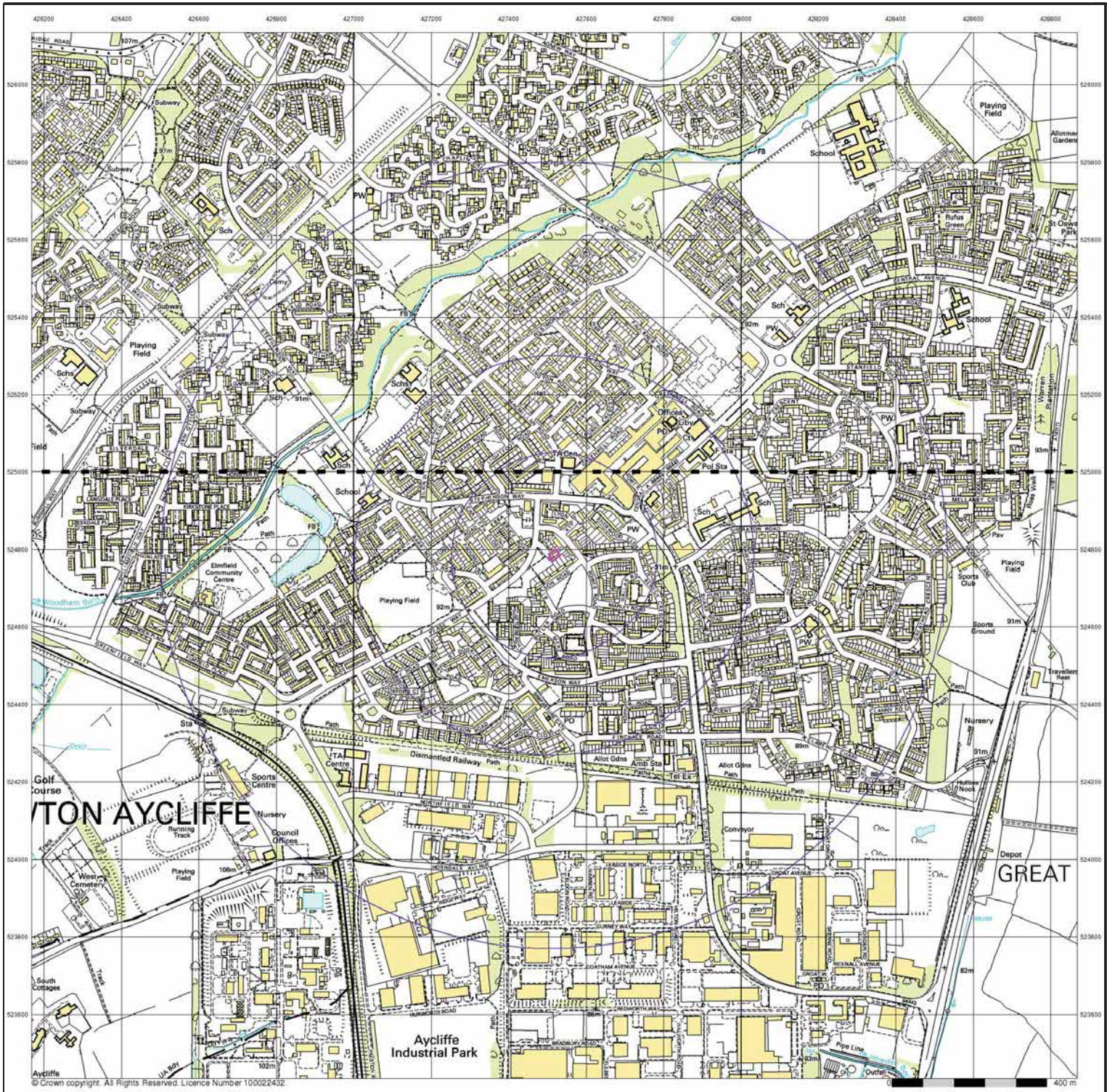
Order Details

Order Number:	136000462_1_1
Customer Ref:	17-631(D)
National Grid Reference:	427520, 524780
Slice:	A
Site Area (Ha):	0.05
Search Buffer (m):	1000

Site Details

Pease Way, Newton Aycliffe, DL5 5NE

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



arc environmental

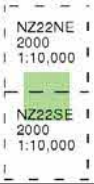
10k Raster Mapping

Published 2000

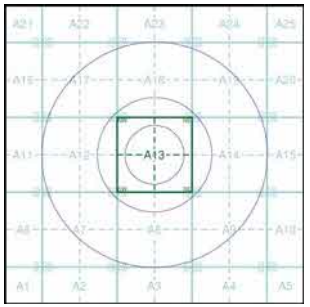
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	136000462_1_1
Customer Ref:	17-631(D)
National Grid Reference:	427520, 524780
Slice:	A
Site Area (Ha):	0.05
Search Buffer (m):	1000

Site Details

Pease Way, Newton Aycliffe, DL5 5NE

Landmark INFORMATION GROUP

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

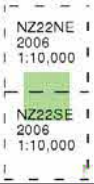
10k Raster Mapping

Published 2006

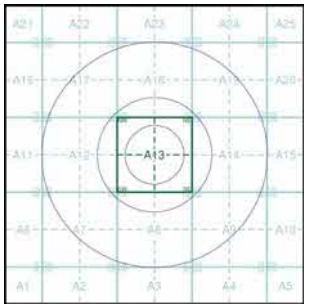
Source map scale - 1:10,000

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)



Historical Map - Slice A



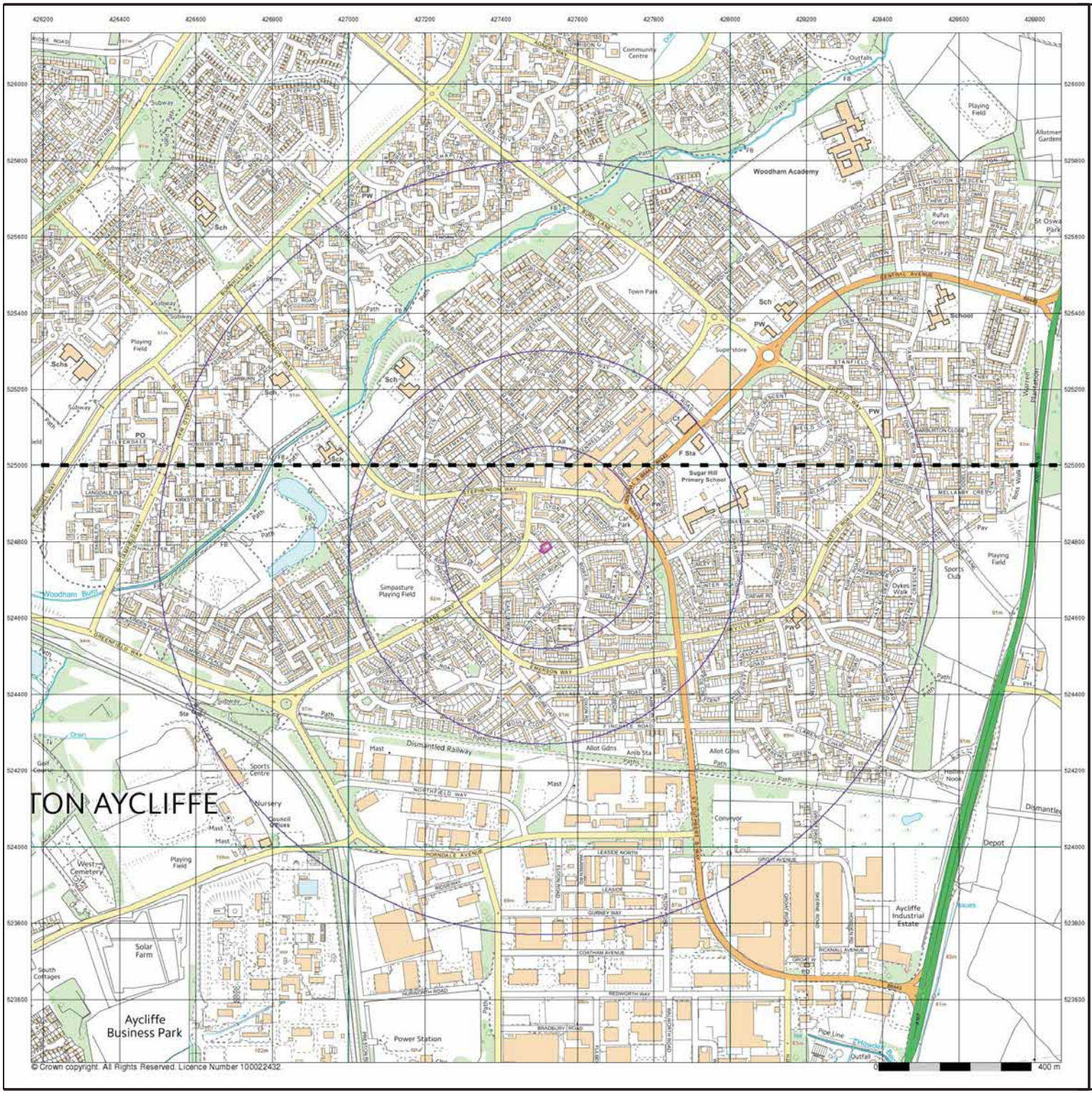
Order Details

Order Number:	136000462_1_1
Customer Ref:	17-631(D)
National Grid Reference:	427520, 524780
Slice:	A
Site Area (Ha):	0.05
Search Buffer (m):	1000

Site Details

Pease Way, Newton Aycliffe, DL5 5NE

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



arc environmental

VectorMap Local

Published 2017

Source map scale - 1:10,000

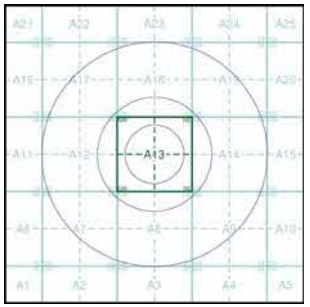
VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap Local is derived from large-scale information surveyed at 1:1250 scale (covering major towns and cities),1:2500 scale (smaller towns, villages and developed rural areas), and 1:10 000 scale (mountain, moorland and river estuary areas).

Map Name(s) and Date(s)

NZ22NE 2017 Variable

NZ22SE 2017 Variable

Historical Map - Slice A



Order Details

Order Number:	136000462_1_1
Customer Ref:	17-631(D)
National Grid Reference:	427520, 524780
Slice:	A
Site Area (Ha):	0.05
Search Buffer (m):	1000

Site Details

Pease Way, Newton Aycliffe, DL5 5NE

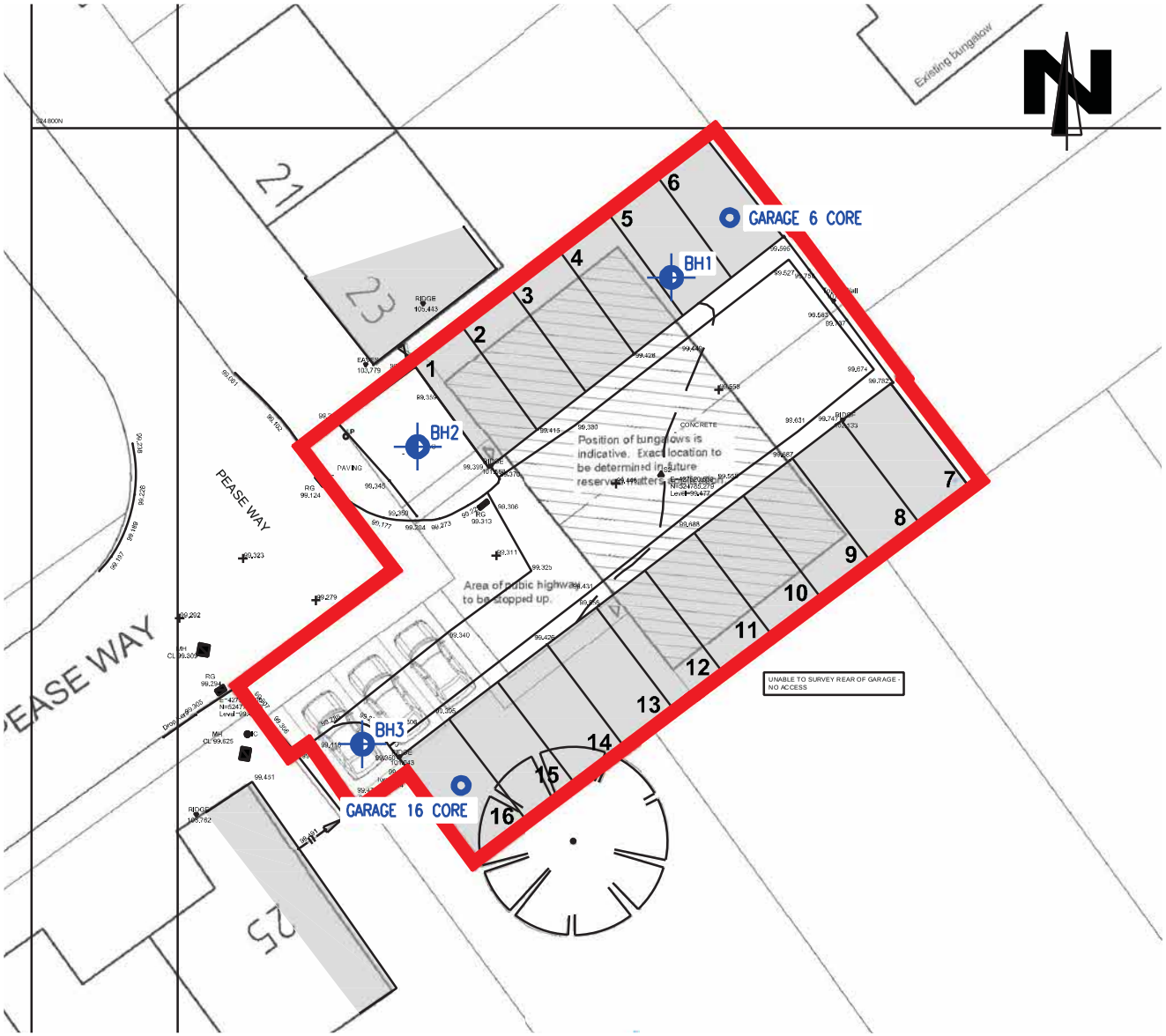
Landmark INFORMATION GROUP

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

APPENDIX III

Borehole Location Plan

Borehole Record Sheets



ARC ENVIRONMENTAL LTD
Solum House
Unit 1 Elliott Court
St. John's Road
Meadowfield
Durham, DH7 8PN
Tel: (0191) 378 6380
Fax: (0191) 378 0494
e-mail: admin@arc-environmental.com
web: www.arc-environmental.com

The contractor shall check all dimensions on site before commencement of any works. No dimensions to be scaled off this drawing.

LEGEND	
	APPROXIMATE SITE BOUNDARY
	WINDOWLESS SAMPLING BOREHOLE POSITION
	INTERNAL CORE POSITION THROUGH GARAGE FLOOR SLAB

rev.	date	amendments	drawn	chckd

Client:
LIVIN HOUSING LTD

Project Title:
Proposed Residential Development
Pease Way
Newton Aycliffe

Drawing Title:
Borehole Location Plan

Scale at A3:	Date:	Drawn by:	Approved by:
1:200 @ A3	12.09.17	P.D	J.P.D

Job Ref:	Drg no:	Rev:
17-631(D)	–	–

Solum House, Unit 1 Elliott Court
St Johns Road, Meadowfield
Durham, DH7 8PN
Telephone: 01913786380

BOREHOLE LOG

Project				BOREHOLE No
Pease Way, Newton Aycliffe				**BH1**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
17-631(D)	11-09-17			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						0.10	Concrete (MADE GROUND)		
0.10-0.30	J/D					0.30	Dark grey and black ash with some pieces of slag (MADE GROUND)		
0.30-0.50	J/D					0.50	Firm dark grey sandy clay (MADE GROUND)		
0.50-1.00	B						Stiff (high strength) brown sandy gravelly CLAY with some cobbles (GLACIAL TILL)		
1.00-2.00	B								
1.00	V	110kN/m^2							
1.50	V	110kN/m^2							
2.00-3.00	B								
2.00	V	118kN/m^2				(3.50)			
2.50	V	>120kN/m^2							
3.00-4.00	B								
3.00	V	>120kN/m^2							
						4.00			
4.00	V	>120kN/m^2							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	WATER OBSERVATIONS: Borehole dry.

All dimensions in metres Scale 1:31.25	Client Livin Housing Ltd	Method/ Plant Used Windowless Sampling	Logged By JPD

AGS3 UK BH SITE D LOGS.GPJ AGS3_ALL.GDT 15/9/17

Solum House, Unit 1 Elliott Court
St Johns Road, Meadowfield
Durham, DH7 8PN
Telephone: 01913786380

BOREHOLE LOG

Project				BOREHOLE No
Pease Way, Newton Aycliffe				**BH2**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
17-631(D)	11-09-17			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						0.10	Tarmac (MADE GROUND)		
0.10-0.30	J/D					0.30	Black ash with some pieces of slag (MADE GROUND)		
0.30-0.60	J/D					(0.30) 0.60	Firm dark grey sandy clay. **HYDROCARBON ODOUR** (MADE GROUND)		
0.60-1.00	B						Stiff (high strength) brown sandy gravelly CLAY with some cobbles (GLACIAL TILL)		
1.00-2.00	B								
1.00	V	88kN/m^2							
1.50	V	94kN/m^2							
2.00-3.00	B								
2.00	V	102kN/m^2				(3.40)			
2.50	V	114kN/m^2							
3.00-4.00	B								
3.00	V	>120kN/m^2							
						4.00			
4.00	V	>120kN/m^2							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	WATER OBSERVATIONS: Borehole dry.

All dimensions in metres Scale 1:31.25	Client Livin Housing Ltd	Method/ Plant Used Windowless Sampling	Logged By JPD

AGS3 UK BH SITE D LOGS.GPJ AGS3_ALL.GDT 15/9/17

Solum House, Unit 1 Elliott Court
St Johns Road, Meadowfield
Durham, DH7 8PN
Telephone: 01913786380

BOREHOLE LOG

Project				BOREHOLE No
Pease Way, Newton Aycliffe				**BH3**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
17-631(D)	11-09-17			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-0.50	J/D					(0.50) 0.50	Grass overlying dark brown soil with clay drainage fragments and possible asbestos tile/sheeting fragments? (MADE GROUND)		
0.50-1.00	J/D					(0.50) 1.00	Soft brown very sandy gravelly clay with some fine roots (MADE GROUND)		
1.00-2.00	B					(3.00) 4.00	Stiff (high strength) brown sandy gravelly CLAY with some cobbles (GLACIAL TILL)		
1.00	V	28kN/m^2							
1.50	V	90kN/m^2							
2.00-3.00	B								
2.00	V	118kN/m^2							
2.50	V	>120kN/m^2							
3.00-4.00	B								
3.00	V	>120kN/m^2							
4.00	V	>120kN/m^2							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	WATER OBSERVATIONS: Borehole dry.

All dimensions in metres Scale 1:31.25	Client Livin Housing Ltd	Method/ Plant Used Windowless Sampling	Logged By JPD

APPENDIX IV

Laboratory Results

LABORATORY REPORT

4043

Contract Number: PSL17/4510

Report Date: 20 September 2017

Client's Reference: 17-631 (D)

Client Name: Arc Environmental
Solum House
Unit 1 Elliott Court
St Johns Road, Meadowfield
Durham
DH7 8PN

For the attention of: John Ditchburn

Contract Title: Pease Way, Newton Aycliffe

Date Received: 18/9/2017
Date Commenced: 18/9/2017
Date Completed: 20/9/2017

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)

A Watkins (Director)

R Berriman (Quality Manager)

[redacted]

L Knight (Senior Technician)

S Eyre (Senior Technician)

A Fry (Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
BH1		B	1.00	2.00	Brown slightly gravelly very sandy CLAY.
BH2		B	2.00	3.00	Grey slightly gravelly very sandy CLAY.
BH3		B	1.00	2.00	Brown slightly gravelly very sandy CLAY.

UKAS TESTING
4043

PSL
Professional Soils Laboratory

Pease Way, Newton Aycliffe

Contract No:
PSL17/4510
Client Ref:
17-631 D

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
BH1		B	1.00	2.00	12			32	16	16	91	Low plasticity CL.
BH2		B	2.00	3.00	14			31	15	16	97	Low plasticity CL.
BH3		B	1.00	2.00	13			28	14	14	94	Low plasticity CL.

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

PSL Professional Soils Laboratory

Pease Way, Newton Aycliffe

Contract No:

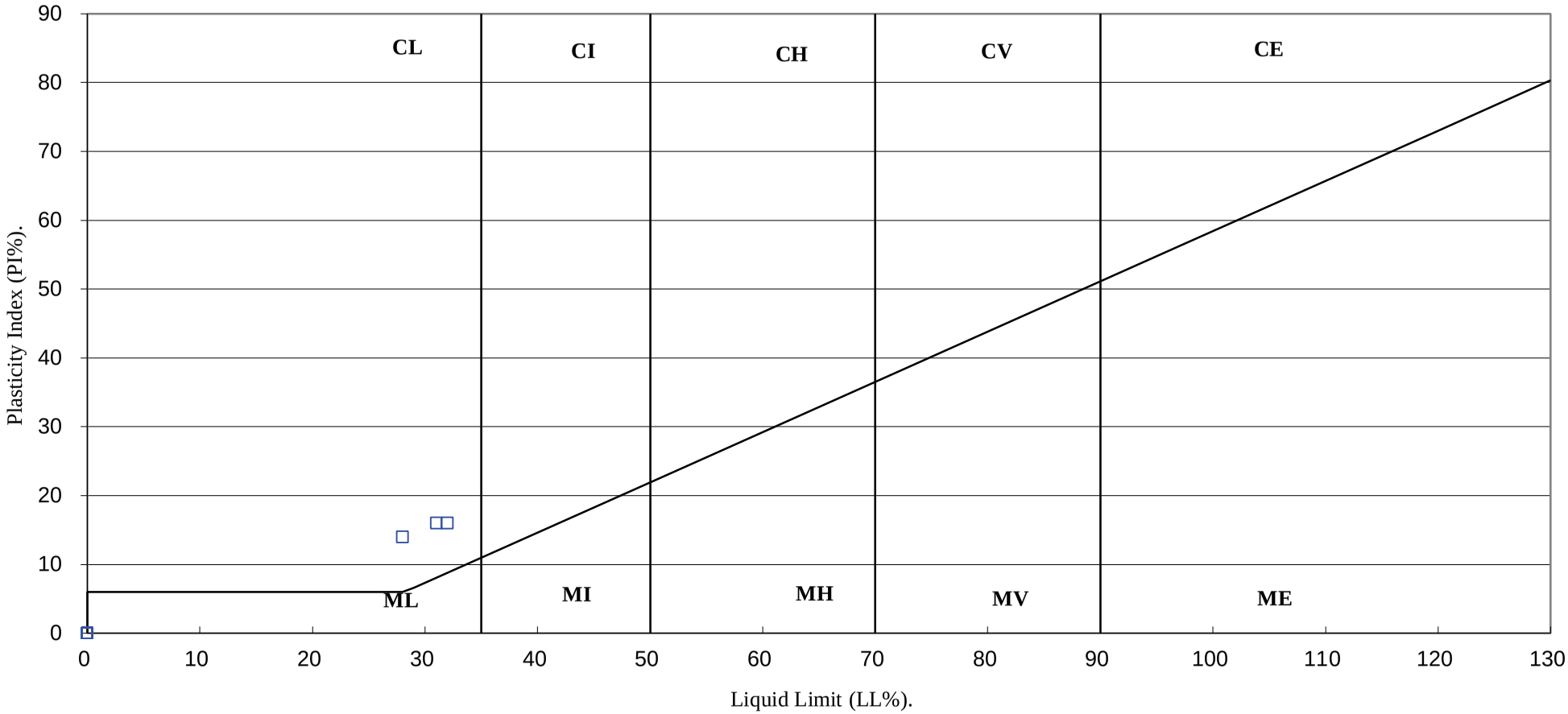
PSL17/4510

Client Ref:

17-631 D

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



UKAS TESTING 4043	PSL Professional Soils Laboratory	**Pease Way, Newton Aycliffe**	**Contract No:**
			PSL17/4510
			Client Ref:
			17-631 D

2531

ANALYTICAL TEST REPORT

Contract no: 67262

Contract name: Pease Way, Newton Aycliffe

Client reference: 17-631(D)

Clients name: ARC Environmental

Clients address: Solum House, Unit 1 Elliott Court
St Johns Road
Meadowfield
DH7 8PN

Samples received: 14 September 2017

Analysis started: 14 September 2017

Analysis completed 21 September 2017

Report issued: 21 September 2017

Notes:

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

This report shall not be reproduced except in full, without prior written approval.

Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

BTEX compounds are identified by retention time only and may include interference from co-eluting compounds.

Key:

U UKAS accredited test

M MCERTS & UKAS accredited test

$ Test carried out by an approved subcontractor

I/S Insufficient sample to carry out test

N/S Sample not suitable for testing

NAD No Asbestos Detected

Approved by:

James Spittle
Customer Services Team Leader

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
67262-1	BH1	0.50-1.00	Sandy Clay with Gravel	-	-	12.1
67262-2	BH2	0.30-0.60	Sandy Clay with Gravel	-	-	12.9
67262-3	BH2	1.00-2.00	Sandy Clay with Gravel	-	-	12.3
67262-4	BH3	0.00-0.50	Sandy Clay with Gravel and Brick and Slag	-	-	13.0

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SOILS

Lab number			67262-1	67262-2	67262-3	67262-4
Sample id			BH1	BH2	BH2	BH3
Depth (m)			0.50-1.00	0.30-0.60	1.00-2.00	0.00-0.50
Date sampled			11/09/2017	11/09/2017	11/09/2017	11/09/2017
Test	Method	Units				
Arsenic (total)	CE127 M	mg/kg As	-	23	-	9.1
Cadmium (total)	CE127 M	mg/kg Cd	-	<0.2	-	1.4
Chromium (total)	CE127 M	mg/kg Cr	-	63	-	70
Chromium (III)	-	mg/kg CrIII	-	63	-	70
Chromium (VI)	CE146	mg/kg CrVI	-	<1	-	<1
Copper (total)	CE127 M	mg/kg Cu	-	93	-	44
Lead (total)	CE127 M	mg/kg Pb	-	41	-	650
Mercury (total)	CE127 M	mg/kg Hg	-	<0.5	-	<0.5
Nickel (total)	CE127 M	mg/kg Ni	-	47	-	36
Selenium (total)	CE127 M	mg/kg Se	-	4.0	-	1.8
Zinc (total)	CE127 M	mg/kg Zn	-	56	-	236
pH	CE004 M	units	8.4	7.8	8.5	8.2
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	40	1157	79	249
Cyanide (free)	CE077	mg/kg CN	-	<1	-	<1
Total Organic Carbon (TOC)	CE072 M	% w/w C	-	2.00	-	5.87
PAH						
Acenaphthene	CE087 M	mg/kg	-	0.04	-	0.26
Acenaphthylene	CE087 M	mg/kg	-	<0.01	-	0.02
Anthracene	CE087 U	mg/kg	-	0.13	-	2.20
Benzo(a)anthracene	CE087 U	mg/kg	-	0.25	-	6.31
Benzo(a)pyrene	CE087 U	mg/kg	-	0.22	-	4.84
Benzo(b)fluoranthene	CE087 M	mg/kg	-	0.27	-	6.10
Benzo(ghi)perylene	CE087 M	mg/kg	-	0.10	-	2.90
Benzo(k)fluoranthene	CE087 M	mg/kg	-	0.10	-	2.78
Chrysene	CE087 M	mg/kg	-	0.26	-	6.03
Dibenz(ah)anthracene	CE087 M	mg/kg	-	<0.02	-	0.85
Fluoranthene	CE087 M	mg/kg	-	0.65	-	13.82
Fluorene	CE087 U	mg/kg	-	0.03	-	0.43
Indeno(123cd)pyrene	CE087 M	mg/kg	-	0.09	-	2.81
Naphthalene	CE087 M	mg/kg	-	<0.01	-	0.04
Phenanthrene	CE087 M	mg/kg	-	0.38	-	7.12
Pyrene	CE087 M	mg/kg	-	0.55	-	10.51
PAH (total of USEPA 16)	CE087	mg/kg	-	3.06	-	67.0
Benzo(j)fluoranthene	CE087	mg/kg	-	0.03	-	0.79
PAH (total of OIL 8)	CE087	mg/kg	-	1.21	-	30.5
BTEX & TPH						
Benzene	CE057 U	mg/kg	-	<0.01	-	-
Toluene	CE057 U	mg/kg	-	<0.01	-	-
Ethylbenzene	CE057 U	mg/kg	-	<0.01	-	-
m & p-Xylene	CE057 U	mg/kg	-	<0.02	-	-
o-Xylene	CE057 U	mg/kg	-	<0.01	-	-

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SOILS

Lab number			67262-1	67262-2	67262-3	67262-4
Sample id			BH1	BH2	BH2	BH3
Depth (m)			0.50-1.00	0.30-0.60	1.00-2.00	0.00-0.50
Date sampled			11/09/2017	11/09/2017	11/09/2017	11/09/2017
Test	Method	Units				
VPH Aliphatic (>C5-C6)	CE067	mg/kg	-	<0.1	-	-
VPH Aliphatic (>C6-C8)	CE067	mg/kg	-	<0.1	-	-
VPH Aliphatic (>C8-C10)	CE067	mg/kg	-	0.4	-	-
EPH Aliphatic (>C10-C12)	CE068	mg/kg	-	10	-	-
EPH Aliphatic (>C12-C16)	CE068	mg/kg	-	60	-	-
EPH Aliphatic (>C16-C35)	CE068	mg/kg	-	977	-	-
EPH Aliphatic (>C35-C44)	CE068	mg/kg	-	1016	-	-
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	-	<0.01	-	-
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	-	<0.01	-	-
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	-	0.01	-	-
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	-	<1	-	-
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	-	<1	-	-
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	-	2	-	-
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	-	<1	-	-
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	-	<1	-	-
VPH (>C5-C7)	CE067	mg/kg	-	-	-	<0.1
VPH (>C7-C8)	CE067	mg/kg	-	-	-	<0.1
VPH (>C8-C10)	CE067	mg/kg	-	-	-	<0.1
EPH (>C10-C12)	CE033 M	mg/kg	-	-	-	5
EPH (>C12-C16)	CE033 M	mg/kg	-	-	-	11
EPH (>C16-C21)	CE033 M	mg/kg	-	-	-	32
EPH (>C21-C35)	CE033 M	mg/kg	-	-	-	187
EPH (>C35-C44)	CE033 M	mg/kg	-	-	-	122
Subcontracted analysis						
Asbestos (qualitative)	$	-	-	NAD	-	Chrysotile

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
-	Chromium (III)	Calculation: Cr (total) - Cr (VI)	Dry		1	mg/kg CrIII
CE146	Chromium (VI)	Acid extraction, Colorimetry	Dry		1	mg/kg CrVI
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	Wet	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	10	mg/l SO_4
CE077	Cyanide (free)	Extraction, Continuous Flow Colorimetry	Wet		1	mg/kg CN
CE072	Total Organic Carbon (TOC)	Removal of IC by acidification, Carbon Analyser	Dry	M	0.1	% w/w C
CE087	Acenaphthene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	Wet	U	0.01	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Naphthalene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	Wet		0.27	mg/kg
CE087	Benzo(j)fluoranthene	Solvent extraction, GC-MS	Wet		0.02	mg/kg
CE087	PAH (total of OIL 8)	Solvent extraction, GC-MS	Wet		0.15	mg/kg
CE057	Benzene	Headspace GC-FID	Wet	U	0.01	mg/kg
CE057	Toluene	Headspace GC-FID	Wet	U	0.01	mg/kg
CE057	Ethylbenzene	Headspace GC-FID	Wet	U	0.01	mg/kg
CE057	m & p-Xylene	Headspace GC-FID	Wet	U	0.02	mg/kg
CE057	o-Xylene	Headspace GC-FID	Wet	U	0.01	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	Wet		0.1	mg/kg
CE068	EPH Aliphatic (>C10-C12)	Solvent extraction, GC-FID	Wet		4	mg/kg

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE068	EPH Aliphatic (>C12-C16)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C16-C35)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C35-C44)	Solvent extraction, GC-FID	Wet		10	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	Wet		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	Wet		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	Wet		0.01	mg/kg
CE068	EPH Aromatic (>EC10-EC12)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC12-EC16)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC16-EC21)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC21-EC35)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC35-EC44)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE067	VPH (>C5-C7)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH (>C7-C8)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH (>C8-C10)	Headspace GC-FID	Wet		0.1	mg/kg
CE033	EPH (>C10-C12)	Solvent extraction, GC-FID	Wet	M	4	mg/kg
CE033	EPH (>C12-C16)	Solvent extraction, GC-FID	Wet	M	4	mg/kg
CE033	EPH (>C16-C21)	Solvent extraction, GC-FID	Wet	M	4	mg/kg
CE033	EPH (>C21-C35)	Solvent extraction, GC-FID	Wet	M	6	mg/kg
CE033	EPH (>C35-C44)	Solvent extraction, GC-FID	Wet	M	10	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
IT	Sample not cooled
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
67262-1	BH1	0.50-1.00	N	
67262-2	BH2	0.30-0.60	N	
67262-3	BH2	1.00-2.00	N	
67262-4	BH3	0.00-0.50	N	