Appendix 12.2 Noise survey method and results

Introduction

Noise and vibration surveys were undertaken between 23 and 24 October 2014 in order to determine the prevailing baseline conditions of the West Cambridge site. This appendix sets out the survey methodology and presents the results of the long- and short-term noise and vibration measurements.

Policy Guidance and Legislation

British Standard 7445 Part 1[32] describes methods and procedures for measuring noise from all sources which contribute to the total noise climate of a community environment, individually and in combination. The noise survey was completed in general accordance with these measurement procedures.

British Standard 5228 Part 2[33] provides practical information on construction vibration reduction measures including vibration due to piling. It indicates that the simplest way to quantify vibration effects is to use the concept of peak particle velocity. The standard suggests that, for construction activities, it is considered more appropriate to provide guidance in terms of the PPV since this parameter is more routinely measured based upon the more usual concerns over potential building damage.

BS 7385 Part 1[34] and 2[35] provides guidance on the measurement of vibration and its effect on buildings in terms of peak particle velocity.

Methodology

Baseline Noise Survey

Unattended Environmental Noise Survey

Unattended noise measurements were undertaken at five locations across the site. Noise levels were logged with a sampling frequency (logging period) of 15 minutes for a continuous 24 hour period. Table A12.2.1 provides descriptions of the unattended survey locations. Details of the instrumentation used during the noise survey are provided in Table A12.2.2.

Table A12.2.1 Descriptions of Unattended Noise Survey Locations

Measurement Location	Description
LT1	The sound level meter was located along a secluded footpath on the western site boundary. At the measurement location, the footpath was raised approximately 4 m above the motorway. The microphone was positioned with line of sight to the motorway at a height of approximately 1.5 m above the local ground level.
LT2	The sound level meter was located approximately 7 m from the edge of the A1303 Madingley Road carriageway. To the east of the location lies the pedestrian access to the Department of Veterinary Medicine. While on site, two cars were parked in the disused vehicular access at the entrance to the pedestrian access route, however, these were more than 3 m away from the microphone. To the north of the measurement location was the junction with Conduit Head Road. The microphone was positioned at a height of approximately 1.4 m above local ground level.
LT3	A bund is located along the eastern site boundary between the site and Clerk Maxwell Road. A staggered gap is provided for pedestrian access opposite the Clerk Maxwell Road junction with The Lawns cul-de-sac. The sound level meter was located to the west of the bund, within the site boundary, on the grassy area outside of the Nanoscience Centre. The microphone was positioned at a height of approximately 1.4 m above local ground level.
LT4	The sound level meter was located on the top of a bund which lies between the lake and the southern site boundary. The microphone was positioned at approximately 1.5 m above the local ground level.
LT5	This measurement location was in the centre of the site to the west of the North Residences. The sound level meter was positioned on a grassy bank approximately 8 m to the north of Charles Babbage Road and was reasonably well screened from nearby, onsite construction noise (of the Department of Chemical Engineering and Biotechnology) by existing buildings.

Table A12.2.2 Instrumentation Used During the Unattended Environmental Noise Survey

Item	Manufacturer	Type	Serial Number	Laboratory Calibration Date
Location LT1				
Sound Level Meter	Brüel & Kjær	2250	2626231	08 January 2014
½" Pre-polarised Microphone	Brüel & Kjær	4189	2621209	
Location LT2				
Sound Level Meter	Rion	NL-52	00542903	31 July 2014
Pre-amplifier	Rion	UC59	42931	
½" Pre-polarised Microphone	Rion	NH-25	06480	
Location LT3				
Sound Level Meter	Rion	NL-52	00542902	31 July 2014
Pre-amplifier	Rion	UC59	42930	
½" Pre-polarised Microphone	Rion	NH-25	06479	
Location LT4				

[32] British Standard 7445: 2003 Description and measurement of environmental noise Part 1: Guide to quantities and procedures provides
[33] British Standard 5228: 2009 +A1: 2014 Code of practice for noise and vibration control on construction and open sites Part 2: Vibration
[34] British Standard 7385: 1990 Evaluation and measurement for vibration in buildings Part 1: Guide for measurement of vibrations and evaluation of their effects on buildings
[35] British Standard 7385: 1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from groundborne vibration

Item	Manufacturer	Type	Serial Number	Laboratory Calibration Date
Sound Level Meter	Brüel & Kjær	2250	2626233	16 January 2014
½" Pre-polarised Microphone	Brüel & Kjær	4189	26261211	
Location LT5				
Sound Level Meter	Rion	NL-52	00542901	31 July 2014
Pre-amplifier	Rion	UC59	42929	
½" Pre-polarised Microphone	Rion	NH-25	06478	
All Locations				
Calibrators	Brüel & Kjær	4231	2619374	15 January 2014
	Rion	NC-74	34746691	12 September 2014

On site calibration checks were undertaken before and after each measurement period with no significant drift in calibration level observed (i.e. below 0.3 dB).

The weather conditions noted while on site on 23 October 2014 were dry with complete cloud cover. A very light southerly breeze was also present. A few light rain showers were present in the area from about 15:00 hours on 24 October 2014.

It is considered that the environmental noise survey was undertaken during typical conditions. It was undertaken during the school term, there were no observed accidents on the local road network and there were no known events taking place in the local area. Please note that highway and utility construction works for the North West Cambridge development site had commenced along Madingley Road prior to the noise survey; this will be discussed in the Results section.

Plant Noise Survey

In addition to the unattended noise survey, a few, short, attended measurements close to existing plant noise sources were undertaken. The locations of these measurements are described in Table A12.2.3 and details of the instrumentation used for these measurements are provided in Table A12.2.4. Measurement durations ranged from approximately 30 seconds to 1.5 minutes.

Table A12.2.3 Descriptions of Attended Noise Survey Locations

Plant Noise Survey Location	Description
PN1	This location was on East Square, north of the Hauser Forum.
PN2	This location was adjacent to the plant units on the north façade of the Nanoscience Centre. The outdoor plant is housed in a cage beneath a solid roof.
PN3	This measurement location was to the south of the Mott Building at the pedestrian access to the Coton Path which runs along the southern site boundary.
PN4	This location was to the west of the Sports Centre which overlooks areas of undeveloped land and the lake.
PN5	This location was to the south of the Department of Material Science and Metallurgy building close to an external building between two bicycle sheds. The southern façade of the Department building also overlooks some undeveloped land and the lake.

Table A12.2.4 Instrumentation Used During the Attended Noise Survey

Item	Manufacturer	Type	Serial Number	Laboratory Calibration Date
Sound Level Meter	Rion	NL-52	00542903	31 July 2014
Pre-amplifier	Rion	UC59	42931	
½" Pre-polarised Microphone	Rion	NH-25	06480	

Vibration Survey

Vibration measurements were carried out at the three, external locations described in Table A12.2.5. Peak particle velocities (PPV) were recorded with a 5-minute sampling frequency (logging period) when the PPV exceeded a trigger level of 0.1 mm/s. Details of the instrumentation used during the vibration survey is provided in Table A12.2.6.

Table A12.2.5 Descriptions of Vibration Survey Locations

Measurement Location	Description	Measurement Period
VL1	The geophone was located in the centre of the site at the noise survey location LT5. The x-axis was perpendicular to Charles Babbage Road with the y-axis parallel.	24 hours
VS1	The geophone was located near to the M11 motorway at the same noise survey location LT1. The x-axis was parallel to the M11 with the y-axis perpendicular to the M11.	30 minutes
VS2	The geophone was located near to the A1303 Madingley Road close to noise survey location LT2. The geophone was positioned approximately 5 m from the carriageway. The x-axis was parallel to the carriageway with the y-axis perpendicular to the carriageway.	30 minutes

Table A12.2.6 Instrumentation Used During the Vibration Surveys

Item	Manufacturer	Serial Number	Laboratory Calibration Date
Vibra +	Profound	VIB02436	25 July 2014
3D Geophone	Profound	TDA01361	

Results

Baseline Noise Survey

Unattended Noise Survey

A description of the noise climate noted and the beginning of the noise survey for each of the survey locations is provided in Table A12.2.7.

Table A12.2.7 Description of the Noise Climate at each Unattended Noise Survey Location

Measurement Location	Description of Noise Climate
LT1	The dominant noise source at this location was road traffic on the M11 motorway which includes HGV and bus movements.
LT2	The dominant noise source at this location was road traffic along Madingley Road including regular buses. Due to temporary traffic lights at High Cross Junction associated with the highways and utilities works being undertaken for the North West Cambridge project, the traffic was often heavy or idling close to the measurement location. These works are not expected to be completed until Summer 2015. Construction noise from the road works was not subjectively discernible over the road traffic noise. However, noise from the crane movements at the new Chemical Engineering and Biotechnology building construction site was noticeable.
LT3	At this location, road traffic noise from the M11 was subjectively noticeable. The Nanoscience Centre includes some large, exposed plant on the northern façade which was partially screened from the measurement location by the main building. A construction site (south of the Roger Needham Building) was subjectively silent during set up and collection of the sound level meter: it is unknown if noisy construction works were undertaken during the day on 24 October. Noises from loose plastic window/material coverings flapping in the light breeze were noted. Other noise sources included pedestrians and cyclists talking and using a gravel path, and car and other light vehicles entering the car park to the north of the location. Access to the car park was over a large metal barrier which caused a metallic thud for each pair of wheels.
LT4	Road traffic noise from the M11 was dominant at this location. Noise from the construction site (Department of Chemical Engineering and Biotechnology) was also present during the daytime due to lack of screening, including crane movements.
LT5	At this location, road traffic noise from the M11 was present along with local cars and buses travelling along Charles Babbage Road and arriving/departing from nearby car parks. Charles Babbage Road has a low speed limit and regular speed bumps. Construction noise from the crane movements at the Chemical Engineering and Biotechnology building was noticeable at this location but other construction noise from this building was screened by buildings.

A summary of the unattended noise survey measurements is provided in Table A12.2.8. Time history graphs of the entire measurement period for each location are provided at the end of this Appendix (THG 1-10).

Table A12.2.8 Summary of Unattended Noise Survey Measurement Results

Measurement Location	Daytime $L_{Aeq,16h}$ (dB)	Night-time $L_{Aeq,8h}$ (dB)	Typical Night-time L_{AFmax} (dB)	Typical Daytime $L_{A90,15min}$ (dB)	Typical Night-time $L_{A90,15min}$ (dB)
LT1	75	70	80	72	52
LT2	69	62	82	54	41
LT3	50	44	57	46	43
LT4	59	55	63	58	47
LT5	55	49	58	52	44

Plant Noise Survey

A description of the noise sources at the short-term measurement locations is provided in Table A12.2.9. The results of the plant noise survey are presented in Table A12.2.10 including the duration of each measurement.

Table A12.2.9 Description of the Noise Climate at the Plant Noise Measurement Locations

Plant Noise Survey Location	Description
PN1	Plant noise was noted from a number of sources including the Physics of Medicine building and Cavendish Laboratory. The noise was continuous and the source of plant extracts appeared to be located on building roofs. Most of the plant noise sources were around 50 m from the measurement location. Other noise sources included road traffic (cars, buses) on Charles Babbage Road and the continuous road traffic from the motorway.
PN2	The microphone was located approximately 6 m from the plant to the north of the Nanoscience Centre which is housed in a cage beneath a solid roof. The noise source was continuous, tonal and loud, and was subjectively noticeable from at least 80 m away on the footpath to the west. This source was also subjectively noticeable from the unattended noise survey location LT3 despite partial screening from the Nanoscience Centre building.
PN3	The cumulative noise emissions from a variety of plant sources were measured at this location. Many of the sources were from stacks extracts on the southern façade and roof of the Mott Building. The noise sources were continuous and tonal.
PN4	Plant units are located on the north-east and north-west corners of the Sports Centre. Generally the plant noise was subjectively quiet over the noise of the road traffic on the motorway. The plant noise was also continuous.
PN5	A high-pitched, continuous tone was noted at this location emitting from an external building between the bicycle sheds.

Vibration Survey

Time history graphs of the vibration survey measurements are presented at the end of this Appendix (THG 11-15).

The speed limit on Charles Babbage Road was noted to be 20 mph and there are speed bumps along the route in the vicinity of the vibration survey. During the long term survey adjacent to Charles Babbage Road, PPV levels did not exceed 0.8 mm/s in any direction. There were also large periods of time during the night-time where vibration levels did not exceed 0.1 mm/s and were therefore not recorded.

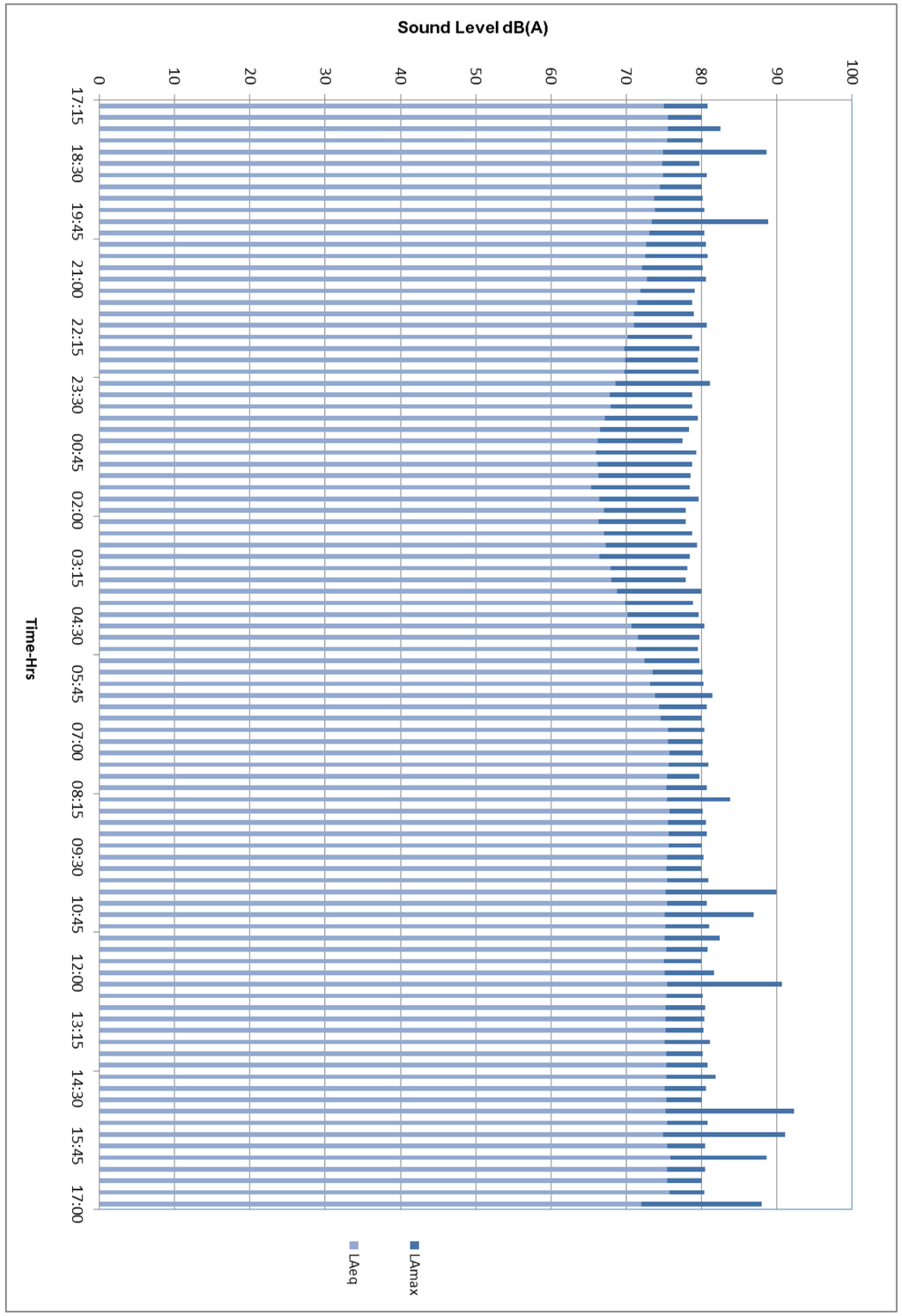
Measured PPV levels at the short-term location VS1 do not exceed 0.14 mm/s. The survey was undertaken during the evening peak period where the traffic was continuous and included a large number of HGVs.

The large PPV levels measured during the short-term survey at location VS2 are due to HGVs or buses passing the measurement location. Traffic was flowing freely past the measurement location during the survey.

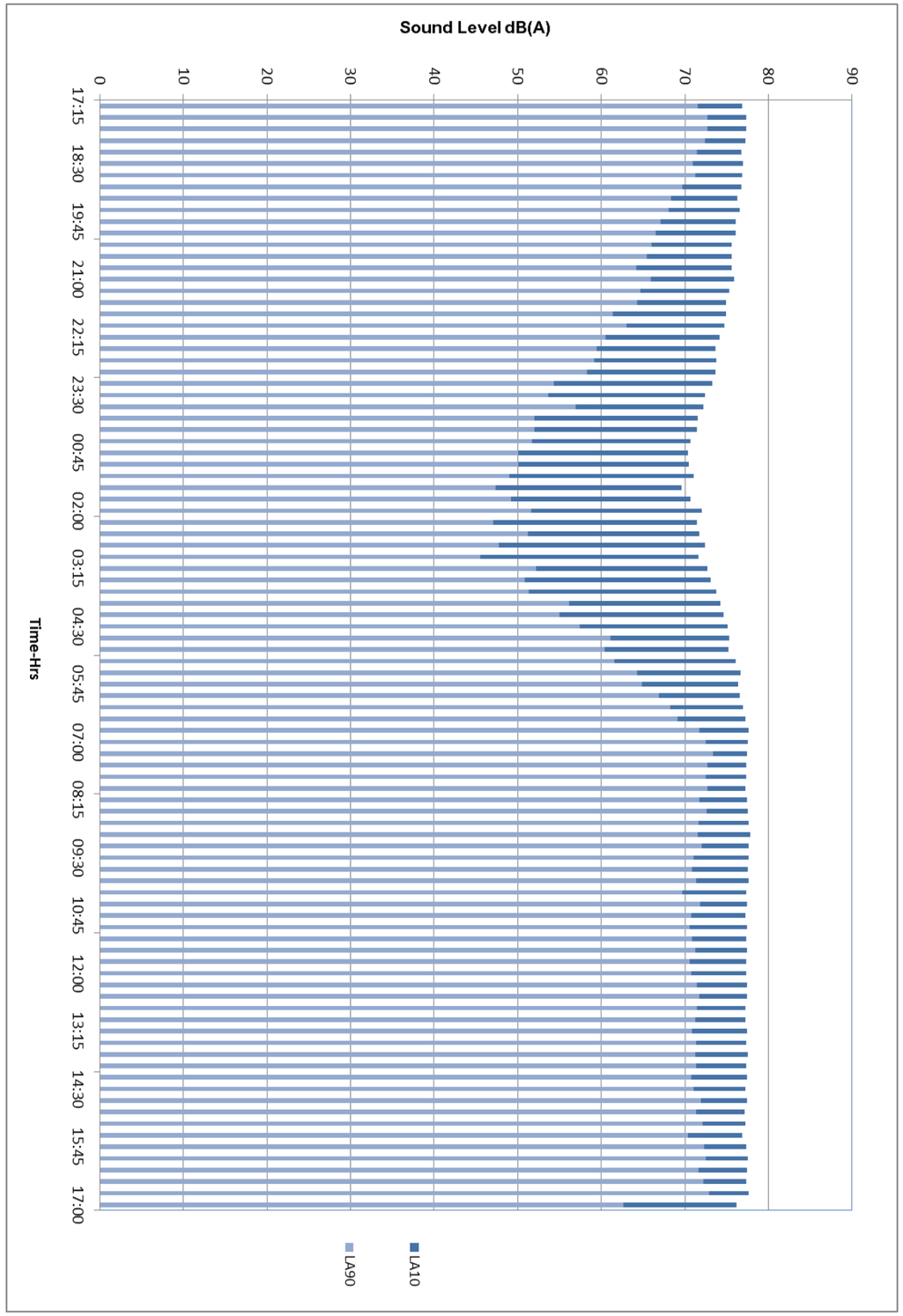
Table A12.2.10 Plant Noise Survey Result

Reference	Notes	Duration (mm:ss)	Parameter	Main (dBA)	Octave Band Centre Frequency (Hz)									
					16	31.5	63	125	250	500	1k	2k	4k	8k
PN1-A		01:19	L_{Aeq}	53	57	59	59	54	52	48	50	44	37	29
			L_{A90}	51	53	55	55	52	49	46	48	40	32	20
PN1-B		00:57	L_{Aeq}	52	56	58	58	55	51	48	49	41	34	27
			L_{A90}	51	52	55	55	52	49	47	48	40	32	19
PN1-C		00:33	L_{Aeq}	56	65	67	67	61	60	50	50	44	38	29
			L_{A90}	52	57	61	59	54	50	47	49	41	35	24
PN2		01:00	L_{Aeq}	63	61	63	59	59	67	57	58	53	46	37
			L_{A90}	62	58	60	57	57	65	56	58	53	46	36
PN3-A	Microphone located approximately 15 m from nearest noise source	01:00	L_{Aeq}	55	59	60	60	56	53	52	52	45	37	29
			L_{A90}	54	56	57	58	55	52	51	51	44	36	28
PN3-B	Microphone located approximately 5 m from nearest noise source	01:00	L_{Aeq}	60	63	63	64	63	61	57	56	51	43	33
			L_{A90}	60	60	60	61	61	60	57	55	51	42	32
PN4	Tonal noise from location PN5 was subjectively discernible	01:00	L_{Aeq}	57	59	58	63	53	49	51	56	56	36	27
			L_{A90}	56	55	55	59	51	48	50	54	45	29	24
PN5-A	Microphone located approximately 6 m from source	01:00	L_{Aeq}	57	56	58	59	52	47	51	56	46	37	32
			L_{A90}	56	53	56	57	49	46	50	55	44	33	28
PN5-B	Microphone located approximately 3 m from source	01:00	L_{Aeq}	57	58	57	62	51	56	52	56	45	34	32
			L_{A90}	56	54	54	57	59	45	50	55	43	31	30

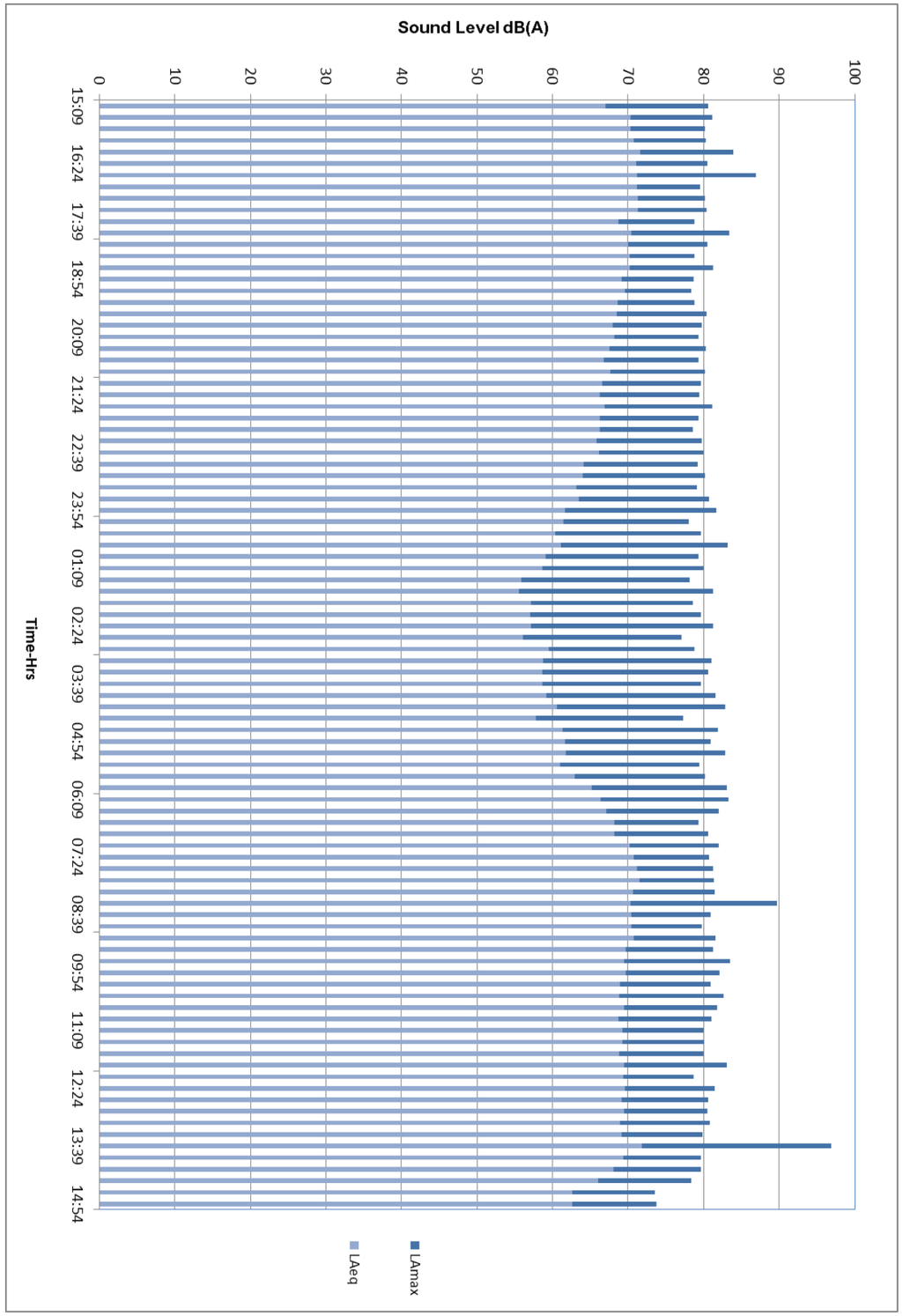
THG 1: LAeq and LAmax Noise Levels Measured at Location LT1 from 23 October 2014 to 24 October 2014



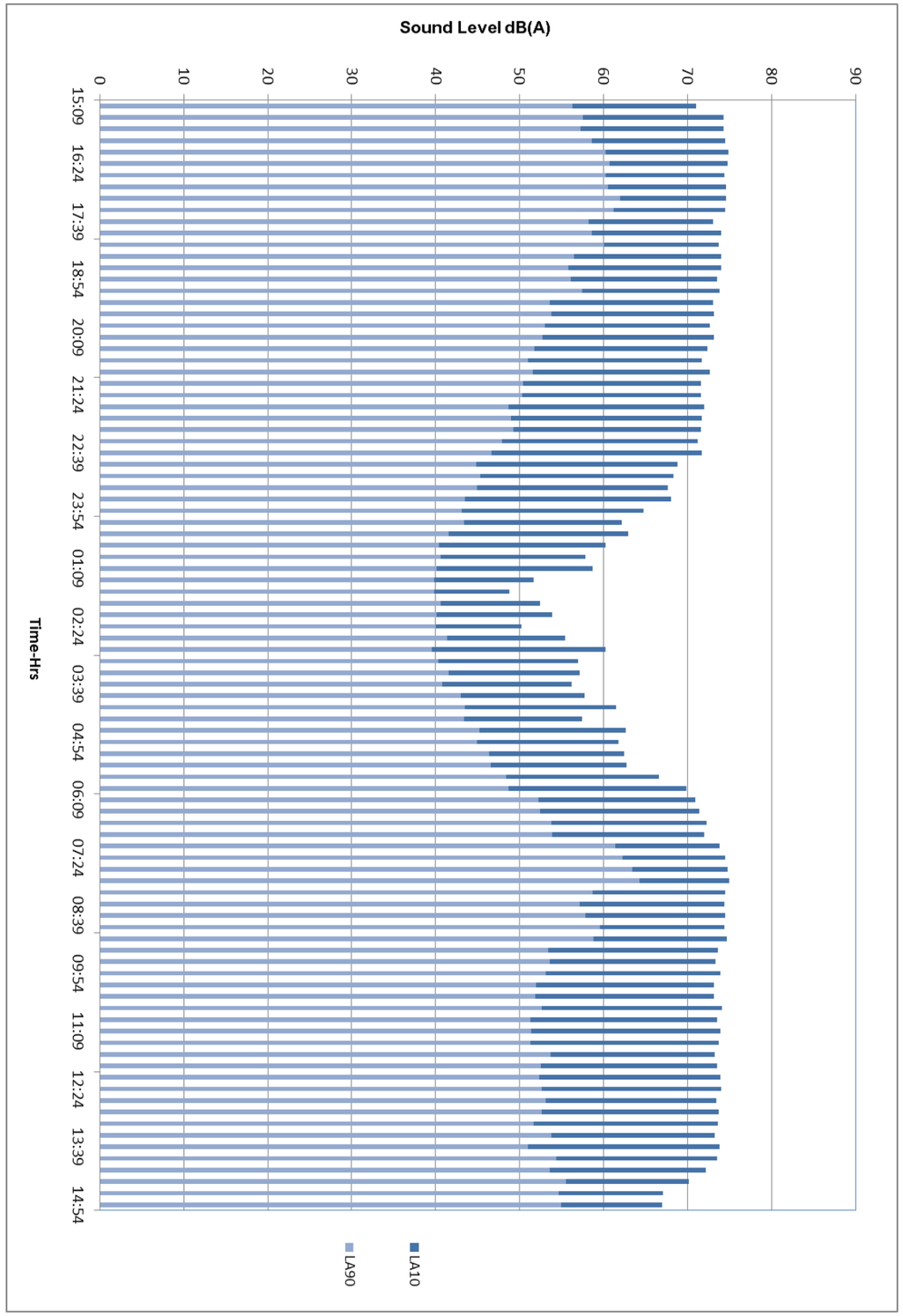
THG 2: LA10 and LA90 Noise Levels Measured at Location LT1 from 23 October 2014 to 24 October 2014



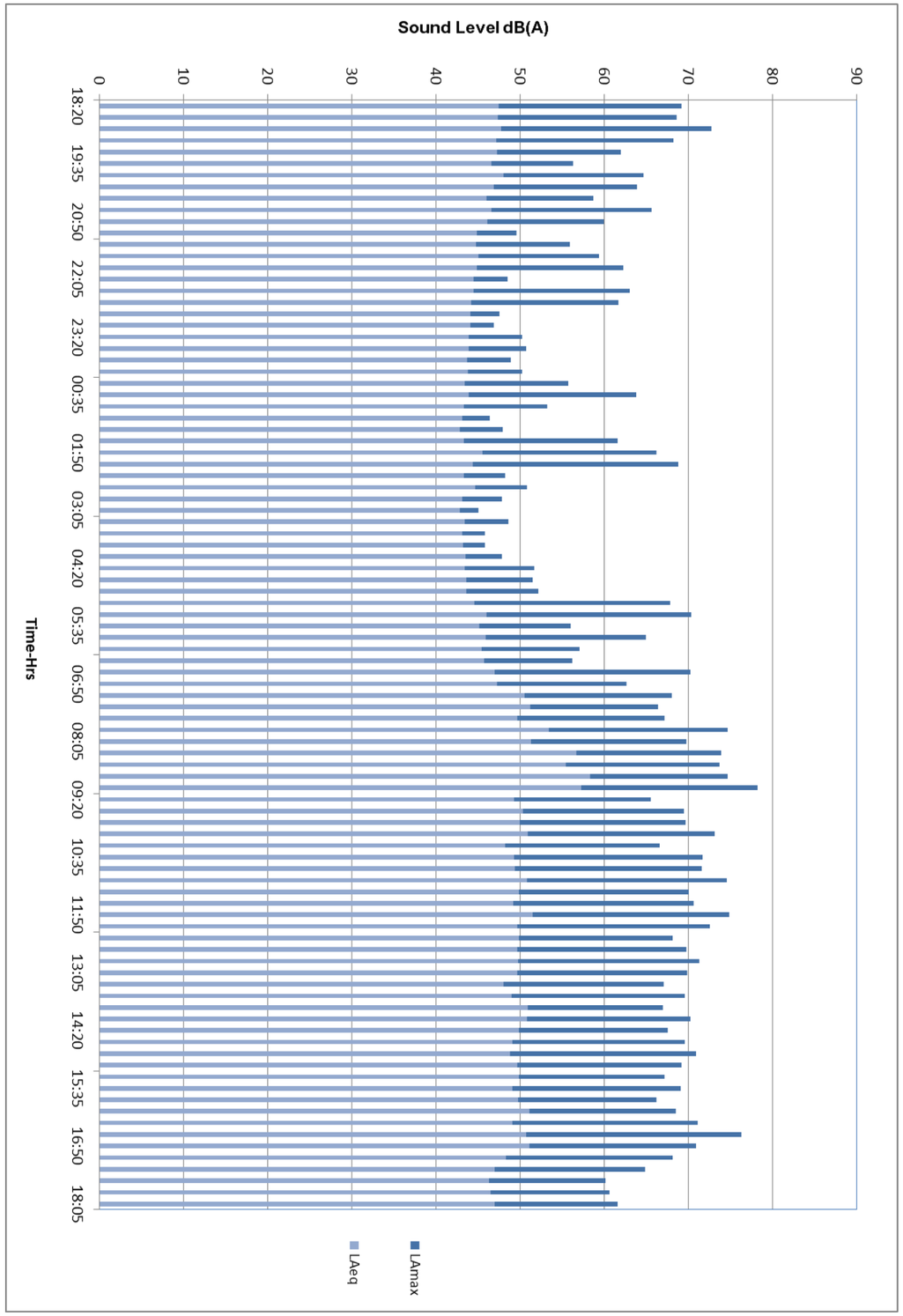
THG 3: LAeq and LAmax Noise Levels Measured at Location LT2 from 23 October 2014 to 24 October 2014



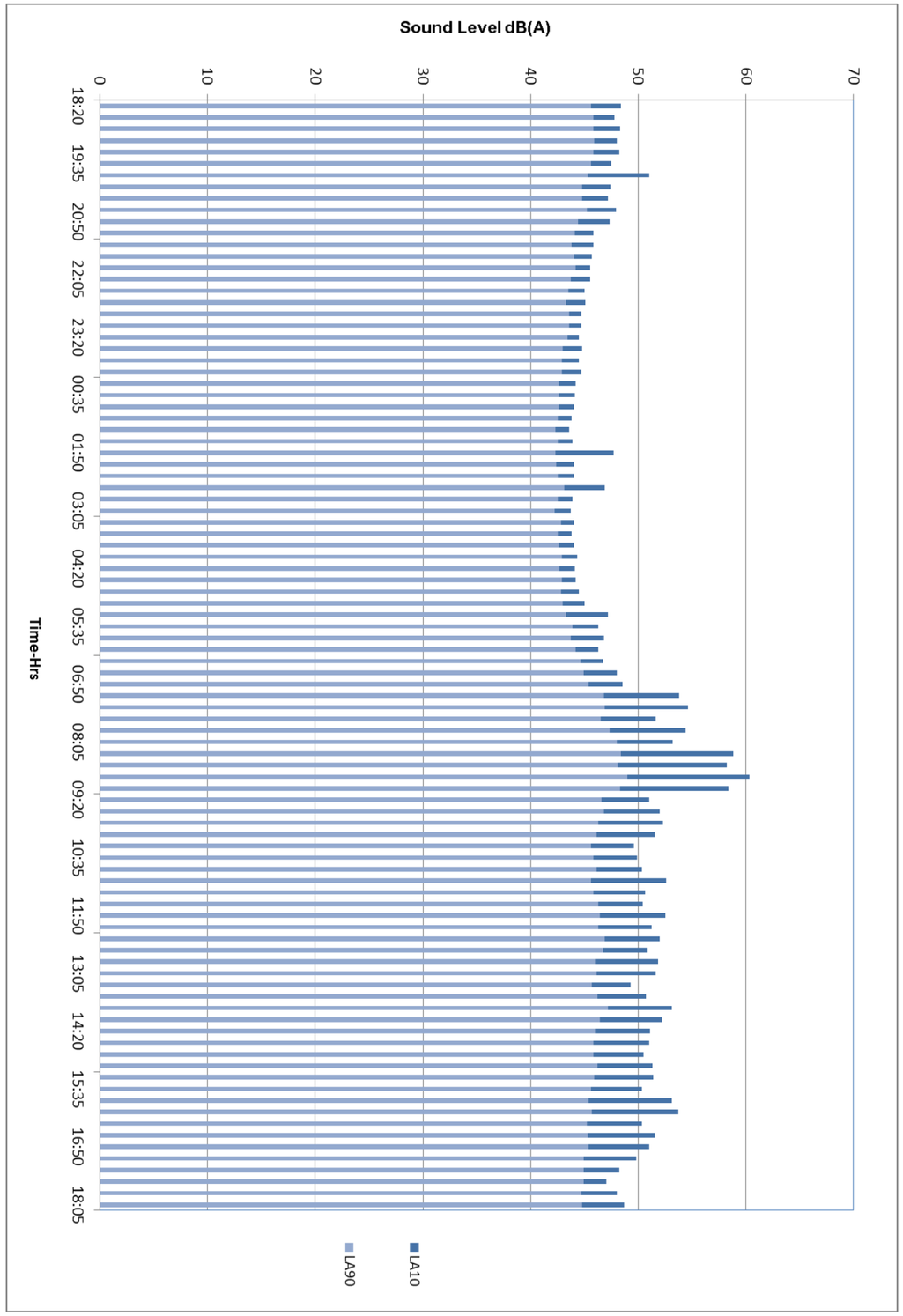
THG 4: LA10 and LA90 Noise Levels Measured at Location LT2 from 23 October 2014 to 24 October 2014



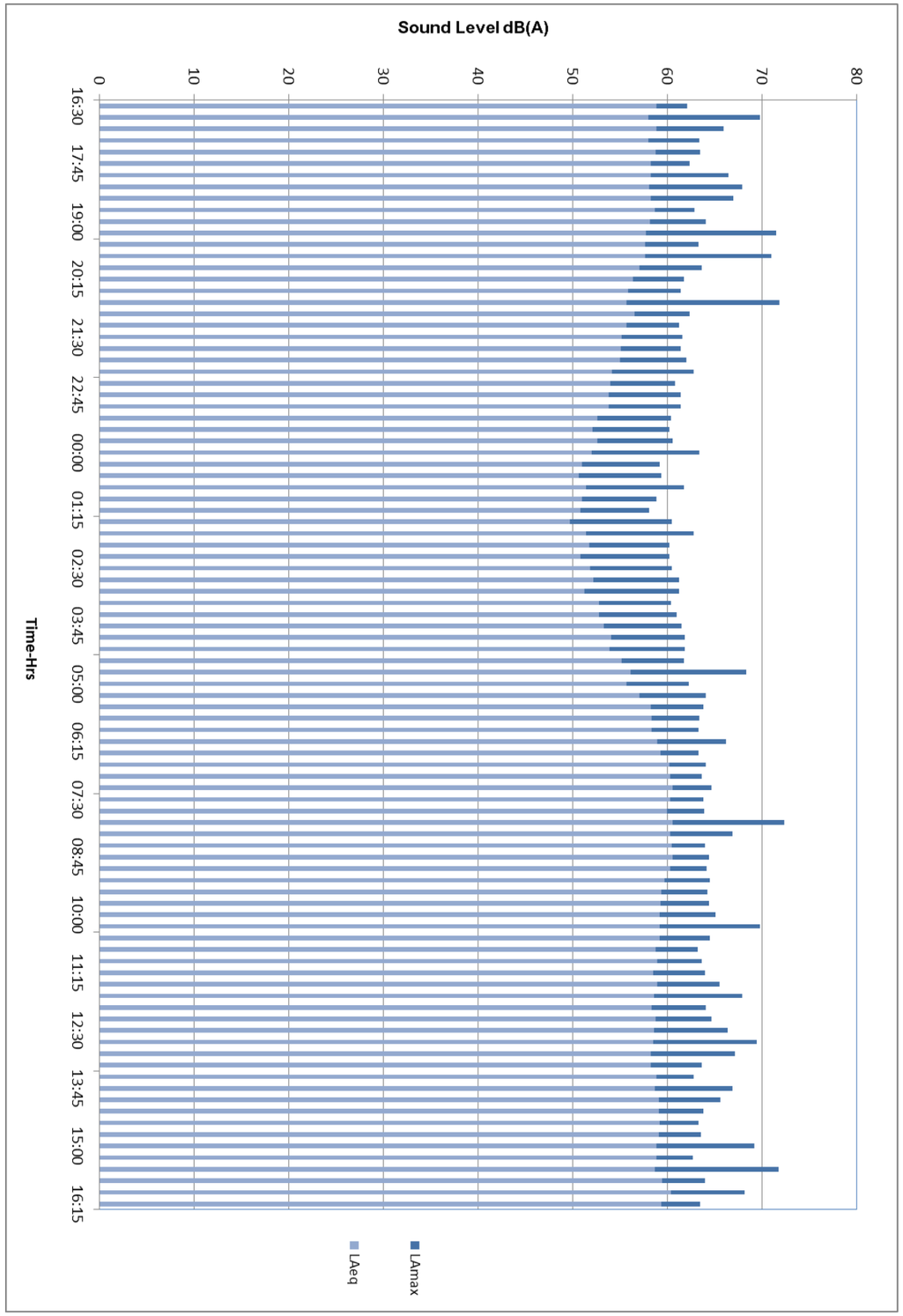
THG 5: LAeq and LAmax Noise Levels Measured at Location LT3 from 23 October 2014 to 24 October 2014



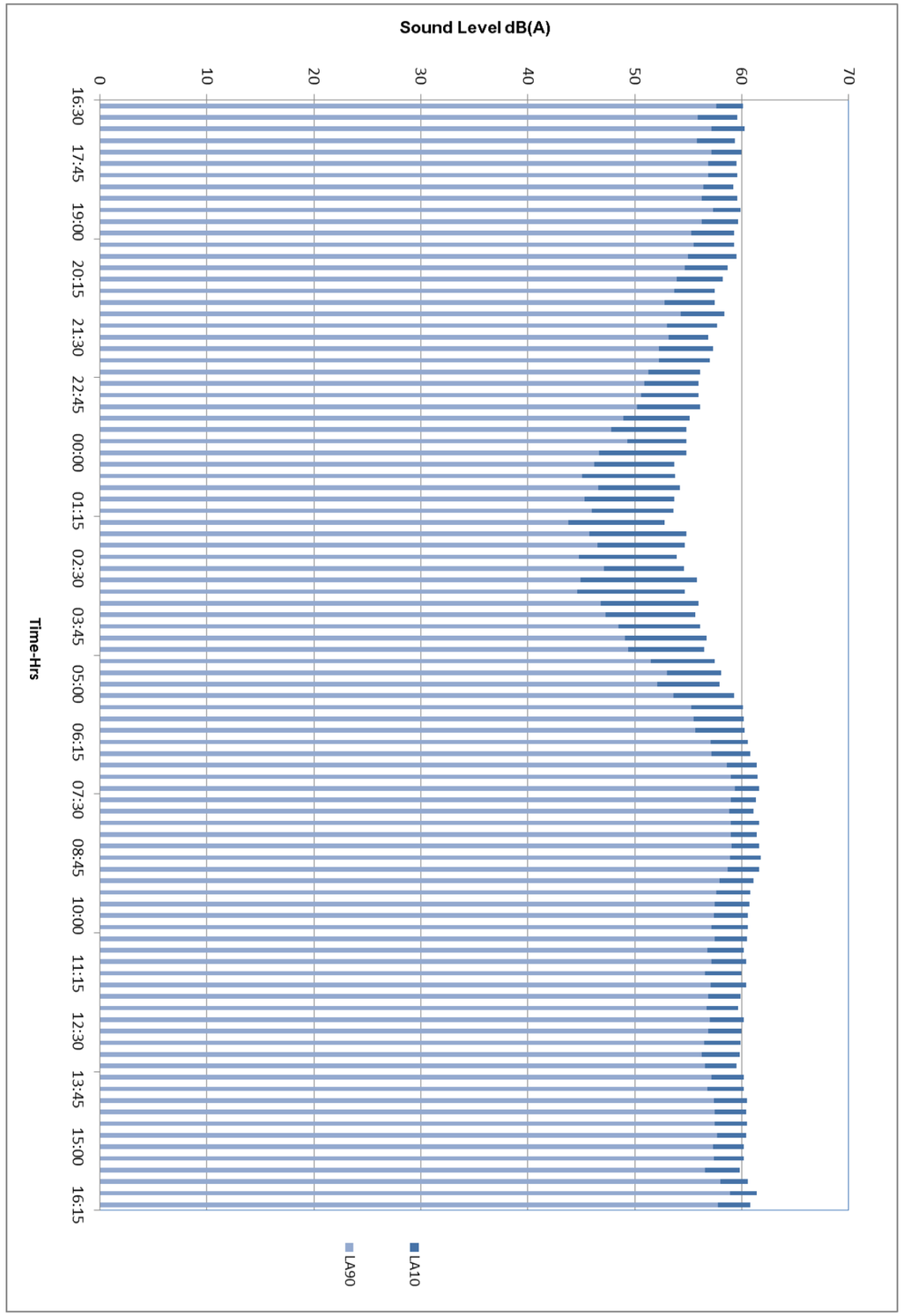
THG 6: LA10 and LA90 Noise Levels Measured at Location LT3 from 23 October 2014 to 24 October 2014



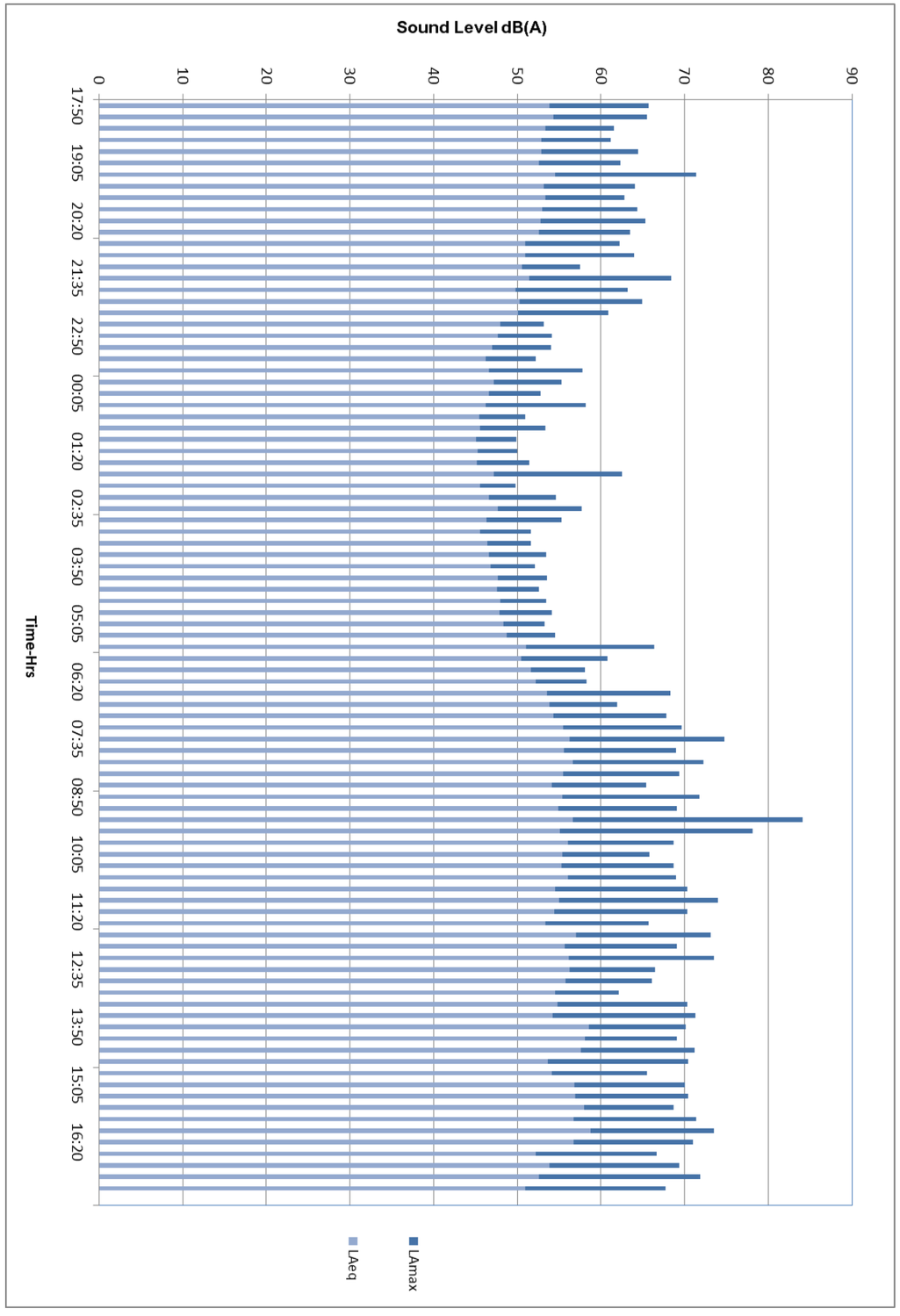
THG 7: LAeq and LAmax Noise Levels Measured at Location LT4 from 23 October 2014 to 24 October 2014



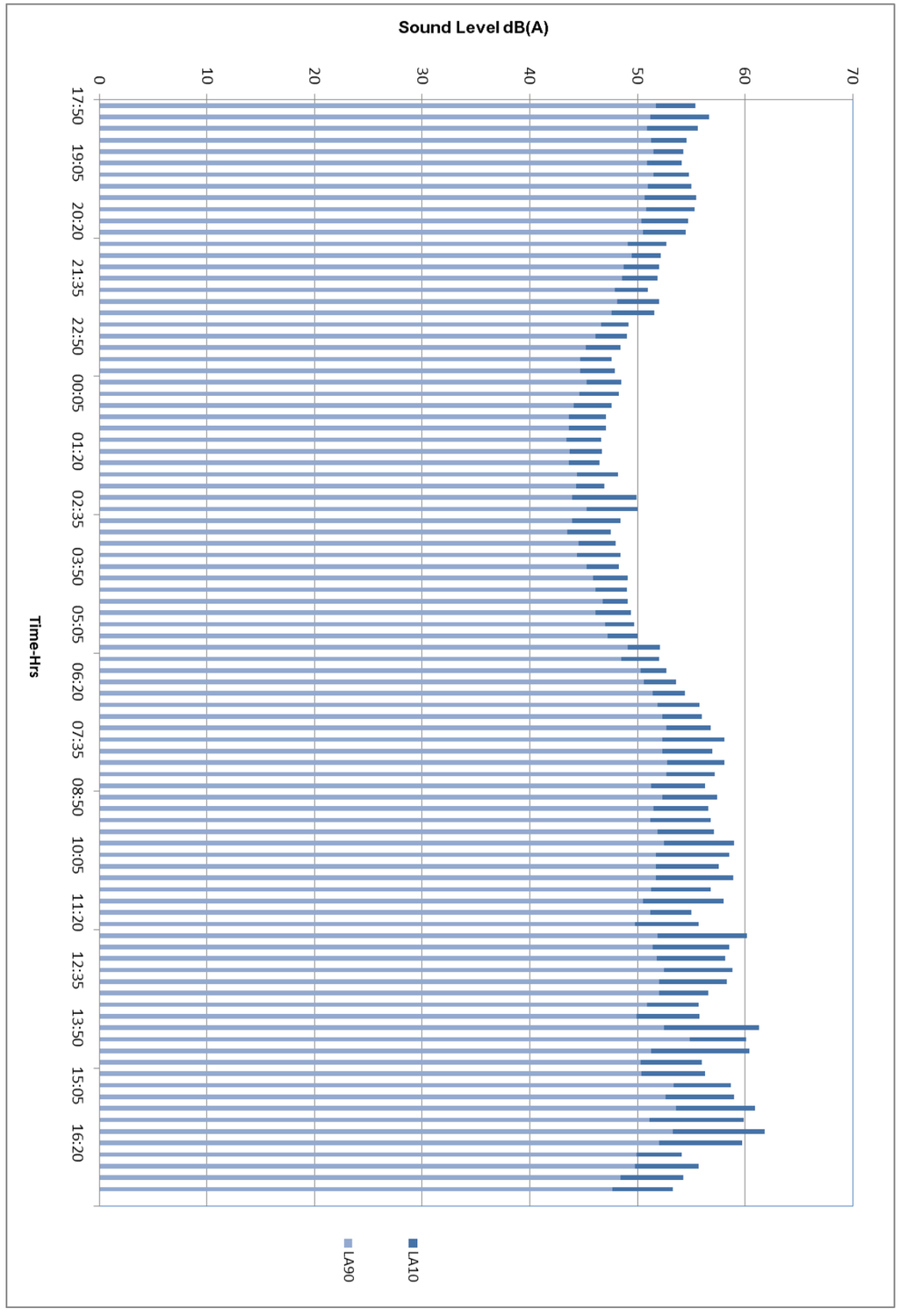
THG 8: LA10 and LA90 Noise Levels Measured at Location LT4 from 23 October 2014 to 24 October 2014



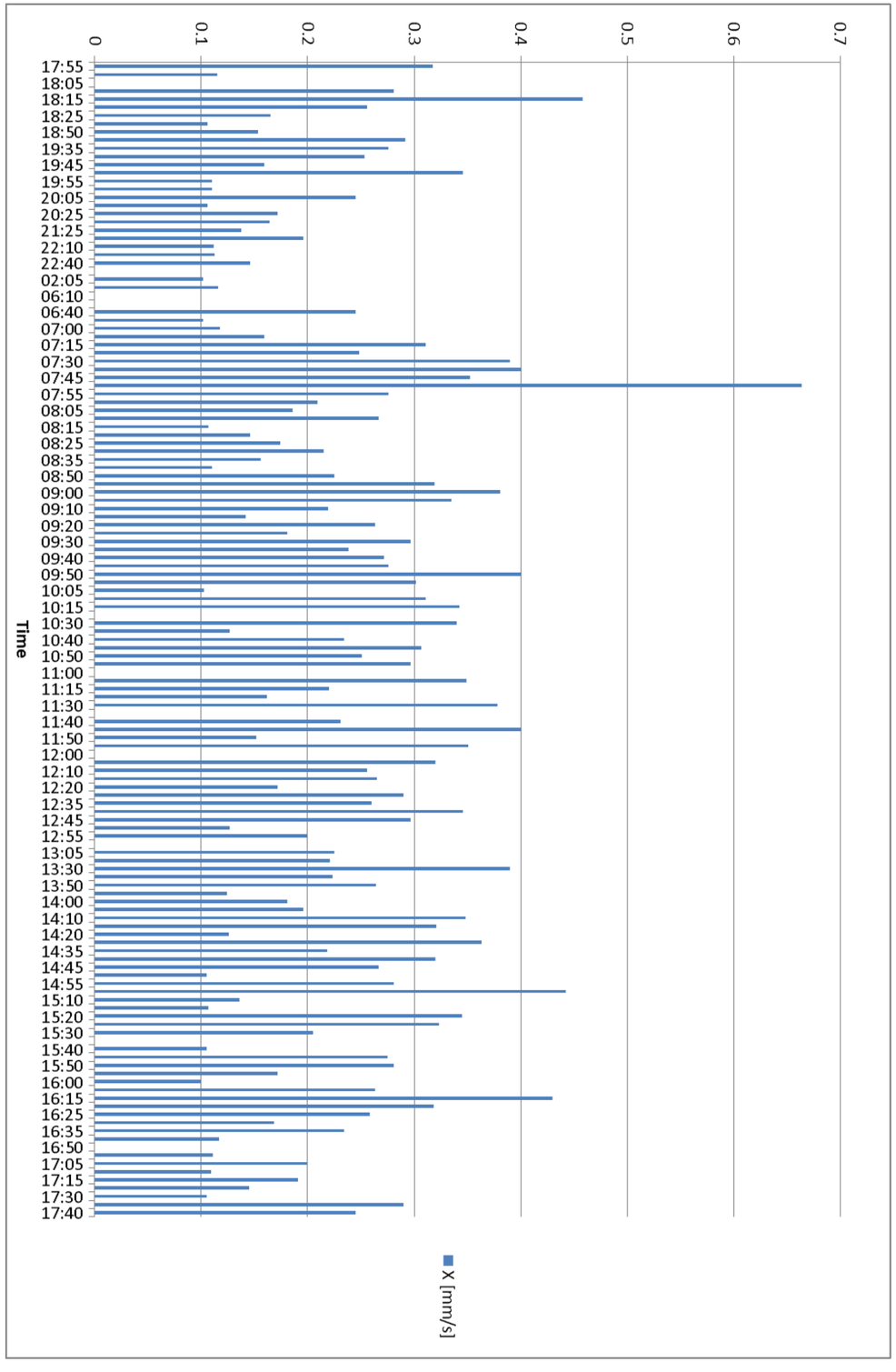
THG 9: LAeq and LAmax Noise Levels Measured at Location LT5 from 23 October 2014 to 24 October 2014



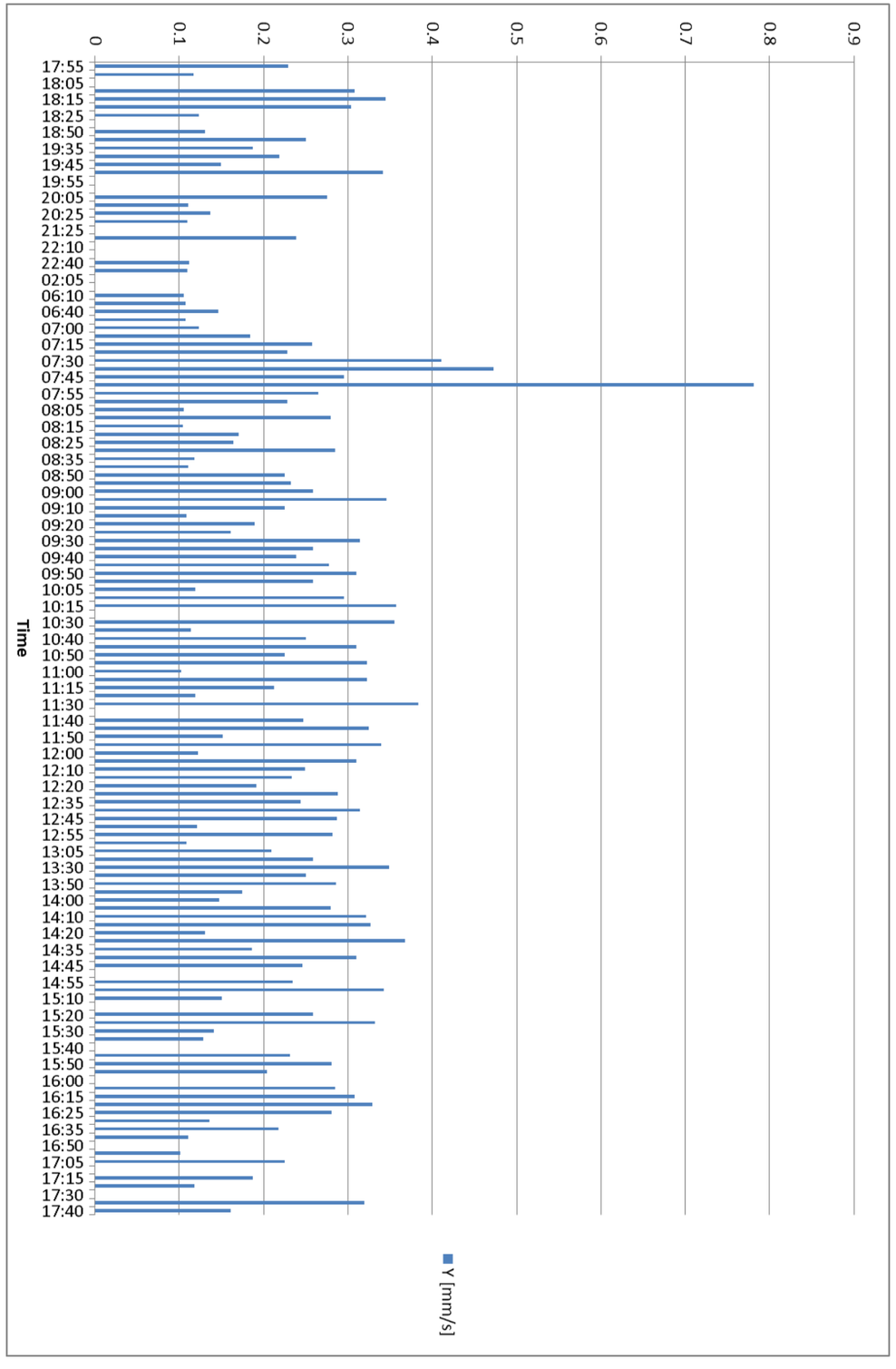
THG 10: LA10 and LA90 Noise Levels Measured at Location LT5 from 23 October 2014 to 24 October 2014



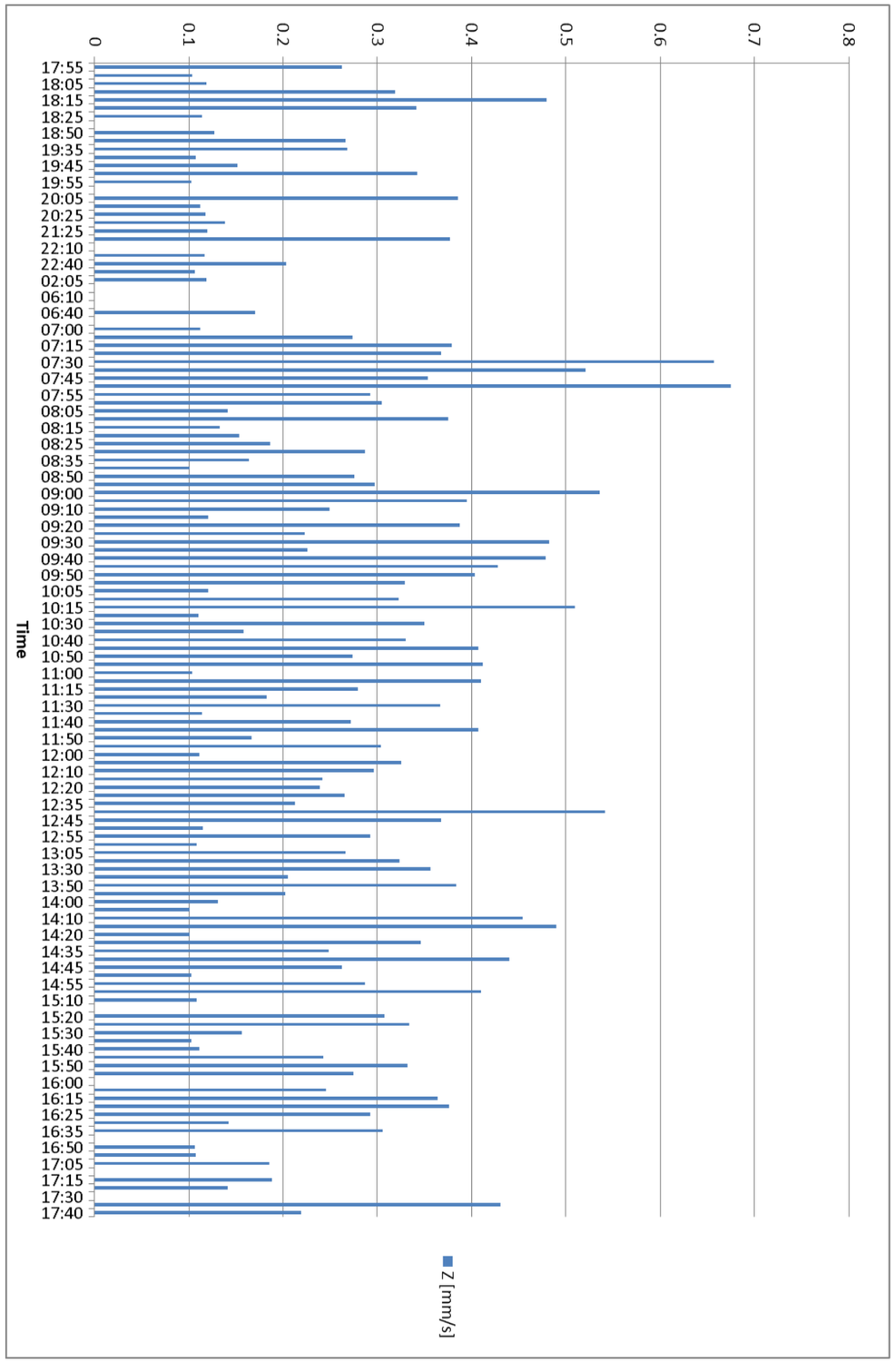
THG 11: Peak Particle Velocities in the x-direction at Location VL1 between 23 October 2014 and 24 October 2014



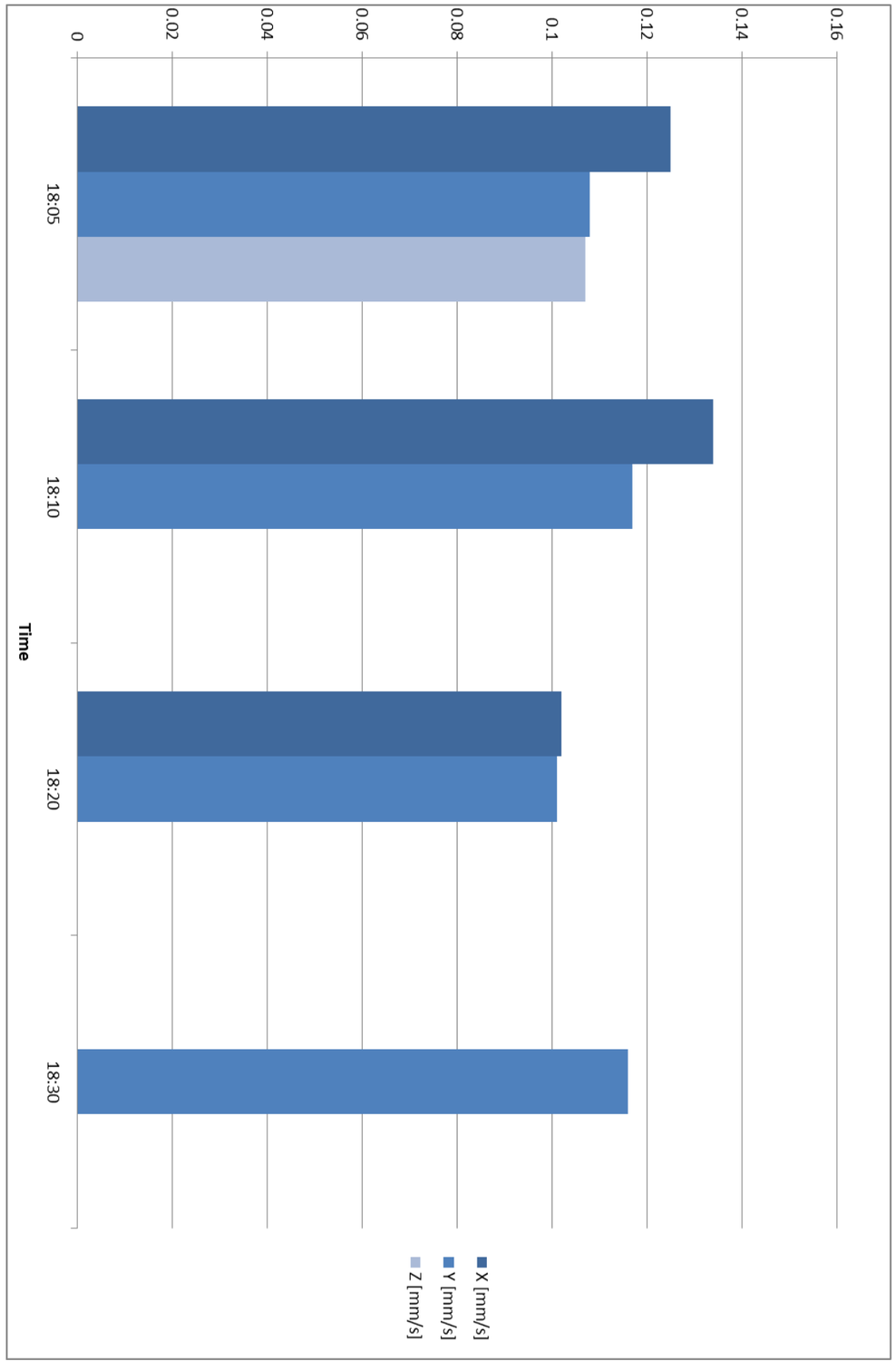
THG 12: Peak Particle Velocities in the y-direction at Location VL1 between 23 October 2014 and 24 October 2014



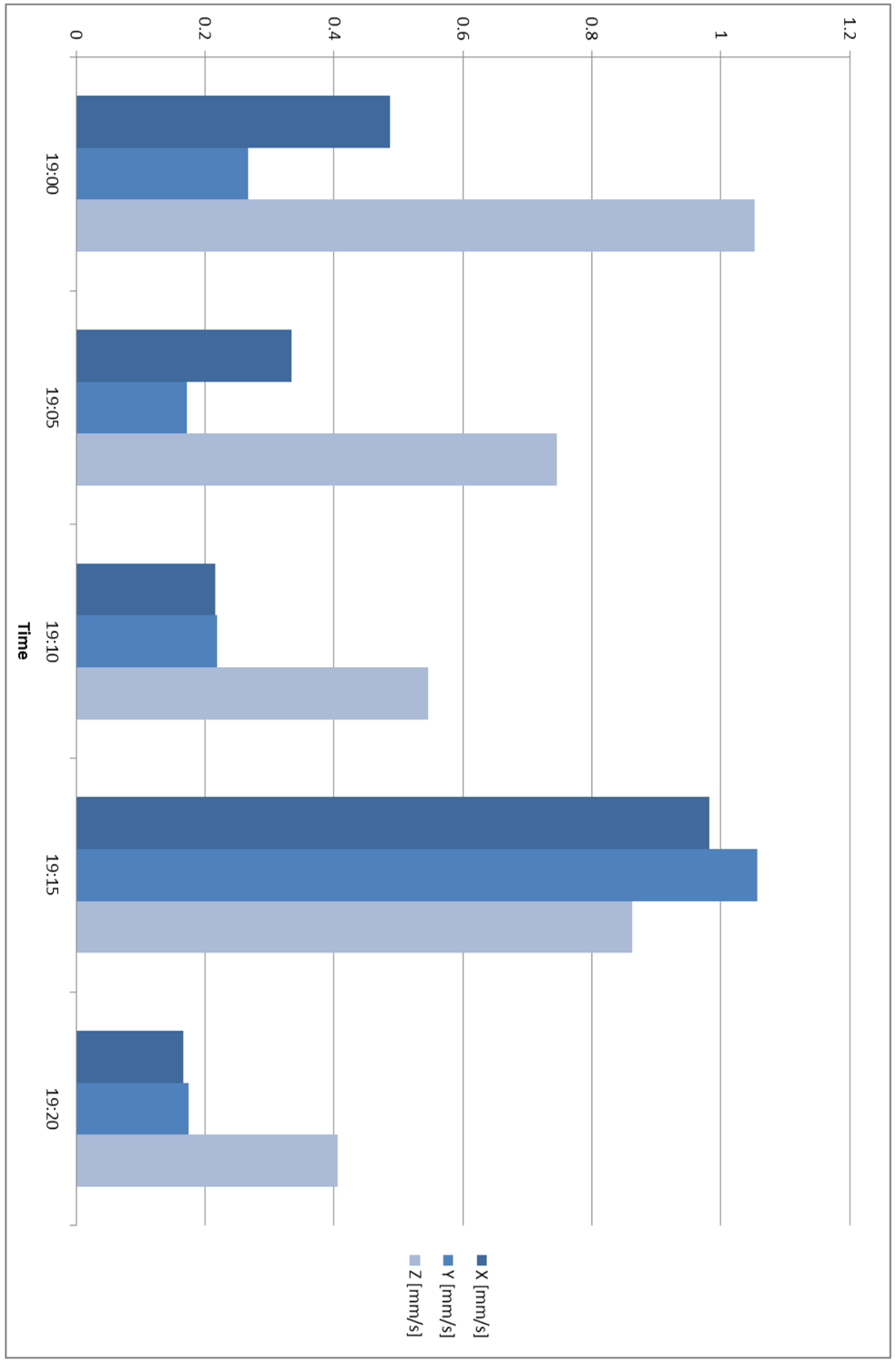
THG 13: Peak Particle Velocities in the z-direction at Location VL1 between 23 October 2014 and 24 October 2014



THG 14: Peak Particle Velocities in all directions at Location VS1 on 24 October 2014



THG 15: Peak Particle Velocities in all directions at Location VS2 on 24 October 2014



Appendix 12.3 Construction noise and vibration assessment

Introduction

Construction noise and vibration can be predicted and assessed using British Standard 5228.

BS 5228 Part 1: Noise[36] does not provide limits for construction noise. The standard, as a whole, provides practical information on demolition and construction noise and vibration reduction measures, and promotes a 'Best Practice Means' approach to control noise and vibration.

BS 5228 Part 2: Vibration[37] provides similar guidance for vibration effects including vibration due to piling activities.

Method of Assessment

Construction Noise

The sound levels that are considered the LOAELs and SOAELs for construction noise are set out in Table A12.3.1. The LOAELs are the "lower cut offs" identified in Appendix E of BS 5228 Part 1[36] and the SOAELs are the levels identified that, if exceeded for "significant" periods of time (either continuously or sporadically), could result in "widespread community disturbance, or interfere with activities or sleep".

Table A12.3.1 Construction noise adverse effect levels for permanent buildings

Day	Time (hours)	Averaging Period, T	Lowest Observed Adverse Effect Level LAeq,T (dB)	Significant Observed Adverse Effect Level LAeq,T (dB)
Mondays to Fridays	0700 - 0800	1 hour	60	70
	0800 - 1800	10 hours	65	75
	1800 - 1900	1 hour	60	70
	1900 – 2200	1 hour	55	65
Saturdays	0700 - 0800	1 hour	60	70
	0800 - 1300	5 hours	65	75
	1300 - 1400	1 hour	60	70
	1400 – 2200	1 hour	55	65
Sundays & Public Holidays	0700 – 2200	1 hour	55	65
Any night	2200 – 0700	1 hour	45	55

Daytime construction noise levels should not exceed the SOAELs for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any six consecutive months.

BS 5228 Part 1 provides typical construction plant noise levels in terms of L_{Aeq} at a distance of 10 m from the source. The standard also provides calculation methods in order to predict the noise levels at a receptor with corrections for distance and ground attenuation, noise screening and reflections, and the percentage on-time of an activity over the course of the assessment period.

Prior to the production of specific details on the phasing and siting of construction activities, the BS 5228 data and calculation procedures have been used to derive indicative noise levels at selected distance bands from the construction site boundary. Items of typical construction plant which might be associated with the construction of future development have been selected for the assessment. The assessment considers a worst case scenario without noise controls such as screening or operational constraints. The assessment does not consider the cumulative impact of multiple items of plant operating at the same time.

Construction Traffic Noise

Traffic associated with a construction site is likely to include heavy vehicles delivering equipment and materials to site and the daily arrival and departure of construction workers to the site. Noise levels are likely to increase along the designated site access route through or around Cambridge due to the temporary change in volume and composition of the road traffic.

Off-site construction traffic noise can be assessed by considering the change in traffic volume and composition during construction works following the principles of CRTN[38] and DMRB[39]. DMRB suggests that a 25% increase in road traffic volume constitutes a 1 dB increase in noise level where all other factors (speed and composition) remain the same.

The criteria for the assessment of the magnitude of impact due to road traffic noise changes arising from construction works are provided here in Table A12.3.2.

Table A12.3.2 Construction traffic noise impact levels

Adverse Effect Levels	Increase in LA10,18h Noise Levels due to Construction Traffic
SOAEL	5 dB
LOAEL	3 dB
NOEL	0 dB

Until details of the proposed access route to and across the West Cambridge site are available an assessment of a change in noise levels due to construction traffic cannot be undertaken.

On-site construction traffic noise within the construction site boundary (such as on a haul road) can be assessed in accordance with BS 5228 Part 1[36]. Prior to the production of specific details on the phasing and siting of construction vehicles and any temporary haul roads this has not been assessed.

[36] British Standards Institution, 2014. BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites Part 1 Noise. London: BSI.
[37] British Standards Institution, 2014. BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites Part 2 Vibration. London: BSI.
[38] Department of Transport Welsh Office, 1988. Calculation of Road Traffic Noise. London: HMSO.
[39] The Highways Agency, 2011. Design Manual for Roads and Bridges Volume 11 Environmental Assessment Section 3 Environmental Assessment Techniques Part 7 Noise and vibration. London: HMSO.

Construction Vibration

The simplest approach to quantify vibration effects is to use the concept of peak particle velocity (PPV). BS 5228 Part 2[37] suggests that for construction activities, it is considered more appropriate to provide guidance in terms of the PPV, since this parameter is likely to be more routinely measured based upon the more usual concerns over potential building damage.

Table A12.3.3 presents the suggested adverse effect levels for the human response to construction vibration as measured at the point of entry into the recipient in terms of PPV.

Table A12.3.3 Construction vibration adverse effect levels for the human response to vibration

Adverse Effect Level	Peak Particle Velocity	Effect
SOAEL	10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.
LOAEL	1 mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.

Building Contents

BS 5228 Part 2 also provides guidance on the assessment of vulnerability of contents of buildings identifying that many types of equipment, activities and processes are often sensitive to levels of vibration below those levels that are perceptible to humans. Example criteria are provided in terms of rms particle velocity (µm/s) for a range of facilities and equipment, however, specific criteria should be established through investigation of the actual conditions and requires or through discussion with the receptor manufacturer, supplier or operator.

Structural and Cosmetic Building Damage

BS 5228 Part 2 provides guidance on PPV vibration limits for transient excitation for different types of buildings. These limits are presented in Table A12.3.4.

Table A12.3.4 PPV Limits for Cosmetic Damage to Buildings.

Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse (1)	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or Framed Structures. Industrial and heavy commercial buildings.	50 mm/s at 4 Hz and above	
Un-reinforced or light framed structures. Residential or light commercial type buildings. (2)	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz2	22 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and Above
(1) Values referred to are at the base of the building (2) At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) should not be exceeded		

When vibration experienced at structures exceeds the values shown in Table xxx, this would be considered to be an adverse impact.

Impact Assessment

Construction Noise

It is noted that some of the older existing buildings on site will be demolished. Demolition of these buildings is likely to require breakers, crushers and site clearance. Any internal stripping out prior to demolition of the structure is unlikely to be a significant source of noise or vibration for nearby receptors.

The construction of new buildings is likely to include site levelling/clearance, ground excavation, concreting, piling, superstructure construction and external works such as road construction. The building construction phase and the servicing and fitting out of new buildings is not normally a significant source of noise or vibration for nearby receptors.

An assessment of construction noise at selected distance bands from the construction site boundary has been undertaken based on typical construction plant noise levels provided in BS 5228 Part 1. The assessment considers a worst case scenario without noise controls such as screening or operational constraints.

Table A12.3.5 presents typical construction plant taken from BS 5228 Part 1. Table A12.3.6 presents the results of the assessment for typical demolition and construction activities.

Table A12.3.5 Predicted indicative construction plant noise levels

Type of Construction Plant	Typical $L_{Aeq,1h}$ Noise Levels (dB) At various distances from the construction site boundary				
	10 m	20m	30m	50m	100m
Crusher	84	78	74	70	64
Breaker mounted on wheeled backhoe	92	86	82	78	72
Hand-held pneumatic breaker	83	77	73	69	63
Excavator 16T	76	70	66	62	56
Excavator 22T	78	72	68	64	58
Dozer 20T	81	75	71	67	61
Wheeled loader	80	74	70	66	60
Dozer towing roller	81	75	71	67	61
Dumper 6T	79	73	69	65	59
Dumper 9T	76	70	66	62	56
Continuous flight auger piling (one cycle into sand and clay)	83	77	73	69	63
Wheeled mobile crane	70	64	60	56	50
Hand- held welder	73	67	63	59	53
Concrete mixer truck	80	74	70	66	60
Poker vibrator	78	72	68	64	58
Tower crane	77	71	67	63	57

Type of Construction Plant	Typical $L_{Aeq,1h}$ Noise Levels (dB) At various distances from the construction site boundary				
	10 m	20m	30m	50m	100m
Hand-held circular saw (petrol)	79	73	69	65	59
Diesel generator (to power site cabins, lighting, welding etc.)	74	68	64	60	54
Road planer	82	76	72	68	62
Vibratory roller	75	69	65	61	55
Road paver	77	71	67	63	57

Table A12.3.6 Predicted indicative construction activity noise levels

Type of Construction Activity	Typical $L_{Aeq,1h}$ Noise Levels (dB) At various distances from the construction site boundary				
	10 m	20 m	30 m	50 m	100 m
Demolition	93	87	84	79	73
Site Preparation/Clearance	87	81	77	73	67
Piling	84	78	74	70	64
Concrete Pouring	82	76	73	68	62
Road Construction	86	80	77	72	66

If all plant associated with a construction activity shown in Table A12.3.5 operated at the same time for 100% of the time along the construction site boundary, noise levels are likely to exceed the SOAEL of 75 dB $L_{Aeq,10h}$ over distances of approximately 20-30 m from the construction site boundary. Therefore, construction plant operating on the site will have the potential to affect noise-sensitive receptors located immediately adjacent to the site.

However, in practice, the main construction activities such as ground excavation works and new build construction will tend to take place slightly further onto the construction site, or only affect a limited number of receptors for a temporary period at any given time during each construction phase. Plant will only have to progress a relatively short distance away from each existing receptor before noise levels fall below the typical construction noise criterion.

Construction Vibration

Construction of new development is not normally seen to be significant source of vibration. Vibration is normally only associated with piling activity. The recommended piling method is continuous flight augering. This method reduces adverse impacts as it does not involve driving piles into the ground using impulsive forces.

Many existing and proposed vibration sensitive receptors close to the construction site boundary are likely to be 20 m or more from the closest construction works. BS 5228 provides some indicative levels of vibration associated with auger piling, which indicates levels below 0.4 mm/s peak particle velocity (PPV) at distances beyond 10 m. Vibration due to auger piling is considered to be below the proposed LOAEL of 1 mm/s PPV for human response.

The risk of minor or cosmetic damage to buildings is considered to be low.

However, vibration due to auger piling (or other construction activities) may affect vibration sensitive equipment in nearby buildings.

Mitigation Measures

Construction Noise

The control of noise and vibration from demolition and construction activities would be incorporated into a site-specific Construction Environmental Management Plan (CEMP). The CEMP would be agreed in consultation with CCC through ha suitable planning condition and should include and/or specify the following routine noise and vibration management controls:

- Breaking out of concrete structures would be undertaken, where possible, using low noise effect methods including bursting and splitting rather than percussive breaking;
- Detailed programming of works to make maximum use of existing barriers to noise;
- Retention of the outer walls of structures for as long as possible before demolition is necessary;
- Careful selection of demolition/construction methods and plant to be used;
- Switching off of plant and vehicle engines when not in use;
- Restriction of drop heights onto lorries;
- Regular maintenance and servicing of vehicles, equipment and plant;
- Appropriate handling and storage of materials;
- Appropriate operational hours (to be agreed with the local authority);
- Enforcement of restricted working hours for excessively noisy activities;
- Implementation of an appropriate traffic management strategy;
- Use of temporary acoustic barriers where appropriate and other noise containment measures such as screens, sheeting and acoustic hoardings at the construction site boundary to minimise noise breakout and reduce noise levels at the potentially affected receptors.

If a temporary source of noise cannot reasonably be prevented and the works being undertaken are crucial to progressing the particular project phase then separate liaison with CCC and the appropriate neighbours would be held to reach an acceptable compromise.

In addition to -the above, all reasonable steps would be taken to keep the local community (including the existing commercial and university occupants as well as nearby residential inhabitants) informed of proposed demolition and construction operations. Measures for community liaison would be dealt with by a dedicated Community Liaison Officer to co-ordinate the dissemination of information (for example, by means of a regular newsletter) and to program those operations at time that would minimise the potential for disturbance.

The above range of environmental management controls represent measures that are regularly and successfully applied to large-scale construction projects in order to minimise noise effects on local communities. The application of similar control measures during the demolition and construction phases would likewise ensure that the works proceed with the minimum disturbance to local residents, commercial properties and pedestrians and cyclists.

Construction Vibration

Appendix B.5 of BS 5228 Part 2 reviews the assessment of vulnerability of contents of buildings such as scientific laboratories or microelectronics manufacturing.

It states that it is advisable to investigate the actual vibration conditions and requirements in detail where there is uncertainty concerning the level of transmitted vibration and its acceptability to the particular environment. From this, preliminary trials and monitoring can be designed to establish suitable working procedures.

Another option would be to discuss vibration criteria with the equipment manufacturer, supplier or operator to establish suitable levels of vibration as manufacturers often set acceptable external vibration criteria for their equipment.

A further option would be to consider published information such as the vibration criteria curves (VC-curves) or previous experience. The VC-curves were developed by the Institute of Environmental Sciences and Technology and are commonly used in the design and evaluation of the performance of facilities housing vibration sensitive equipment. The curves broadly define classes of equipment and processes. For example, VC-A may include bench microscopes up to 400x magnification and Class A microelectronics manufacturing equipment. VC-D may include electron microscopes at greater than 30 000x magnification, mass spectrometers and Class D microelectronics manufacturing equipment with a line width of 0.5 µm.

Construction vibration monitoring would be undertaken throughout construction phases to ensure the resulting vibration criteria are met.

Appendix 12.4 Traffic data used for noise modelling

		2015 Baseline				2021 DM				2021 DS					2031 DM				2031 DS				
Link Ref	Link Description	Estimated 18hr Base 5-Day Flows (vehicles)	Estimated 18hr > 3.5t Flows	Estimated 18hr Base 5-Day Flows (Total Flows)	HGV %	Estimated 18hr Base 5-Day Flows (vehicles)	Estimated 18hr > 3.5t Flows	Estimated 18hr Base 5-Day Flows (Total Flows)	HGV %	Estimated 18hr Base 5-Day Flows (vehicles)	Estimated 18hr > 3.5t Flows	Estimated 18hr Base 5-Day Flows (Total Flows)	HGV %	Short Term Impact	Estimated 18hr Base 5-Day Flows (vehicles)	Estimated 18hr > 3.5t Flows	Estimated 18hr Base 5-Day Flows (Total Flows)	HGV %	Estimated 18hr Base 5-Day Flows (vehicles)	Estimated 18hr > 3.5t Flows	Estimated 18hr Base 5-Day Flows (Total Flows)	HGV %	Long Term Impact
1.0	M11 - J12 - J13 - Nbd	41,896	6,578	**48,474**	**14%**	44,651	7,011	**51,662**	**14%**	45,184	7,470	**52,654**	**14.19%**	**1.92%**	46,308	7,271	**53,579**	**14%**	47,578	7,470	**55,048**	**14%**	**6.55%**
1.0	M11 - J12 - J13 - Sbd	37,350	5,864	**43,214**	**14%**	40,353	6,336	**46,689**	**14%**	40,918	6,876	**47,794**	**14.39%**	**2.37%**	42,486	6,671	**49,157**	**14%**	43,794	6,876	**50,670**	**14%**	**8.53%**
3.1	Madingley Rd - East of Cambridge Rd Crossroads Wbd	11,436	655	**12,092**	**5%**	11,659	668	**12,327**	**5%**	11,950	752	**12,701**	**5.92%**	**3.04%**	12,477	715	**13,192**	**5%**	13,116	752	**13,867**	**5%**	**12.50%**
3.1	Madingley Rd - East of Cambridge Rd Crossroads Ebd	6,433	369	**6,802**	**5%**	7,023	402	**7,425**	**5%**	7,328	495	**7,823**	**6.32%**	**5.35%**	7,897	452	**8,350**	**5%**	8,633	495	**9,127**	**5%**	**22.92%**
3.2	Madingley Rd on Over Bridge M11 Ebd	13,657	783	**14,440**	**5%**	15,420	884	**16,303**	**5%**	16,315	1,082	**17,397**	**6.22%**	**6.71%**	16,711	957	**17,668**	**5%**	18,883	1,082	**19,965**	**5%**	**22.46%**
3.2	Madingley Rd on Over Bridge M11 Wbd	5,933	340	**6,273**	**5%**	5,822	334	**6,156**	**5%**	6,121	401	**6,522**	**6.15%**	**5.94%**	6,343	363	**6,706**	**5%**	6,995	401	**7,396**	**5%**	**20.14%**
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Ebd	10,016	367	**10,383**	**4%**	11,279	414	**11,692**	**4%**	12,097	517	**12,615**	**4.10%**	**7.89%**	12,104	444	**12,548**	**4%**	14,097	517	**14,614**	**4%**	**24.99%**
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Wbd	9,800	360	**10,159**	**4%**	10,898	400	**11,298**	**4%**	11,736	508	**12,243**	**4.15%**	**8.37%**	11,894	436	**12,331**	**4%**	13,843	508	**14,351**	**4%**	**27.02%**
3.4	Madingley Rd - West of P&R Access Wbd	9,800	360	**10,159**	**4%**	10,898	400	**11,298**	**4%**	11,736	609	**12,345**	**4.94%**	**9.27%**	11,894	436	**12,331**	**4%**	16,610	609	**17,219**	**4%**	**52.42%**
3.4	Madingley Rd - West of P&R Access Ebd	10,016	367	**10,383**	**4%**	11,279	414	**11,692**	**4%**	12,097	535	**12,632**	**4.23%**	**8.04%**	12,104	444	**12,548**	**4%**	14,573	535	**15,107**	**4%**	**29.21%**
3.5	Madingley Rd - East of P&R Access Wbd	9,715	356	**10,072**	**4%**	10,813	397	**11,210**	**4%**	11,651	606	**12,257**	**4.95%**	**9.34%**	11,810	433	**12,243**	**4%**	16,525	606	**17,132**	**4%**	**52.83%**
3.5	Madingley Rd - East of P&R Access Ebd	9,501	349	**9,849**	**4%**	10,764	395	**11,159**	**4%**	11,583	516	**12,098**	**4.26%**	**8.42%**	11,589	425	**12,014**	**4%**	14,058	516	**14,574**	**4%**	**30.60%**
3.6	Madingley Rd - East of Proposed High Cross Access Ebd	8,228	302	**8,530**	**4%**	9,066	333	**9,399**	**4%**	10,037	455	**10,492**	**4.34%**	**11.63%**	9,739	357	**10,096**	**4%**	12,398	455	**12,853**	**4%**	**36.75%**
3.6	Madingley Rd - East of Proposed High Cross Access Wbd	8,532	313	**8,845**	**4%**	9,446	347	**9,792**	**4%**	10,791	505	**11,296**	**4.47%**	**15.36%**	10,258	376	**10,634**	**4%**	13,768	505	**14,273**	**4%**	**45.76%**
3.7	Madingley Rd - East of JJ Thomson Ave Ebd	9,366	344	**9,710**	**4%**	10,369	380	**10,750**	**4%**	11,778	547	**11,778**	**4.65%**	**9.57%**	11,055	406	**11,460**	**4%**	14,920	547	**15,467**	**4%**	**43.89%**
3.7	Madingley Rd - East of JJ Thomson Ave Wbd	9,431	346	**9,777**	**4%**	10,231	375	**10,606**	**4%**	11,970	577	**11,881**	**4.86%**	**12.02%**	10,840	398	**11,238**	**4%**	15,734	577	**16,311**	**4%**	**53.79%**
3.8	Madingley Rd - East of Clerk Maxwell Rd Ebd	9,129	335	**9,464**	**4%**	10,132	372	**10,503**	**4%**	11,541	539	**12,079**	**4.46%**	**15.00%**	10,817	397	**11,214**	**4%**	14,682	539	**15,221**	**4%**	**44.92%**
3.8	Madingley Rd - East of Clerk Maxwell Rd Wbd	9,470	347	**9,817**	**4%**	10,269	377	**10,646**	**4%**	12,009	579	**12,587**	**4.60%**	**18.23%**	10,879	399	**11,278**	**4%**	15,772	579	**16,351**	**4%**	**53.58%**
3.9	Madingley Rd - East of Storey's Way Ebd	7,839	288	**8,126**	**4%**	8,873	326	**9,199**	**4%**	10,263	490	**10,753**	**4.56%**	**16.90%**	9,533	350	**9,883**	**4%**	13,360	490	**13,851**	**4%**	**50.57%**
3.9	Madingley Rd - East of Storey's Way Wbd	7,693	282	**7,975**	**4%**	8,772	322	**9,093**	**4%**	10,492	522	**11,013**	**4.74%**	**21.11%**	9,375	344	**9,718**	**4%**	14,224	522	**14,745**	**4%**	**62.16%**
12.1	High Cross Access to Madingley Rd Nbd	1,391	92	**1,483**	**6%**	1,391	92	**1,483**	**6%**	2,885	183	**2,510**	**7.29%**	**69.20%**	1,391	92	**1,483**	**6%**	2,759	183	**2,942**	**6%**	**98.30%**
12.1	High Cross Access to Madingley Rd Sbd	1,457	97	**1,554**	**6%**	1,678	111	**1,789**	**6%**	3,497	151	**1,805**	**8.36%**	**0.87%**	1,678	111	**1,789**	**6%**	2,275	151	**2,426**	**6%**	**35.57%**
12.2	JJ Thomson Ave Access to Madingley Rd Nbd	1,653	110	**1,763**	**6%**	1,644	109	**1,753**	**6%**	2,311	185	**1,310**	**14.14%**	**-25.26%**	1,644	109	**1,753**	**6%**	2,790	185	**2,975**	**6%**	**69.76%**
12.2	JJ Thomson Ave Access to Madingley Rd Sbd	1,452	96	**1,549**	**6%**	1,236	82	**1,318**	**6%**	1,899	168	**2,303**	**7.30%**	**74.69%**	1,236	82	**1,318**	**6%**	2,533	168	**2,701**	**6%**	**104.91%**
12.3	Clerk Maxwell Rd Nbd	453	30	**483**	**6%**	453	30	**483**	**6%**	453	30	**1,806**	**1.66%**	**274.20%**	453	30	**483**	**6%**	453	30	**483**	**6%**	**0.00%**
12.3	Clerk Maxwell Rd Sbd	395	26	**421**	**6%**	395	26	**421**	**6%**	395	26	**1,800**	**1.46%**	**327.07%**	395	26	**421**	**6%**	395	26	**421**	**6%**	**0.00%**

Appendix 14.1 Ground investigation

TECHNICAL NOTE

Job Name: West Cambridge Masterplan

Job No: 31500/3503

Note No: TN001

Date: 1 July 2015

Prepared By: Robert Foster

Subject: **Archaeological Trenches**

Introduction

In May and June 2015, the University of Cambridge's Archaeological Unit (UCAU) carried out an archaeological investigation in the western, northern and eastern areas of the West Cambridge site, predominantly in areas of grazing pasture that are currently used by the University's School of Veterinary Medicine. The archaeological investigation comprised 37 no. trenches varying in length and depth, although the majority were less than 1m deep. PBA engineers visited site on 18, 19 and 20 May and 1 June 2015 to observe this investigation, log open trenches and to take a small number of soil samples for subsequent geo-environmental testing.

The locations of the archaeological trenches, notes, sketches and selected photographs are attached to this note.

Ground Conditions

The ground conditions revealed by the archaeological investigation supported the general ground model for the West Cambridge site i.e. localised and variable thicknesses of Head Deposits (orange/brown clayey sand and gravel) overlying grey brown Gault Clay. Head Deposits were prevalent on the higher ground and ridgeline west of the School of Veterinary Medicine.

Remnants of former site buildings (Merton Hall Farm outbuildings in the north-eastern area) and evidence of land raising /landscaping in the northern area of the site were also identified during the archaeological investigation.

Geoenvironmental Assessment

PBA took 10 samples of the near surface soils arising from the trench excavations for subsequent geo-environmental testing. The archaeological trenches were positioned to target suspected archaeological features identified by an earlier geophysical survey. Trenches were not positioned to target potential sources of contamination. As such, the samples were scheduled for a general suite comprising a range of common industrial contaminants to provide a general overview of the background levels of potential contaminants in the near surface soils in the areas investigated.

The results of the geo-environmental testing and a summary of the results (Table 1) are attached to

DOCUMENT ISSUE RECORD

Technical Note No	Rev	Date	Prepared	Checked	Reviewed (Discipline Lead)	Approved (Project Director)
31500/3503/TN001	-	01.07.15	RF			MB

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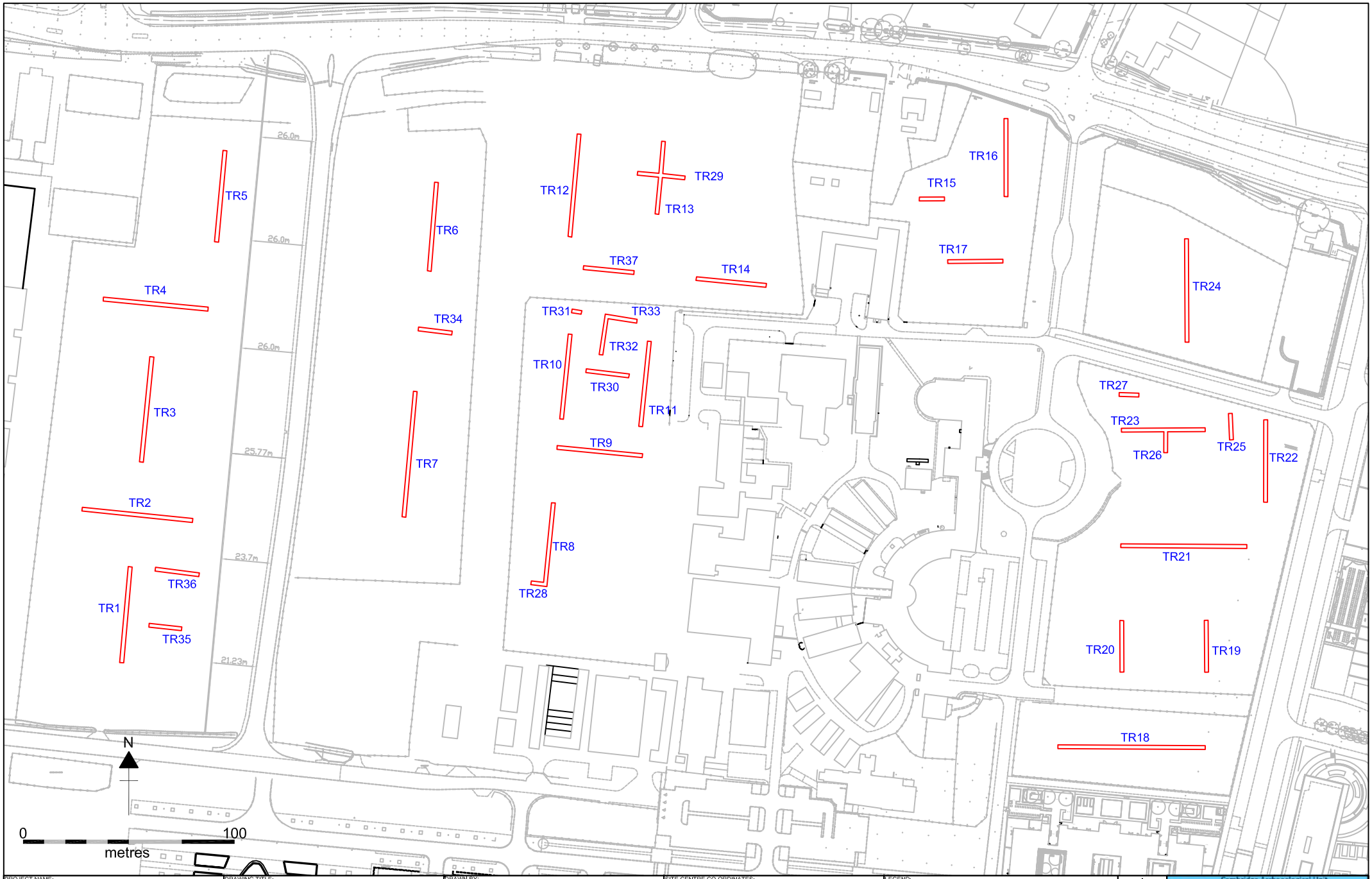
this note.

In order to assess the potential risk posed to human health by contaminants in the soil, the results of the chemical analysis on soil samples have been compared to Defra's Category 4 Screening Levels (C4SLs). C4SLs are available for six substances (arsenic, benzene, benzo-a-pyrene, cadmium, chromium IV and lead). For other potential contaminants, the results of the chemical analysis have been compared to LQM/CIEH Suitable for Use Screening Levels (S4ULs).

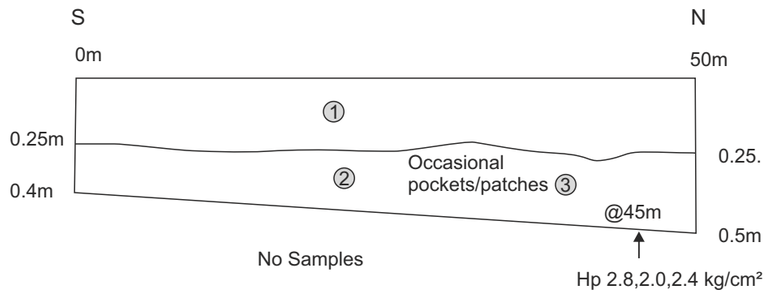
The proposed land use of the site is predominantly academic/commercial. As such, the results of the chemical analysis have been compared to C4SL/S4ULs for commercial and public open space (park) land uses which are considered to be the most applicable to the proposed land use at the site. Full details of the assessment criteria are attached to this note.

For the samples analysed, the measured concentrations of potential contaminants, as summarised on Table 1 attached, are below the chosen assessment values for a commercial and public open space (park) land use. Further, concentrations of contaminants were also below the more conservative assessment values for a residential land use with home grown produce indicating the low background level of potential contaminants within the shallow site soils in these areas of the site.



PROJECT NAME: West Cambridge	DRAWING TITLE: Locations of trenches	DRAWN BY: JM	SITE CENTRE CO-ORDINATES: 542675/259100	LEGEND: xx xx xx	Cambridge Archaeological Unit, University of Cambridge, Department of Archaeology, University of Cambridge, Downing Street, Cambridge, CB2 3DZ, TEL: (01223) 327802 FAX: (01223) 314686, Email: cauadmin@arch.cam.ac.uk, www.cau.arch.cam.ac.uk
SITE CODE: VET15		DATE: 16/06/15	SCALE: See bar		

TR1



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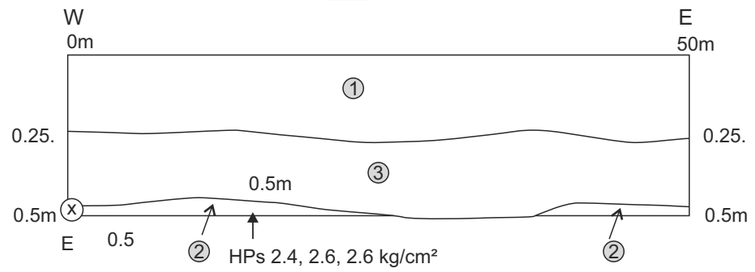

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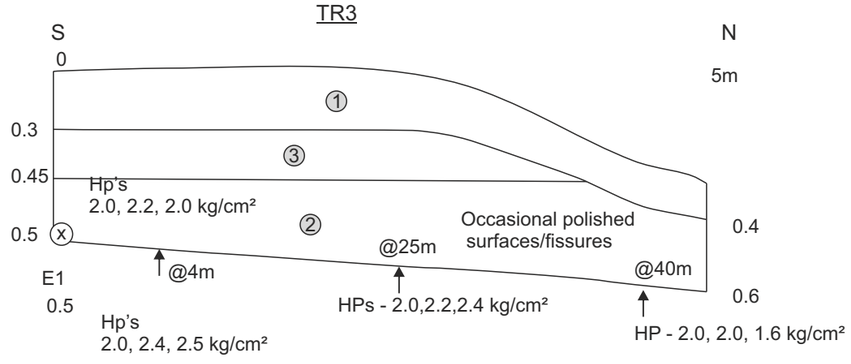

Land drain running N-S at base of trench for entire length
- dry and silted up in places

Key

① Dark brown, silty, clayey TOPSOIL with occasional sub angular flint gravel and fragments of brick, pottery and slate.

② Firm to soft, grey brown, slightly sandy, silty CLAY with occasional fine to coarse, angular to sub rounded flint + exotic gravel, occasional rootlets and cobbles.

③ Orange brown, slightly clayey to clayey in places, sandy fine to coarse angular to sub rounded, flint and exotic gravel, very occasional cobbles.

HP- Hand penetrometer readings
E - Environmental Sample

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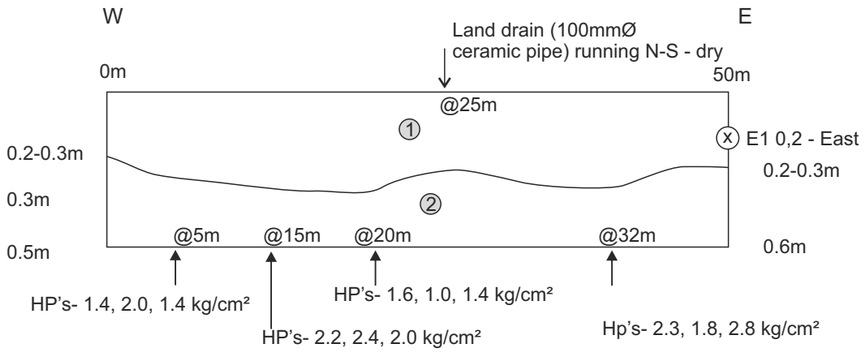
UNIVERSITY OF CAMBRIDGE

WEST CAMBRIDGE MASTERPLAN

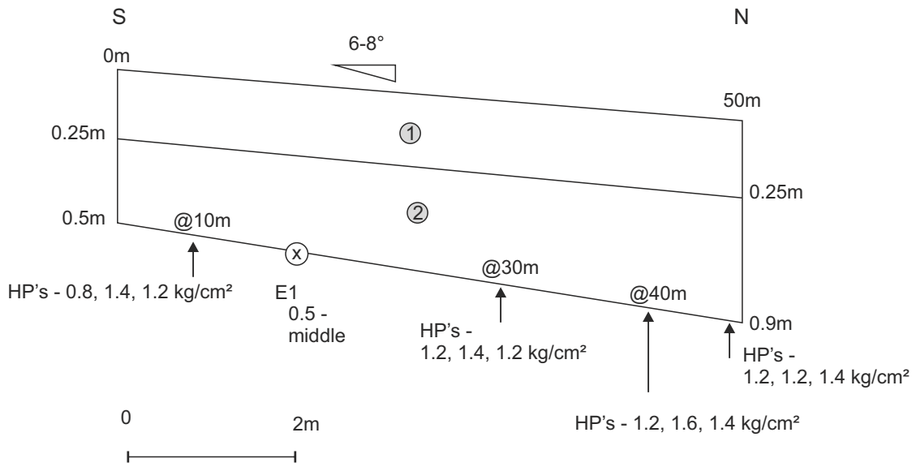
DIAGRAMMATIC TRENCH SECTIONS FROM ARCHAEOLOGICAL INVESTIGATION

Date	18.06.2015
A3 Scale	nts
Drawn by	davco
Checked by	RF
Revision	0

TR4



TR5



Containing very occasional pockets of ③

Key

① Dark brown, silty, clayey TOPSOIL with occasional sub angular flint gravel and fragments of brick, pottery and slate.

② Firm, grey brown, silty clay with very occasional, fine to coarse, angular to sub round flint + exotic gravel and occasional white fragments (epsomite?). Material peels away on slightly polished surfaces - hill creep/solifluction?

③ Orange brown, slightly clayey to clayey in places, sandy fine to coarse angular to sub rounded, flint and exotic gravel, very occasional cobbles.

HP- Hand penetrometer readings
E - Environmental Sample

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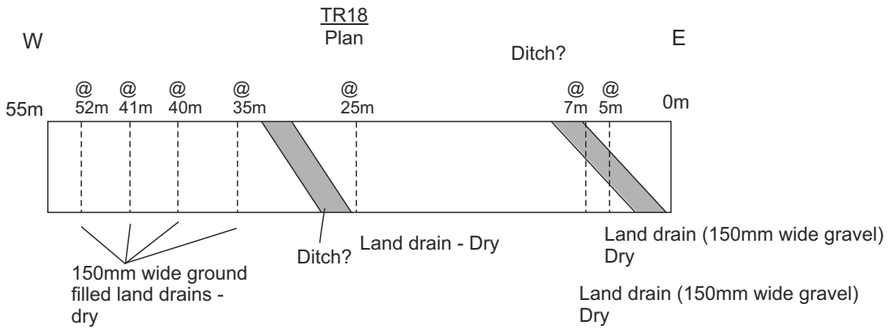
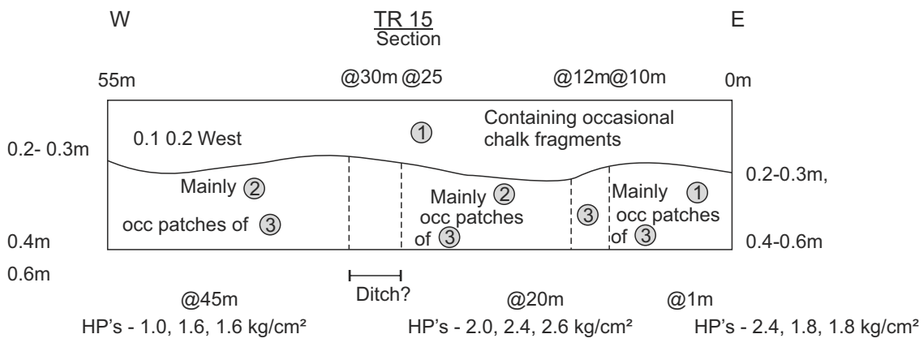
WEST CAMBRIDGE MASTERPLAN

DIAGRAMMATIC TRENCH SECTIONS FROM ARCHAEOLOGICAL INVESTIGATION

Date	18.06.2015
A3 Scale	nts
Drawn by	davco
Checked by	RF
Revision	0





Key

① Dark brown, silty, clayey TOPSOIL with occasional sub angular flint gravel and fragments of brick, pottery and slate.

② Firm to soft, grey brown, slightly sandy, silty CLAY with occasional fine to coarse, angular to sub rounded flint + exotic gravel, occasional rootlets and cobbles.

③ Orange brown, slightly clayey to clayey in places, sandy fine to coarse angular to sub rounded, flint and exotic gravel, very occasional cobbles.

HP- Hand penetrometer readings
E - Environmental Sample

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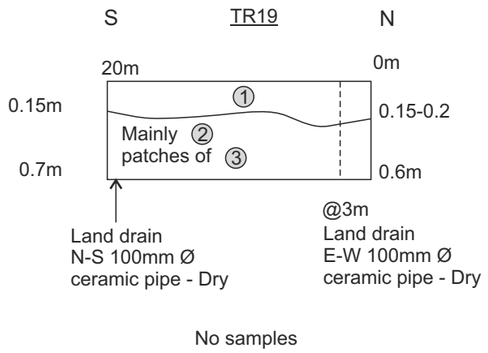
Client
UNIVERSITY OF CAMBRIDGE

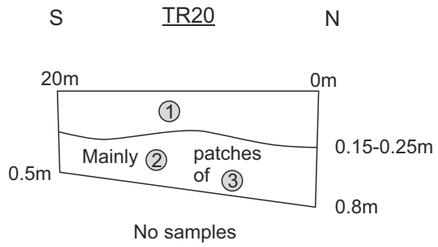
WEST CAMBRIDGE MASTERPLAN

DIAGRAMMATIC TRENCH SECTIONS FROM ARCHAEOLOGICAL INVESTIGATION

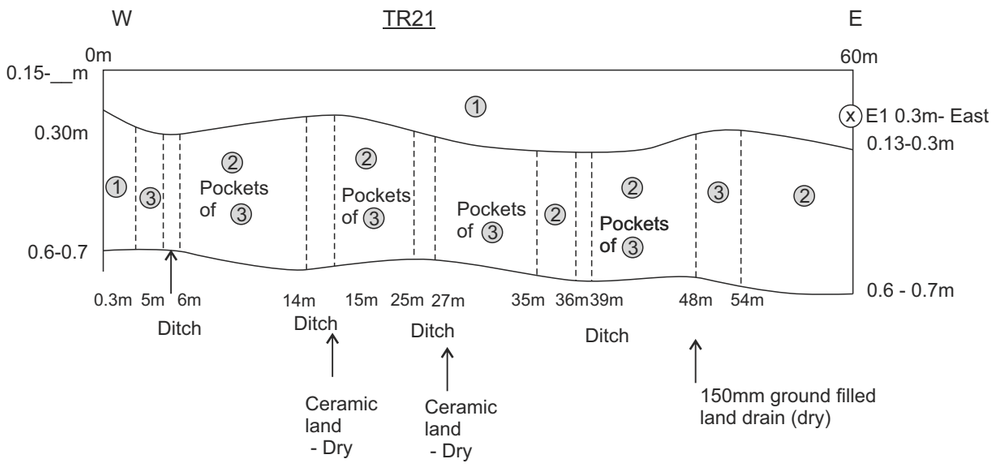
Date	18.06.2015
A3 Scale	nts
Drawn by	davco
Checked by	RF
Revision	0



No samples



No samples



Key

① Dark brown, silty, clayey TOPSOIL with occasional sub angular flint gravel and fragments of brick, pottery and slate.

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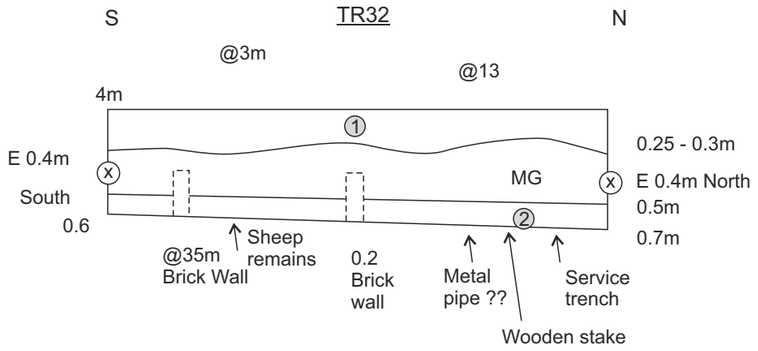
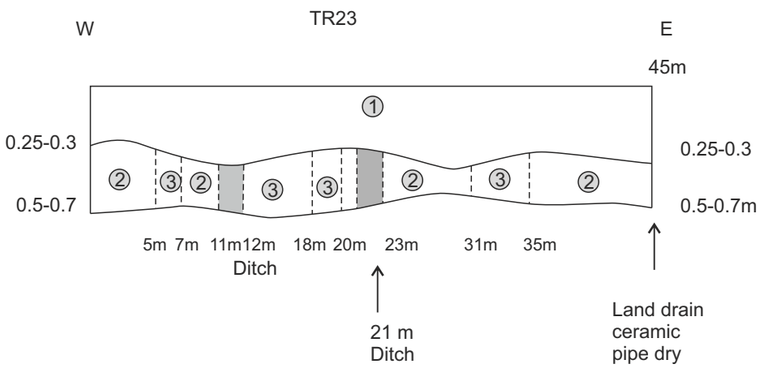
WEST CAMBRIDGE MASTERPLAN

DIAGRAMMATIC TRENCH SECTIONS FROM ARCHAEOLOGICAL INVESTIGATION

Date	18.06.2015
A3 Scale	nts
Drawn by	davco
Checked by	RF
Revision	0





Key

MG MADE GROUND - soft to firm, dark brown/black, sandy to very sandy, silty CLAY with occasional to some up to cobble size. Fragments of brick, concrete, timber, gravel, glass, metal and plastic

① Dark brown, silty, clayey TOPSOIL with occasional sub angular flint gravel and fragments of brick, pottery and slate.

② Firm to soft, grey brown, slightly sandy, silty CLAY with occasional fine to coarse, angular to sub rounded flint + exotic gravel, occasional rootlets and cobbles.

③ Orange brown, slightly clayey to clayey in places, sandy fine to coarse angular to sub rounded, flint and exotic gravel, very occasional cobbles.

HP- Hand penetrometer readings
E - Environmental Sample

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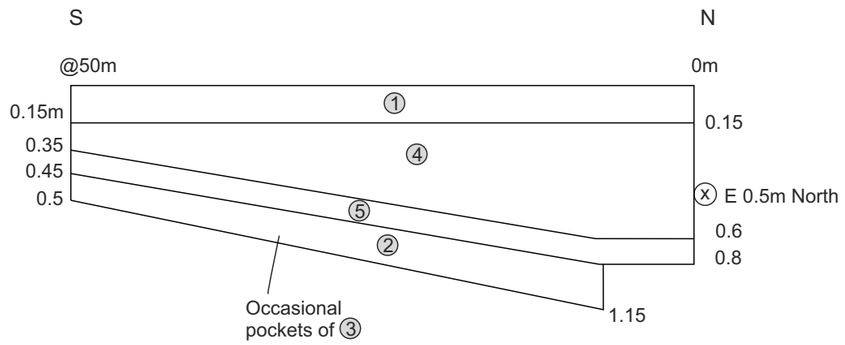
WEST CAMBRIDGE MASTERPLAN

DIAGRAMMATIC TRENCH SECTIONS FROM ARCHAEOLOGICAL INVESTIGATION

Date	18.06.2015
A3 Scale	nts
Drawn by	davco
Checked by	RF
Revision	0

TR24



Key

① Dark brown, silty, clayey TOPSOIL with occasional sub angular flint gravel and fragments of brick, pottery and slate.

② Firm to soft, grey brown, slightly sandy, silty CLAY with occasional fine to coarse, angular to sub rounded flint + exotic gravel, occasional rootlets and cobbles.

③ Orange brown, slightly clayey to clayey in places, sandy fine to coarse angular to sub rounded, flint and exotic gravel, very occasional cobbles.

④ MADE GROUND - Firm to soft, grey brown, silty CLAY with occasional fine to coarse, angular to sub rounded, flint gravel and fragment of brick and shells

⑤ Relic Topsoil - dark brown, slightly silty to very silty, clay with occasional fragments of brick and pottery

HP- Hand penetrometer readings
E - Environmental Sample

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WEST CAMBRIDGE MASTERPLAN

DIAGRAMMATIC TRENCH SECTIONS FROM ARCHAEOLOGICAL INVESTIGATION

Date	18.06.2015
A3 Scale	nts
Drawn by	davco
Checked by	RF
Revision	0

Calculations

Exploratory Hole Notes from Archaeological Investigation
RF on-site 1 June 2015

Project Title West Cambridge Masterplan Site.

Project No	31500 3503	By	RF	Checked	Date	18 06 15

TR8 - excavated ~~prior to logging~~ prior to site attendance.

0 - 0.3 topsoil: dark grey sandy gravelly clay.

0.3 - 0.6 brown/orange clayey gravelly sand and light grey sandy gravelly clay; occasional concentrations of very gravelly sand becoming more firm to stiff light grey clay towards southern end of pit with less frequent gravel inclusions.

one sample at 0.6m.

TR9 - excavated prior to site attendance. 0.6m deep x 1.8m wide x ~40m long

0 - 0.3 topsoil: dark grey sandy gravelly clay.

0.3 - 0.6 orange/brown gravelly sandy clay with occassional inclusions of very gravelly sand. Some light grey clay patterning on base of excavation towards eastern end of pit
old ceramic drainage pipe at base of trench approximately 8m from eastern end.

one sample at 0.5m.

Calculations

Exploratory Hole Notes from Archaeological Investigation

Project Title	West Cambridge Masterplan Site.						
Project No	31500	3503.	By RF	Checked	Date	18	06 15

TR10 – excavated prior to site attendance. 0.6m deep x 1.8m wide x ~40m long.

0 – 0.4 topsoil: dark grey sandy gravelly clay with occasional gravel sized lumps of brick and tile.

0.4 – 0.6 orange brown gravelly sandy clay, occassionally dark brown clayey gravelly sand with patterning of light grey clay. local archaeological investigations at base of trench to 1m showing light grey/brown sandy clay with some organic traces. old ceramic drainage pipe along entire length of trench base.

TR11 – excavated prior to site attendance 0.5m deep x 1.8m wide x ~43m long.

0 – 0.3 topsoil: dark grey gravelly clay.

0.3 – 0.5 brown sandy clay with frequent patches of very gravelly clayey sand. Gravel is fine to coarse flint with occassional flint cobbles. In amongst light grey clay with fine white gravels (evidence of cryoburation?) - becoming predominantly brown sandy gravelly clay towards the southern end of trench.

TR13 – excavated prior to site attendance.
+TR29

0 – 0.4 topsoil: dark grey very gravelly clay. Gravel is fine to coarse flint, fine chalk and occassional medium brick.

0.4 – 0.7 brown/grey clay with abundant fine white gravel, patches of brown sandy gravel on base of trench (cryoburation?)

sample at 0.4m.

Calculations

Exploratory Hole Notes from Archaeological Investigation

Project Title	West Cambridge Masterplan Site.						
Project No	31550 3503	By	RT	Checked	Date	18	06 15

TR15 – excavated prior to site attendance 0.7m deep x 1.8m wide x 12m long

0–0.3 grey/brown slightly sandy gravelly clay. Gravel is fine to coarse locally os flint, brick and occassional black coal? Small fragments of porcelain and some fine chalk gravel.

0.3–0.7 light grey/brown clay with some fine and medium white gravel. old ceramic drain (80mm) at base of trench approximately 2.6m from eastern end.

TR16 – excavated prior to site attendance 1.2m deep x 1.9m wide x ~36m long

0–0.5 light grey gravelly clay. Gravel is fine to coarse chalk and flint occasional inclusions of yellow/brown sandy gravel – probable Made Ground.

0.5–0.8 brown mottled dark brown/grey sandy gravelly clay. Small lumps of concrete/brick and black coal? – probable Made Ground.

0.8–1.0 brown sandy gravelly clay

1.0–1.2 Stiff light grey/brown clay
old ceramic drain (ϕ80mm) diagonally across northern end of trench at approx 1m below ground level.

one sample at 0.5m.

Calculations

Exploratory Hole Notes from Archaeological Investigation

Project Title	West Cambridge Masterplan Site.							
Project No	31500	3503	By	RF	Checked	Date	18	6	15

TR 37 – excavated with ft in attendance. 0·45m deep x 1·8m wide x 24m long

0 – 0·3 topsoil: dark grey friable gravelly clay. Gravel is fine to coarse flint, brick and slate, rare organics ? coal

0·3 – 0·45 stiff grey brown sandy clay with inclusions of orange / brown gravelly sandy clay. Gravel is fine to coarse flint with rare cobbles of flint.

old ceramic drainage pipe at 0·5m approximately 17m from eastern edge of pit.

TR22 – Buried brickwork of former outbuildings south of Merton Hall Farm

TR24 – Buried structure / Made Ground west of Merton Hal Farm

pba peterbrett
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Client

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ARCHAEOLOGICAL INVESTIGATION PHOTOGRAPHS

WEST CAMBRIDGE MASTERPLAN SITE

Date	JUNE 2015
A4 Scale	nts
Drawn	rf
Checked	rf
Appendix	**9**

TR5 – Slightly polished clay surfaces observed in this area indicative of possible hill creep / solifluction

TR4 – Evidence of polished clay surfaces

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ARCHAEOLOGICAL INVESTIGATION PHOTOGRAPHS

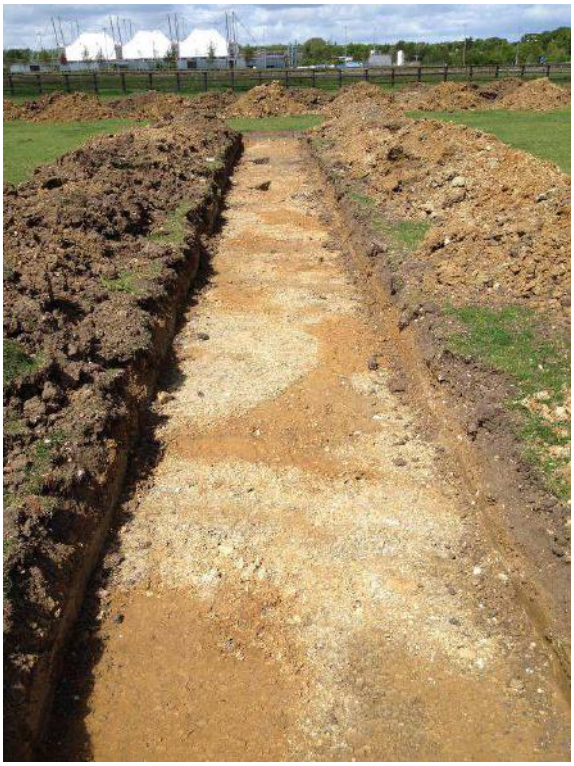
WEST CAMBRIDGE MASTERPLAN SITE

Date	JUNE 2015
A4 Scale	nts
Drawn	rf
Checked	rf
Appendix	**9**

TR16 – Looking north

TR11 – Looking north

TR13 – Looking north



TR30 – Looking west

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ARCHAEOLOGICAL INVESTIGATION PHOTOGRAPHS

WEST CAMBRIDGE MASTERPLAN SITE

Date	JUNE 2015
A4 Scale	nts
Drawn	rf
Checked	rf
Appendix	**9**

Potential Contaminant		Measured Values			Critical Concentration	Outlier Test		Assessment Values								
		Number of Tests	Minimum	Maximum		Critical Value	Number Exceedng	S4UL POSpark		Exceeding No	Exceeding CC	S4UL commercial		Exceeding No	Exceeding CC	C4SL commercial		Exceeding No	Exceeding CC
Arsenic	mg/kg	10	6.4	24	15	26	0	170	(1)	0	-	640	(2)	0	-	640	(3)	0	-
Cadmium	mg/kg	10	0.3	0.9	0.6	1.0	0	532	(1)	0	-	190	(2)	0	-	410	(3)	0	-
Chromium	mg/kg	10	22	32	29	34	0	33000	(1)	0	-	8600	(2)	0	-	-		-	-
Copper	mg/kg	10	12	34	26	45	0	44000	(1)	0	-	68000	(2)	0	-	-		-	-
Lead	mg/kg	10	12	76	55	159	0	-		-	-	-		-	-	2300	(3)	0	-
Mercury	mg/kg	10	<0.1	0.2	0.2	0.4	0	30	(1)	0	-	58	(2)	0	-	-		-	-
Nickel	mg/kg	10	20	40	28	38	1	3400	(1)	0	-	980	(2)	0	-	-		-	-
Selenium	mg/kg	10	<1	<1	-	-	0	1800	(1)	0	-	12000	(2)	0	-	-		-	-
Zinc	mg/kg	10	35	320	131	246	1	2E+05	(1)	0	-	7E+05	(2)	0	-	-		-	-
Sulphate	mg/l	10	<10.0	26															
EPH (C10-C40)	mg/kg	10	<10.0	<10.0															
Organic matter	%	10	0.4	4.1															
pH Value	pH Units	10	7.7	8.2															

Notes

(1) Denotes LQM/CIEH S4UL for public open space (park)

(2) Denotes LQM/CIEH S4UL for commercial landuse

(3) Denotes C4SL for commercial landuse

Critical Concentration is the concentration which the actual mean concentration will be below 19 times out of 20

Critical Value is the concentration above which values may be outliers of the data set.

Critical Concentrations are determined including values exceeeding Outlier Test

Values below the Method Detection Limit taken to be equal to the Method Detection Limit

Critical Values and Critical Concentrations have been determined assuming the data forms a normally distributed dataset.

pba peterbrett

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Client

UNIVERSITY OF CAMBRIDGE

SUMMARY OF CHEMICAL ANALYSIS OF SOIL SAMPLES FROM 2015 ARCHAEOLOGICAL INVESTIGATION

WEST CAMBRIDGE MASTERPLAN SITE

Date	July 2015
A4 Scale	nts
Drawn	rf
Checked	mb
Table	1

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number 15-36907

11-Jun-15

Client Peter Brett Associates
Caversham Bridge House
Waterman Place
Reading
Berkshire
RG1 8DN

Our Reference 15-36907

Client Reference 31500/3502

Contract Title West Cambridge

Description 4 Soil samples.

Date Received 04-Jun-15

Date Started 05-Jun-15

Date Completed 11-Jun-15

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. 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. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Rob Brown
Business Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 15-36907
Client Ref 31500/3502
Contract Title West Cambridge

			Lab No	821328	821329	821330	821331
			Sample ID	TR16	TR13	TR9	TR8
			Depth	0.50	0.40	0.50	0.60
			Other ID				
			Sample Type	ES	ES	ES	ES
			Sampling Date	01/06/15	01/06/15	01/06/15	01/06/15
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Preparation							
Stones >10mm	DETSC 1003*	1	% m/m	< 1.0	< 1.0	< 1.0	< 1.0
Moisture Content	DETSC 1004*	0.1	%	20	14	9.0	24
Metals							
Arsenic	DETSC 2301#	0.2	mg/kg	12	12	12	6.4
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	0.5	0.5	0.3
Chromium	DETSC 2301#	0.15	mg/kg	25	27	28	25
Hexavalent Chromium	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	34	26	12	16
Lead	DETSC 2301#	0.3	mg/kg	76	73	17	12
Mercury	DETSC 2325#	0.05	mg/kg	0.21	0.22	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	23	25	21	23
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	67	64	52	35
Inorganics							
Conductivity	DETSC 2009	1	uS/cm	240	270	220	350
pH	DETSC 2008#			8.0	7.9	7.9	8.2
Cyanide Total	DETSC 2130#	0.1	mg/kg	0.2	0.2	0.1	< 0.1
Organic matter	DETSC 2002#	0.1	%	2.7	3.0	1.6	0.4
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	15	15	13	26
Petroleum Hydrocarbons							
EPH (C10-C12)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10
EPH (C12-C16)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10
EPH (C16-C21)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10
EPH (C21-C28)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10
EPH (C28-C35)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10
EPH (C35-C40)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10
EPH (C10-C40)	DETSC 3311#	10	mg/kg	< 10	< 10	< 10	< 10

Key: * -not accredited. # -MCERTS (accreditation only implied if report carries the MCERTS logo). n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 15-36907
Client Ref 31500/3502
Contract Title West Cambridge

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
821328	TR16 0.50	SOIL	NAD	none	Colin Patrick
821329	TR13 0.40	SOIL	NAD	none	Colin Patrick
821330	TR9 0.50	SOIL	NAD	none	Colin Patrick
821331	TR8 0.60	SOIL	NAD	none	Colin Patrick

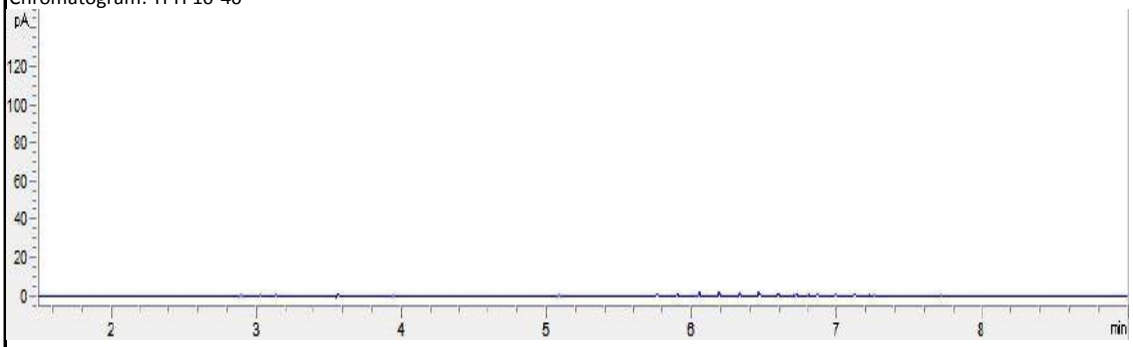
Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Summary of Chemical Analysis
Chromatograms

Our Ref 15-36907
Client Ref 31500/3502
Contract Title West Cambridge

Lab No	821328
Sample ID	TR16
Depth	0.5
Other ID	
Sample Type	SOIL
Sampling Date	06/01/2015
Sampling Time	

Test	Method	LOD	Units
Petroleum Hydrocarbons			
Chromatogram: TPH 10-40	*		

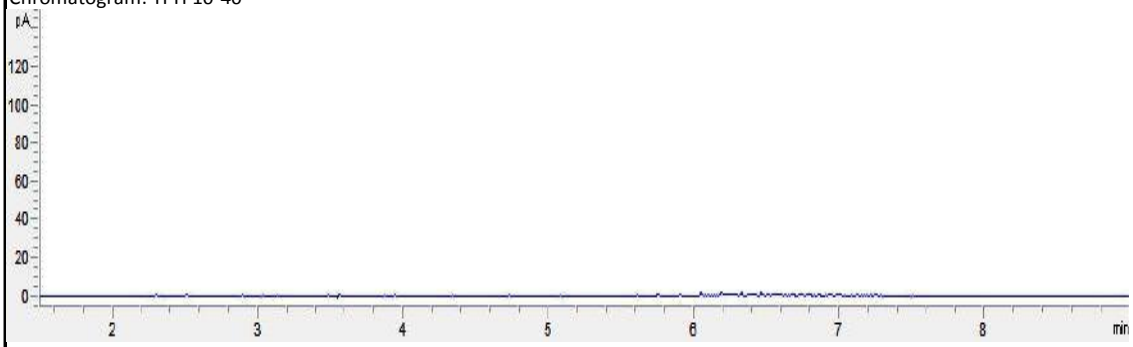


Summary of Chemical Analysis
Chromatograms

Our Ref 15-36907
Client Ref 31500/3502
Contract Title West Cambridge

Lab No	821329
Sample ID	TR13
Depth	0.4
Other ID	
Sample Type	SOIL
Sampling Date	06/01/2015
Sampling Time	

Test	Method	LOD	Units
Petroleum Hydrocarbons			
Chromatogram: TPH 10-40	*		

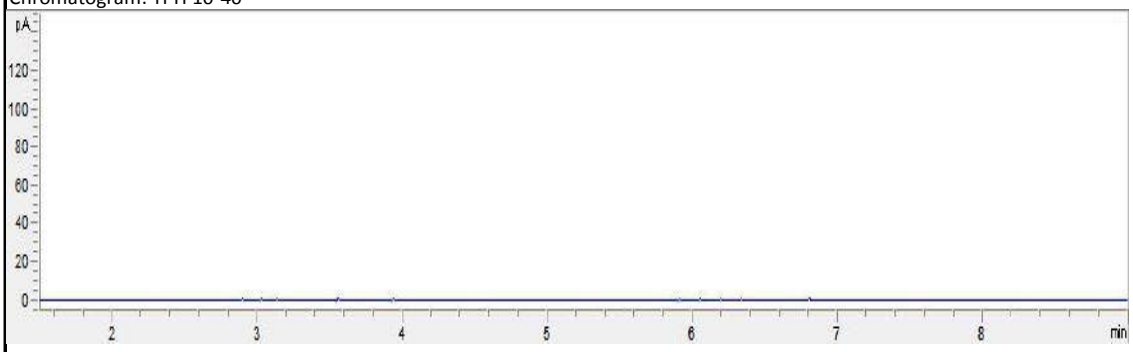


Summary of Chemical Analysis
Chromatograms

Our Ref 15-36907
Client Ref 31500/3502
Contract Title West Cambridge

Lab No	821330
Sample ID	TR9
Depth	0.5
Other ID	
Sample Type	SOIL
Sampling Date	06/01/2015
Sampling Time	

Test	Method	LOD	Units
Petroleum Hydrocarbons			
Chromatogram: TPH 10-40	*		

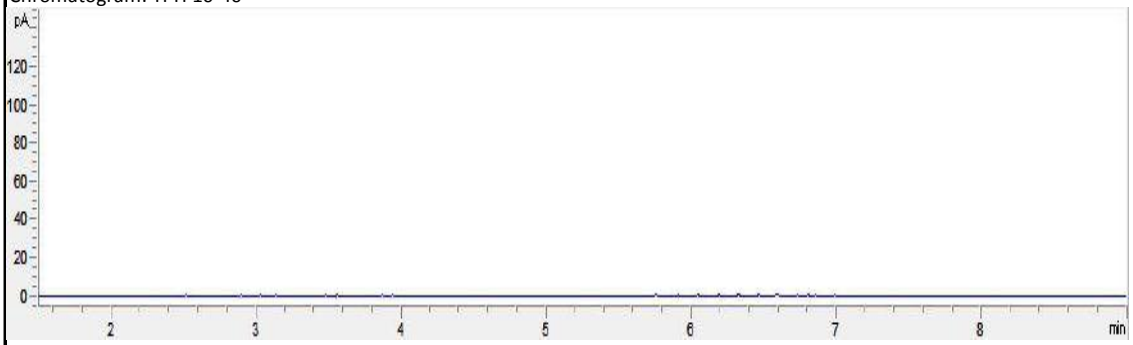


Summary of Chemical Analysis
Chromatograms

Our Ref 15-36907
Client Ref 31500/3502
Contract Title West Cambridge

Lab No	821331
Sample ID	TR8
Depth	0.6
Other ID	
Sample Type	SOIL
Sampling Date	06/01/2015
Sampling Time	

Test	Method	LOD	Units
Petroleum Hydrocarbons			
Chromatogram: TPH 10-40	*		



Information in Support of the Analytical Results

Our Ref 15-36907
Client Ref 31500/3502
Contract West Cambridge

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
821328	TR16 0.50 SOIL	01/06/15	GJ 250ml, GJ 60ml, PT 1L		
821329	TR13 0.40 SOIL	01/06/15	GJ 250ml, GJ 60ml, PT 1L		
821330	TR9 0.50 SOIL	01/06/15	GJ 250ml, GJ 60ml, PT 1L		
821331	TR8 0.60 SOIL	01/06/15	GJ 250ml, GJ 60ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number 15-36908

11-Jun-15

Client Peter Brett Associates
Caversham Bridge House
Waterman Place
Reading
Berkshire
RG1 8DN

Our Reference 15-36908

Client Reference 31500/3502

Contract Title WEST CAMBRIDGE

Description 6 Soil samples.

Date Received 04-Jun-15

Date Started 05-Jun-15

Date Completed 11-Jun-15

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. 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. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Rob Brown
Business Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 15-36908
Client Ref 31500/3502
Contract Title WEST CAMBRIDGE

			Lab No	821332	821333	821334	821335	821336	821337
				TR2			TR21	TR22	TR24
			Sample ID	WEST	TR4 EAST	TR5 MID	EAST	NORTH	NORTH
			Depth	0.50	0.20	0.50	0.30	0.40	0.50
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	20/05/15	19/05/15	19/05/15	16/05/15	18/05/15	18/05/15
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Preparation									
Stones >10mm	DETSC 1003*	1	% m/m	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Moisture Content	DETSC 1004*	0.1	%	14	19	27	22	25	14
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	24	12	6.7	12	14	8.8
Cadmium	DETSC 2301#	0.1	mg/kg	0.9	0.5	0.3	0.7	0.5	0.4
Chromium	DETSC 2301#	0.15	mg/kg	30	32	28	29	22	25
Hexavalent Chromium	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	18	26	17	32	23	14
Lead	DETSC 2301#	0.3	mg/kg	18	53	13	63	49	27
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.14	< 0.05	0.17	0.19	< 0.05
Nickel	DETSC 2301#	1	mg/kg	40	26	28	22	21	20
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	63	61	38	320	74	48
Inorganics									
Conductivity	DETSC 2009	1	uS/cm	180	360	370	320	320	220
pH	DETSC 2008#			8.0	7.8	8.2	7.7	7.9	8.0
Cyanide Total	DETSC 2130#	0.1	mg/kg	< 0.1	0.2	< 0.1	0.4	0.2	< 0.1
Organic matter	DETSC 2002#	0.1	%	1.2	3.7	0.8	4.1	3.7	1.5
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	< 10	17	15	26	25	11
Petroleum Hydrocarbons									
EPH (C10-C12)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C12-C16)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C16-C21)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C21-C28)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C28-C35)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C35-C40)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C10-C40)	DETSC 3311#	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10

Key: * -not accredited. # -MCERTS (accreditation only implied if report carries the MCERTS logo). n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 15-36908
Client Ref 31500/3502
Contract Title WEST CAMBRIDGE

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
821332	TR2 WEST 0.50	SOIL	NAD	none	Colin Patrick
821333	TR4 EAST 0.20	SOIL	NAD	none	Colin Patrick
821334	TR5 MID 0.50	SOIL	NAD	none	Colin Patrick
821335	TR21 EAST 0.30	SOIL	NAD	none	Colin Patrick
821336	TR22 NORTH 0.40	SOIL	NAD	none	Colin Patrick
821337	TR24 NORTH 0.50	SOIL	NAD	none	Colin Patrick

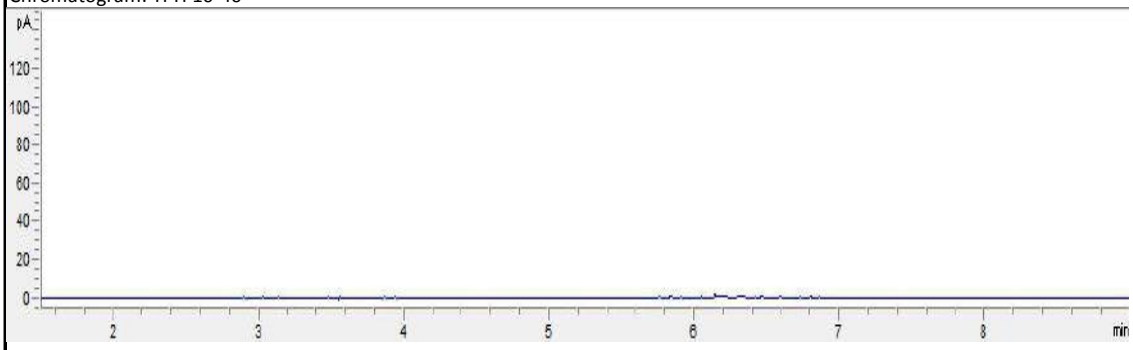
Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Summary of Chemical Analysis
Chromatograms

Our Ref 15-36908
Client Ref 31500/3502
Contract Title WEST CAMBRIDGE

Lab No	821332
Sample ID	TR2 WEST
Depth	0.5
Other ID	
Sample Type	SOIL
Sampling Date	20/05/2015
Sampling Time	

Test	Method	LOD	Units
Petroleum Hydrocarbons			
Chromatogram: TPH 10-40	*		

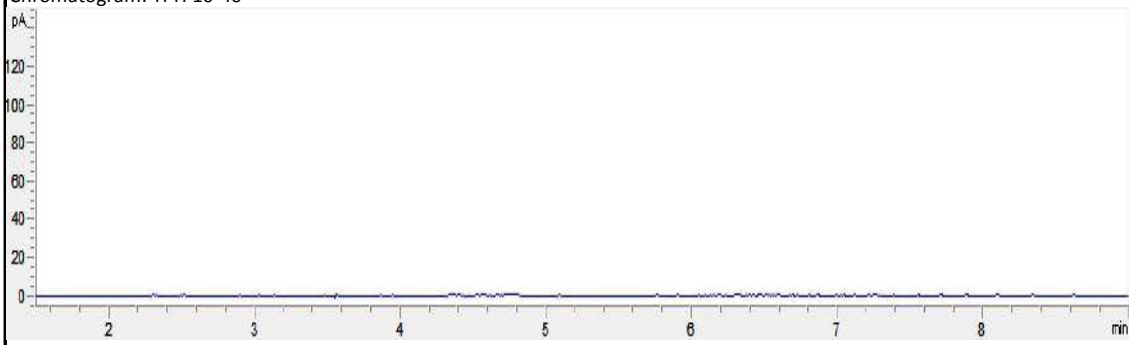


Summary of Chemical Analysis
Chromatograms

Our Ref 15-36908
Client Ref 31500/3502
Contract Title WEST CAMBRIDGE

Lab No	821333
Sample ID	TR4 EAST
Depth	0.2
Other ID	
Sample Type	SOIL
Sampling Date	19/05/2015
Sampling Time	

Test	Method	LOD	Units
Petroleum Hydrocarbons			
Chromatogram: TPH 10-40	*		

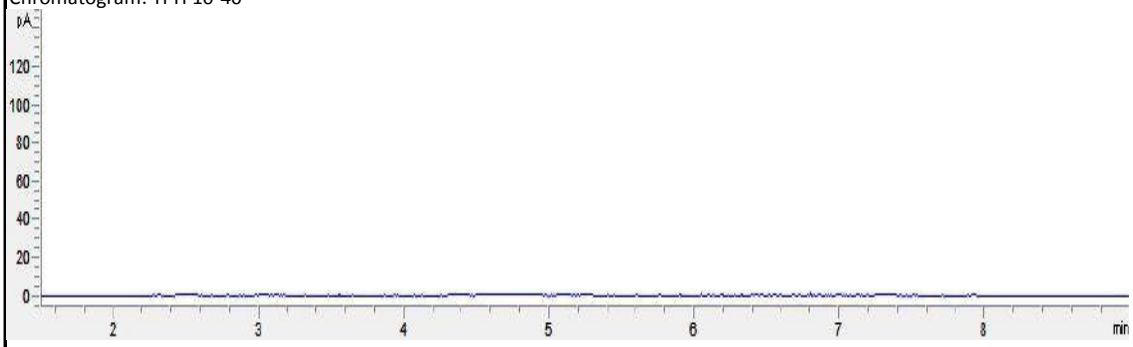


Summary of Chemical Analysis
Chromatograms

Our Ref 15-36908
Client Ref 31500/3502
Contract Title WEST CAMBRIDGE

Lab No	821334
Sample ID	TR5 MID
Depth	0.5
Other ID	
Sample Type	SOIL
Sampling Date	19/05/2015
Sampling Time	

Test	Method	LOD	Units
Petroleum Hydrocarbons			
Chromatogram: TPH 10-40	*		

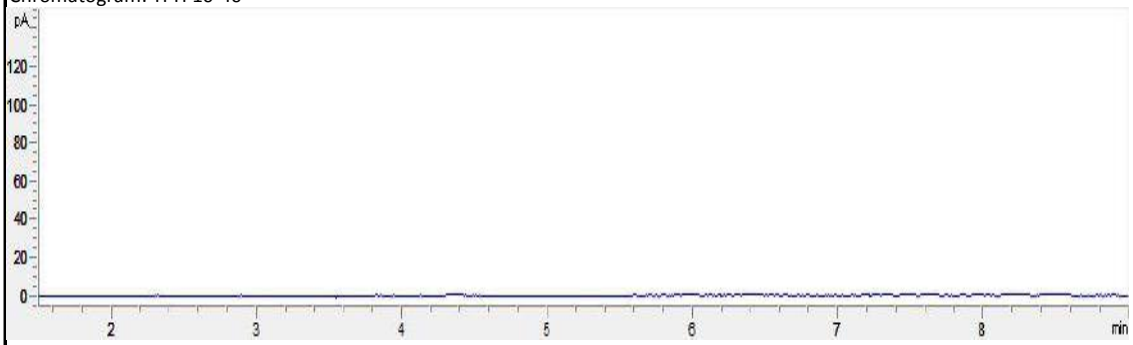


Summary of Chemical Analysis
Chromatograms

Our Ref 15-36908
Client Ref 31500/3502
Contract Title WEST CAMBRIDGE

Lab No	821335
Sample ID	TR21 EAST
Depth	0.3
Other ID	
Sample Type	SOIL
Sampling Date	16/05/2015
Sampling Time	

Test	Method	LOD	Units
Petroleum Hydrocarbons			
Chromatogram: TPH 10-40	*		

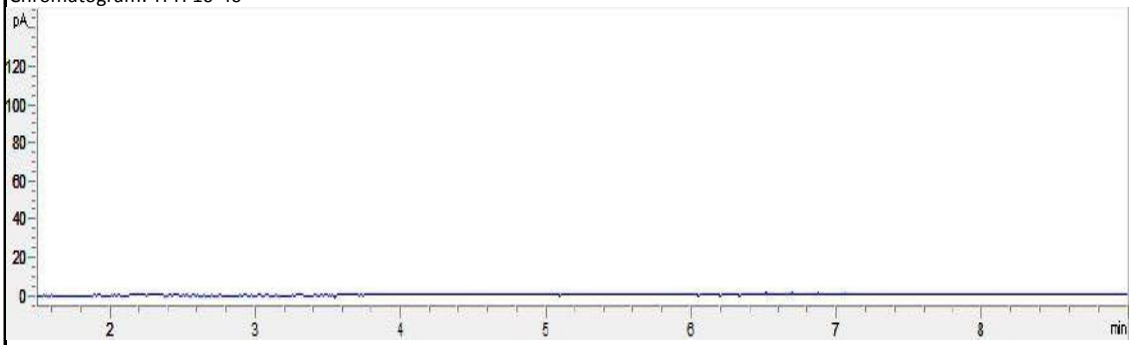


Summary of Chemical Analysis
Chromatograms

Our Ref 15-36908
Client Ref 31500/3502
Contract Title WEST CAMBRIDGE

Lab No	821336
Sample ID	TR22
Depth	0.4
Other ID	
Sample Type	SOIL
Sampling Date	18/05/2015
Sampling Time	

Test	Method	LOD	Units
Petroleum Hydrocarbons			
Chromatogram: TPH 10-40	*		

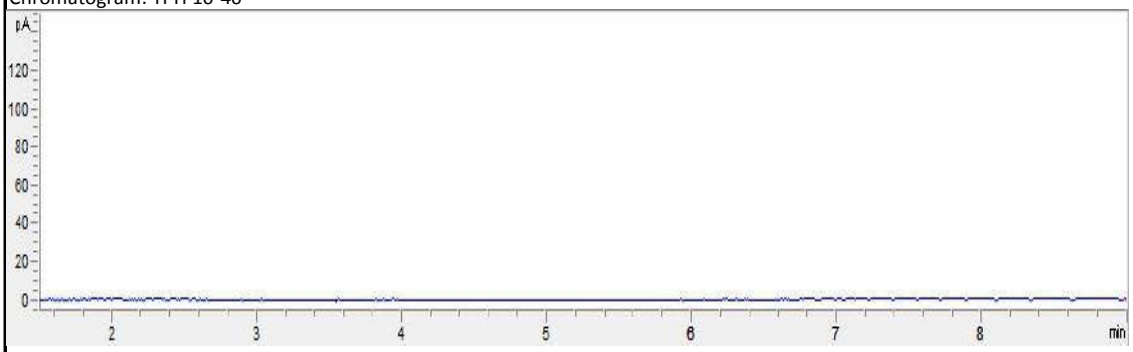


Summary of Chemical Analysis
Chromatograms

Our Ref 15-36908
Client Ref 31500/3502
Contract Title WEST CAMBRIDGE

Lab No	821337
Sample ID	TR24
Depth	0.5
Other ID	
Sample Type	SOIL
Sampling Date	18/05/2015
Sampling Time	

Test	Method	LOD	Units
Petroleum Hydrocarbons			
Chromatogram: TPH 10-40	*		



Information in Support of the Analytical Results

Our Ref 15-36908
Client Ref 31500/3502
Contract WEST CAMBRIDGE

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
821332	TR2 WEST 0.50 SOIL	20/05/15	GJ 250ml x2, GJ 60ml x2, PT 1L	Chromium (14 days), pH (7 days), EPH/TPH (14 days)	
821333	TR4 EAST 0.20 SOIL	19/05/15	GJ 250ml x2, GJ 60ml x2, PT 1L	Chromium (14 days), pH (7 days), EPH/TPH (14 days)	
821334	TR5 MID 0.50 SOIL	19/05/15	GJ 250ml x2, GJ 60ml x2, PT 1L	Chromium (14 days), pH (7 days), EPH/TPH (14 days)	
821335	TR21 EAST 0.30 SOIL	16/05/15	GJ 250ml, GJ 60ml x2, PT 1L	Chromium (14 days), pH (7 days), EPH/TPH (14 days)	
821336	TR22 NORTH 0.40 SOIL	18/05/15	GJ 250ml, GJ 60ml x2, PT 1L	Chromium (14 days), pH (7 days), EPH/TPH (14 days)	
821337	TR24 NORTH 0.50 SOIL	18/05/15	GJ 250ml, GJ 60ml x2, PT 1L	Chromium (14 days), pH (7 days), EPH/TPH (14 days)	

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

1 Introduction

The aim of this document is to present an explanation for the selection of the assessment criteria routinely used by PBA when undertaking a Tier 2 contamination risk assessment. Any deviation from the routine criteria and/or selection of criteria for parameters not covered in this document will be described in the report text.

A Tier 2 assessment is a quantitative assessment using published criteria to "screen" the site-specific contamination testing data and identify potential hazards to specific receptors. Generic criteria are typically cautious in derivation and exceedance does not indicate that a site is statutorily contaminated and/or necessarily unsuitable for use in the planning context. These criteria are used to identify situations where further assessment and/or action is required.

This document is divided into general introductory text and sections on soils, waters and soil gases.

2 General Notes

This document should be read in conjunction with another entitled "PBA Methodology for Assessment of Land Contamination" which summarises the legislative regime and our approach to ground contamination and risk assessment.

Any PBA interpretation of contamination test results is based on a scientific and engineering appraisal. The perceptions of, for example, banks, insurers, lay people etc are not taken into account.

Any tables included in this document are produced for ease of reference to the criteria, they do not in any way replace the documents of origin (which are fully referenced) and which should be read to ensure appropriate use and interpretation of the data.

Generic criteria provide an aid to decision-making, but they do not replace the need for sound professional judgement in risk assessment (EA, 2006b). The criteria are based on numerous and complex assumptions. The appropriateness of these assumptions in a site-specific context requires confirmation on a project by project basis. Our interpretative report will comment on the appropriateness of the routine criteria for project objectives or ground conditions. It is important to note that if the use of the published criteria is challenged, it may be necessary to carry out modelling to generate site-specific assessment criteria.

3 Criteria for Assessing Soil Results

3.1 Potential Harm to Human Health

The criteria routinely used by PBA as Tier 2 soil screening values for the protection of human health are:-

- Soil Guidance Values (SGVs) published in 2009 using CLEAv1.06,
- Category 4 Screening Levels (C4SLs) published in 2014 which adopt a "low level of toxicological concern" (LLTC) as the toxicological benchmark
- Suitable 4 Use Levels (S4ULs) published in 2015 which adopt a minimal or torable risk as described in SR2 (EA 2009c).

The criteria have been generated using the Contaminated Land Exposure Assessment model (CLEA) and supporting technical guidance (EA, 2009a, 2009b, 2009c). The CLEA model uses generic assumptions about the fate and transport of chemicals in the environment and a generic conceptual model for site conditions and human behaviour to estimate child and adult exposures to soil contaminants for those potentially living, working, and/or playing on contaminated sites over long time periods (EA, 2009b).

The CLEA software 2009 has changed significantly since 2005 and is now a deterministic model. The CLEA model has been updated to incorporate the changes to exposure assessments. The software was amended to version 1.06 to fix some bugs. The handbook referring to version 1.05 is still valid as the functionality has not changed between version 1.05 and 1.06. The software has not been updated to incorporate Defra's revised Statutory Guidance (SG) (CL:AIRE 2013).

The CLEA model uses ten exposure pathways (Ingestion (outdoor soil, indoor dust, homegrown vegetables and soil attached to homegrown vegetables), Dermal Contact (outdoor soil and indoor dust) and Inhalation (outdoor dust, indoor dust, outdoor vapours and indoor vapours)). There are exposure pathways not included in the CLEA model such as the permeation of organics into plastic water supply pipes.

The presence and/or significance of each of the potential exposure pathways is dependant on the land use being considered. The model uses standard land use scenarios as follows:-

Residential – habitation of a dwelling up to two storeys high with various default material and design parameters, access to either private or nearby community open space with soil track back to form indoor dust. Assumes ingestion of homegrown produce.

Allotments – the model has default parameters

for use and consumption of vegetables but not animals or their products (eggs).

Industrial/commercial – assumes office or light physical work in a permanent three storey structure with breaks taken outside and that the site is NOT covered in hardstanding.

Recent guidance (Defra 2012) introduces a four stage classification system where Category 1 sites are obviously contaminated and Category 4 sites uncontaminated as defined by EPA 1990. Outside of these categories further specific risk assessment is required to determine if the site should fall into Category 2 contaminated or category 3 uncontaminated. Category 4 screening values are considered to be more pragmatic than the current published SGV/GAC criteria but still strongly precautionary with the aim of allowing rapid identification of sites where the risk is above minimal but still low/acceptable (within the context of Part 2A).

At the end of 2013 technical guidance in support of Defra's revised Statutory Guidance (SG) was published (CL:AIRE 2013) which provided:

• A methodology for deriving C4SLs for the standard land-uses and two new public open space scenarios using the updated assumptions relating to the modelling of human exposure to soil contaminants; and

• A demonstration of the methodology, via the derivation of C4SLs for six substances – arsenic, benzene, benzo(a)pyrene, cadmium, chromium (VI) and lead.

Following issue of an Erratum in December 2014 a Policy Companion Document was published (Defra 2014B).

Soil Guideline Values (SGVs)

The first series of SGVs were generated using a probabilistic version of the CLEA model. However, on 22 July 2008 DEFRA announced the withdrawal of these SGVs and revised SGVs were calculated for all substances except lead using a deterministic version of the CLEA model (v1.05). Table 1 presents the SGVs which have not been withdrawn but it should be noted that they were developed using assumptions for body weight and inhalation rates that have been revised since publication.

Category 4 Screening Levels (C4SLs)

Table 6 summarises the C4SL (DEFRA 2014B) for each of the six substances. PBA will use the criteria for lead and may use the other criterion, depending on site specific conditions.

GAC's & Suitable 4 Use Levels (S4ULs)

In July 2009, Generic Assessment Criteria (GACs) for 82 substances were published by the Chartered Institute of Environmental Health (CIEH) (LQM and CIEH, 2009) using the then current version of the CLEA software v1.04 and replacing those generated in 2006 using the original version of the model CLEA UK *beta*. In 2015 S4ULs were published by LQM/CIEH to replace the second edition GACs. Table 7 summarises the S4ULs.

Note on Mercury, Chromium and Arsenic Assessment The analytical testing routinely undertaken by PBA determines total concentration, however, the toxicity depends on the form of the contaminant.

If a source of Mercury, Chromium or Arsenic is identified or the total concentration exceeds the relevant worst case speciated criteria it will be desirable/necessary to undertake additional speciated testing and further assessment.

Note on Asbestos

Asbestos in soil and made ground is currently under review by a number of bodies. There are no current published guidance values for asbestos in soil other than the waste classification values given in the EA's Technical Guidance WM2, Hazardous Waste – Interpretation of the definition and classification of hazard waste (3d Edition, 2013). This guidance is only appropriate for soils that are being discarded as waste.

Testing for asbestos will be carried out on selected samples of made ground encountered during investigation, initially samples will be subjected to an asbestos screen and, if asbestos is found to be present, subjected to quantification. The reader is directed to the report text for guidance on the approach adopted in respect to any asbestos found to be present. Further guidance is also available in the 2014 CIRIA publication C733, Asbestos in soil and made ground: a guide to understanding and managing risks.

Note on the use of C4SLs

A letter from Lord de Mauley dated 3rd September 2014 provides more explicit direction to local authorities on the use of the C4SL in a planning context. The letter identifies four key points:

1) that the screening values were developed expressly with the planning regime in mind

2) their use is recommended in DCLG's planning guidance

3) soil concentrations below a C4SL limit are considered to be 'definitely not contaminated' under Part IIA of the 1990 Environmental Protection Act and pose at most a 'low level of toxicological concern' and

4) exceedance of a C4SL screening value does not mean that land is definitely contaminated, just that further investigation and assessment may be warranted.

3.2 Potential Harm to the Built Environment

Land contamination can pose risks to buildings,

building materials and services (BBM&S) in a number of ways. Volatile contaminants and gases can accumulate and cause explosion or fire. Foundations and buried services can be damaged by corrosive substances and contaminants such as steel slags can create unstable ground conditions through expansion causing structural damage. PBA use the following primary guidance to assess the significance of soil chemistry with respect to its potential to harm the built environment.

i) Approved Document C - Site Preparation and Resistance to Contaminants and Moisture. (DCLG 2010);

ii) Concrete in aggressive ground SD1 (BRE 2005);

iii) Guidance for the selection of water supply pipes to be used in brownfield sites (UKWIR 2011);

iv) Protocols published by agreement between Water UK and the Home Builders Federation providing supplementary guidance which includes the Risk Assessment for Water Pipes (the 'RA') (Water UK 2014).

v) Performance of Building Materials in Contaminated Land report BR255 (BRE 1994).

vi) Risks of Contaminated Land to Buildings, Building Materials and Services. A Literature Review - Technical Report P331 (EA 2000).

vii) Guidance on assessing and managing risks to buildings from land contamination - Technical Report P5 035/TR/01 (EA 2001).

3.3 Potential to Harm Ecosystems, Animals, Crops etc

The criteria routinely used by PBA as Tier 2 screening values to assess the potential of soil chemistry to harm ecosystems are taken from the following guidance and summarised in are given in Table 2.

i) Ecological Risk Assessment (ERA) Science Report Series SC070009, published by the Environment Agency, Bristol (EA, 2008);

ii) The Restoration and Aftercare of Metalliferous Mining Sites for Pasture and Grazing (ICRCL 70/90, 1990); and

iii) Code of Practice for Agricultural Use of Sewage Sludge 2nd Edition (DOE, 2006).

iv) BS 3882:2007 Specification for topsoil and requirements for use. Unless stated in the report the assessment is solely for phytotoxic parameters and additional assessment is required to determine suitability as a growing medium.

4 Criteria for Assessing Liquid Results

4.1 Potential Harm to Human Health

The criteria routinely used by PBA as Tier 2 water screening values (Table 3) are taken from the Water Supply (Water Quality) Regulations (Defra 2010). It should be noted that some of the prescribed concentrations listed in the Water Supply Regulations have been set for reasons other than their potential to cause harm to human health. The concentrations of iron and manganese are controlled because they may taint potable water with an undesirable taste, odour or colour or may potentially deposit precipitates in water supply pipes.

4.2 Potential to Harm Controlled Waters

Controlled Waters are rivers, estuaries, coastal waters, lakes and groundwaters. Water in the unsaturated zone is not groundwater but does come within the scope of the term "ground waters" as used and defined in the Water Resources Act 1991. It will continue to be a technical decision for the Environment Agency to determine what is groundwater in certain circumstances for the purposes of the Regulations. The approach adopted by PBA considers the objectives of the Water Framework Diredctive (WFD) and the Groundwater Daughter Directive (GWDD) (refer to PBA Methodology).

When assessing ground condition data the aim is to identify whether there could be an environmentally significant input to groundwater. An environmentally insignificant input into groundwater would be one that could not have any effect on (i) any of the receptors noted in the Water Framework/GWDD definition of pollution (ii) the chemical status of a groundwater body; or (iii) could give rise to a significant and sustained rising trend in the concentrations of pollutants in groundwater as noted in those directives. PBA uses the approach presented in Groundwater Protection Policy and Practice (GP3) (EA 2013). The criteria routinely used by PBA as Tier 2 screening values (Tables 3, 4 and 5) are taken from directions to the Environment Agency (EA 2010). Reference is also made to Directive 2013/39/EU (12 August 2013) amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy. While the Directive has yet to be transposed, it is intended that the standards it sets will apply for the purposes of the second cycle of river basin plans.

The 2014 Water Framework Directive implementation in England and Wales: new and updated standards to protect the water environment - Directions to the Environment Agency relating to the Groundwater Directive

(Directive 2006/118/EC) informs interested parties of the new and updated environmental standards to be used in the second cycle of Water Framework Directive (2000/60/EC) river basin management planning process in England and Wales. It also presents new and updated assessment criteria for biological elements that must be monitored to assess the ecological status of surface water bodies. The relevant Directions to the Environment Agency and Natural Resources Wales (referred to hereafter as the Agencies) will be updated to give legal effect to the standards (currently not updated).

5 Criteria for Assessing Gas Results

PBA use the following primary guidance on gas monitoring methods and strategy, the assessment of risk posed by soil gases (including Volatile Organic Compounds (VOCs)) and mitigation measures/risk reduction during site development.

i) BS 8576:2013 – Guidance on Ground Gas Investigations: Permanent gases and Volatile Organic Compounds (VOCs). (BSI 2013)

ii) A pragmatic approach to Ground Gas Risk Assessment. CL:AIRE Research Bulletin RB17 (Card 2012)

iii) The VOCs Handbook. C682 (CIRIA 2009).

iv) Assessing risks posed by hazardous gases to buildings C665 (CIRIA 2007);

v) Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present. (NHBC 2007); and

vi) Code of practice for the characterization and remediation from ground gas in affected developments BS 8485 (BSI 2007)

Gas and borehole flow data are used to obtain the gas screening value (GSV) for methane and carbon dioxide. The GSV is used to establish the characteristic situation and to make recommendations for gas protection measures for buildings if required.

Radon

PBA use the following primary guidance to assess the significance of the radon content of soil gas.

i) Radon: guidance on protective measures for new dwellings. Report BR211 (BRE, 2007); and

ii) Radon Atlas of England, R290 (NRPB, 1996).

6 References

BRE (2005) Concrete in aggressive ground. Special Digest 1, Building Research Establishment, Garston, Herts.

BRE (2007) Radon: guidance on protective measures for new dwellings. Report BR211, Building Research Establishment, Garston, Herts.

BSI (2007) BS 8485:2007 Code of practice for the characterization and remediation from ground gas in affected developments. British Standards Institute, London.

BSI (2011) BS10175:2011 +A1:2013 Investigation of contaminated sites – code of practice. British Standards Institute, London.

BSI (2013) BS 8576:2013 – Guidance on Ground Gas Investigations : Permanent gases and Volatile Organic Compounds (VOCs). British Standards Institute, London.

Card G, Wilson S, Mortimer S. (2012). A Pragmatic Approach to Ground Gas Risk Assessment. CL:AIRE Research Bulletin RB17. CL:AIRE, London, UK. ISSN 2047-6450 (Online)

CIRIA (2007) Assessing risks posed by hazardous gases to buildings. C665, Construction Industry Research and Information Association, London.

CL:AIRE (2010) Soil Generic Assessment Criteria for Human Health Risk Assessment. Published in January 2010 by Contaminated Land: Applications in Real Environments, London. ISBN 978-1-905046-20-1.

CL:AIRE (2013) SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination. Final Project Report published by Contaminated Land: Applications in Real Environments (CL:AIRE) 20th December 2013

CLAN2-05 Contaminated land advice note 02 from September 2005. Department for the Environment, Food and Rural Affairs, London.

CLSD (2009) Contaminated-Land-Strategies Digest - 30 Apr 2009 to 1 May 2009 - Special issue (#2009-89). Posting titled: “JISCmail GACs for SGV substances: April 2009 and subsequent postings”.

DCLG (2013) Approved Document C - Site preparation and resistance to contaminates and moisture (2004 Edition incorporating 2010 and 2013 amendments).

Defra (2010) The Water Supply (Water Quality) Regulations, 2010. Statutory Instrument 2010 No 944, Department of the Environment, Transport and the Regions, London.

Defra (2012) Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance.

Defra (2014) Water Framework Directive implementation in England and Wales: new and updated standards to protect the water environment

Defra (2014B) SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document. Department for Environment, Food and Rural Affairs December 2014

DoE (2006) Code of Practice for Agricultural Use of Sewage Sludge. Department of the Environment, London.

EA (2004) Guidance on Assessment of Risks from Landfill Sites. Environment Agency, Bristol.

EA (2006b) CLEA update No. 4. Environment Agency, Bristol.

EA (2008) Ecological Risk Assessment (ERA). Science Report Series SC070009, Environment Agency, Bristol.

EA (2009a) Using Soil Guideline Values. Science Report SC050021/SGV Introduction. Environment Agency, Bristol.

EA (2009b) Updated Technical Background to the CLEA model. Science Report SC050021/SR3 Introduction. Environment Agency, Bristol.

EA (2009c) Human health toxicological assessment of contaminants in soil. Science Report SC050021/SR2. Environment Agency, Bristol.

EA (2009d) Compilation data for priority organic contaminants for derivation of soil guideline values Science Report SC50021/SR7

EA (2009e) CLEA Software (Version 1.05) Handbook Science Report SC050021/SR4

EA (2010) River Basin DistrictsTypology, Standards and Groundwater Threshold Values (Water Framework Directive) England and Wales) Directions 2010.

EA (2013) Groundwater Protection Policy and Practice (GP3) August 2013 Version 1.1

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Water UK 2014 Contaminated Land Assessment Guidance

Table 1: Tier 2 Criteria for the Assessment of Potential Contaminant Concentrations in Soil – Protection of Human Health Published Soil Guideline Value (2009) with SOM of 6%

Determinand	Allotments	Residential with plant uptake	Commercial/ Industrial
Arsenic (Inorganic)	43	32	640
Cadmium	1.8	10	230
Mercury (elemental)	1	26	26
Mercury (inorganic)	80	170	3600
Methyl Mercury	8	11	410
Nickel	230	130	1800
Selenium	120	350	13000
Benzene	0.07	0.33	95
Toluene	120	610	4400
Ethylbenzene	90	350	2800
Xylenes #	160	230	2600
Phenol	280	420	3200
Dioxins, Furans and dioxin-like PCBs *	0.008	0.008	0.24

Units mg/kg
from the three isomers the most conservative criterion has been selected for each scenario
* these SGVs are now recognised to have limitations and should be used with caution

Table 2 Tier 2 Criteria for the Assessment of Potential Contaminant Concentrations in Soil – Protection of Ecological Systems

Parameter	ICRCL 70/90 [a]		Proposed SSVs [b]	Code of Practice for Agricultural Use of Sewage Sludge [c]	BS 3882:2007 Specification for topsoil and requirements for use
	Maximum				Phytotoxic contaminants
	Livestock mg/kg	Crop Growth mg/kg	mg/kg	mg/kg	mg/kgDS
Benzo(a)pyrene			0.15		
Arsenic	500	1000		50	
Cadmium	30	50	1.15	3	
Chromium			21.1	400	
Copper	500	250	88.4	80/ 100/ 135/ 200 [e]	<100/<135/<200 [f]
Fluoride	1000			500	
Lead	1000		167.9	300	
Mercury			0.06	1	
Molybdenum				4	
Nickel			25.1	50/ 60/ 75/ 110 [e]	<60/<75/<110 [f]
Pentachlorobenzene			0.029		
Pentachlorophenol			0.6		
Selenium				3	
Tetrachloroethene			0.01		
Toluene			0.3		
Zinc	3000	1000	90.1	200/200/200/300 [e]	<200/<200/<300 [f]

a. Interdepartmental Committee on the Redevelopment of Contaminated Land (ICRCL) 70/90 Restoration and Aftercare of Metalliferous Mining Sites for Pasture and Grazing 1st edition 1990.
b. Proposed Soil Screening Values (SSVs) – Consultation, Environment Agency 2008. Threshold which if exceeded prompts further assessment.
c. Maximum permissible concentration of potentially toxic elements from the Code of Practice for Agricultural Use of Sewage Sludge. Second Edition. DOE 2006.
d. Concentrations are for contamination derived from mine spoil. In other situations the speciation may be more available. Factors include total concentration, speciation, particle size, pH, species of plant, type of animal/grazing habit.
e. Where four values are presented, concentrations are for soils with pH values 5.0-5.5/ 5.5-6.0/ 6.0-7.0/ >7.0
f. Where three values are presented, concentrations are for soils with pH values <6.0/ 6.0-7.0/ >7.0

Table 3: Tier 2 Criteria for Screening Selected Contaminants in Groundwater

Parameter	Protection of Human Health	Protection of Controlled Waters			
	Water Supply (Water Quality) Regulations 2000	Test 2 Minimum	Test 2 Maximum	Test 4	Test 5
Metal/Semi Metal:					
Antimony (µg/l)	5				
Arsenic (µg/l)	10	51.6	199	7.5	
Boron (µg/l)	1000			750	
Cadmium (µg/l)	5	0.2	1.1	3.75	
Chromium (µg/l)	50	5	27.6	37.5	
Copper (µg/l)	2000	10.1	57.8	1500	
Iron (µg/l)	200				
Lead (µg/l)	25 (10 from 25/12/13)	7.3	39.8	18.8	
Manganese (µg/l)	50				
Mercury (µg/l)	1			0.75	
Nickel (µg/l)	20	20.2	116	15	
Selenium (µg/l)	10				
Zinc (µg/l)	-	75.8	414	3750	
Other:					
Ammonium NH4 (mg/l)	0.5				
Ammonia NH3 (mg/l)	-	0.3	1.73	0.29	0.29
Chloride (mg/l)	250			188	187.5
Cyanide (ug/l)	50				
Electrical Conductivity (µS/cm)	2500			1880	
pH (pH units)	6.5 to 10				
Nitrate NO3 (mg/l)	50			42	42
Sulphate (mg/l)	250			188	188
Organics:					
Anthracene		0.1	0.55		
Benzene (µg/l)	1	10.1	55.2	0.75	0.75
Benzo(a)pyrene (µg/l)	0.01			0.075	
Chloroform (µg/l)	100 a	2.53	13.8	75	75
1.2-Dichloroethane (µg/l)	3			2.25	2.25
Fluoranthene		0.1	0.6		
Naphthalene (µg/l)	-	2.4	13.2		
Phenol Total (mg/l)	0.5	15.2	82.8		
PAHs (µg/l)	0.1 b				
Pesticides (ug/l)	0.03c				
Toluene (µg/l)	-	50.5	276		
Trichloroethene TCE (µg/l)	10 d	10.1	55.2	7.5	7.5
Tetrachloroethene PCE (µg/l)	10 d	10.1	57.8	7.5	7.5
Tetrachoromethane (ug/l)	3				
Vinyl Chloride (µg/l)	0.5				
Xylene (µg/l)	-	30.3	166		

Notes

TV Threshold Values for each groundwater body are given in the River Basin Management Plans (RBMP)

Test 2 Groundwater Impacts on Surface Water – Minimum is the lowest TV for any RBMP

Test 4 Groundwater Drinking Water Protected Areas – designed to be equivalent to a 95% standard

Test 5 General Quality of Groundwater Body – designed to be equivalent to a 95% standard

a. Sum for Tri-halomethanes – chloroform, bromoform, dibromochloromethane, bromodichloromethane

b. Concentration for sum of benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene, indeno(1,2,3-cd)pyrene

c. Sum for Aldrin, Dieldrin, Heptachor and Heptachor epoxide

d. Sum of TCE and PCE

Table 4a : Specific Pollutants – Currently Inforce

Pollutant	Rivers and Freshwater Lakes	Transitional and Coastal Waters
2,4-Dichlorophenoxyacetic acid (2,4-D)	0.3 (1.3)*	0.3 (1.3)*
2,4-Dichlorophenol	20	20
Ammonia (Un-ionised) as Nitrogen	Not applicable	21
Arsenic #	50	25
Chlorine (total available)	2 (5)*	(10)*
Chromium VI	3.4	0.6 (32)*
Chromium III	4.7	(32)*
Copper – standard is hardness dependant for freshwater	1/ 6 /10/ 28	5
Cyanide	1 (5)*	1 (5)*
Cypermethrin as ng/l	0.1 (0.4)*	0.1 (0.4)*
Diazinon	0.01 (0.02)*	0.01 (0.1)*
Dimethoate	0.48 (4)*	0.48 (4)*
Iron as mg/l	1	1
Linuron	0.5 (0.9)*	0.5 (0.9)*
Mecoprop	18 (187)*	18 (187)*
Permethrin	(0.01)	(0.01)
Phenol	7.7 (46)*	7.7 (46)*
Toluene	50 (380)*	40 (370)*
Zinc – standard is hardness dependant for freshwater	8/ 50/ 75/ 125	40

i. All units ug/l unless otherwise stated.
ii. The standard is the annual mean standard over a period of 12 consecutive months unless otherwise stated.
iii. Values in brackets ( ) indicates the 95-percentile standard where the standard is exceeded if the measured concentration is above the standard for 5% or more of the time.
iv. Values marked * indicate that the standard is not to be used for the purpose of classifying the ecological status or potential of bodies of surface water.
v. # indicates that the standard is the dissolved fraction obtained by filtration through a 0.45um filter.
vi. Where four values are presented, concentrations are for soils with $CaCO_3$ concentration <50/50-100/100-250/>250 mg/l

Reproduced from Part 4 of The River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Direction 2010.

Table 4b Proposed Standards for 29 specific pollutants

Substances	All Concentrations in ug/l				Standard Existing-E Revised-R New-N
	Fresh water		Salt water		
	Long-term (Mean)	Short- term (95 percentile)	Long-term (Mean)	Short- term (95 percentile)	
Unionised ammonia	---	---	21	---	E
Arsenic	50	---	25	---	E
Benzyl butyl phthalate	7.5	51	0.75	10	N
Carbendazim	0.15	0.7	---	---	N
Chlorothalonil	0.035	1.2	---	---	N
Chromium(III)	4.7	32	---	---	E
Chromium(VI)	3.4	---	0.6	32	E
Chlorine	2	5	---	10	E
Copper bioavailable	1		3.76 dissolved, where DOC ≤1mg/l 3.76 + (2.677 x ((DOC/2)–0.5)) dissolved, where DOC >1mg/l		R
Cyanide	1	5	1	5	E
Cypermethrin[1]	0.1	0.4	0.1	0.4	E
Diazinon	0.01	0.02	0.01	0.26	R/E
2,4- dichlorophenol	4.2	140	0.42	6	R
2,4- dichlorophenoxyacetic acid	0.3	1.3	0.3	1.3	E
3,4- dichloroaniline	0.2	5.4	0.2	5.4	N
Dimethoate	0.48	4.0	0.48	4.0	E
Glyphosate	196	398	196	398	N
Iron	1	---	1	---	E
Linuron	0.5	0.9	0.5	0.9	E
Manganese bioavailable	123	---	---	---	N
Mecoprop	18	187	18	187	E
Methiocarb	0.01	0.77	---	---	N
Pendimethalin	0.3	0.58	---	---	N
Permethrin	0.001	0.01	0.0002	0.001	R
Phenol	7.7	46	7.7	46	E
Tetrachloroethane	140	1848	---	---	N
Triclosan	0.1	0.28	0.1	0.28	N
Toluene	74	380	74	370	R/E
Zinc bioavailable	10.9 plus Ambient Background Concentration (µg/l)		6.8 dissolved plus Ambient Background Concentration (µg/l)		R

[1] Note that cypermethrin becomes a Priority Substance under 2013/39/EU but there will be a transitional period before the PS standards apply.

Table 5: Surface Waters - Priority Substances – Standards for Chemical Status

Pollutant	Annual Average		Maximum Allowable Concentration	
	Inland	Other	Inland	Other
Alachlor	0.3	0.3	0.7	0.7
Anthracene	1.0 (0.1)	1.0 (0.1)	0.1	0.1
Atrazine	0.6	0.6	2.0	2.0
Benzene	10	8	50	50
Brominated diphenylether	0.0005 (NA)	0.0005 (NA)	0.14	0.014
Cadmium (and its compounds) # – hardness dependant	<0.08/ 0.08/ 0.09/ 0.15/ 0.25	0.2	<0.45/ 0.45/ 0.6/ 0.9 / 1.5	<0.45/ 0.45/ 0.6/ 0.9/ 1.5
Carbon tetrachloride	12	12	NA	NA
C10-13 Chloroalkanes	0.4	0.4	1.4	1.4
Chlorfenvinphos	0.1	0.1	0.3	0.3
Chlorpyrifos	0.03	0.03	0.1	0.1
Aldrin, Dieldin, Endrin, Isodrin (Sum)	0.01	0.005	NA	NA
DDT Total	0.025	0.25	NA	NA
Para-para-DDT	0.01	0.01	NA	NA
1,2-Dichloroethane	10	10	NA	NA
Dichloromethane	20	20	NA	NA
Di(2-ethylhexyl)-phthalate (DEHP)	1.3	1.3	NA	NA
Diuron	0.2	0.2	1.8	1.8
Endosulfan	0.005	0.0005	0.01	0.004
Fluoranthene	0.1 (0.0063)	0.1 (0.0063)	0.12	0.12
Hexachlorobenzene	0.01 (NA)	0.01 (NA)	0.05	0.05
Hexachlorobutadiene	0.1 (NA)	0.1 (NA)	0.6	0.6
Hexachlorocyclohexane	0.02	0.002	0.04	0.02
Isoproturon	0.3	0.3	1	1
Lead (and its compounds) #	7.2 (1.2)	7.2 (1.3)	14	14
Mercury (and its compounds) #	0.05 (NA)	0.05 (NA)	0.07	0.07
Naphthalene	2.4 (2.0)	1.2 (2.0)	130	130
Nickel (and its compounds) #	20 (4)	20 (8.6)	34	34
Nonylphenol	0.3	0.3	2	2
Octylphenol	0.1	0.01	NA	NA
Pentachlorobenzene	0.007	0.0007	NA	NA
Pentachlorophenol	0.4	0.4	1	1
Benzo(a)pyrene (v)	0.05 (0.00017)	0.05 (0.00017)	0.27	0.027
Benzo(b)fluoranthene (v)	0.03 (NA)	0.03 (NA)	NA	NA
Benzo(k)fluoranthene (v)	0.03 (NA)	0.03 (NA)	0.017	0.017
Benzo(ghi)perylene (v)	0.002 (NA)	0.002 (NA)	0.017	0.017
Indeno(1,2,3-cd)pyrene (v)	0.002 (NA)	0.002 (NA)	0.017	0.017
Simazine	1	1	4	4
Tetrachloroethylene	10	10	NA	NA
Trichloroethylene	10	10	NA	NA
Tributyl tin compounds	0.0002	0.0002	0.0015	0.0015
Trichlorobenzenes	0.4	0.4	NA	NA
Trichloromethane	2.5	2.5	NA	NA
Tifluralin	0.03	0.03	NA	NA
Dicofol	0.0013	0.000032	NA	NA
PFOS (9.1)	0.00065	0.00013	36	7.2
Quinoxyfen	0.15	0.015	2.7	0.54
Dioxins and like compounds			NA	NA

Pollutant	Annual Average		Maximum Allowable Concentration	
	Inland	Other	Inland	Other
Aclonifen	0.12	0.012	0.12	0.012
Bifenox	0.012	0.0012	0.04	0.004
Cybutryne	0.0025	0.0025	0.016	0.016
Cypermethrin	0.00008	0.000008	0.0006	0.00006
Dichlorvos	0.0006	0.00006	0.0007	0.00007
HBCDD	0.0016	0.0008	0.5	0.05
Heptachlor and heptachlor epoxide	$2x10^{-7}$	$1x10^{-8}$	$3x10^{-4}$	$3x10^{-5}$
Terbutryn	0.065	0.0065	0.34	0.034

i. Units ug/l
ii. The EQS are expressed as total concentrations in the whole water sample except for #.
iii. # indicates that the EQS is dissolved concentration obtained by filtration through 0.45um filter.
iv. Inland = surface waters encompassing rivers and lakes and related artificial or heavily modified water bodies.
v. Hardness Classifications; Where five values are presented, concentrations are for soils with CaCO3 concentration <40/ 40-50/ 50-100/ 100-200/>200 mg/l
vi. For the group of priority substances of polycyclic aromatic hydrocarbons (PAHs) benzo(a)pyrene can be considered a marker for the other PAHs and therefore only this substance need be monitored

New or revised substance in Directive 2013/39/EU BUT currently without revised Direction – the additions and revisions are considered as proposed. The proposed revised concentration is presented in brackets

Reproduced from Part 5 of The River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Direction 2010 and Directive 2013/39/EU

Table 6: Category 4 Screening Levels (C4SL) – Table taken from SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document (Department for Environment, Food and Rural Affairs December 2014)

	Residential (with home-grown produce)	Residential (without home-grown produce)	Allotments	Commercial	Public Open Space 1	Public Open Space 2
Arsenic	37	40	49	640	79	170
Benzene	0.87	3.3	0.18	98	140	230
Benzo(a)pyrene	5.0	5.3	5.7	77	10	21
Cadmium	22	150	3.9	410	220	880
Chromium VI	21	21	170	49	21	250
Lead	200	310	80	2300	630	1300

All in mg/kg
Public Open Space 1 – for grassed area adjacent to residential housing
Public Open Space 2 - Park Type Public Open Space Scenario

Table 7: Suitable 4 Use Levels (S4UL) - units are mg/kg Dry Weight

Determinand	Allotment	$R_{\underline{W}}HP$	$R_{\underline{WO}}HP$	Commercial/ Industrial	POSresi	POSpark
Metals						
Arsenic (**Inorganic**)[a, b, c]	43	37	40	640	79	170
Beryllium [a, b, d, e]	35	1.7	1.7	12	2.2	63
Boron [a, b, d]	45	290	11000	240000	21000	46000
Cadmium (**pH6-8**) [a, b, d, f]	1.9	11	85	190	120	532
Chromium (trivalent) [a, b, d, g]	18000	910	910	8600	1500	33000
Chromium (hexavalent) [a, b, c]	1.8[h]	6[i]	6[i]	33[i]	7.7[i]	220[i]
Copper [a, b, c]	520	2400	7100	68000	12000	44000
Mercury (elemental) [a, b, c, j]	21	1.2	1.2	58[vap] (25.8)	16	30[vap] (25.8)
Mercury (inorganic) [a, b, c]	19	40	56	1100	120	240
Methylmercury [a, b, c]	6	11	15	320	40	68
Nickel [a, b, c]	230[k]	180[e]	180[e]	980[e]	230[e]	3400[k]
Selenium [a, b, c]	88	250	430	12000	1100	1800
Vanadium [a, b, c, i, j]	91	410	1200	9000	2000	5000
Zinc [a, b, c]	620	3700	40000	730000	81000	170000
BTEX Compounds (SOM 1%/ 2.5%/ 6%)						
Benzene [a, b, l, m]	0.017/0.034/ 0.075	0.087/0.17/ 0.37	0.38/0.7/1.4	27 / 47 / 90	72 / 72 / 73	90 / 100 / 110
Toluene [a, b, l, m]	22 / 51 / 120	130 / 290 / 660	800[vap] (869) /1900/3900	56000[vap] (869) / 110000[vap] 1920)/ 180000[vap] (4360)	56000 / 56000 / 56000	87000[vap](869)/ 95000[vap](1920)/ 100000[vap](4360)
Ethylbenzene [a, b, l, m]	16 / 39 / 91	47 / 110 / 260	83 / 190 / 440	5700[vap] (518) / 13000[vap] (1220) / 27000[vap] (2840)	24000 / 24000 / 25000	17000[vap] (518) / 22000[vap](1220) / 27000[vap] (2840)
O – Xylene [a, b, l, m, n]	28 / 67 / 160	60 / 140 / 330	88 / 210 / 480	6600[sol] (478) / 15000[sol] (1120) / 33000[sol] (2620)	41000 / 42000 / 43000	17000[sol] (478) / 24000[sol] (1120) / 33000[sol] (2620)
M – Xylene [a, b, l, m, n]	31 / 74 / 170	59 / 140 / 320	82 / 190 / 450	6200[vap] (625) / 14000[vap] (1470) / 31000[vap] (3460)	41000 / 42000 / 43000	17000[vap] (625) / 24000[vap](1470) / 32000[vap] (3460)
P – Xylene [a, b, l, m, n]	29 / 69 / 160	56 / 130 / 310	79 / 180 / 430	5900[sol] (576) / 14000[sol] (1350) / 30000[sol] (3170)	41000 / 42000 / 43000	17000[sol] (576) / 23000[sol] (1350) / 31000[sol] (3170)
Polycyclic Aromatic Hydrocarbons (SOM 1%/ 2.5%/ 6%) [a, b, l, p]						
Acenaphthene	34 / 85 / 200	210 / 510 / 1100	3000[sol](57.0)/ 4700[sol] (141)/ 6000[sol] (336)	84000[sol] (57.0)/ 97000[sol] (141)/ 100000	15000 / 15000 / 15000	29000/ 30000/ 30000
Acenaphthylene	28 / 69 / 160	170 / 420 / 920	2900[sol](86.1)/ 4600[sol] (212)/ 6000[sol] (506)	83000[sol] (86.1)/ 97000[sol] (212)/ 100000	15000 / 15000 / 15000	29000 / 30000 / 30000
Anthracene	380 / 950 / 2200	2400 / 5400 / 11000	31000[sol](1.17 /35000/ 37000	520000/ 540000/ 540000	74000 / 74000 / 74000	150000 / 150000 / 150000
Benz(a)anthracene	2.9 / 6.5 / 13	7.2 / 11 / 13	11 / 14 / 15	170 / 170 / 180	29 / 29 / 29	49 / 56 / 62
Benzo(a)pyrene (Bap)	0.97 / 2.0 / 3.5	2.2 / 2.7 / 3.0	3.2 / 3.2 / 3.2	35 / 35 / 36	5.7/ 5.7/5.7	11 / 12 / 13
Benzo(b)fluoranthene	0.99 / 2.1 / 3.9	2.6 / 3.3 / 3.7	3.9 / 4.0 / 4.0	44 / 44 / 45	7.1/7.2/7.2	13 / 15 / 16
Benzo(g,h,i)perylene	290 / 470 / 640	320 / 340 / 350	360/360 / 360	3900/4000/ 4000	640/640/640	1400/1500/ 1600
Benzo(k)fluoranthene	37 / 75 / 130	77 / 93 / 100	110/ 110 / 110	1200/ 1200/1200	190/190/190	370 / 410 / 440
Chrysene	4.1 / 9.4 / 19	15 / 22 / 27	30 / 31 / 32	350 / 350 / 350	57 / 57 / 57	93 / 110 / 120
Dibenzo(ah)anthracene	0.14 / 0.27 / 0.43	0.24 / 0.28 / 0.3	0.31/0.32/ 0.32	3.5 / 3.6 / 3.6	0.57/0.57/0.58	1.1 / 1.3 / 1.4
Fluoranthene	52 / 130 / 290	280 / 560 / 890	1500/1600/ 1600	23000/23000/ 23000	3100/3100/ 3100	6300 / 6300 / 6400
Fluorene	27 / 67 / 160	170 / 400 / 860	2800[sol] (30.9) /3800[sol] (76.5) /4500[sol] (183)	63000[sol] (30.9) / 68000 / 71000	9900 / 9900 / 9900	20000 / 20000 / 20000
Indeno(1,2,3-cd)pyrene	9.5 / 21 / 39	27 / 36 / 41	45 / 46 / 46	500 / 510 / 510	82 / 82 / 82	150 / 170 / 180
Naphthalene [q]	4.1 / 10 / 24	2.3 / 5.6 / 13	2.3 / 5.6 / 13	190[sol] (76.4) / 460[sol] (183) / 1100[sol] (432)	4900/ 4900/ 4900	1200[sol] (76.4) / 1900[sol] (183) / 3000
Phenanthrene	15 / 38 / 90	95 / 220 / 440	1300[sol](36.0)/ 1500/1500	22000 / 22000 / 23000	3100 / 3100 / 3100	6200 / 6200 / 6300
Pyrene	110 / 270 / 620	620 / 1200 / 2000	3700 / 3800 / 3800	54000 / 54000 / 54000	7400 / 7400 / 7400	15000 / 15000 / 15000
Coal Tar (Bap as surrogate marker)	0.32 / 0.67 / 1.2	0.79 / 0.98 / 1.1	1.2 / 1.2 / 1.2	15 / 15 / 15	2.2 / 2.2 / 2.2	4.4 / 4.7 / 4.8
Explosives [a, b, l, p]						
2, 4, 6 Trinitrotoluene	0.24 / 0.58 / 1.40	1.6 / 3.7 / 8.0	65 / 66 / 66	1000/1000/1000	130/130 / 130	260 / 270 / 270
RDX (Royal Demolition Explosive $C_3H_6N_6O_6$)	17 / 38 / 85	120 / 250 / 540	13000 / 13000 / 13000	210000 / 210000 / 210000	26000/26000/ 27000	49000[sol] (18.7) / 51000 / 53000
HMX (High Melting Explosive $C_4H_8N_8O_8$)	0.86 / 1.9 / 3.9	5.7 / 13 / 26	6700 / 6700 / 6700	110000 / 110000 / 110000	13000 / 13000 / 13000	23000[vap] (0.35) /23000[vap] (0.39) /24000[vap] (0.48)

Determinand	Allotment	R_WHP	R_{WO}HP	Commercial/ Industrial	POSresi	POSpark
Petroleum Hydrocarbons (SOM 1%/ 2.5%/ 6%) [a, b, l, m]						
Aliphatic EC 5-6	730 / 1700 / 3900	42 / 78 / 160	42 / 78 / 160	3200[sol] (304) / 5900[sol] (558) / 12000[sol] (1150)	570000[sol](304 590000 / 600000	95000[sol] (304) / 130000[sol] (558)/ 180000[sol](1150)
Aliphatic EC >6-8	2300 / 5600 / 13000	100 / 230 / 530	100 / 230 / 530	7800[sol] (144) / 17000[sol] (322) / 40000[sol] (736)	600000 / 610000 / 620000	150000[sol] (144) 220000[sol] (322)/ 320000[sol] (736)
Aliphatic EC >8-10	320 / 770 / 1700	27 / 65 / 150	27 / 65 / 150	2000[sol] (78) / 4800[vap] (190) / 11000[vap] (451)	13000 / 13000 / 13000	14000[sol] (78) / 18000[vap] (190) / 21000[vap] (451)
Aliphatic EC >10-12	2200 / 4400 / 7300	130v[ap] (48) / 330[vap] (118) / 760[vap] (283)	130v[ap] (48) / 330[vap] (118) / 770[vap] (283)	9700[sol] (48) / 23000[vap] (118) / 47000[vap] (283)	13000 / 13000 / 13000	21000[sol] (48) / 23000[vap] (118) / 24000[vap] (283)
Aliphatic EC >12-16	11000 / 13000 / 13000	1100[sol] (24) / 2400[sol] (59) / 4300[sol] (142)	1100[sol] (24) / 2400[sol] (59) / 4400[sol] (142)	59000[sol] (24) / 82000[sol] (59) / 90000[sol] (142)	13000 / 13000 / 13000	25000[sol] (24) / 25000[sol] (59) / 26000[sol] (142)
Aliphatic EC >16-35 [o]	260000 / 270000 / 270000	65000[sol](8.48 92000[sol] (21) 110000	65000[sol] (8.48 92000[sol] (21) 110000	1600000 / 1700000 / 1800000	250000 / 250000 / 250000	450000 / 480000 / 490000
Aliphatic EC >35-44 [o]	260000 / 270000 / 270000	65000[sol](8.48 92000[sol] (21) / 110000	65000[sol](8.48 92000[sol] (21) 110000	1600000 / 1700000 / 1800000	250000 / 250000 / 250000	450000 / 480000 / 490000
Aromatic EC 5-7 (benzene)	13 / 27 / 57	70 / 140 / 300	370 / 690 / 1400	260000[sol] (1220) / 46000[sol] (2260) / 86000[sol] (4710)	56000 / 56000 / 56000	76000[sol](1220) /84000[sol](2260)/ 92000[sol] (4710)
Aromatic EC >7-8 (toluene)	22 / 51 / 120	130 / 290 / 660	860 / 1800 / 3900	56000[vap] (869)/ 110000[sol] (1920)/ 180000[vap] (4360)	56000 / 56000 / 56000	87000[vap](869) / 95000[sol] (1920)/ 100000[vap](4360)
Aromatic EC >8-10	8.6 / 21 / 51	34 / 83 / 190	47 / 110 / 270	3500[vap] (613) / 8100[vap] (1500) / 17000[vap] (3580)	5000 / 5000 / 5000	7200[vap](613) / 8500[vap] (1500) / 9300[vap] (3580)
Aromatic EC >10-12	13 / 31 / 74	74 / 180 / 380	250 / 590 / 1200	16000[sol] (364) / 28000[sol] (899) / 34000[sol] (2150)	5000 / 5000 / 5000	9200[sol](364) / 97000[sol] (899) / 10000
Aromatic EC >12-16	23 / 57 / 130	140 / 330 / 660	1800 / 2300[sol] (419) / 2500	36000[sol] (169) / 37000 / 38000	5100 / 5100 / 5000	10000 / 10000 / 10000
Aromatic EC >16-21 [o]	46 / 110 / 260	260 / 540 / 930	1900 / 1900 / 1900	28000 / 28000 / 28000	3800 / 3800 / 3800	7600 / 7700 / 7800
Aromatic EC >21-35 [o]	370 / 820 / 1600	1100 / 1500 / 1700	1900 / 1900 / 1900	28000 / 28000 / 28000	3800 / 3800 / 3800	7800 / 7800 / 7900
Aromatic EC >35-44 [o]	370 / 820 / 1600	1100 / 1500 / 1700	1900 / 1900 / 1900	28000 / 28000 / 28000	3800 / 3800 / 3800	7800 / 7800 / 7900
Aliphatic+Aromatic EC >44-70 [o]	1200 / 2100 / 3000	1600 / 1800 / 1900	1900 / 1900 / 1900	28000 / 28000 / 28000	3800 / 3800 / 3800	7800 / 7800 / 7900
Chloroalkanes & Chloroalkenes (SOM 1%/ 2.5%/ 6%) [a, b, l, p]						
1,2-Dichloroethane	0.0046 / 0.0083 / 0.016	0.0071 / 0.011 / 0.019	0.092 / 0.013 / 0.023	0.67 / 0.97 / 1.7	29 / 29 / 29	21 / 24 / 28
1,1,1 Trichloroethane (TCA)	48 / 110 / 240	8.8 / 18 / 39	9.0 / 18 / 40	660 / 1300 / 3000	140000 / 140000 / 140000	57000[vap](1425) 76000[vap](2915)/ 100000[vap](6392
1,1,1,2 Tetrachloroethane	0.79 / 1.9 / 4.4	1.2 / 2.8 / 6.4	1.5 / 3.5 / 8.2	110 / 250 / 560	1400 / 1400 / 1400	1500 / 1800 / 2100
1,1,2,2 Tetrachloroethane	0.41 / 0.89 / 2.0	1.6 / 3.4 / 7.5	3.9 / 8.0 / 17	270 / 550 / 1100	1400 / 1400 / 1400	1800 / 2100 / 2300
Tetrachloroethene (PCE)	0.65 / 1.5 / 3.6	0.18 / 0.39 / 0.90	0.18 / 0.4 / 0.92	19 / 42 / 95	1400 / 1400 / 1400	810[sol](424)/1100 [sol] (951)/1500
Tetrachloromethane (Carbon Tetrachloride)	0.45 / 1.0 / 2.4	0.026 / 0.056 / 0.13	0.026 / 0.056 / 0.13	2.9 / 6.3 / 14	890 / 920 / 950	190 / 270 / 400
Trichloroethene (TCE)	0.041 / 0.091 / 0.21	0.016 / 0.034 / 0.075	0.017 / 0.036 / 0.080	1.2 / 2.6 / 5.7	120 / 120 / 120	70 / 91 / 120
Trichloromethane (Chloroform)	0.42 / 0.83 / 1.7	0.91 / 1.7 / 3.4	1.2 / 2.1 / 4.2	99 / 170 / 350	2500 / 2500 / 2500	2600 / 2800 / 3100
Chloroethene (Vinyl Chloride)	0.00055/ 0.001/ 0.0018	0.00064 / 0.00087/ 0.0014	0.00077 / 0.001 / 0.0015	0.059 / 0.077 / 0.12	3.5 / 3.5 / 3.5	4.8 / 5.0 / 5.4
Phenol & Chlorophenols [a, b, l, p]						
Phenol	66 / 140 / 280	280 / 550/1100	750/1300 /2300	760[dir] (31000) / 1500[dir] (35000) / 3200[dir] (37000)	760[dir] (11000)/ 1500[dir](11000) 3200[dir](11000)	760[dir] (6600) / 1500[dir] (9700) / 3200[dir] (11000)
Chlorophenols (excluding PCP) [r]	0.13[s] / 0.3 / 0.7	0.87[s] / 2.0 / 4.5	94 / 150 / 210	3500 / 4000 / 4300	620/ 620 / 620	1100/1100/ 1100
Pentachlorophenol (PCP)	0.03 / 0.08 / 0.19	0.22/ 0.52 / 1.2	27[vap] (16.4) / 29 / 31	400 / 400 / 400	60 / 60 / 60	110 / 120 / 120
Other [a, b, l, p]						
Carbon Disulphide	4.8 / 10 / 23	0.14/0.29 /0.62	0.14/0.29 /0.62	11 / 22 / 47	11000 / 11000 / 12000	1300 / 1900 / 2700
Hexachlorobutadiene (HCBD)	0.25/0.61/1.4	0.29/0.7/1.6	0.32/0.78/1.8	31 / 66 / 120	25 / 25 / 25	48 / 50 / 51

Determinand	Allotment	R_WHP	$R_{WO}HP$	Commercial/ Industrial	POSresi	POSpark
Pesticides (SOM 1%/ 2.5%/ 6%) [a, b, l, p]						
Aldrin	3.2 / 6.1 / 9.6	5.7/ 6.6 /7.1	7.3 / 7.4 / 7.5	170 / 170 / 170	18 / 18 / 18	30 / 31 / 31
Atrazine	0.5 / 1.2 / 2.7	3.3/7.6/17.4	610/ 620 / 620	9300 / 9400 / 9400	1200/1200 /1200	2300 / 2400 / 2400
Dichlorvos	0.0049/0.010/ 0.022	0.032/0.066/ 0.14	6.4 / 6.5 / 6.6	140 / 140 / 140	16 / 16 / 16	26 / 26 / 27
Dieldrin	0.17/0.41/0.96	0.97/ 2 / 3.5	7.0 / 7.3 / 7.4	170 / 170 / 170	18 / 18 / 18	30 / 30 / 31
Alpha - Endosulfan	1.2 / 2.9 / 6.8	7.4 / 18 / 41	160^{vap} (0.003)/ 280^{vap} (0.007)/ 410^{vap} (0.016)	5600^{vap} (0.003) / 7400^{vap} (0.007) / 8400^{vap} (0.016)	1200 / 1200 / 1200	2400 / 2400 / 2500
Beta - Endosulfan	1.1 / 2.7 / 6.4	7.0 / 17 / 39	190^{vap}(0.00007) /320^{vap}(0.0002) /440^{vap}(0.0004)	6300^{vap}(0.00007) /7800^{vap}(0.0002) / 8700	1200 / 1200 / 1200	2400 / 2400 / 2500
Alpha-Hexachlorocyclohexane	0.035/0.087/ 0.21	0.23/0.55 / 1.2	6.9 / 9.2 / 11	170 / 180 / 180	24 / 24 / 24	47 / 48 / 48
Beta - Hexachlorocyclohexane	0.013/0.032/ 0.077	0.085 / 0.2/ 0.46	3.7 / 3.8 / 3.8	65 / 65 / 65	8.1 / 8.1 / 8.1	15 / 15 / 16
Gamma – Hexachlorocyclohexane	0.0092 / 0.023 / 0.054	0.06/0.14/ 0.33	2.9 / 3.3 / 3.5	67 / 69 / 70	8.2 / 8.2 / 8.2	14 / 15 / 15
Chlorobenzenes [a, b, l, p]						
Chlorobenzene	5.9 / 14 / 32	0.46 / 1.0 / 2.4	0.46 / 1.0 / 2.4	56 / 130 / 290	11000 / 13000 / 14000	1300^{sol}(675)/ 2000^{sol}(1520)/ 2900
1,2-dichlorobenzene (1,2-DCB)	94 / 230 / 540	23 / 55 / 130	24 / 57 / 130	2000^{sol} (571) / 4800^{sol} (1370) / 11000^{sol} (3240)	90000 / 95000 / 98000	24000^{sol} (571) / 36000^{sol} (1370) /51000^{sol} (3240)
1,3-dichlorobenzene (1,3-DCB)	0.25 / 0.6 / 1.5	0.4 / 1.0 / 2.3	0.44/1.1 / 2.5	30 / 73 / 170	300/ 300 / 300	390 / 440 / 470
1-4-dichlorobenzene (1,4-DCB)	15^{l} / 37^{l} / 88 ^{l}	61^{q} / 150^{q} /350 ^{q}	61^{q}/150^{q}/350^{q}	4400^{vap,q} (224) / 10000^{vap,q} (540) / 25000^{vap,q} (1280)	17000^{l} / 17000^{l} / 17000^{l}	36000^{vap,i} (224) 36000$^{vap,\ i}$(540)/ 36000^{vap,i}(1280)
1,2,3-Trichlorobenzene	4.7 / 12 / 28	1.5 / 3.6 / 8.6	1.5 / 3.7 / 8.8	102 / 250 / 590	1800 / 1800 / 1800	770^{vap} (134) / 1100^{vap} (330) / 1600^{vap} (789)
1,2,4- Trichlorobenzene	55 / 140 / 320	2.6 / 6.4 / 15	2.6 / 6.4 / 15	220 / 530 / 1300	15000 / 17000 / 19000	1700^{vap} (318) / 2600^{vap} (786) / 4000^{vap} (1880)
1,3,5- Trichlorobenzene	4.7 / 12 / 28	0.33 / 0.81 / 1.9	0.33 / 0.81 / 1.9	23 / 55 / 130	1700 / 1700 / 1800	380^{vap} (36.7) / 580^{vap} (90.8) / 860^{vap} (217)
1,2,3,4-Tetrachlorobenzene	4.4 / 11 / 26	15 / 36 / 78	24 / 56 / 120	1700^{vap} (122) / 3080^{vap} (304) / 4400^{vap} (728)	830 / 830 / 830	1500^{vap} (122) / 1600 / 1600
1,2,3,5- Tetrachlorobenzene	0.38 / 0.90 / 2.2	0.66 / 1.6 / 3.7	0.75 / 1.9 / 4.3	49^{vap} (39.4) / 120^{vap} (98.1) / 240^{vap} (235)	78 / 79 / 79	110^{vap} (39) / 120 / 130
1,2,4,5- Tetrachlorobenzene	0.06 / 0.16 / 0.37	0.33 / 0.77 / 1.6	0.73 / 1.7 / 3.5	42^{sol} (19.7) / 72^{sol} (49.1) / 96	13 / 13 / 13	25 / 26 / 26
Pentachlorobenzene (P_ECB)	1.2 / 3.1 / 7.0	5.8 / 12 / 22	19 / 30 / 38	640^{sol} (43.0) / 770^{sol} (107) / 830	100 / 100 / 100	190 / 190 / 190
Hexachlorobenzene (HCB)	0.47 / 1.1 / 2.5	1.8^{vap} (0.20) / 3.3^{vap} (0.5) / 4.9	4.1^{vap} (0.20) / 5.7^{vap} (0.5) / 6.7^{vap} (1.2)	110^{vap} (0.20) / 120 / 120	16 / 16 / 16	30 / 30 / 30

R_WHP Residential with homegrown produce
$R_{WO}HP$ Residential without homegrown produce
POSresi public open spaces near residential housing
POSpark public open space for recreational use but not dedicated sports pitches
SOM Soil Organic Matter – ***the S4UL for all organic compounds will vary according to SOM***

a Based on a sandy loam soil as defined in SR3 (Environment Agency, 2009b) and 6% soil organic matter (SOM)
b Figures rounded to two significant figures
c Based only on a comparison of oral and dermal soil exposure with oral Index Dose
d The background ADE is limited to being no larger than the contribution from the relevant soil ADE
e Based on comparison of inhalation exposure with inhalation TDI only
f Based on a lifetime exposure via the oral, dermal and inhalation pathways
g Based on localised effects comparing inhalation exposure with inhalation ID only
h Based on comparison of inhalation exposure with inhalation ID
i Based on comparison of oral and dermal exposure with oral TDI
j Based on comparison of oral, dermal and inhalation exposure with inhalation TDI
k Based on comparison of all exposure pathways with oral TDI
l S4ULs assume that free phase contamination is not present
m S4ULs based on a sub-surface soil to indoor air correction factor of 10
n The HCV applied is based on the intake of total Xylene and therefore exposure should not consider an isomer in isolation
o Oral, dermal and inhalation exposure compared with oral HCV
p S4ULs based on a sub-surface soil to indoor air correction factor of 1
q Based on a comparison of inhalation exposure with the inhalation TDI for localised effects
r Based on 2,4-dichlorophenol unless otherwise stated
s Based on 2,3,4,6-tetrachlorophenol
vap S4UL presented exceeded the vapour saturation limit, which is presented in brackets

sol S4UL presented exceeds the solubility saturation limit, which is presented in brackets
dir S4ULs based on a threshold protective of direct skin contact, guideline in brackets based on the health effects following long term exposure provided for illustration only

Appendix 14.2 Phase 1 ground condition assessment

West Cambridge Masterplan Site

Phase 1 Ground Condition (Geotechnical and Contamination) Assessment

On behalf of

UNIVERSITY OF CAMBRIDGE

Project Ref: 31500/3503 | Rev: 01 | Date: June 2016

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Document Control Sheet

Project Name: **West Cambridge Masterplan Site**

Project Ref: **31500/3503**

Report Title: **Phase 1 Ground Condition (Geotechnical and Contamination) Assessment**

Doc Ref: **R001**

Date: **June 2016**

	Name	Position	Signature	Date
Prepared by:	Robert Foster	Senior Engineer		07/06/2016
Reviewed and approved by	Mark Brenton	LLP Director		07/06/2016
For and on behalf of Peter Brett Associates LLP				

Revision	Date	Description	Prepared	Reviewed	Approved
R001	June 15	Draft for comment	RF	MB	MB
R002	June 16	Final	RF	MB	MB

Contents

Figures

Appendices

Summary

This report presents the findings of a Phase 1 Ground Condition (Geotechnical and Contamination) Assessment for the West Cambridge Masterplan site.

The site lies on the western outskirts of Cambridge and currently comprises a mix of academic, commercial and residential land-uses and open ground (undeveloped plots, arable farmland and paddocks used by University of Cambridge's veterinary school). The anticipated general site geology comprises the Gault Clay (a non-aquifer), although previous ground investigations at the site have identified variable thicknesses of localised Made Ground and Head Deposits (Secondary Undifferentiated aquifer) overlying and masking the bedrock strata.

In terms of recent land use history, the site was largely open farmland until the 1940s when parts of the site were requisitioned by the government and developed for use as a wartime facility named the Shorts site. The Shorts site buildings in the western area of the site were demolished after the war and the area subsequently redeveloped for use by the University of Cambridge and the British Antarctic Survey. The wartime buildings in the southern area of the site were used up until the early 1970s and were then demolished. This area has been partly redeveloped recently by the University Sports Centre and West Cambridge Lake. Other than the Shorts site, the site has become increasingly developed since the 1950s, initially with the School of Veterinary Medicine located in the central area of the site and then subsequently by further academic and faculty buildings, laboratories and commercial premises.

Based on the known on-site land use, and geo-environmental information from ground investigations at the site, the potential for significant contamination to be present is considered to be **Low**. Based on the known surrounding land uses the potential for wide spread contamination to be present in the immediate vicinity of the site is considered to be **Very Low**.

Potential pollutant linkages have been identified using the information on potential sources (contaminant types), receptors and exposure pathways. Possible pollutant linkages have been identified for Human Health, Groundwater, Surface Water, Property and Building/Services and Ecological Systems.

Based on the information available, the estimated risks have been designated as follows:-

- Human Health – **Very Low** for on-site current and future commercial, **Low** for construction works and off-site residential
- Groundwater – **Very Low**.
- Surface water – **Very Low**.
- Buildings and property - **Very Low**.
- Ecological systems –**Very Low**.

Where a 'Low risk' has been estimated, it is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.

The Phase 1 geoenvironmental risk assessment has identified that progression to a Phase 2 study will be required as part of the development process. However, given the limited scale of the potential sources of contamination, it is anticipated that any requirement to carry out intrusive investigation can be satisfactorily dealt with by incorporation of a suitable condition in any granted Outline Planning Consent.

With respect to the preliminary geotechnical assessment the study has identified:

Geotechnical Issue	Description
Ground stability	Natural and artificial cavities - No hazard anticipated Compressible ground - There are potential hazards for conventional shallow foundations and ground bearing floor slabs associated with compressible ground in any localised areas of deep Made Ground. 'Clay-soils' - There is the possibility of shrinking or swelling hazards associated with the anticipated predominant clay soil. Aggressive ground conditions - The Gault Clay is known as a geological stratum likely to have sulphate concentrations.
Foundations	Conventional shallow foundations bearing on Head Deposits and/or Gault Clay should be feasible for lightly loaded structures. More heavily loaded structures may require piled foundations.
Slope stability	There is the potential for relict slip surfaces to be present in the near surface soils associated with periglacial soils and processes. Potential reactivation of this slip surfaces should be considered in future development areas where large excavations are proposed.
Excavations	They are unlikely to be any construction issues with shallow excavations at the site, although provision of side support to maintain stability will be required should shallow groundwater be encountered.
Roads and pavements	The properties of the near surface soils will require confirmation prior to the design of roads and pavements.
Infiltration drainage	Given the generally clayey nature of the underlying strata, it is unlikely that infiltration drainage will be feasible at the site.

To quantify the extent of the potential risk associated with areas of Made Ground and Head Deposits, an intrusive ground investigation is required in due course to confirm the nature of the near surface ground and groundwater conditions in areas yet to be investigated.

The summary contains an overview of the key findings and conclusions. This summary should not be treated independently but should be read in conjunction with the main report text including Section 8 and the accompanying tables, figures and appendices.

1 Introduction

1.1 Background Information

Peter Brett Associates LLP (PBA) has been instructed by University of Cambridge (the Client) to undertake a Phase 1 Ground Condition (Geotechnical and Contamination) Assessment for the West Cambridge Masterplan site.

This report presents the findings of the desk study researches carried out, together with the observations from a site walkover. It includes a preliminary ground stability risk assessment and Tier 1 (preliminary) geoenvironmental qualitative risk assessment.

1.2 Objective

The objective of this report is to identify the likely ground conditions at the site and to assess whether there are significant geotechnical or geoenvironmental risks associated with the ground conditions that require management (remediation or mitigation) during and after the development.

This report is required to support an Outline Planning Application and Environmental Impact Assessment and a Ground Condition chapter for an Environmental Statement.

1.3 Scope of Work/Terms of Reference

Geotechnical Desk Study

Available published geological information has been obtained and reviewed, together with data acquired from public databases. A site walkover with direct inspection of the site and surrounding land was also carried out in conjunction with the desk study. This report presents a review of the acquired information and gives comments with respect to potential constraints on foundation and general site infra-structure design and construction.

Ground Condition (Contamination) Assessment

The principal components of this assessment are generally as described in Section 6.2 of BS 10175 (2011) and CLR 11 Model Procedures for the Management of Contaminated Land (EA, 2004). CLR 11 sets out a risk management process based on a tiered risk assessment with an increasing level of detail required to progress through the tiers. Due regard is also paid to the National Planning Policy Framework (NPPF) Clauses 120, 121 and 122. Under the definition of “Site Investigation Information” given in the NPPF Glossary Page 56, the Phase 1 Desk Study and contamination risk assessment is the minimum requirement under the NPPF to support any planning application on a site that might be potentially affected by contamination. Similarly, a desk study and site reconnaissance is the minimum information that should be provided for a site potentially at risk from ground instability.

In order to identify the current conditions and land use on the site and in the surrounding area, readily available information in the public domain has been obtained and reviewed, and a site reconnaissance walkover has been carried out. This report presents a review of the acquired information, together with the development of a Preliminary Conceptual Site Model (CSM) and the associated Tier 1 risk assessment.

Attention is drawn to the Guidance Note in Section 7 which provides advice for readers of this report.

1.4 Site Location and Setting

The site is located approximately 2km north-west of Cambridge City Centre in the area known as High Cross. The site is bordered to the north by Madingley Road, to the east by residential properties, to the south by agricultural land and to the west by the M11 Motorway. The site area is approximately 66 hectares. The approximate centre of the site is at National Grid Reference (NGR) TL 426 590.

A site location plan is presented as **Figure 1**.

The site is currently occupied by a mix of academic, commercial, sports and residential (predominantly student and postgraduate accommodation) land uses. However, there are also areas of open land comprising a mixture of roads, footpaths, car parks, undeveloped plots, formal landscaping and large paddocks and pasture associated with the University's veterinary school.

Topographically, ground levels fall gradually from approximately 20.0m AOD in the north-western area of the site to approximate 15.0m AOD in the south-eastern area of the site.

A site layout plan, annotated with features discussed in this report is presented as **Figure 2**.

1.5 Proposed Development

The University of Cambridge is preparing an Outline Planning Application for the development of the site for academic and commercial use. An existing masterplan for the site was approved in 1999 and forms the basis of the current development of the site. Development in some areas has not been delivered to the envisaged levels of the 1999 masterplan and, as such, the Client is producing a new masterplan that significantly increases the amount and density of development at the site.

An Environmental Statement (ES) is being produced to support an Outline Planning Application. This Phase 1 report is being prepared to support the Ground Conditions chapter of the ES.

1.6 Sources of Information

The following sources of information were used in the preparation of this report:-

- A walkover survey by a PBA engineer to observe existing conditions both on and surrounding the site.
- PBA observations of shallow archaeological trenches carried out in currently undeveloped areas of the site by the University of Cambridge's Archaeological Unit, including some soil sampling and geo-environmental testing.
- Landmark was commissioned to provide historical maps, geological and environmental setting data searches (Envirocheck report).
- Additional environmental information was obtained by review of the Environment Agency public registers accessed through the internet.
- The responses to environmental enquiries made to the Environment Agency and Cambridge City Council.
- An unexploded ordnance (UXO) risk assessment prepared by BAE Systems Ltd.
- Output from the PBA Natural and Mining Cavities Databases for a site centred search.

- Historical borehole records obtained from the British Geological Survey's (BGS) on-shore borehole record archive.

- Several previous desk studies and ground investigation reports carried out on land parcels within the site boundary that have been provided by University of Cambridge or accessed via Cambridge City Council's online planning portal. Ground investigations reviewed as part of this assessment are detailed below:

Table 1.1 Summary of previous ground investigations reviewed as part of Phase 1

Report Author	Date of Report	Title and Purpose of Report
Mira	Dec 2014	Proposed Research Facility, Land off Charles Babbage Road, West Cambridge, University of Cambridge. Ground investigation for a proposed research facility south-west of School of Veterinary Medicine.
Ramboll	Nov 2013	CAPE Annexe, University of Cambridge. Ground investigation for a proposed extension to CAPE building.
Arup	Sept 2012	University of Cambridge Data Centre, University of Cambridge. Ground investigation for a proposed new data centre.
Ramboll	Jan and July 2012	Chemical Engineering and Biotechnology Building, University of Cambridge. Ground investigation (separate geoenvironmental and geotechnical phases) for a proposed chemical engineering and biotechnology building
Arup	Oct 2011	Cambridge University Sports Centre Phase 1 Western University Campus. Ground investigation for proposed sports centre.
Hannah Reed	June 2010	Report on a Ground Investigation, Infrastructure Phase 3, Charles Babbage Road. Ground investigation for proposed car park.
Ramboll	Dec 2009	Materials Science and Metallurgy Building, University of Cambridge. Factual ground investigation report at site of proposed Materials and Metallurgy Building.
Hannah Reed	Oct 2009	West Cambridge Development – Infrastructure Phase 3, Madingley Road, Cambridge. Factual ground investigation report for proposed infrastructure route.
Richard Jackson Plc	Sept 2008	West Cambridge Development. Madingley Road, Cambridge - Ground Investigation Report. Ground investigation for development parcel.
Hannah Reed	Apr 2007	West Cambridge Development, Madingley Road, Cambridge. Ground investigation to determine appropriate method of stabilisation for near surface soils.
Arup	2007	University of Cambridge, Institute for Manufacturing Building, Charles Babbage Road. Ground investigation for proposed building.

Report Author	Date of Report	Title and Purpose of Report
WSP	Sept 1998	West Cambridge Development Site. Geotechnical site investigation and contamination survey.
WS Atkins	Dec 1996	High Cross, Madingley Road, Cambridge. Environmental study to investigate incident of cattle poisoning.

Some desk studies and ground investigation reports make reference to other ground investigations carried out within the site boundary. Although copies of these investigations have not been reviewed as part of this assessment, the zones of investigation for these sites have been gleaned from other reports and studies. These investigations comprise:

i. Ground Investigation for CAPE Building carried out by Geotechnical Engineering in February 2001.

ii. Ground Investigation for West Cambridge Residencies carried out by WSP in September 2001.

iii. Ground Investigation for Physics of Medicine Building carried out by Ground Engineering in April 2006.

2 Land Use Information

2.1 Introduction

This section presents a summary of current and historical land use activity on and immediately adjacent to the site. Land use is used to inform the hazard identification element of the Tier 1 risk assessment.

2.2 Current Land Use

The current land use information is based on a walkover inspection undertaken by a PBA engineer on the 11th May 2015. Some areas of the site have restricted access (e.g. commercial laboratories) and were not accessed during the walkover. Photographs taken during the site walkover (Photographs 1 - 52) are presented in **Appendix 3** with their locations presented on **Figure 2**. It should be noted that the aerial photograph used as the base for Figure 2 does not completely reflect the existing site conditions as recent developments have been added since the publication of the photograph. Outlines of these recent developments have been added to Figure 2 as necessary.

For the purposes of this report “on-site” is defined as within the site boundary line as shown on Figures 1 and 2.

On-Site

The site is primarily occupied by the University of Cambridge, with some additional laboratories and technology companies also present on-site. The eastern area of the site is occupied by University faculty and office buildings and laboratories. These structures range from single to four storey. The southern central area is also occupied by faculty buildings and accommodation blocks (postgraduate and student residences). The centre of the site is mainly occupied by the University’s School of Veterinary Medicine with the surrounding land used as paddocks and pastures by the veterinary school. The buildings in this area range from single storey stables and storage buildings to three storey lecture theatres. Warning signs on some doorways indicate the use of radioactive materials in some of these buildings (presumably x-ray equipment). A distinct low ridgeline is evident in the paddock areas west of the veterinary school with ground levels falling generally to the north and south from this feature. Merton Hall Farm and an electrical substation, which is accessed off the Madingley Road (A1303), are present on the northern site boundary.

The south western part of the site is used as agricultural land (arable). The western part of the site is occupied by the West Cambridge Data Centre, Aveva (a software company), the British Antarctic Survey and Schlumberger laboratory. An area of vacant land is situated between the West Cambridge Data Centre and the Aveva buildings further north. A drainage ditch runs from west to east across the southern part of the site. The ditch appears to be culverted along the western section until it reaches a new lake feature (West Cambridge Lake) in the southern central part of the site (not shown on the aerial photograph). The lake is bordered to the east by an area of raised ground with the new University Sports Building (also not shown on the aerial photograph) present further east. Beyond the access bridge to the north of the University Sports building the channel was dry at the time of the walkover, although hydrophilic vegetation was noted along its length and outlet structures into the channel on the northern bank were observed. Further east, the channel was full and formed “the West Cambridge Canal” and appears to form part of the ornamental landscaping to the University buildings in this area. A mix of young and mature trees and bushes are situated throughout the site, especially lining the access roads through the site.

No visual or olfactory evidence of land contamination was identified during the walkover.

Off–site

The site is bordered by agricultural fields to the south. The western boundary of the site borders the M11 motorway, with woodland and agricultural land present further west of the motorway. The northern boundary of the site borders Madingley Road (A1303). Beyond the road is the Madingley Road Park & Ride facility serving Cambridge City Centre, houses and further University associated buildings. The eastern boundary of the site borders Clerk Maxwell Road with houses and University Sports facilities further east of the site. A public footpath runs along the southern boundary of the site.

2.3 Historical Land Use

The historical land use information is based on the review of historical Ordnance Survey (OS) map extracts and aerial photography provided by Landmark (**Appendix 4**) and other sources of historical information presented in previous desk study reports.

On site

The earliest historical OS map edition from 1888 shows the site area to comprise open agricultural land. Farm buildings (initially named Church Hall Farm and latterly Vicar's Farm) are shown in the eastern area of the site adjacent to the eastern site boundary. Some other unnamed structures (later named Merton Hall Farm and Merton Cottages) are located on the northern site boundary at this time. On early map editions, a watercourse is shown running across the north-east corner of the site through Vicar's Farm, but is not visible on maps from the 1960s onwards.

These farm and cottage buildings are evident on the 1948 aerial photograph. The aerial photograph (and 1953 OS map edition) also shows some industrial development in the southern and western areas of the site. This was a wartime industrial facility known as "the Shorts site" and is described in more detail below.

Other than the Shorts site, the next significant development of the site is shown on the 1972 map edition with several buildings in the central area of the site labelled as the "University of Cambridge School of Veterinary Medicine" (built during the 1950s). The map also shows the expansion of Merton Hall Farm on the northern site boundary, and some isolated structures in the western area (formerly part of the Shorts site) labelled as "laboratory" and "Atlas Centre".

Further academic development of the site is evident on the 1983 map edition with new laboratories shown in the eastern area of the site (including the Cavendish Laboratory located in the south-east corner which was constructed in the early 1970s). New structures labelled "Design Centre" and "British Antarctic Survey" are shown in the western area of the site at this time. The 2006 map edition shows further academic development in the eastern area of the site which is now almost completely covered with buildings. A new laboratory building (Schlumberger), as well as the expansion of the British Antarctic Survey area, is evident in the north-western area of the site. Further development in the central area of the site, south and south-east of the School of Veterinary Medicine faculty buildings, is evident on the recent map edition from 2015.

As part of the original masterplanning of the site in the late 1990s, several site buildings were demolished. These included some Merton Hall Farm outbuildings, Vicars Farm, some small structures associated with the veterinary school (possibly stables) and the "Dairy Unit" (first shown on the historical maps in the mid-1980s) located south of the veterinary school.

The Shorts Site

The history of the Shorts site (Shorts Brothers Repair Organisation or SEBRO) has been gathered from the WS Atkins 1996 report, which included desk based research and interviews

with former SEBRO site workers, and supplemented with information from historical OS maps and aerial photographs.

The Shorts site was a wartime facility used to repair bomber aircraft (that had been dismantled at the nearby Bourn airfield) and salvage used parts from redundant bombers. Plans of the facility from the 1940s, gathered during the WS Atkins report are shown in **Appendix 2**. Phase 1 of the Shorts site, comprising Hangars 1, 2 and 3, the administration block, canteen and stores were located in the western area of the site and was completed in 1941. Phase 2 of the Shorts site, comprising Hangars 4, 5, 6 and 7, offices, a maintenance building and boiler house were located in the southern area of the site and was completed in 1942.

During the war, Hangar 1 was used as the main stores with Hangar 2 used for spray painting. Hangars 4 and 5 were used for breaking up and parts salvage of scrap aircraft. Hangar 6 was used for heat treatment of metal parts, battery charging and testing, copper working and possibly chemical degreasing. The compound area between Phase 1 and 2 was used to store aircraft sections and parts for refurbishment and possible contained spent ammunition from aircraft guns. A Home Guard unit located south of Hangar 3 may also have contained small arms and limited amounts of ammunition. A series of small structures located west of the Phase 2 area (as shown on the 1945 aerial photograph and 1949 site plan) may have been air raid shelters or ammunition stores. The Atkins report discusses the presence of embankments around the south and east of the Phase 2 area, and these embankments can be identified on the 1945 and 1949 aerial photographs and historical maps from the 1950s and 1960s. Remnant parts of these embankments are still visible on the recent aerial photograph (Figure 2) located along the southern site boundary.

After the war in the late 1940s and 1950s, the Phase 2 area was used by the Ministry of Supply as a selling depot and latterly by the University of Cambridge for the development of electronic projects. Hangars 6 and 7 were used for the storage of civil defence equipment. Hangars 2 and 3 were used to receive and sort clothes donated for the victims of the East Anglian floods. In the 1950s, Hangars 4 and 5 were being used for general storage and Hangars 6 and 7 for the storage of “sensitive goods”. Several above ground tanks were present within the area, most understood to be water tanks, although a record of a partly buried fuel tank was also discussed in the WS Atkins report. The 1949 plan shows a “fuel dump” located on the southern boundary adjacent to the boiler house.

By the late 1960s the Phase 1 site in the western area of the site had been demolished, but the Phase 2 site buildings in the southern area were still present and labelled “Depot” on the 1972 OS map edition. These buildings were subsequently demolished in 1972. This area of the site was taken over by veterinary school and subsequently the University Farm and was used for grazing cattle or for grass cutting.

Off site

In the late 19th and early 20th Centuries, the area surrounding the site was largely agricultural land. The University Observatory was located approximately 200m north-east of the site boundary and some small gravel pits are shown in this area on the 1904 map. The University Rifle Range was located approximately 200m south-east of the site boundary. The western residential fringe of Cambridge was located beyond the eastern site boundary.

Some localised residential development north and east of the site boundary is evident from the map editions from the mid-20th Century. Significant off-site developments comprise the construction of the M11 Motorway along the western site boundary which is shown on the 1983 and subsequent map editions. A park and ride site is shown on the 2006 map beyond the northern site boundary. Further residential development is evident from the 2006 map just beyond the eastern site boundary, with the “University Sports Centre” shown beyond the south-east corner of the site from the 2006 map edition onwards.

3 Environmental Setting

3.1 Introduction

Information on the geological setting of the site is used in the general geotechnical assessment.

Information on the environmental setting is used in the Hazard Assessment section of the Tier 1 (geoenvironmental) risk assessment to identify potential pathways and receptors.

3.2 Geology

Information on the local geological conditions has been gathered from the review of geological maps, on-line borehole records, available ground investigation reports and site observations by PBA during recent archaeological investigations. Each of these sources of information are described in more detail below, with **Table 3.1** summarising all the geological information reviewed as part of this assessment.

Geological Map

The 1:10,000 British Geological Survey (BGS) geology map of the local area indicates the following sequence of strata beneath the site:-

- Artificial Ground – Small lobes of Made Ground are shown to be present on-site, generally along parts of the western and eastern site boundaries. These lobes were identified as landscaping bunds during the site walkover.

- Superficial – No Superficial Deposits are shown to be present on-site. A large tract of Head Deposits is shown north of the site boundary. Lobes of River Terrace Deposits are shown overlying the solid geology beyond the north-eastern and eastern site boundary.

- Solid – The whole site is underlain by the Gault Formation. The Gault Formation is described as pale to dark grey and blue grey clay and mudstone. Outcrops of the West Melbury Marly Chalk Formation (formerly known as the Lower Chalk) are shown overlying the Gault Formation beyond the western and north-eastern site boundaries.

BGS Borehole Records

A review of the British Geological Surveys web-hosted 'Onshore borehole records' database has identified several borehole records located within the site boundary and very close to the site boundary. The on-site records relate to ground investigations carried out for current site developments e.g. the Schlumberger laboratory and the University's CAD Centre, both located in the western section of the site, and the electrical substation located on the northern site boundary off Madingley Road. The off-site records relate to ground investigations carried out for the Cambridge Western Bypass (subsequently the M11 Motorway) along the western boundary of the site and also the small residential development of Eaton Gate located just beyond the south-eastern boundary of the site.

The approximate locations of these borehole records are shown on **Figure 3**.

Previous Ground Investigations

As part of this assessment, several reports detailing previous ground investigations carried out within the site boundary have been reviewed. These reports have been gathered directly from the University or from Cambridge City Council's on-line planning portal. The main purposes of these investigations are varied, but can be summarised as:

- Environmental studies carried out in the mid-1990s to investigate the cause of an incident of cattle poisoning in the southern area of the site (including the area of the former Shorts site);
- A widespread ground investigation carried out by WSP in 1998 to support the original West Cambridge Development Site masterplan;
- Plot specific ground investigations carried out within the last 15 years to satisfy planning conditions and to inform the design of University buildings.

Combined, the investigations reviewed have comprised approximately 200 exploratory holes consisting of trial pits, boreholes (windowless sample and cable percussion) and cone penetration tests (CPTs). The approximate locations of exploratory holes carried as part of these investigations, or the location of zones of investigation for the smaller investigations, are presented in **Figure 3**.

2015 Archaeological Investigation

In May and June 2015, an archaeological investigation was carried in the western, northern and eastern areas of the site, predominantly in areas of grazing pasture that are used by the School of Veterinary Medicine. The investigation comprised 37 no. trenches varying in length and depth, although the majority were less than 1m deep. PBA observed this investigation, logging open trenches and taking a small number of soil samples for subsequent geo-environmental testing.

The locations of the archaeological trenches, exploratory hole notes and sketches, selected photographs and the results of the geo-environmental testing are contained in **Appendix 9**.

Table 3.1 Summary of Ground Conditions at West Cambridge

Stratum	Typical Description	Thickness Range
Topsoil	Brown grey clay with fine to medium flint gravel and occasional fragments of brick.	0.0 - 0.8m
Made Ground	Variable and localised. Thickest horizons were generally encountered during investigations in the southern areas of the site (area of former Dairy Unit and Shorts site). Remnants of former site buildings (Merton Hall Farm outbuildings) and evidence of land raising /landscaping in the northern area of the site were identified during the archaeological investigation. Brown, grey, orange slightly sandy slightly gravelly clay. Gravel sized fragments of flint, brick, ash, concrete, clinker and limestone and rare inclusions of wire, wood and organic traces. Occasional layers of red brown sand. Occasional cobbles of brick and concrete.	0.0 – 3.0m
Head Deposits	Firm to stiff brown orange variably gravelly and sandy clay. Occasional lenses and irregular inclusions of clayey sand and gravel (cryoturbated soils from underlying clay), layers of silty sand and gravel with pockets of clay. Gravels of flint and chalk. Prevalent on the higher ground and ridgeline west of the School of Veterinary Medicine.	0.0 – 3.0m

Stratum	Typical Description	Thickness Range
Gault Clay	Firm to very stiff closely fissured brown grey becoming grey and blue grey silty clay with rare brown sized phosphatic nodules.	29.0+m

For the purposes of this assessment, Head Deposits has been taken to include solifluction deposits and soils effected by cryoturbation processes, variably described in the previous ground investigations as “River Terrace Deposits”, “Glacial Till” and “Observatory Gravels” (a colloquial term for sands, gravels and silts located in the vicinity of the University’s Observatory north of the site boundary and also known as Head Gravel).

Groundwater was generally not encountered during previous ground investigations at the site, as would be anticipated given the dominant clay geology. Minor seepages were reported in some exploratory holes, although this was generally from Made Ground and Head Deposits horizons.

3.3 Naturally Occurring Geological Hazards

An assessment of potential geological hazards that may give rise to instability or adverse foundation or construction conditions as supplied by the British Geological Survey (BGS) from their National Geoscience Information Service (NGIS) are presented in the Envirocheck Report reproduced in **Appendix 5**. The generic assessment is generated automatically based on digital geological maps and the scope and the accuracy is limited by the methods used to create the dataset and is therefore only indicative for the search area.

The information contained in the Envirocheck Report has been reviewed and where considered necessary reassessed considering the specific information available for the site. The modified assessment of the potential for geological hazards to be present on the site is summarised in **Table 3.2** below.

Table 3.2 Summary of Geological Hazards from third party report.

Description	On-Site	PBA Comment
Coal Mining Affected Areas	Not in coal mining area	
Collapsible Ground Stability Hazards	Very Low	PBA concur with this assessment
Compressible Ground Stability Hazards	No hazard	In general, PBA concur with this assessment although note that areas of Made Ground have been encountered on site during previous ground investigations, and that there is a possibility of other localised areas of Made Ground, yet to be encountered, which may present a compressible stability hazard.
Dissolution Hazard	No hazard	PBA concur with this assessment

Description	On-Site	PBA Comment
Landslide Ground Stability	Very Low	Gault Clay is particularly prone to landsliding (BGS, 1995). The presence of Head Deposits at the surface increases the risk of shallow slope instability, even at low slope angles. Evidence of hill creep/solifluction was observed in archaeological trenches in the pasture area east of the Schlumberger laboratory. Whilst the current potential for a landslide hazard is very low, the development of the site will increase the potential for a landslide hazard to low/moderate.
Running Sand	Very Low	Running sand conditions were reported during previous ground investigations in sandy Head Deposits horizons where high perched water levels were also encountered. This hazard will have to be reassessed in the future on a plot specific basis when more ground condition information is available.
Shrinking or Swelling Clay	Moderate	PBA concur with this assessment. Previous ground investigations at the site have shown that the Gault Clay is of high to very high plasticity and is therefore particularly susceptible to volume change.

Radon

Radon is a naturally occurring radioactive gas and emanates from certain geological formations to varying degrees, depending on the type, porosity and permeability. The Envirocheck report indicates that the site is situated in an area where radon protection measures are not required for new dwellings. As the proposed development will comprise academic and commercial land-uses, which are less sensitive than a residential land use, radon protection measures are unlikely to be required for proposed structures.

Natural and Non-Coal Mining Cavity Records – Cavity Searches

A search of the PBA Natural and Non-Coal Mining Cavities Databases indicates that there are no known cavity locations within 2000m of the site centre.

3.4 Controlled Waters - Groundwater

The following table summarises information recorded in the Envirocheck report regarding hydrogeology and groundwater vulnerability.

Table 3.3 Summary of Hydrogeology and Groundwater Vulnerability information

Item	Details
Aquifer Classification	The Gault Clay is designated an unproductive stratum by the Environment Agency. These are rock layers with low permeability that has negligible significance for water supply or river base flow. The tract of Head Deposits located north of the site boundary is designated a Secondary Undifferentiated Aquifer. This means that the layer has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the material. Given that Head Deposits have been encountered on-site during previous investigations, this designation has been extended onto the site for the purposes of this assessment. Outcrops of the West Melbury Marly Chalk Formation located beyond the site boundary are designated Principal Aquifers. There does not appear to be any connectivity between the site and these chalk outcrops, the majority of which are up hydraulic gradient of the site.
Soil Vulnerability	Gault Clay - Non-aquifer – negligibly permeable Head Deposits – Intermediate (I1) i.e. soils which can possibly transmit a wide range of pollutants
Depth to Groundwater	Sporadic seepages were noted from Made Ground and Head Deposits horizons during previous investigations at the site. It is likely that any groundwater within these layers is perched above the Gault Clay.
Groundwater Flow Direction	Insufficient information from previous investigations to assess the groundwater flow direction, but perched water may follow the local topography which slopes predominantly in a south-easterly direction.
Source Protection Zone (SPZ)	The site is not located within a SPZ.
Groundwater Abstraction	There is no active abstraction records located on or within close proximity of the site boundary.

3.5 Controlled Waters - Surface Water

The following table summarises information recorded in the Envirocheck report regarding hydrology.

Table 3.4 Summary of Surface Water Related Information

Item	Details
Name	The closest watercourse to the site is an unnamed drain (classed as a Tertiary River) which is located just beyond the south-west corner of the site. This drain forms part of a network of drains and ditches that flow away from the site in a south-easterly direction. A similar network of drains and ditches is also present beyond the north-western site boundary. Some off line drainage features and surface water features (ornamental waterways and ponds) are located in the southern and south-eastern areas of the site and have been incorporated into the landscape of recent developments in these areas. From the walkover, some of these features may be connected to the surface drainage network in these areas. These features continue along the southern site boundary towards the south-east corner of the site.
Quality	Not applicable
Abstraction	There are no surface water abstraction records located within or in close proximity to the site boundary.
Discharge Consents	There are no discharge consents located on site. The nearest discharge consent is located approximately 50m north-west of the site boundary and relates to the discharge of surface water, possibly from a housing estate, to a tributary of the Bin Brook.
Flood Risk*	The site is not located in an area at risk of flooding.
* The scope of this report does not include a flood risk assessment.	

3.6 Ecological Systems

A study of the Envirocheck report and the interactive ecological maps on the MAGIC website (http://magic.defra.gov.uk/website/magic/) indicates that the following environmentally sensitive areas are located within 2km of the site boundary.

- Areas of adopted Green Belt are located to the north and south of the site boundary.
- Travellers' Rest Pit (a Site of Special Scientific Interest or SSSI) is located approximately 600m north of the site boundary. The site preserves an exposure of unexcavated and finite Observatory Gravels. Given the geological nature of this SSSI, it is unlikely to be affected by any future development on the site.
- Sheep's Green and Coe Fen Local Nature Reserve (LNR) are located approximately 1.8km south-east of the site boundary.
- Madingley Wood SSSI is located approximately 2km west of the site boundary.

Both the LNR and Madingley Wood SSSI are located away from the site boundary and, given the clay dominant ground conditions of the area, are unlikely to be affected by any land or groundwater contamination emanating from within the site boundary.

3.7 Potentially Contaminative Current and Historic Land Uses

Information from Envirocheck Report

Pertinent information from the Envirocheck report is summarised below:

- Academic land use – There are several laboratories on-site that are licensed to store, use and dispose of potentially contaminative substances. The Envirocheck report contains details of numerous registered radioactive substances records and one explosive site record, all allocated to the University. A Local Authority Pollution Prevention and Control process (now revoked) is also allocated to the University that related to the incineration of animal carcasses at the veterinary medicine site.

  These potentially contaminative activities, or use of potentially contaminative substances, are, or have been, regulated and therefore the potential for an uncontrolled release of contaminants is considered to be low.

- There are two contemporary trade directory entries located on site. The first is the Cavendish Laboratory (located in the south-east corner of the site); the other is named Polysolar (a building integrated photovoltaic designer – also located in the south-east area of the site). Neither of these entries is considered to represent a source of significant contamination at the site.

- There are no historical landfill sites located within the site boundary or in close proximity to the site boundary.

- There are two pollution incidents to controlled waters recorded on-site. Both are dated 1992 and are located in the eastern area of the site. Both relate to unknown pollutant discharges into a tributary of the River Cam. The incidents are categorised as Category 3 – Minor Incident and Category 1 – Major Incident. The sources of these pollutant discharges and exact location of the receiving watercourse are unknown. Given the age of the incidents, it is considered unlikely that, if located on-site they will represent a continued source of contamination.

Information from Environment Agency

The Environment Agency's *What's in my backyard* website has been accessed to review information available for the site. There is no pertinent information, other than the use of radioactive substances in some of the laboratories located on-site, from the website relating to the site.

A request was made to the local Environment Agency (EA) office regarding any environmental information that they may hold on the site. The response from the EA is presented in Appendix 6. In summary, the EA have records of four potential pollution incidents at the site between 2001 and 2013. Two records relate to water pollution, one to a spillage at a laboratory and the last to a fire at a laboratory. These incidents have been recorded as "minimal impact" or "no impact".

The EA has also provided details of a discharge consent for surface water to a tributary of the Bin Brook located at the University Sports Centre. The discharge consent is positioned beyond the south-east corner of the site boundary.

Information from Local Authority

A request was made to Cambridge City Council's Contaminated Land Officer regarding any information that they may hold on the site. The Council has produced a Land Use Report for the site that is presented in Appendix 6. The Land Use Report included a review of historical

maps and a search of historical planning records located within the site area relating to ground conditions. This information is largely as described elsewhere in this Phase 1 report.

The Council has stated that no areas of the site have been identified as "contaminated land" under Part IIA of the Environmental Protection Act 1990.

Information from Previous Investigations

The ground investigation reports that have been reviewed, and that has included geoenvironmental testing, have not highlighted gross or widespread contamination at the site.

An incident of poisoning of cattle in the southern area of the site (adjacent to the former Phase 2 Shorts site) in August 1995 was investigated by the Ministry of Agriculture Fisheries and Food (MAFF) State Veterinary Service's Veterinary Investigation Centre in 1995 and subsequently by ADAS and WS Atkins in 1996. It was concluded that the animals had probably died from acute toxicity, possible due to the ingestion of a grey material (possibly lead putty or paint) located under a hedgerow of one of the fields. The grey material was found to contain up to 27% lead.

The soils in the area of the former Phase 2 Shorts site in the southern area of the site have been subject to contamination testing as part of the ADAS/Atkins 1996 investigation, the WSP 1998 investigation, the Richard Jackson Plc 2008 investigation and, most recently, the Arup 2011 investigation for the University Sports Centre (which also incorporated a radiological survey). Significant concentrations of contaminants have not been encountered in this area, or in neighbouring areas. This area has subsequently been partly developed by the University Sports Centre and adjoining West Cambridge Lake.

Unexploded Ordnance (UXO)

Cambridge was bombed during the Second World War and the Shorts site could be deemed a potential bomb target. Spent ammunition from aircraft guns may have been deposited in the area west of the road between the Phase 1 and 2 areas of the Shorts site, although no evidence for UXO or other munitions have been encountered during previous investigations or during redevelopment of the site areas to date.

As part of this Phase 1 assessment, an UXO risk assessment equivalent to a "detailed risk assessment", as described in CIRIA report C681 'UXO – A construction industry guide', has been prepared by BAE Systems (see **Appendix 7**).

The BAE Systems report concluded that the probability of encountering UXO during future site works, when compared to other BAE projects, would be low. No special measures are deemed necessary to mitigate the risk of encountering German air-dropped UXO during future site works.

2015 Archaeological Investigation

During the 2015 archaeological investigation, PBA took 10 samples of the near surface soils arising from the trench excavations for subsequent geo-environmental testing. The archaeological trenches were positioned to target suspected archaeological features identified by an earlier geophysical survey. Trenches were not positioned to target potential sources of contamination. As such, the samples were scheduled for a general suite comprising a range of common industrial contaminants to provide a general overview of the background levels of potential contaminants in the near surface soils in the areas investigated.

The results of the geo-environmental testing and a summary of the results are presented in **Appendix 9**.

In order to assess the potential risk posed to human health by contaminants in the soil, the results of the chemical analysis on soil samples have been compared to Defra's Category 4

Screening Levels (C4SLs). C4SLs are available for six substances (arsenic, benzene, benzo-a-pyrene, cadmium, chromium IV and lead). For other potential contaminants, the results of the chemical analysis have been compared to LQM/CIEH Suitable for Use Screening Levels (S4ULs).

The proposed land use of the site is predominantly academic/commercial. As such, the results of the chemical analysis have been compared to C4SL/S4ULs for commercial and public open space (park) land uses which are considered to be the most applicable to the proposed land use at the site. Full details of the assessment criteria are given in **Appendix 9**.

For the samples analysed, the measured concentrations of potential contaminants, as summarised on **Table 1** in **Appendix 9**, are below the chosen assessment values for a commercial and public open space (park) land use. Further, concentrations of contaminants were also below the more conservative assessment values for a residential land use with home grown produce indicating the low background level of potential contaminants within the shallow site soils in these areas of the site.

4 Tier 1 Preliminary Geo-environmental Risk Assessment

4.1 Introduction

The methodology developed and adopted by PBA for the assessment of ground conditions is presented in **Appendix 1**.

In accordance with guidance presented in CLR 11 (EA Model Procedures for the Management of Land Contamination) we adopt a staged approach to risk assessment and this report presents a Tier 1 assessment or first stage.

The underlying principle of the Phase 1 Ground Condition Assessment is the identification and evaluation of *pollutant linkages* in order to assess whether the presence of a source of contamination could potentially lead to harmful consequences. A pollutant linkage consists of the following three elements:-

- A source/hazard (chemical or geoenvironmental) which has the potential to cause harm or pollution;
- A pathway for the hazard to move along / generate exposure; and
- A receptor which is affected by the hazard.

For each potential pollutant linkage identified the risk is estimated through consideration of the magnitude of the potential consequence and the likelihood or probability of an event occurring. This assessment report is divided into sections identifying potential sources (hazard identification), potential pathway and receptor identification and risk estimation and assessment.

4.2 Conceptual Site Model

The Tier 1 Preliminary Risk Assessment includes the development of a conceptual site model (CSM). The CSM describes the types and locations of potential contamination sources, the identification of potential receptors and the identification of potential transport/migration pathways.

For a pollutant linkage to be identified a connection between all three elements (source-pathway-receptor) is required.

4.3 Geoenvironmental Hazard Identification

On-site

The historical maps have identified that the site was originally agricultural fields with some isolated farms during the 19th and early 20th Century. Part of the site was developed as a wartime facility in the 1940s. The western part of this facility was demolished in the 1960s and the area has subsequently been redeveloped for academic and commercial uses. The southern part of the wartime facility was demolished in the 1970s. More recent ground investigations in this area have not identified significant widespread contamination associated with this former site use. The former farm buildings have also been mostly demolished and partly redeveloped as part of the academic expansion of the eastern area of the site.

Other development within the site boundary has largely been associated with the University (laboratories and faculty buildings) or similar enterprises. There are potential sources of

contamination associated with these academic and laboratory land-uses, although it is considered that given the scale and regulated nature of these activities, the potential for them to generate significant widespread contamination is low. The Environment Agency has a small number of records of pollution incidents arising from laboratory land-uses, although these incidents have been rated as a no or minimal impact.

Geoenvironmental testing of soil samples collected from the archaeological investigation has indicated very low concentrations of potential contaminants in currently undeveloped areas of the site around the veterinary school.

In general, the hazard classification/potential for generating contamination for the site would be Low given the predominant land use.

Off-site

The area surrounding the site is largely agricultural (farmland) and residential. Based on the known surrounding land uses the potential for widespread contamination to be present in the immediate vicinity of the site is considered to be Very Low.

Summary of Potential Sources of Contamination (PSC)

Potential Sources of Contamination (PSC) identified on the site or within the vicinity of the site are described on the following table.

Table 4.1 - Potential Sources of Contamination (PSC)

PSC		Description
On-site		
1	**Undeveloped areas of former wartime facility**	**Low** potential for localised contamination associated with specific former land uses and demolition e.g. fuel storage, asbestos containing materials etc.
2	**On-site laboratories and other academic buildings**	**Low** potential for localised contamination associated with the storage, disposal, accidental spillages etc., of potentially contaminative substances.
3	**Electrical sub-stations**	**Low** potential for localised contamination associated with site use e.g. hydrocarbons, PCBs etc.
4	**Former Merton Hall Farm outbuildings**	**Low** potential for localised contamination associated with specific former land uses and demolition e.g. fuel and chemical storage, asbestos containing materials etc.

4.4 Pathways

Potential environmental hazards need a pathway connecting the source (if present) to potential receptors in order to be able to impact upon the receptors. These pathways are capable of conveying the contaminants. Pathways may be anthropogenic (artificial) or natural.

Anthropogenic pathways are artificial routes capable of conveying contaminants and include such routes as surface water drains, high permeability backfill materials, poorly consolidated Made Ground, foundations, and persons disturbing contamination sources in such a way as to liberate contaminants.

In the case of persons working with contaminated ground (e.g. to lay foundations or install services) direct contact with the source becomes possible, and pathways such as dermal contact, inhalation or ingestion require consideration.

The underlying geology at the site and the surrounding area is likely to be largely cohesive and therefore the potential for contaminants to migrate from their source is likely to be limited. However, any interconnecting zones of unconsolidated/loose and granular horizons within any Made Ground and Head Deposits may offer preferential pathways for contamination to migrate laterally.

4.5 Hazard Assessment

Identification of Potential Receptors

It is understood that the proposed development of the site will comprise commercial and academic end-uses. Details of the potential receptors considered and whether or not the receptor is plausible are presented in the following table:-

Receptor Type	Comment	Potential Receptor? (Y/N)
Human	End User Current = Mainly academic and commercial with some student/postgraduate accommodation	Y
	End User Future = Mainly academic and commercial with some student accommodation	Y
	Service Maintenance = Commercial	Y
	Off Site = Residential	Y
	Construction Workers	Y
Surface Waters	Tertiary watercourse present just beyond the south-west corner of the site boundary and on-site off-line drainage and ornamental features are also present.	Y
Groundwater	The Gault Clay is a Non-Aquifer, although Head Deposits present on-site are likely to form an extension of the Secondary Undifferentiated Aquifer shown north of the site boundary.	Y
Buildings/Materials	Structures are proposed	Y
Property – including crops, livestock, buildings	Adjacent residential and agricultural land	Y
Ecological Systems	The site is bordered by areas of Green Belt	Y

Identification of Potential Pathways

Table 2 in the PBA methodology describes possible pathways for each receptor type. Each of these possible pathways is then considered when assessing the possible pollutant linkage (see below).

Potential Pollutant Linkages

Potential pollutant linkages have been identified using the information on potential sources (contaminant types), receptors and exposure pathways. The table in **Appendix 8** identifies which pollutant linkages are considered to potentially exist.

4.6 Risk Estimation

When there is a pollutant linkage (and therefore some measure of risk) it is necessary to determine whether the risk matters and therefore whether further action is required. PBA provide an estimation of the level of risk but do not comment on whether or not it is an unacceptable risk as the significance or acceptability of a risk depends on the individual stakeholder. Risk estimation involves predicting the likely consequence (what degree of harm might result) and the probability that the consequences will arise (how likely the outcome is).

The table in **Appendix 8** presents an assessment of consequence and probability for each potential pollutant linkage identified. Based on the information available, and assuming a worst case scenario, the estimated risks have been designated as follows:-

- **Human Health** (current users) – **Very Low**
- **Human Health** (future users) – **Very Low**
- **Human Health** (off site) – **Low**
- **Human Health** (construction workers) – **Low**
- **Surface Water** – **Very Low**
- **Groundwater – Very Low**
- **Buildings and Property** – **Very Low**
- **Ecological Systems** – **Very Low**

Possible pollutant linkages are determined using professional judgement. If a linkage is considered possible, it is considered that this represents a potentially 'unacceptable risk' and therefore requires further consideration. This may be through remediation or mitigation or through further tiers of investigation and assessment.

Possible pollutant linkages have been identified for human health, groundwater, surface water, property and buildings.

4.7 Conclusions and Risk Evaluation

The results of this Ground Condition Assessment consider that as a whole the site is considered to have **Low** potential for ground contamination to be present. Where a **Low** risk has been estimated, it is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.

Whilst the risk associated for the whole site is generally **Low**, a Phase 2 intrusive investigation will be required in due course to investigate on-site PSCs and generally confirm the conceptual site model developed by this study.

Given the limited scale of the PSCs, it is anticipated that any requirement to carry out intrusive investigation can be satisfactorily dealt with by incorporation of a suitable condition in any granted Outline Planning Consent.

This risk assessment and CSM should be reviewed and updated following the Phase 2 intrusive investigation.

5 Preliminary Geotechnical Appraisal

5.1 Introduction

This section provides a preliminary geotechnical assessment of the site, based on the anticipated ground conditions. The section addresses the risk of geohazards at the site and the possible implications of the anticipated ground conditions on the construction of the proposed development. National Planning Policy Framework (NPPF) Clause 121 requires an assessment for a site potentially at risk from ground instability.

Consideration is given below to the risk of potential causes of instability arising from existing ground conditions across the site, as identified by the data review. Comments are also provided on likely development requirements to mitigate ground conditions. As this geotechnical appraisal has been based on publically available information obtained as part of a desk based data collection the comments made herein should therefore be considered as preliminary.

5.2 Ground Stability

Natural and Artificial Cavities

From the geological setting of the site, the local topography and the known site history it is considered unlikely that the future development will have to consider subsidence risks associated with artificial and natural cavities. Wartime air raid shelters may have been located in the south-western corner of the site. However, no such structures have been subsequently encountered during more recent ground investigations in this area. Underground structures may have been removed as part of site development where buildings and infrastructure are present. As such, these subsidence risks are not considered further in this assessment.

Compressible Ground

Made Ground has been identified in some of the ground investigations carried out at the site. The Made Ground encountered has been of variable thickness and composition. Made Ground may be found in others areas of the site even where there is no apparent history of industrial development (such as the area north of the veterinary school where ground levels appear to have been raised). Due to the inherent variability in composition, thickness and strength, structures and infrastructure constructed on Made Ground may be at risk from high total and/or differential settlements. The potential presence of buried former foundations, structures or other obstructions should not be overlooked as these may cause differential settlements or prevent penetration of for example piles or other penetrative ground improvement techniques.

General presence of ‘Clay soils’

The anticipated general presence of the Gault Clay will classify the site as a ‘Clay Soil’ site. Previous ground investigations at the site have shown that the Gault Clay is of high to very high plasticity and is therefore particularly susceptible to volume change.

Seasonal changes in moisture content can affect the near surface soils and foundations in clay soils adopt a minimum depth to avoid such movements. Vegetation such as trees and dense hedgerows can desiccate clay soils to considerable depth and the shrinkage or swelling caused by the planting or removal of trees and hedgerows on clay soils is a common cause of structural damage. New trees planted near foundations cause shrinkage, while the ground below trees and hedgerows that have been removed and built over can take many years to resaturate. In doing so, the ground can swell, causing heave and structural damage.

Design and construction protocols to manage risk of shrinkage/ swelling movements on clay soil sites are well established with published guidelines produced by the Building Research Establishment. Adherence to these published guidelines, including guidelines on new proposed landscape plantings, should ensure no increased risk to development as result of the clay soil classification of the site.

Aggressive ground conditions

The Gault Clay is known to contain sulphate minerals which in the presence of groundwater and air can give rise to aggressive conditions for buried concrete. Previous investigations have reported the sulphate conditions to be DS-2/3, according to BS 8500-1:2005, and concrete for foundations specified accordingly. A check on conditions should be made prior to construction.

5.3 Foundations

Based on the findings of previous ground investigations, it is likely that the Head Deposits, where present, will not exceed 3m in thickness and will consist of firm to stiff sandy gravelly clay. Conventional foundations bearing on to Head Deposits are expected to be suitable for lightly loaded structures, but the depth, thickness and composition of the Head Deposits may be highly variable. Foundations that span different or variable soil types may need to be stepped or lightly reinforced.

More heavily loaded foundations may need to be extended down to the underlying more competent and consistent Gault Clay stratum, either by using trench fill foundation or by piling.

Traditional shallow spread or strip foundations are likely to be suitable for some developments on the Gault Clay. However, the Gault Clay is susceptible to weathering and softening which could affect the allowable bearing pressure and, consequently the depth of the weathering and foundation design parameters should be established on a site specific basis. Gault Clay is also susceptible to ground movements, shrinkage and swelling, due to seasonal and long term moisture changes. All clay soils consolidate to a varying degree under applied loading, and the allowable bearing pressure will be determined to ensure total and differential settlements remain within structural tolerances.

Heavily loaded foundations for major structures may exceed settlement tolerances and in such cases piled foundations will be required. Consequently large span buildings, high rise structures or buildings that are very sensitive to settlement may need piled foundations at this site, even if situated on undisturbed natural ground.

Piled foundations are likely to be required where buildings are to be constructed with undercrofts.

5.4 Slope Stability

In general, the gently sloping topography of the site would not be expected to give rise to significant slope stability issues. However, the presence of Head Deposits at the surface increases the risk of slope instability. Relict slip surfaces roughly parallel to the ground surface and often covering large areas may be present within the Head Deposits themselves, and also in the underlying periglacially weathered clay. Polished surfaces, indicative of possible solifluction/hill creep, were identified in shallow clay soils during the archaeological investigation.

Excavations through these relict slip surfaces, e.g. to create level platforms for development, may lead to reactivation and ground instability. Head Deposits may have already been disturbed by earthwork operations in some areas. Further plot specific ground investigation will be required to assess the potential impacts of these features in currently undeveloped areas of the site as part of the design process.

5.5 Roads and Pavements

Roads constructed in areas where natural soft materials are present at formation level, may require capping layers. Roads in areas of Made Ground will require investigation prior to construction to determine the nature and thickness of the fill material and its properties, and mitigating measures designed accordingly.

CBR tests carried out for the Phase 3 infrastructure ground investigation recorded CBR values of approximately 6% (unsoaked) for near surface samples collected from the Head Deposits/weathered Gault Clay. Based on the plasticity of the Gault Clay, long-term equilibrium CBR values of 2% are considered more appropriate for construction directly on to the Gault Clay (TRRL, 1984).

The use of lime stabilisation methods to improve the geotechnical performance of the near surface soils may be feasible depending on the outcome of laboratory trials. Gault Clay is known to be pyritic, and therefore the swelling propensity of these soils when stabilised with lime would have to be fully assessed.

5.6 General Excavations

Excavations in natural ground, such as for services, should not present any problems specific to the site area. Clay soils predominate and consequently groundwater inflows are likely to be slight and easily controlled. Excavations will require side support wherever man entry is required and in soft or loose material side support should also be provided wherever there is a risk of collapse.

5.7 Infiltration Drainage

The Gault Clay is practicably impermeable so there is no scope for the use of infiltration drainage for the attenuation of runoff from buildings and paved areas. Surface water systems should be designed in accordance with the principles of sustainable urban drainage, SUDS.

5.8 Re-use of Materials

From the overview of earthworks testing carried out as part of previous on-site ground investigations, the re-use of site won natural materials for earthworks is likely to be practicable. The Gault Clay and Head Deposit materials are considered to be suitable for most applications although moisture conditioning may be required to achieve optimum conditions for some applications.

5.9 Ground Investigation

An intrusive geotechnical investigation will be required in due course to provide site specific information to assist in the design of the proposed development. The investigation work will be required to confirm the general near surface ground and groundwater conditions on the site in areas yet to be fully investigated.

6 Essential Guidance for Report Readers

This report has been prepared within an agreed timeframe and to an agreed budget that will necessarily apply some constraints on its content and usage. The remarks below are presented to assist the reader in understanding the context of this report and any general limitations or constraints. If there are any specific limitations and constraints they are described in the report text.

The opinions and recommendations expressed in this report are based on statute, guidance, and best practice current at the time of its publication. Peter Brett Associates LLP (PBA) does not accept any liability whatsoever for the consequences of any future legislative changes or the release of subsequent guidance documentation, etc. Such changes may render some of the opinions and advice in this report inappropriate or incorrect and the report should be returned to us and reassessed if required for re-use after one year from date of publication. Following delivery of the report PBA has no obligation to advise the Client or any other party of such changes or their repercussions.

Some of the conclusions in this report may be based on third party data. No guarantee can be given for the accuracy or completeness of any of the third party data used. Historical maps and aerial photographs provide a “snap shot” in time about conditions or activities at the site and cannot be relied upon as indicators of any events or activities that may have taken place at other times.

The conclusions and recommendations made in this report and the opinions expressed are based on the information reviewed and/or the ground conditions encountered in exploratory holes and the results of any field or laboratory testing undertaken. There may be ground conditions at the site that have not been disclosed by the information reviewed or by the investigative work undertaken. Such undisclosed conditions cannot be taken into account in any analysis and reporting.

This report has been written for the sole use of the Client stated at the front of the report in relation to a specific development or scheme. The conclusions and recommendations presented herein are only relevant to the scheme or the phase of project under consideration. This report shall not be relied upon or transferred to any other party without the express written authorisation of PBA. Any such party relies upon the report at its own risk.

The interpretation carried out in this report is based on scientific and engineering appraisal carried out by suitably experienced and qualified technical consultants based on the scope of our engagement. We have not taken into account the perceptions of, for example, banks, insurers, other funders, lay people, etc, unless the report has been prepared specifically for that purpose. Advice from other specialists may be required such as the legal, planning and architecture professions, whether specifically recommended in our report or not.

Public or legal consultations or enquiries, or consultation with any Regulatory Bodies (such as the Environment Agency, Natural England or Local Authority) have taken place only as part of this work where specifically stated.

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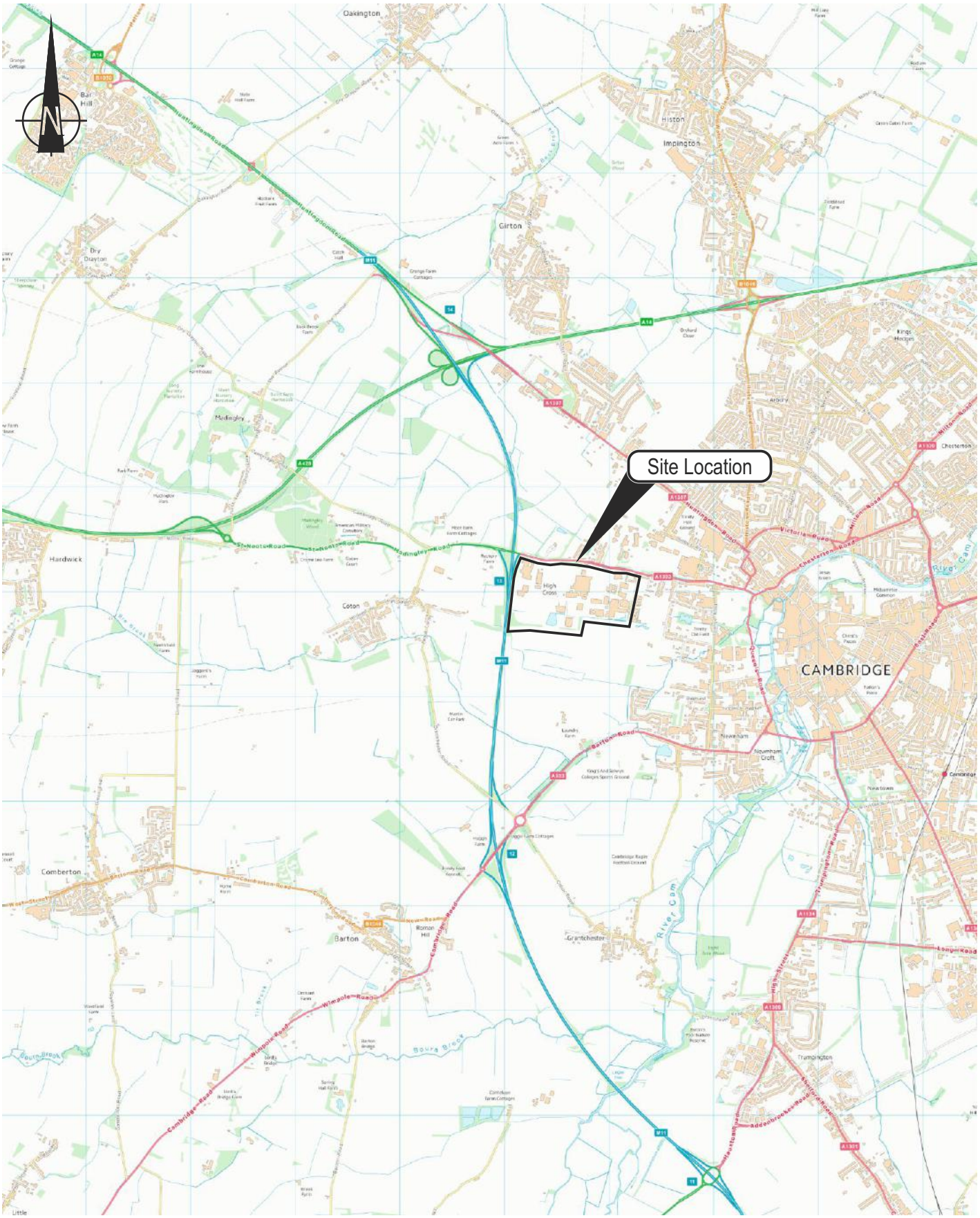
FIGURES



Site Grid Ref: TL 425 590

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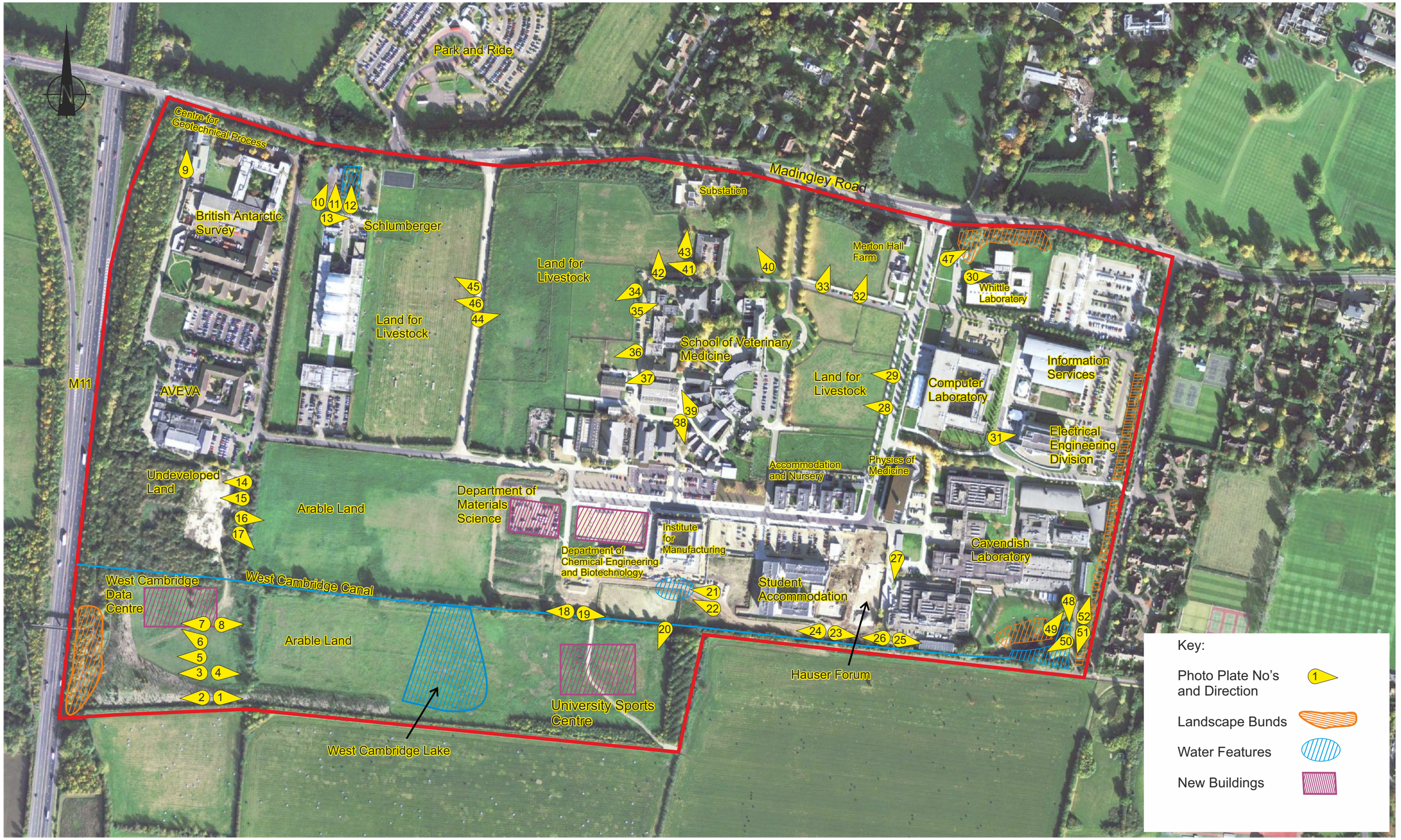
WEST CAMBRIDGE MASTERPLAN SITE

SITE LOCATION PLAN

Date	18.05.2015
A4 Scale	1:50 000
Drawn by	davco
Checked by	RF
Revision	0

FIGURE 1



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Google Earth

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Image Date: Oct 2008

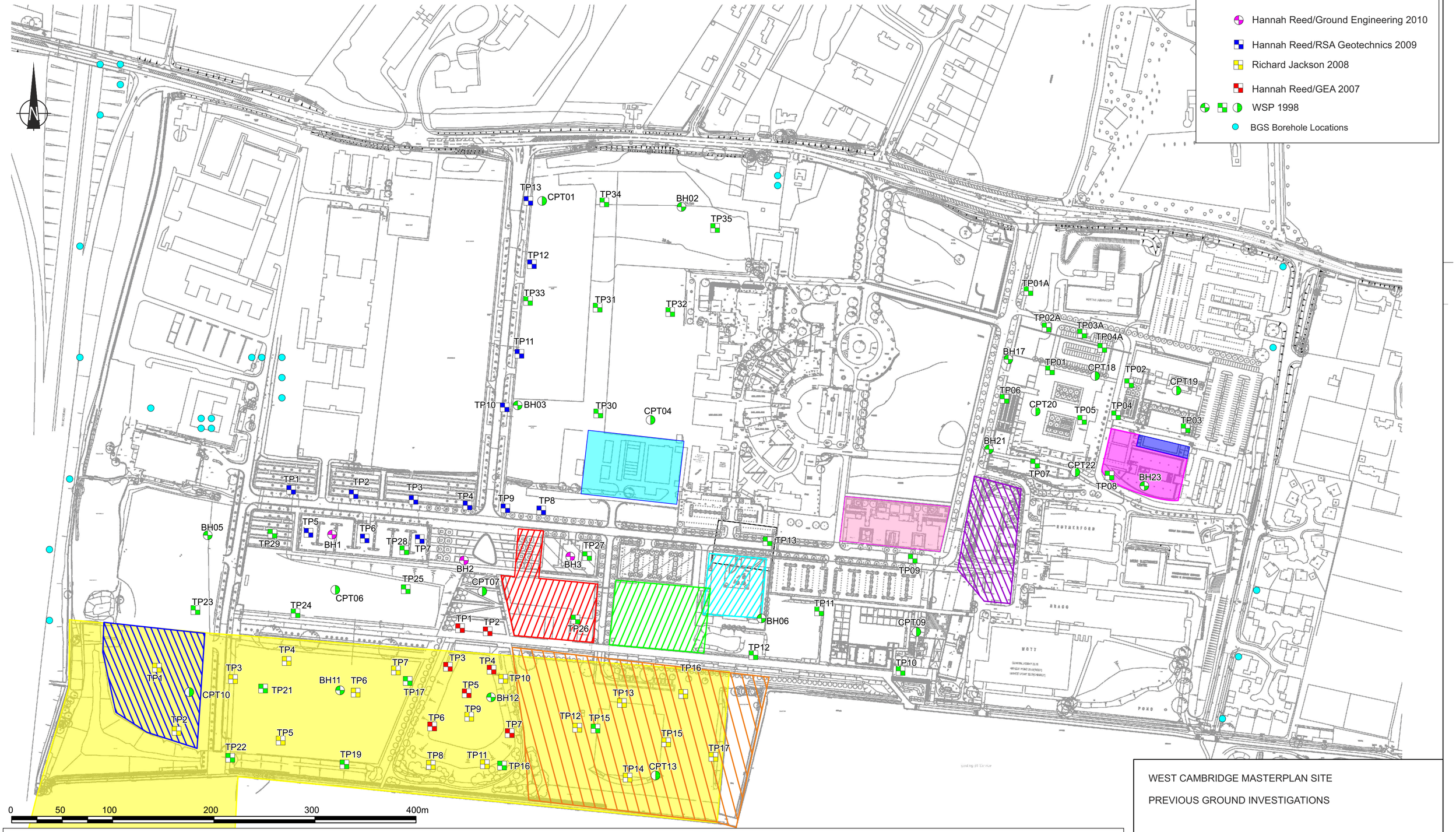
WEST CAMBRIDGE
MASTERPLAN SITE

SITE WALKOVER PLAN

Date	14.05.2015
A3 Scale	1:4000
Drawn by	davco
Checked by	AJ
Revision	0

FIGURE 2

J:\31500 West Cambridge\Geo\CAD & Graphics\Corel



CAPE Extension Annex - Ramboll / Fugro 2013

University of Cambridge Data Centre Ground Investigation - Arup/Bam Richies 2012

University of Cambridge Chemical Engineering & Biotechnology - Ramboll/Ground Engineering 2012

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Institute for Manufacturing Ground Investigation - Ove Arup /Ground Engineering 2007

Physics of Medicine Ground Investigation - Ground Engineering 2006

CAPE Building - Oscar Faber / Geotechnical Engineering 2001

West Cambridge Residencies Ground Investigation - WSP 2001

State Veterinary Investigation Centre 1995 / Atkins / ADAS 1996

Land Off Charles Babbage Road, West Cambridge- Mira 2014

WEST CAMBRIDGE MASTERPLAN SITE

PREVIOUS GROUND INVESTIGATIONS

Client: UNIVERSITY OF CAMBRIDGE

Date of 1st Issue: 27.10.2014	Drawn by: davco
A2 Scale: 1:2500	Checked by: RF
Figure Number: 3	

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Appendix 1 PBA Methodology for Ground Condition Assessment

PBA Methodology for Assessing Land Contamination in England

1 Introduction

This document defines the approach adopted by PBA in relation to the assessment of land contamination in England. The aim is for the approach to (i) be systematic and objective, (ii) provide for the assessment of uncertainty and (iii) provide a rational, consistent, transparent framework.

When preparing our methodology we have made reference to various technical guidance documents and legislation referenced in Section 7 of which the principal documents are (i) Contaminated Land Statutory Guidance (Defra 2012), (ii) the Model Procedures for the Management of Contamination (CLR 11) (EA 2004), (iii) Contaminated land risk assessment: A guide to good practice (C552) (CIRIA 2001) and (iv) National Planning Policy Framework (DCLG 2012).

2 Dealing with Land Contamination

Government policy on land contamination aims to prevent new contaminated land from being created and promotes a risk based approach to addressing historical contamination. With regard to historical contamination, regulatory intervention is held in reserve for land that meets the legal definition and cannot be dealt with through any other means, including through planning. Land is only considered to be "contaminated land" in the legal sense if it poses an unacceptable risk.

UK legislation on contaminated land is principally contained in Part 2A of the Environmental Protection Act, 1990 (which was inserted into the 1990 Act by section 57 of the Environment Act 1995). Part 2A was introduced in England on 1 April 2000 and provides a risk-based approach to the identification and remediation of land where contamination poses an unacceptable risk to human health or the environment. In 2004 the Model Procedures for the Management of Contamination (CLR 11) were published providing guidance on how the statutory requirements were to be delivery. The approach, concepts and principles for land contamination management promoted by CLR 11 are applied to the determination of planning applications.

Other legislative regimes may also provide a means of dealing with land contamination issues, such as the regimes for waste, water, environmental permitting, and environmental damage. Further, the law of statutory nuisance may result in contaminants being unacceptable to third parties whilst not attracting action under Part 2A or other environmental legislation.

2.1 Part 2A

The Regulations and Statutory Guidance that accompanied the Act, including the Contaminated Land (England) Regulations 2006, has been revised with the issue of The Contaminated Land (England) (Amendment) Regulations 2012 (SI 2012/263) and the Contaminated Land Statutory Guidance for England 2012.

Part 2A defines contaminated land as "*land which appears to the Local Authority in whose area it is situated to be in such a condition that, by reason of substances in, on or under the land that significant harm is being caused, or there is a significant possibility that such harm could be caused, or pollution of controlled waters is being, or likely to be, caused*".

Harm is defined as "*harm to the health of living organisms or other interference with the ecological systems of which they form part, and in the case of man, includes harm to his property*".

For the purposes of Part 2A, land is contaminated if it poses a significant possibility of significant harm (SPOSH).

Part 2A provides a means of dealing with unacceptable risks posed by land contamination to human health and the environment, and under the guidance enforcing authorities should seek to find and deal with such land. It states that "*under Part 2A the starting point should be that land is not contaminated land unless there is reason to consider otherwise. Only land where unacceptable risks are clearly identified, after a risk assessment has been undertaken in accordance with the Guidance, should be considered as meeting the Part 2A definition of contaminated land"*. Further the guidance makes it clear that *"regulatory decisions should be based on what is reasonably likely, not what is hypothetically possible".*

The overarching objectives of the Government's policy on contaminated land and the Part 2A regime are:

"(a) To identify and remove unacceptable risks to human health and the environment.
(a) To seek to ensure that contaminated land is made suitable for its current use.
(b) To ensure that the burdens faced by individuals, companies and society as a whole are proportionate, manageable and compatible with the principles of sustainable development".

The enforcing authority may need to decide whether and how to act in situations where decisions are not straight forward, and where there is uncertainty. "*In so doing, the authority should use its judgement to strike a reasonable balance between: (a) dealing with risks raised by contaminants in land and the benefits of remediating land to remove or reduce those risks; and (b) the potential impacts of regulatory intervention including financial costs to whoever will pay for remediation, health and environmental impacts of taking action, property blight, and burdens on affected people".* The authority is required to "*take a precautionary approach to the risks raised by contamination, whilst avoiding a disproportionate approach given the circumstances of each case".* The aim is "*that the regime produces net benefits, taking account of local circumstances*".

The guidance recognises that *"normal levels of contaminants in soils should not be considered to cause land to qualify as contaminated land, unless there is a particular reason to consider otherwise".*

Normal levels are quoted as:
"a) natural presence of contaminants' such as from underlying geology *'that have not been shown to pose an unacceptable risk to health and the environment*
b) …low level diffuse pollution, and common human activity…"

Similarly the guidance states that significant pollution of controlled waters is required for land to be considered contaminated and the "*fact that substances are merely entering water"* or "*where discharge from land is not discernible at a location immediately downstream"* does not constitute contaminated land.

To help achieve a more targeted approach to identifying and managing contaminated land in relation to the risk (or possibility) of harm to human health, the revised Statutory Guidance presented a new four category system for considering land under Part 2A, ranging from Category 4, where there is no risk that land poses a significant possibility of significant harm (SPOSH), or the level of risk is low, to Category 1, where the risk that land poses a significant possibility of significant harm (SPOSH) is unacceptably high.

For land that cannot be readily placed into Categories 1 or 4 further assessment is required. If there is a sufficiently strong case that the risks are of sufficient concern to cause significant harm/pollution or have the significant possibility of significant harm/pollution the land is to be placed into Category 2. If the concern is not met land is considered Category 3.

The technical guidance clearly states that the currently published SGV and GAC's represent *"cautious estimates of level of contaminants in soils"* which should be considered *"no risk to health or, at most, a minimal risk"*. These values do not represent the boundary between categories 3 and 4 and "*should be considered to be comfortably within Category 4".*

At the end of 2013 technical guidance in support of Defra's revised Statutory Guidance (SG) was published (CL:AIRE 2013) which provided:

- A methodology for deriving C4SLs for four generic land-uses comprising residential, commercial, allotments and public open space; and
- A demonstration of the methodology, via the derivation of C4SLs for six substances – arsenic, benzene, benzo(a)pyrene, cadmium, chromium (VI) and lead.

2.2 Planning

The Local Planning Authority (LPA) is responsible for the control of development, and in doing so it has a duty to take account of all material considerations, including contamination.

Section 11, Paragraph 109 of the National Planning Policy Framework (NPPF) (DCLG 2012) states the planning system should contribute to and enhance the natural and local environment by *"preventing both new and existing developments from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water pollution"* and *"remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate"*. Paragraphs 120 and 121 describe the policy considerations the Government expects LPA to have in regard to land affected by contamination when preparing policies for development plans and in taking decisions on applications.

For planning purposes, the NPPF requires that the assessment of risks arising from contamination and remediation requirements should be considered on the basis of the current environmental setting, the current land use, and the circumstances of its proposed new use The NPPF stipulates that planning policies and decisions should ensure that "the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation"; and that "after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990; and adequate site investigation information, prepared by a competent person, is presented."

The level at which contamination is deemed to be unacceptable, or, gives rise to adverse effects under a planning context has not been identified but is envisaged to be more precautionary than the level required to detrmine land as contaminated under Part 2A.

In paragraph 121 the developer is required to ensure that land, after development, is not capable of being determined as contaminated land under Part 2A of the EPA 1990.

The principal planning objective is to ensure that any unacceptable risks to human health, buildings and other property and the natural and historical environment from the contaminated condition of the land are identified so that appropriate action can be considered and taken to address those risks. In order to grant a planning permission the Local Planning Authority (LPA) has to be satisfied that there is sufficient information about the condition of the land, its impacts and the availability of viable remedial options. NPPF Paragraph 21 states that *"planning policies and decisions should also ensure that adequate site investigation information, prepared by a competent person, is presented".* Site investigation information is further defined in the NPPF Glossary page 56 and that also states that investigations should be carried out in accordance with established procedures, including BS10175 (BSI 2011) that in turn links procedure to the requirements of CLR11.

A key distinction between the Soil Guideline Values (SGVs) and the C4SLs is the level of risk that they describe. As described by the Environment Agency (2009a):

"SGVs are guidelines on the level of long-term human exposure to individual chemicals in soil that, unless stated otherwise, are tolerable or pose a minimal risk to human health."

A letter from Lord de Mauley dated 3rd September 2014 provides more explicit direction to local authorities on the use of the C4SL in a planning context. The letter identifies four key points:

1) that the screening values were developed expressly with the planning regime in mind
2) their use is recommended in DCLG's planning guidance
3) soil concentrations below a C4SL limit are considered to be 'definitely not contaminated' under Part llA of the 1990 Environmental Protection Act and pose at most a 'low level of toxicological concern' and
4) exceedance of a C4SL screening value does not mean that land is definitely contaminated, just that further investigation may be warranted.

2.3 Building Control

The building control department of the local authority or private sector approved inspectors are responsible for the operation and enforcement of the Building Regulations (DCLG 2010) to protect the health, safety and welfare of people in and around buildings. Approved Document C requires the protection of buildings and associated land from the effects of contamination, to be applied (non-exclusively) in all changes of use from commercial or industrial premises, to residential property.

3 Approach

CLR 11 recommends a phased or tiered approach to risk assessment with the three tiers being:-

- Tier 1 - preliminary – a qualitative assessment forming part of a Phase 1 report,
- Tier 2 - generic - a quantitative assessment using published criteria to screen site specific ground condition data forming part of a Phase 2 report
- Tier 3 - detailed – a quantitative assessment involving the generation of site specific assessment criteria

Each tier of risk assessment comprises the following four stages:-

1. Hazard Identification – identifying potential contaminant sources on and off site;
2. Hazard Assessment – assessing the potential for unacceptable risks by identifying what pathways and receptors could be present, and what pollutant linkages could result (forming the Conceptual Site Model (CSM));
3. Risk Estimation – estimating the magnitude and probability of the possible consequences (what degree of harm might result to a defined receptor and how likely); and
4. Risk Evaluation – evaluating whether the risk needs to be, and can be, managed.

A PBA Phase 1 report normally comprises a desk study, walkover and Tier 1 risk assessment (the project specific offer defines the actual scope of work). This is the minimum requirement as defined by the NPPF, pp56. At Tier 1 the PBA approach to risk estimation involves identifying the magnitude of the potential consequence (taking into account both the potential severity of the hazard and the sensitivity of the receptor) and the magnitude of the likelihood i.e. the probability (taking into account the presence of the hazard and the receptor and the integrity of the pathway). This approach is promoted in current guidance such as R&D 66 (NHBC 2008).

The PBA approach is that if a pollution linkage is identified then it represents a potential risk which requires further consideration and either (1) remediation / direct risk management or (2) further tiers of assessment.

A PBA preliminary Phase 2 report comprises an intrusive investigation to collect site specific information, a Tier 2 quantitative generic risk assessment and a refinement of the CSM using the site specific data. Depending on the findings further investigation and/or progression to Tier 3 risk assessment and the generation of site specific assessment criteria may be required.

The PBA methodology provides an estimate of the level of risk, it does not identify a risk level at which the risk is considered “significant” and/or “unacceptable” as this is dependant on the view of the individual / stakeholder. For example; to a risk adverse stakeholder even a risk level of “very low” may be considered unacceptable and as such this stakeholder may require risk management options to be implemented.

4 Identification of Pollutant Linkages and Conceptual Site Model (CSM)

For all Tiers the underlying principle to ground condition assessment is the identification of *pollutant linkages* in order to evaluate whether the presence of a source of contamination could potentially lead to harmful consequences. A pollutant linkage consists of the following three elements:-

- A source/hazard – a substance or situation which has the potential to cause harm or pollution;
- A pathway – a means by which the hazard moves along / generates exposure; and
- A receptor/target – an entity which is vulnerable to the potential adverse effects of the hazard.

The *Conceptual Site Model* identifies the types and locations of potential contaminant sources/hazards and potential receptors and potential migration/transportation pathway(s). The CSM is refined as the assessment progresses through the Tiers.

4.1 Hazard Identification

A hazard is a substance or situation that has the potential to cause harm. Hazards may be chemical, biological or physical (e.g. explosive gases).

At Tier 1 the potential for hazards to be present is determined from consideration of the previous or ongoing activities on or near to the site in accordance with the criteria presented in the **Table 1**.

Based on the land use information Potential Contaminants of Concern (PCOC) are identified. The PCOC direct the scope of the collection of site specific data and the analytical testing selected for subsequent Tiers.

At Tier 2 the site specific data is screened using published assessment criteria (refer to PBA document entitled Rationale for the Selection of Tier 2 Assessment Criteria). In general, published criteria have been developed using highly conservative assumptions and therefore if the screening criterion is not exceeded then the PCOC is eliminated as a potential Hazard. It should be noted that exceedance does not necessarily indicate that a site is contaminated and/or unsuitable for use only that the PCOC is retained as a potential Hazard. Published criteria are generated using models based on numerous and complex assumptions. Whether or not these assumptions are appropriate in a site-specific context requires confirmation on a project by project basis and would form part of a Tier 3 assessment.

When reviewing or assessing site specific data PBA utilise published guidance on comparing contamination

data with a critical concentration (CL:AIRE/CIEH 2008) which presents a structured process for employing statistical techniques for data assessment purposes. The benefit of the statistical tool is uncertainty is quantified and decisions are made knowing the strength of the evidence. Correct decision probability is a function of sample size, difference in the mean and the critical concentration, variation in measured values and the significance level.

4.2 Receptor and Pathway Identification

For all Tiers the potential receptors (for both on site and adjoining land) that will be considered are:

- Human Health – including current and future occupiers, construction and future maintenance workers, and neighbouring properties/third parties;
- Ecological systems; *[1]
- Controlled waters *[2] – including surface water and groundwater;
- Property, Animal or Crop (existing or proposed) - including buildings, service lines and pipes, crops, livestock, pets, woodland; and
- Archaeological sites and ancient monuments.

*[1] International or nationally designated sites (as defined in the statutory guidance (Defra Circular 04/12)) "in the local area" will be identified as potential ecological receptors. A search radius of 1, 2 or 5km will be utilised depending on the site specific circumstances (see also pathway identification). The Environment Agency has published an ecological risk assessment framework (EA 2008) which promotes (as opposed to statutorily enforces) consideration of additional receptors to include locally protected sites and protected or notable species. These additional potential receptors will only be considered if a Phase 1 habitat survey, undertaken in accordance with guidance (JNCC 1993), is commissioned and the data provided to PBA. It should be noted that without such a survey the Tier 1 risk assessment may conclude that the identification of potential ecological receptors is inconclusive (refer to PBA Specification for Phase 1).

*[2] the definition of "pollution of controlled water" was amended by the introduction of Section 86 of the Water Act 2003. For the purposes of Part 2A groundwater does not include waters above the saturated zone and our assessment does not therefore address perched water other than where development causes a pathway to develop.

If a receptor is taken forward for further assessment it will be classified in terms of its sensitivity, the criteria for which are presented in **Table 2**. Table 2 has been generated using descriptions of environmental receptor importance/value given in various guidance documents including R&D 66 (NHBC 2008) and Transport Analysis Guidance (based on DETR 2000). Human health and buildings classifications have been generated by PBA using the attribute description for each class.

The exposure pathway and modes of transport that will be considered are presented in **Table 3**.

4.3 Note regarding Ecological Systems

The Environment Agency (EA) has developed an ecological risk assessment framework which aims to provide a structured approach for assessing the risks to ecology from chemical contaminants in soils (EA 2008). In circumstances where contaminants in water represent a potential risk to aquatic ecosystems then risk assessors will need to consider this separately.

The framework consists of a three tiered process:-

- Tier 1 is a screening step where the site soils chemical data is compared to a soil screening value (SSV)
- Tier 2 uses various tools (including surveys and biological testing) to gather evidence for any harm to the ecological receptors
- Tier 3 seeks to attribute the harm to the chemical contamination

Tier 1 is preceded by a desk study to collate information about the site and the nature of the contamination to assess whether pollutant linkages are feasible. The framework presents ten steps for ecological desk studies and development of a conceptual site model as follows.

1 Establish Regulatory Context
2 Collate and Assess Documentary Information
3 Summarise Documentary Information
4 Identify Potential Contaminants of Concern
5 Identify Likely Fate Transport of Contaminants
6 Identify Potential Receptors of Concern
7 Identify Potential Pathways of Concern
8 Create a Conceptual Site Model
9 Identify Assessment and Measurement Endpoints
10 Identify Gaps and Uncertainties

The information in a standard PBA Phase 1 report covers Steps 1 to 4 inclusive. Step 5 considers fate and transport of contaminants and it should be noted that our standard report adopts a simplified approach considering only transport mechanisms. A simplified approach has also been adopted in respect of Steps 6 and 7 receptors (a detailed review of the ecological attributes has not been undertaken) and pathways (a food chain assessment has not been undertaken).
Step 9 is outside the scope of our standard Phase 1 report.

It should be noted that the Tier 1 assessment for ecological systems (i.e. where designated sites are identified) as part of a Phase 1 report will assess the viability of the mode of transport given the site specific circumstances not specific pathways.

The Tier 1 risk assessment may conclude that the risk to potential ecological receptors is inconclusive (see PBA Specification for Phase 1).

4.4 Note regarding Controlled Waters

Controlled Waters are rivers, estuaries, coastal waters, lakes and groundwaters, but not perched waters.

The Water Framework Directive (WFD) (2000) aims to protect and enhance the quality of surface freshwater, groundwaters and dependent eco systems, estuaries and coastal waters. The WFD was transposed into UK law in 2003 (Statutory Instruments 2003). Member states must aim to reach good chemical and ecological status as defined in the Directive by 2015.

The Ground Water Daughter Directive (GWDD) was enacted by the Groundwater Regulations (2009), which were subsumed by the Environmental Permitting Regulations (2010) which provide essential clarification including on the four objectives specifically for groundwater quality in the WFD:-

- Achieve 'Good' groundwater chemical status by 2015, commonly referred to as 'status objective';
- Achieve Drinking Water Protected Area Objectives;
- Implement measures to reverse any significant and sustained upward trend in groundwater quality, referred to as 'trend objective'; and
- Prevent or limit the inputs of pollutants into groundwater, commonly referred to as 'prevent or limit' objectives

The Water Act 2003 (Commencement No.11) Order 2012 amends the test for 'contaminated land' which relates to water pollution so that pollution of controlled waters must now be "significant" to meet the definition of contaminated land.

River Basin Management Plans (RBMP) have been developed for the 11 River Basin Districts in England and Wales. These were released by Defra in 2009 (Defra 2009).

These RBMP's establish the current status of waters within the catchments of the respective Districts and the current status of adjoining waters identified. As part of a Tier 2 risk assessment water quality data is screened against the WFD assessment criteria. Compare to the RBMP's current status of waters for the catchment under consideration would form part of a Tier 3 assessment.

5 Risk Estimation

Risk estimation classifies what degree of harm might result to a receptor (defined as consequence) and how likely it is that such harm might arise (probability).

At Tier 1 the consequence classification is generated by multiplying the hazard classification score and the receptor sensitivity score. This approach follows that presented in the republished R&D 66 (NHBC 2008).

The criteria for classifying probability are set out in **Table 4** and have been taken directly from Table 6.4 CIRIA C552 (CIRIA 2001). Probability considers the integrity of the exposure pathway.

The consequence classifications detailed in **Table 5** have been adapted from Table 6.3 presented in C552 and R&D 66 (Annex 4 Table A4.3).

The Tier 1 risk classification is estimated for each pollutant linkage using the matrix given in **Table 6** which is taken directly from C552 (Table 6.5).
Subsequent Tiers refine the CSM through retention or elimination of potential hazards and pollutant linkages.

6 Risk Evaluation

In order to put the Tier 1 risk classification into context the likely actions are described in **Table 7** which is taken directly from C552 (Table 6.6). Subsequent Tiers identify potential risk management options through remediation and/or mitigation measures.

Unless the initial assessment clearly demonstrates that the risk from contamination can be satisfactorily reduced to an acceptable level, further site investigations and risk assessment will be needed before the application can be determined.

7 References

BSI 2007 BS 8485 Code of Practice for characterisation and remediation from ground gas in affected developments.
BSI 2011 BS 10175 (2011) Code of practice - Investigation of potentially contaminated sites

CIRIA 2001: Contaminated land risk assessment – a guide to good practice C552.

CIRIA 2008: Assessing risks posed by hazardous ground gases to buildings C655

CL:AIRE/EIH 2008 Guidance on Company Soil Contamination Data with a Critical Concentration. Published by Contaminated Land: Applications in Real Environments (CL:AIRE)

CL:AIRE 2013 SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination. Final Project Report published by Contaminated Land: Applications in Real Environments (CL:AIRE) 20th December 2013

DCLG 2010 Building Regulations 2010 Approved Document C Site preparation and resistance to contaminants and moisture.

DCLG 2012 National Planning Policy Framework.

DETR 2000 Methodology for Multi Modal Studies. Volume 2 Section 4. The Environmental Objective.

Defra Circular 01/2006

Defra Circular 04/2012 Environmental Protection Act 1990: Part 2A. Contaminated Land Statutory Guidance.

DEFRA, 2006 The Contaminated Land (England) Regulations 2006.

DEFRA, 2012 The Contaminated Land (England) (Amendment) Regulations 2012 (SI2012/263).

DEFRA, 2012 Environmental Protection Act 1990: Part 2A. Contaminated Land Statuary Guidance. April 2012.

DEFRA, 2013 Environmental Damage (Prevention and Remediation) Regulations 2009: Guidance for England and Wales

Defra '2009 Water for Life and Livelihoods. River Basin Management Plan. (11 Districts: Anglia, Dee, Humber, Northumbria, Northwest, Severn, Solway and Tweed, Southeast, Thames, Western Wales) December 2009

EA 2004: The Model Procedures for the Management of Land Contamination CRL 11 published by the Environment Agency (EA).

EA 2008 Ecological Risk Assessment Science Report Series SC070009 published by the Environment Agency (EA).

European Community 2000 Water Framework Directive (2000/60/EC)

JNCC 1993 Handbook for Phase 1 Habitat Survey – A Technical for Environmental Audit prepared by the Joint Nature Conservancy Council (JNCC)

NHBC/EA/CIEH 2008: R&D Publication 66 Guidance for the safe development of housing on land affected by contamination.

Statutory Instrument 2003 No. 3242 Water Resources, England and Wales. The Water Environment (Water Framework Directive) Regulations 2003.

Table 1: Criteria for Classifying Hazards / Potential for Generating Contamination

Classification/Score	Potential for generating contamination/gas based on land use
Very Low 1	Land Use: greenfield Contamination: None. Gas generation potential : Inert Made Ground
Low 2	Land Use: residential, retail or office use, recent small scale industrial. Contamination: None or locally slightly elevated concentrations. Gas generation potential : Shallow thickness of Alluvium
Moderate 3	Land Use: railway yards, collieries, scrap yards, light industry, engineering works. Contamination: Locally elevated concentrations. Gas generation potential : Dock silt and substantial thickness of organic alluvium/peat
High 4	Land Use: gas works, chemical works, heavy industry, non-hazardous landfills. Contamination: Possible widespread elevated concentrations. Gas generation potential : Shallow mine workings Pre 1960's landfill
Very High 5	Land Use: hazardous waste landfills. Contamination: Likely widespread elevated concentrations. Gas generation potential : Domestic landfill post 1960

"Greenfield" is land which has not been developed including not used for crop production or animal husbandry and no contamination source therefore no pollutant linkages.

Table 2: Criteria for Classifying Receptor Sensitivity/Value

Classification/Score	Definition
Very Low 1	Receptor of limited importance Groundwater: Non aquifer Surface water: GQA Grade F Ecology: No local designation Buildings: Replaceable Human health: Unoccupied/limited access
Low 2	Receptor of local or county importance with potential for replacement Groundwater: Secondary aquifer Surface water: GQA Grade D/E Ecology: local habitat resources Buildings: Local value Human health: Minimum score 4 where human health identified as potential receptor
Moderate 3	Receptor of local or county importance with potential for replacement Groundwater: Principal aquifer Surface water: GQA Grade B/C Ecology: County wildlife sites, Areas of Outstanding Natural Beauty (AONB) Buildings: Area of Historic Character Human health: Minimum score 4 where human health identified as potential receptor
High 4	Receptor of county or regional importance with limited potential for replacement Groundwater: Source Protection Zone 2 Surface water: GQA Grade A Ecology: SSSI, National or Marine Nature Reserve (NNR or MNR) Buildings: Conservation Area Human health: Minimum score 4 where human health identified as potential receptor
Very High 5	Receptor of national or international importance Groundwater: Source Protection Zone 1 Surface water: GQA Grade A Ecology: Special Areas of Conservation (SAC and candidates), Special Protection Areas (SPA and potentials) or wetlands of international importance (RAMSAR) Buildings: World Heritage site Human health: Residential, open spaces and uses where children are present

Table 3: Exposure Pathway and Modes of Transport

Receptor	Pathway	Mode of transport
Human health	Ingestion	Fruit or vegetable leaf or roots
		Contaminated water
		Soil/dust indoors
		Soil/dust outdoors
	Inhalation	Particles (dust / soil) – outdoor
		Particles (dust / soil) - indoor
		Vapours – outdoor - migration via natural or anthropogenic pathways
		Vapours - indoor - migration via natural or anthropogenic pathways
	Dermal absorption	Direct contact with soil
		Direct contact with waters (swimming / showering)
		Irradiation
Groundwater	Leaching	Gravity / permeation
	Migration	Natural – groundwater as pathway Anthropogenic (e.g. boreholes, culverts, pipelines etc.)
Surface Water	Direct	Runoff or discharges from pipes
	Indirect	Recharge from groundwater
	Indirect	Deposition of wind blown dust
Buildings	Direct contact	Sulphate attack on concrete, hydrocarbon corrosion of plastics
	Gas ingress	Migration via natural or anthropogenic paths
Ecological systems	See Notes	Runoff/discharge to surface water body
	See Notes	Windblown dust
	See Notes	Groundwater migration
	See Notes	At point of contaminant source
Animal and crop	Direct	Wind blown or flood deposited particles / dust / sediments
	Indirect	Plants via root up take or irrigation. Animals through watering
	Inhalation	By livestock / fish - gas / vapour / particulates / dust
	Ingestion	Consumption of vegetation / water / soil by animals

Table 4: Classification of Probability

Classification	Definition
High likelihood	There is a pollution linkage and an event either appears very likely in the short-term and almost inevitable over the long-term, or there is already evidence at the receptor of harm / pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.
Low likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter-term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.

Table 5: Classification of Consequence (score = magnitude of hazard Table 1 and sensitivity of receptor Table 2)

Classification / Score	Examples
Severe **20-25**	Human health effect - exposure likely to result in "significant harm". Significant harm to humans is defined in circular 01/2006 as death, disease, serious injury, genetic mutation, birth defects or impairment of reproductive function. Controlled water effect - short-term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource. Equivalent to EA Category 1 incident (persistent and/or extensive effects on water quality leading to closure of potable abstraction point or loss of amenity, agriculture or commercial value. Major fish kill. Ecological effect - short-term exposure likely to result in a substantial adverse effect. Catastrophic damage to crops, buildings or property
Medium **13-19**	Human health effect - exposure could result in "significant harm". Significant harm to humans is defined in circular 01/2006 as death, disease, serious injury, genetic mutation, birth defects or impairment of reproductive function. Controlled water effect - equivalent to EA Category 2 incident requiring notification of abstractor Ecological effect - short-term exposure may result in a substantial adverse effect. Damage to crops, buildings or property
Mild **6-12**	Human health effect - exposure may result in "significant harm". Significant harm to humans is defined in circular 01/2006 as death, disease, serious injury, genetic mutation, birth defects or impairment of reproductive function. Controlled water effect - equivalent to EA Category 3 incident (short lived and/or minimal effects on water quality). Ecological effect - unlikely to result in a substantial adverse effect. Minor damage to crops, buildings or property. Damage to building rendering it unsafe to occupy (for example foundation damage resulting in instability).
Minor **1-5**	No measurable effect on humans. Protective equipment is not required during site works. Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems. Repairable effects to crops, buildings or property. The loss of plants in a landscaping scheme. Discolouration of concrete.

Table 6: Classification of Risk (Combination of Consequence Table 5 and Probability Table 4)

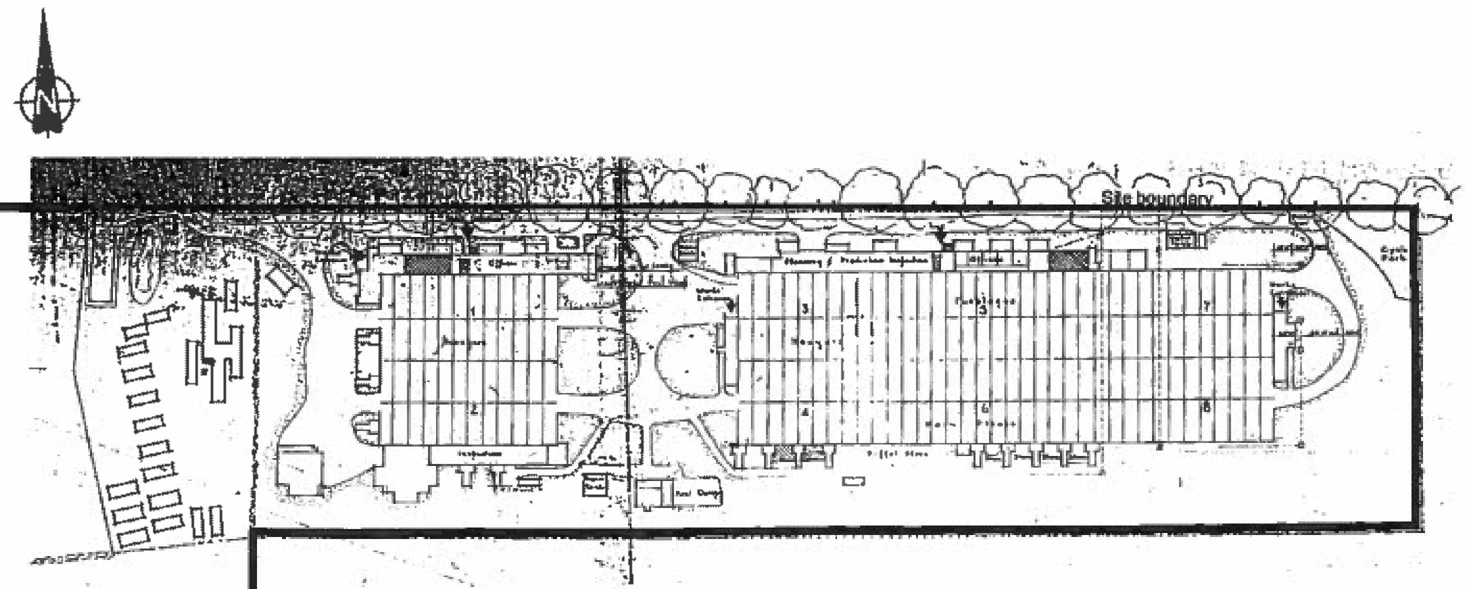
	Consequence			
Probability	***Severe***	***Medium***	***Mild***	***Minor***
High likelihood	Very high	High	Moderate	Low
Likely	High	Moderate	Moderate/low	Low
Low likelihood	Moderate	Moderate/low	Low	Very low
Unlikely	Moderate/low	Low	Very low	Very low

Table 7: Description of Risks and Likely Action Required

Risk Classification	Description
Very high risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation is likely to be required in the short term.
High risk	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short-term and are likely over the longer-term.
Moderate risk	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer-term.
Low risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very low risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

Appendix 2 Shorts Site Layout Plans

DO NOT SCALE



The full extent of the South West part of the site was not available on the original drawing

Reproduced from a diagram provided by the University

WS/Atkins

NOTES.

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Client: UNIVERSITY OF CAMBRIDGE ESTATE MANAGEMENT

Project: HIGH CROSS LEAD CONTAMINATION

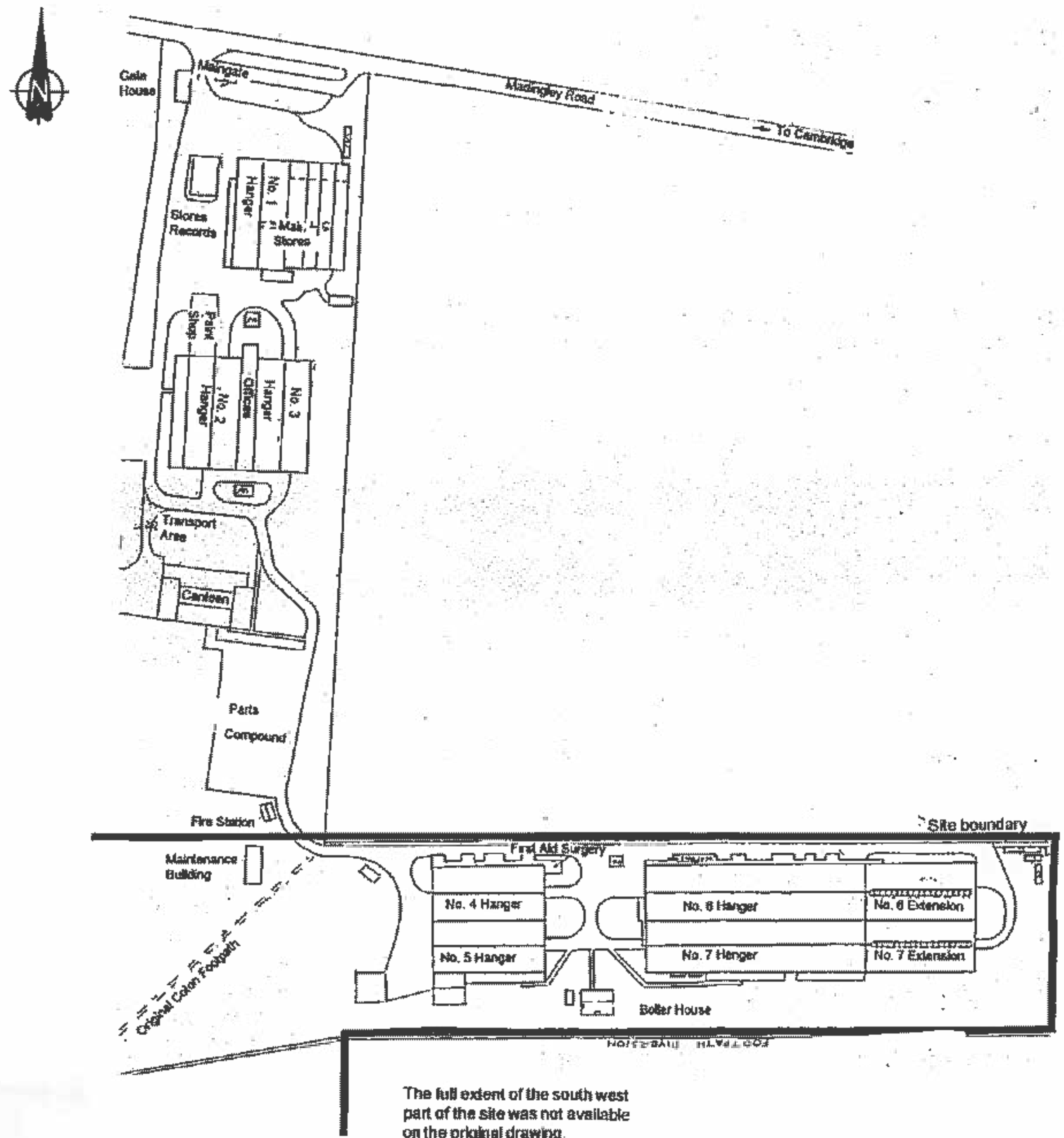
Title: SHORTS SITE 1949

Original Scale	Drawn	Checked	Authorised
NTS		HMP	

Figure Number: Figure 6

Rev

DO NOT SCALE



The full extent of the south west part of the site was not available on the original drawing.

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Project: HIGH CROSS LEAD CONTAMINATION

Title: SHORTS SITE 1943/44

Original Scale	Drawn	Checked	Authorised
NTS		HHP	
	Date 9.10.96	Date 10.10.96	Date 10.10.96

Figure Number: Figure 5

Rev

5031 1095 A3

Appendix 3 Site Walkover Photographs

PHOTO 1 - Public footpath
along southern boundary looking east

PHOTO 2 - Public footpath
along southern boundary looking west

PHOTO 3 - Landscaped bund located southwest
of Former Phase 2 Shorts Site looking west.

PHOTO 4 - Landscaped bund located southwest
of Former Phase 2 Shorts Site looking east.

PHOTO 5 - Area west of Former Phase 2 Shorts Site
(now University Data Centre).

PHOTO 6 - Area west of Former Phase 2 Shorts Site
(now University Data Centre).

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SITE WALKOVER PHOTOGRAPHS

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Revision	0

APP 3 - PLATE 1

PHOTO 7 - Area west of Former Phase 2 Shorts Site, showing gravel filled drain.

PHOTO 8 - View of undeveloped western section of Former Phase 2 Shorts Site (now agricultural field).

PHOTO 9 - Centre for Geotechnical Process storage area

PHOTO 10 - Schlumberger storage area

PHOTO 11 - Schlumberger storage area

PHOTO 12 - Pond feature north of Schlumberger laboratory.

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APP 3 - PLATE 2

PHOTO 13 - Schlumberger liquid nitrogen tank located north of laboratory.

PHOTO 14 - Former Shorts Site parts storage area (now vacant land north of Data Centre)

PHOTO 15 - Former Shorts Site parts storage area (now vacant land north of Data Centre)

PHOTO 16 - Agricultural land located north of Former Phase 2 Shorts Site area

PHOTO 17 - Agricultural land located north of Former Phase 2 Shorts Site area

PHOTO 18 - Canal looking west south of Materials Science building

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APP 3 - PLATE 3

PHOTO 19 - Canal (dry) looking east south of Materials Science building.

PHOTO 20 - Vacant land next to University Sports building.

PHOTO 21 - Pond behind Institute for Manufacturing.

PHOTO 22 - Pond behind Institute for Manufacturing showing drainage structure.

PHOTO 23 - Canal looking east behind student accommodation block.

PHOTO 24 - Canal (dry)looking west behind student accommodation block.

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APP 3 - PLATE 4

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PHOTO 25 - Canal looking east
behind Hauser Forum building.

PHOTO 26 - canal looking west
behind Hauser Forum building.

PHOTO 27 - Liquid nitrogen tanks
adjacent to Cavendish Laboratory

PHOTO 28 - Horse paddock areas
to the west of JJ Thomson Avenue

PHOTO 29 - Horse paddock areas
to the west of JJ Thomson Avenue

PHOTO 30 - Storage area behind Whittle Laboratory

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APP 3 - PLATE 5

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PHOTO 31 - Ornamental feature at entrance to Electrical Engineering building

PHOTO 32 - Horse paddock land south of Merton Hall Farm

PHOTO 33 - Horse paddock land south of Merton Hall Farm

PHOTO 34 - Horse paddock east of School of Veterinary Medicine

PHOTO 35 - Storage area of School of Veterinary Medicine

PHOTO 36 - Horse paddock east of School of Veterinary Medicine

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APP 3 - PLATE 6

PHOTO 37 - Barn storage
part of School of Veterinary Medicine

PHOTO 38 - Cancer Therapy Unit
part of School of Veterinary Medicine

PHOTO 39 - Stables for
School of Veterinary Medicine

PHOTO 40 - Cow paddock
part of Merton Hall Farm

PHOTO 41 - Electrical Infrastructure
north of School of Veterinary Medicine

PHOTO 42 - Electrical Infrastructure
north of School of Veterinary Medicine

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APP 3 - PLATE 7

PHOTO 43 - Electrical Substation (in distance of) off Madingley Road on northern site boundary looking north.

PHOTO 44 - Sheep paddock to the west of the School of Veterinary Medicine

PHOTO 45 - Schlumberger tank storage area

PHOTO 46 - Vacant land to the east of Schlumberger laboratory.

PHOTO 47 - Landscape bund to the north of Whittle Laboratory

PHOTO 48 - Drainage channel to the south of Cavendish Laboratory

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APP 3 - PLATE 8

PHOTO 49 - Drainage channel
to the south of Cavendish Laboratory

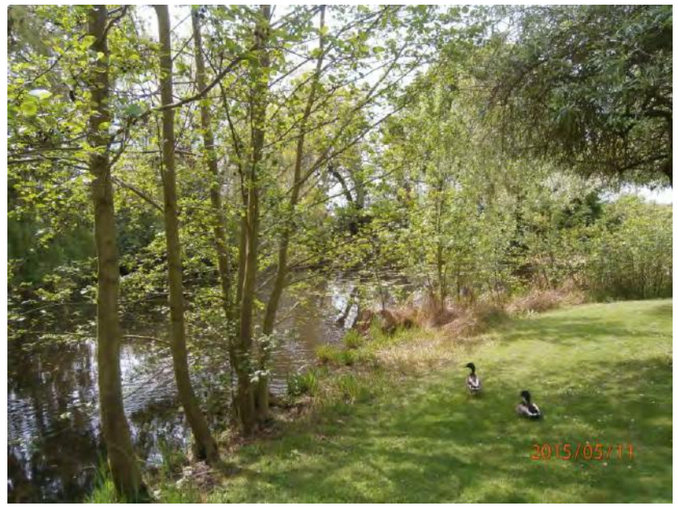

PHOTO 50 - Drainage channel
to the south of Cavendish Laboratory

PHOTO 51 - Landscape Bund
south east of Cavendish Laboratory

PHOTO 52 - Landscape Bund
south east of Cavendish Laboratory

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APP 3 - PLATE 9

Appendix 4 Historical Maps

Historical Mapping Legends

Ordnance Survey County Series 1:10,560

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

Ordnance Survey Plan 1:10,000

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

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

1:10,000 Raster Mapping

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

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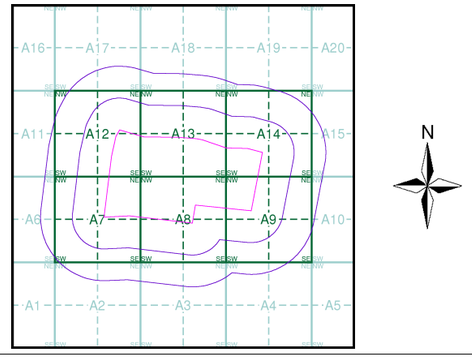
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Cambridgeshire & Isle Of Ely	1:10,560	1886 - 1888	3
Cambridgeshire & Isle Of Ely	1:10,560	1903 - 1904	4
Cambridgeshire & Isle Of Ely	1:10,560	1927	5
Cambridgeshire & Isle Of Ely	1:10,560	1938 - 1953	6
Historical Aerial Photography	1:10,560	1948	7
Cambridgeshire & Isle Of Ely	1:10,560	1952 - 1953	8
Ordnance Survey Plan	1:10,000	1959	9
Ordnance Survey Plan	1:10,000	1960 - 1966	10
Ordnance Survey Plan	1:10,000	1966	11
Ordnance Survey Plan	1:10,000	1972 - 1973	12
Ordnance Survey Plan	1:10,000	1983	13
Cambridge	1:10,000	1989	14
10K Raster Mapping	1:10,000	2006	15
VectorMap Local	1:10,000	2015	16

Historical Map - Slice A



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
Search Buffer (m):	500

Site Details

Site at, Cambridge, Cambridgeshire

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Russian Military Mapping Legends

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

a. Not drawn to scale b. Drawn to scale

- Government and Administrative Buildings
- Military and Industrial Buildings
- Military and Communication Areas
- Subway Entrance
- Fireproof Building
- Prominent Fireproof Building
- Non-fireproof Building
- Non-fireproof Building (non-dwelling)
- Factory, mill, and flour mill, with chimneys
- Factory, mill, and flour mill, without chimneys
- Power Station, drawn to scale
- Hydroelectric Power Station
- Radio Station, drawn to scale
- Telephone Station, drawn to scale
- Abandoned Open-pit Mine or Quarry
- Open-pit Salt Mine
- Pit
- Oil Deposit or Well
- Oil Seepage
- Tailings Pile
- Fuel Storage Tanks
- Natural Gas Tank
- Bench Mark
- Drill Hole
- Burial Mound
- Triangulation Point on Burial Mound
- Single-track Railroad
- Double-track Railroad and Station Building
- Coniferous Forest
- Deciduous Forest
- Mixed Forest
- Lawns
- Citrus Orchard
- Wet Ground
- Scattered Vegetation

243,8 Values for prominent elevations

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

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

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

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

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

1:25,000 mapping

a. Not drawn to scale b. Drawn to scale

- Government and Administrative Buildings
- Military and Industrial Buildings
- Military and Communication Areas
- Subway Entrance
- Partly Demolished Buildings
- Demolished Buildings
- Built-Up Area with Fireproof Buildings Predominant
- Built-Up Area with Non-Fireproof Buildings Predominant
- Individual Fireproof Building
- Prominent Industrial Building
- Individual Dwelling, Fireproof
- Ruins of an Individual Dwelling
- Factory or Mill Chimney
- Factory or Mill with Chimney (*бум.*)
- Factory or Mill without Chimney (*скип.*)
- Mine or Open Pit Mine (*медн.*)
- Operating Shaft or Mine (*кам. уг.*)
- Non-Operating Shaft or Mine
- Salt Mine (*сол.*)
- Tailings Pile
- Pit (–1.7)
- Stone Quarry (*гл. пес. кам.*)
- Gas Pump or Service Station
- Fuel Storage or Natural Gas Tank
- Oil or Natural Gas Derrick
- Small Hydroelectric Power Station
- Power Station
- Transformer Station (*б.тр.*)
- Cemetery
- Burial Mound (height in metres) (+8.1)
- Triangulation Point on Burial Mound (95.7)
- Triangulation Point (92.6)
- Bench Mark (52.1)
- Bench Mark (monumented) (71.1)
- Telegraph Office
- Telephone Station
- Radio Station
- Radio Tower
- Airfield or Seaplane Base
- Landing Strip
- Main Highway (Cut, Fill, Km Post, Plantings, Telegraph/Telephone Lines)
- Highway under Construction
- Improved Dirt Road (former truck road) (Width of Road 6, Steep Grade)
- Double-track Railroad with First Class Station (Small Bridge, *cm.*, Pipe (Culvert), Tunnel)
- Dismantled Railroad
- Railroad Under Construction
- Shore Embankment
- River or Ditch with Embankment (+2.4)
- Direction and velocity of current (Water Gauge, 0.2, 135.1, Water Level Mark)
- Well (K. 125.0 гл.8м (г.-сол.))
- Water Reservoir or Rain Water Pit (*вдхр.*)
- Spring (156.2 *кл.*)
- Isobath with value (20)
- Heavy (Index) Contour Line
- Contour Line and Value (20)
- Half Contour Line
- Spot Elevation Value (347.1)
- Coniferous
- Deciduous
- Mixed
- Scrub

Key to Numbers on Mapping

TL45NW_Cambridge

No.	Description
24	Laboratory
26	Laboratory (Solar Research)
28	Observatory (University)
48	Laboratory (University)
53	Research Centre (Computer Aided Design)

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Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Cambridgeshire & Isle Of Ely	1:10,560	1886 - 1888	3
Cambridgeshire & Isle Of Ely	1:10,560	1903 - 1904	4
Cambridgeshire & Isle Of Ely	1:10,560	1927	5
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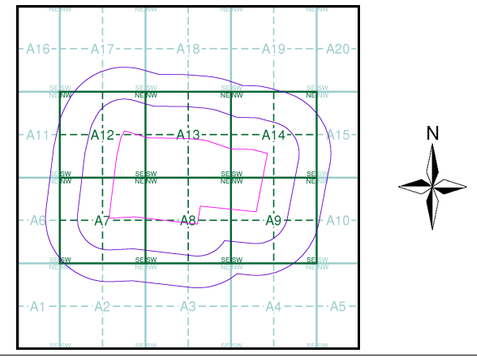
Cambridge	1:10,000	1989	14
10K Raster Mapping	1:10,000	2006	15
VectorMap Local	1:10,000	2015	16

Russian Map - Slice A



Order Details

Order Number: 66871644_1_1
Customer Ref: 31500
National Grid Reference: 542610, 258970
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Site Area (Ha): 67.92
Search Buffer (m): 500

Site Details

Site at, Cambridge, Cambridgeshire

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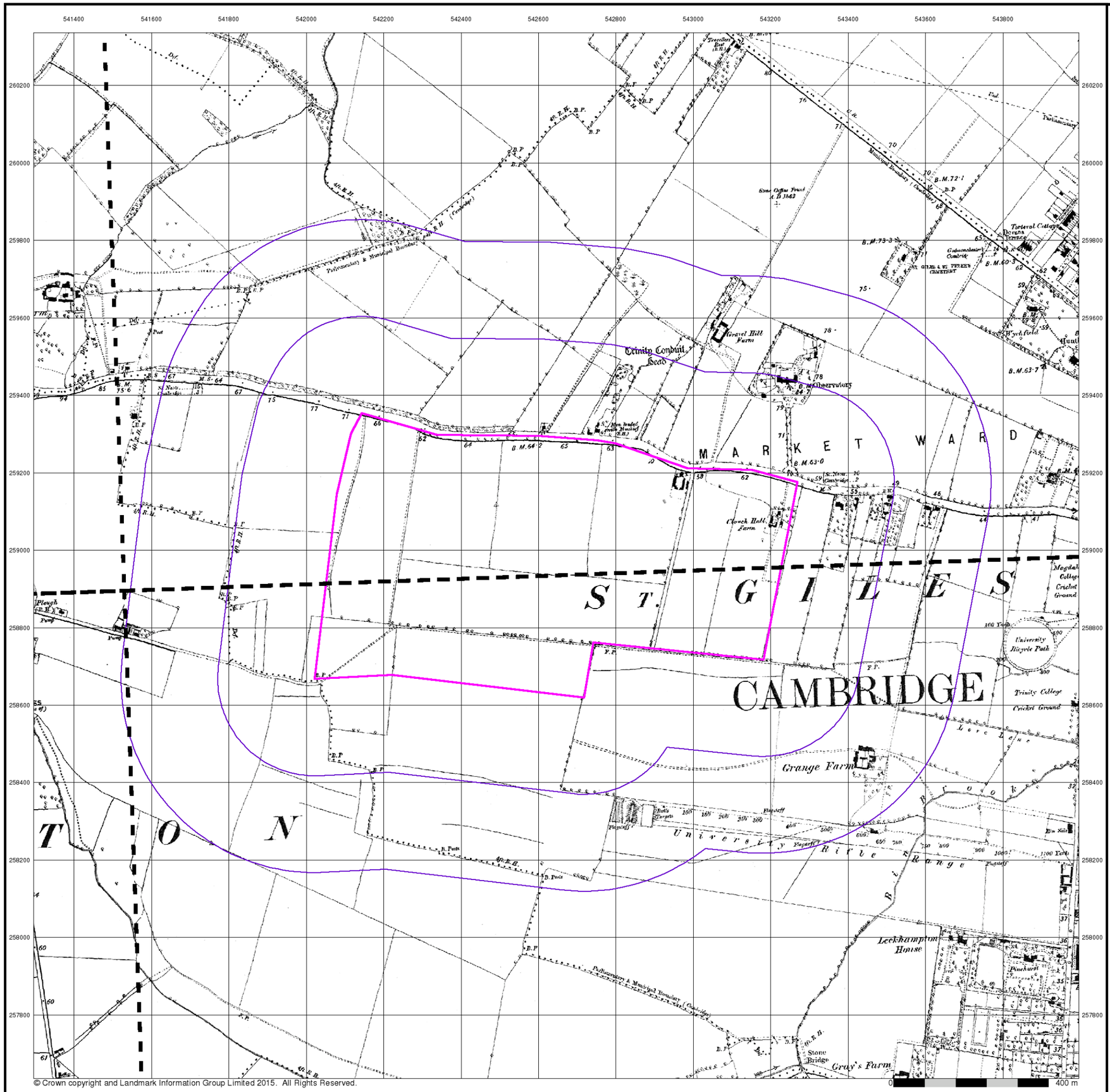

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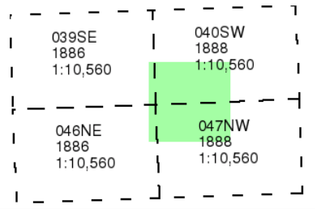
Cambridgeshire & Isle Of Ely

Published 1886 - 1888

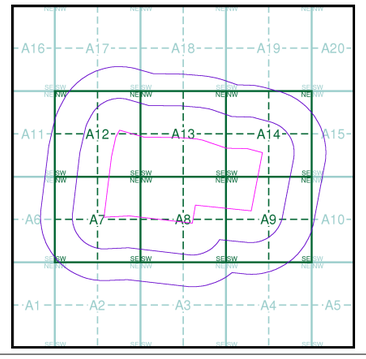
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A



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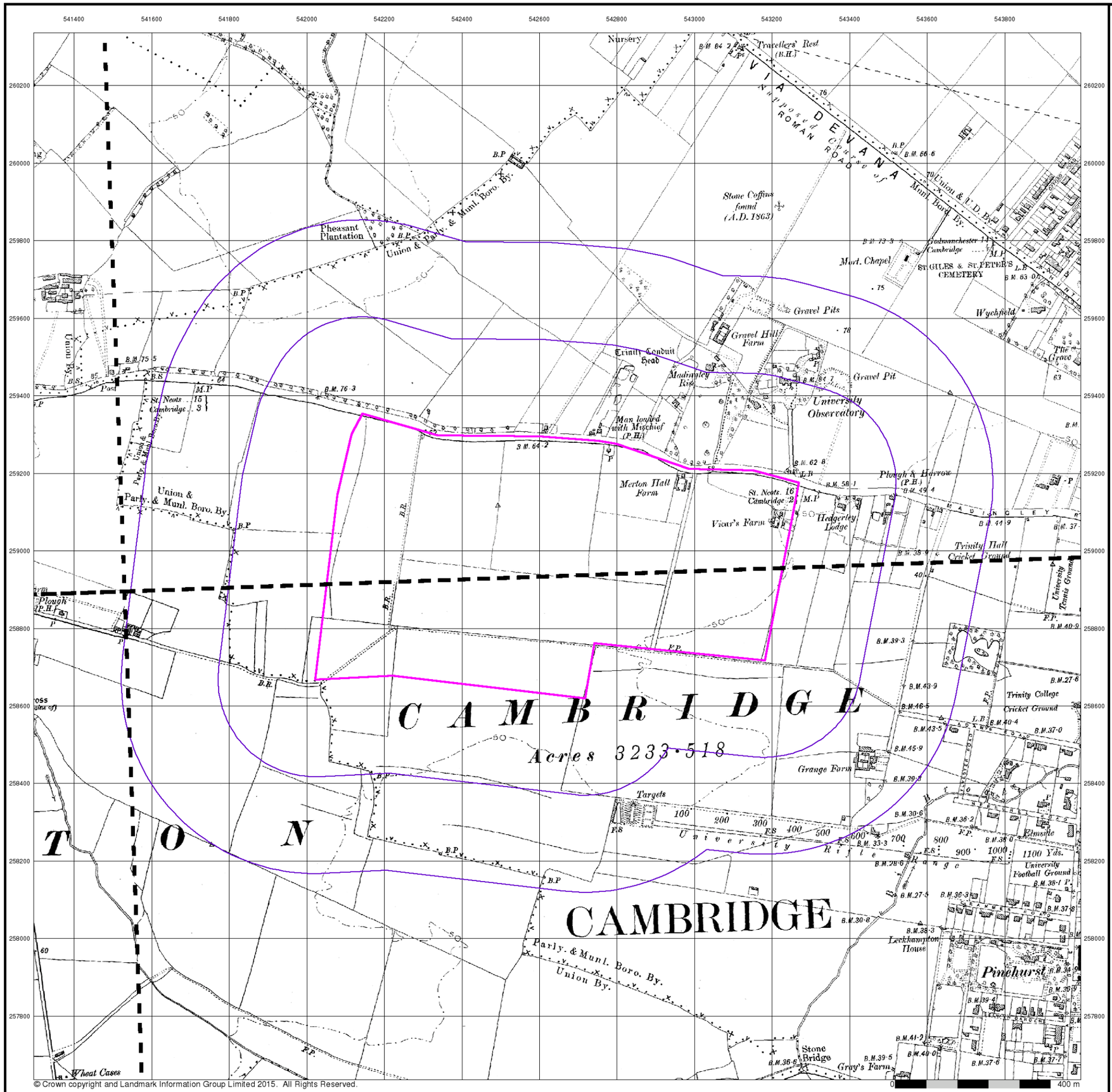

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Cambridgeshire & Isle Of Ely

Published 1903 - 1904

Source map scale - 1:10,560

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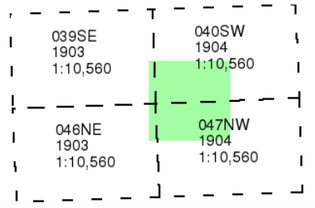
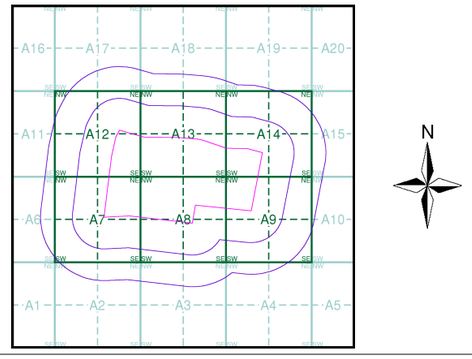
Map Name(s) and Date(s)



Historical Map - Slice A



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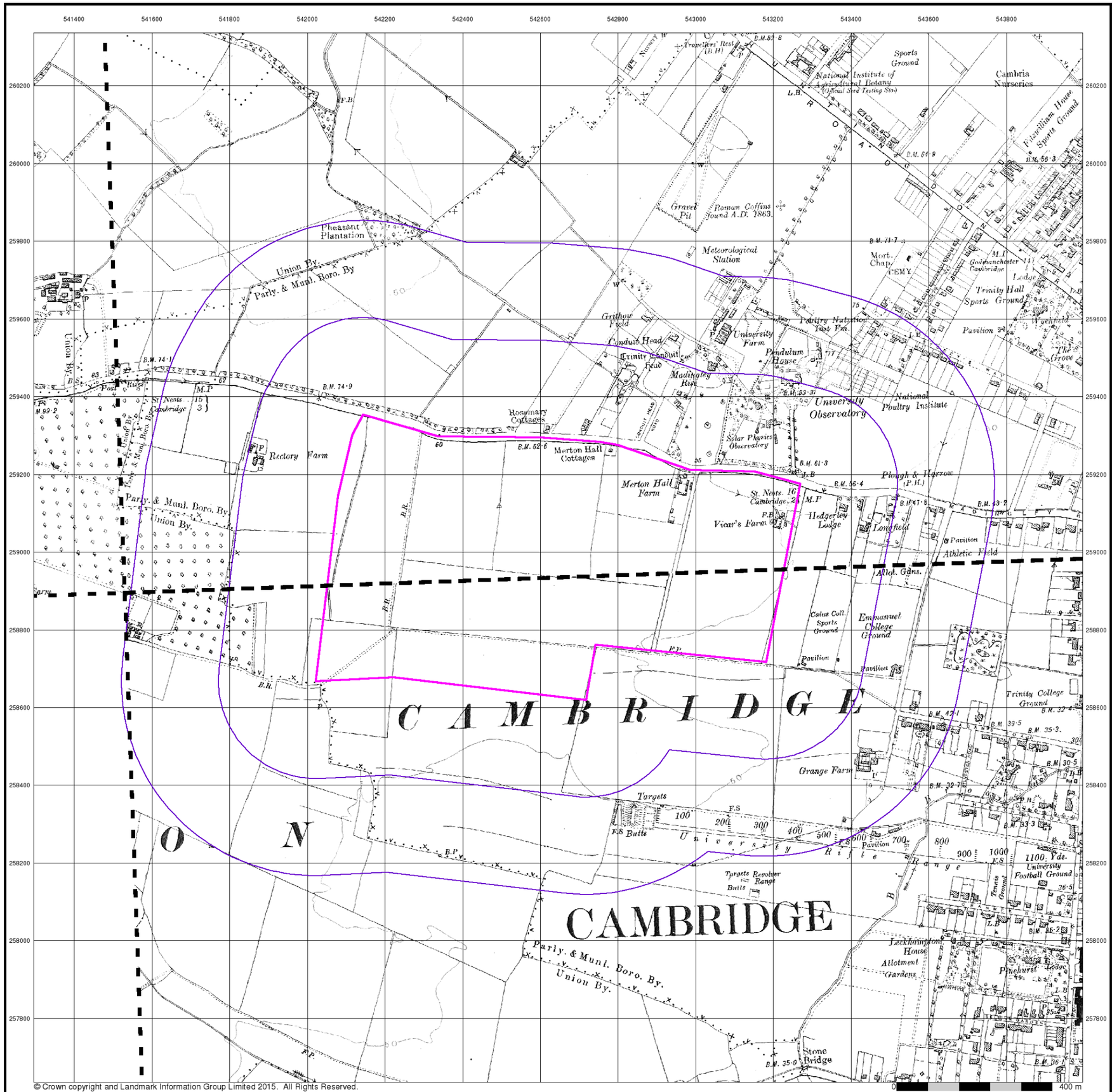

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Cambridgeshire & Isle Of Ely

Published 1927

Source map scale - 1:10,560

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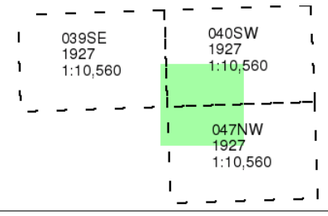
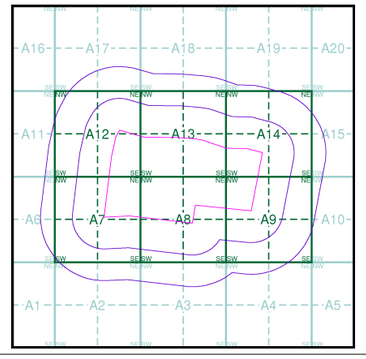
Map Name(s) and Date(s)



Historical Map - Slice A



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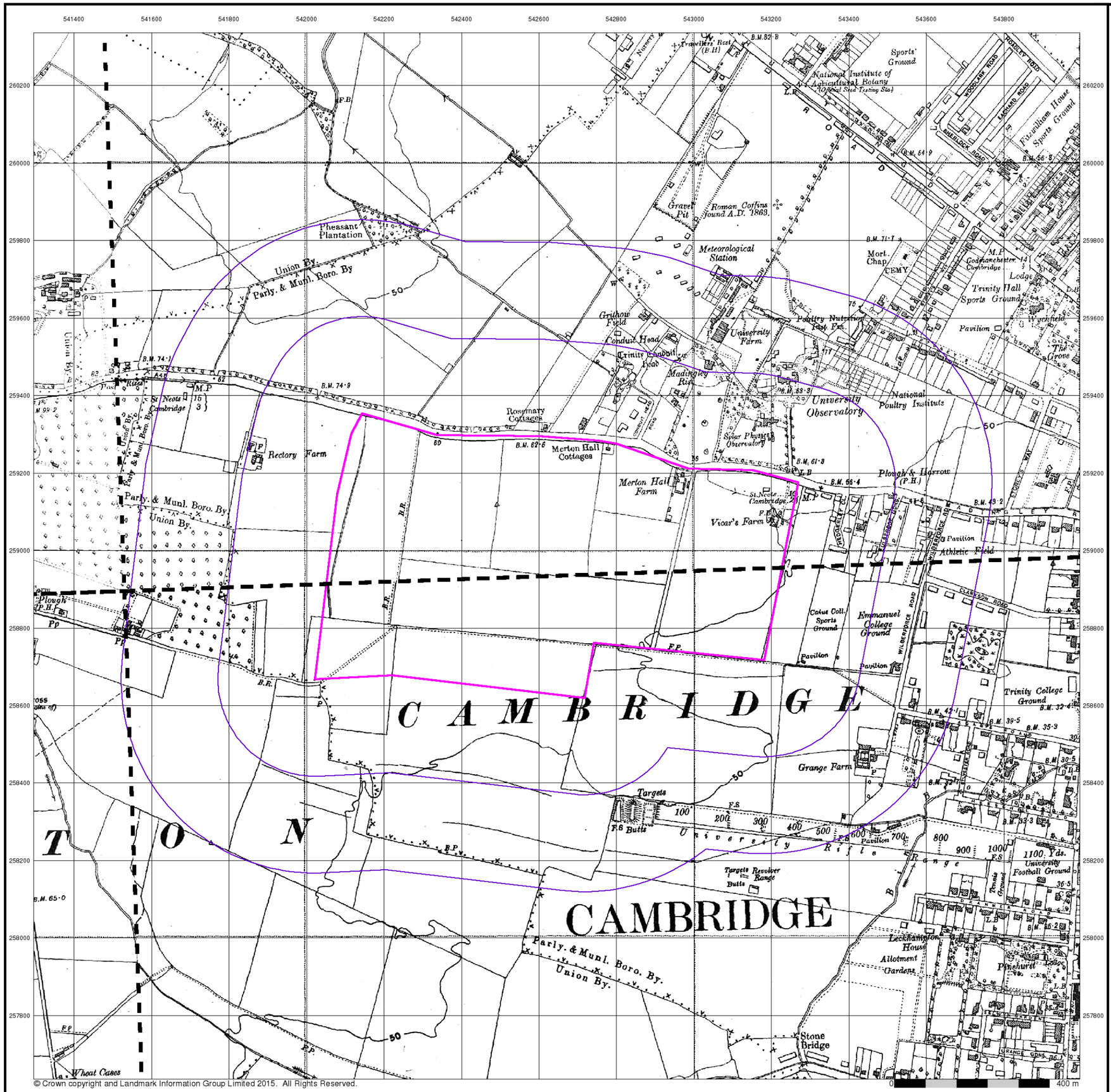

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Cambridgeshire & Isle Of Ely

Published 1938 - 1953

Source map scale - 1:10,560

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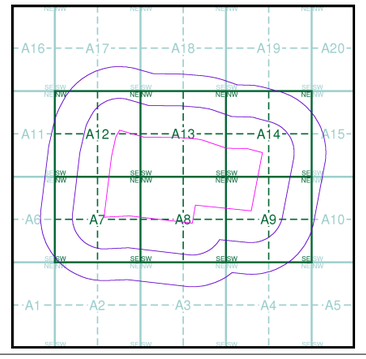
Map Name(s) and Date(s)

039SE 1938 1:10,560	040SW 1938 1:10,560
046NE 1953 1:10,560	047NW 1938 1:10,560

Historical Map - Slice A



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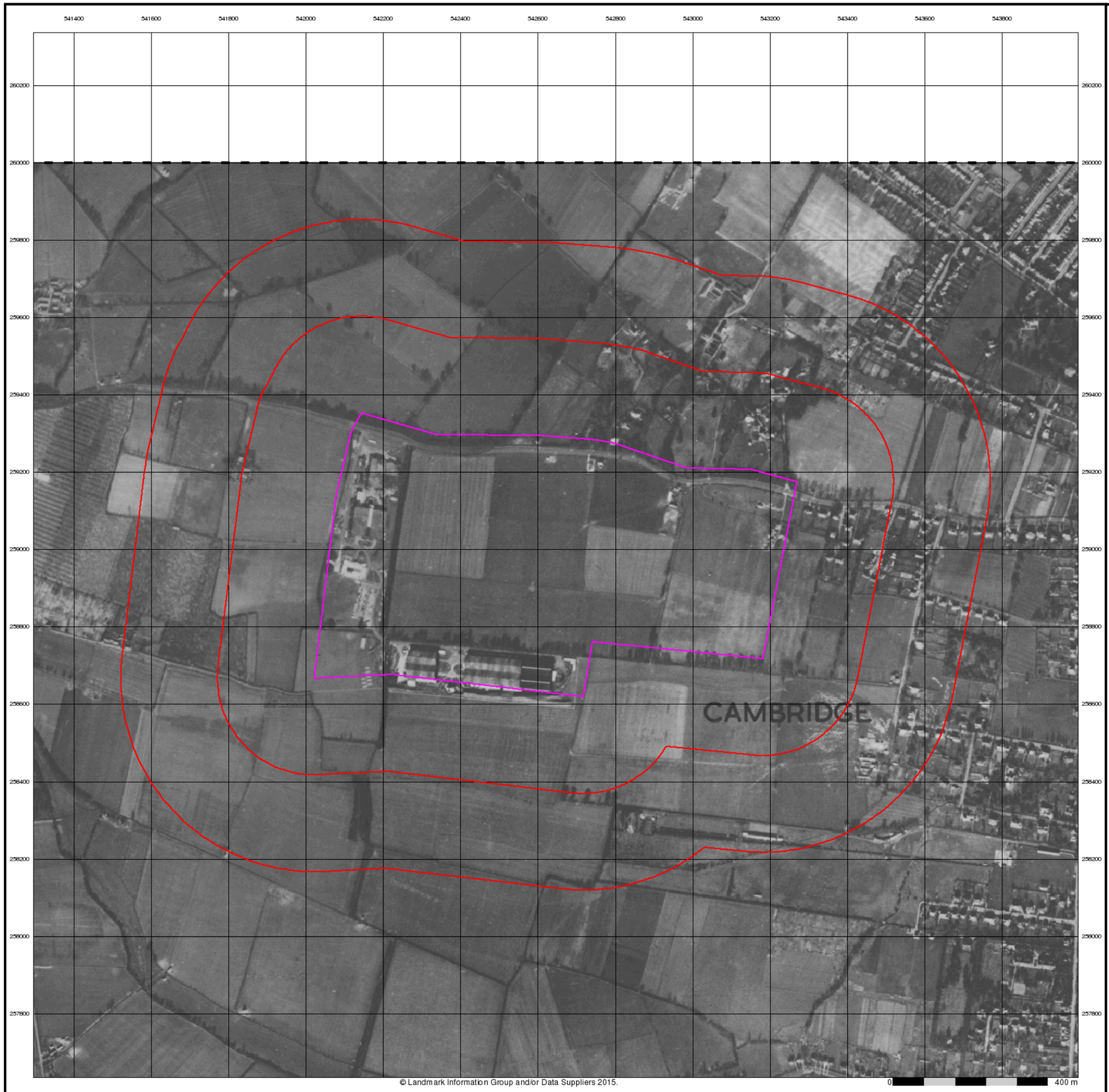


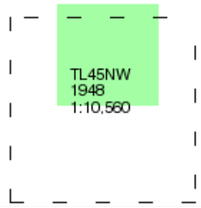
Historical Aerial Photography

Published 1948

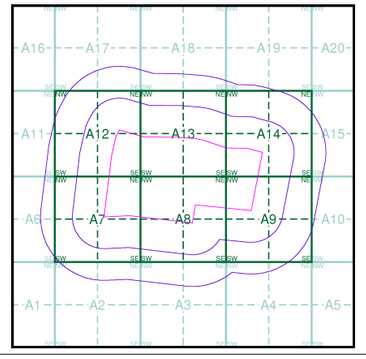
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Aerial Photography - Slice A



BRITISH LIBRARY

Order Details

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Site Area (Ha):	67.92
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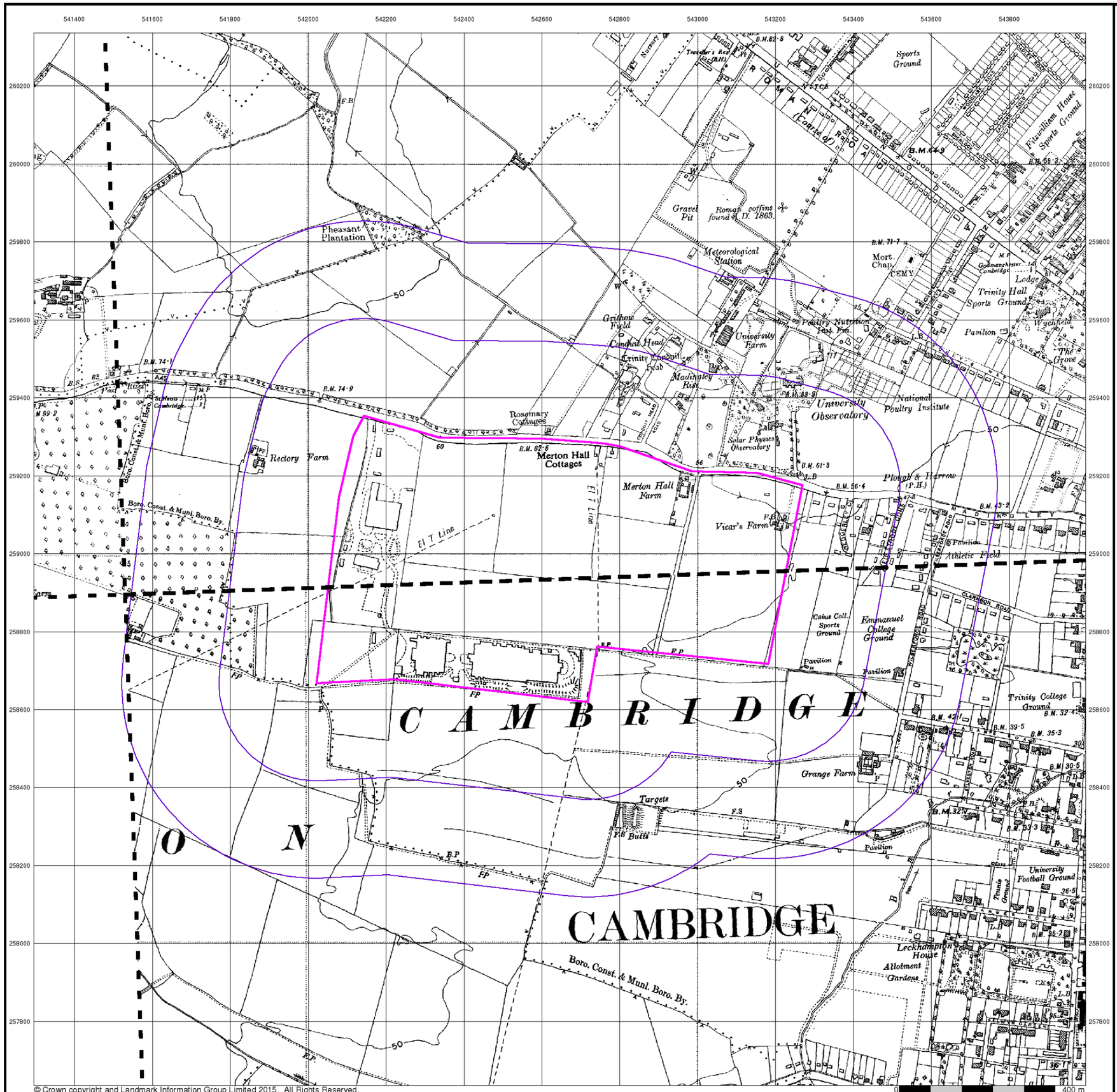

pba peterbrett

Cambridgeshire & Isle Of Ely

Published 1952 - 1953

Source map scale - 1:10,560

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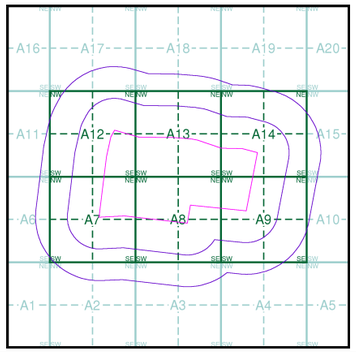
Map Name(s) and Date(s)

039SE 1952 1:10,560

040SW 1953 1:10,560

047NW 1952 1:10,560

Historical Map - Slice A



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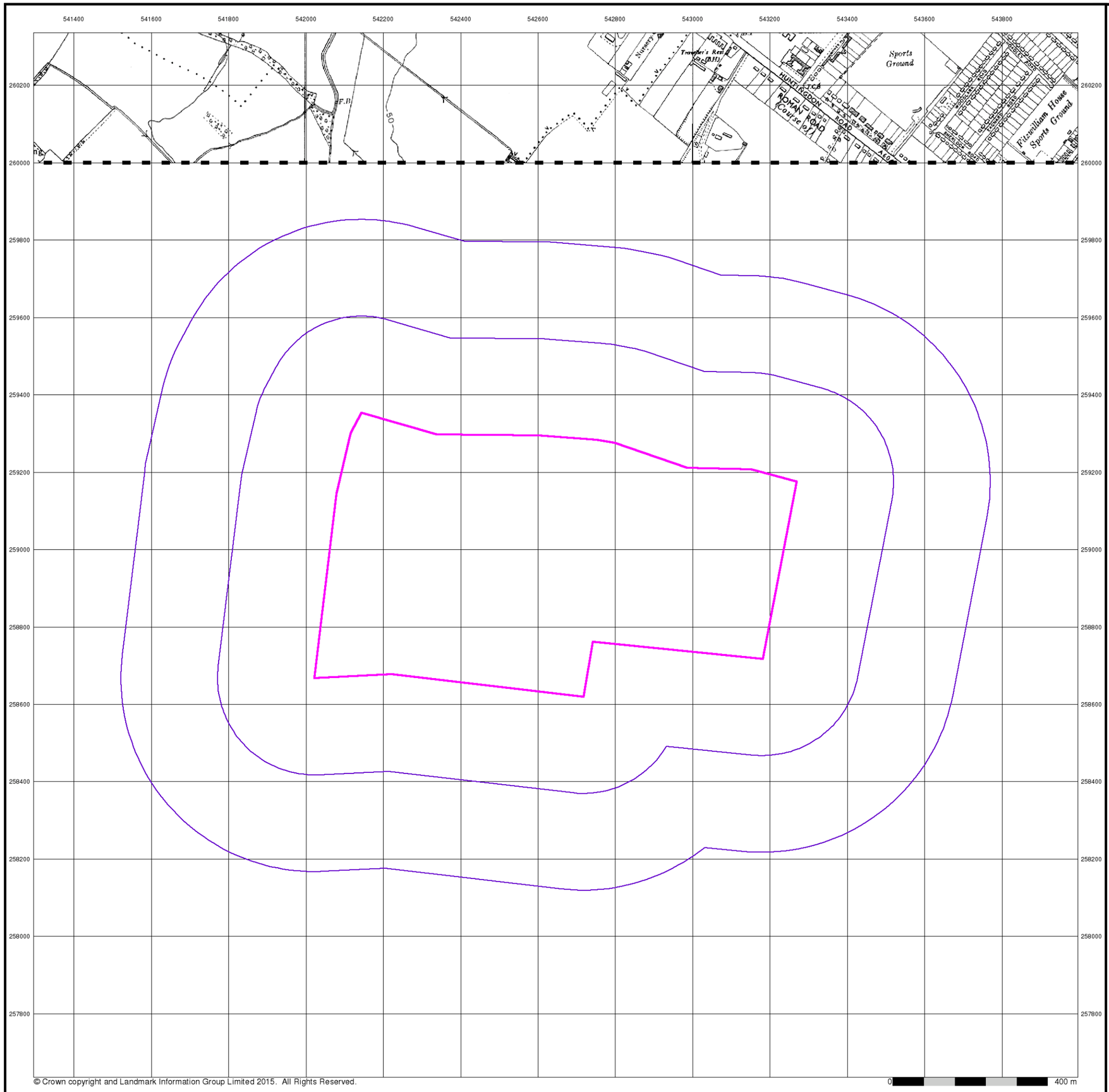

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Ordnance Survey Plan

Published 1959

Source map scale - 1:10,000

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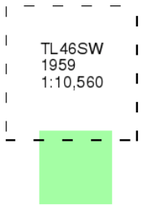
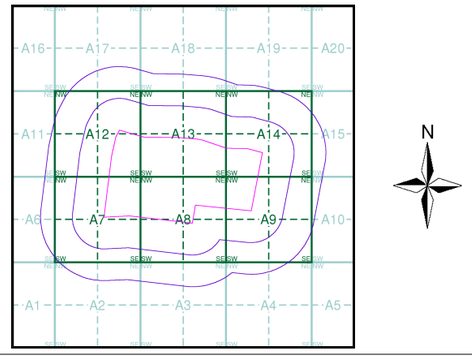
Map Name(s) and Date(s)



Historical Map - Slice A



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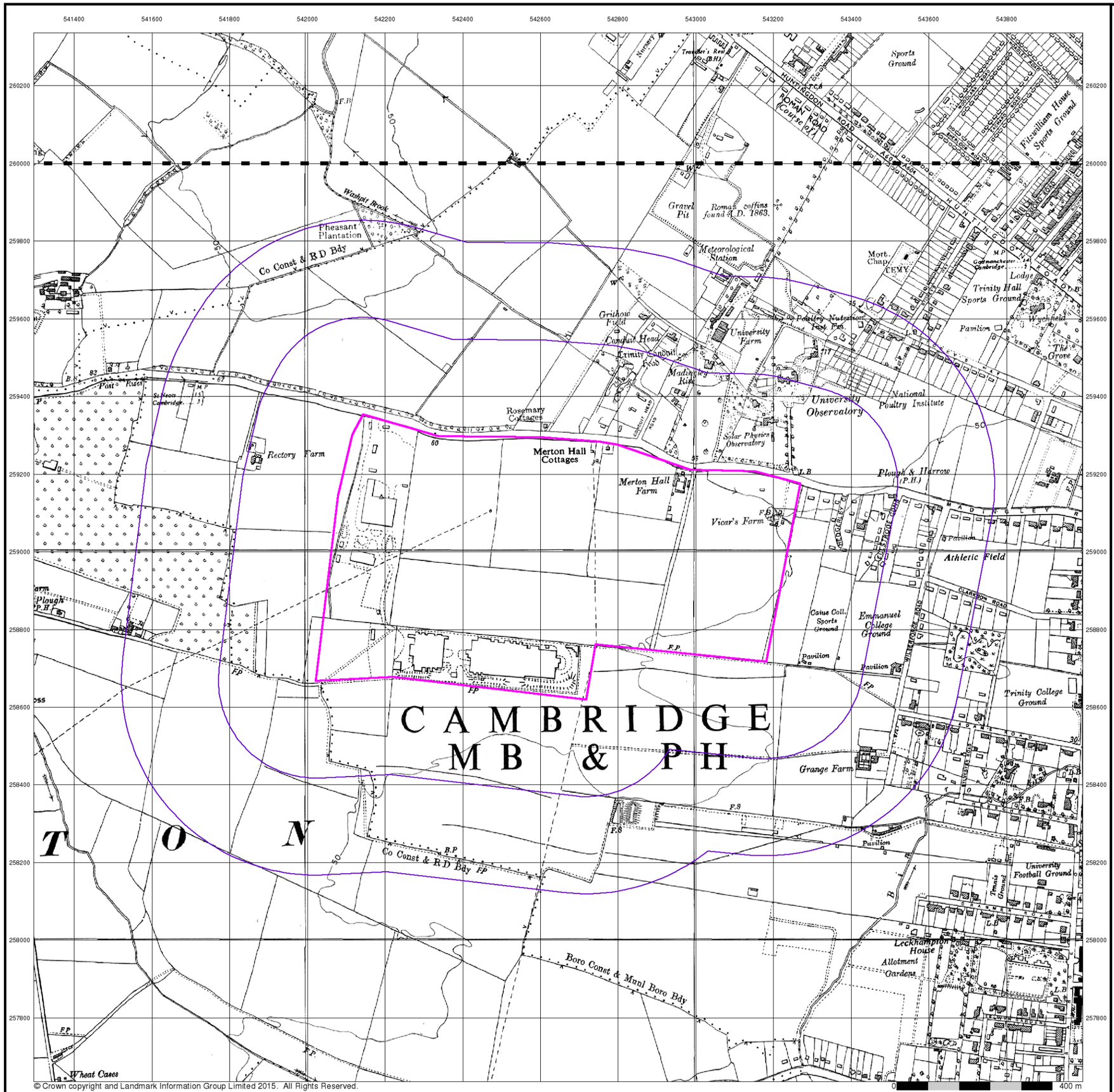


pba peterbrett

Ordnance Survey Plan

Published 1960 - 1966

Source map scale - 1:10,000

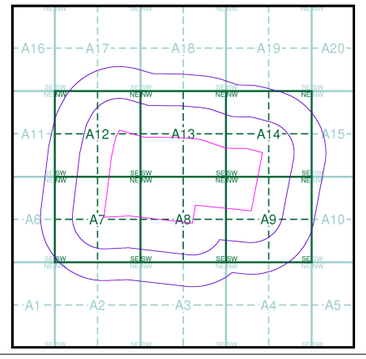
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some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

TL46SW
1966
1:10,560

TL45NW
1960
1:10,560

Historical Map - Slice A



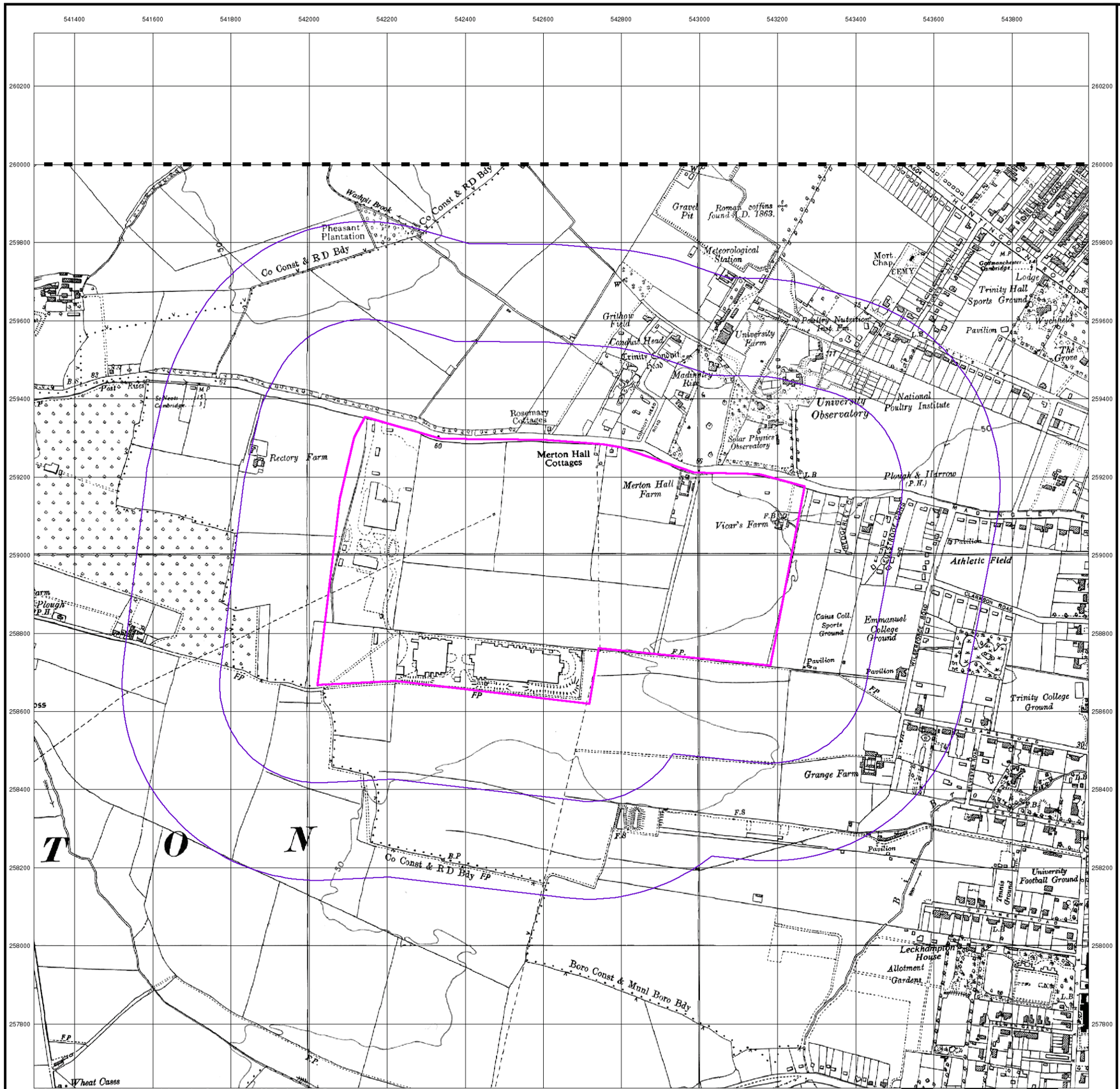
Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
Search Buffer (m):	500

Site Details

Site at, Cambridge, Cambridgeshire

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



pba peterbrett

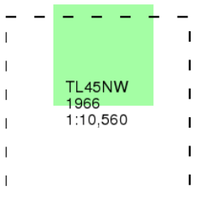
Ordnance Survey Plan

Published 1966

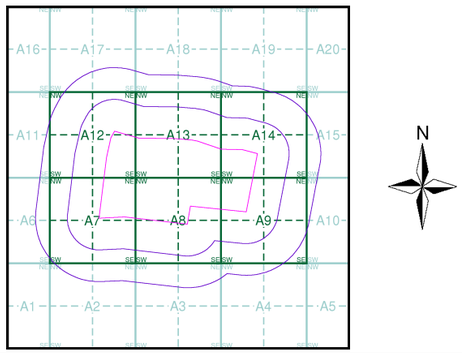
Source map scale - 1:10,000

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)



Historical Map - Slice A



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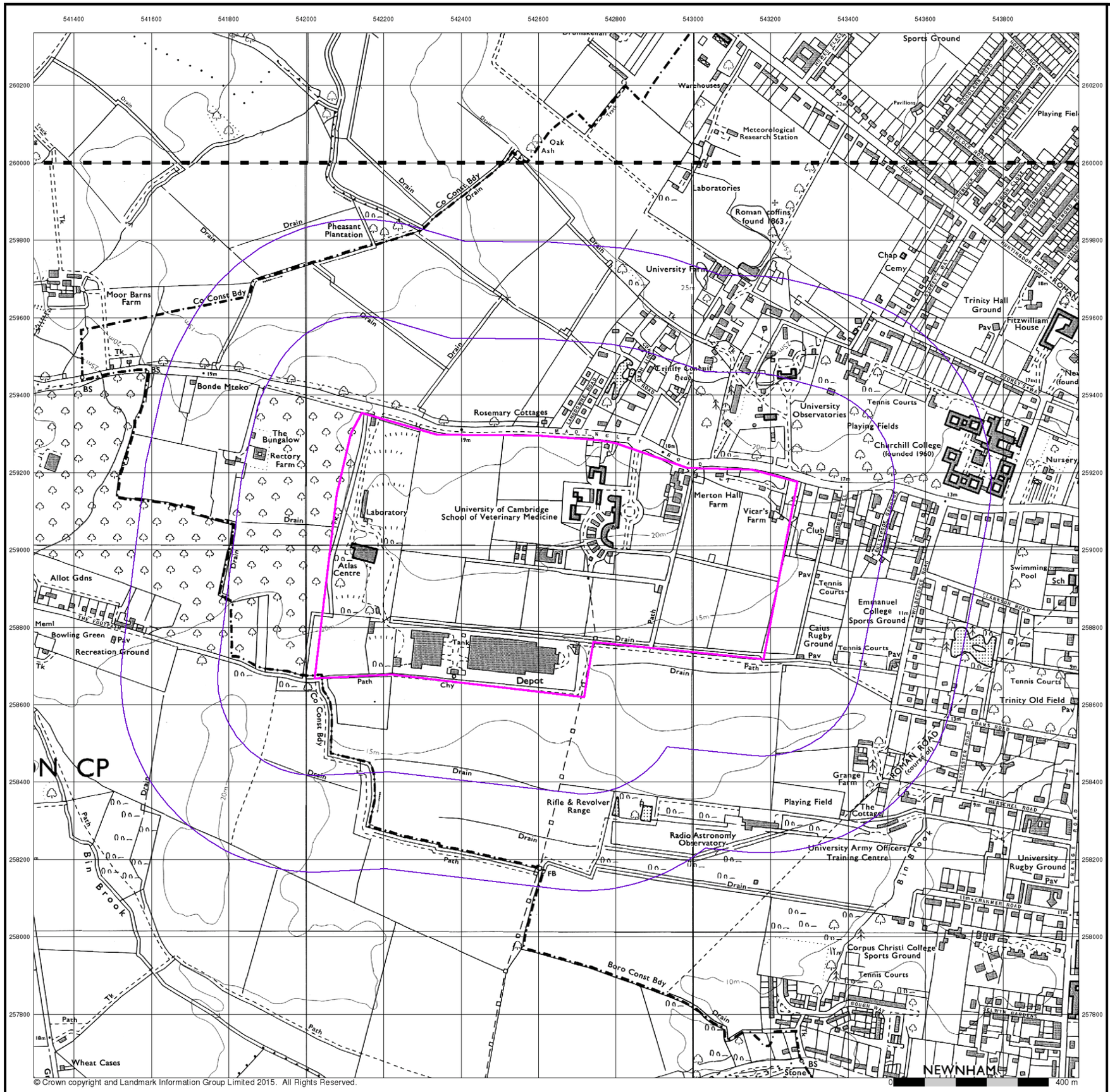

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Ordnance Survey Plan

Published 1972 - 1973

Source map scale - 1:10,000

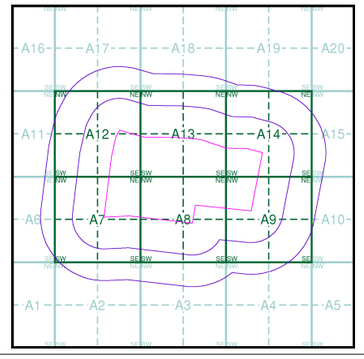
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some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

TL46SW
1973
1:10,000

TL45NW
1972
1:10,000

Historical Map - Slice A



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
Search Buffer (m):	500

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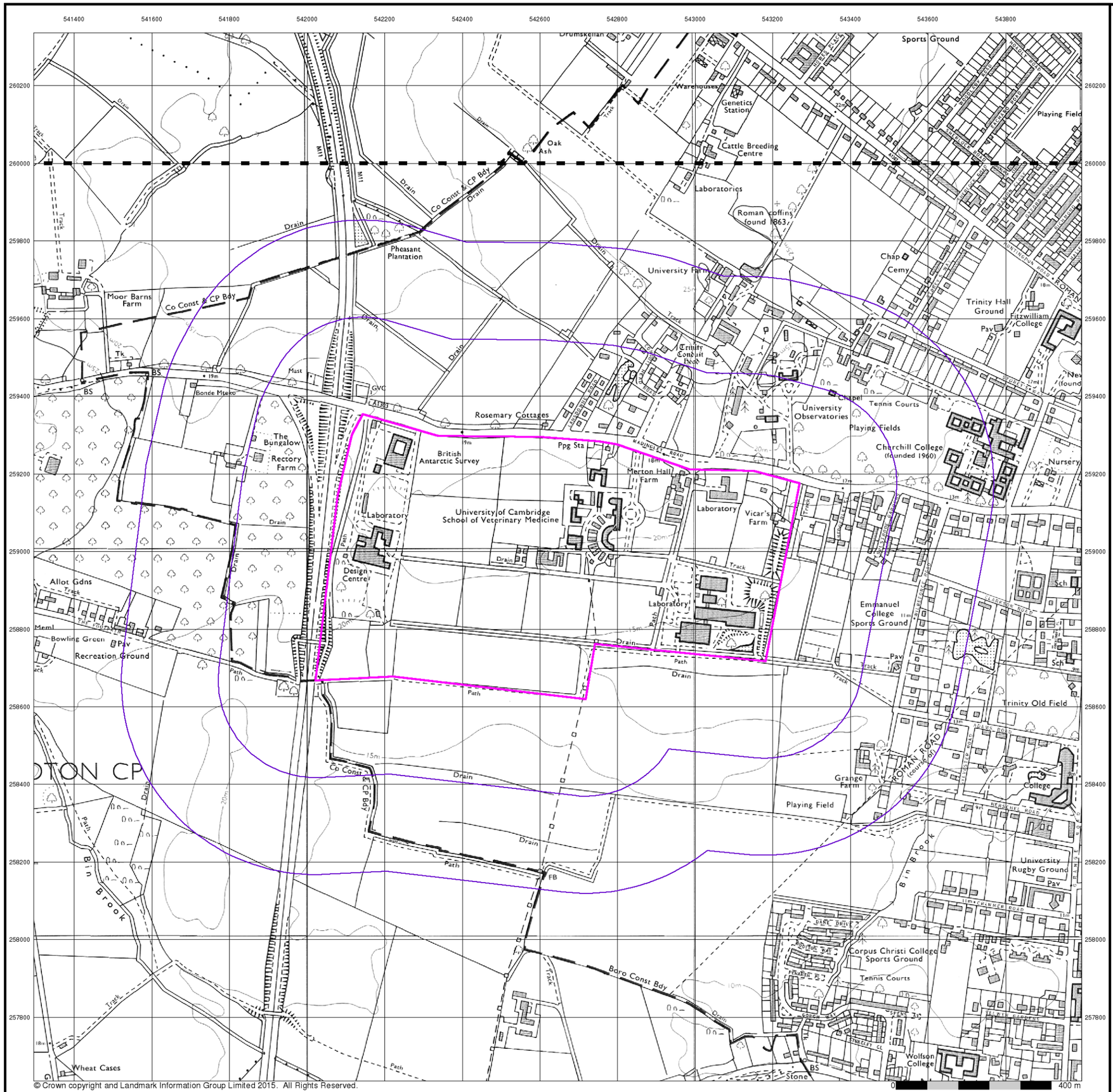

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Ordnance Survey Plan

Published 1983

Source map scale - 1:10,000

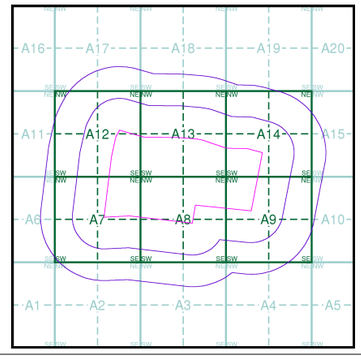
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some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

TL46SW
1983
1:10,000

TL45NW
1983
1:10,000

Historical Map - Slice A



Order Details

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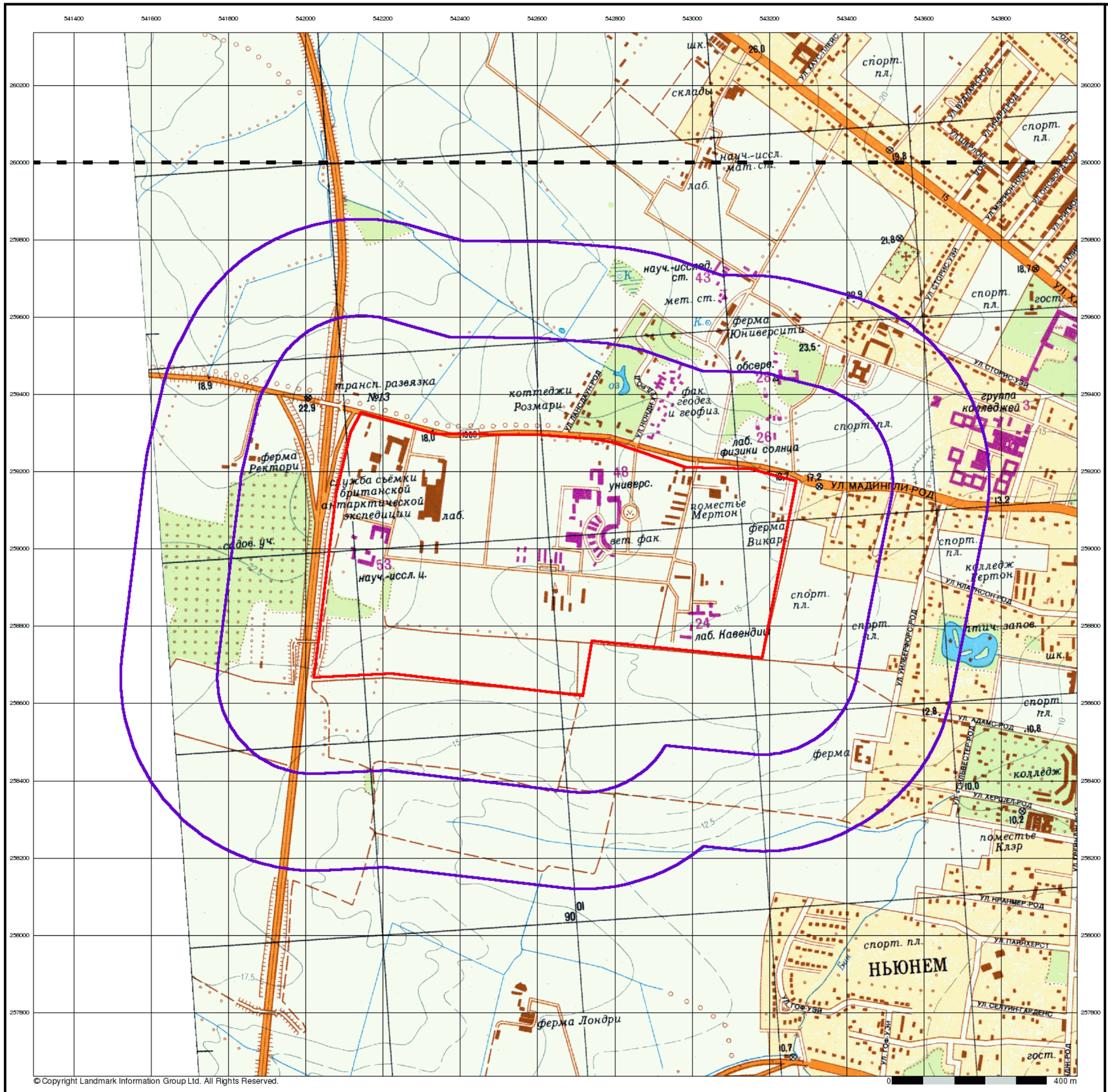


Cambridge

Published 1989

Source map scale - 1:10,000

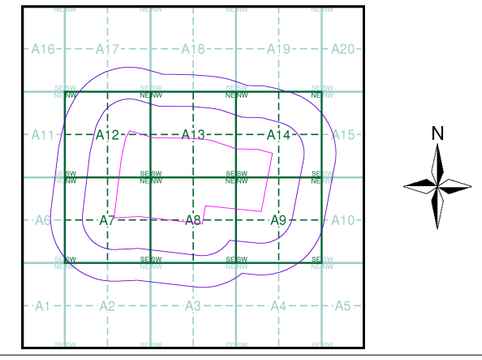
These maps were produced by the Russian military during the Cold War between 1950 and 1997, and cover 103 towns and cities throughout the U.K. The maps are produced at 1:25,000, 1:10,000 and 1:5,000 scale, and show detailed land use, with colour-coded areas for development, green areas, and non-developed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

Map Name(s) and Date(s)

TL46SW
1989
1:10,000

TL45NW
1989
1:10,000

Russian Map - Slice A



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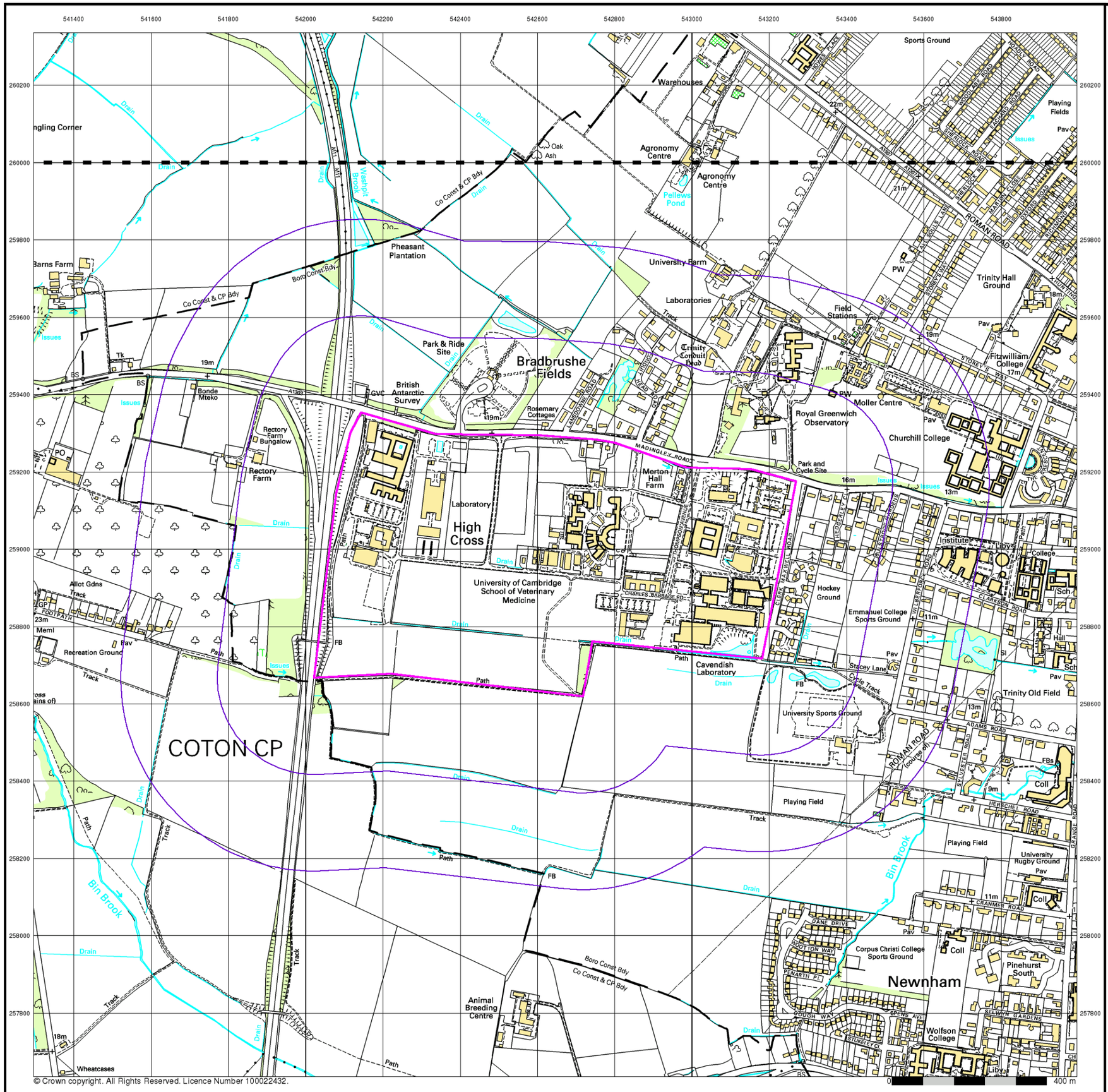

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10k Raster Mapping

Published 2006

Source map scale - 1:10,000

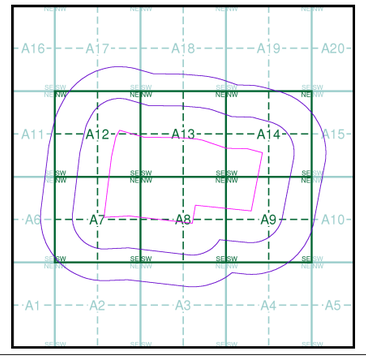
The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks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

Map Name(s) and Date(s)

TL46SW 2006 1:10,000

TL45NW 2006 1:10,000

Historical Map - Slice A



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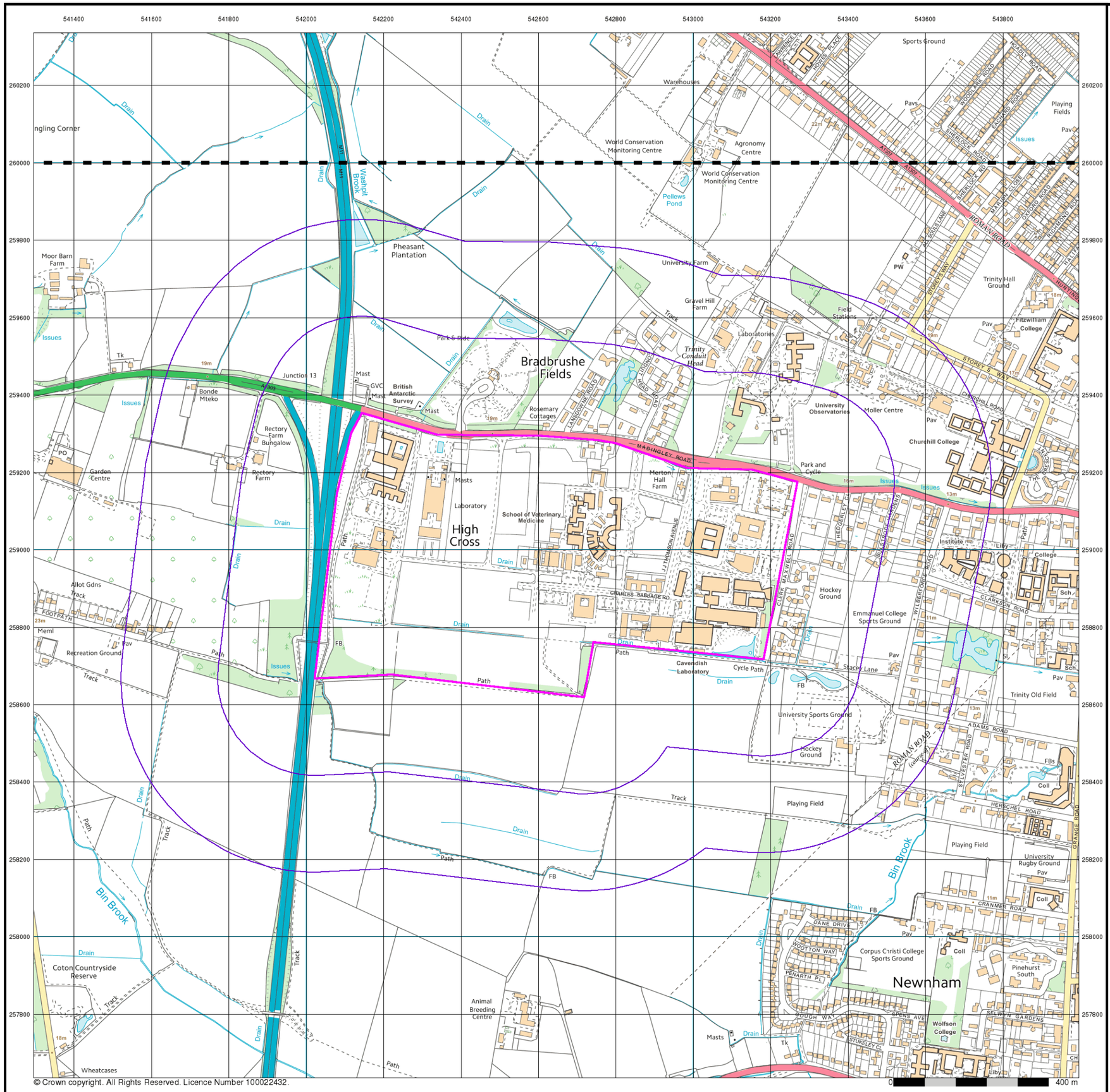

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VectorMap Local

Published 2015

Source map scale - 1:10,000

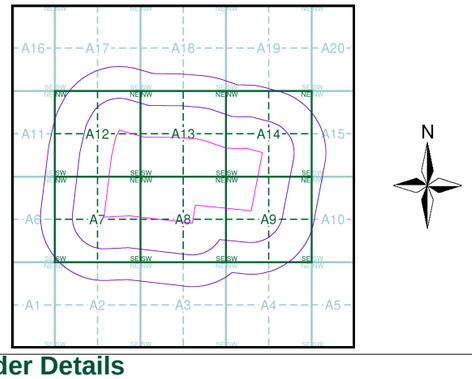
VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap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

TL46SW 2015 Variable

TL45NW 2015 Variable

Historical Map - Slice A



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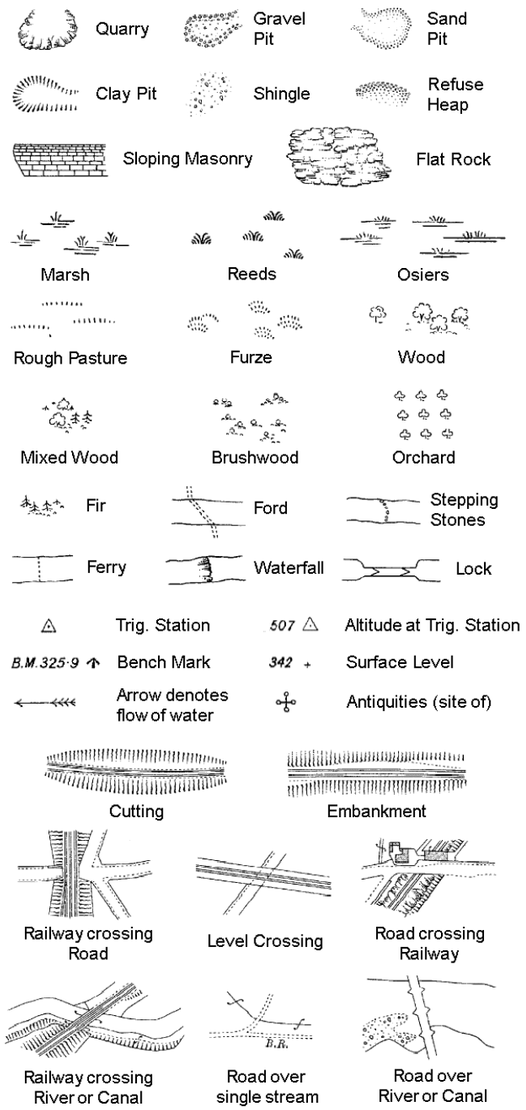
Historical Mapping Legends

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



County Boundary (Geographical)

County & Civil Parish Boundary

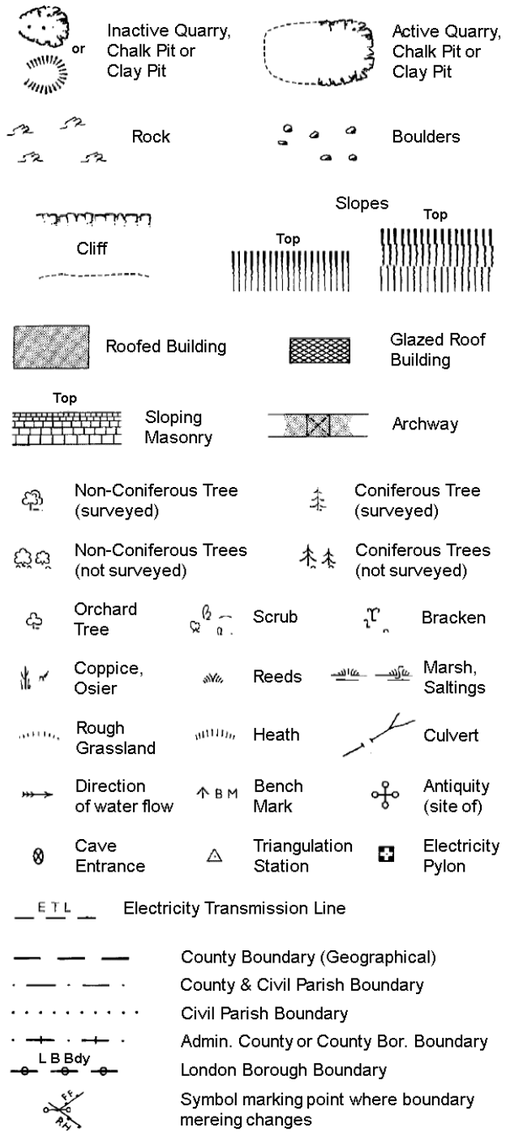
Administrative County & Civil Parish Boundary

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

Co. Burgh Bdy. County Burgh Boundary (Scotland)

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

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



County Boundary (Geographical)

County & Civil Parish Boundary

Civil Parish Boundary

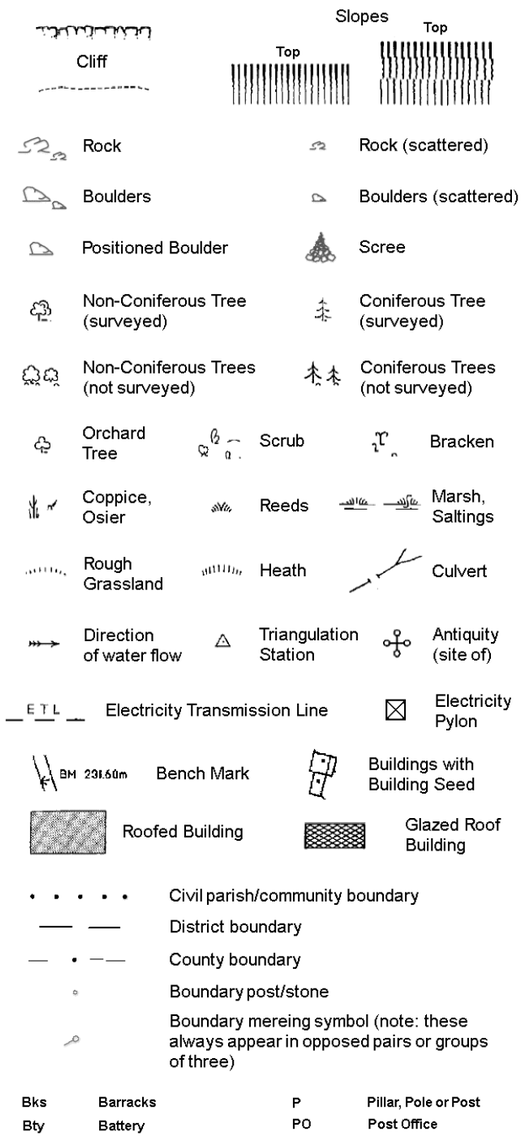
Admin. County or County Bor. Boundary

L B Bdy London Borough Boundary

Symbol marking point where boundary mereing changes

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

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



Civil parish/community boundary

District boundary

County boundary

Boundary post/stone

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

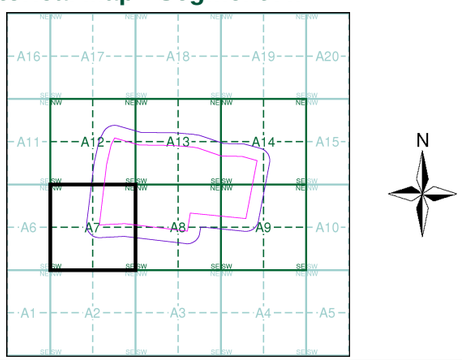
Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity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

pba peterbrett

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Cambridgeshire & Isle Of Ely	1:2,500	1888	2
Cambridgeshire & Isle Of Ely	1:2,500	1903	3
Cambridgeshire & Isle Of Ely	1:2,500	1926 - 1927	4
Ordnance Survey Plan	1:2,500	1970	5
Additional SIMs	1:2,500	1980	6
Additional SIMs	1:2,500	1985	7
Large-Scale National Grid Data	1:2,500	1993	8

Historical Map - Segment A7



Order Details

Order Number: 66871644_1_1
Customer Ref: 31500
National Grid Reference: 542610, 258970
Slice: A
Site Area (Ha): 67.92
Search Buffer (m): 100

Site Details

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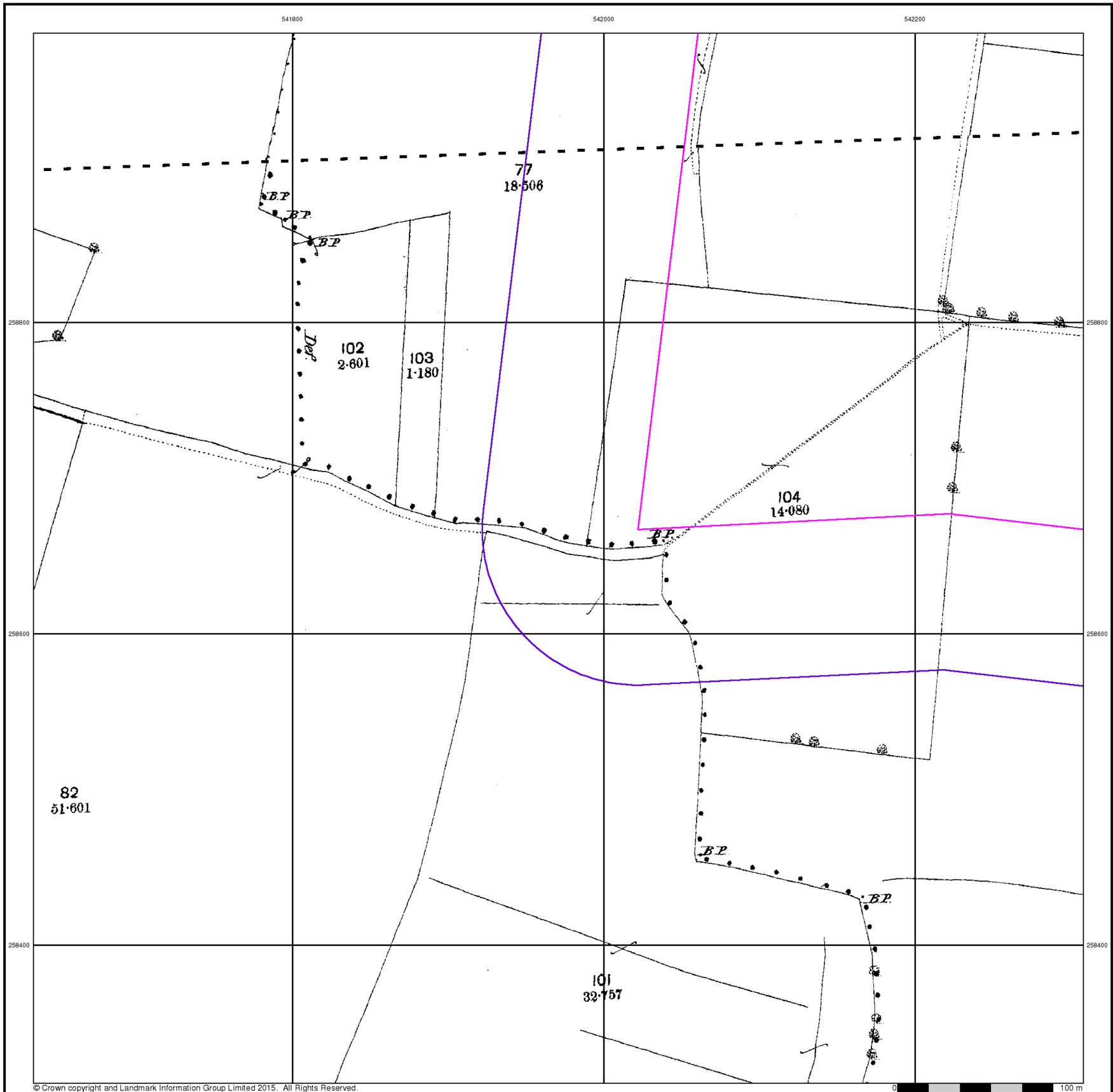

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Cambridgeshire & Isle Of Ely

Published 1888

Source map scale - 1:2,500

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

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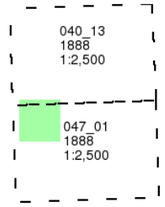
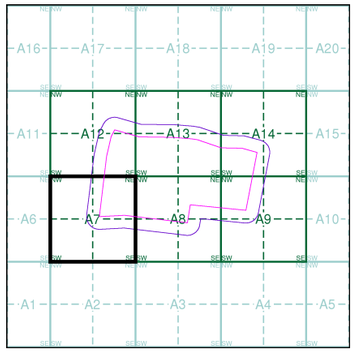


Historical Map - Segment A7



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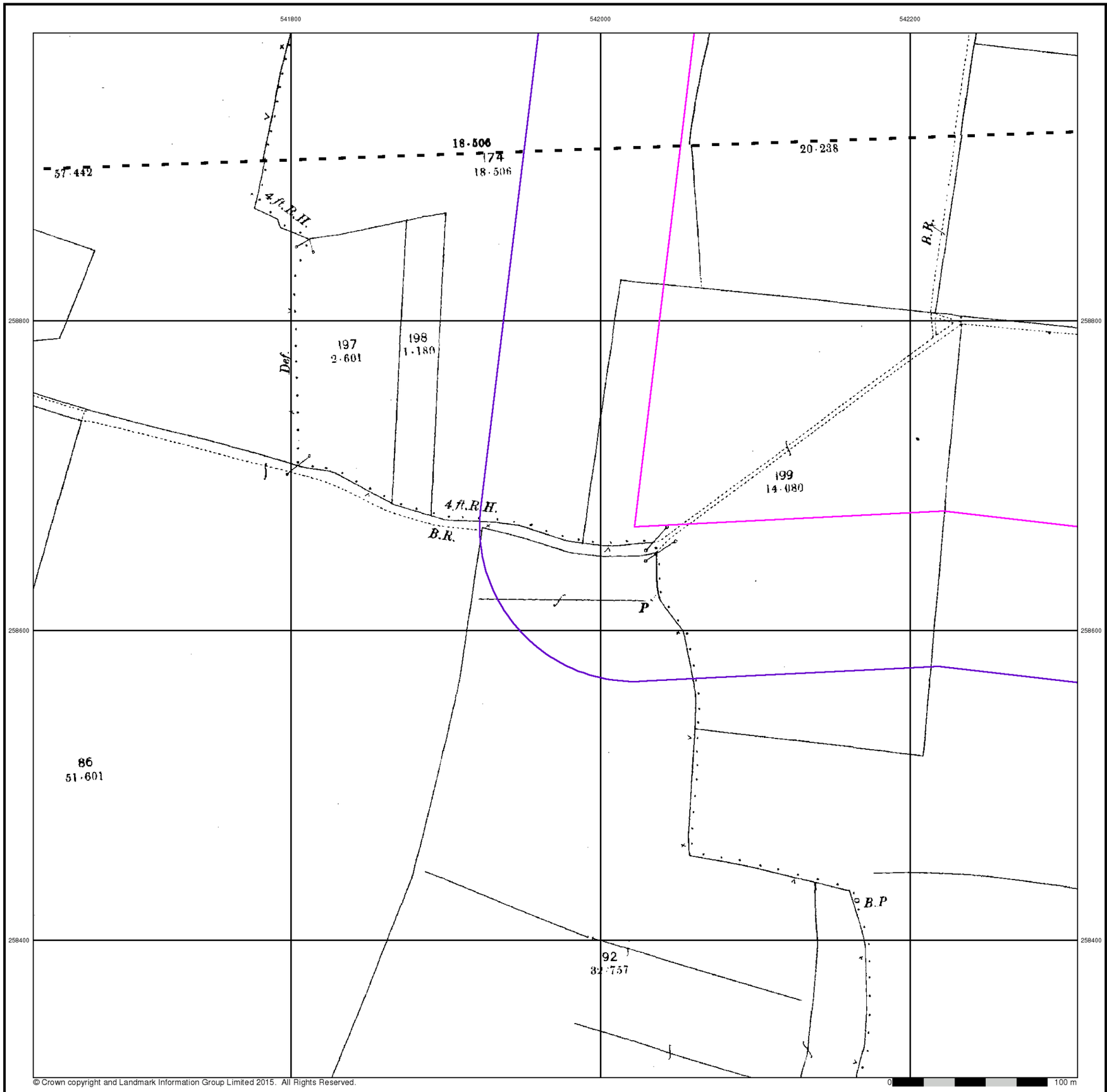

Cambridgeshire & Isle Of Ely

Published 1903

Source map scale - 1:2,500

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

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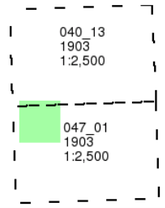
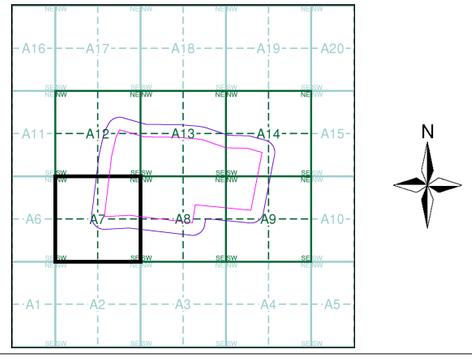


Historical Map - Segment A7



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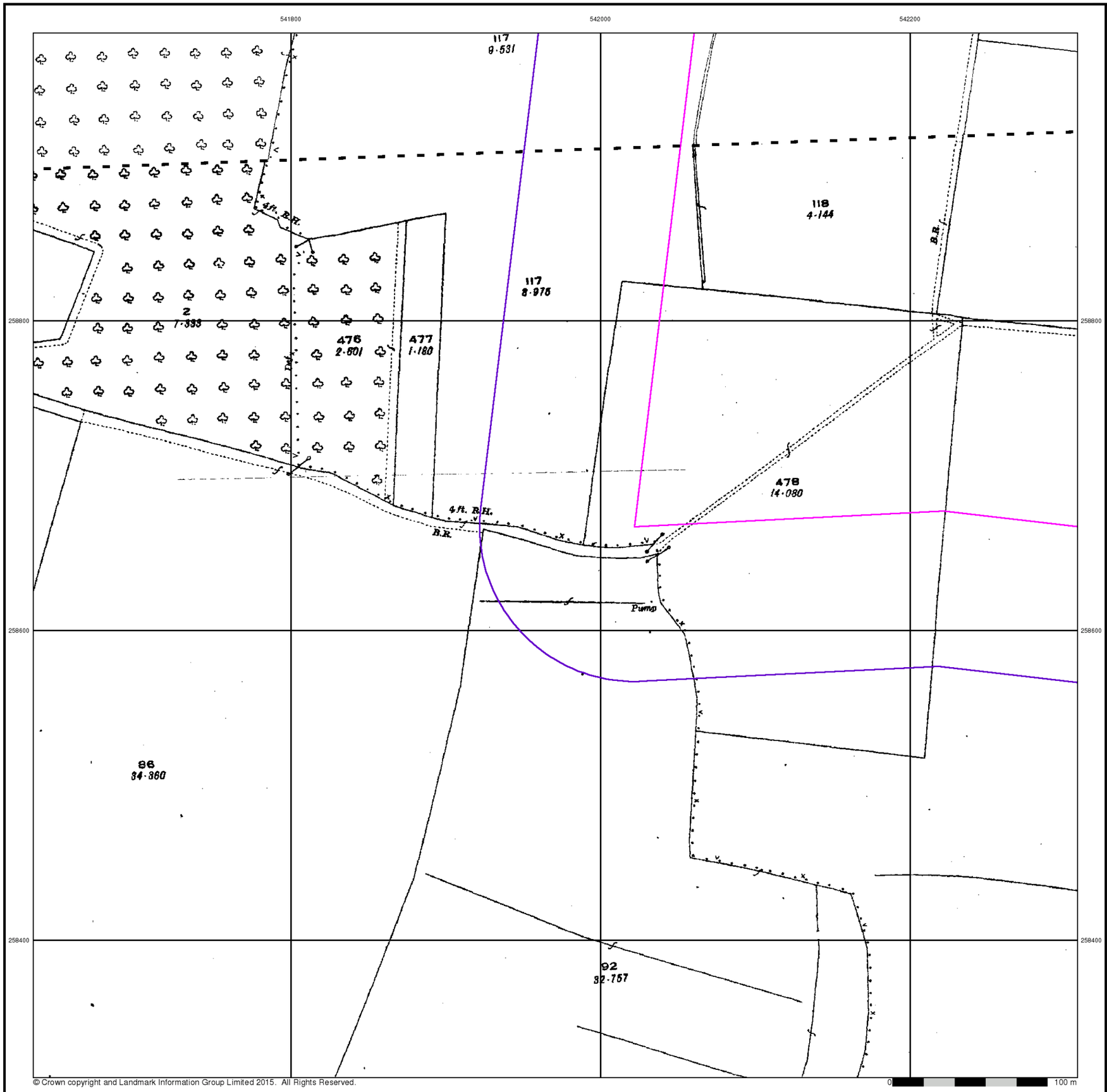

0 100 m

pba peterbrett

Cambridgeshire & Isle Of Ely

Published 1926 - 1927

Source map scale - 1:2,500

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

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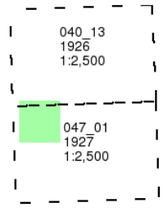
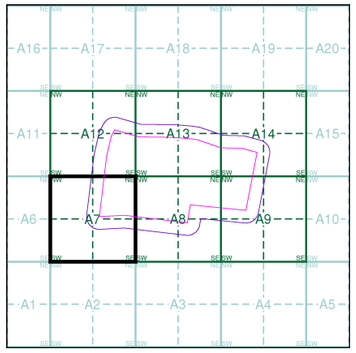


Historical Map - Segment A7



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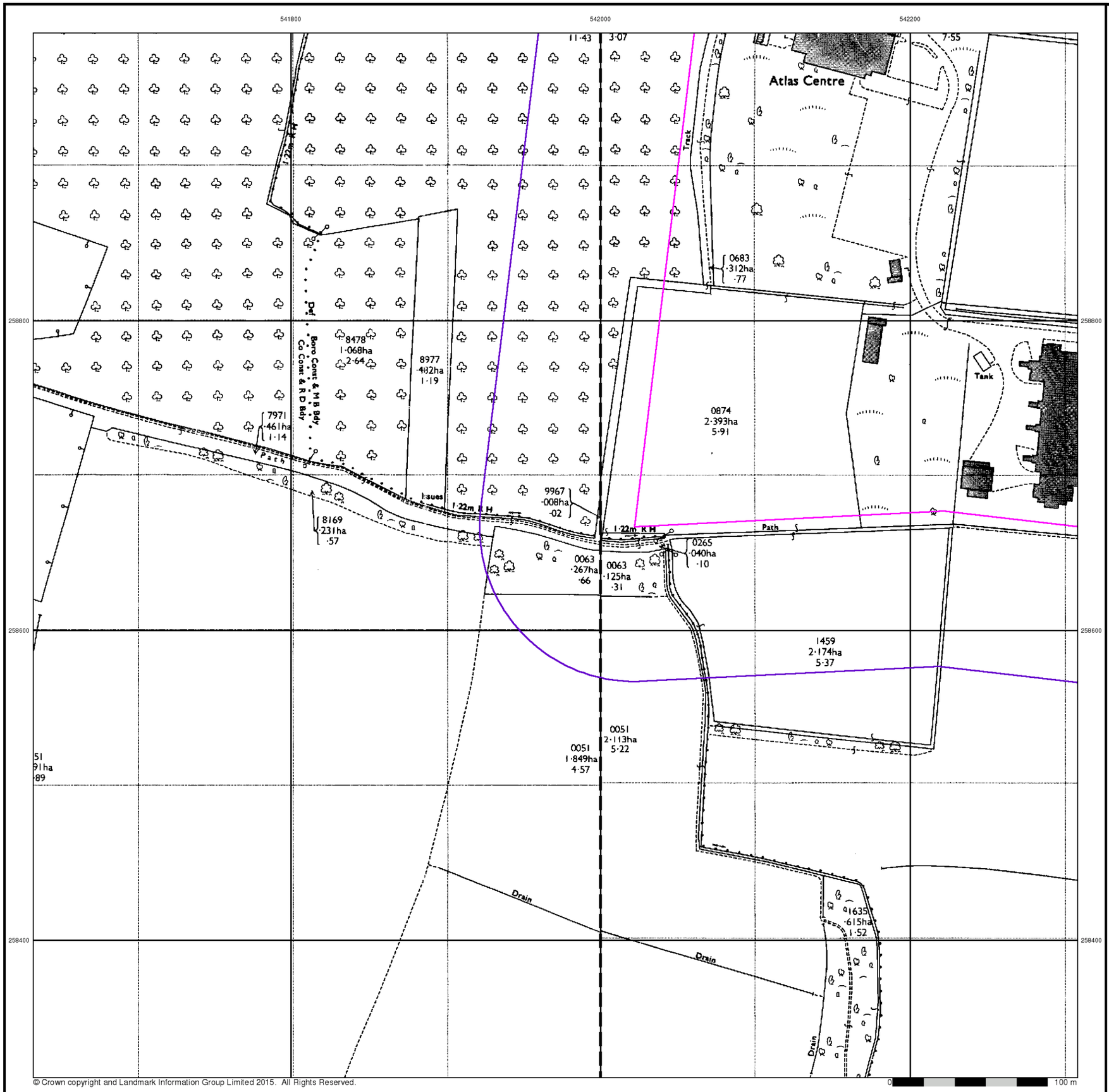

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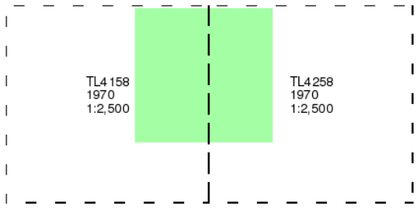
Ordnance Survey Plan

Published 1970

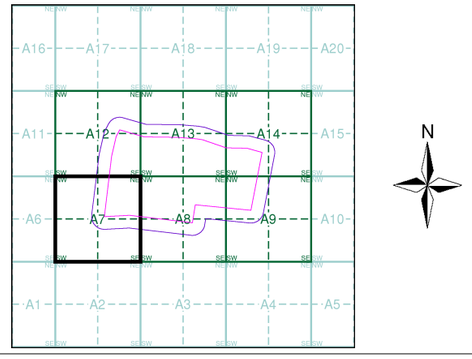
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A7



Order Details

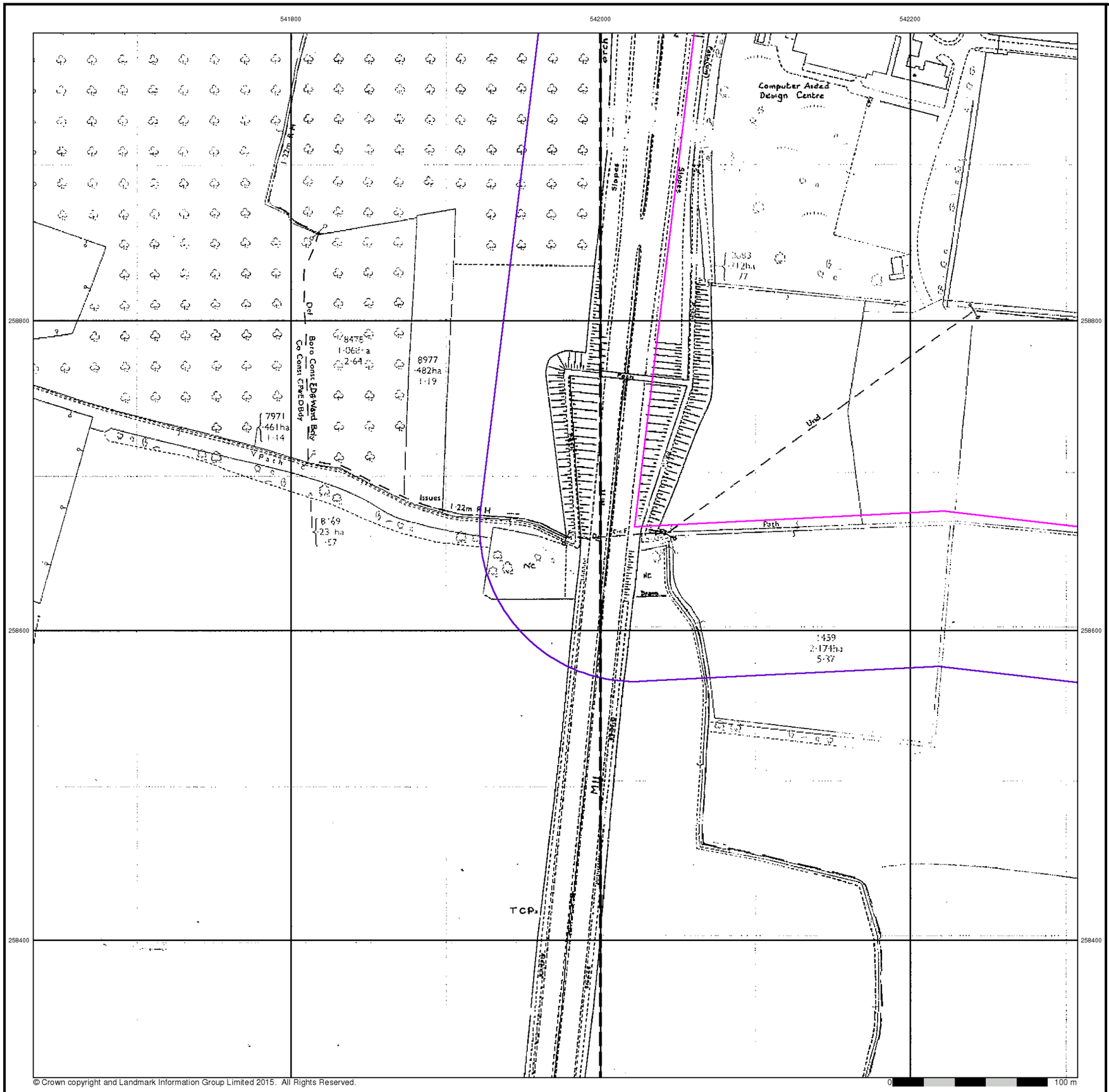
Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
Search Buffer (m):	100

Site Details

Site at, Cambridge, Cambridgeshire

Landmark Information Group

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



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Additional SIMs

Published 1980

Source map scale - 1:2,500

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

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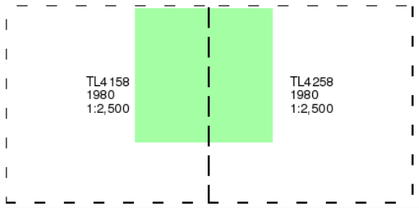
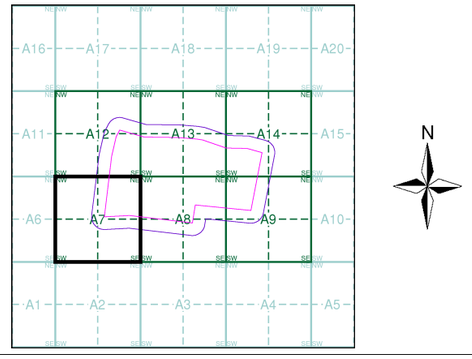


Historical Map - Segment A7



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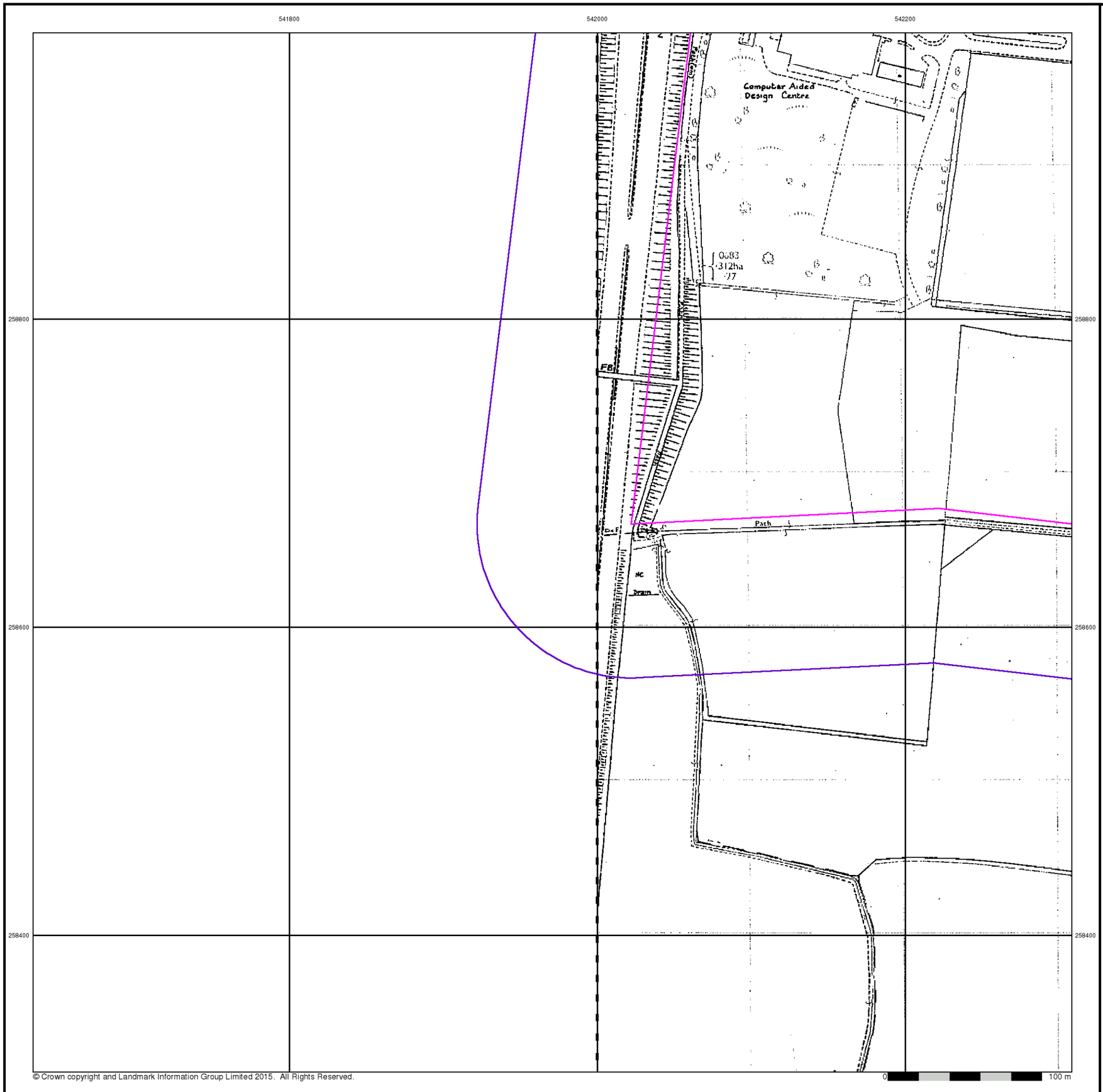

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Additional SIMs

Published 1985

Source map scale - 1:2,500

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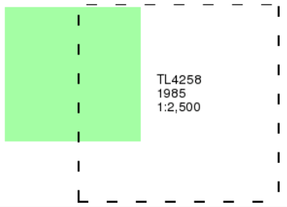
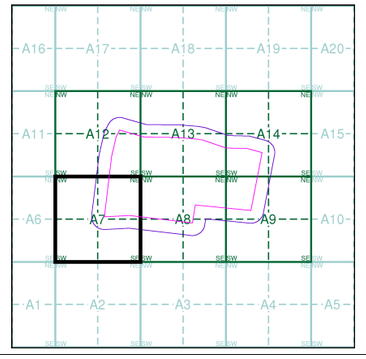


Historical Map - Segment A7



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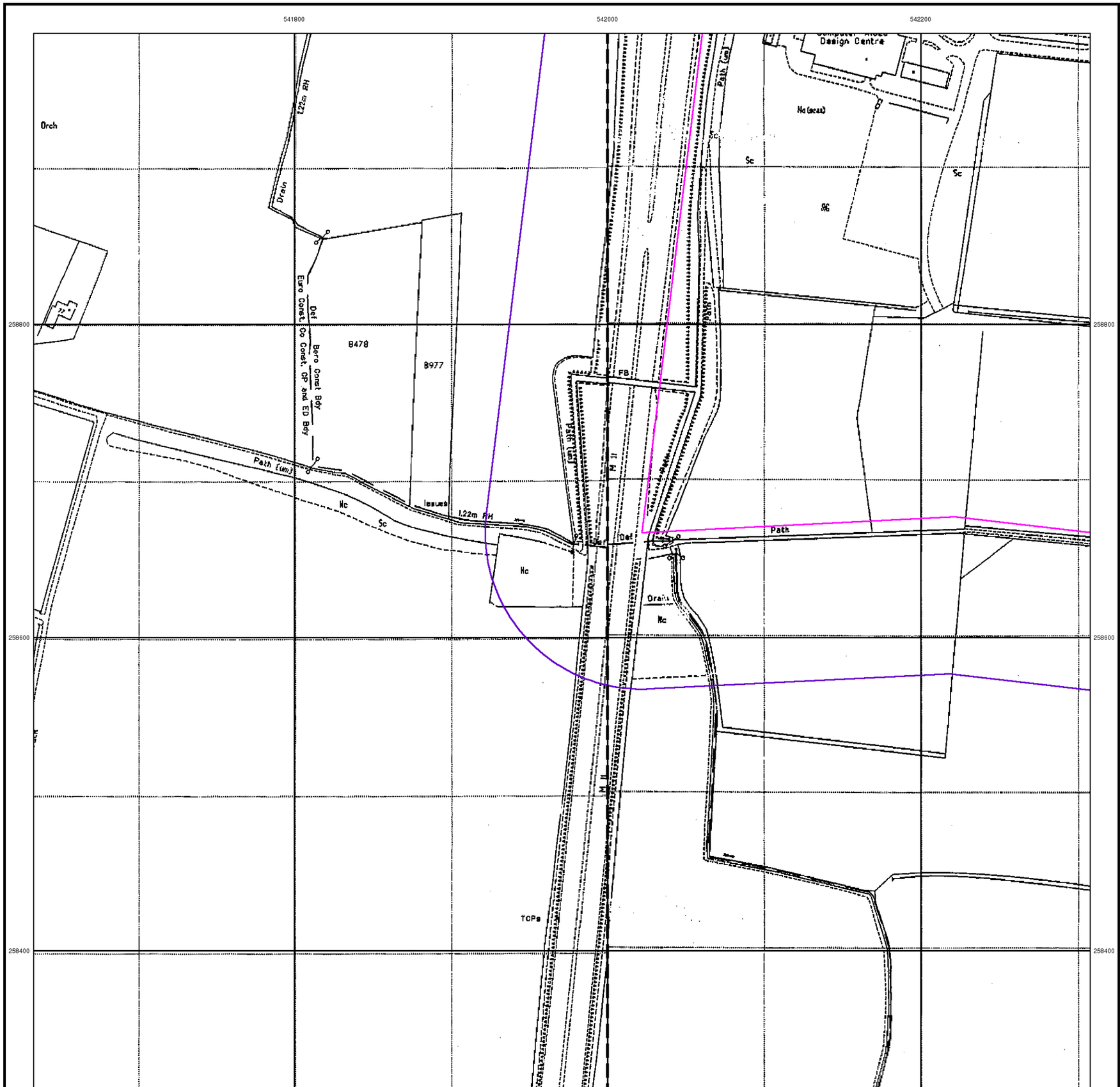

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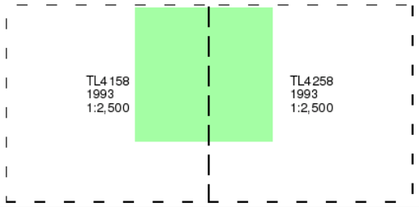
Large-Scale National Grid Data

Published 1993

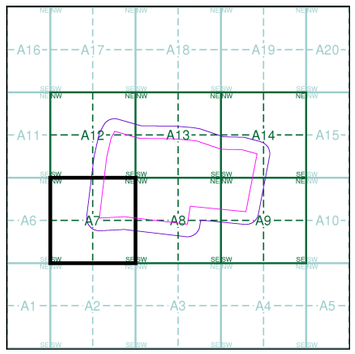
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A7



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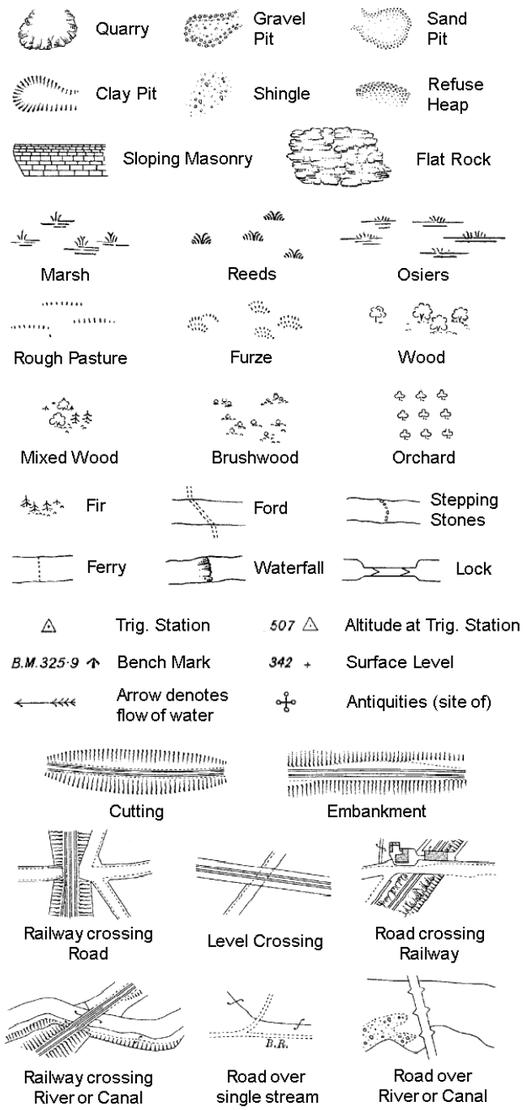
Historical Mapping Legends

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



County Boundary (Geographical)

County & Civil Parish Boundary

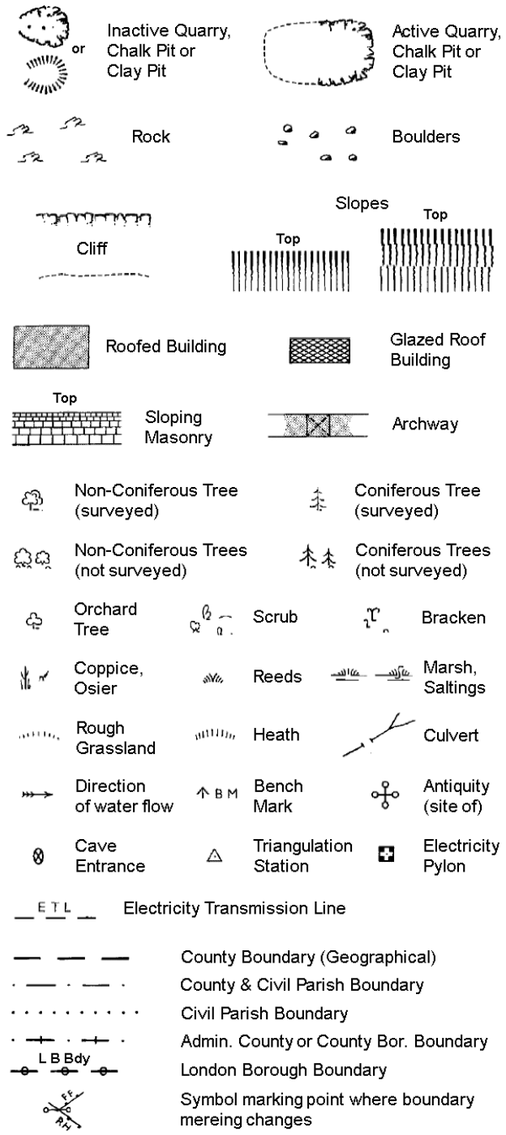
Administrative County & Civil Parish Boundary

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

Co. Burgh Bdy. County Burgh Boundary (Scotland)

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

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



County Boundary (Geographical)

County & Civil Parish Boundary

Civil Parish Boundary

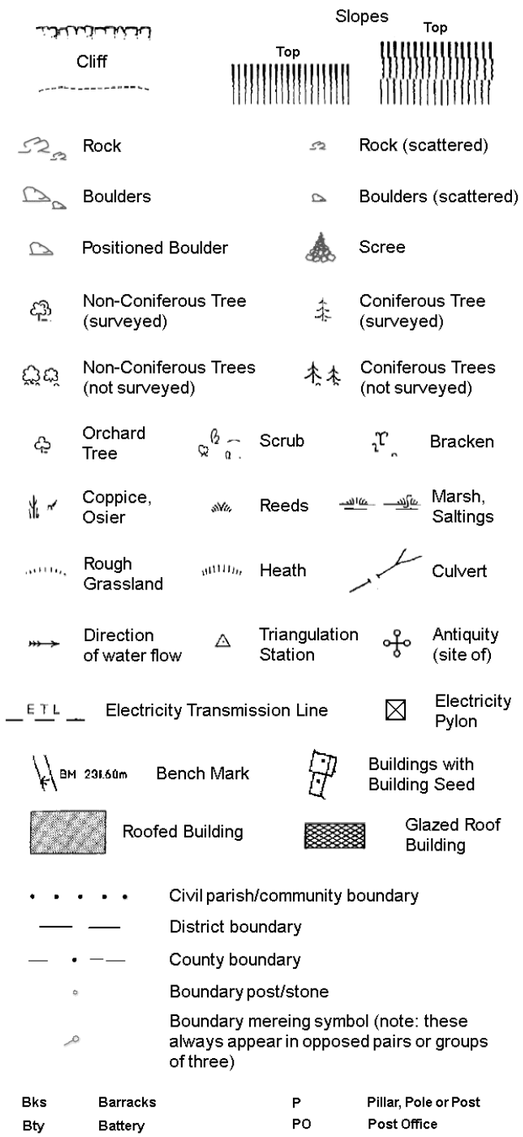
Admin. County or County Bor. Boundary

L B Bdy London Borough Boundary

Symbol marking point where boundary mereing changes

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

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



Civil parish/community boundary

District boundary

County boundary

Boundary post/stone

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

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

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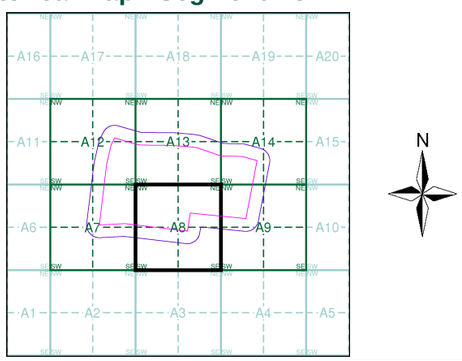
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Cambridgeshire & Isle Of Ely	1:2,500	1888	2
Cambridgeshire & Isle Of Ely	1:2,500	1903	3
Cambridgeshire & Isle Of Ely	1:2,500	1926 - 1927	4
Ordnance Survey Plan	1:2,500	1970	5
Additional SIMs	1:2,500	1980	6
Additional SIMs	1:2,500	1985	7
Large-Scale National Grid Data	1:2,500	1993	8

Historical Map - Segment A8



Order Details

Order Number: 66871644_1_1
Customer Ref: 31500
National Grid Reference: 542610, 258970
Slice: A
Site Area (Ha): 67.92
Search Buffer (m): 100

Site Details

Site at, Cambridge, Cambridgeshire

Landmark® Information Group

Tel: 0844 844 9952
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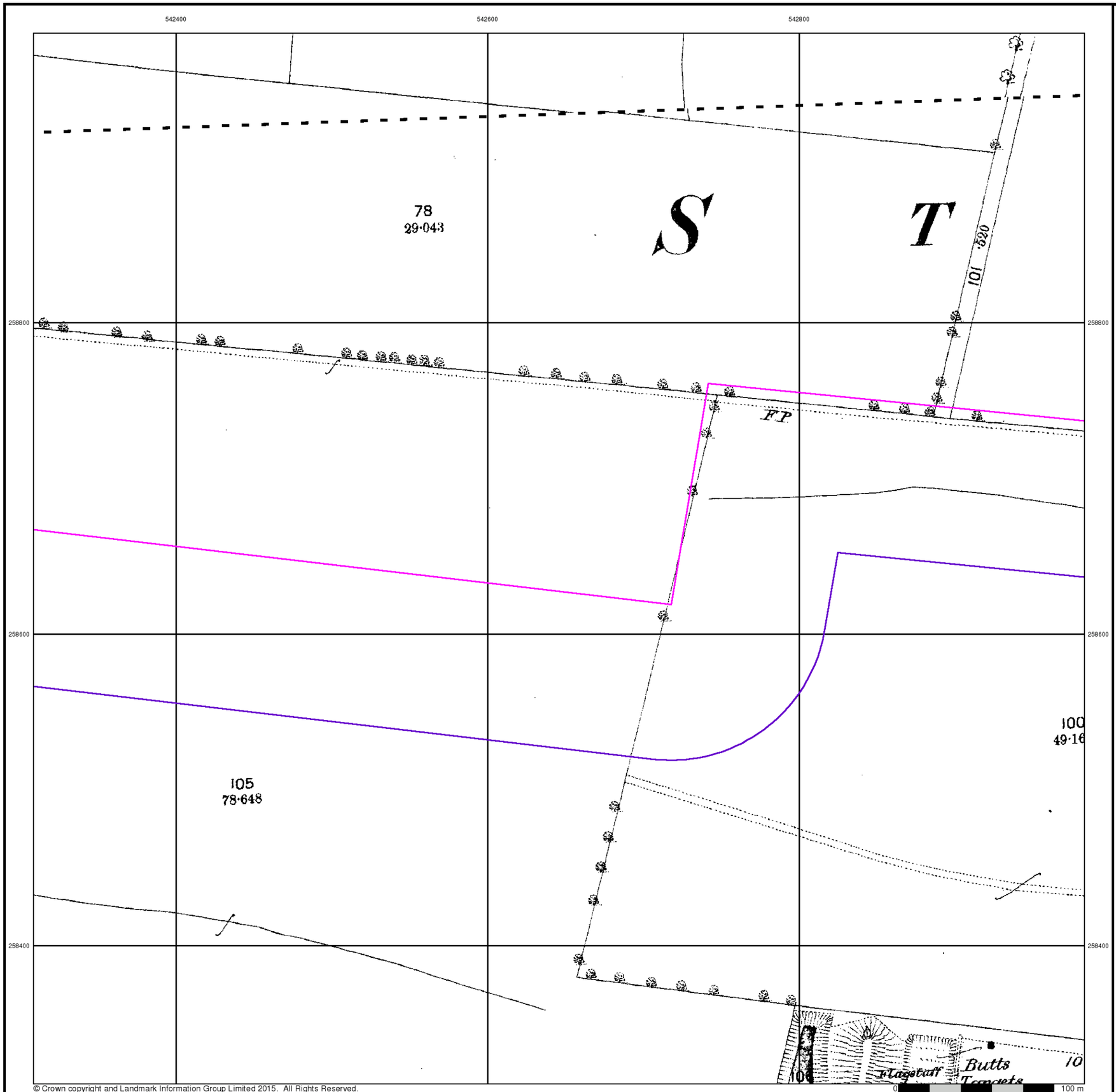

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Cambridgeshire & Isle Of Ely

Published 1888

Source map scale - 1:2,500

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

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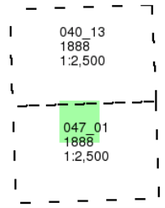
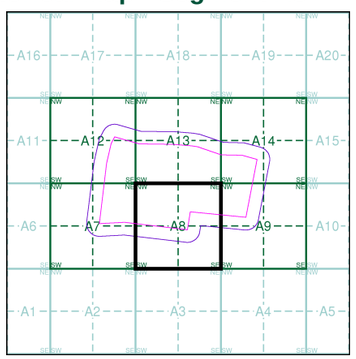


Historical Map - Segment A8



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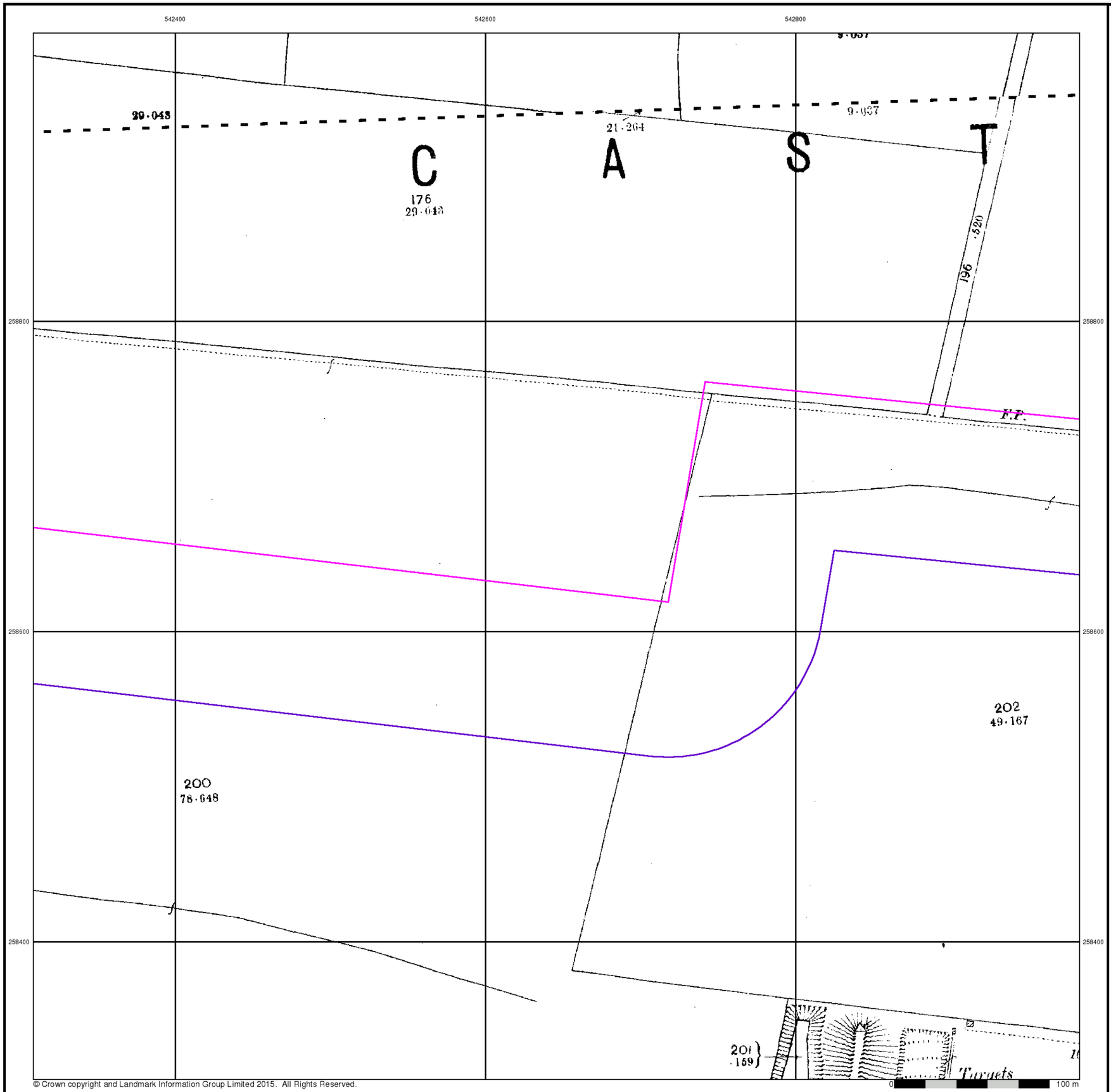

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Cambridgeshire & Isle Of Ely

Published 1903

Source map scale - 1:2,500

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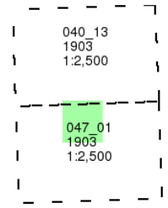
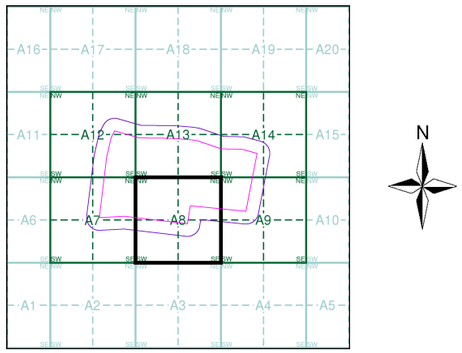


Historical Map - Segment A8



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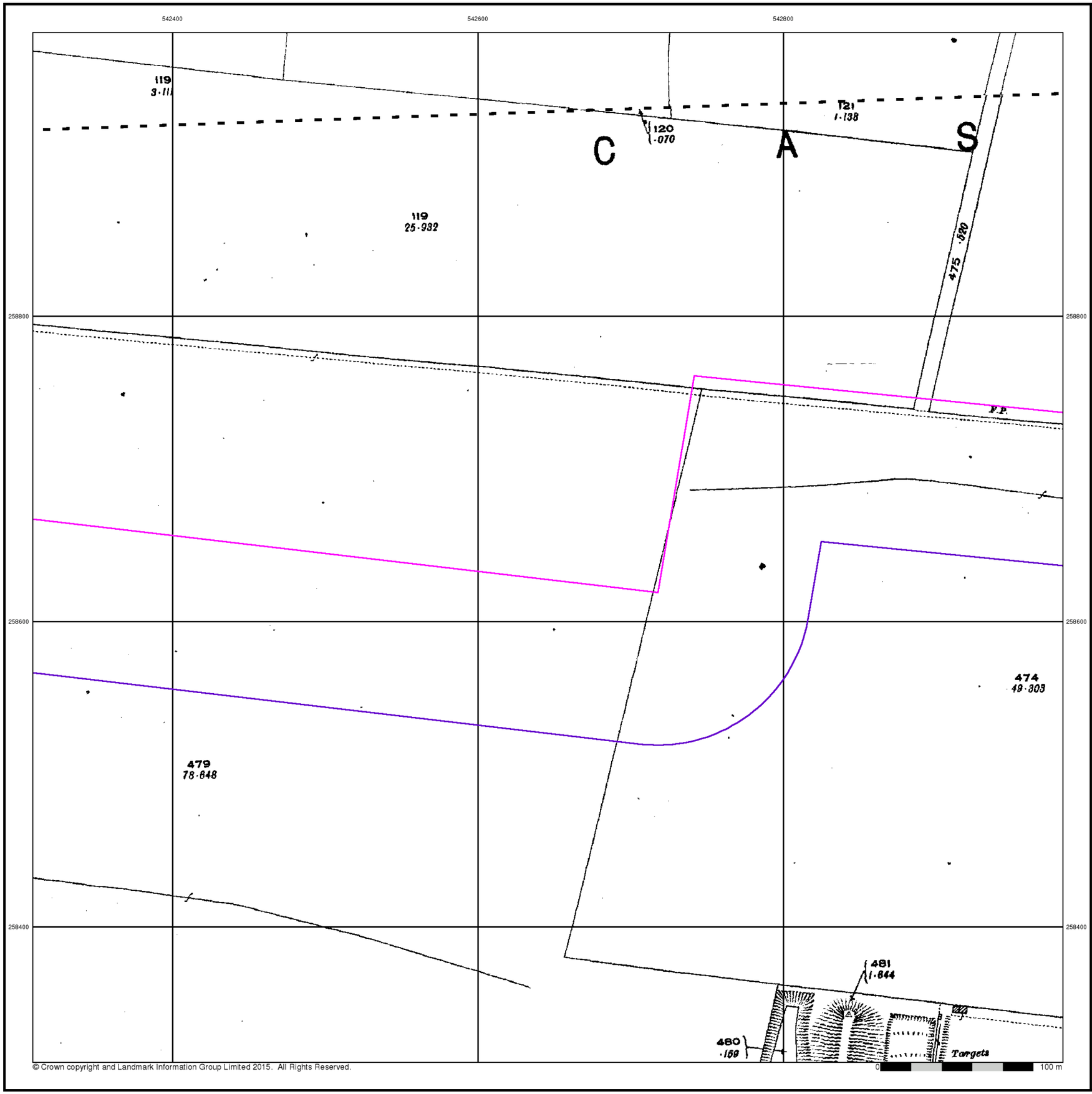

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Cambridgeshire & Isle Of Ely

Published 1926 - 1927

Source map scale - 1:2,500

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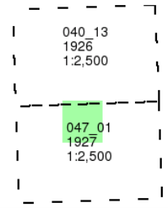
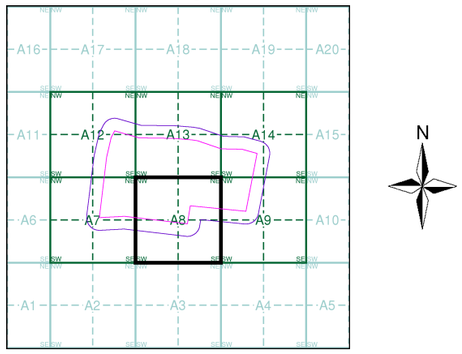


Historical Map - Segment A8



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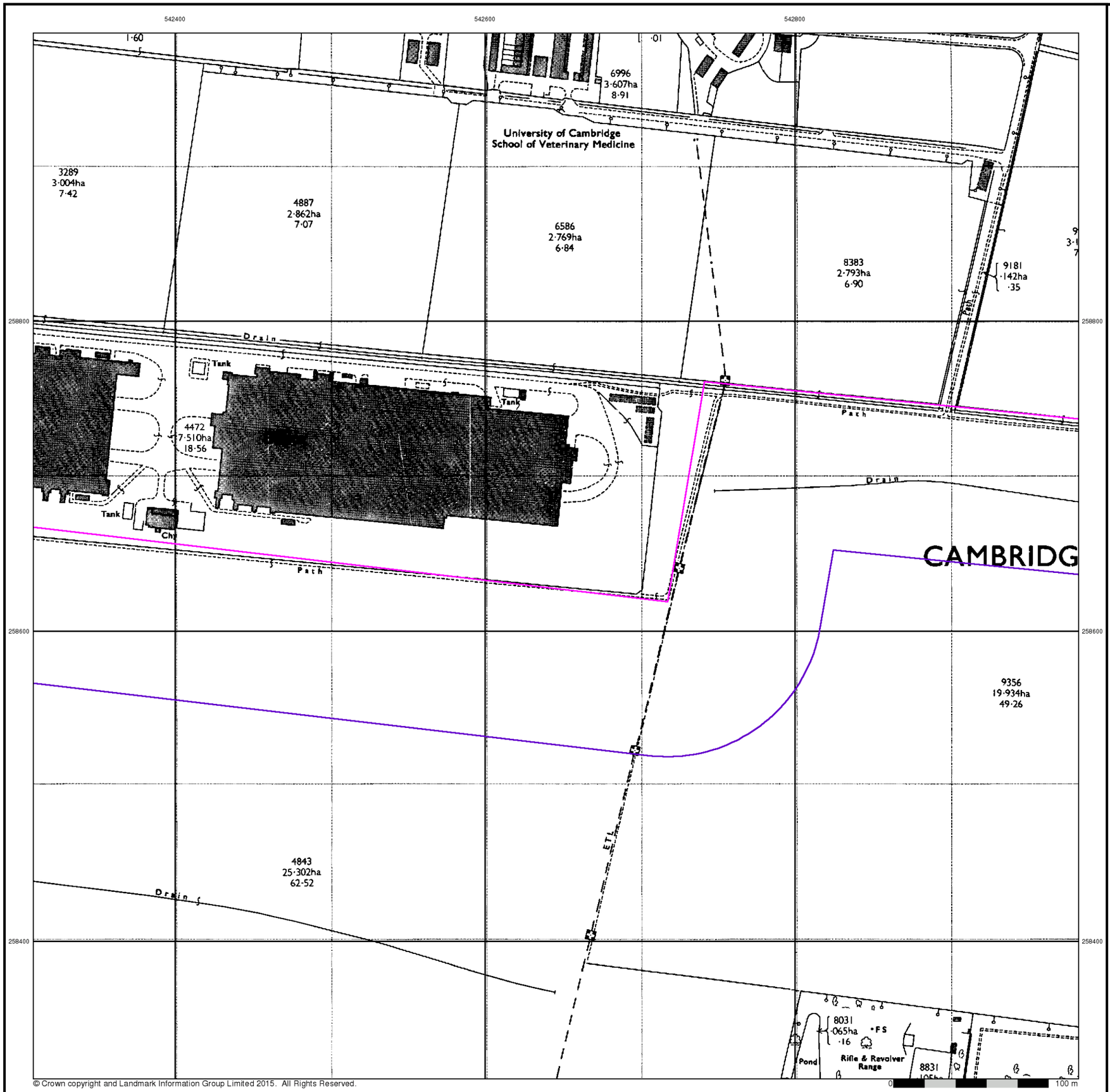

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Ordnance Survey Plan

Published 1970

Source map scale - 1:2,500

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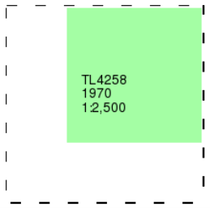
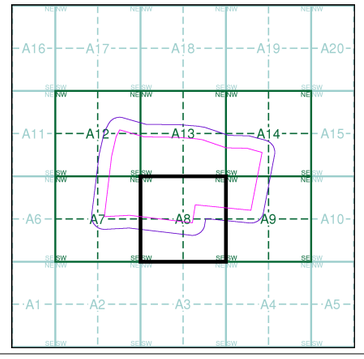


Historical Map - Segment A8



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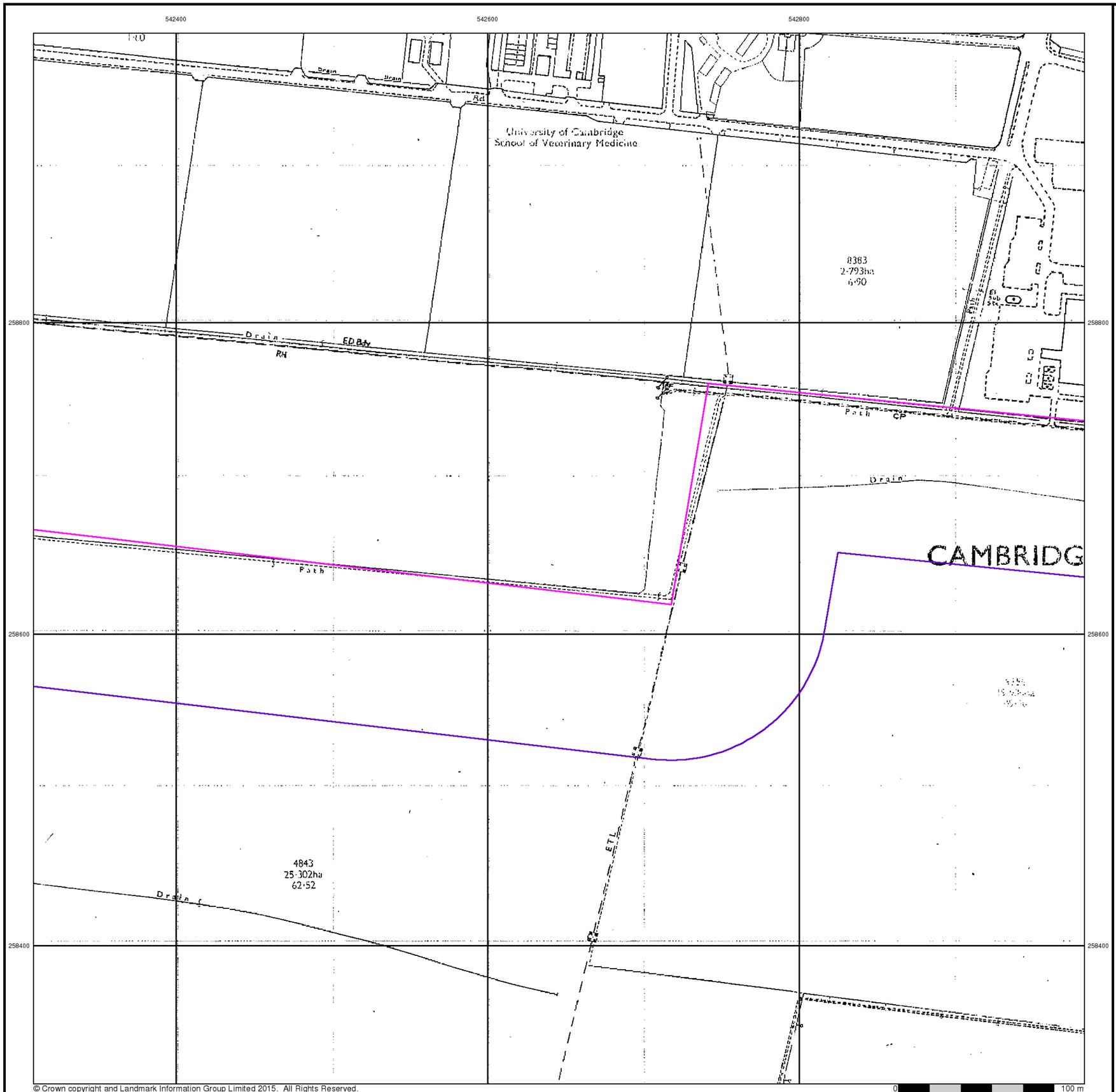

Additional SIMs

Published 1980

Source map scale - 1:2,500

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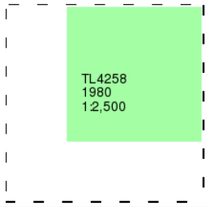
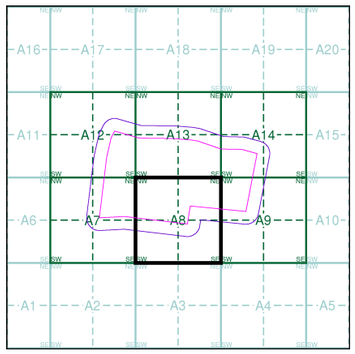


Historical Map - Segment A8



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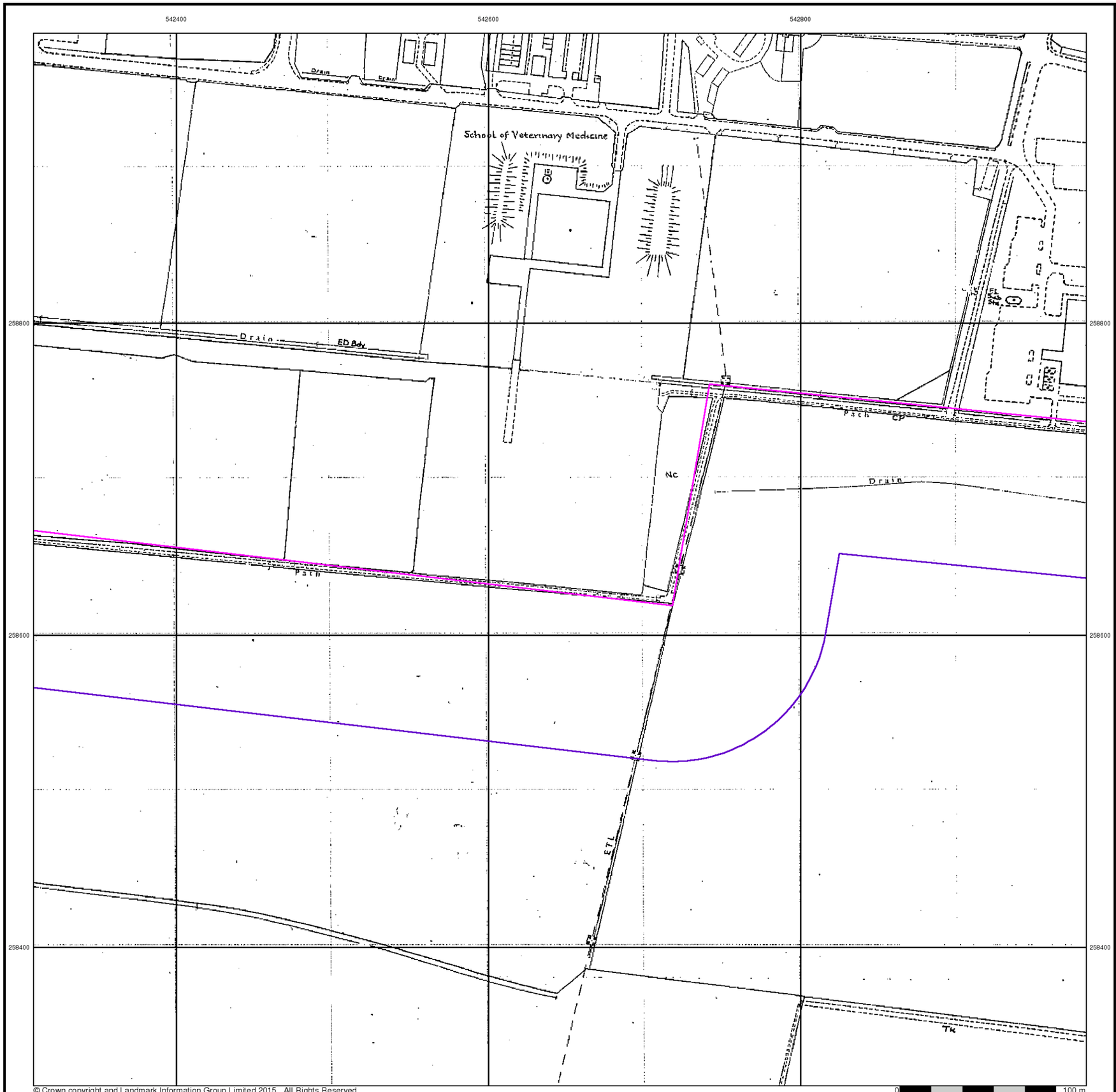

Additional SIMs

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Source map scale - 1:2,500

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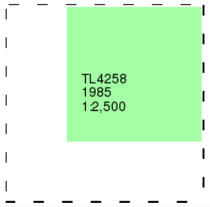
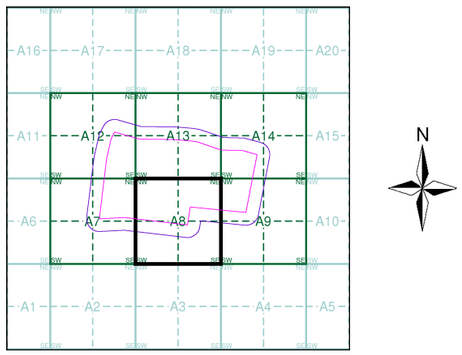


Historical Map - Segment A8



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Slice:	A
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Search Buffer (m):	100

Site Details

Site at, Cambridge, Cambridgeshire

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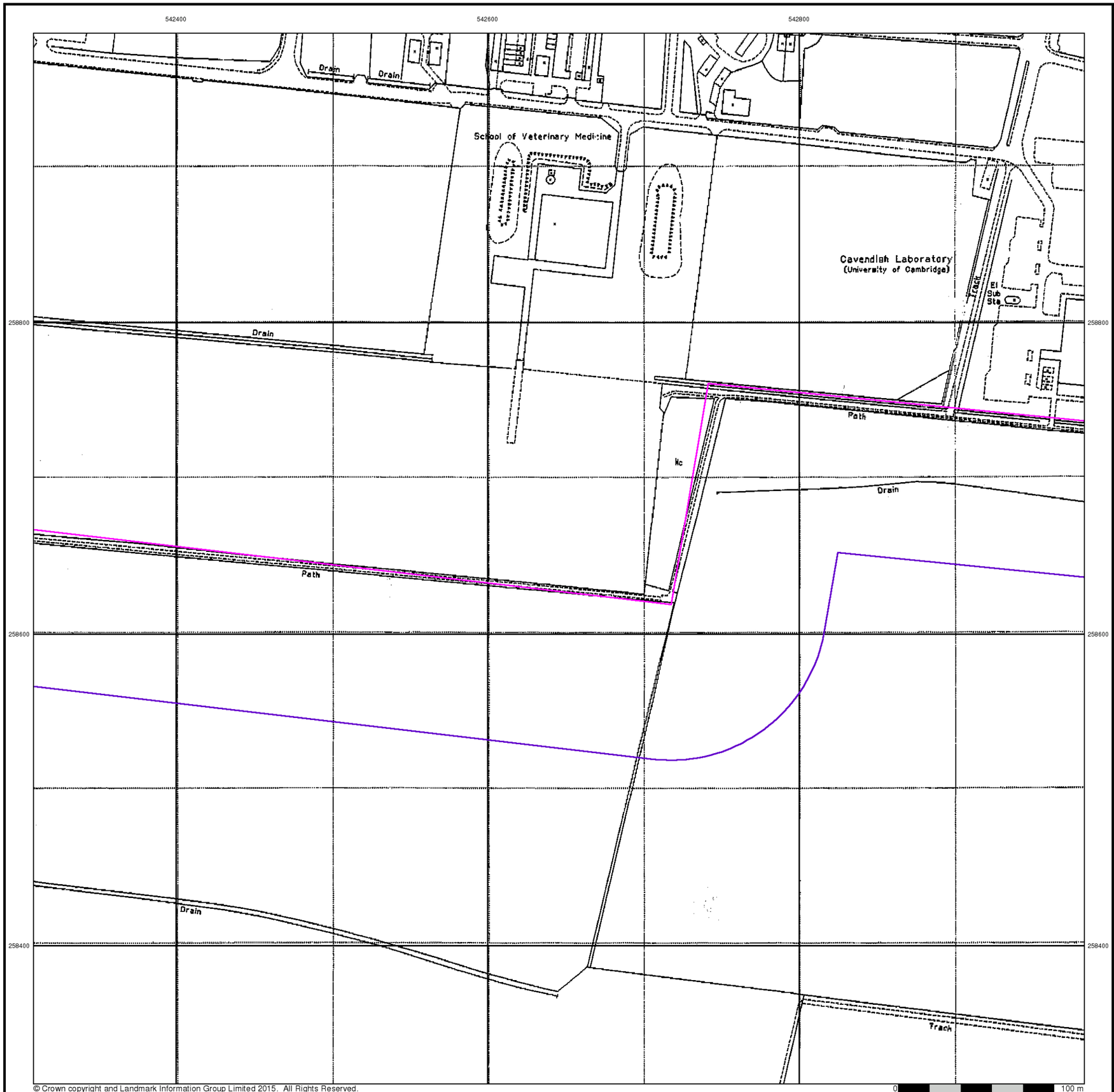
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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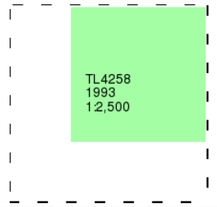
Large-Scale National Grid Data

Published 1993

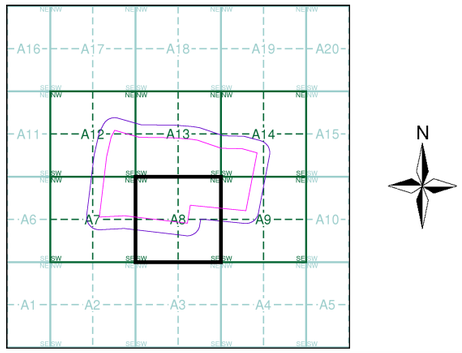
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A8



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
Search Buffer (m):	100

Site Details

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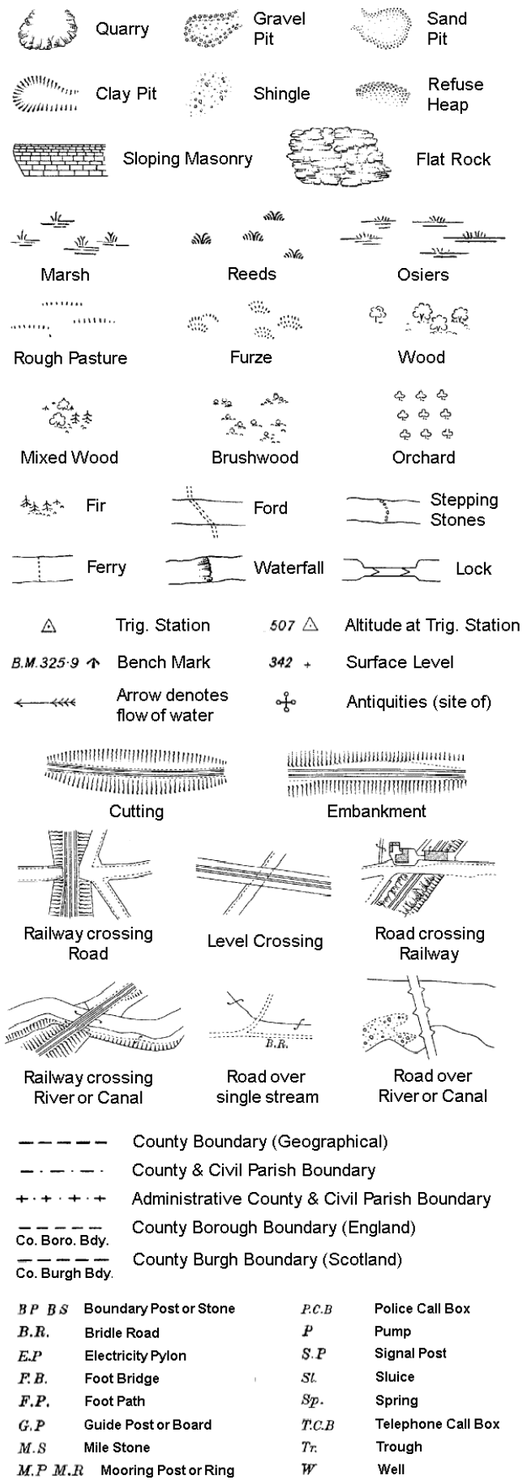
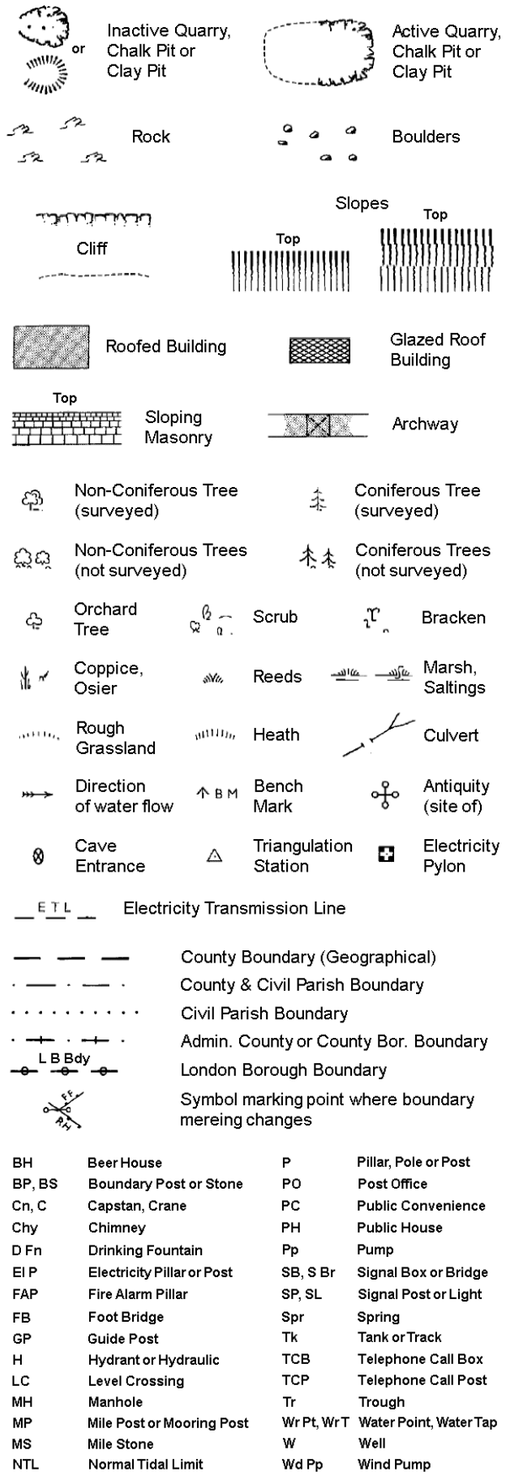
Historical Mapping Legends

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



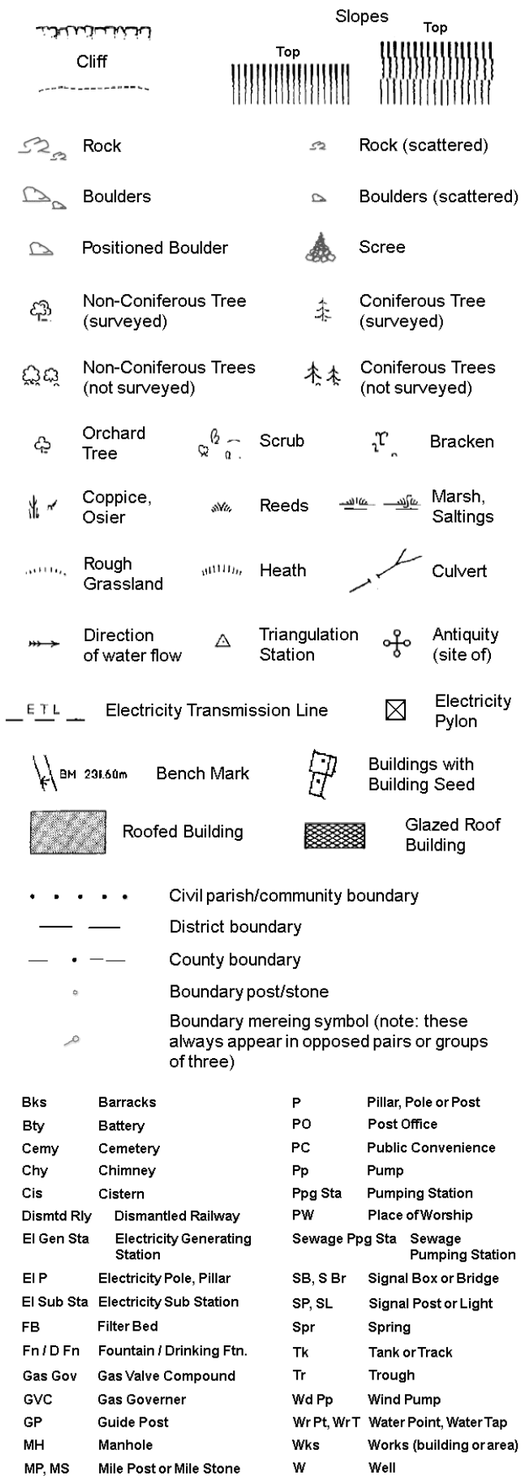
B P B S	Boundary Post or Stone	P.C.B	Police Call Box
B.R.	Bridle Road	P	Pump
E.P	Electricity Pylon	S.P	Signal Post
F.B.	Foot Bridge	St.	Sluice
F.P.	Foot Path	Sp.	Spring
G.P	Guide Post or Board	T.C.B	Telephone Call Box
M.S	Mile Stone	Tr.	Trough
M.P M.R	Mooring Post or Ring	W	Well

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

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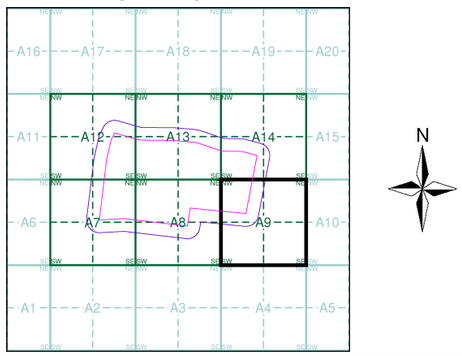
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Cambridgeshire & Isle Of Ely	1:2,500	1888	2
Cambridgeshire & Isle Of Ely	1:2,500	1903	3
Cambridgeshire & Isle Of Ely	1:2,500	1926 - 1927	4
Ordnance Survey Plan	1:1,250	1967	5
Ordnance Survey Plan	1:2,500	1970	6
Ordnance Survey Plan	1:1,250	1976 - 1977	7
Additional SIMs	1:2,500	1980	8
Additional SIMs	1:1,250	1983	9
Additional SIMs	1:2,500	1985	10
Large-Scale National Grid Data	1:2,500	1993	11
Large-Scale National Grid Data	1:1,250	1993	12
Large-Scale National Grid Data	1:1,250	1994	13

Historical Map - Segment A9



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
Search Buffer (m):	100

Site Details

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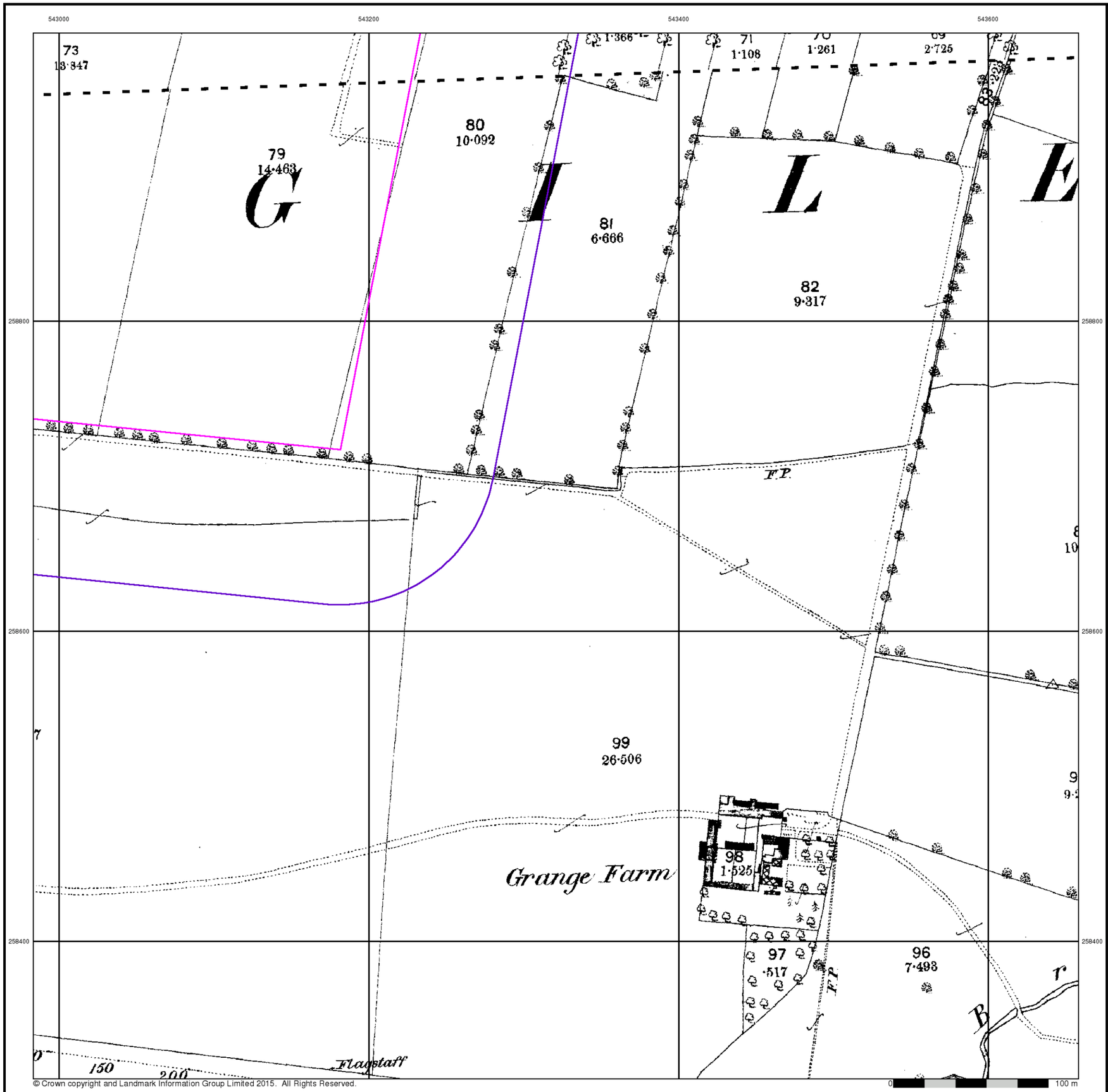

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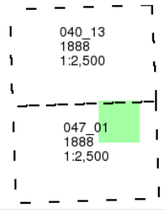
Cambridgeshire & Isle Of Ely

Published 1888

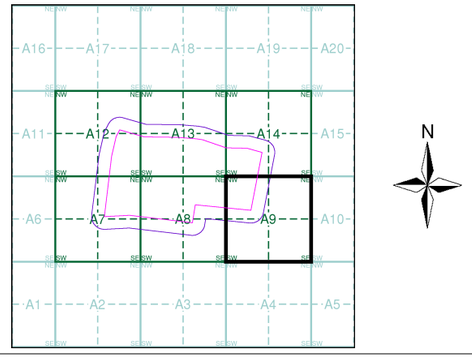
Source map scale - 1:2,500

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 A9



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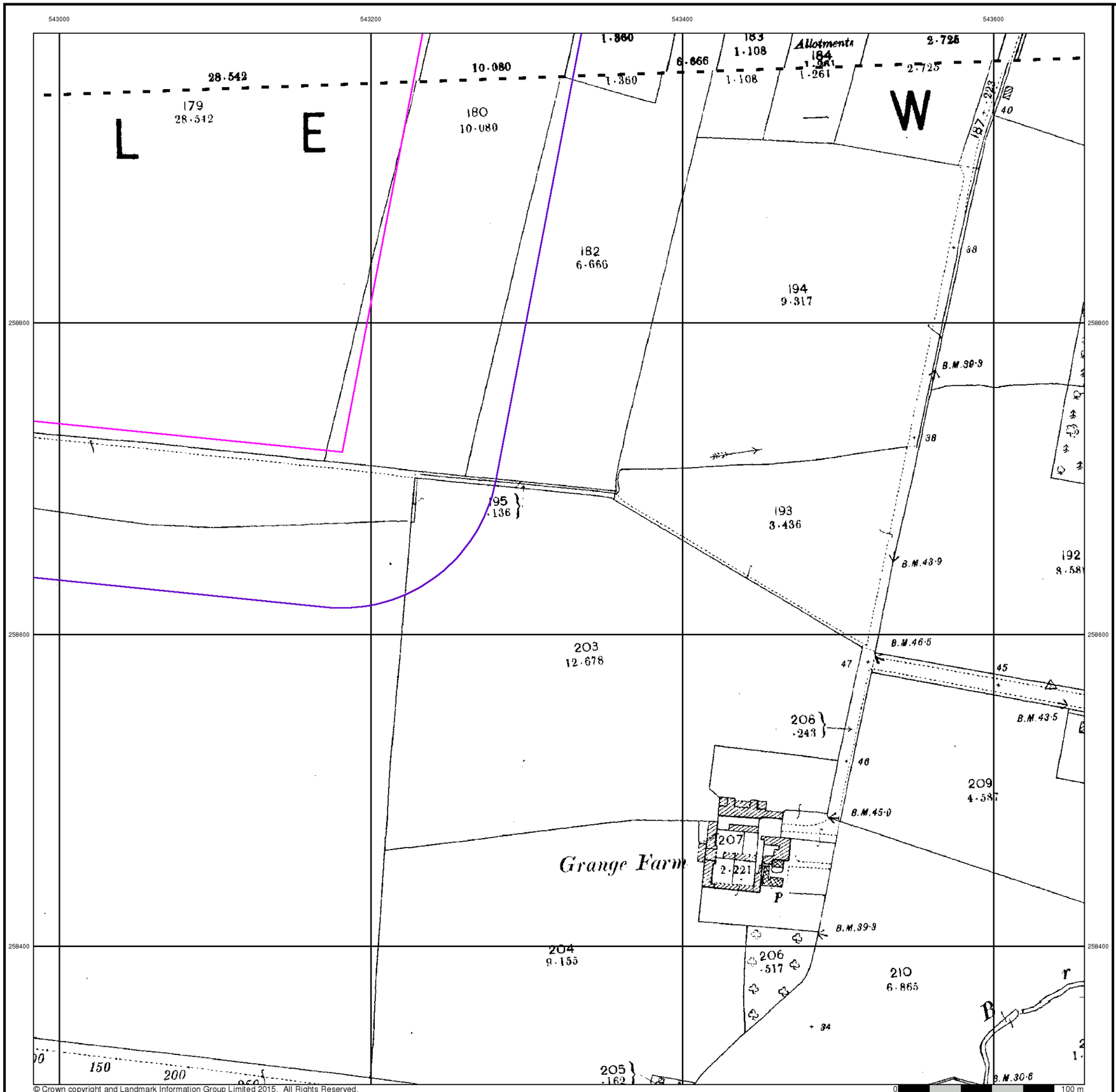

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Cambridgeshire & Isle Of Ely

Published 1903

Source map scale - 1:2,500

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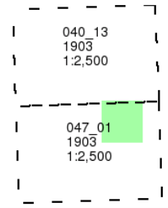
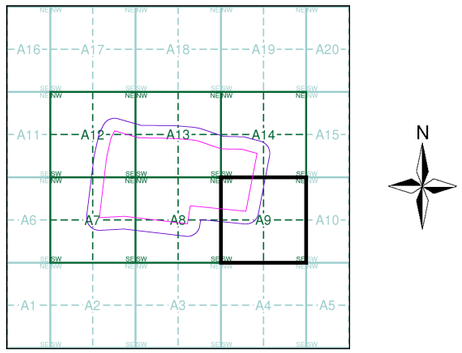
Map Name(s) and Date(s)



Historical Map - Segment A9



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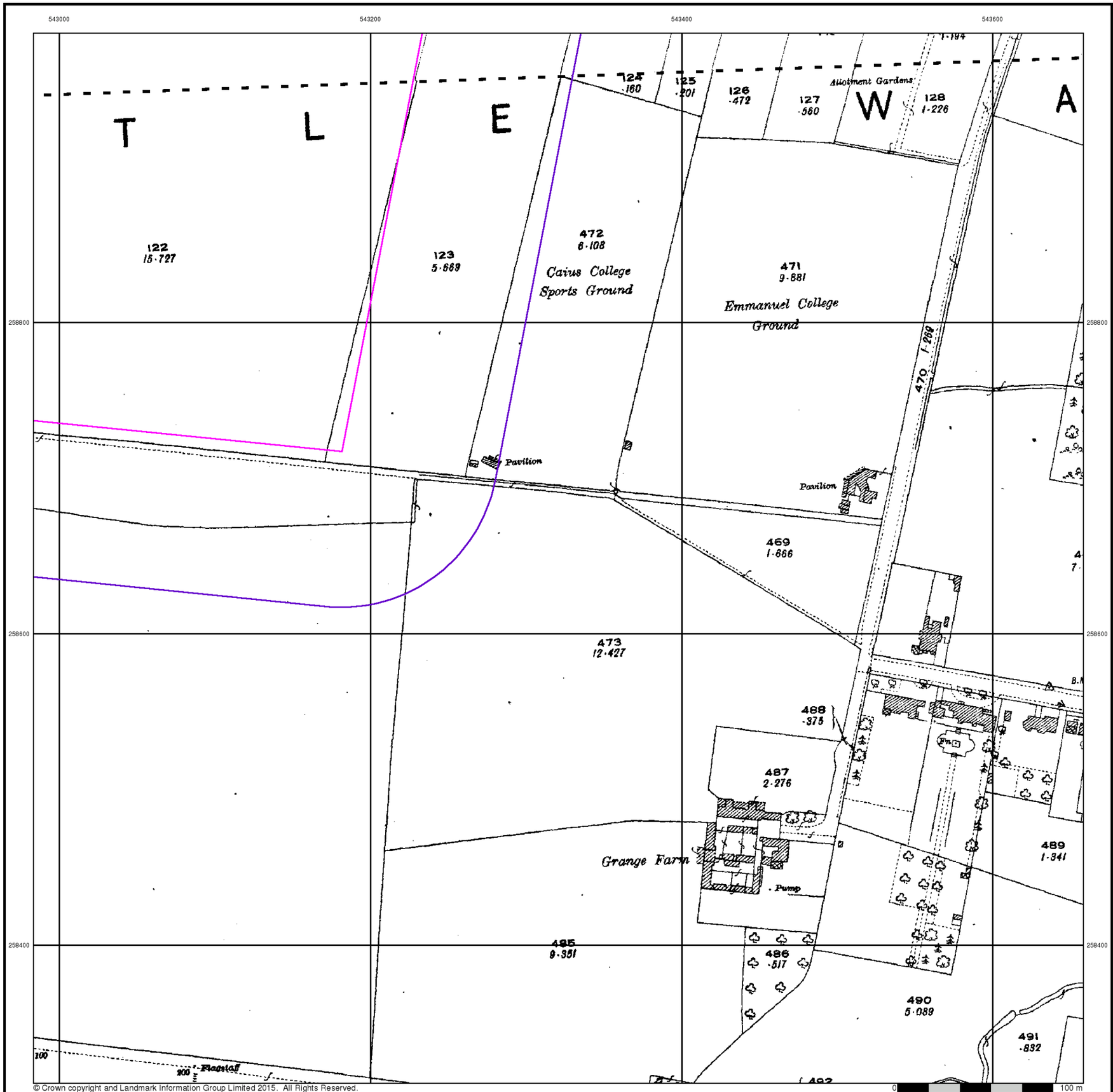


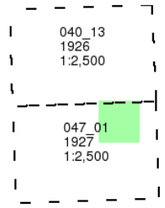
Cambridgeshire & Isle Of Ely

Published 1926 - 1927

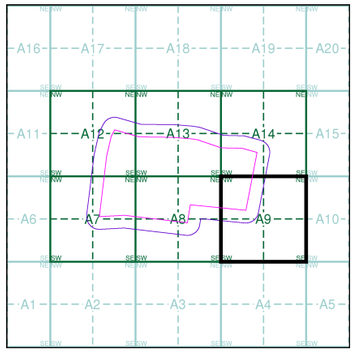
Source map scale - 1:2,500

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 A9



Order Details

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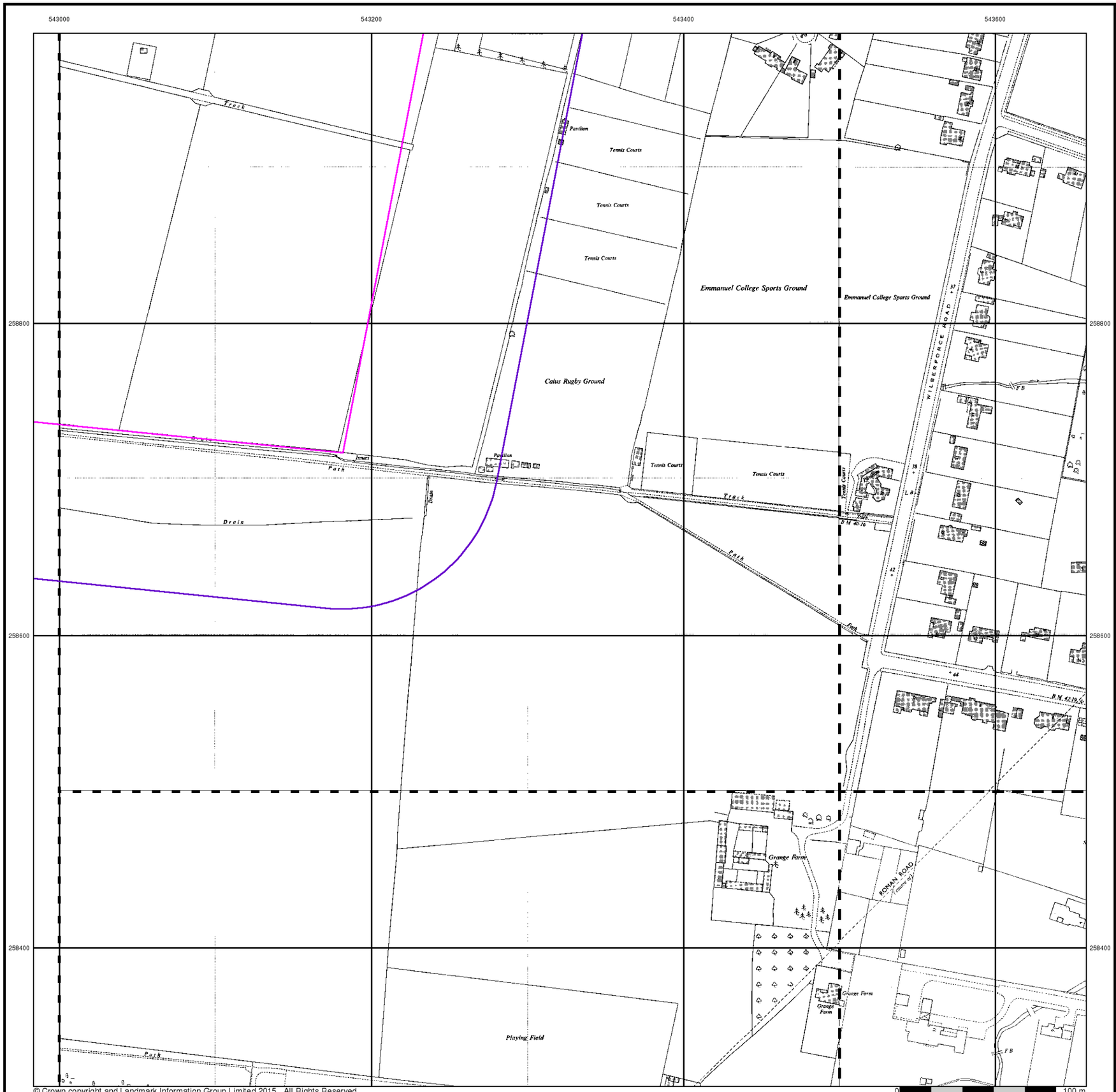

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Ordnance Survey Plan

Published 1967

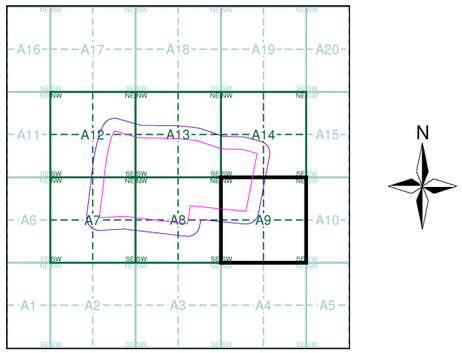
Source map scale - 1:1,250

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)

TL4358NW 1967 1:1,250	TL4358NE 1967 1:1,250
TL4358SW 1967 1:1,250	TL4358SE 1967 1:1,250

Historical Map - Segment A9



Order Details

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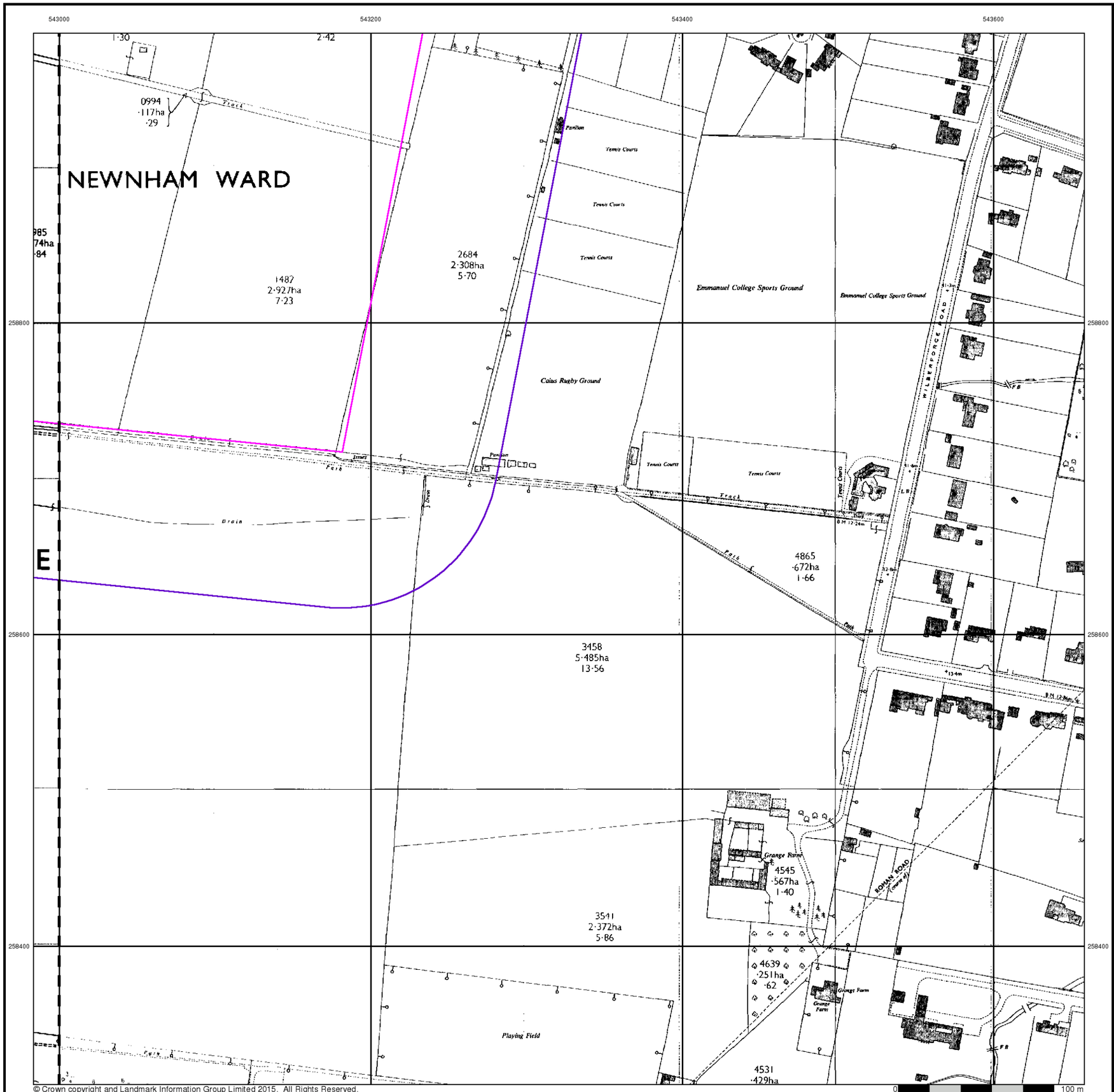


pba peterbrett

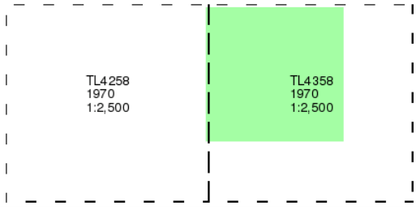
Ordnance Survey Plan

Published 1970

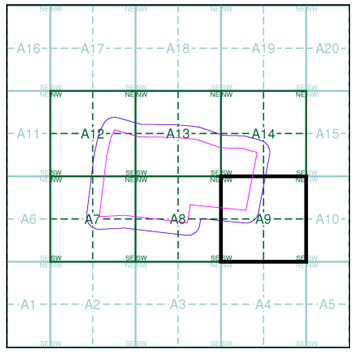
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A9



Order Details

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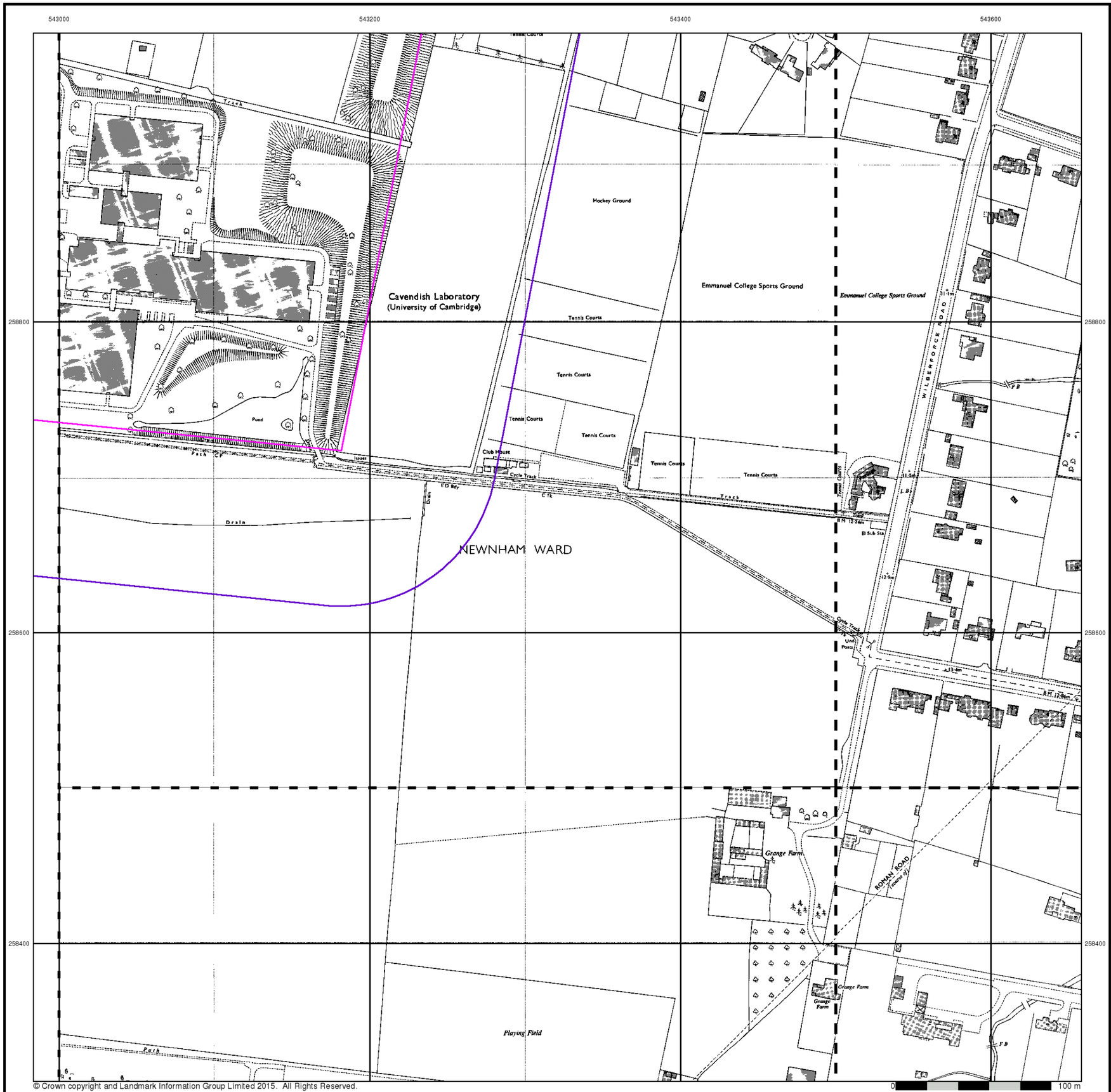

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Ordnance Survey Plan

Published 1976 - 1977

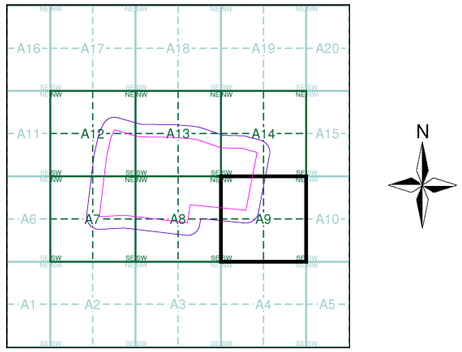
Source map scale - 1:1,250

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

Map Name(s) and Date(s)

TL4358NW 1976 1:1,250	TL4358NE 1976 1:1,250
TL4358SW 1976 1:1,250	TL4358SE 1977 1:1,250

Historical Map - Segment A9



Order Details

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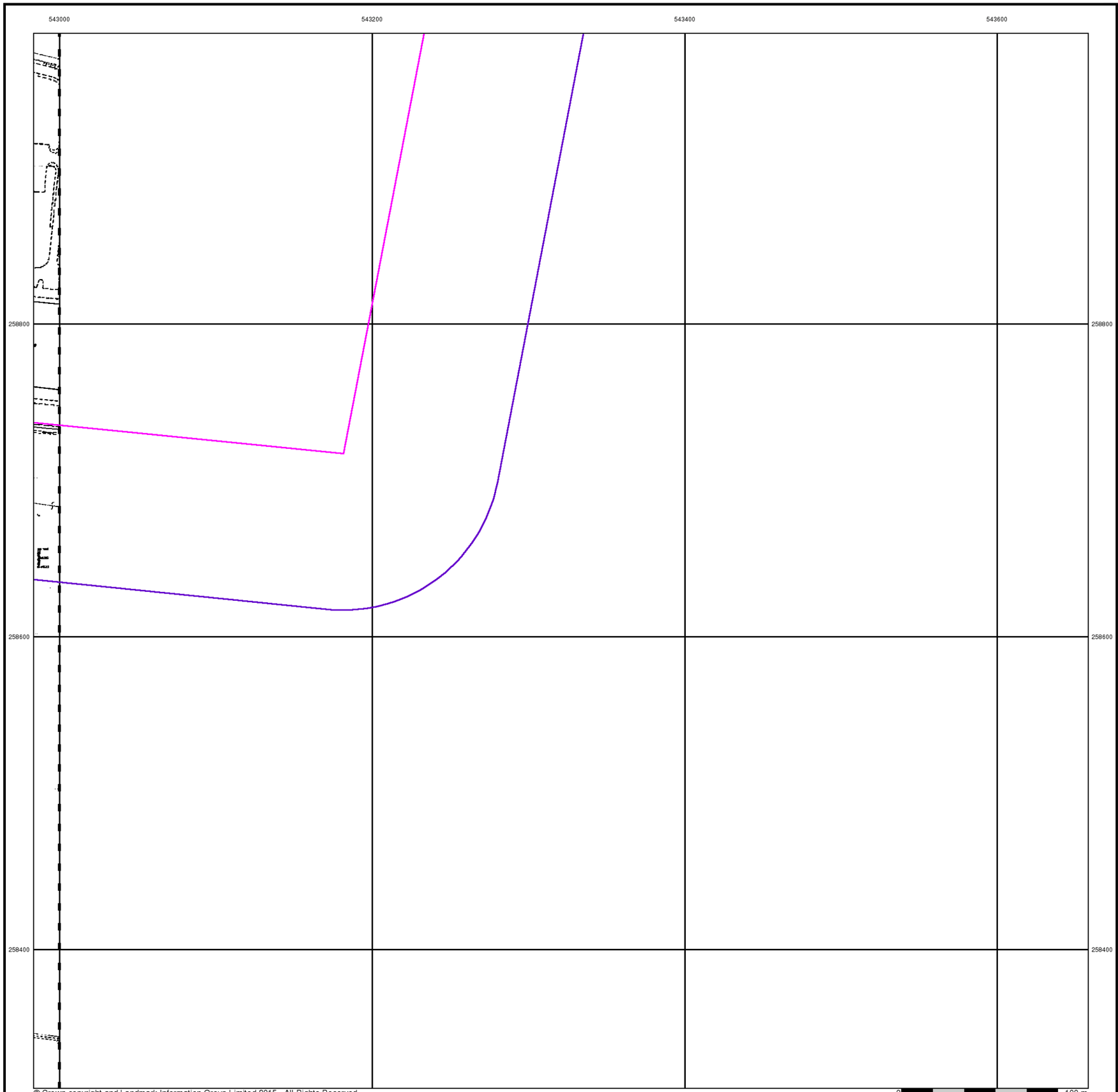


0 100 m

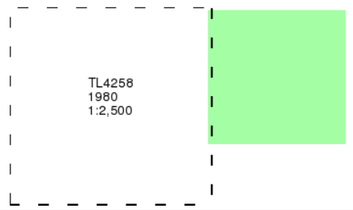
Additional SIMs

Published 1980

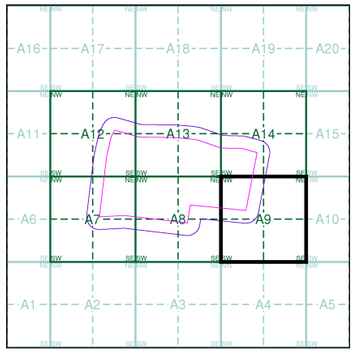
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A9



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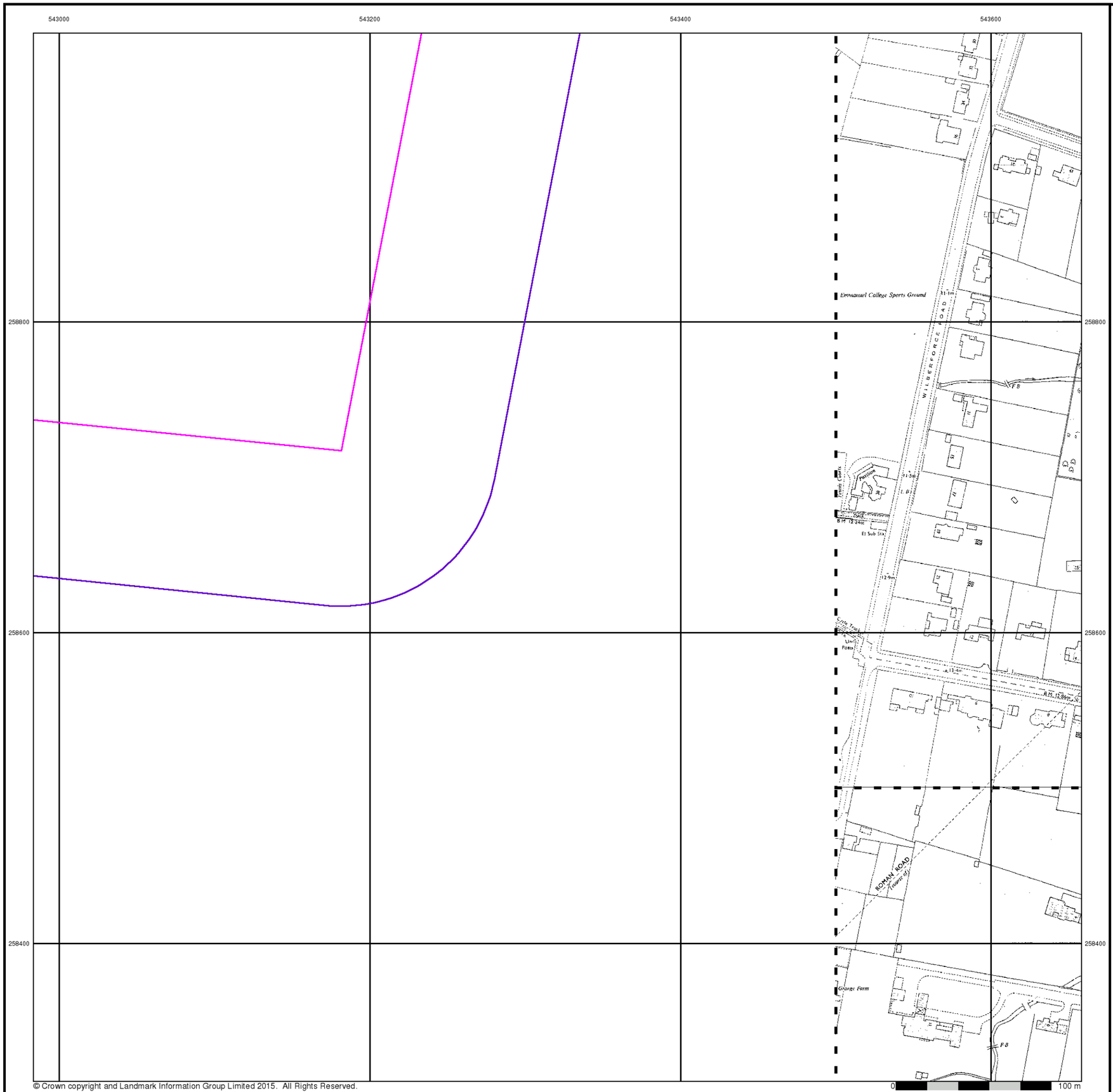

Additional SIMs

Published 1983

Source map scale - 1:1,250

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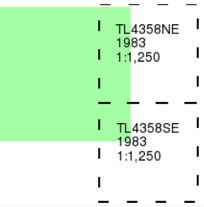
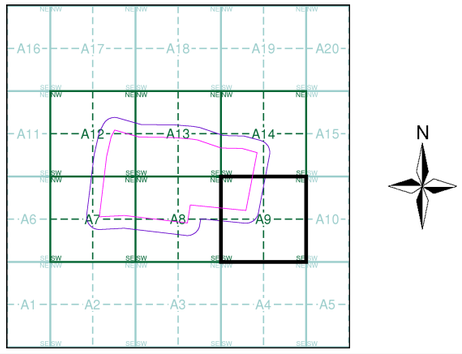
Map Name(s) and Date(s)



Historical Map - Segment A9



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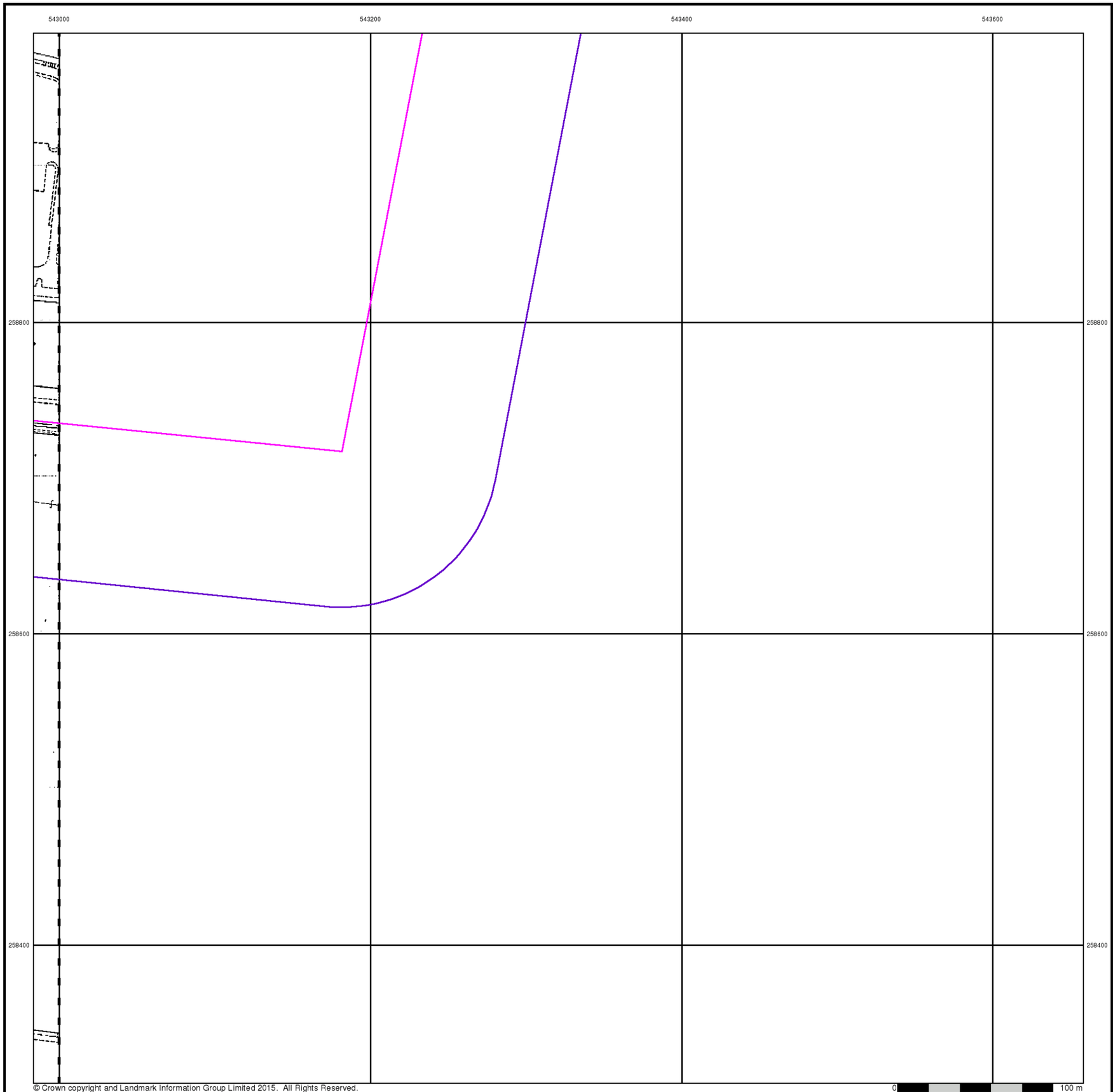


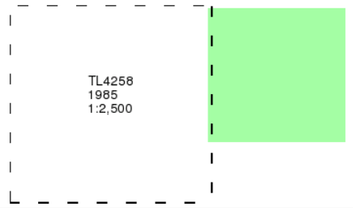
Additional SIMs

Published 1985

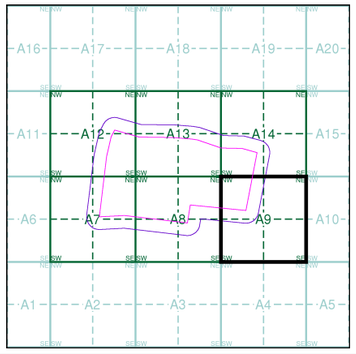
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A9



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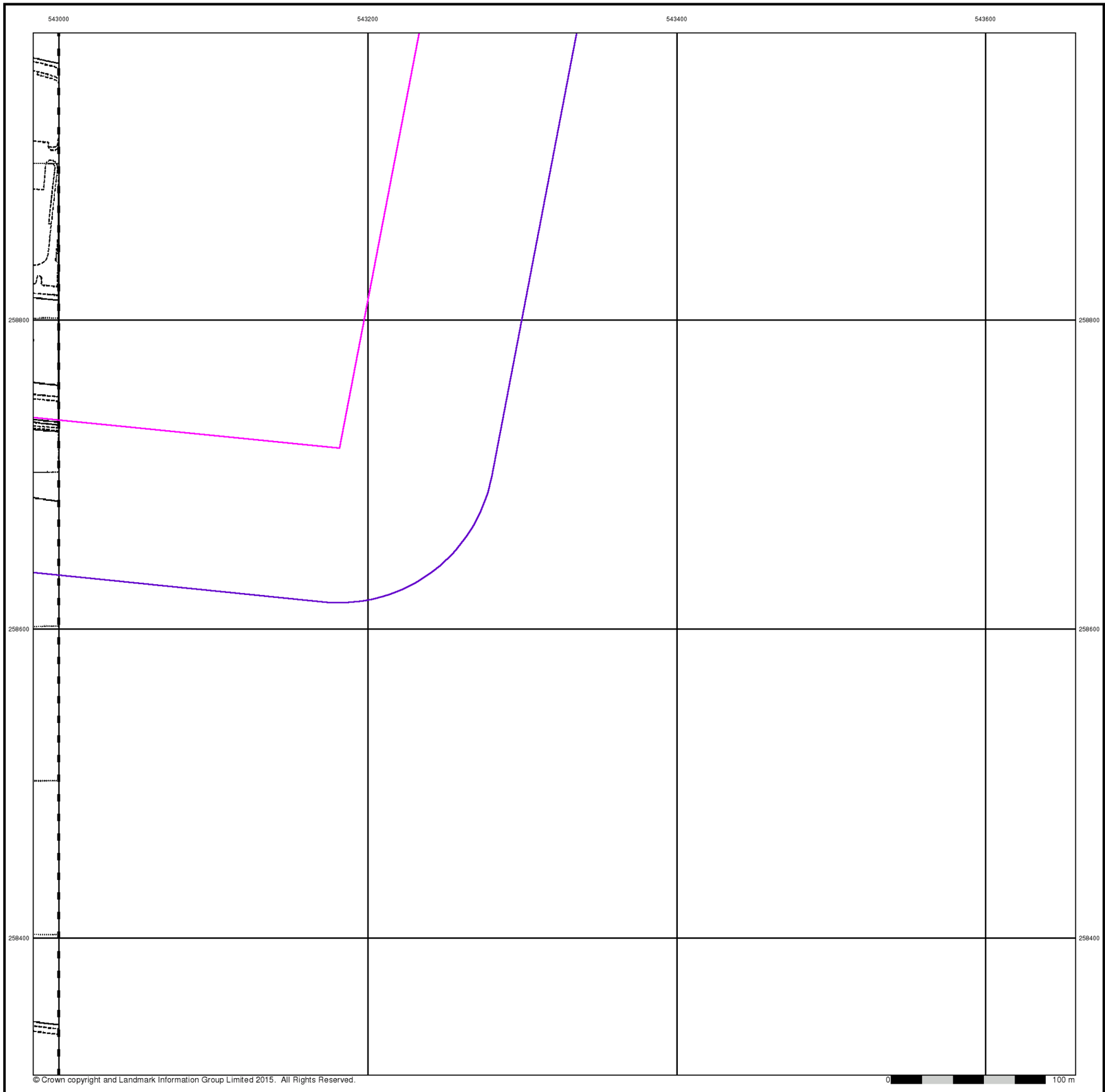


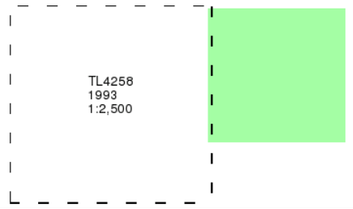
Large-Scale National Grid Data

Published 1993

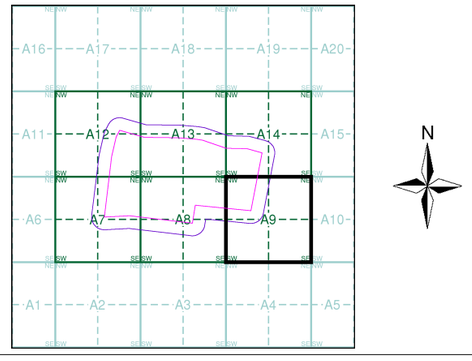
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A9



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
Search Buffer (m):	100

Site Details

Site at, Cambridge, Cambridgeshire

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Large-Scale National Grid Data

Published 1993

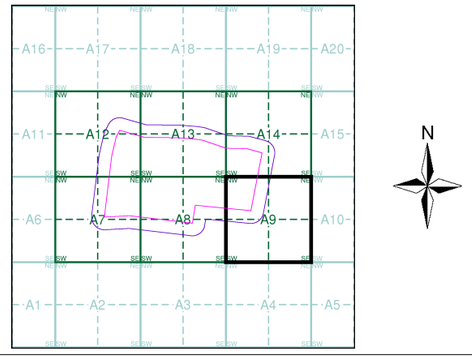
Source map scale - 1:1,250

'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)

TL4358NW
1993
1:1,250

Historical Map - Segment A9



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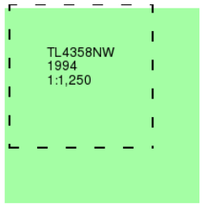
Large-Scale National Grid Data

Published 1994

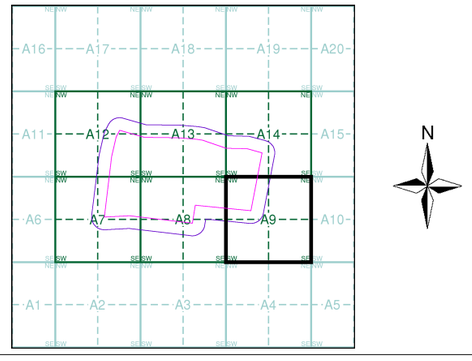
Source map scale - 1:1,250

'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 A9



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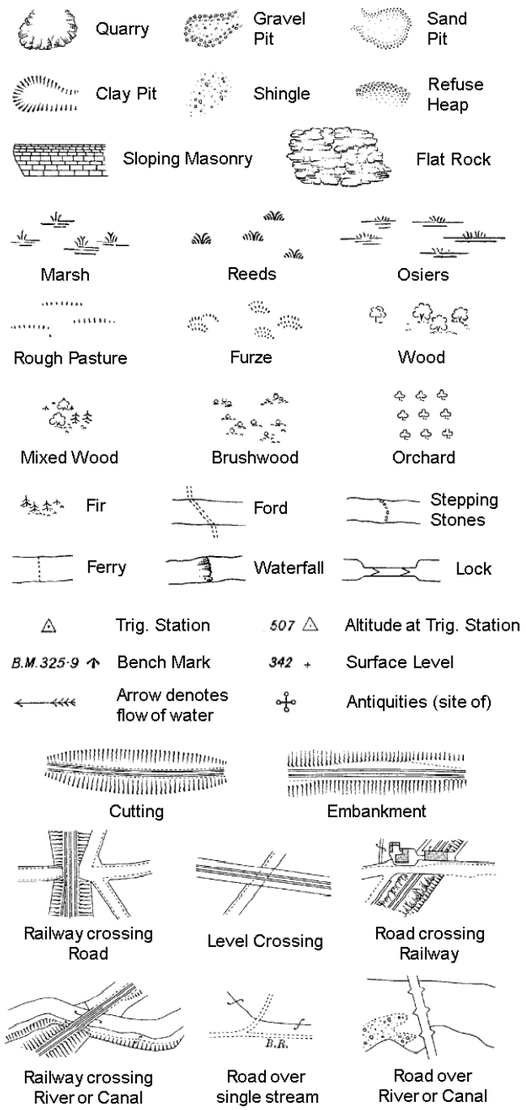
Historical Mapping Legends

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



County Boundary (Geographical)

County & Civil Parish Boundary

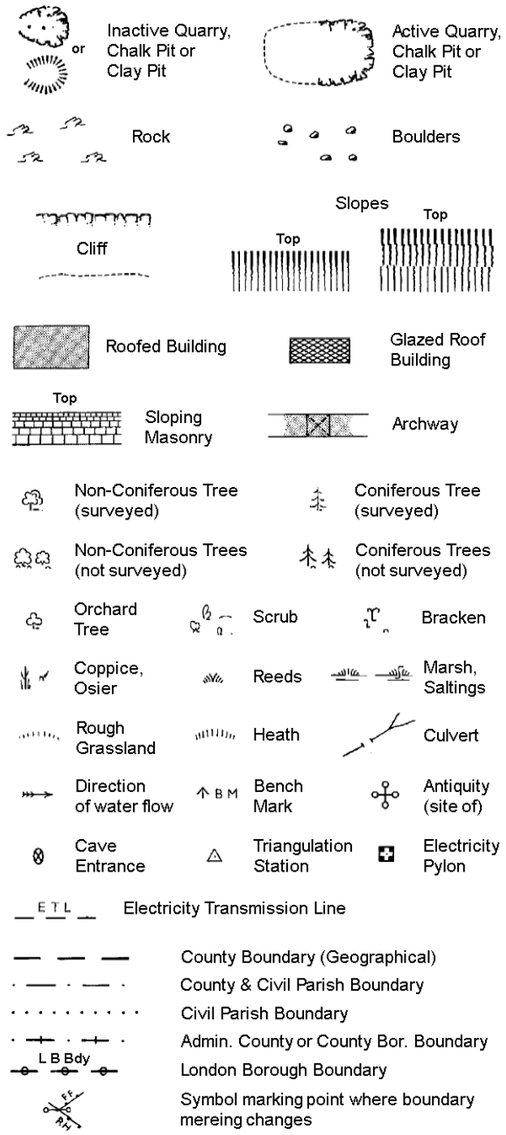
Administrative County & Civil Parish Boundary

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

Co. Burgh Bdy. County Burgh Boundary (Scotland)

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

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



County Boundary (Geographical)

County & Civil Parish Boundary

Civil Parish Boundary

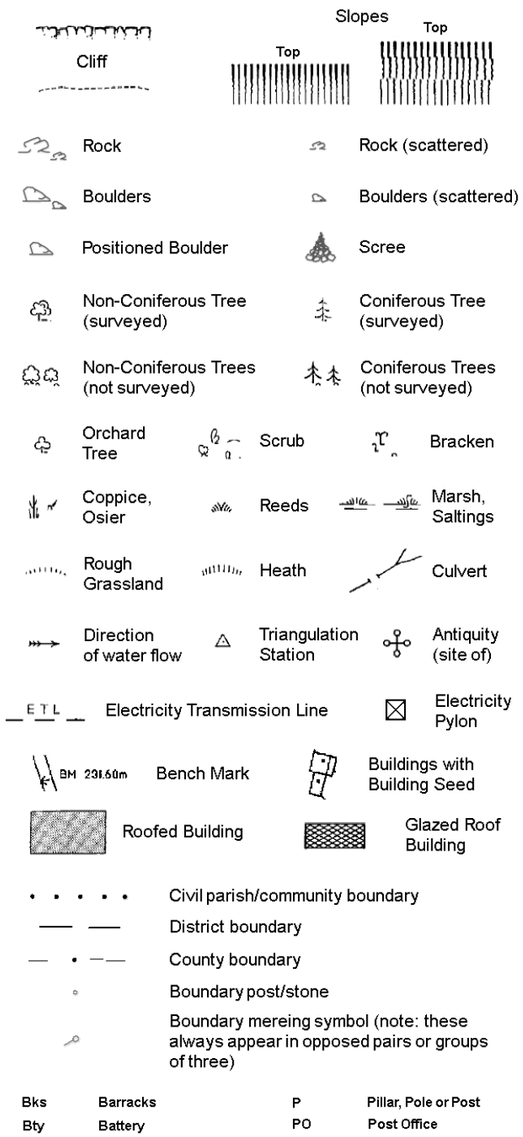
Admin. County or County Bor. Boundary

L B Bdy London Borough Boundary

Symbol marking point where boundary mereing changes

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

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



Civil parish/community boundary

District boundary

County boundary

Boundary post/stone

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

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

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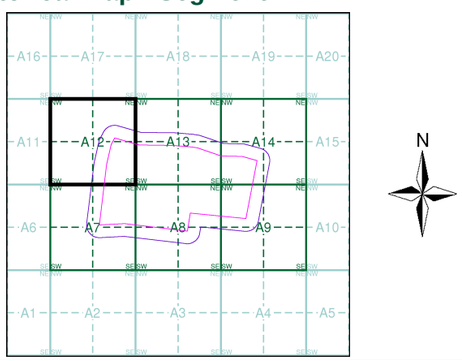
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Cambridgeshire & Isle Of Ely	1:2,500	1888	2
Cambridgeshire & Isle Of Ely	1:2,500	1903	3
Cambridgeshire & Isle Of Ely	1:2,500	1926	4
Ordnance Survey Plan	1:2,500	1970	5
Additional SIMs	1:2,500	1980 - 1986	6
Additional SIMs	1:2,500	1985	7
Additional SIMs	1:2,500	1989	8
Large-Scale National Grid Data	1:2,500	1993	9

Historical Map - Segment A12



Order Details

Order Number: 66871644_1_1
Customer Ref: 31500
National Grid Reference: 542610, 258970
Slice: A
Site Area (Ha): 67.92
Search Buffer (m): 100

Site Details

Site at, Cambridge, Cambridgeshire

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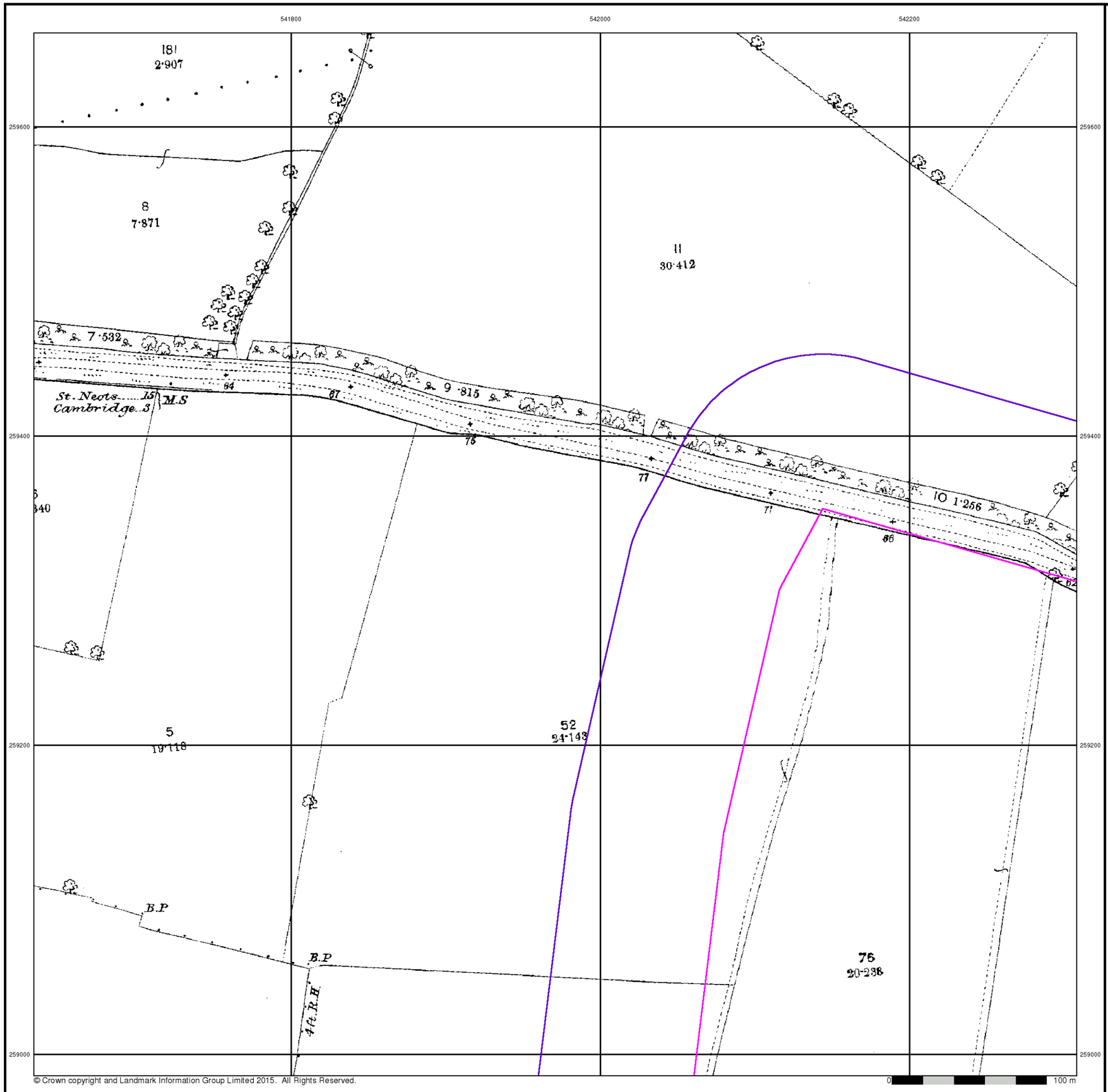

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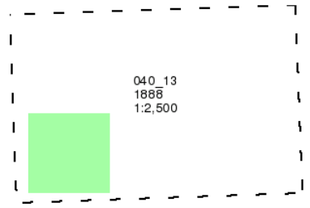
Cambridgeshire & Isle Of Ely

Published 1888

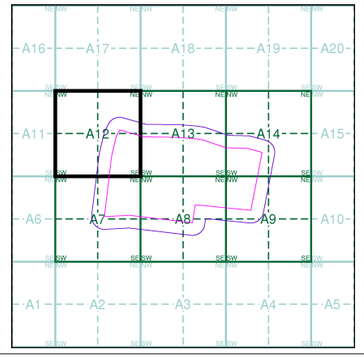
Source map scale - 1:2,500

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 A12



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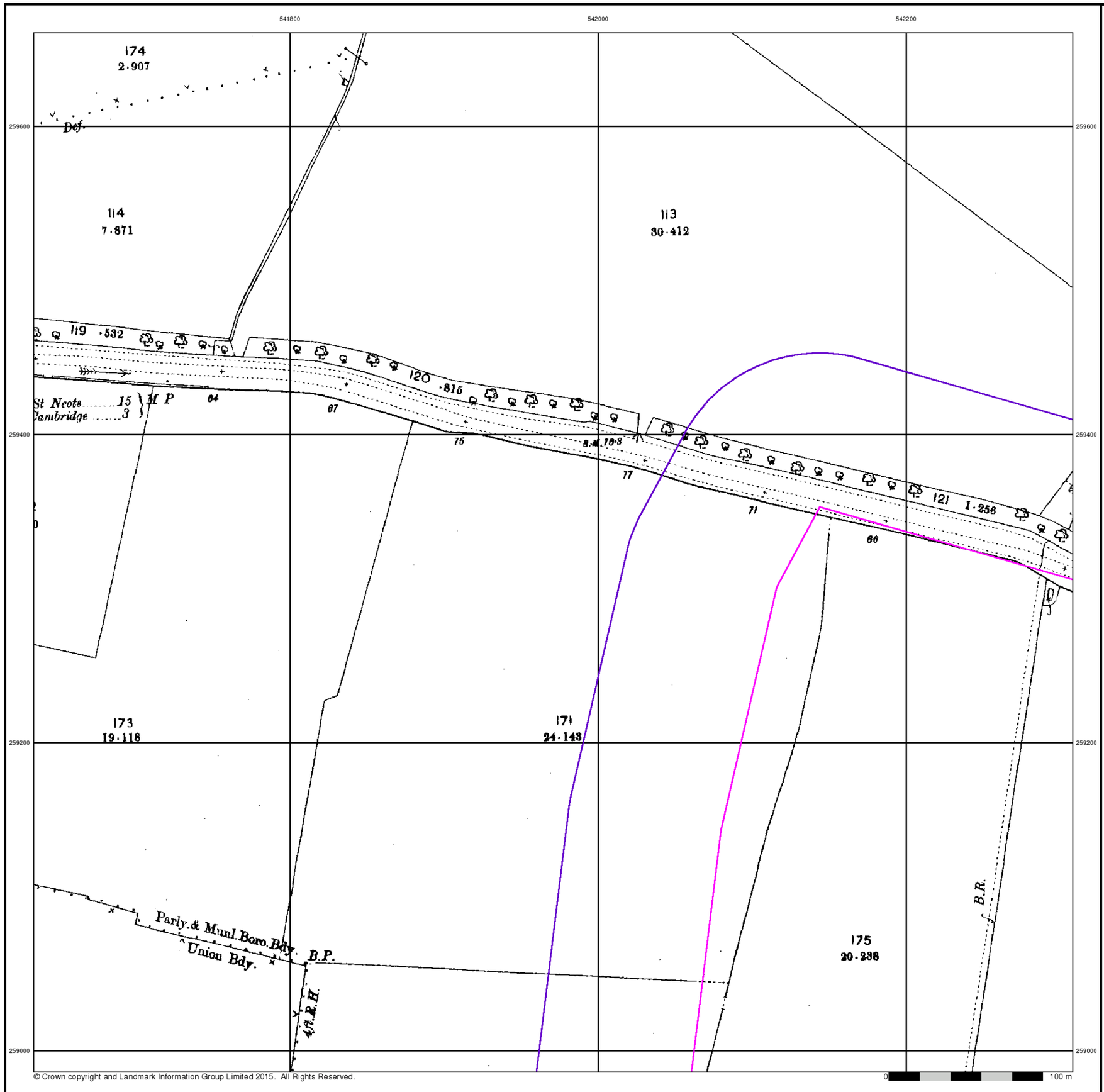

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Cambridgeshire & Isle Of Ely

Published 1903

Source map scale - 1:2,500

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

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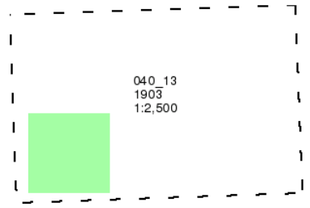
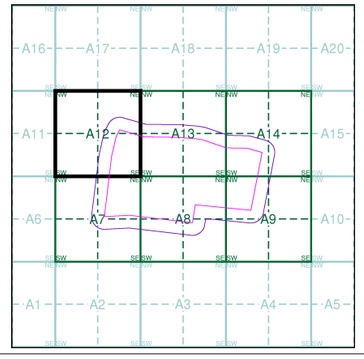


Historical Map - Segment A12



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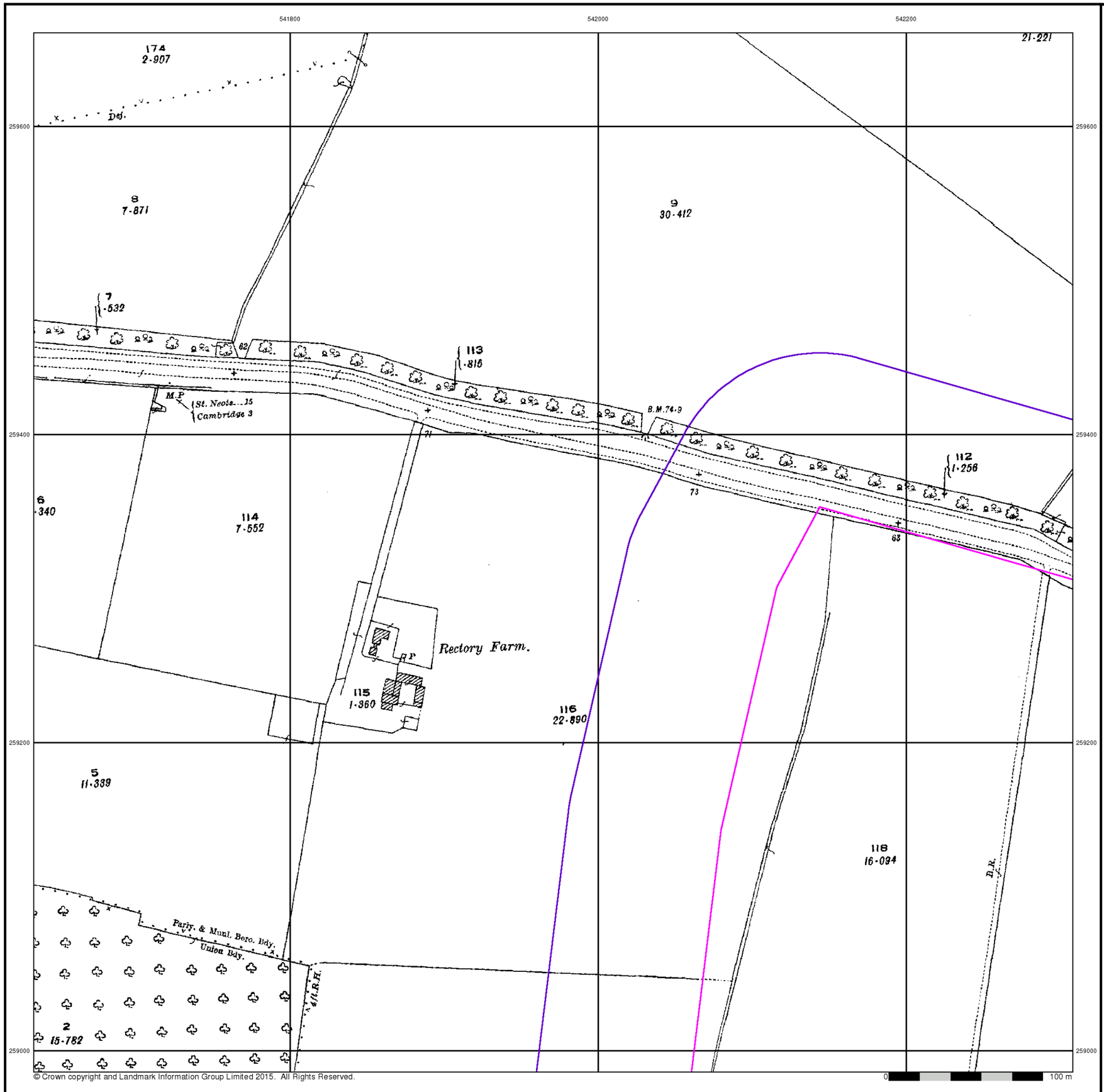

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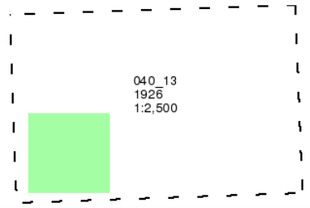
Cambridgeshire & Isle Of Ely

Published 1926

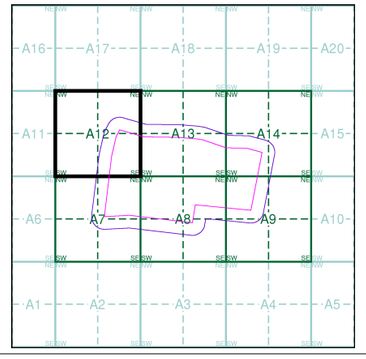
Source map scale - 1:2,500

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 A12



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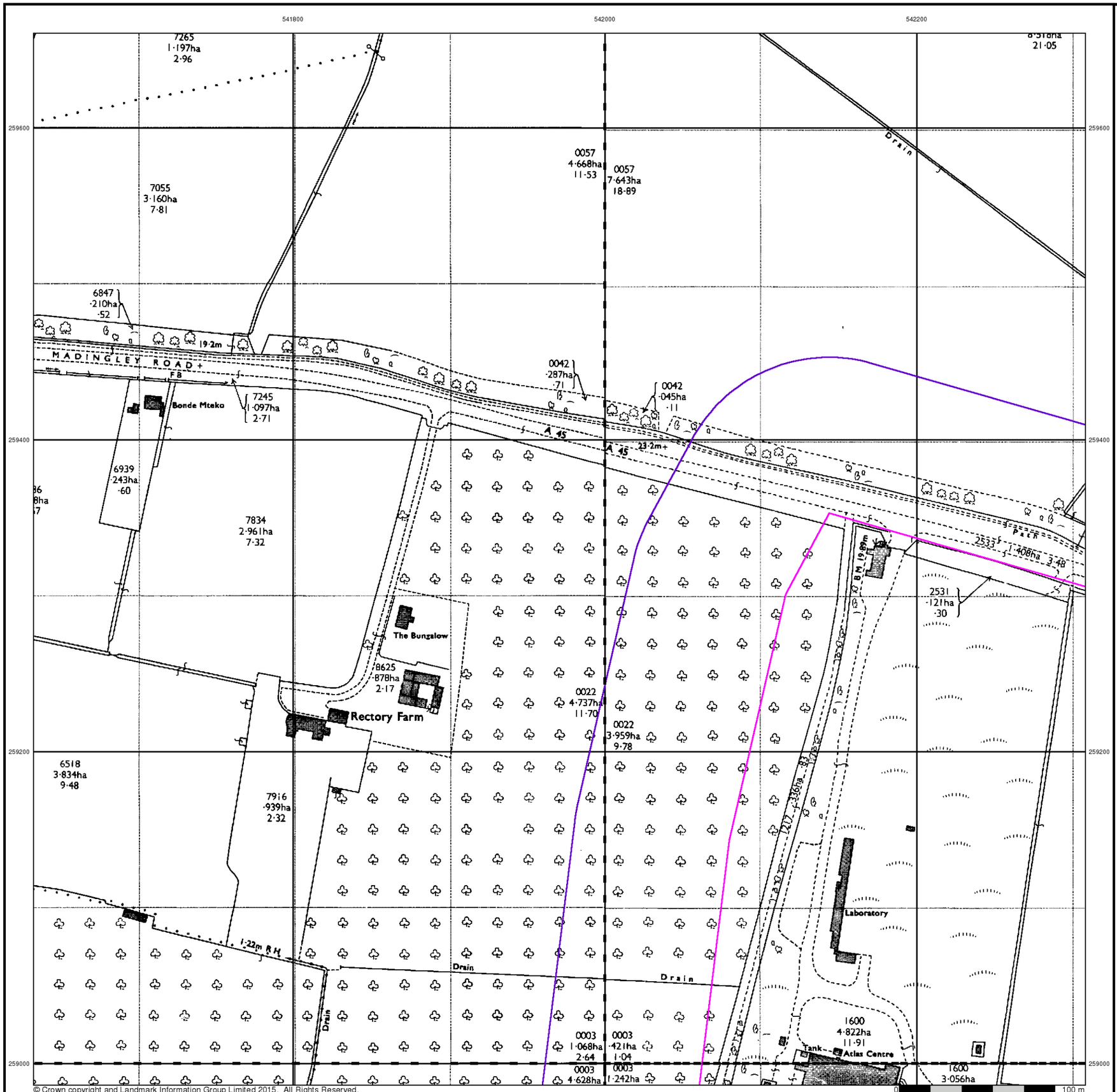

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Ordnance Survey Plan

Published 1970

Source map scale - 1:2,500

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

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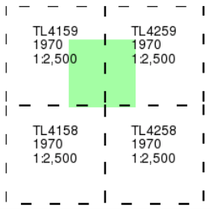
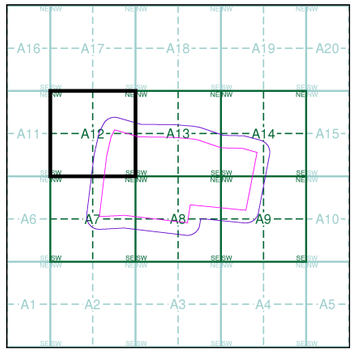


Historical Map - Segment A12



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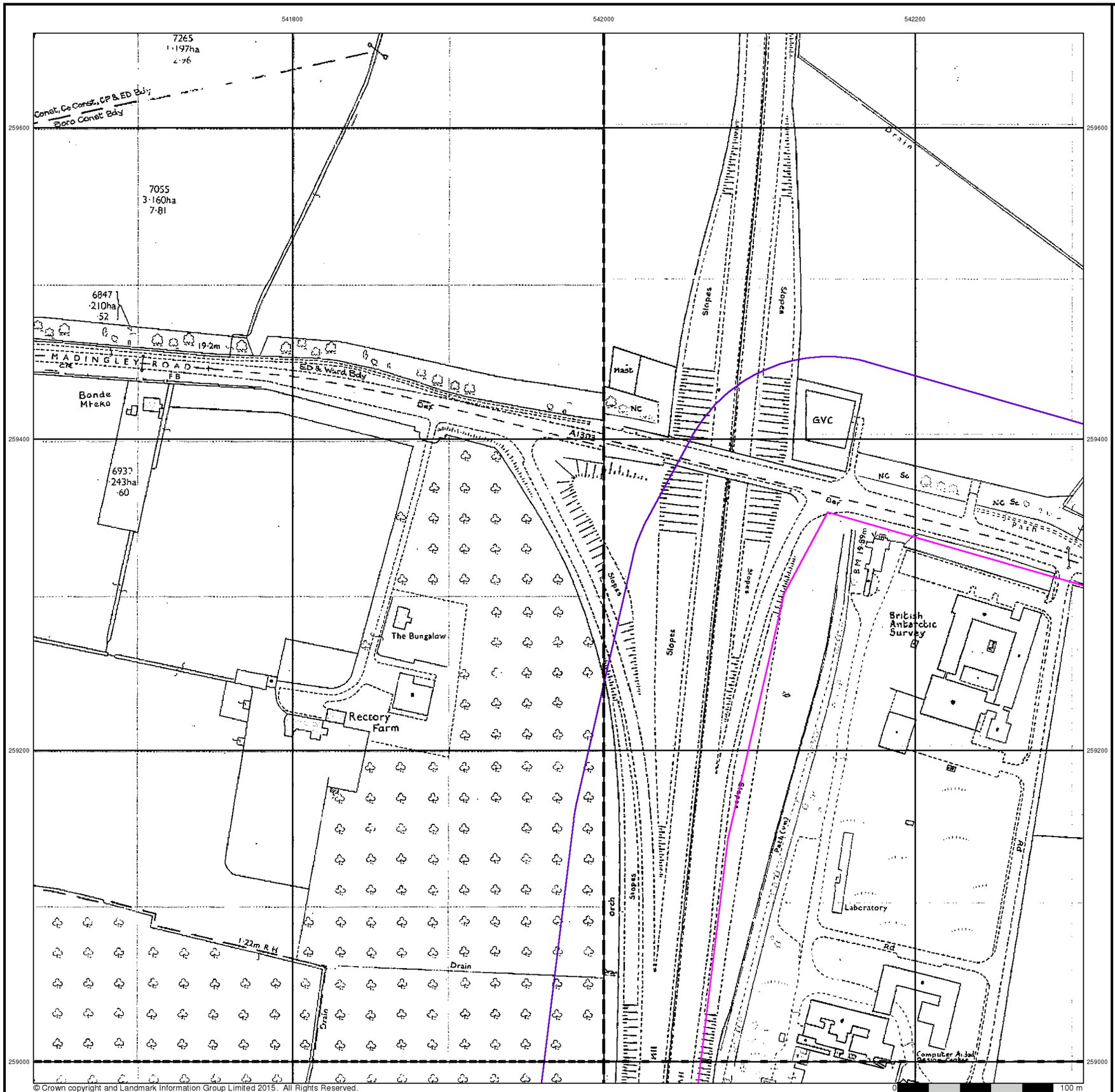


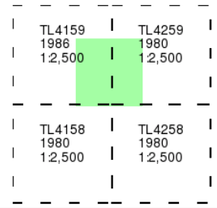
Additional SIMs

Published 1980 - 1986

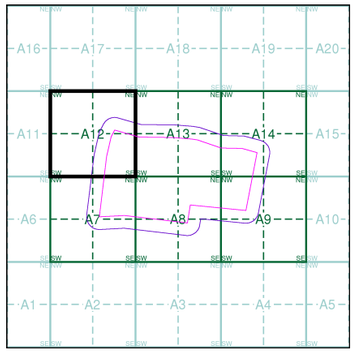
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A12



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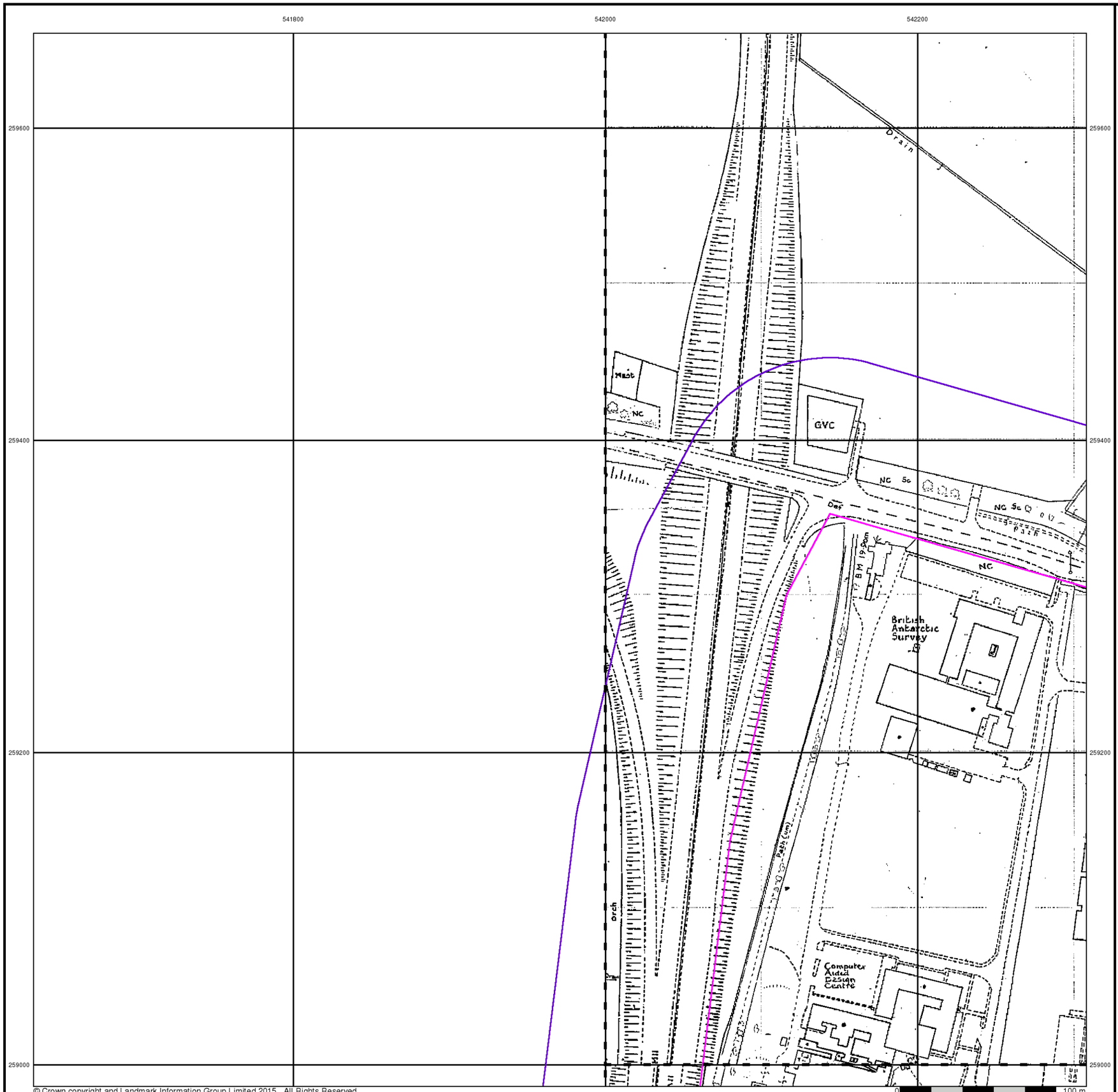

Additional SIMs

Published 1985

Source map scale - 1:2,500

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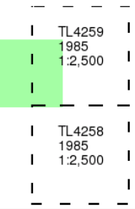
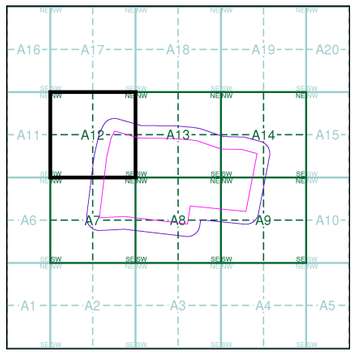
Map Name(s) and Date(s)



Historical Map - Segment A12



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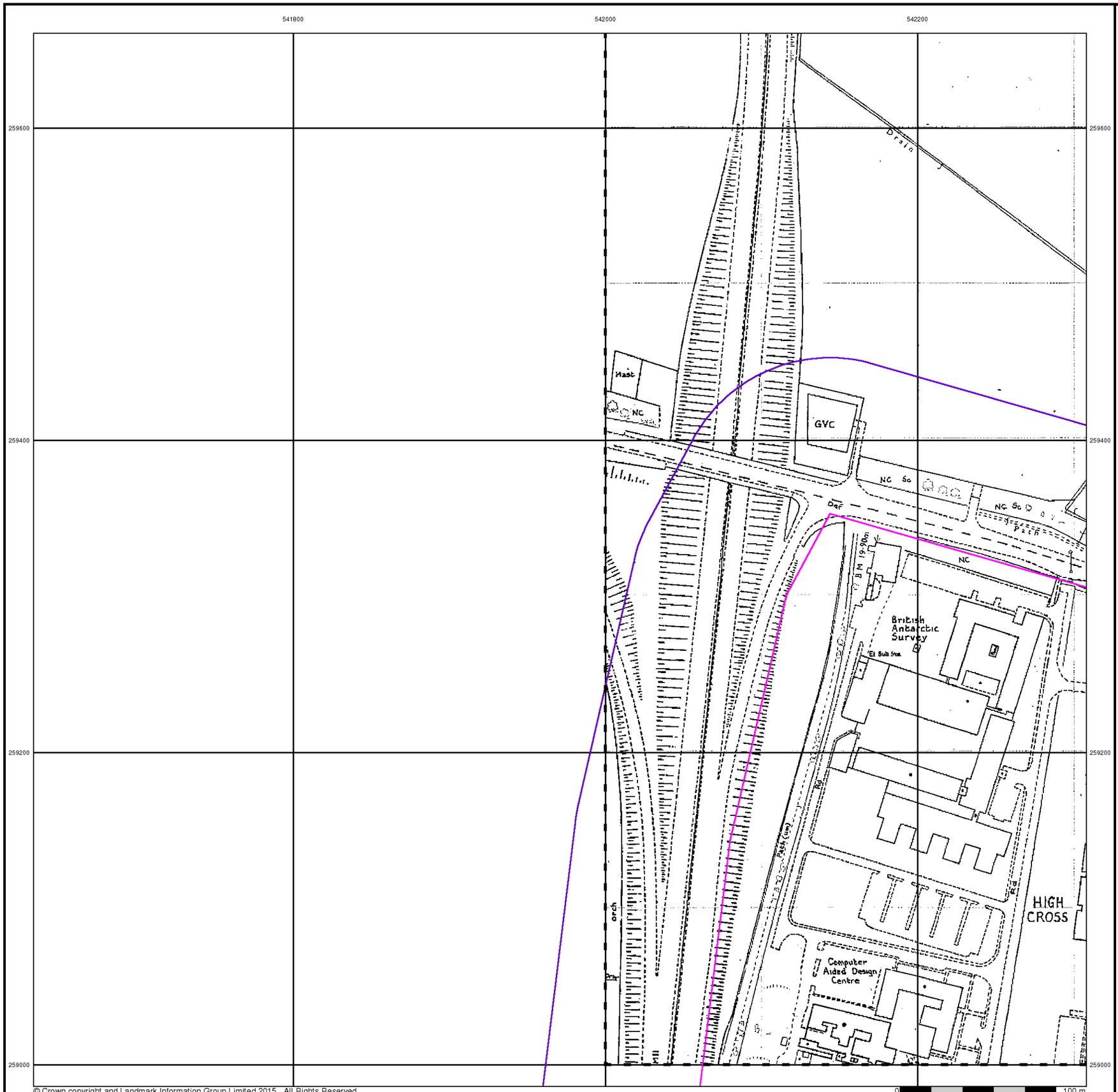

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Additional SIMs

Published 1989

Source map scale - 1:2,500

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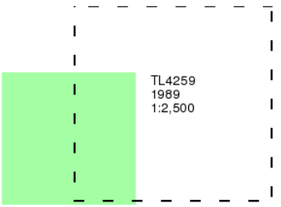
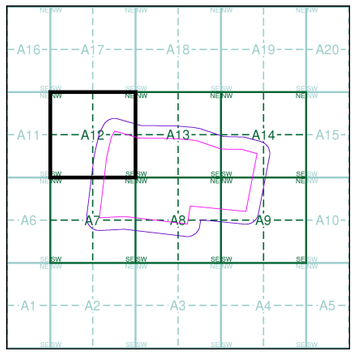
Map Name(s) and Date(s)



Historical Map - Segment A12



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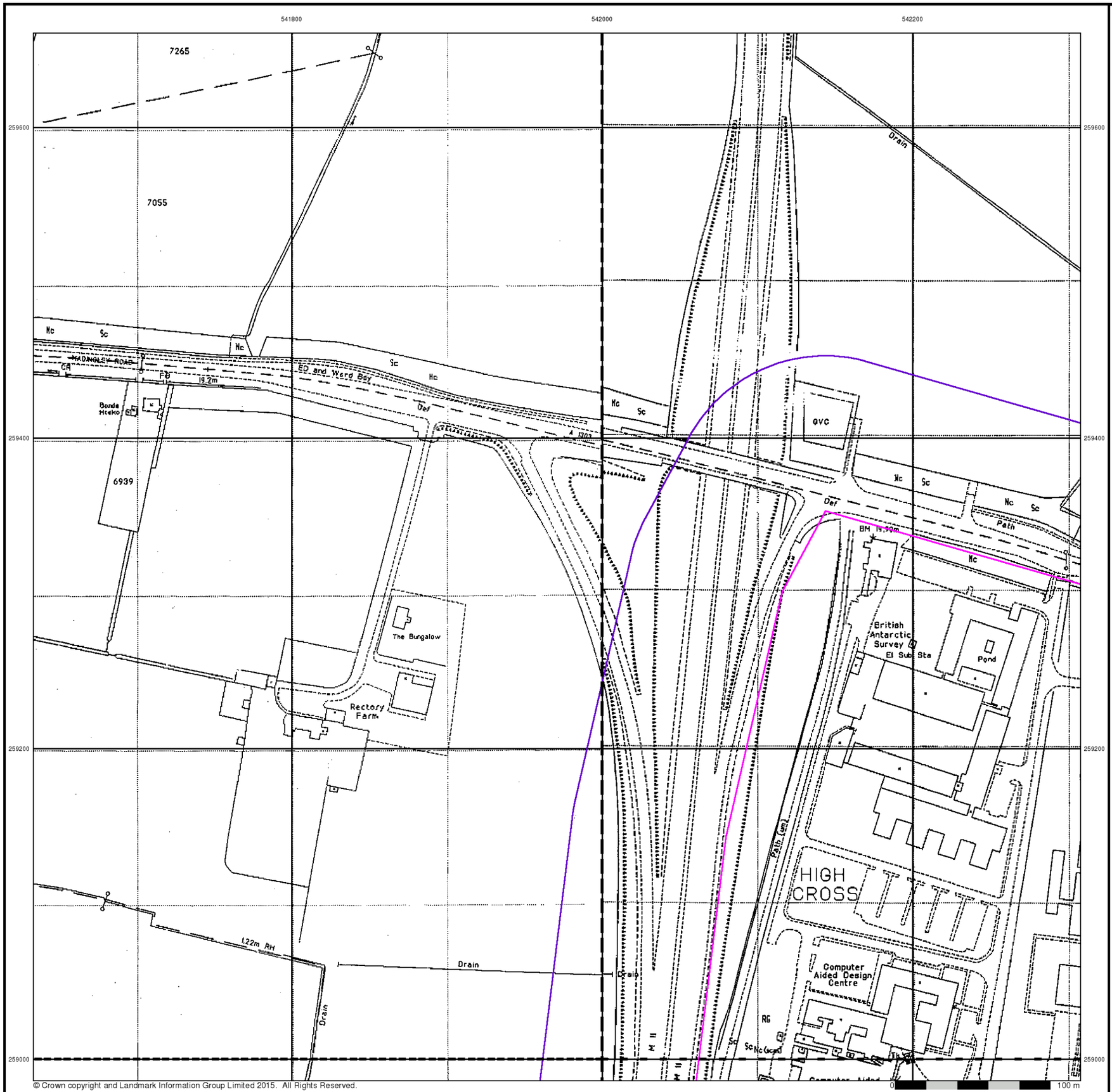

Large-Scale National Grid Data

Published 1993

Source map scale - 1:2,500

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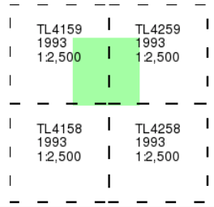
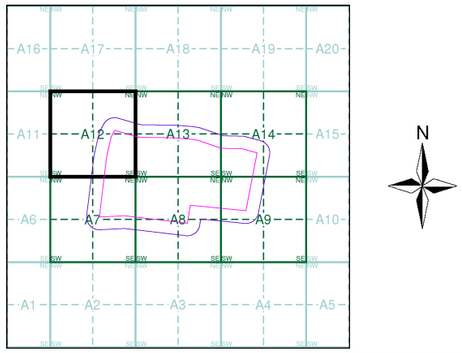
Map Name(s) and Date(s)



Historical Map - Segment A12



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
Search Buffer (m):	100

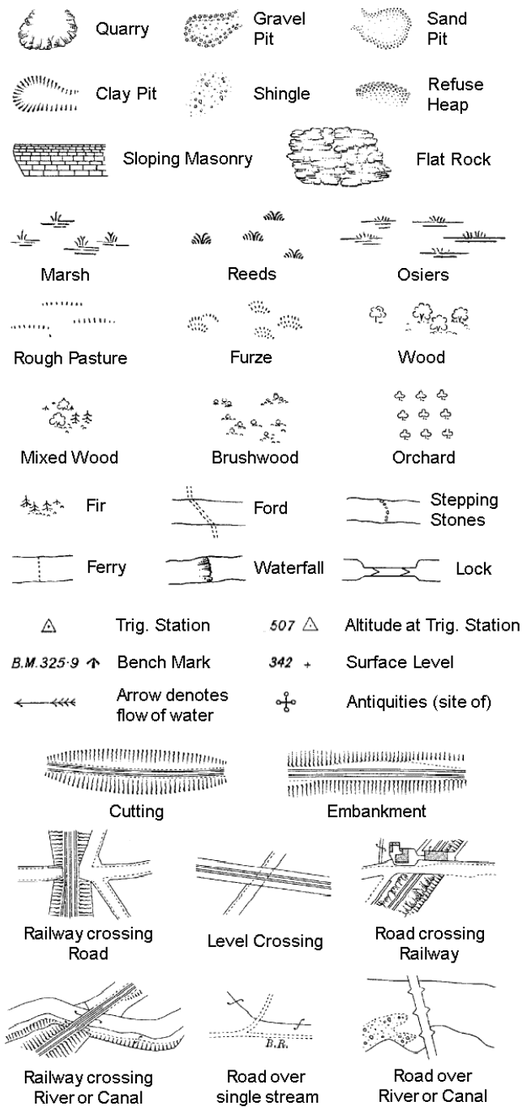
Site Details

Site at, Cambridge, Cambridgeshire

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

Historical Mapping Legends

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



County Boundary (Geographical)

County & Civil Parish Boundary

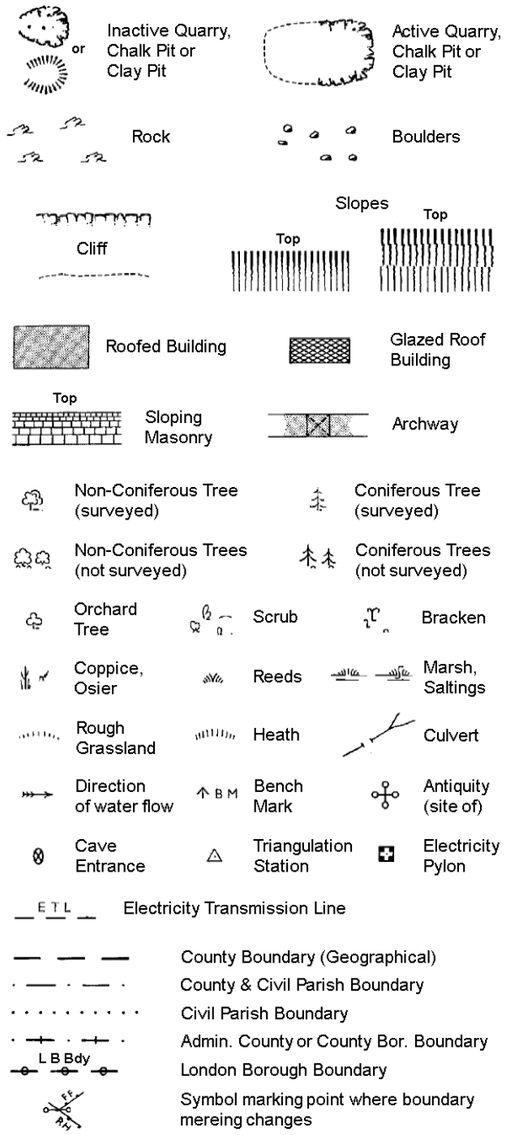
Administrative County & Civil Parish Boundary

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

Co. Burgh Bdy. County Burgh Boundary (Scotland)

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

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



County Boundary (Geographical)

County & Civil Parish Boundary

Civil Parish Boundary

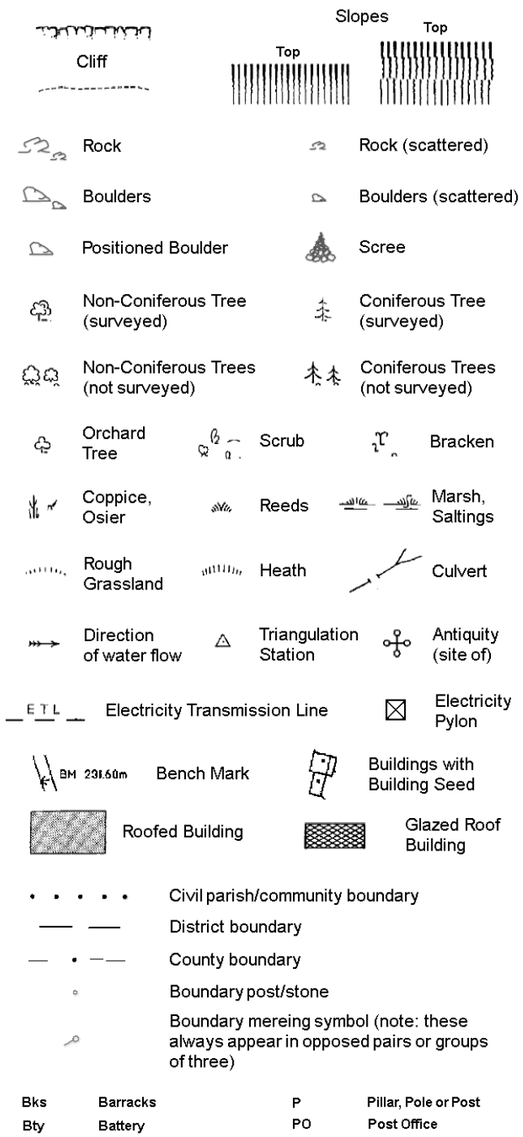
Admin. County or County Bor. Boundary

L B Bdy London Borough Boundary

Symbol marking point where boundary mereing changes

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

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



Civil parish/community boundary

District boundary

County boundary

Boundary post/stone

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

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

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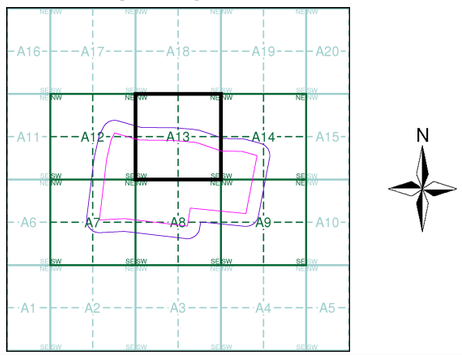
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Cambridgeshire & Isle Of Ely	1:2,500	1888	2
Cambridgeshire & Isle Of Ely	1:2,500	1903	3
Cambridgeshire & Isle Of Ely	1:2,500	1926	4
Ordnance Survey Plan	1:2,500	1970	5
Additional SIMs	1:2,500	1980	6
Additional SIMs	1:2,500	1985	7
Additional SIMs	1:2,500	1989	8
Large-Scale National Grid Data	1:2,500	1993	9

Historical Map - Segment A13



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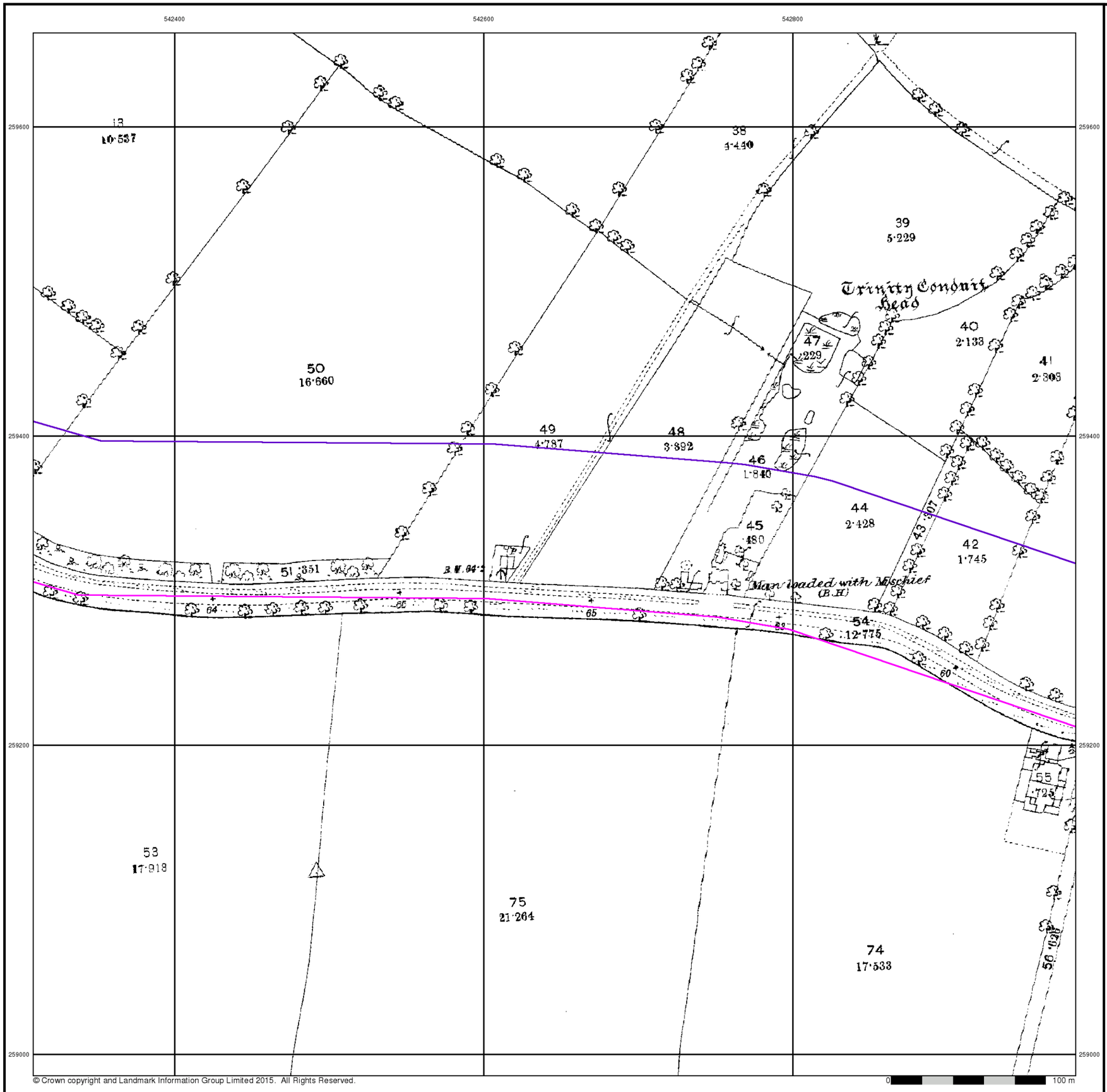

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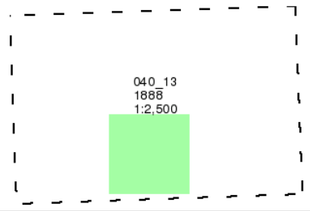
Cambridgeshire & Isle Of Ely

Published 1888

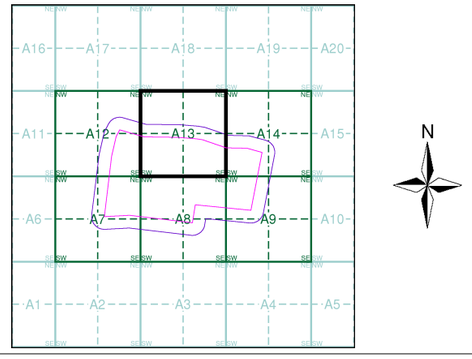
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A13



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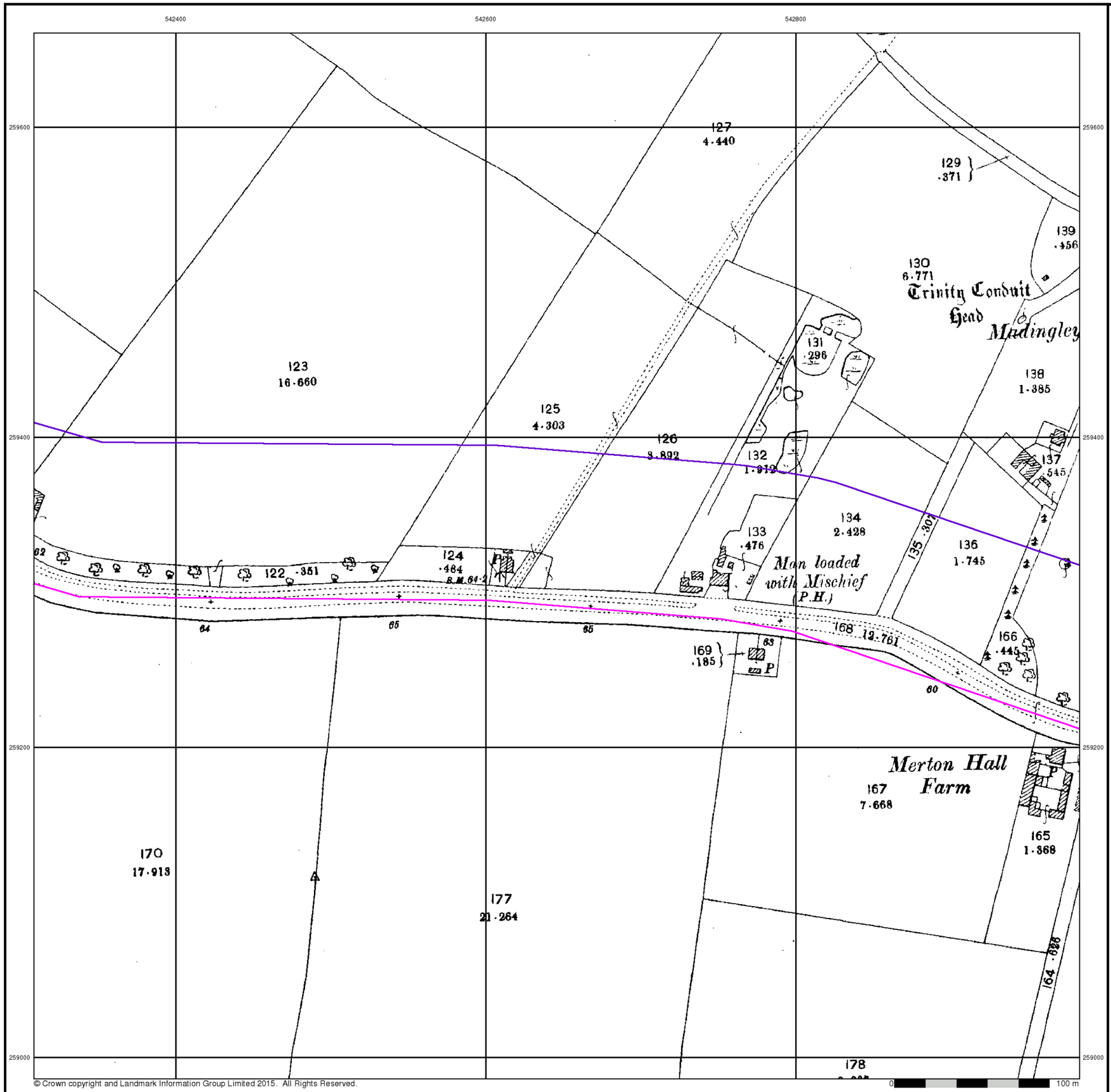

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Cambridgeshire & Isle Of Ely

Published 1903

Source map scale - 1:2,500

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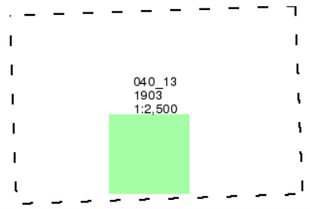
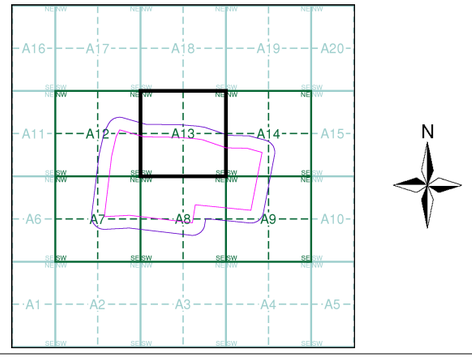


Historical Map - Segment A13



Order Details

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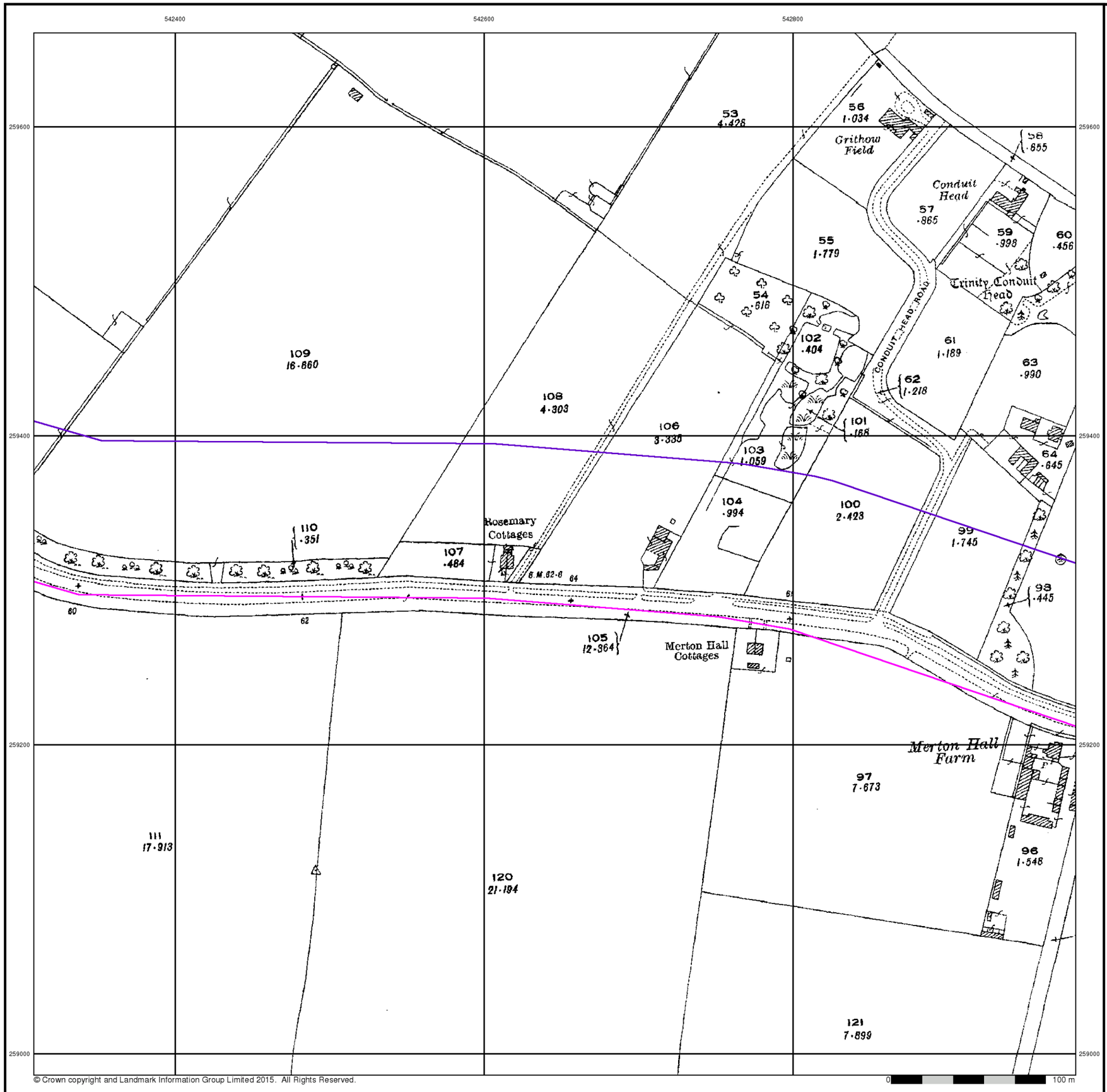

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Cambridgeshire & Isle Of Ely

Published 1926

Source map scale - 1:2,500

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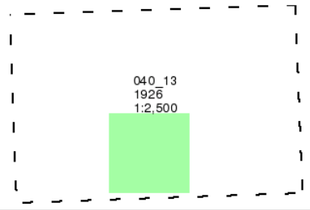
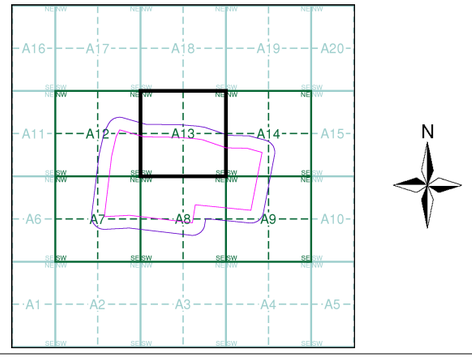


Historical Map - Segment A13



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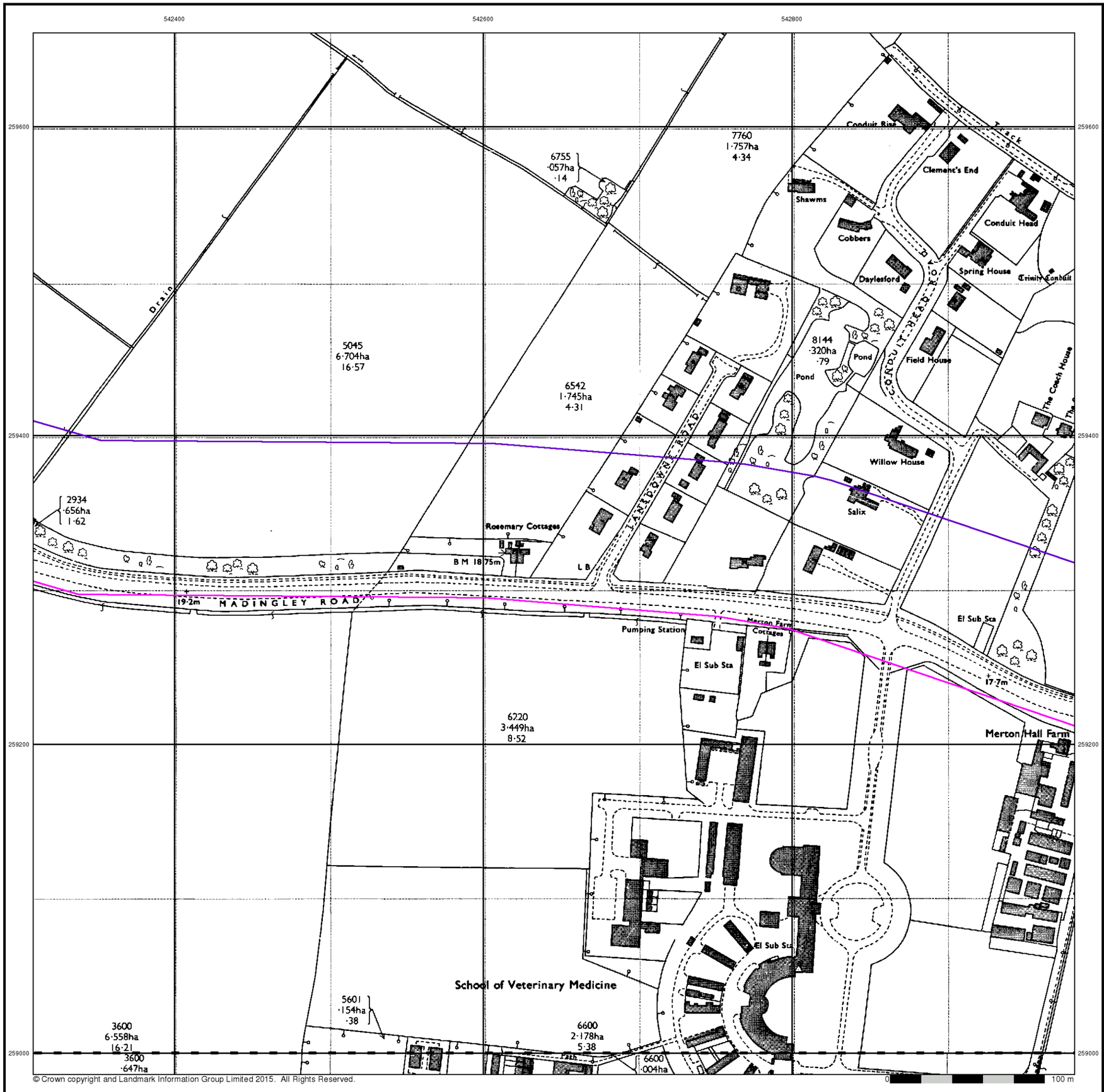

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Ordnance Survey Plan

Published 1970

Source map scale - 1:2,500

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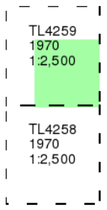
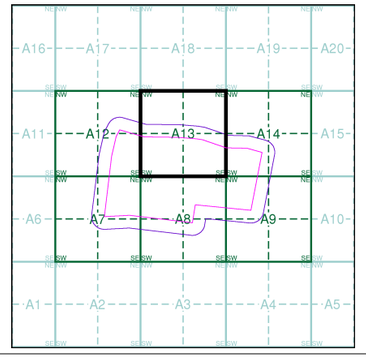


Historical Map - Segment A13



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
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Site Details

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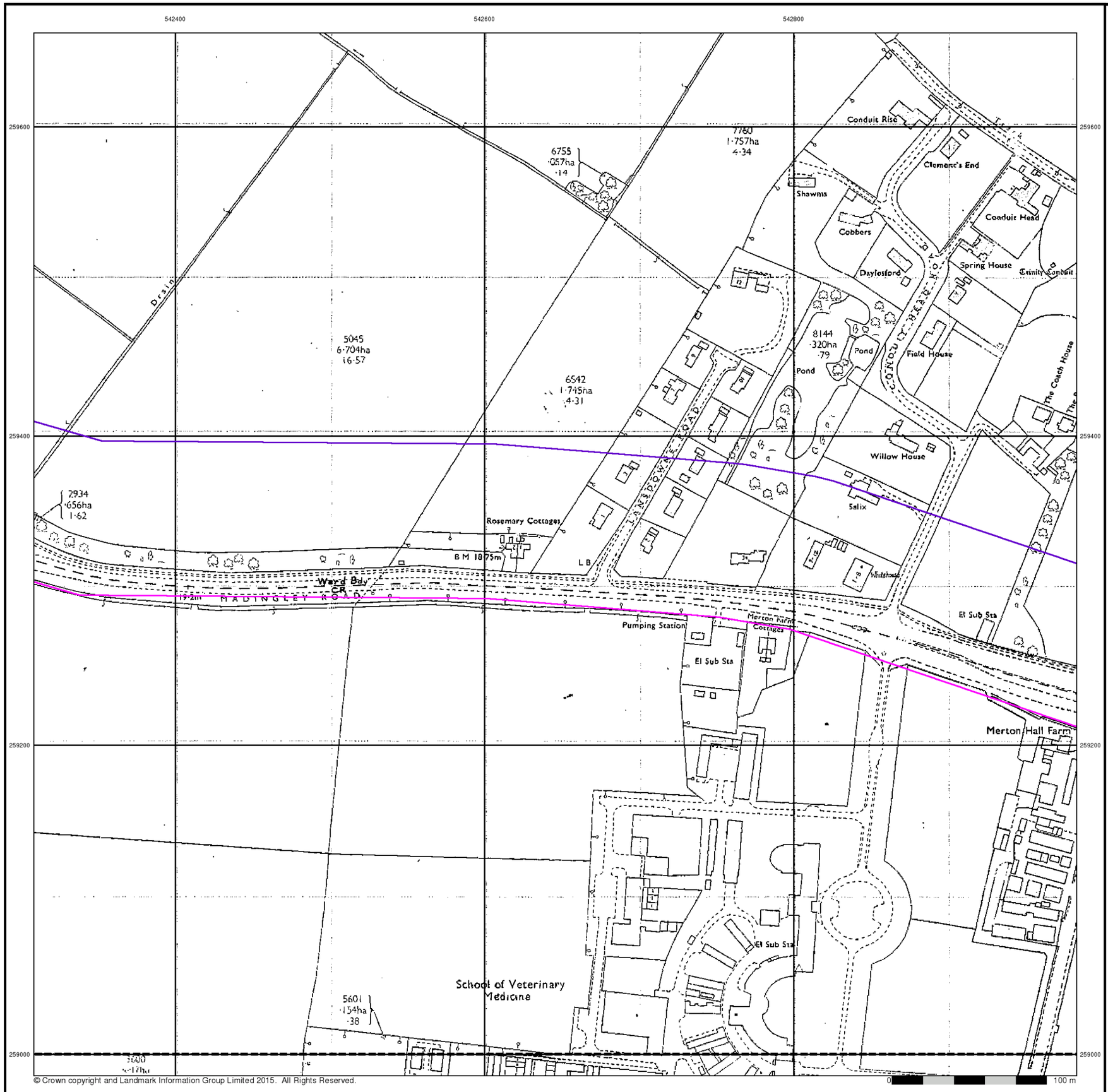


Additional SIMs

Published 1980

Source map scale - 1:2,500

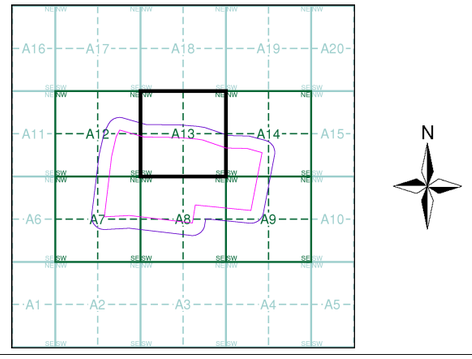
The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps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

Map Name(s) and Date(s)

TL4259
1980
1:2,500

TL4258
1980
1:2,500

Historical Map - Segment A13



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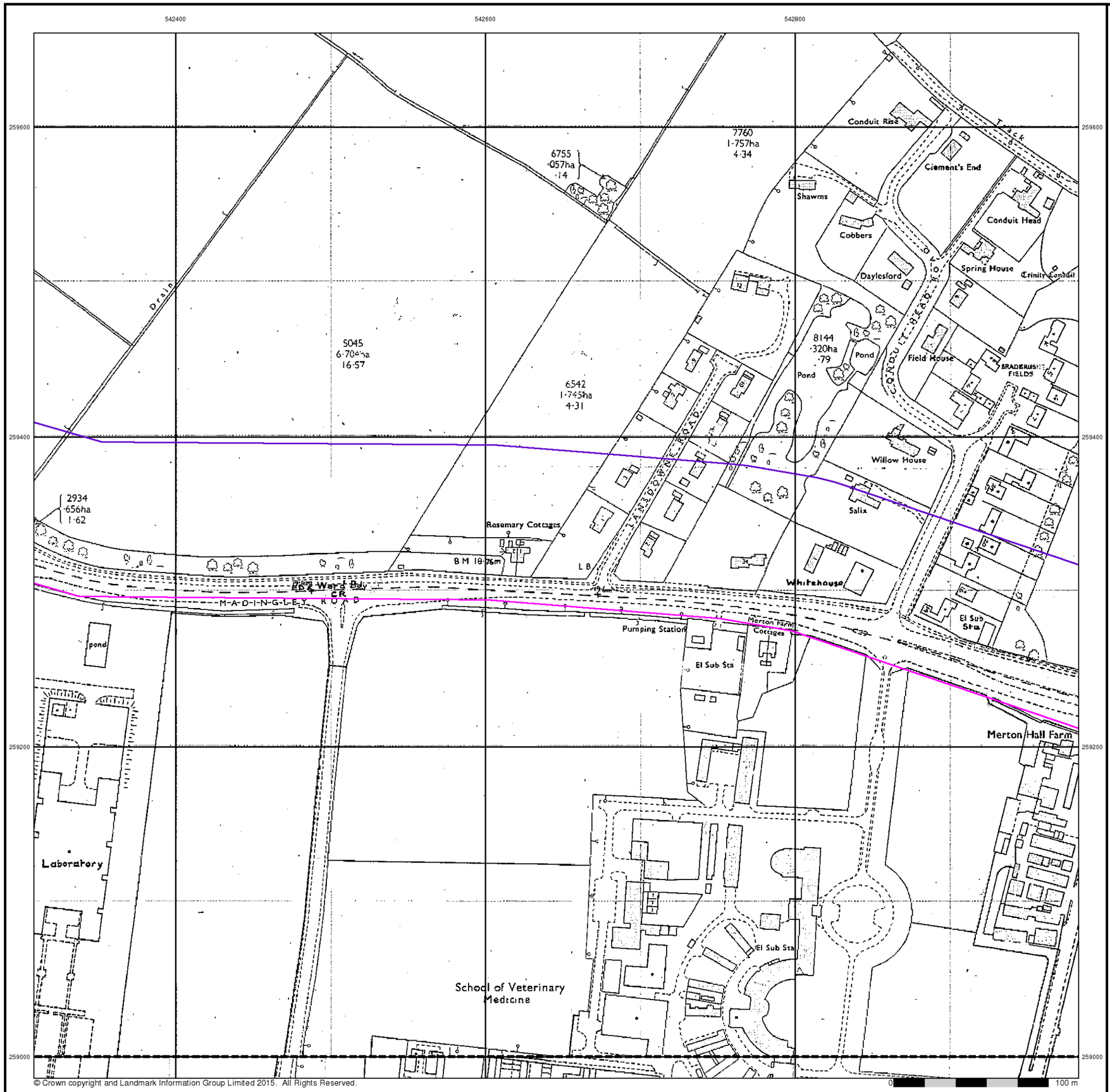

pba peterbrett

Additional SIMs

Published 1985

Source map scale - 1:2,500

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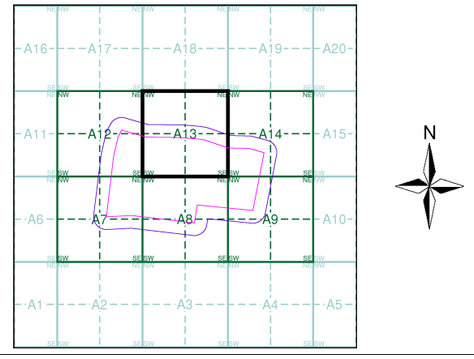
Map Name(s) and Date(s)

TL4259
1985
1:2,500

TL4258
1985
1:2,500

Historical Map - Segment A13



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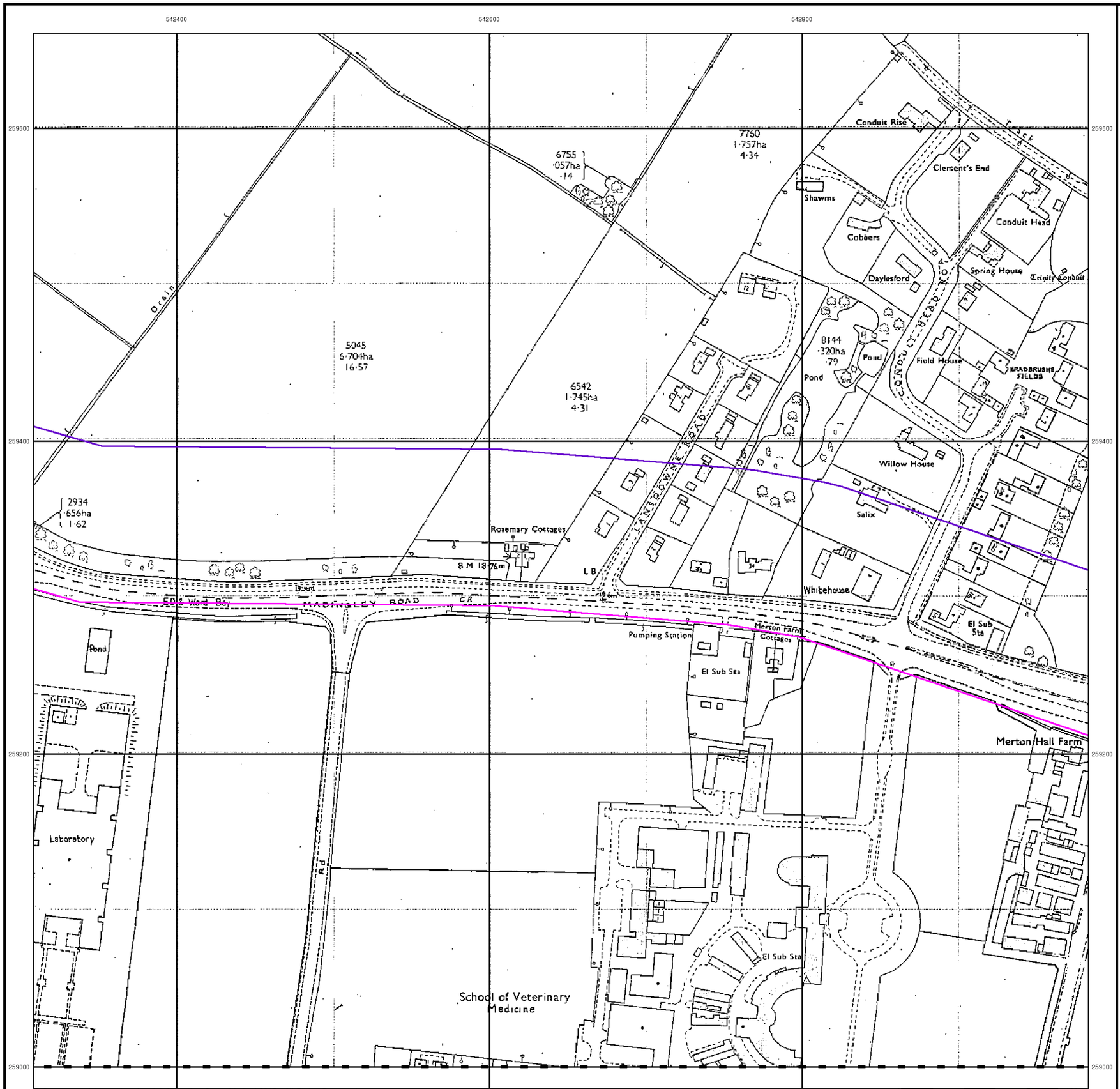


pba peterbrett

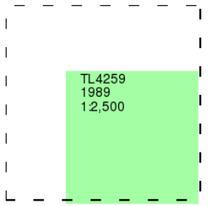
Additional SIMs

Published 1989

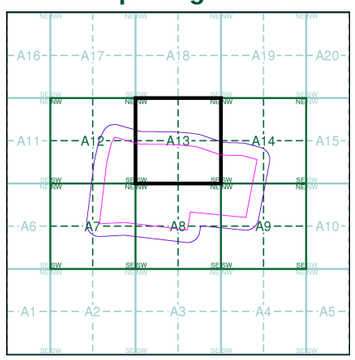
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A13



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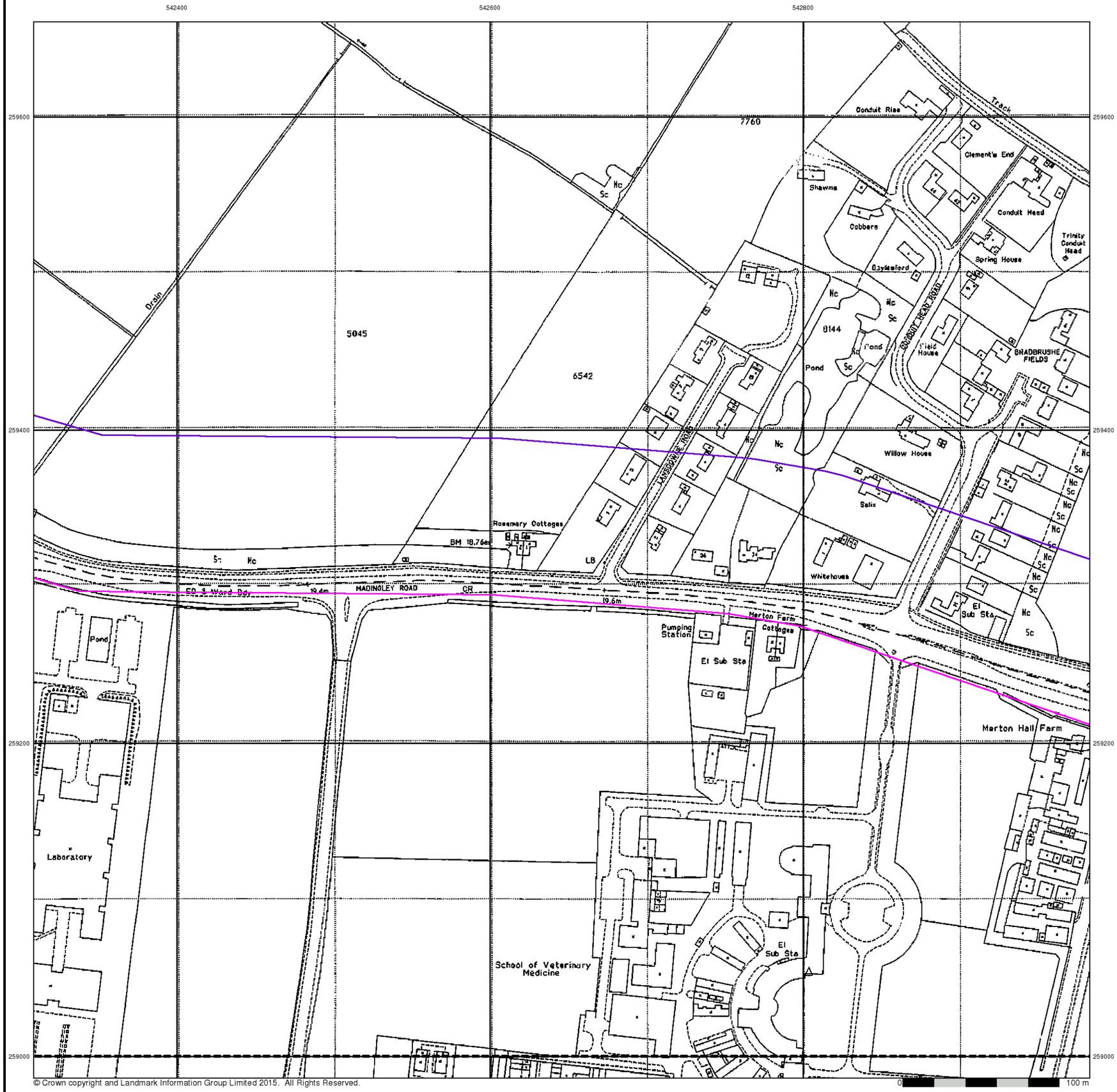


Large-Scale National Grid Data

Published 1993

Source map scale - 1:2,500

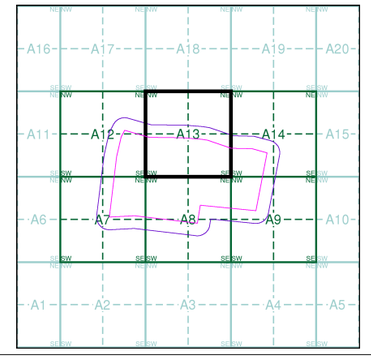
'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic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

Map Name(s) and Date(s)

TL4259
1993
1:2,500

TL4258
1993
1:2,500

Historical Map - Segment A13



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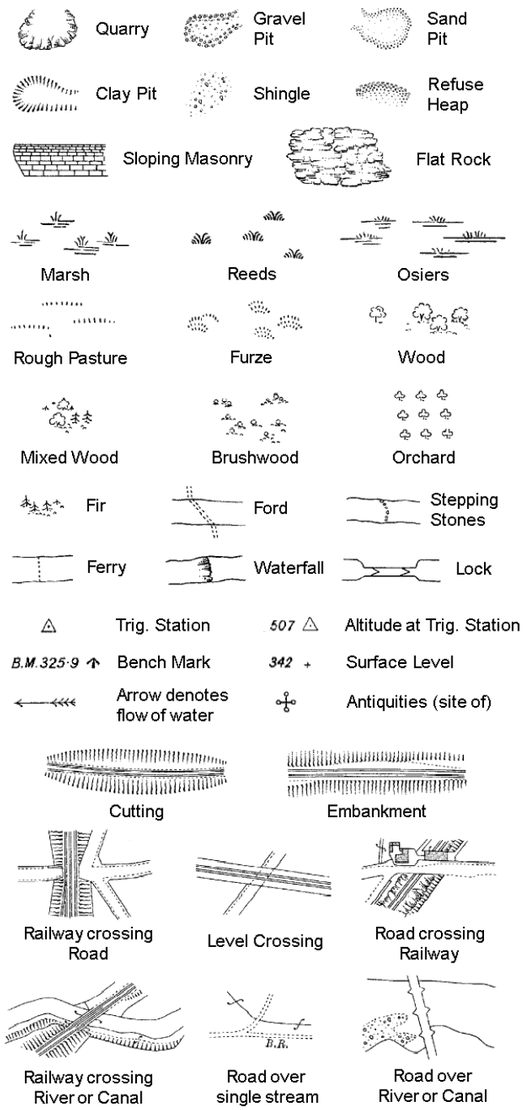
Historical Mapping Legends

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



County Boundary (Geographical)

County & Civil Parish Boundary

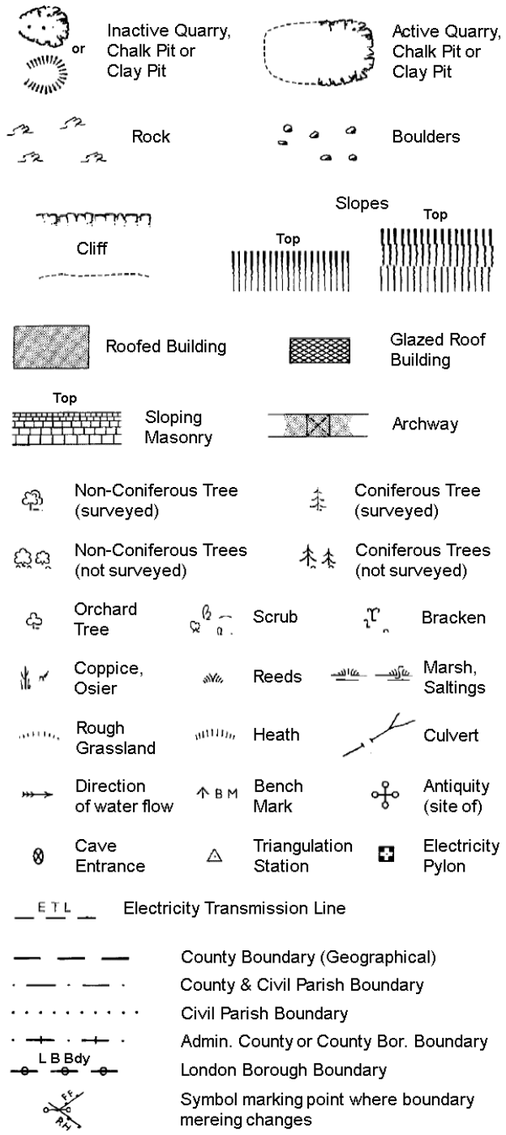
Administrative County & Civil Parish Boundary

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

Co. Burgh Bdy. County Burgh Boundary (Scotland)

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

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



County Boundary (Geographical)

County & Civil Parish Boundary

Civil Parish Boundary

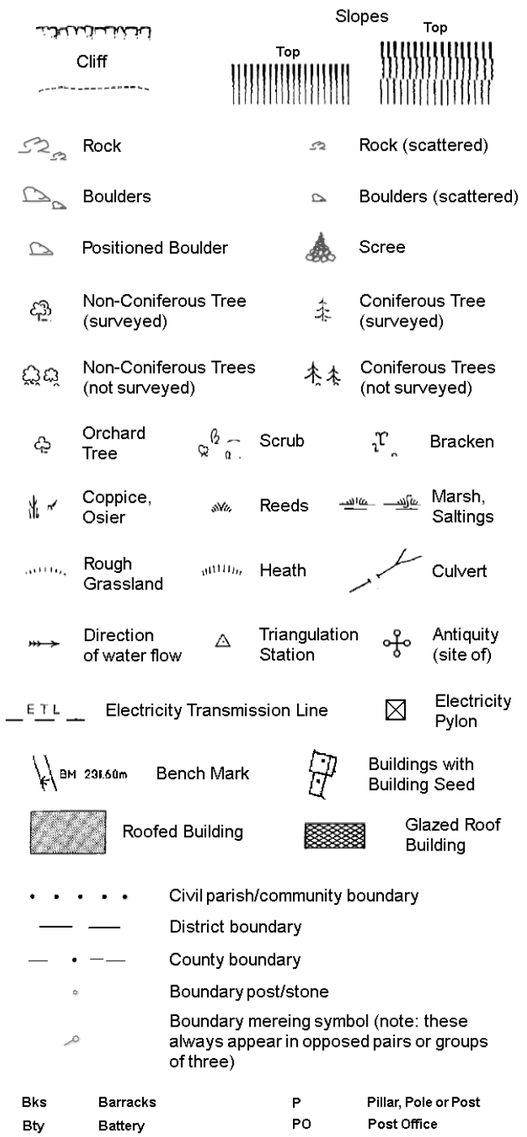
Admin. County or County Bor. Boundary

L B Bdy London Borough Boundary

Symbol marking point where boundary mereing changes

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

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



Civil parish/community boundary

District boundary

County boundary

Boundary post/stone

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

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

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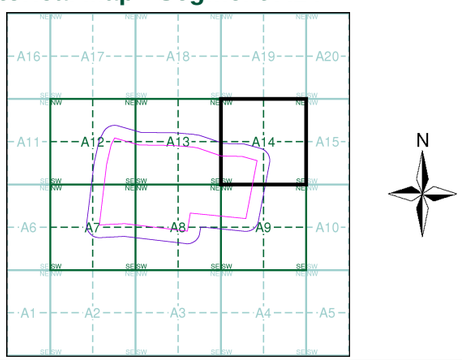
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Cambridgeshire & Isle Of Ely	1:2,500	1888	2
Cambridgeshire & Isle Of Ely	1:2,500	1903	3
Cambridgeshire & Isle Of Ely	1:2,500	1926	4
Ordnance Survey Plan	1:1,250	1967	5
Additional SIMs	1:1,250	1967 - 1984	6
Ordnance Survey Plan	1:2,500	1970	7
Ordnance Survey Plan	1:1,250	1976	8
Additional SIMs	1:2,500	1980	9
Additional SIMs	1:1,250	1984 - 1988	10
Additional SIMs	1:2,500	1985	11
Additional SIMs	1:2,500	1989	12
Large-Scale National Grid Data	1:2,500	1993	13
Large-Scale National Grid Data	1:1,250	1993	14
Large-Scale National Grid Data	1:1,250	1994	15
Large-Scale National Grid Data	1:1,250	1996	16

Historical Map - Segment A14



Order Details

Order Number: 66871644_1_1
Customer Ref: 31500
National Grid Reference: 542610, 258970
Slice: A
Site Area (Ha): 67.92
Search Buffer (m): 100

Site Details

Site at, Cambridge, Cambridgeshire

Landmark® Information Group

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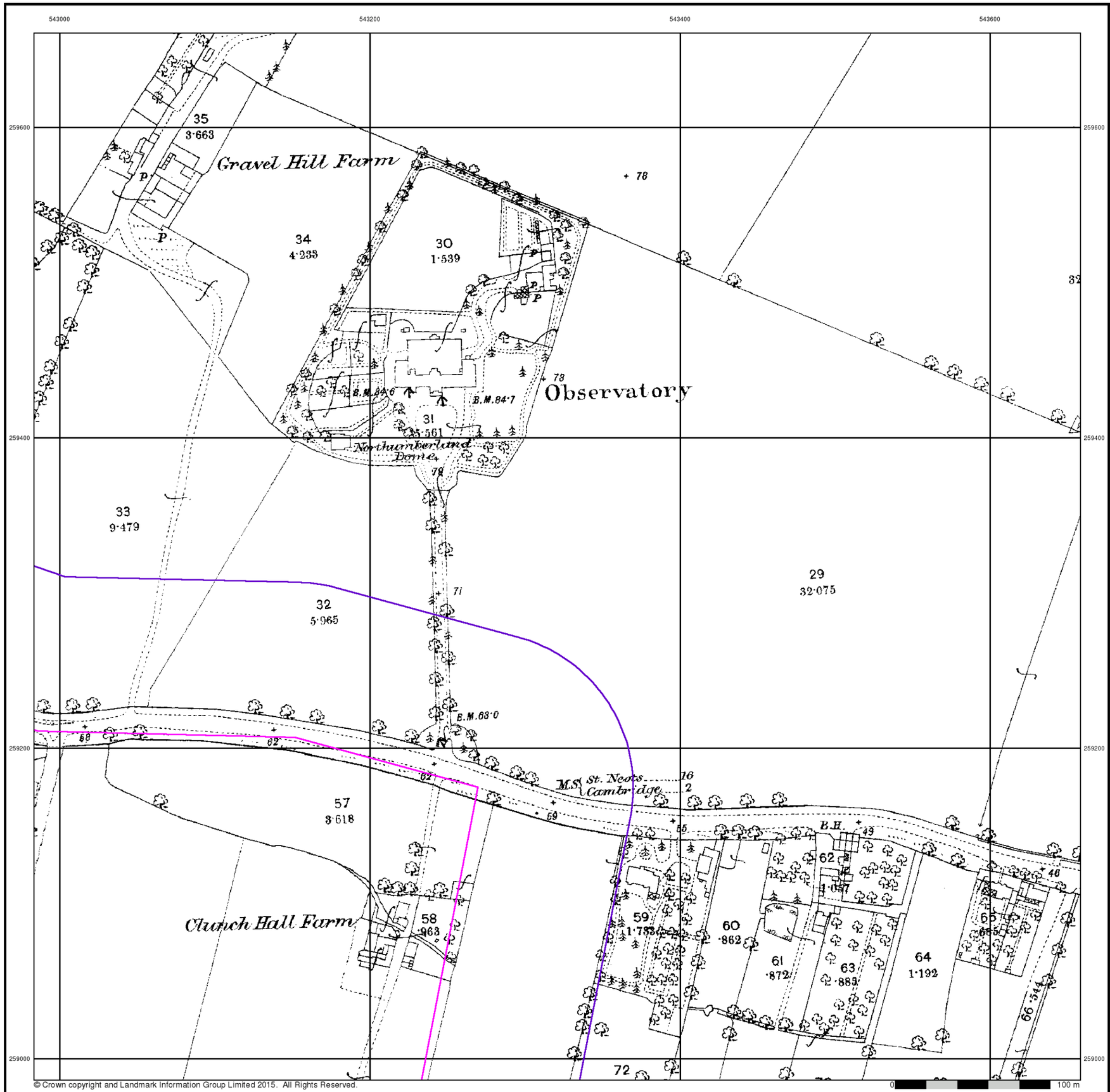
Web: www.envirocheck.co.uk



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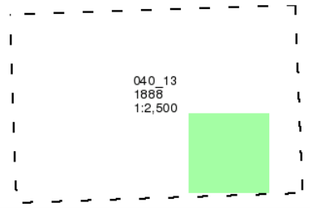
Cambridgeshire & Isle Of Ely

Published 1888

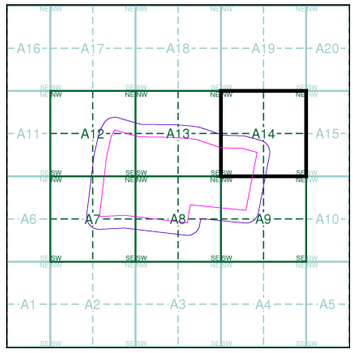
Source map scale - 1:2,500

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 A14



Order Details

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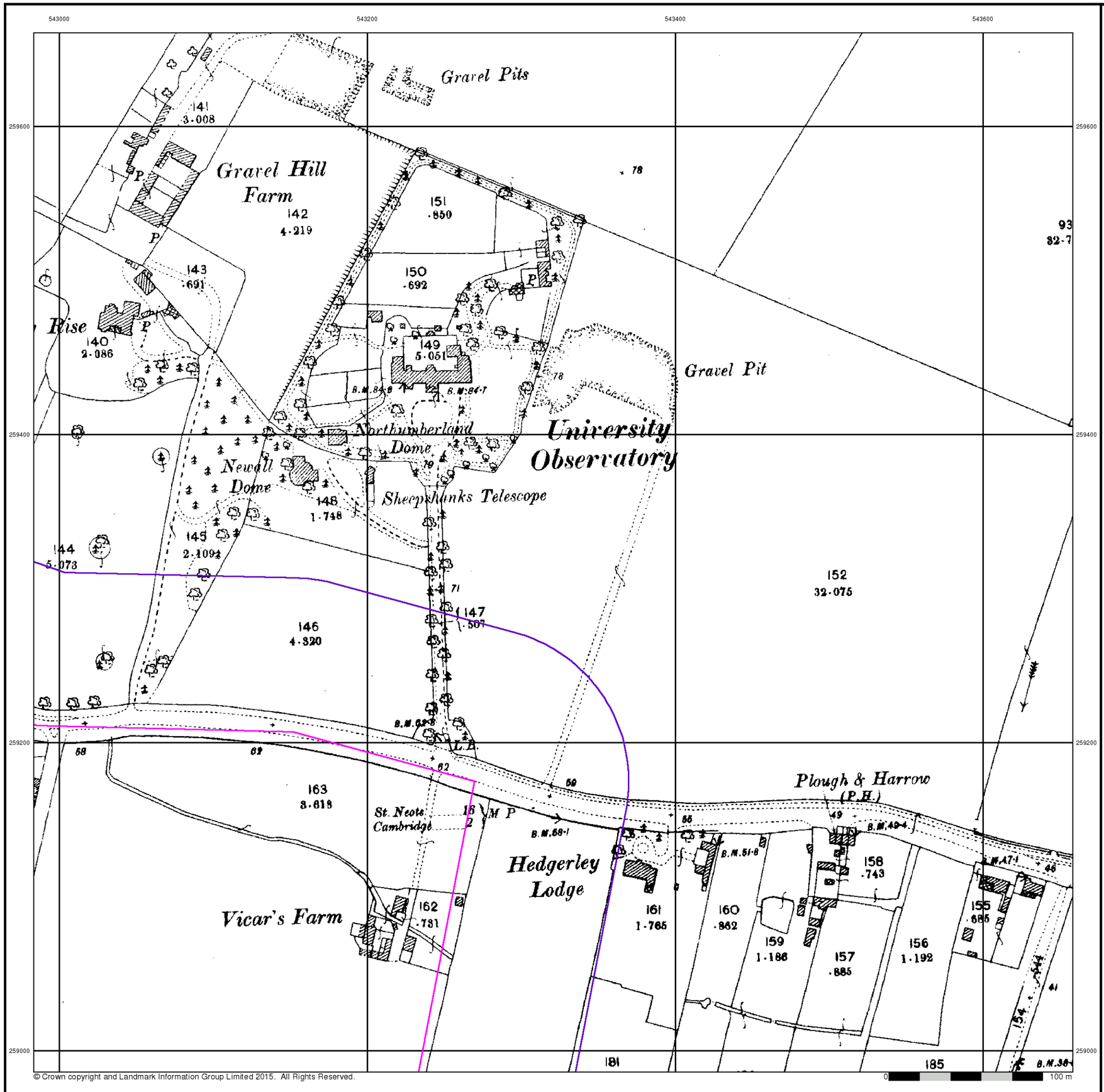

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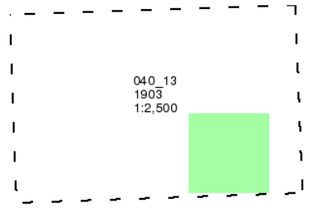
Cambridgeshire & Isle Of Ely

Published 1903

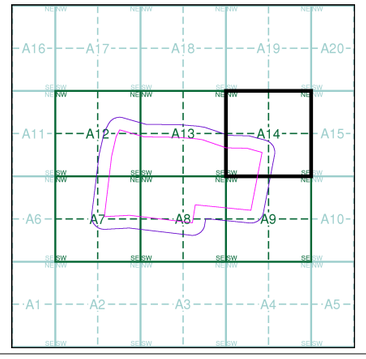
Source map scale - 1:2,500

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 A14



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
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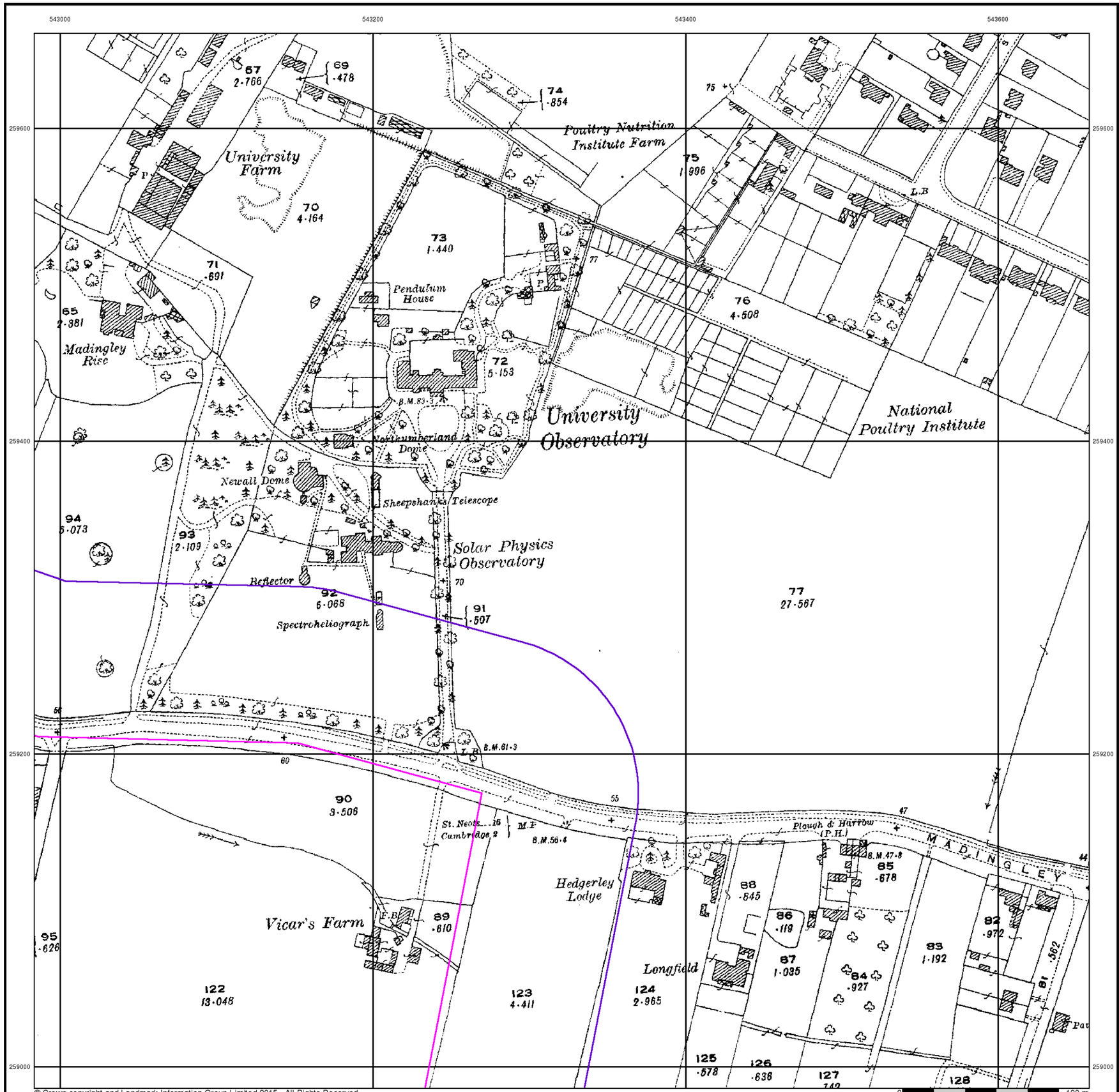

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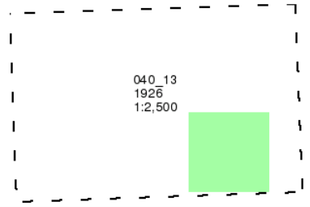
Cambridgeshire & Isle Of Ely

Published 1926

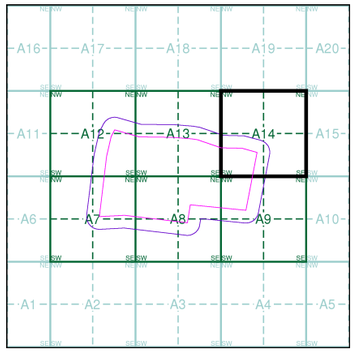
Source map scale - 1:2,500

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 A14



Order Details

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Site Area (Ha):	67.92
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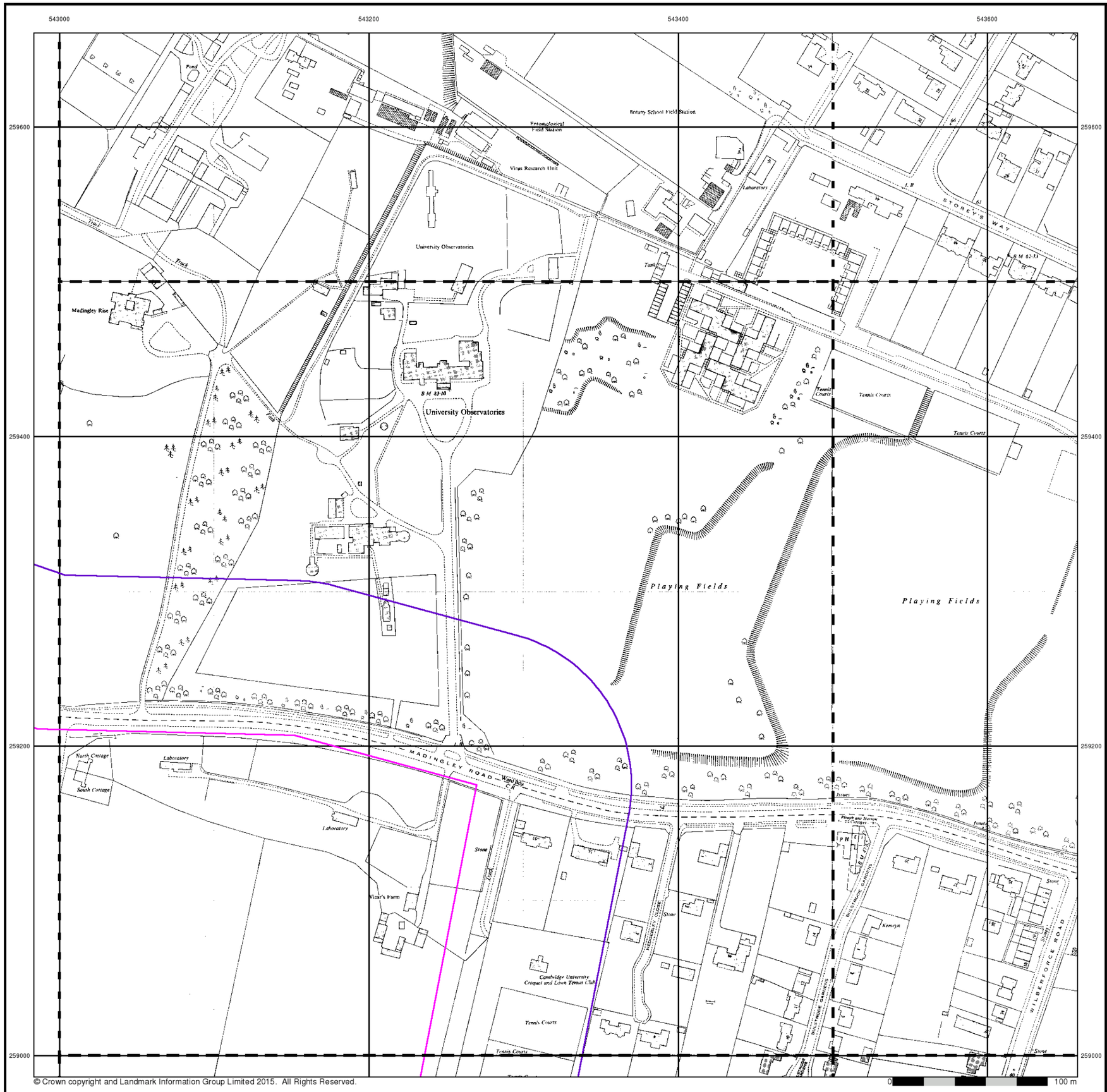

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Ordnance Survey Plan

Published 1967

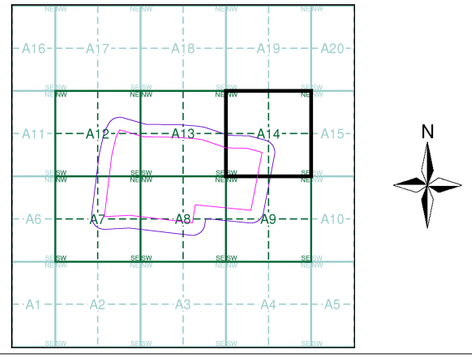
Source map scale - 1:1,250

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)

TL4359NW 1967 1:1,250	TL4359NE 1967 1:1,250
TL4359SW 1967 1:1,250	TL4359SE 1967 1:1,250
TL4358NW 1967 1:1,250	TL4358NE 1967 1:1,250

Historical Map - Segment A14



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
Search Buffer (m):	100

Site Details

Site at, Cambridge, Cambridgeshire

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Additional SIMs

Published 1967 - 1984

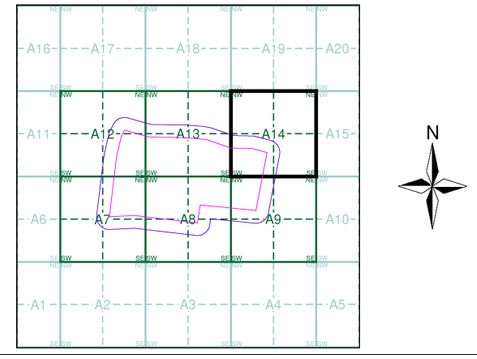
Source map scale - 1:1,250

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)

TL4359NW 1967 1:1,250
TL4359NE 1984 1:1,250
TL4359SE 1967 1:1,250
TL4358NE 1983 1:1,250

Historical Map - Segment A14



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
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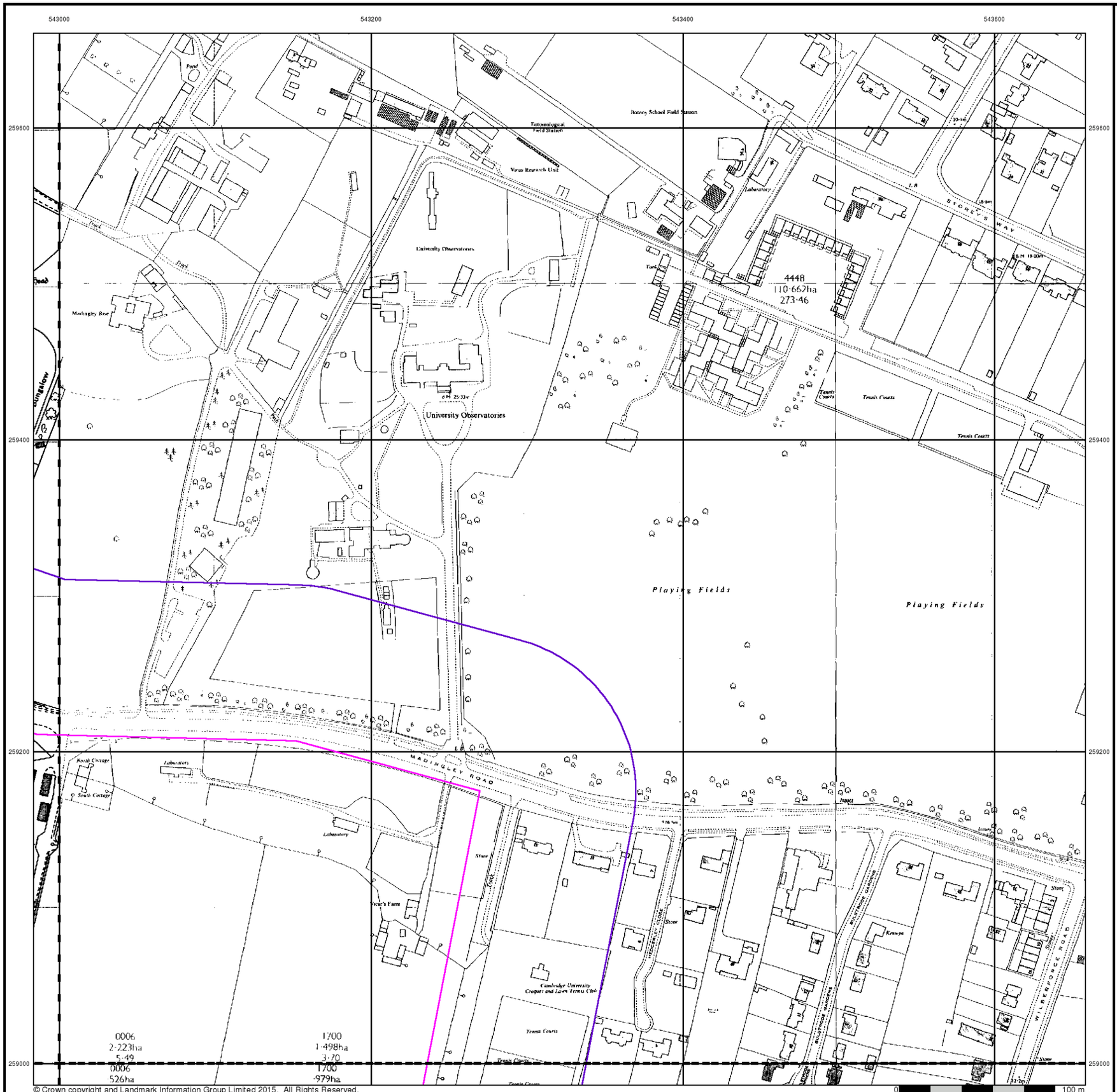

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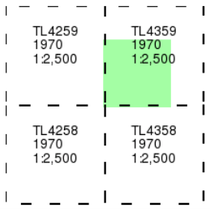
Ordnance Survey Plan

Published 1970

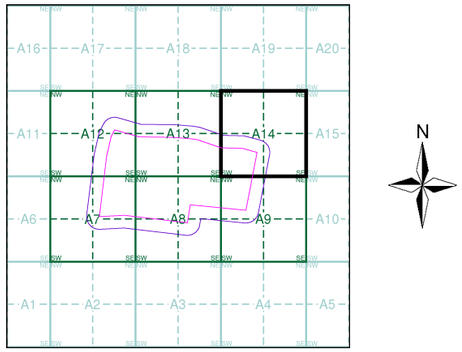
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A14



Order Details

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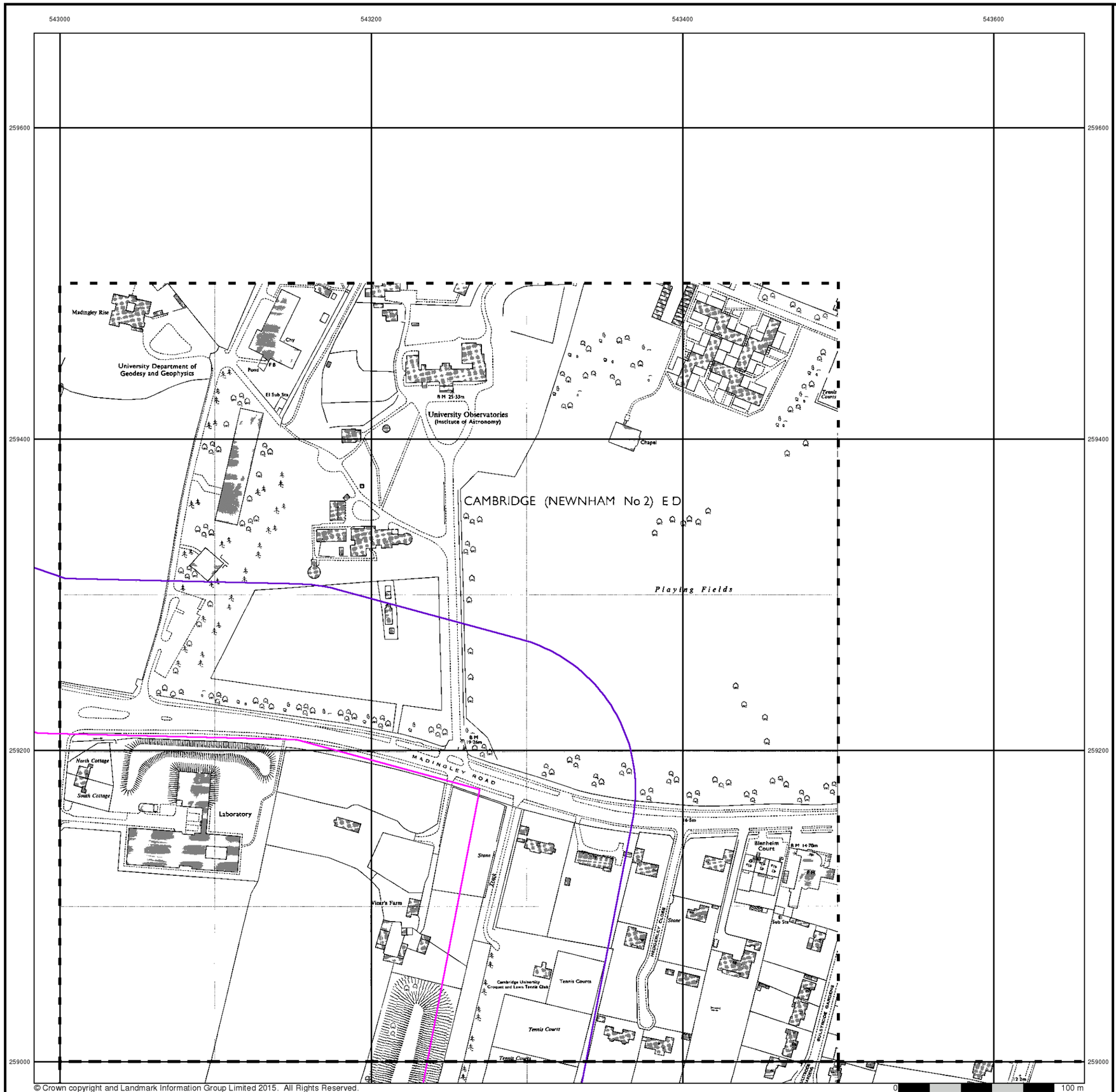

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Ordnance Survey Plan

Published 1976

Source map scale - 1:1,250

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

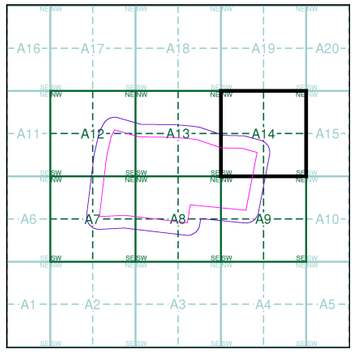
Map Name(s) and Date(s)

TL4359SW 1976 1:1,250

TL4358NW 1976 1:1,250

TL4358NE 1976 1:1,250

Historical Map - Segment A14



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
Search Buffer (m):	100

Site Details

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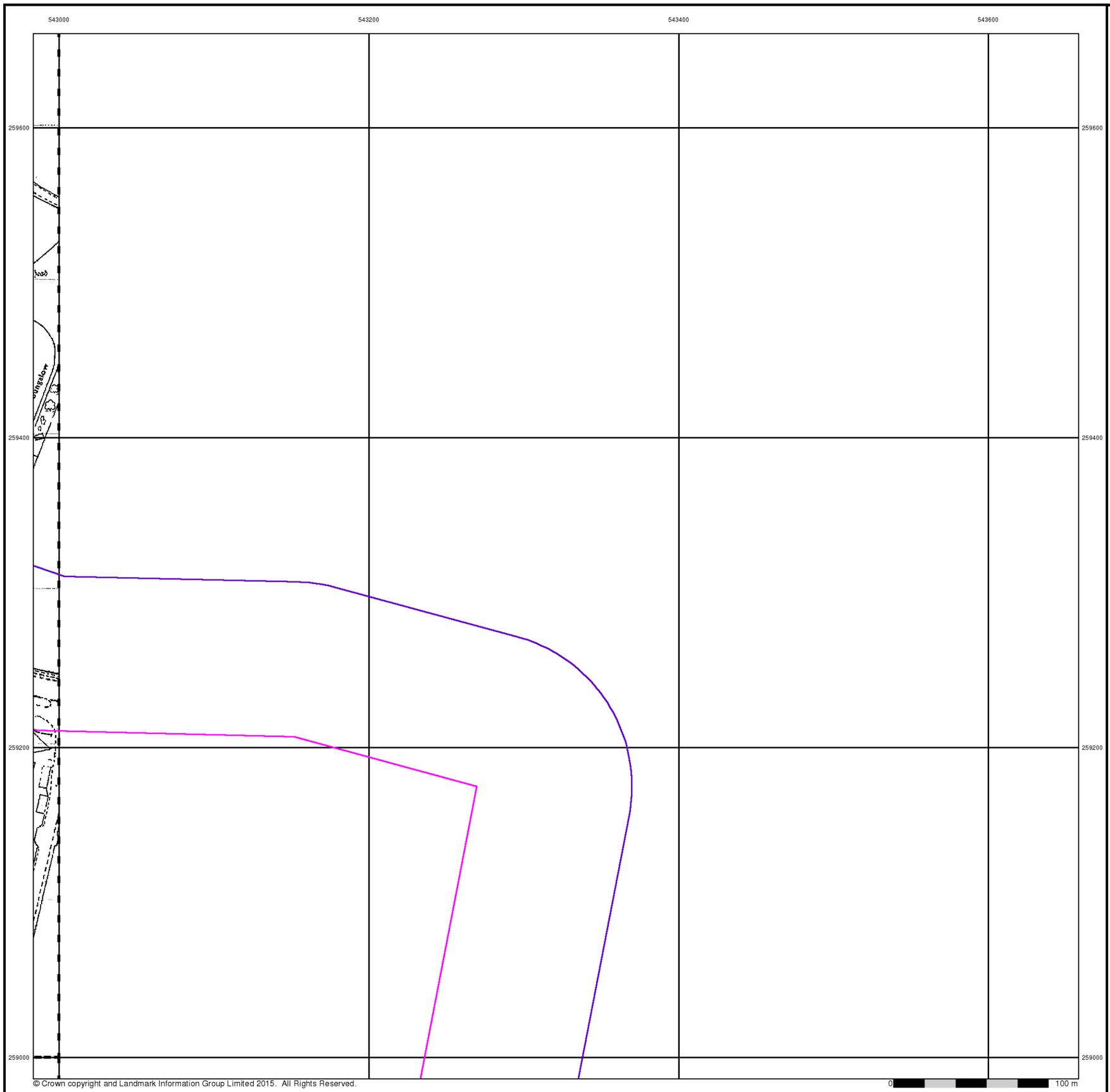


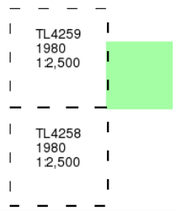
Additional SIMs

Published 1980

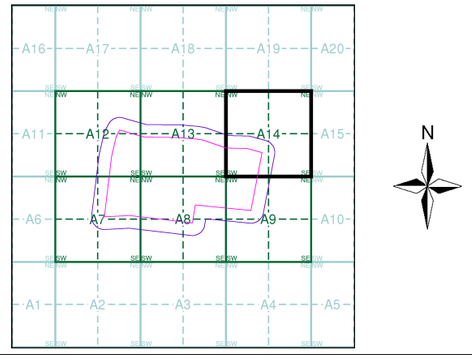
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A14



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
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Search Buffer (m):	100

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Additional SIMs

Published 1984 - 1988

Source map scale - 1:1,250

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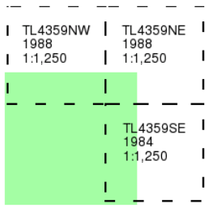
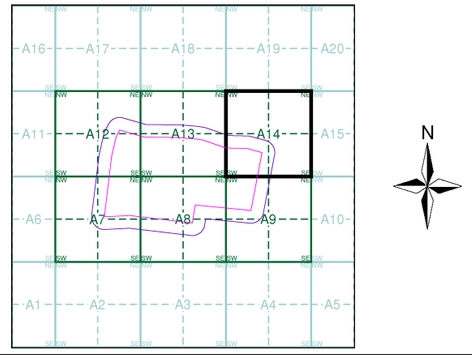
Map Name(s) and Date(s)



Historical Map - Segment A14



Order Details

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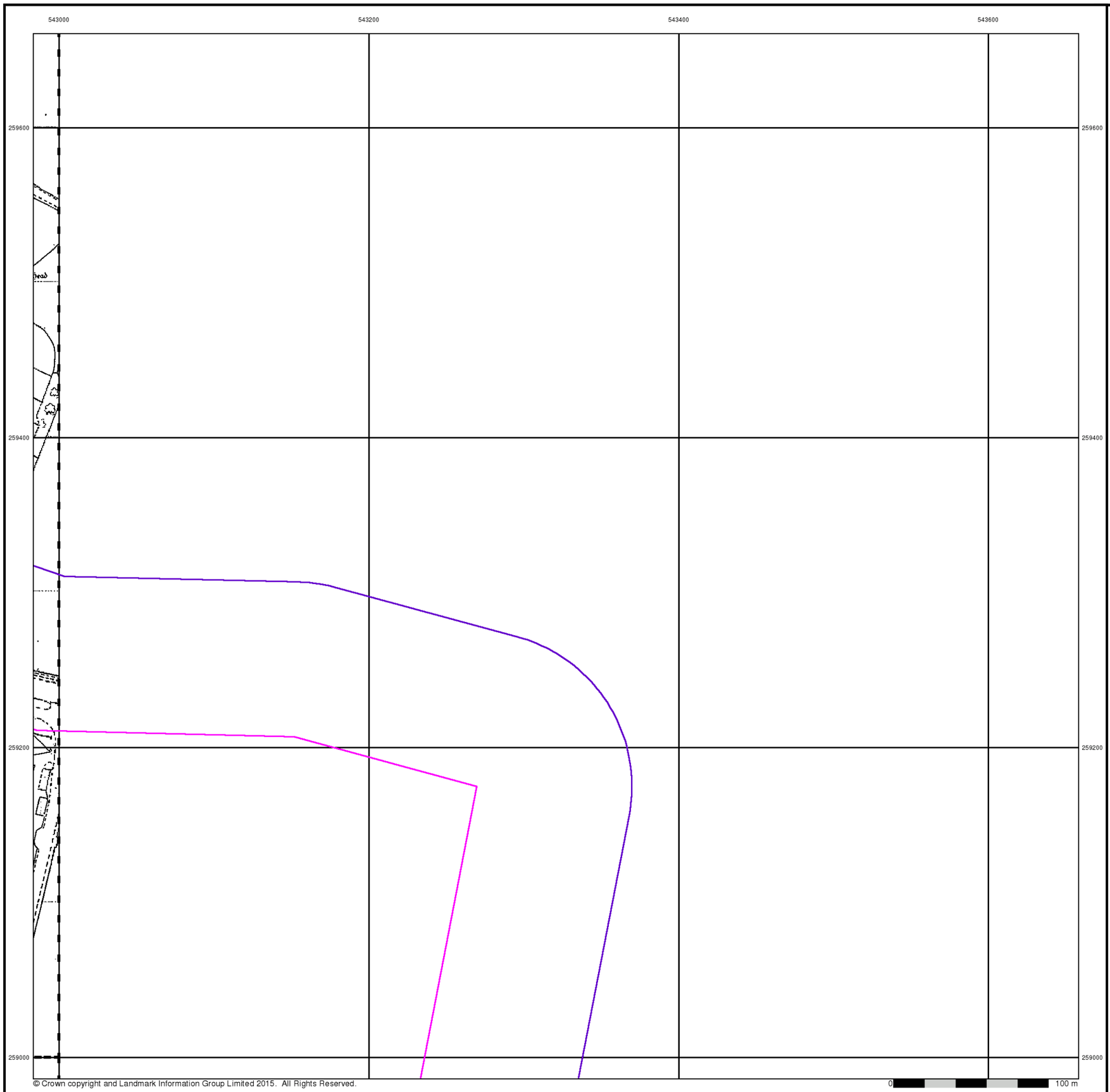

Additional SIMs

Published 1985

Source map scale - 1:2,500

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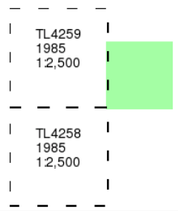
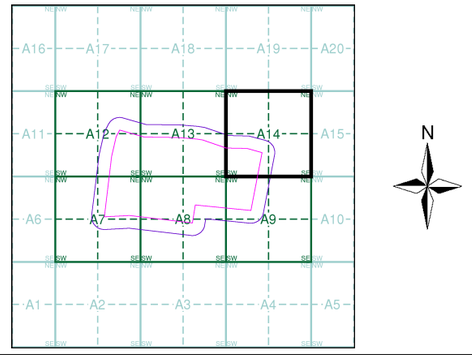
Map Name(s) and Date(s)



Historical Map - Segment A14



Order Details

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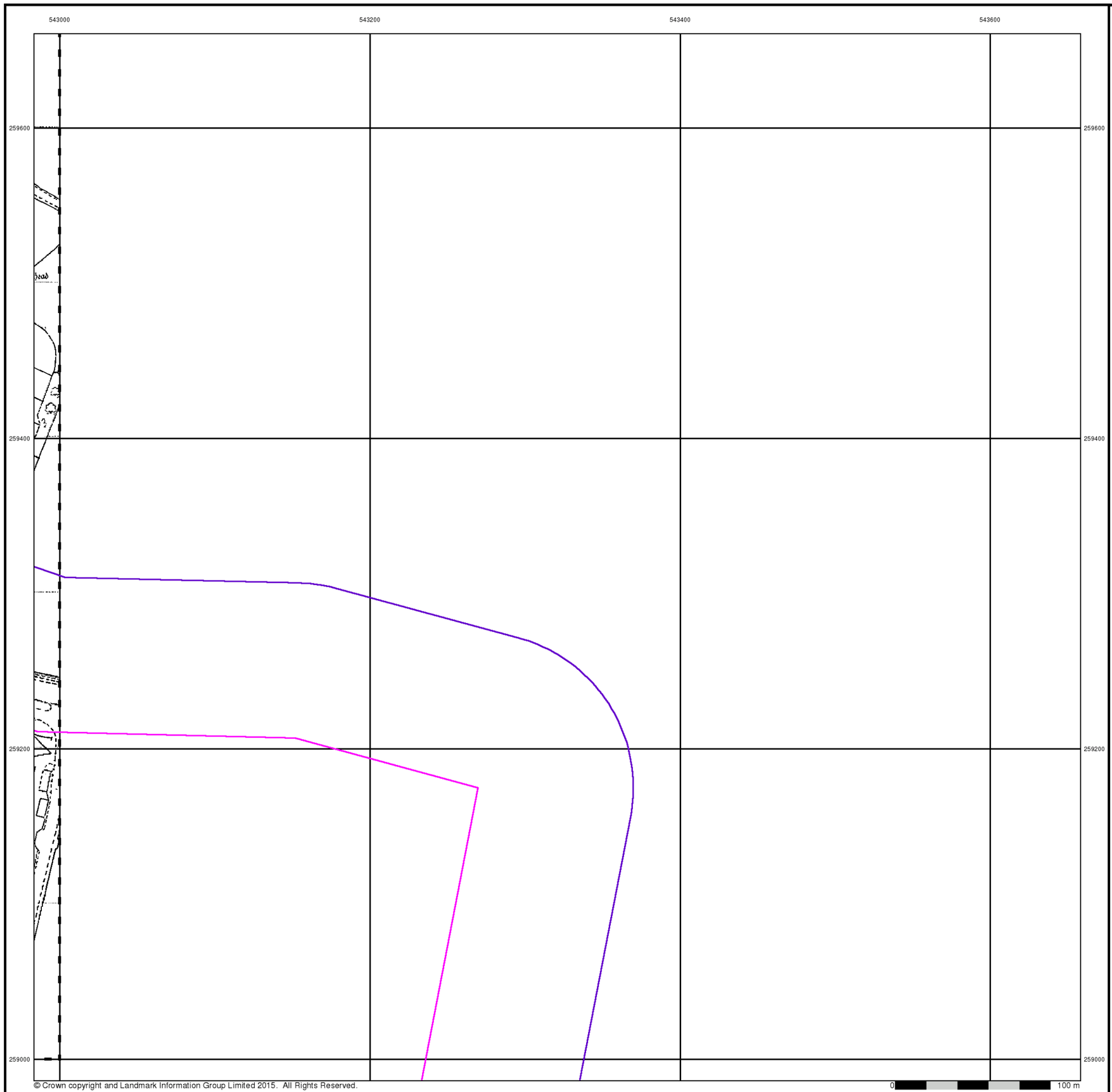

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Additional SIMs

Published 1989

Source map scale - 1:2,500

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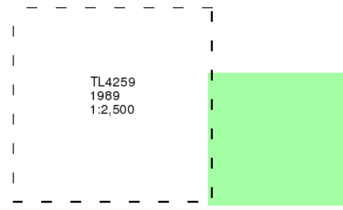
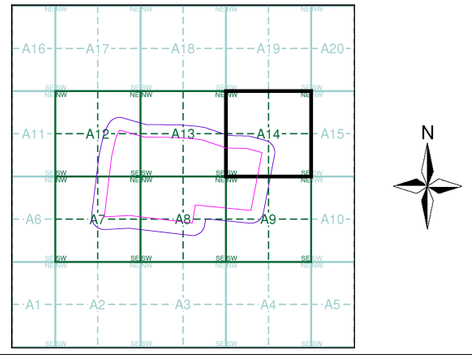
Map Name(s) and Date(s)



Historical Map - Segment A14



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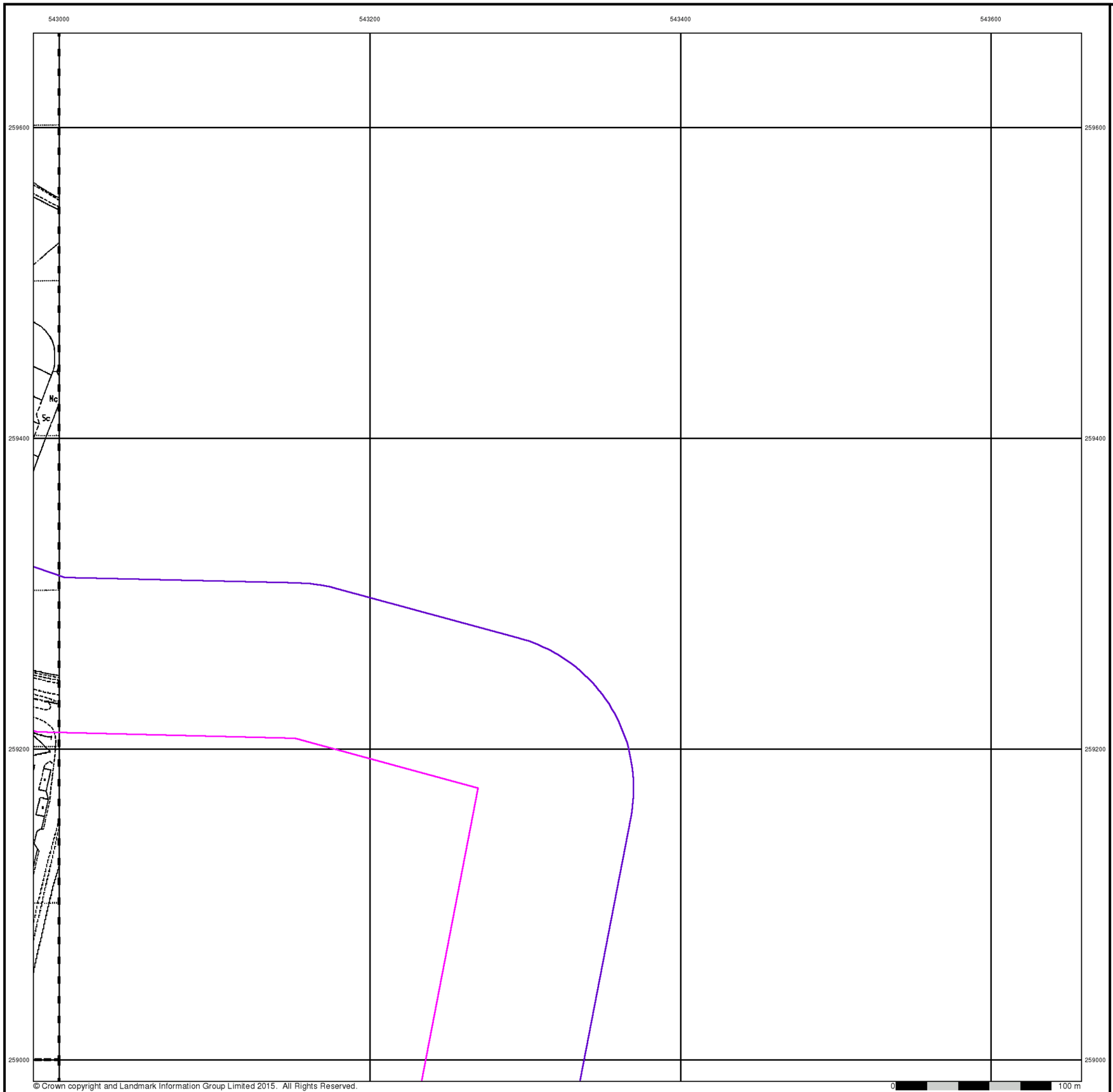

0 100 m

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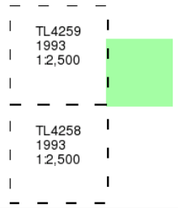
Large-Scale National Grid Data

Published 1993

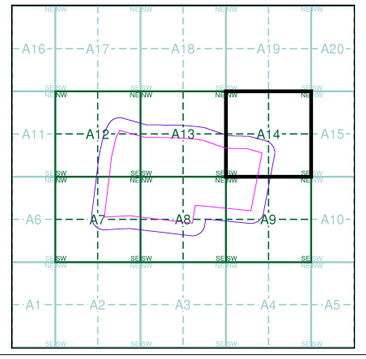
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A14



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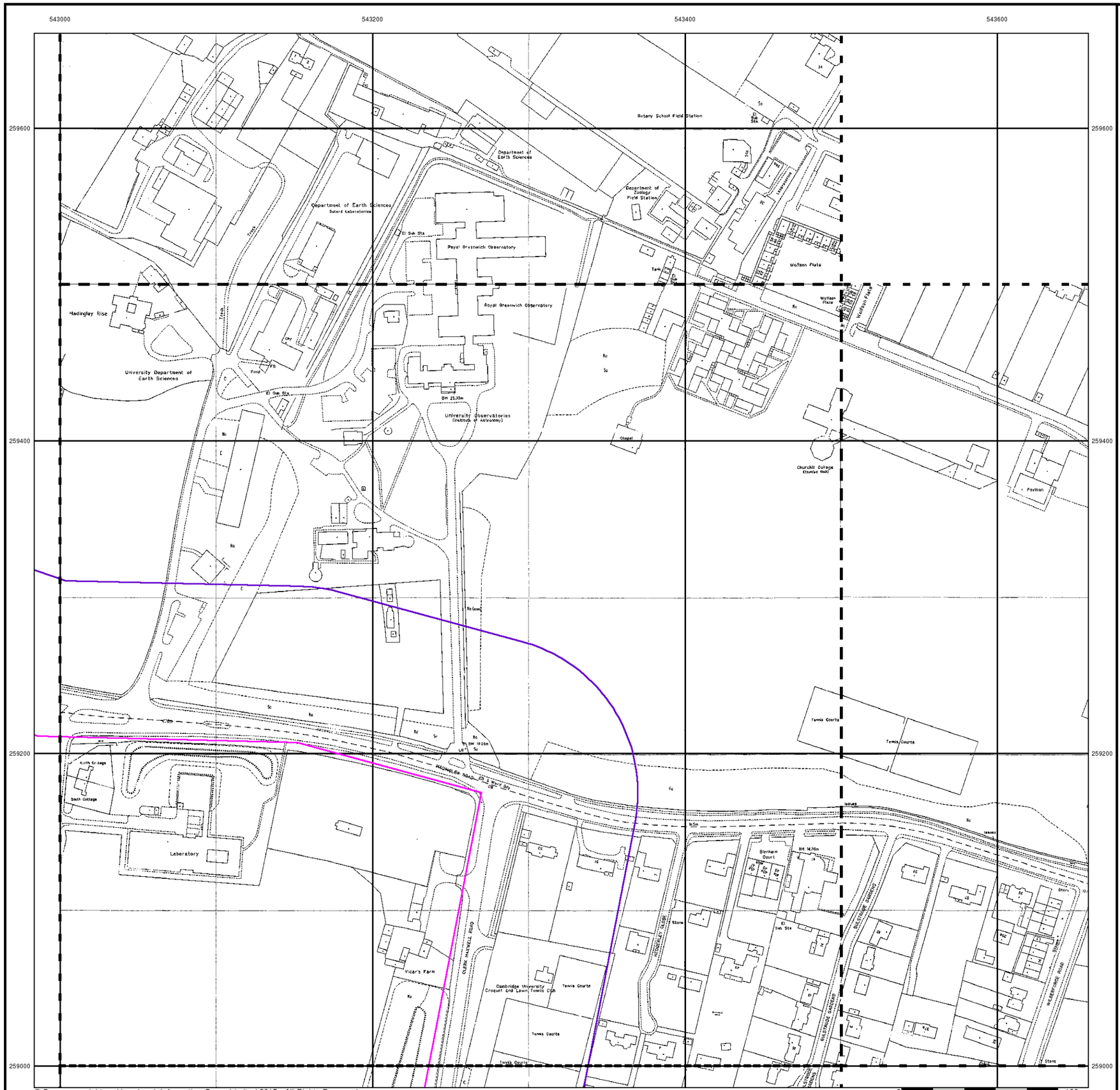
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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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)

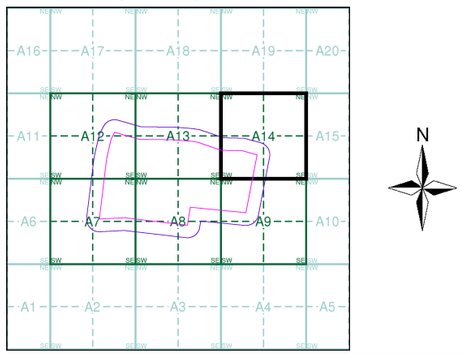
TL4359NW 1993 1:1,250

TL4359SW 1993 1:1,250

TL4359SE 1993 1:1,250

TL4358NW 1993 1:1,250

Historical Map - Segment A14



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Customer Ref:	31500
National Grid Reference:	542610, 258970
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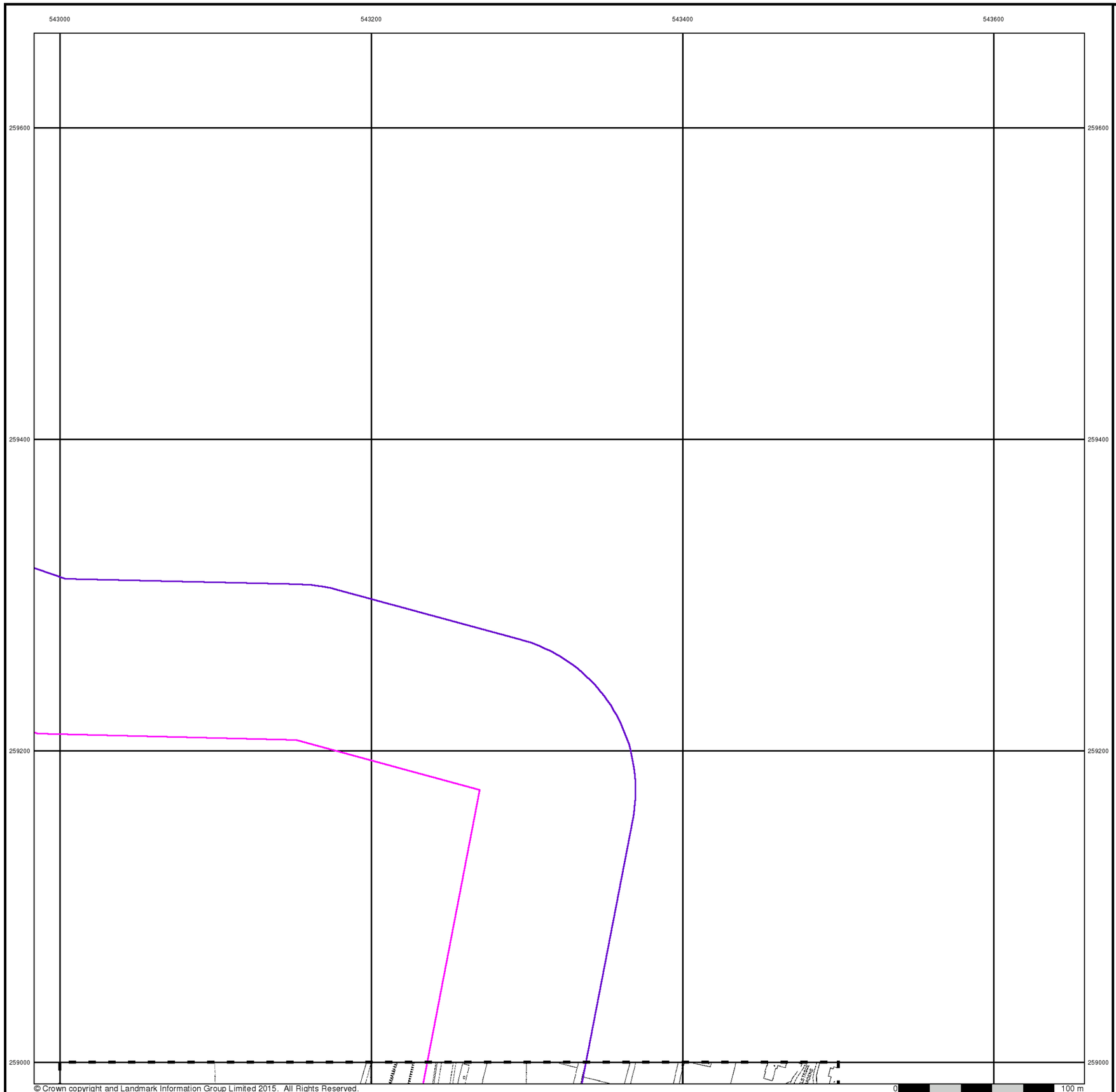
Site Area (Ha):	67.92
Search Buffer (m):	100

Site Details

Site at, Cambridge, Cambridgeshire



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Published 1994

Source map scale - 1:1,250

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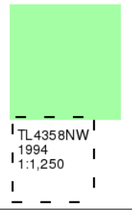

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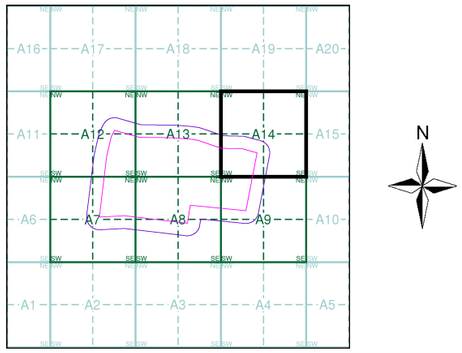

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Large-Scale National Grid Data

Published 1996

Source map scale - 1:1,250

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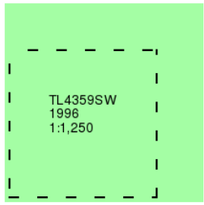
Map Name(s) and Date(s)



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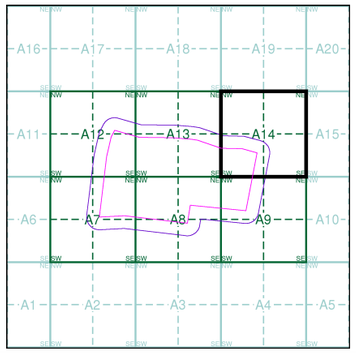

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Appendix 5 Envirocheck Report

Geology 1:10,000 Maps Legends

Artificial Ground and Landslip

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	MGR	Made Ground (Undivided)	Artificial Deposit	Holocene - Holocene
	WGR	Worked Ground (Undivided)	Void	Holocene - Holocene

Superficial Geology

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	HEAD	Head	Gravel	Quaternary - Ryazanian
	RTD4	River Terrace Deposits, 4	Sand and Gravel	Quaternary - Ryazanian
	RTD3	River Terrace Deposits, 3	Sand and Gravel	Quaternary - Ryazanian

Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	WMCH	West Melbury Marly Chalk Formation	Chalk	Cenomanian - Cenomanian
	GLT	Gault Formation	Mudstone	Albian - Albian

Geology 1:10,000 Maps

This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:10,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around a site. This mapping may be more up to date than previously published paper maps.

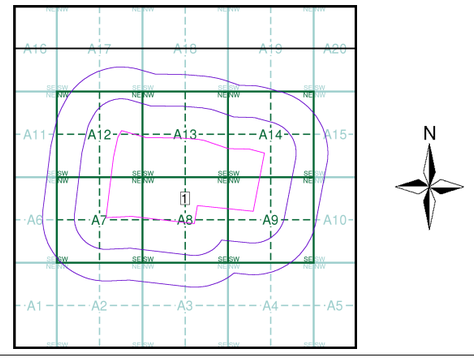
The various geological layers - artificial and landslip deposits, superficial geology and solid (bedrock) geology are displayed in separate maps, but superimposed on the final 'Combined Surface Geology' map. All map legends feature on this page.

Please Note: Not all of the layers have complete nationwide coverage, so availability of data for relevant map sheets is indicated below.

Geology 1:10,000 Maps Coverage

Map ID:		**Map ID:**	1
Map Name:	TL46SW	**Map Name:**	TL45NW
Map Date:	1952 B	**Map Date:**	1960
Bedrock Geology:	Available	**Bedrock Geology:**	Available
Superficial Geology:	Available	**Superficial Geology:**	Available
Artificial Geology:	Not Available	**Artificial Geology:**	Available
Faults:	Not Available	**Faults:**	Not Available
Landslip:	Not Available	**Landslip:**	Not Available
Rock Segments:	Not Available	**Rock Segments:**	Not Available

Geology 1:10,000 Maps - Slice A



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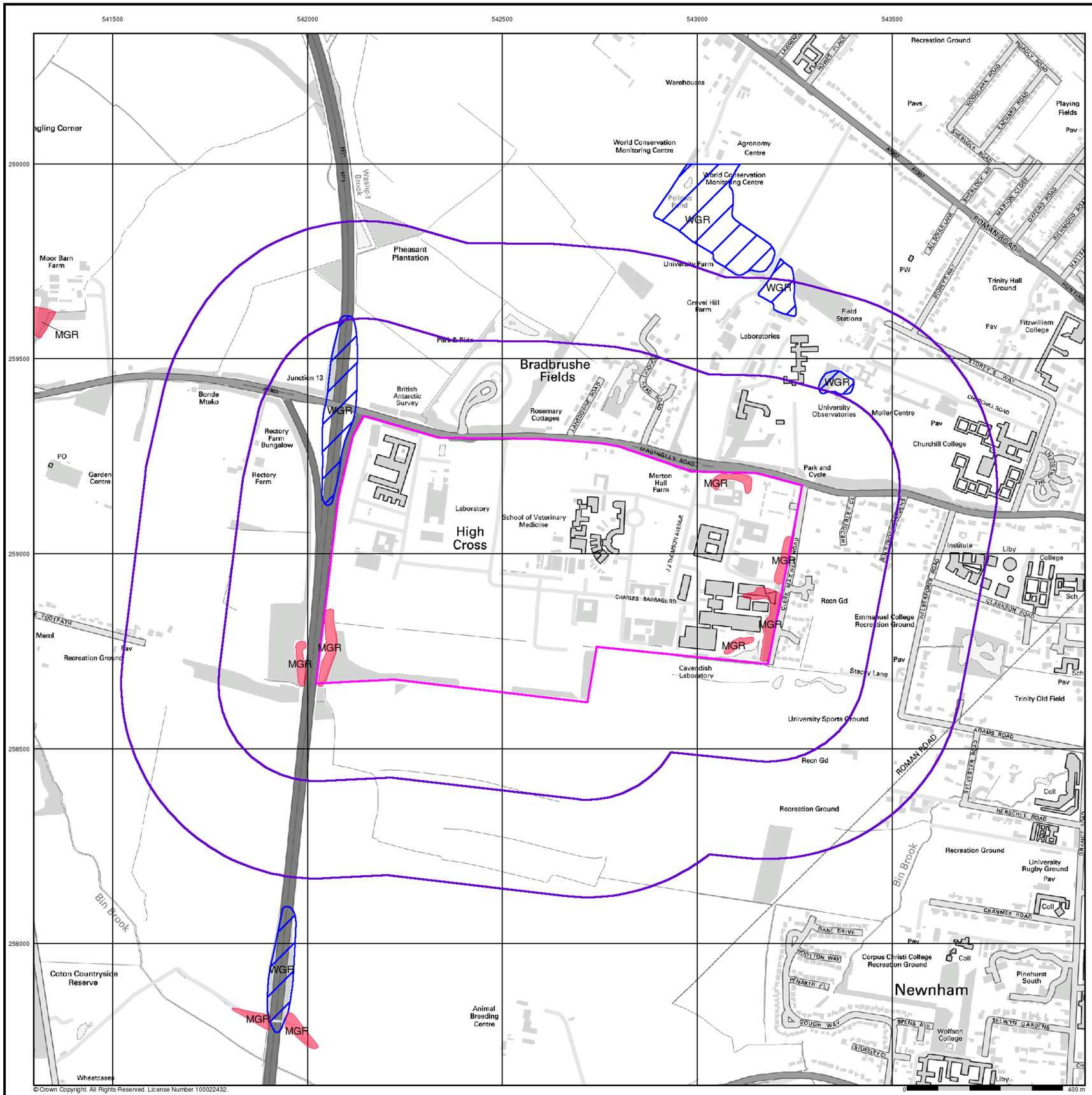


Artificial Ground and Landslip

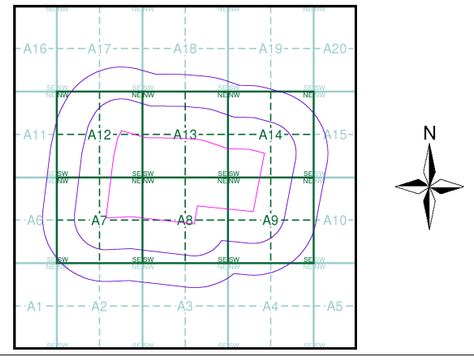
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions and unstable ground.

Artificial ground includes:

- Made ground - man-made deposits such as embankments and spoil heaps on the natural ground surface.
- Worked ground - areas where the ground has been cut away such as quarries and road cuttings.
- Infilled ground - areas where the ground has been cut away then wholly or partially backfilled.
- Landscaped ground - areas where the surface has been reshaped.
- Disturbed ground - areas of ill-defined shallow or near surface mineral workings where it is impracticable to map made and worked ground separately.

Mass movement (landslip) deposits on BGS geological maps are primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground. The dataset also includes foundered strata, where the ground has collapsed due to subsidence.

Artificial Ground and Landslip Map - Slice A



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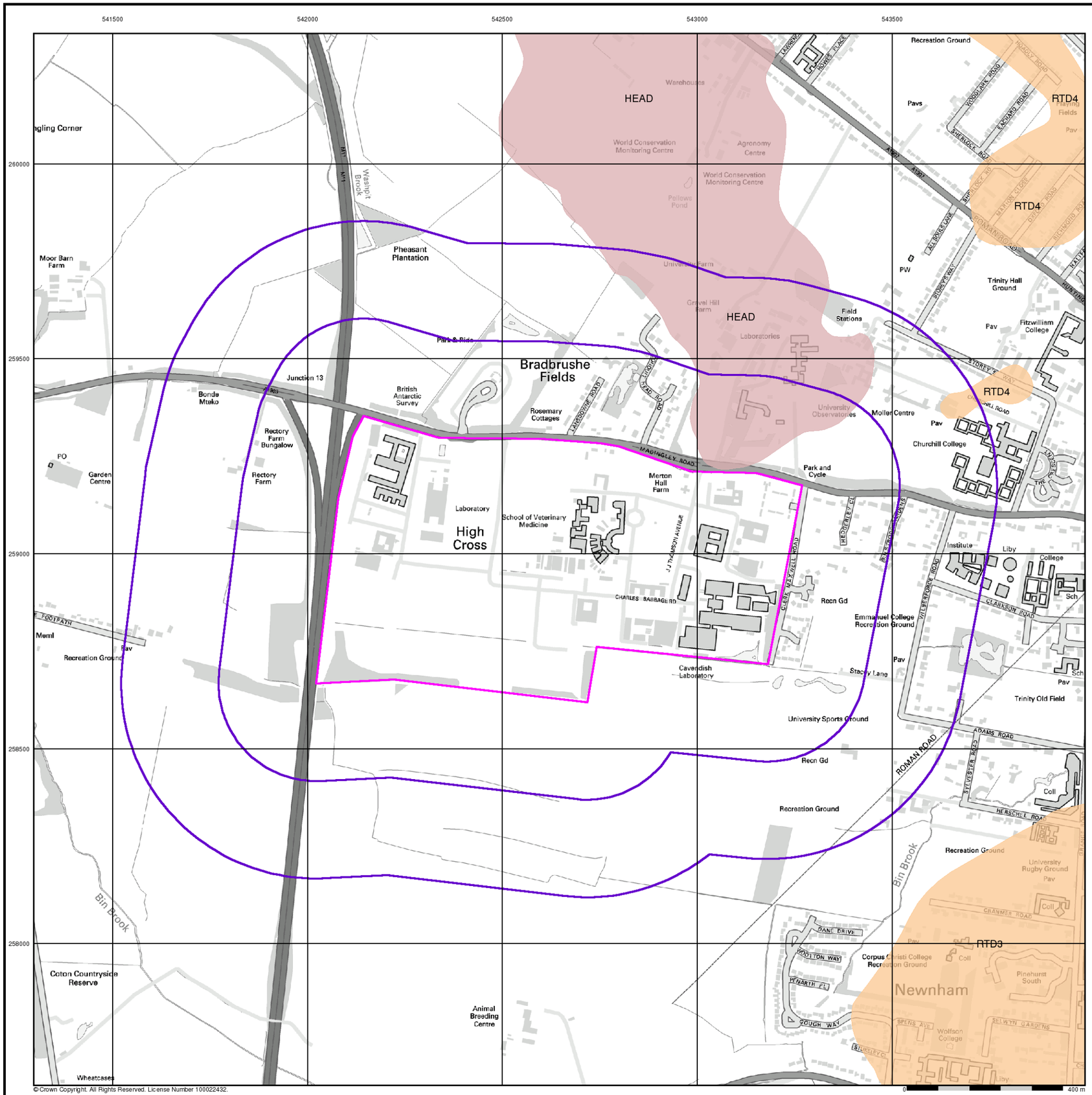

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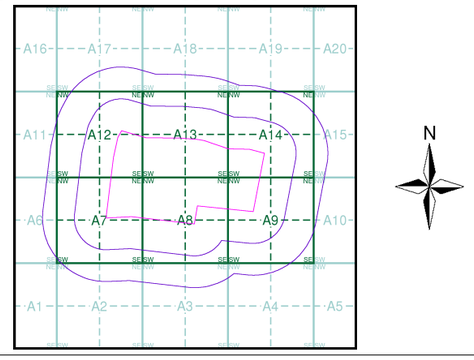
Superficial Geology

BGS 1:10,000 Superficial Deposits are the youngest geological deposits formed during the most recent period of geological time, which extends back about 1.8 million years from the present.

They rest on older deposits or rocks referred to as Bedrock. This dataset contains Superficial deposits that are of natural origin and 'in place'. Other superficial strata may be held in the Mass Movement dataset where they have been moved, or in the Artificial Ground dataset where they are of man-made origin.

Most of these Superficial deposits are unconsolidated sediments such as gravel, sand, silt and clay, and onshore they form relatively thin, often discontinuous patches or larger spreads.

Superficial Geology Map - Slice A



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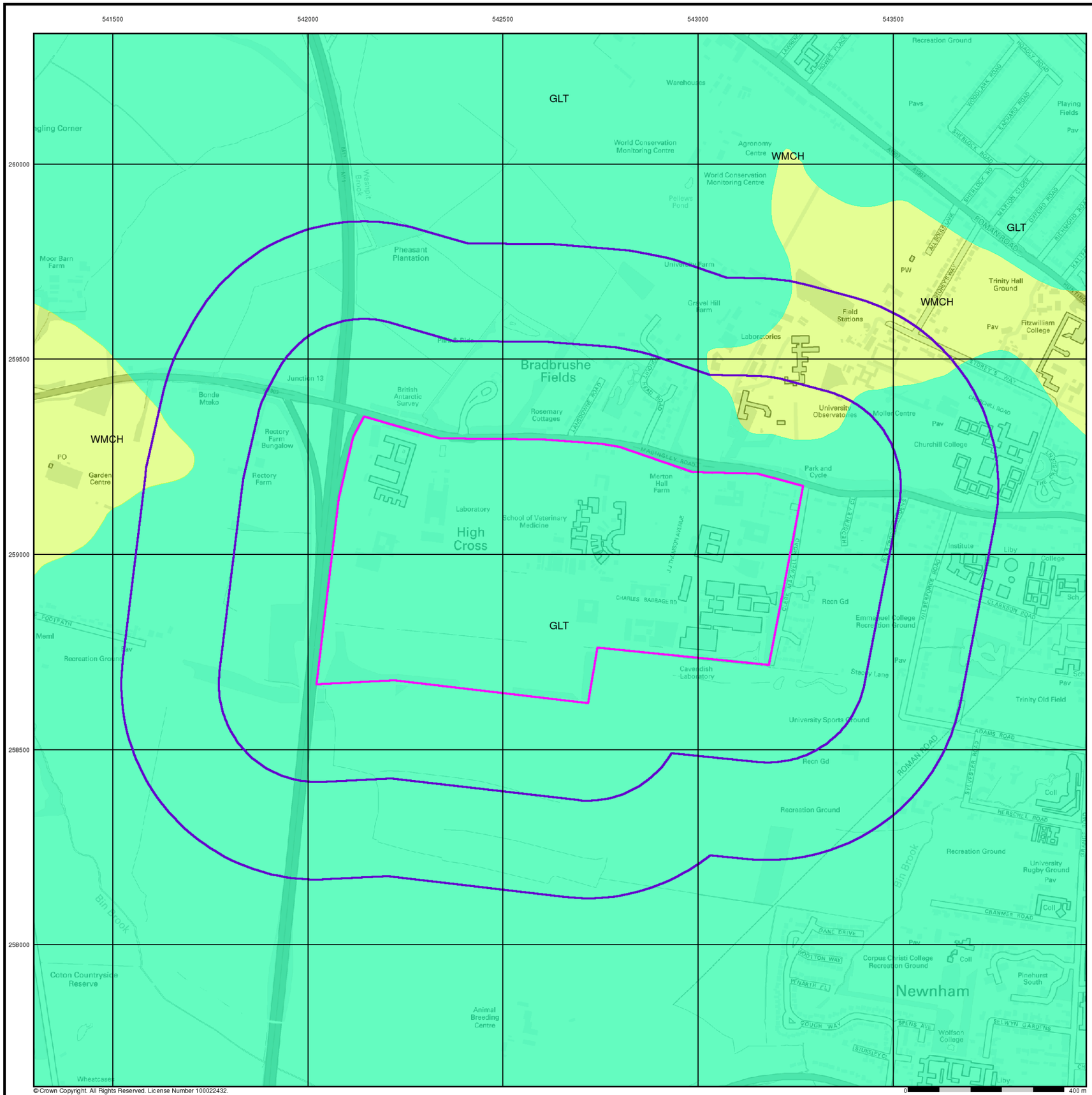

Bedrock and Faults

Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

The bedrock has formed over vast lengths of geological time ranging from ancient and highly altered rocks of the Proterozoic, some 2500 million years ago, or older, up to the relatively young Pliocene, 1.8 million years ago.

The bedrock geology includes many lithologies, often classified into three types based on origin: igneous, metamorphic and sedimentary.

The BGS Faults and Rock Segments dataset includes geological faults and thin beds mapped as lines such as coal seams and mineral veins. These are not restricted by age and could relate to features of any of the 1:10,000 geology datasets.

Bedrock and Faults Map - Slice A

Order Details

Order Number:	66871644_1_1
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National Grid Reference:	542610, 258970
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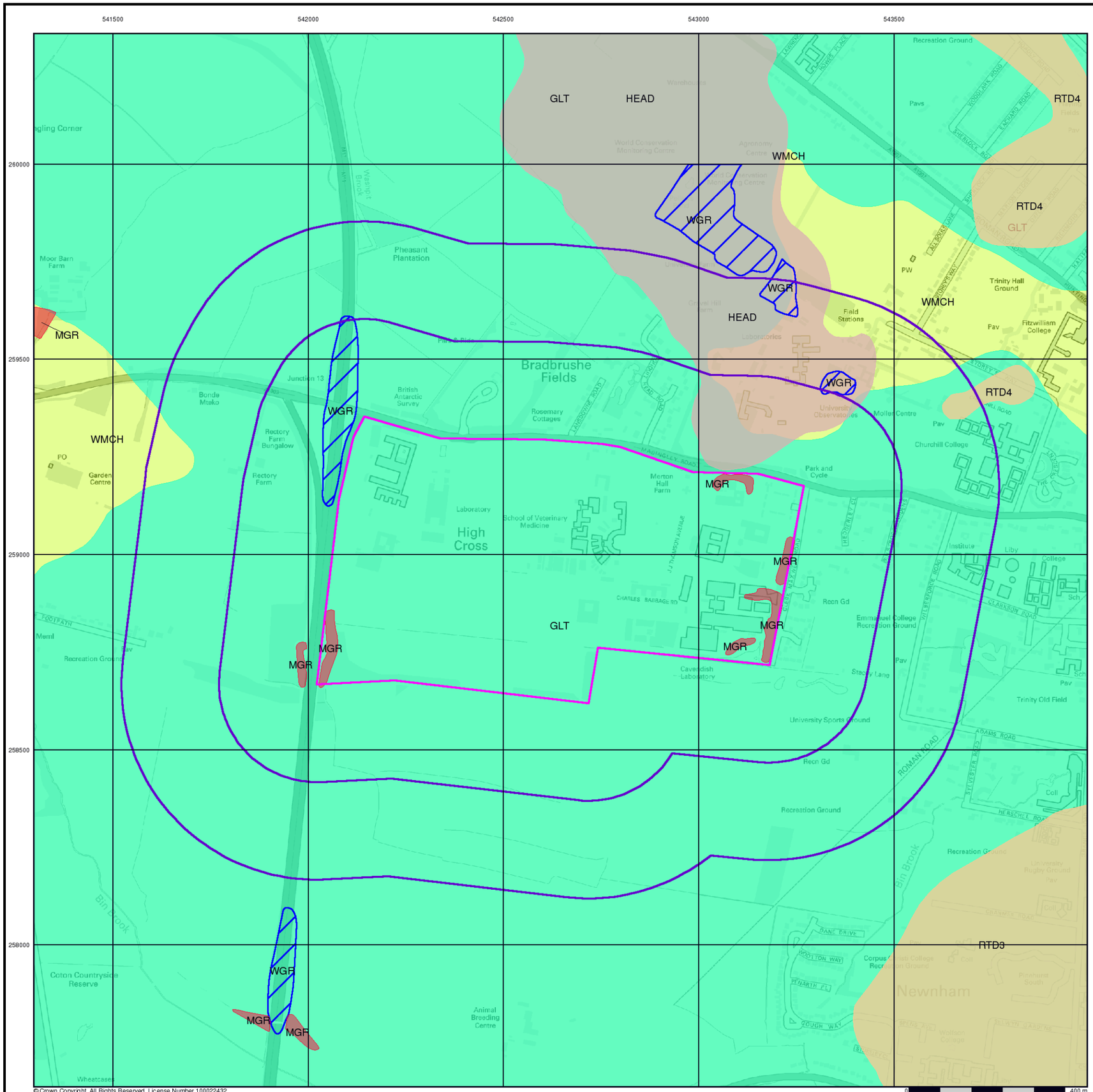

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Combined Surface Geology

The Combined Surface Geology map combines all the previous maps into one combined geological overview of your site.

Please consult the legends to the previous maps to interpret the Combined "Surface Geology" map.

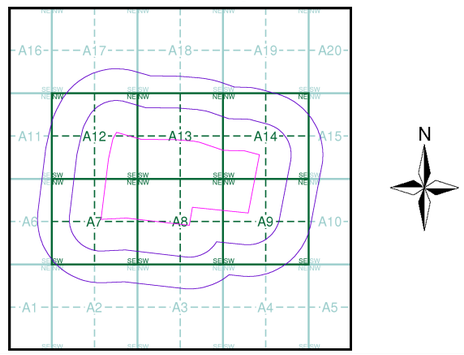
Additional Information

More information on 1:10,000 Geological mapping and explanations of rock classifications can be found on the BGS website. Using the LEX Codes in this report, further descriptions of rock types can be obtained by interrogating the 'BGS Lexicon of Named Rock Units'. This database can be accessed by following the 'Information and Data' link on the BGS website.

Contact

British Geological Survey
Kingsley Dunham Centre
Keyworth
Nottingham
NG12 5GG
Telephone: 0115 936 3143
Fax: 0115 936 3276
email: enquiries@bgs.ac.uk
website: www.bgs.ac.uk

Combined Geology Map - Slice A



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Site Details

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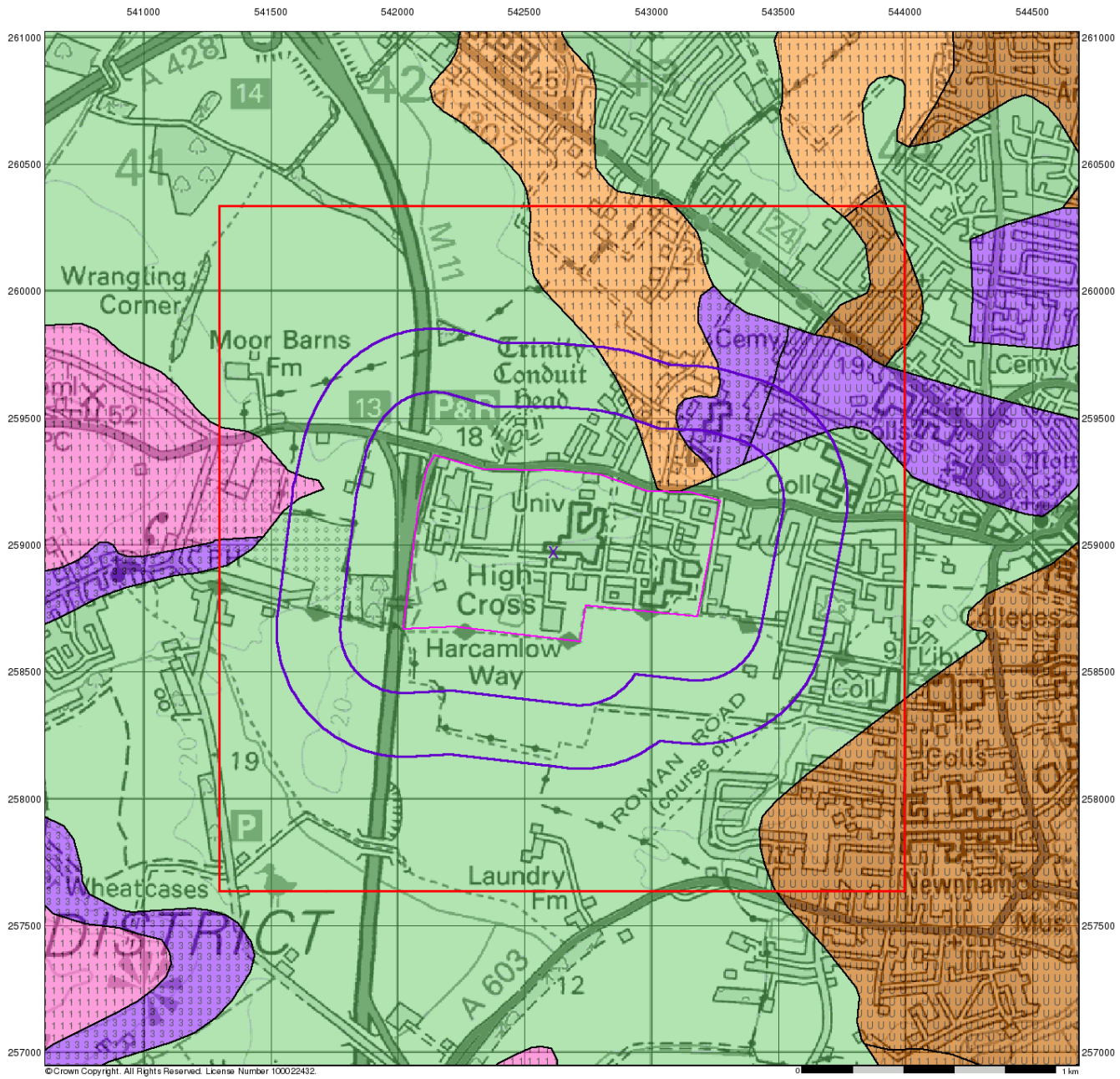


Groundwater Vulnerability

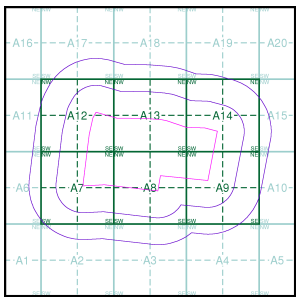
General

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

Agency and Hydrological

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

Site Sensitivity Context Map - Slice A



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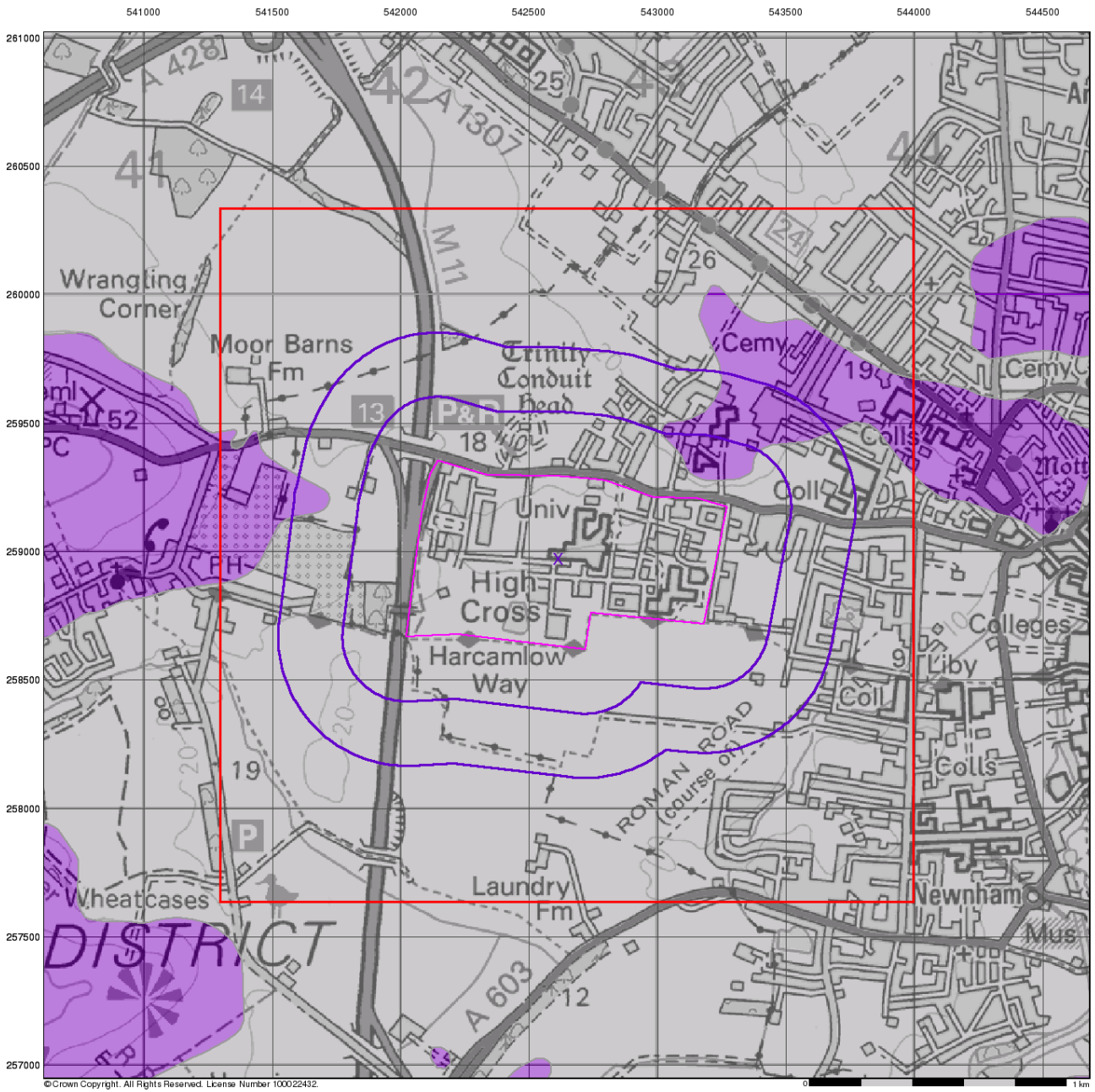


Bedrock Aquifer Designation

General

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

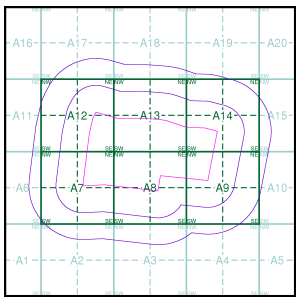
Slice | Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown

Site Sensitivity Context Map - Slice A



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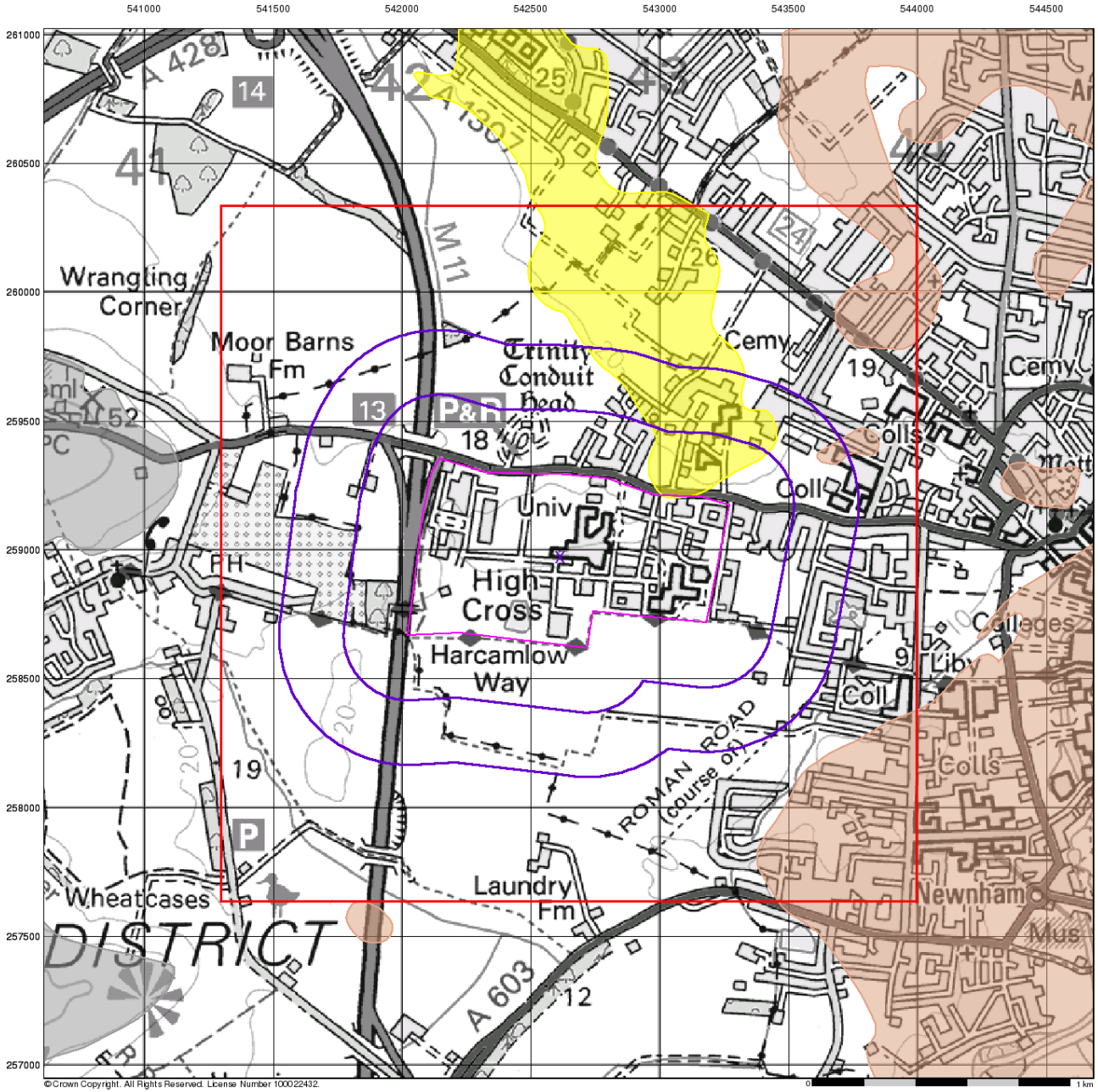

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Superficial Aquifer Designation

General

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

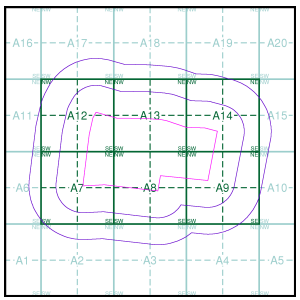
Slice | Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown

Site Sensitivity Context Map - Slice A



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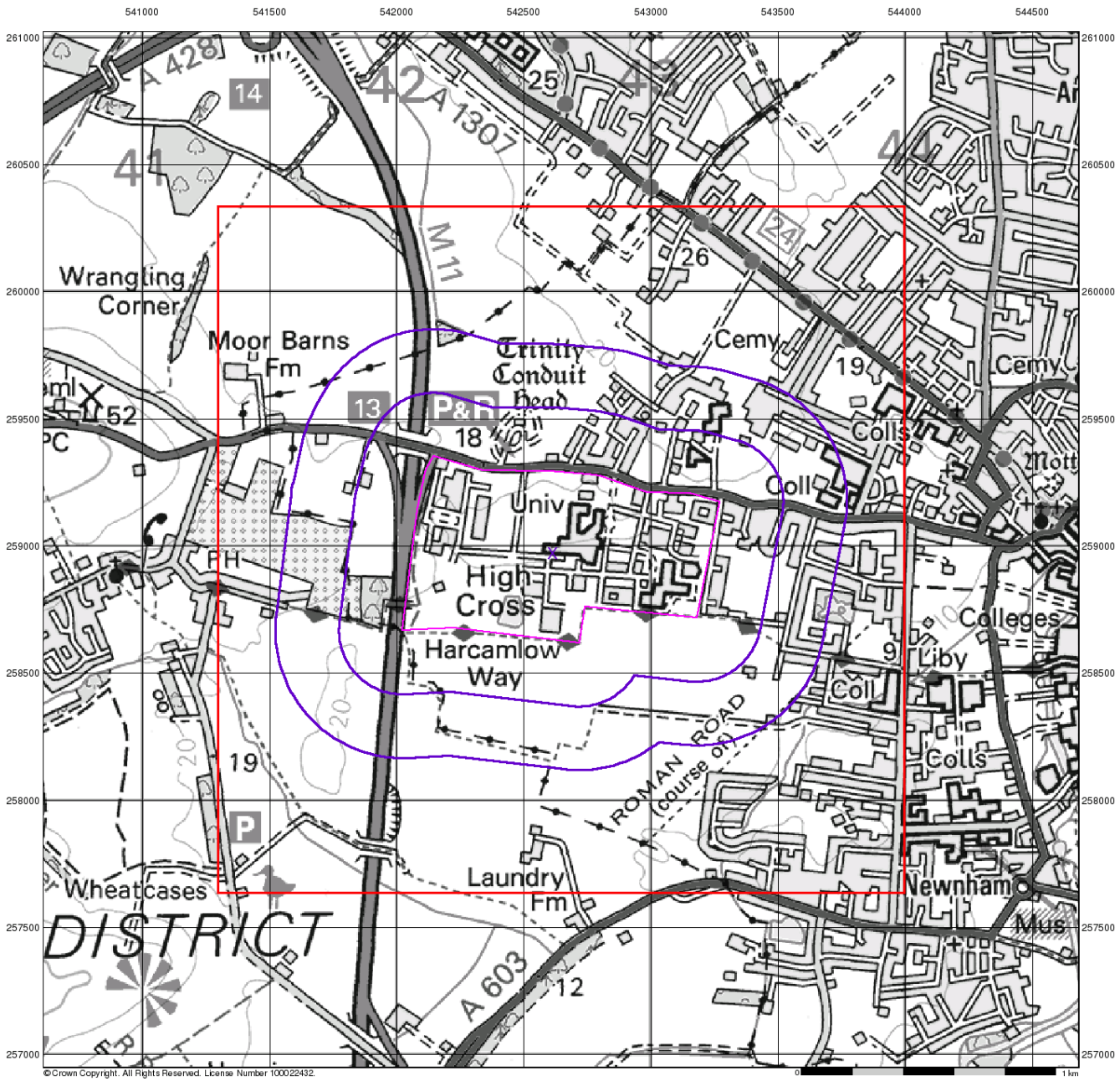

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Source Protection Zones

General

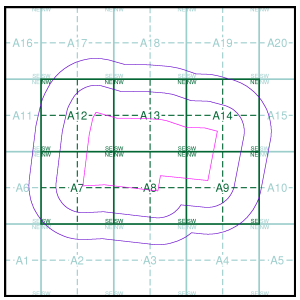
Specified Site | Specified Buffer(s) | Bearing Reference Point

Slice | Map ID

Agency and Hydrological

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

Site Sensitivity Context Map - Slice A



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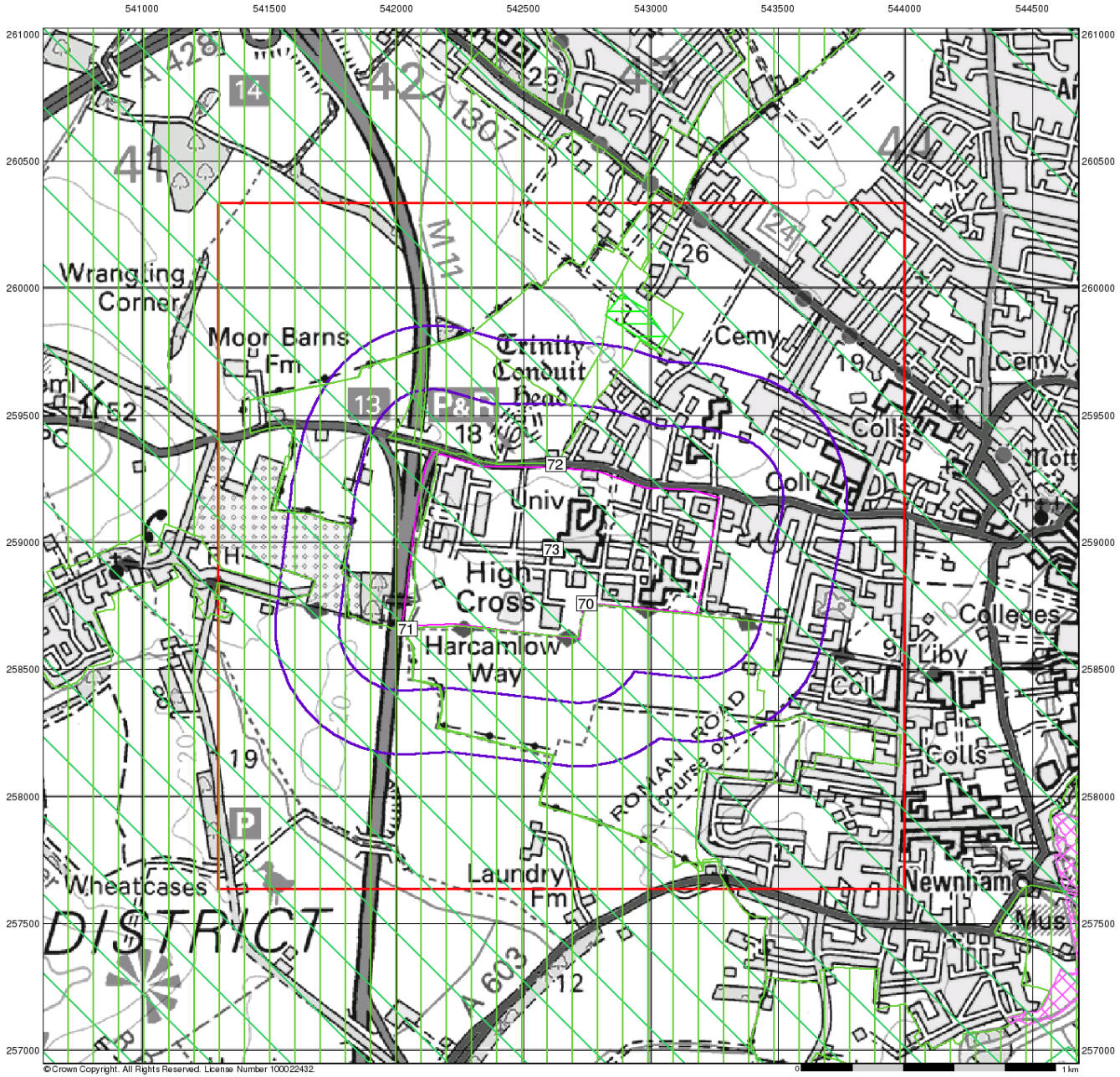

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Sensitive Land Uses

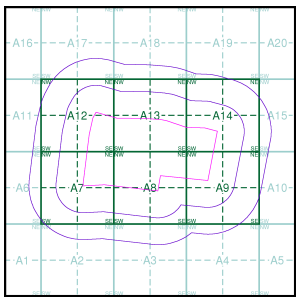
General

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

Sensitive Land Uses

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

Site Sensitivity Context Map - Slice A



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

Envirocheck® Report:

Datasheet

Order Details:

Order Number:
66871644_1_1

Customer Reference:
31500

National Grid Reference:
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Slice:
A

Site Area (Ha):
67.92

Search Buffer (m):
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Site Details:

Site at
Cambridge
Cambridgeshire

Client Details:

Ms K Riley
Brett Consulting Ltd
Caversham Bridge House
Waterman Place
Reading
Berkshire
RG1 8DN

Contents

Introduction

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

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Natural England Copyright Notice

Ove Arup Copyright Notice

Peter Brett Associates Copyright Notice

Radon Potential dataset Copyright Notice

Report Version v49.0

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m (*up to 1000m)
Agency & Hydrological				
Contaminated Land Register Entries and Notices				
Discharge Consents	pg 1		2	2
Enforcement and Prohibition Notices				
Integrated Pollution Controls				
Integrated Pollution Prevention And Control				
Local Authority Integrated Pollution Prevention And Control				
Local Authority Pollution Prevention and Controls	pg 1	1		
Local Authority Pollution Prevention and Control Enforcements				
Nearest Surface Water Feature		Yes		
Pollution Incidents to Controlled Waters	pg 2	2		
Prosecutions Relating to Authorised Processes				
Prosecutions Relating to Controlled Waters				
Registered Radioactive Substances	pg 2	14	3	
River Quality				
River Quality Biology Sampling Points				
River Quality Chemistry Sampling Points				
Substantiated Pollution Incident Register				
Water Abstractions	pg 5	1		
Water Industry Act Referrals	pg 5	2		
Groundwater Vulnerability	pg 5	Yes	n/a	n/a
Bedrock Aquifer Designations	pg 6	Yes	n/a	n/a
Superficial Aquifer Designations	pg 6	Yes	n/a	n/a
Source Protection Zones				
Extreme Flooding from Rivers or Sea without Defences				n/a
Flooding from Rivers or Sea without Defences				n/a
Areas Benefiting from Flood Defences				n/a
Flood Water Storage Areas				n/a
Flood Defences				n/a
Detailed River Network Lines	pg 6		Yes	Yes
Detailed River Network Offline Drainage	pg 10	Yes	Yes	Yes

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m (*up to 1000m)
Waste				
BGS Recorded Landfill Sites				
Historical Landfill Sites				
Integrated Pollution Control Registered Waste Sites				
Licensed Waste Management Facilities (Landfill Boundaries)				
Licensed Waste Management Facilities (Locations)				
Local Authority Recorded Landfill Sites				
Registered Landfill Sites				
Registered Waste Transfer Sites				
Registered Waste Treatment or Disposal Sites				
Hazardous Substances				
Control of Major Accident Hazards Sites (COMAH)				
Explosive Sites	pg 13	1		
Notification of Installations Handling Hazardous Substances (NIHHS)				
Planning Hazardous Substance Consents				
Planning Hazardous Substance Enforcements				
Geological				
BGS 1:625,000 Solid Geology	pg 14	Yes	n/a	n/a
BGS Estimated Soil Chemistry	pg 14	Yes	Yes	Yes
BGS Recorded Mineral Sites	pg 16			2
BGS Urban Soil Chemistry				
BGS Urban Soil Chemistry Averages				
Brine Compensation Area			n/a	n/a
Coal Mining Affected Areas			n/a	n/a
Mining Instability			n/a	n/a
Man-Made Mining Cavities	pg 17			1
Natural Cavities				
Non Coal Mining Areas of Great Britain	pg 17		Yes	n/a
Potential for Collapsible Ground Stability Hazards	pg 17	Yes		n/a
Potential for Compressible Ground Stability Hazards				n/a
Potential for Ground Dissolution Stability Hazards	pg 17		Yes	n/a
Potential for Landslide Ground Stability Hazards	pg 17	Yes	Yes	n/a
Potential for Running Sand Ground Stability Hazards	pg 17	Yes		n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 17	Yes	Yes	n/a
Radon Potential - Radon Affected Areas	pg 18	Yes	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m (*up to 1000m)
Industrial Land Use				
Contemporary Trade Directory Entries	pg 19	2		
Fuel Station Entries				
Sensitive Land Use				
Areas of Adopted Green Belt	pg 20	1	2	
Areas of Unadopted Green Belt				
Areas of Outstanding Natural Beauty				
Environmentally Sensitive Areas				
Forest Parks				
Local Nature Reserves				
Marine Nature Reserves				
National Nature Reserves				
National Parks				
Nitrate Sensitive Areas				
Nitrate Vulnerable Zones	pg 20	1		
Ramsar Sites				
Sites of Special Scientific Interest				
Special Areas of Conservation				
Special Protection Areas				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	**Discharge Consents** Operator: Wimpey Homes Holdings Ltd Property Type: Not Supplied Location: Rear Of 51-53 Madingley Road, Cambridge Authority: Environment Agency, Anglian Region Catchment Area: Not Supplied Reference: Prcnf00608 Permit Version: 1 Effective Date: 22nd March 1989 Issued Date: 22nd March 1989 Revocation Date: 10th February 1992 Discharge Type: Discharge Of Other Matter-Surface Water Discharge Environment: Freshwater Stream/River Receiving Water: Trib Bin Brook **Status:** **Post National Rivers Authority Legislation where issue date > 31/08/1989** Positional Accuracy: Located by supplier to within 10m	A9NW (E)	55	2	543240 258730
2	**Discharge Consents** Operator: The University Of Cambridge Property Type: Education Location: University Sports Ctre, Wilberforce Road, Cambridge Authority: Environment Agency, Anglian Region Catchment Area: River Cam (Cambridge) Reference: Prcnf00412 Permit Version: 1 Effective Date: 20th January 1989 Issued Date: 20th January 1989 Revocation Date: Not Supplied Discharge Type: Discharge Of Other Matter-Surface Water Discharge Environment: Freshwater Stream/River Receiving Water: Trib Bin Brook **Status:** **Post National Rivers Authority Legislation where issue date > 31/08/1989** Positional Accuracy: Located by supplier to within 100m	A9NW (SE)	96	2	543270 258680
3	**Discharge Consents** Operator: Ridgeon Mr Property Type: Sewage Disposal Works - Other Location: Rectory Farm Madingley Road, Coton, Cambridge, Cambs, Cb3 7pg Authority: Environment Agency, Anglian Region Catchment Area: River Cam (Cambridge) Reference: Prcnf17365 Permit Version: 1 Effective Date: 15th September 2004 Issued Date: 4th October 2004 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Final/Treated Effluent - Not Water Company Discharge Environment: Freshwater Stream/River Receiving Water: Ground & Unamed Ditch Via Soak **Status:** **New Consent (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 10m	A12SW (W)	261	2	541808 259065
4	**Discharge Consents** Operator: Skanska Uk Plc Property Type: Sewage Disposal Works - Other Location: North West Cambridge Swic, Madingley Road, Cambridge, Cb3 0ex Authority: Environment Agency, Anglian Region Catchment Area: Low River Ouse/Old West River Reference: Eprbb3499wf Permit Version: 1 Effective Date: 22nd August 2014 Issued Date: 22nd August 2014 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Final/Treated Effluent - Not Water Company Discharge Environment: Freshwater Stream/River Receiving Water: Unnamed Trip Washpit Brook **Status:** **New issued under EPR 2010** Positional Accuracy: Located by supplier to within 10m	A18SW (N)	451	2	542355 259761
5	**Local Authority Pollution Prevention and Controls** Name: University Of Cambridge Location: Deaprtment Of Clinical Vet Medicine, Madingley Road, Cambridge Authority: Cambridge City Council, Environmental Health And Protection Permit Reference: 180991 Dated: Not Supplied Process Type: Local Authority Pollution Prevention and Control Description: PG5/3 Animal carcase incineration processes under 1 tonne an hour **Status:** **Authorisation revokedRevoked** Positional Accuracy: Manually positioned to the address or location	A13SE (E)	0	3	542790 258999

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Nearest Surface Water Feature	A8NW (S)	0	-	542562 258776
6	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Ely District Authority: Environment Agency, Anglian Region Pollutant: Unknown Note: Ditch Tributary Of Cam Incident Date: 5th October 1992 Incident Reference: 1859 Catchment Area: Not Given Receiving Water: Freshwater Stream/River Cause of Incident: Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A9NW (E)	0	2	543200 258900
7	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Ely District Authority: Environment Agency, Anglian Region Pollutant: Unknown Note: Tributary Of Cam Incident Date: 17th March 1992 Incident Reference: 1577 Catchment Area: Not Given Receiving Water: Freshwater Stream/River Cause of Incident: Unknown Incident Severity: Category 1 - Major Incident Positional Accuracy: Located by supplier to within 100m	A14SW (E)	0	2	543000 259000
8	**Registered Radioactive Substances** Name: University Of Cambridge Location: Waste Store,High Cross,Madingley Road, CAMBRIDGE, Cambridgeshire, CB3 0HB Authority: Environment Agency, Anglian Region Permit Reference: CE3825 Dated: 1st April 2010 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Minor variation to authorisation under RSA **Status: Application has been authorised and any conditions apply to the operatorAuthorised** Positional Accuracy: Automatically positioned to the address	A13SE (NE)	0	2	542794 259125
8	**Registered Radioactive Substances** Name: University Of Cambridge Location: Madingley Road, Cambridge, Cambridgeshire, CB3 0ES Authority: Environment Agency, Anglian Region Permit Reference: Bt2530 Dated: 7th October 2002 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Substantial variation to a registration under the Act of an open source which is also the subject of an authorisation **Status: Authorisation superseded by a substantial or non substantial variationSuperseded** Positional Accuracy: Automatically positioned to the address	A13SE (NE)	0	2	542794 259125
8	**Registered Radioactive Substances** Name: University Of Cambridge Location: West Sites, Cambridge, Cambridgeshire, CB3 0ES Authority: Environment Agency, Anglian Region Permit Reference: Bk0485 Dated: 27th March 2001 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Substantial variation to a registration under the Act of an open source which is also the subject of an authorisation **Status: Authorisation superseded by a substantial or non substantial variationSuperseded** Positional Accuracy: Automatically positioned to the address	A13SE (NE)	0	2	542794 259125

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
8	**Registered Radioactive Substances** Name: University Of Cambridge Location: West Sites, CAMBRIDGE, Cambridgeshire, CB3 0ES Authority: Environment Agency, Anglian Region Permit Reference: AW3619 Dated: 11th March 1997 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Initial variation to an authorisation under RSA **Status: Application has been authorised and any conditions apply to the operatorAuthorised** Positional Accuracy: Automatically positioned to the address	A13SE (NE)	0	2	542799 259120
8	**Registered Radioactive Substances** Name: University Of Cambridge Location: West Sites, CAMBRIDGE, CB3 0ES Authority: Environment Agency, Anglian Region Permit Reference: AF1705 Dated: 4th August 1993 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Authorisation under RSA dated pre April 1991 **Status: Authorisation superseded by a substantial or non substantial variationSuperseded** Positional Accuracy: Automatically positioned to the address	A13SE (NE)	0	2	542794 259124
8	**Registered Radioactive Substances** Name: University Of Cambridge Location: West Sites, CAMBRIDGE, CB3 0ES Authority: Environment Agency, Anglian Region Permit Reference: AF1683 Dated: 7th December 1992 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Registration under the Act of an open source which is also the subject of an authorisation dated pre April 1991 **Status: Authorisation superseded by a substantial or non substantial variationSuperseded** Positional Accuracy: Automatically positioned to the address	A13SE (NE)	0	2	542794 259124
9	**Registered Radioactive Substances** Name: University Of Cambridge Location: West Sites, Cambridge, CB3 0ES Authority: Environment Agency, Anglian Region Permit Reference: CA9767 Dated: 22nd February 2007 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Minor variation to a registration under the Act of an open source which is also the subject of an authorisation **Status: Application has been authorised and any conditions apply to the operatorAuthorised** Positional Accuracy: Manually positioned to the address or location	A13SE (NE)	0	2	542739 259028
10	**Registered Radioactive Substances** Name: University Of Cambridge Location: High Cross, Madingley Road, Cambridge, Cambridgeshire, CB3 0EL Authority: Environment Agency, Anglian Region Permit Reference: Bw3494 Dated: 1st December 2003 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Minor variation to authorisation under RSA **Status: Authorisation superseded by a substantial or non substantial variationSuperseded** Positional Accuracy: Automatically positioned to the address	A13SW (NW)	0	2	542331 259132
11	**Registered Radioactive Substances** Name: British Antarctic Survey Location: High Cross, Madingley Road, CAMBRIDGE, Cambridgeshire, CB3 0ET Authority: Environment Agency, Anglian Region Permit Reference: Bw3621 Dated: 1st December 2003 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Minor variation to authorisation under RSA **Status: Authorisation either revoked or cancelledCancelled** Positional Accuracy: Automatically positioned to the address	A12SE (NW)	0	2	542207 259234

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
11	**Registered Radioactive Substances** Name: British Antarctic Survey Location: High Cross, Madingley Road, CAMBRIDGE, Cambridgeshire, CB3 0ET Authority: Environment Agency, Anglian Region Permit Reference: BI0332 Dated: 15th June 2001 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Minor variation to authorisation under RSA **Status: Authorisation superseded by a substantial or non substantial variationSuperseded** Positional Accuracy: Automatically positioned to the address	A12SE (NW)	0	2	542207 259234
11	**Registered Radioactive Substances** Name: British Antarctic Survey Location: High Cross, Madingley Road, CAMBRIDGE, Cambridgeshire, CB3 0ET Authority: Environment Agency, Anglian Region Permit Reference: BC1053 Dated: 19th November 1998 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Initial variation to an authorisation under RSA **Status: Authorisation superseded by a substantial or non substantial variationSuperseded** Positional Accuracy: Manually positioned to the address or location	A12SE (NW)	0	2	542227 259200
11	**Registered Radioactive Substances** Name: British Antarctic Survey Location: High Cross, Madingley Road, CAMBRIDGE, Cambridgeshire, CB3 0ET Authority: Environment Agency, Anglian Region Permit Reference: BC1312 Dated: 1st April 1998 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Authorisation under RSA **Status: Authorisation superseded by a substantial or non substantial variationSuperseded** Positional Accuracy: Manually positioned to the address or location	A12SE (NW)	0	2	542227 259195
11	**Registered Radioactive Substances** Name: British Antarctic Survey Location: P O Box 219, Madingley Road, CAMBRIDGE, Gloucestershire, CB3 0ED Authority: Environment Agency, Anglian Region Permit Reference: AB0413 Dated: 8th October 1993 Process Type: Application under S13 or S14 of RSA to accumulate or dispose of radioactive waste Description: Process under S13 or S14 of RSA 93 **Status: Application received by HMIP but is not yet authorisedNot Yet Authorised** Positional Accuracy: Manually positioned to the address or location	A12SE (NW)	0	2	542200 259195
11	**Registered Radioactive Substances** Name: British Antarctic Survey Location: Main Building Madingley Road, CAMBRIDGE, Cambridgeshire, CB3 0ET Authority: Environment Agency, Anglian Region Permit Reference: AA9628 Dated: 17th October 1991 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Registration under the Act of an open source which is also the subject of an authorisation **Status: Authorisation either revoked or cancelledCancelled** Positional Accuracy: Automatically positioned to the address	A12SE (NW)	0	2	542207 259234
12	**Registered Radioactive Substances** Name: University Of Cambridge Location: Waste Store, High Cross, Madingley Road, Cambridge, Cambridgeshire, Cb3 0hb Authority: Environment Agency, Anglian Region Permit Reference: By5765 Dated: 17th March 2005 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Minor variation to authorisation under RSA **Status: Authorisation superseded by a substantial or non substantial variationSuperseded** Positional Accuracy: Manually positioned to the road within the address or location	A12NE (NW)	10	2	542266 259328

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
13	**Registered Radioactive Substances** Name: University Of Cambridge Location: Waste Storehigh Cross Site, High Cross Site, Madingley Road, CAMBRIDGE, Cambridgeshire, CB3 0HA Authority: Environment Agency, Anglian Region Permit Reference: AG4289 Dated: 4th August 1993 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Authorisation under RSA dated pre April 1991 **Status: Authorisation superseded by a substantial or non substantial variationSuperseded** Positional Accuracy: Unknown	A14NW (NE)	243	2	543250 259432
13	**Registered Radioactive Substances** Name: University Of Cambridge Location: Waste Storehigh Cross Site, High Cross Site, Madingley Road, CAMBRIDGE, Cambridgeshire, CB3 0HA Authority: Environment Agency, Anglian Region Permit Reference: BB3875 Dated: 18th September 1998 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Minor variation to authorisation under RSA **Status: Authorisation superseded by a substantial or non substantial variationSuperseded** Positional Accuracy: Unknown	A14NW (NE)	244	2	543255 259432
14	**Water Abstractions** Operator: Natural Environmental Research Licence Number: 6/33/33/*g/054 Permit Version: Not Supplied Location: Borehole West Of, CAMBRIDGE Authority: Environment Agency, Anglian Region Abstraction: Industrial Processing (Miscellaneous) Abstraction Type: Not Supplied Source: Well And Borehole Daily Rate (m3): 1 Yearly Rate (m3): 4550 Details: Greensand 3; Status: Revoked Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A12SE (NW)	0	2	542200 259170
15	**Water Industry Act Referrals** Name: University Of Cambridge Location: UNIVERSITY OF CAMBRIDGE, VETERINARY SCHOOL, MADINGLEY ROAD, CAMBRIDGE, CAMBRIDGESHIRE, CB3 0ES Authority: Environment Agency, Anglian Region Permit Reference: CA4447 Dated: 25th April 2006 Process Type: Permissions or amendments to discharge under the Water Industry Act 1991 Description: Processes which result in the discharge of Special Category effluents under The Trade Effluents (Prescribed Processes and Substances) Regulations **Status: Authorisation either revoked or cancelledCancelled** Positional Accuracy: Manually positioned to the address or location	A13SE (NE)	0	2	542650 259039
16	**Water Industry Act Referrals** Name: University Of Cambridge Location: UNIVERSITY OF CAMBRIDGE, DEPARTMENT OF CAMBRIDGE, CAVENDISH LABORATORY, MADINGLEY ROAD, CAMBRIDGE, CAMBRIDGESHIRE, CB3 0HE Authority: Environment Agency, Anglian Region Permit Reference: Bq2502 Dated: 28th December 2001 Process Type: Permissions or amendments to discharge under the Water Industry Act 1991 Description: Processes which result in the discharge of Special Category effluents under The Trade Effluents (Prescribed Processes and Substances) Regulations **Status: Application has been authorised and any conditions apply to the operatorAuthorised** Positional Accuracy: Automatically positioned to the address	A14SW (E)	0	2	543069 259144
	Groundwater Vulnerability Soil Classification: Not classified Map Sheet: Sheet 32 North Essex Scale: 1:100,000	A8NW (W)	0	2	542614 258972
	Drift Deposits None				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Bedrock Aquifer Designations Aquifer Designation: Unproductive Strata	A8NW (W)	0	4	542614 258972
	Superficial Aquifer Designations Aquifer Designation: Secondary Aquifer - Undifferentiated	A13SE (NE)	0	4	542983 259243
	Extreme Flooding from Rivers or Sea without Defences None				
	Flooding from Rivers or Sea without Defences None				
	Areas Benefiting from Flood Defences None				
	Flood Water Storage Areas None				
	Flood Defences None				
17	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A7NE (SW)	7	2	542043 258661
18	**Detailed River Network Lines** River Type: Extended Culvert (greater than 50m) River Name: Not Supplied Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Below Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A7NE (SW)	7	2	542037 258661
19	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A12NE (NW)	25	2	542302 259332
20	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A7NE (SW)	42	2	541981 258660

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
21	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A7SE (SW)	47	2	542049 258621
22	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A7SE (SW)	48	2	542061 258605
23	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A13NW (NW)	161	2	542370 259457
24	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A13NW (NW)	161	2	542370 259457
25	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A13NE (N)	205	2	542742 259489
26	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A8SW (S)	229	2	542477 258411

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
27	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A13NE (N)	250	2	542677 259539
28	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A13NE (N)	250	2	542677 259539
29	**Detailed River Network Lines** River Type: Extended Culvert (greater than 50m) River Name: Not Supplied Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Below Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A8SE (S)	260	2	542647 258365
30	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A3NW (S)	361	2	542474 258279
31	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A12NW (NW)	363	2	541778 259434
32	**Detailed River Network Lines** River Type: Secondary River River Name: Not Supplied Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A9NE (E)	372	2	543568 258759

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
33	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A17SE (NW)	383	2	542129 259769
34	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A12NW (NW)	383	2	541757 259435
35	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A7SW (W)	388	2	541639 258609
36	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A17SE (N)	416	2	542280 259816
37	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A17SE (NW)	417	2	542173 259784
38	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A3NE (S)	450	2	542749 258170

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
39	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Other Rivers Management Status: Water Course Name: Not Supplied Water Course Reference: Not Supplied	A4NE (SE)	455	2	543354 258296
40	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Other Rivers Management Status: Water Course Name: Not Supplied Water Course Reference: Not Supplied	A17SE (N)	483	2	542293 259820
41	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Other Rivers Management Status: Water Course Name: Not Supplied Water Course Reference: Not Supplied	A17SE (N)	496	2	542299 259824
42	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D005 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Other Rivers Management Status: Water Course Name: Not Supplied Water Course Reference: Not Supplied	A17SE (N)	496	2	542299 259824
43	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A8NW (W)	0	2	542512 258956
44	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A8NW (W)	0	2	542561 258951
45	**Detailed River Network Offline Drainage** River Type: Secondary River Hydrographic Area: D005	A9NW (SE)	0	2	543048 258734
46	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A8NE (SE)	0	2	542707 258763
47	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A9NW (SE)	0	2	543158 258723
48	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A14SW (NE)	0	2	543031 259207
49	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A13SE (NE)	0	2	542928 259229

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
50	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A8NW (S)	0	2	542562 258776
51	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A7NE (W)	0	2	542197 258809
52	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A8NE (SE)	3	2	542899 258743
53	**Detailed River Network Offline Drainage** River Type: Secondary River Hydrographic Area: D005	A8NE (SE)	3	2	542961 258737
54	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A9NW (SE)	15	2	543195 258710
55	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A8NE (SE)	45	2	542936 258690
56	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A12SE (W)	62	2	542007 259054
57	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A9NW (E)	84	2	543290 258808
58	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A14SE (E)	173	2	543418 259035
59	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A12SW (W)	225	2	541820 259058
60	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A14SE (E)	238	2	543507 259166
61	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A17SE (NW)	325	2	542087 259672
62	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A14SE (E)	329	2	543597 259145
63	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A14SE (E)	329	2	543597 259145
64	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D005	A13NW (N)	342	2	542505 259638

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Local Authority Landfill Coverage Name: Cambridge City Council - Has supplied landfill data		0	11	542614 258972
	Local Authority Landfill Coverage Name: Cambridgeshire County Council - Has not been able to supply Landfill data		0	12	542614 258972
	Local Authority Landfill Coverage Name: South Cambridgeshire District Council - Has supplied landfill data		8	8	542042 258660

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
65	**Explosive Sites** Name: Cambridge/Mr J Deakin (University Of Cambridge) Location: Cavendish Laboratory, J J Thomson Avenue, Cambridge, CB3 0HE **Status: Active** Positional Accuracy: Automatically positioned to the address	A9NW (E)	0	5	543094 258824

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: Upper Greensand and Gault	A8NW (W)	0	4	542614 258972
	BGS 1:625,000 Solid Geology Description: Chalk including Red Chalk	A13SE (N)	0	4	542672 259263
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 45 - 60 mg/kg	A13SW (N)	0	4	542614 259000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 30 - 45 mg/kg	A14SW (NE)	0	4	543000 259220
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 30 - 45 mg/kg	A14SW (E)	0	4	543000 259000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 30 - 45 mg/kg	A8NW (W)	0	4	542614 258972
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 30 - 45 mg/kg	A9NW (E)	0	4	543000 258972

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 30 - 45 mg/kg	A13SE (NE)	10	4	542982 259242
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 30 - 45 mg/kg	A7NE (W)	22	4	542000 258972
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 45 - 60 mg/kg	A12SE (W)	62	4	542000 259000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 30 - 45 mg/kg	A14NW (NE)	75	4	543109 259324
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A14SW (NE)	91	4	543250 259274
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 30 - 45 mg/kg	A14NE (NE)	198	4	543374 259343

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A14NE (NE)	297	4	543323 259557
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 30 - 45 mg/kg	A12SW (W)	363	4	541722 259200
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A14NE (E)	386	4	543610 259357
66	**BGS Recorded Mineral Sites** Site Name: University Observatory Gravel Pit Location: , High Cross, Cambridge, Cambridgeshire Source: British Geological Survey, National Geoscience Information Service Reference: 145301 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Unknown Operator Periodic Type: Quaternary Geology: Head Commodity: Sand and Gravel Positional Accuracy: Located by supplier to within 10m	A14NE (NE)	281	4	543366 259439
67	**BGS Recorded Mineral Sites** Site Name: Gravel Hill Farm Gravel Pits Location: , High Cross, Cambridge, Cambridgeshire Source: British Geological Survey, National Geoscience Information Service Reference: 145300 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Unknown Operator Periodic Type: Quaternary Geology: Head Commodity: Sand and Gravel Positional Accuracy: Located by supplier to within 10m	A14NW (NE)	424	4	543227 259624
	BGS Measured Urban Soil Chemistry No data available				
	BGS Urban Soil Chemistry Averages No data available				
	Coal Mining Affected Areas In an area that might not be affected by coal mining				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Man-Made Mining Cavities Easting: 543000 Northing: 259500 Distance: 279 Quadrant Reference: A14 Quadrant Reference: NW Bearing Ref: NE Cavity Type: Coprololite Mining-Details unknown Commodity: Coprolite Solid Geology Detail: Gault, Lower Greensand, Kimmeridge Clay, Ampthill Clay Superficial Geology Detail: River Terrace Deposits	A14NW (NE)	279	6	543000 259500
	Non Coal Mining Areas of Great Britain Risk: Rare Source: British Geological Survey, National Geoscience Information Service	A14NW (NE)	75	4	543109 259324
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A8NW (W)	0	4	542614 258972
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A8NW (W)	0	4	542614 258972
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A8NW (W)	0	4	542614 258972
	Potential for Ground Dissolution Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A14NW (NE)	75	4	543109 259324
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A8NW (W)	0	4	542614 258972
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A12SE (NW)	2	4	542093 259209
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A12NE (NW)	52	4	542080 259342
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A12NE (NW)	62	4	542115 259409
	Potential for Landslide Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A14SW (NE)	91	4	543250 259274
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (NE)	0	4	542982 259242
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A8NW (W)	0	4	542614 258972
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A8NW (W)	0	4	542614 258972
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A14NW (NE)	75	4	543109 259324
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A14SW (NE)	91	4	543250 259274
	Radon Potential - Radon Protection Measures Protection Measure: No radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A14SW (NE)	0	4	543051 259251
	Radon Potential - Radon Protection Measures Protection Measure: No radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A8NW (W)	0	4	542614 258972

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Radon Potential - Radon Affected Areas Affected Area: The property is in an intermediate probability radon area, as between 1 and 3% of homes are above the action level Source: British Geological Survey, National Geoscience Information Service	A14SW (NE)	0	4	543051 259251
	Radon Potential - Radon Affected Areas Affected Area: The property is in a lower probability radon area, as less than 1% of homes are above the action level Source: British Geological Survey, National Geoscience Information Service	A8NW (W)	0	4	542614 258972

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
68	**Contemporary Trade Directory Entries** Name: Cavendish Lab Location: J J Thomson Avenue, Cambridge, Cambridgeshire, CB3 0HE Classification: Laboratories **Status: Active** Positional Accuracy: Manually positioned within the geographical locality	A9NW (E)	0	-	543094 258824
69	**Contemporary Trade Directory Entries** Name: Polysolar Location: 1, Charles Babbage Road, Cambridge, CB3 0GT Classification: Builders' Merchants **Status: Active** Positional Accuracy: Automatically positioned to the address	A8NE (SE)	0	-	542898 258790

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
70	**Areas of Adopted Green Belt** Authority: Cambridge City Council Plan Name: Cambridge Local Plan **Status:** **Adopted** Plan Date: 20th July 2006	A8NE (SE)	0	7	542745 258757
71	**Areas of Adopted Green Belt** Authority: South Cambridgeshire District Council Plan Name: Core Strategy **Status:** **Adopted** Plan Date: 31st January 2007	A7NE (SW)	9	8	542041 258659
72	**Areas of Adopted Green Belt** Authority: Cambridge City Council Plan Name: North West Cambridge Area Action Plan **Status:** **Adopted** Plan Date: 22nd October 2009	A13SW (N)	11	7	542627 259307
73	**Nitrate Vulnerable Zones** Name: Not Supplied Description: Surface Water Source: Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	A8NW (W)	0	10	542614 258972

Agency & Hydrological	Version	Update Cycle
Contaminated Land Register Entries and Notices		
Cambridge City Council - Environmental Health And Protection	April 2014	Annual Rolling Update
South Cambridgeshire District Council	October 2014	Annual Rolling Update
Discharge Consents		
Environment Agency - Anglian Region	January 2015	Quarterly
Enforcement and Prohibition Notices		
Environment Agency - Anglian Region	March 2013	As notified
Integrated Pollution Controls		
Environment Agency - Anglian Region	October 2008	Not Applicable
Integrated Pollution Prevention And Control		
Environment Agency - Anglian Region	January 2015	Quarterly
Local Authority Integrated Pollution Prevention And Control		
South Cambridgeshire District Council - Environmental Health Department	February 2013	Annual Rolling Update
Cambridge City Council - Environmental Health And Protection	September 2014	Annual Rolling Update
Local Authority Pollution Prevention and Controls		
South Cambridgeshire District Council - Environmental Health Department	October 2014	Annual Rolling Update
Cambridge City Council - Environmental Health And Protection	September 2014	Annual Rolling Update
Local Authority Pollution Prevention and Control Enforcements		
South Cambridgeshire District Council - Environmental Health Department	February 2013	Annual Rolling Update
Cambridge City Council - Environmental Health And Protection	September 2014	Annual Rolling Update
Nearest Surface Water Feature		
Ordnance Survey	July 2012	Quarterly
Pollution Incidents to Controlled Waters		
Environment Agency - Anglian Region	September 1999	Not Applicable
Prosecutions Relating to Authorised Processes		
Environment Agency - Anglian Region	March 2013	As notified
Prosecutions Relating to Controlled Waters		
Environment Agency - Anglian Region	March 2013	As notified
Registered Radioactive Substances		
Environment Agency - Anglian Region	January 2015	Quarterly
River Quality		
Environment Agency - Head Office	November 2001	Not Applicable
River Quality Biology Sampling Points		
Environment Agency - Head Office	July 2012	Annually
River Quality Chemistry Sampling Points		
Environment Agency - Head Office	July 2012	Annually
Substantiated Pollution Incident Register		
Environment Agency - Anglian Region - Central Area	January 2015	Quarterly
Water Abstractions		
Environment Agency - Anglian Region	October 2014	Quarterly
Water Industry Act Referrals		
Environment Agency - Anglian Region	January 2015	Quarterly
Groundwater Vulnerability		
Environment Agency - Head Office	January 2011	Not Applicable
Drift Deposits		
Environment Agency - Head Office	January 1999	Not Applicable
Bedrock Aquifer Designations		
British Geological Survey - National Geoscience Information Service	October 2012	As notified
Superficial Aquifer Designations		
British Geological Survey - National Geoscience Information Service	January 2015	As notified

Data Currency

Agency & Hydrological	Version	Update Cycle
Source Protection Zones		
Environment Agency - Head Office	January 2015	Quarterly
Extreme Flooding from Rivers or Sea without Defences		
Environment Agency - Head Office	October 2014	Quarterly
Flooding from Rivers or Sea without Defences		
Environment Agency - Head Office	October 2014	Quarterly
Areas Benefiting from Flood Defences		
Environment Agency - Head Office	October 2014	Quarterly
Flood Water Storage Areas		
Environment Agency - Head Office	October 2014	Quarterly
Flood Defences		
Environment Agency - Head Office	October 2014	Quarterly
Detailed River Network Lines		
Environment Agency - Head Office	March 2012	Annually
Detailed River Network Offline Drainage		
Environment Agency - Head Office	March 2012	Annually
Waste	**Version**	**Update Cycle**
BGS Recorded Landfill Sites		
British Geological Survey - National Geoscience Information Service	June 1996	Not Applicable
Historical Landfill Sites		
Environment Agency - Anglian Region - Central Area	February 2015	Quarterly
Integrated Pollution Control Registered Waste Sites		
Environment Agency - Anglian Region	October 2008	Not Applicable
Licensed Waste Management Facilities (Landfill Boundaries)		
Environment Agency - Anglian Region - Central Area	August 2014	Quarterly
Licensed Waste Management Facilities (Locations)		
Environment Agency - Anglian Region - Central Area	August 2014	Quarterly
Local Authority Landfill Coverage		
Cambridge City Council	April 2007	Not Applicable
Cambridgeshire County Council	May 2000	Not Applicable
South Cambridgeshire District Council	May 2000	Not Applicable
Local Authority Recorded Landfill Sites		
South Cambridgeshire District Council	April 2003	Not Applicable
Cambridge City Council	April 2007	Not Applicable
Cambridgeshire County Council	May 2000	Not Applicable
Registered Landfill Sites		
Environment Agency - Anglian Region - Central Area	March 2003	Not Applicable
Registered Waste Transfer Sites		
Environment Agency - Anglian Region - Central Area	March 2003	Not Applicable
Registered Waste Treatment or Disposal Sites		
Environment Agency - Anglian Region - Central Area	March 2003	Not Applicable

Hazardous Substances	Version	Update Cycle
Control of Major Accident Hazards Sites (COMAH)		
Health and Safety Executive	January 2015	Bi-Annually
Explosive Sites		
Health and Safety Executive	October 2014	Bi-Annually
Notification of Installations Handling Hazardous Substances (NIHHS)		
Health and Safety Executive	November 2000	Not Applicable
Planning Hazardous Substance Enforcements		
Cambridge City Council	September 2014	Annual Rolling Update
Cambridgeshire County Council	September 2014	Annual Rolling Update
South Cambridgeshire District Council	September 2014	Annual Rolling Update
Planning Hazardous Substance Consents		
Cambridge City Council	September 2014	Annual Rolling Update
Cambridgeshire County Council	September 2014	Annual Rolling Update
South Cambridgeshire District Council	September 2014	Annual Rolling Update
Geological	**Version**	**Update Cycle**
BGS 1:625,000 Solid Geology		
British Geological Survey - National Geoscience Information Service	August 1996	Not Applicable
BGS Estimated Soil Chemistry		
British Geological Survey - National Geoscience Information Service	January 2010	Annually
BGS Recorded Mineral Sites		
British Geological Survey - National Geoscience Information Service	October 2014	Bi-Annually
Brine Compensation Area		
Cheshire Brine Subsidence Compensation Board	August 2011	Not Applicable
Coal Mining Affected Areas		
The Coal Authority - Mining Report Service	December 2013	As notified
Mining Instability		
Ove Arup & Partners	October 2000	Not Applicable
Non Coal Mining Areas of Great Britain		
British Geological Survey - National Geoscience Information Service	July 2014	Not Applicable
Potential for Collapsible Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2014	Annually
Potential for Compressible Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2014	Annually
Potential for Ground Dissolution Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2014	Annually
Potential for Landslide Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2014	Annually
Potential for Running Sand Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2014	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2014	Annually
Radon Potential - Radon Affected Areas		
British Geological Survey - National Geoscience Information Service	July 2011	As notified
Radon Potential - Radon Protection Measures		
British Geological Survey - National Geoscience Information Service	July 2011	As notified

Industrial Land Use	Version	Update Cycle
Contemporary Trade Directory Entries Thomson Directories	 February 2015	 Quarterly
Fuel Station Entries Catalist Ltd - Experian	 November 2014	 Quarterly
Sensitive Land Use	**Version**	**Update Cycle**
Areas of Adopted Green Belt Cambridge City Council South Cambridgeshire District Council	 February 2015 February 2015	 As notified As notified
Areas of Unadopted Green Belt Cambridge City Council South Cambridgeshire District Council	 February 2015 February 2015	 As notified As notified
Areas of Outstanding Natural Beauty Natural England	 February 2015	 Bi-Annually
Environmentally Sensitive Areas Natural England	 August 2014	 Annually
Forest Parks Forestry Commission	 April 1997	 Not Applicable
Local Nature Reserves Natural England	 April 2015	 Bi-Annually
Marine Nature Reserves Natural England	 July 2013	 Bi-Annually
National Nature Reserves Natural England	 March 2015	 Bi-Annually
National Parks Natural England	 February 2015	 Bi-Annually
Nitrate Sensitive Areas Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	 February 2012	 Not Applicable
Nitrate Vulnerable Zones Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	 July 2014	 Annually
Ramsar Sites Natural England	 March 2014	 Bi-Annually
Sites of Special Scientific Interest Natural England	 April 2015	 Bi-Annually
Special Areas of Conservation Natural England	 March 2014	 Bi-Annually
Special Protection Areas Natural England	 April 2015	 Bi-Annually

Data Suppliers

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
Environment Agency	
Scottish Environment Protection Agency	
The Coal Authority	
British Geological Survey	
Centre for Ecology and Hydrology	
Natural Resources Wales	
Scottish Natural Heritage	
Natural England	
Public Health England	
Ove Arup	
Peter Brett Associates	

Useful Contacts

Contact	Name and Address	Contact Details
2	**Environment Agency - National Customer Contact Centre (NCCC)** PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 08708 506 506 Email: enquiries@environment-agency.gov.uk
3	**Cambridge City Council - Environmental Health And Protection** Mandela House, 4 Regent Street, Cambridge, Cambridgeshire, CB2 1BY	Telephone: 01223 457000 Fax: 01223 457909 Website: www.cambridge.gov.uk
4	**British Geological Survey - Enquiry Service** British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
5	**Health and Safety Executive** 5S.2 Redgrave Court, Merton Road, Bootle, L20 7HS	Website: www.hse.gov.uk
6	**Peter Brett Associates** Caversham Bridge House, Waterman Place, Reading, Berkshire, RG1 8DN	Telephone: 0118 950 0761 Fax: 0118 959 7498 Email: reading@pba.co.uk Website: www.pba.co.uk
7	**Cambridge City Council** The Guildhall, Cambridge, Cambridgeshire, CB2 3QJ	Telephone: 01223 457000 Fax: 01223 463214 Website: www.cambridge.gov.uk
8	**South Cambridgeshire District Council** South Cambridgeshire Hall, Cambourne Business Park, Cambourne, Cambridgeshire, CB23 6EA	Telephone: 08450 450 500 Website: www.scambs.gov.uk
9	**Natural England** Suite D, Unex House, Bourges Boulevard, Peterborough, Cambridgeshire, PE1 1NG	Telephone: 0845 600 3078 Email: enquiries@naturalengland.org.uk Website: www.naturalengland.org.uk
10	**Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)** Government Buildings, Otley Road, Lawnswood, Leeds, West Yorkshire, LS16 5QT	Telephone: 0113 2613333 Fax: 0113 230 0879
11	**Cambridge City Council** The Guildhall, Cambridge, Cambridgeshire, CB2 3QJ	Telephone: 01223 457000 Fax: 01223 463214 Website: www.cambridge.gov.uk
12	**Cambridgeshire County Council** Shire Hall, Castle Hill, Cambridge, Cambridgeshire, CB3 OAP	Telephone: 01223 717111 Fax: 01223 717201 Website: www.camcnty.gov.uk
-	**Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards** Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org
-	**Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

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

pba peterbrett

General

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

Agency and Hydrological

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

Geological

- BGS Recorded Mineral Site

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry

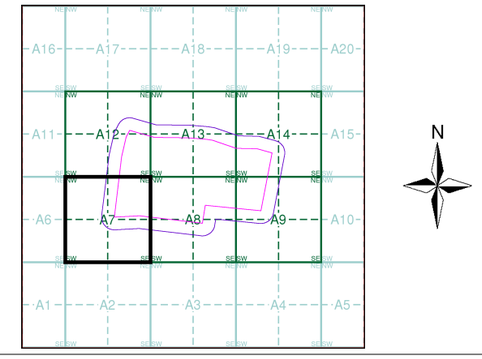
Waste

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

Hazardous Substances

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

Site Sensitivity Map - Segment A7



Order Details

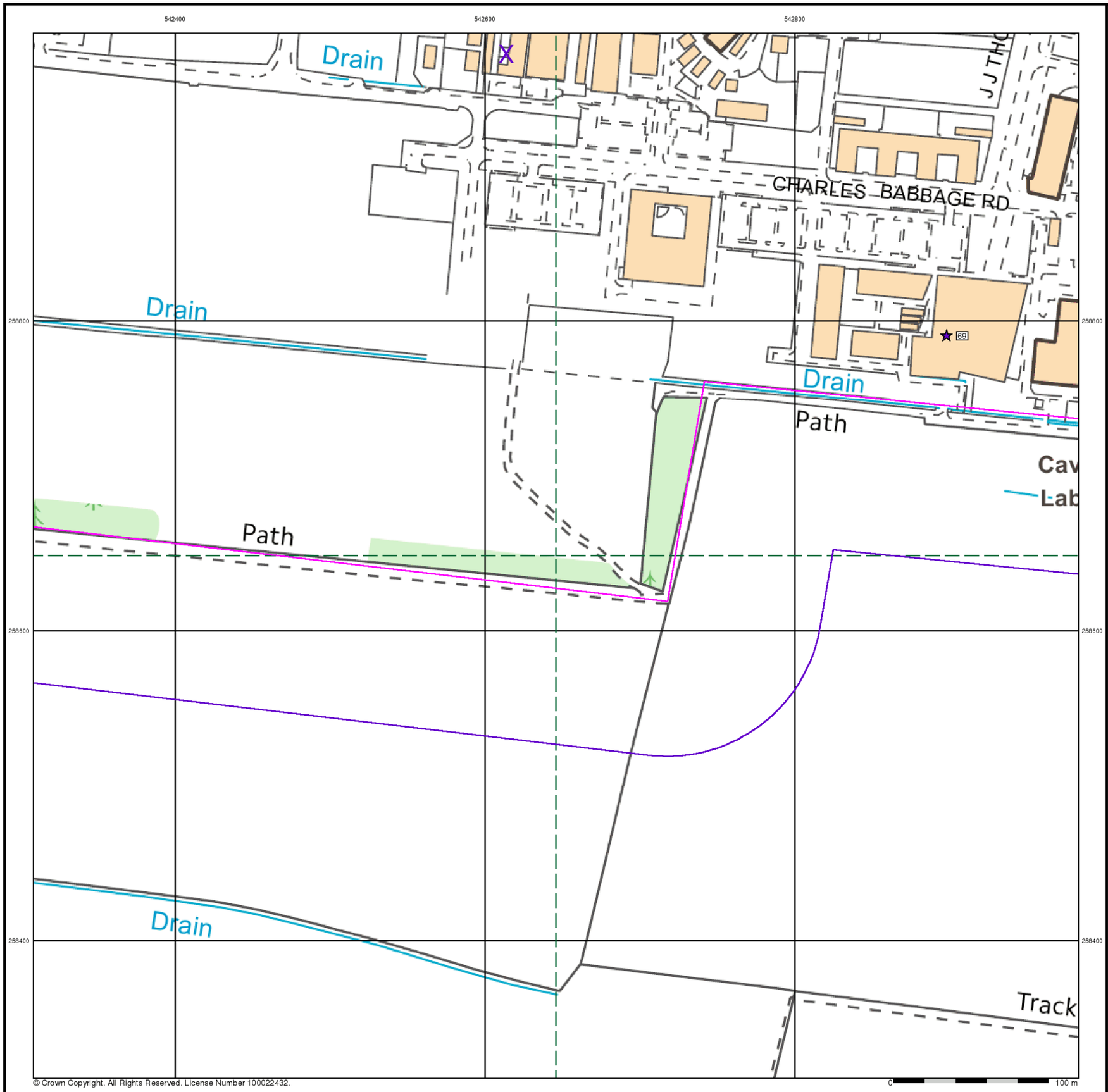
Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92

Site Details

Site at, Cambridge, Cambridgeshire

Landmark® Information Group

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



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General

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

Agency and Hydrological

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

Geological

- BGS Recorded Mineral Site

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry

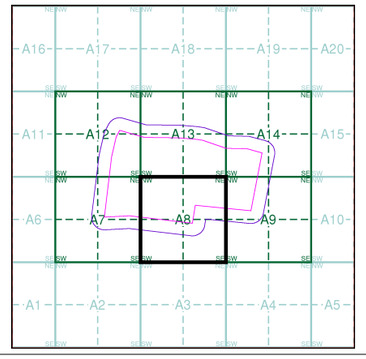
Waste

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

Hazardous Substances

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

Site Sensitivity Map - Segment A8



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92

Site Details

Site at, Cambridge, Cambridgeshire

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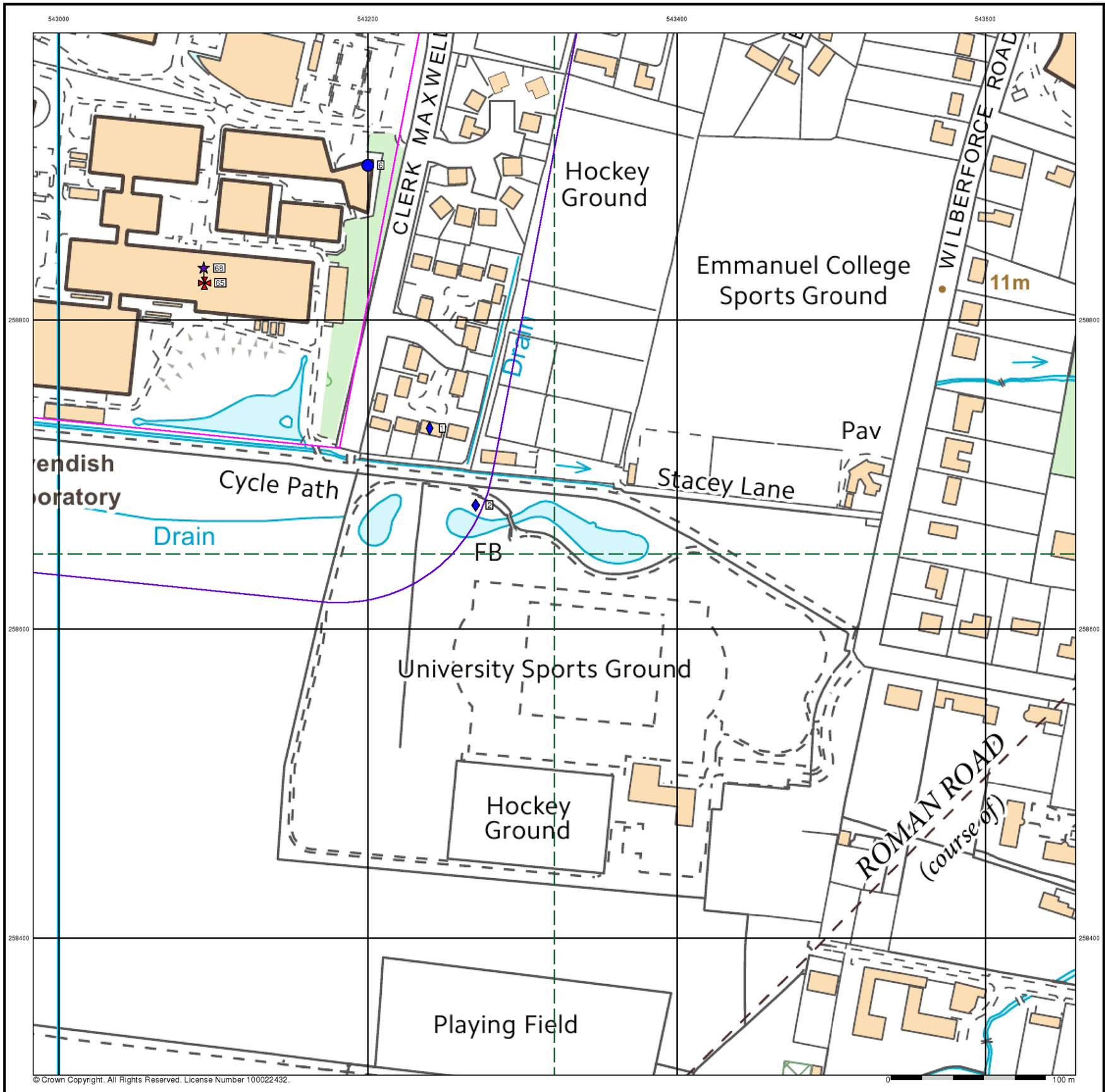
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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General

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

Agency and Hydrological

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

Geological

BGS Recorded Mineral Site

Industrial Land Use

Contemporary Trade Directory Entry
Fuel Station Entry

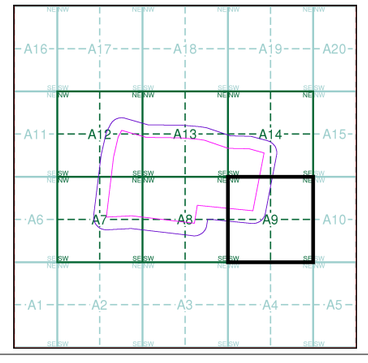
Waste

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

Hazardous Substances

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

Site Sensitivity Map - Segment A9



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92

Site Details

Site at, Cambridge, Cambridgeshire

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General

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

Several of Type at Location

Agency and Hydrological

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

Waste

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

Geological

- BGS Recorded Mineral Site

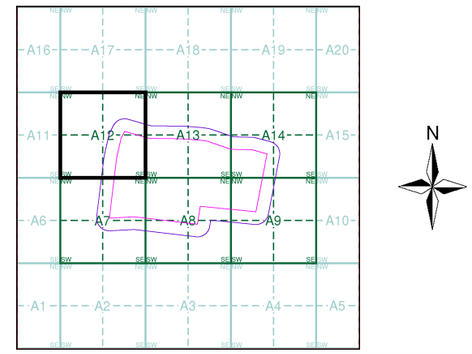
Hazardous Substances

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

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry

Site Sensitivity Map - Segment A12



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92

Site Details

Site at, Cambridge, Cambridgeshire

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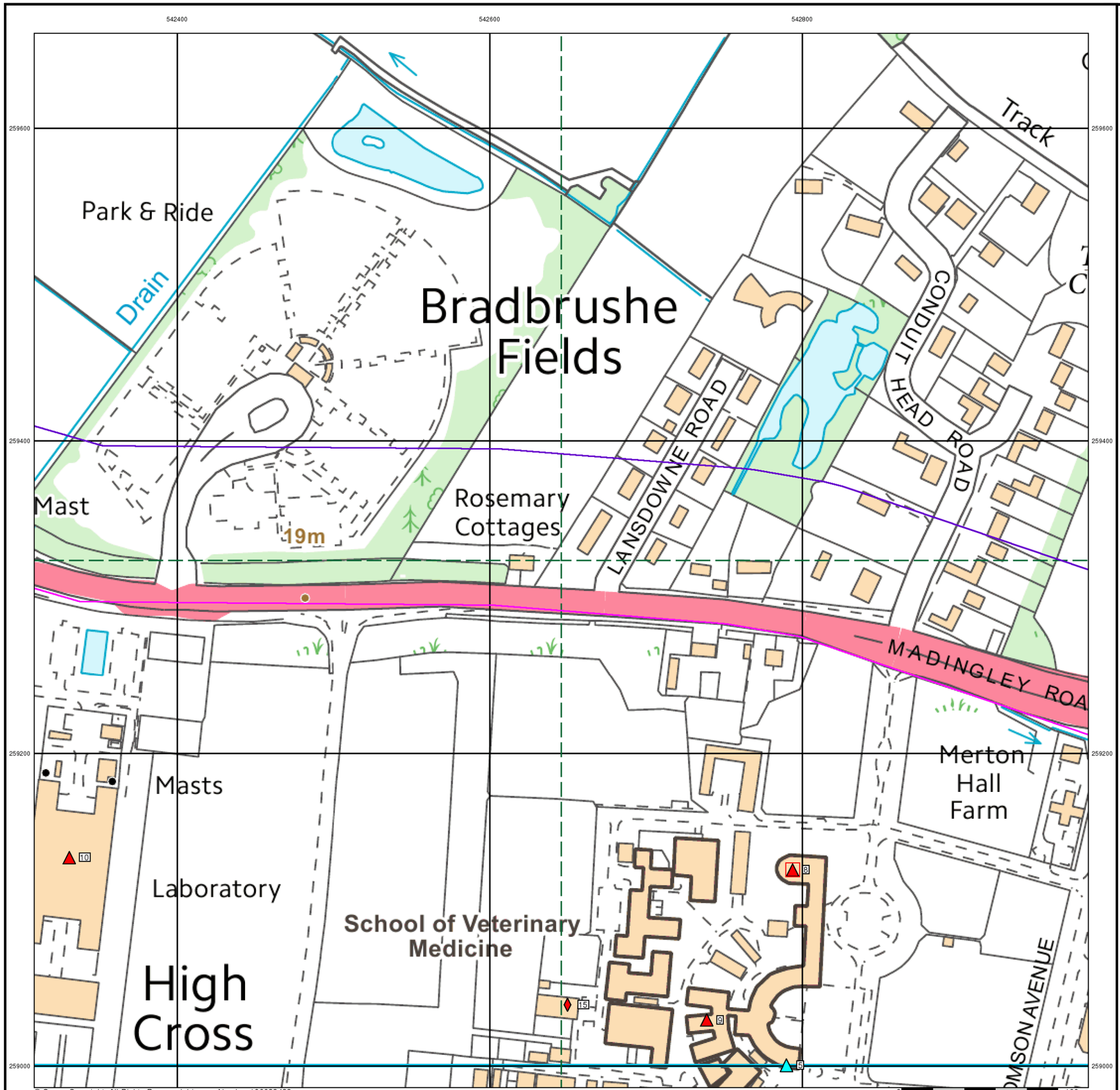

General

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

Agency and Hydrological

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

Geological

- BGS Recorded Mineral Site

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry

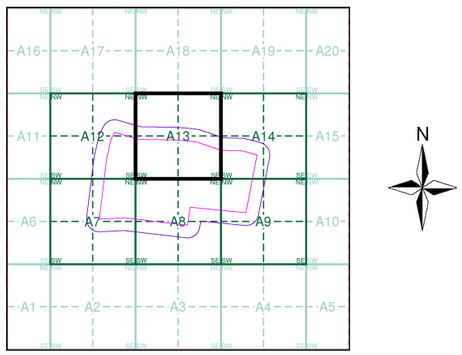
Waste

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

Hazardous Substances

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

Site Sensitivity Map - Segment A13



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92

Site Details

Site at, Cambridge, Cambridgeshire

Landmark Information Group
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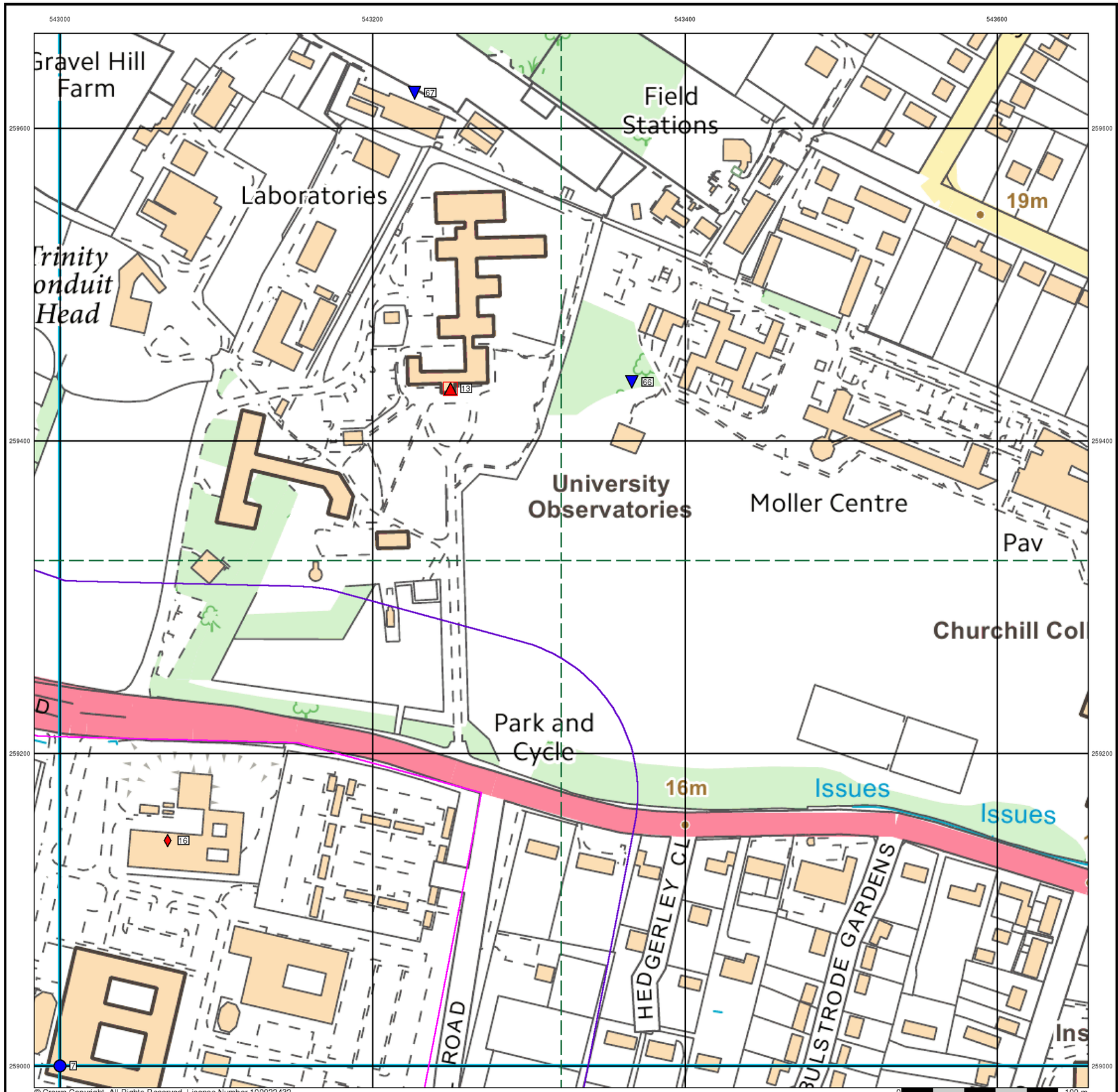

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General

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

Agency and Hydrological

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

Geological

BGS Recorded Mineral Site

Industrial Land Use

Contemporary Trade Directory Entry
Fuel Station Entry

Waste

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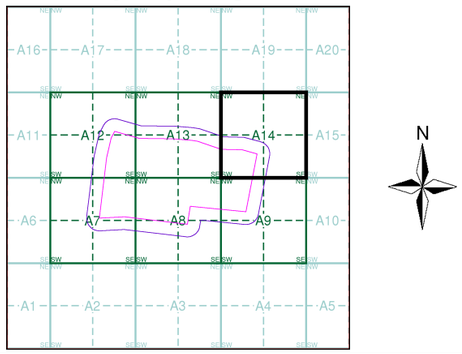
Local Authority Recorded Landfill Site
Registered Landfill Site
Registered Landfill Site (Location)
Registered Landfill Site (Point Buffered to 100m)
Registered Landfill Site (Point Buffered to 250m)
Registered Waste Transfer Site (Location)
Registered Waste Transfer Site
Registered Waste Treatment or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

Hazardous Substances

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

Site Sensitivity Map - Segment A14



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92

Site Details

Site at, Cambridge, Cambridgeshire

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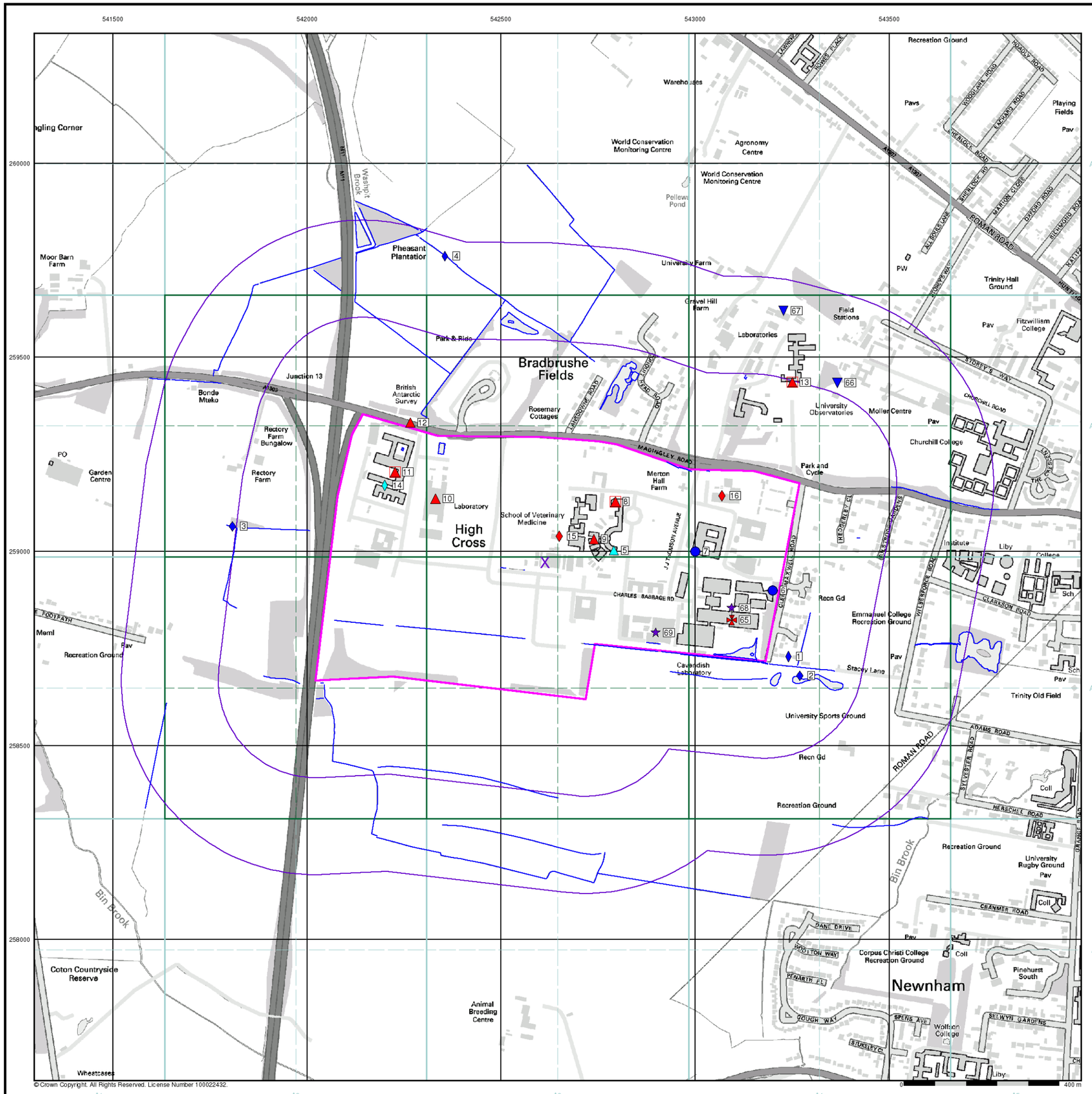
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



pba peterbrett

General

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

Agency and Hydrological

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

Geological

- BGS Recorded Mineral Site

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry

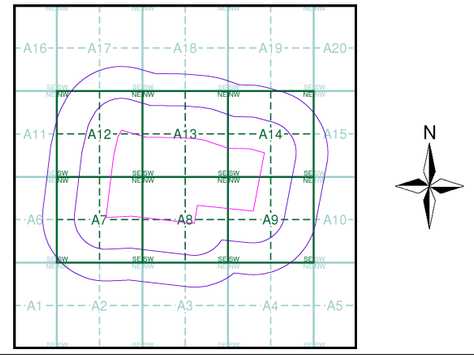
Waste

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

Hazardous Substances

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

Site Sensitivity Map - Slice A



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
Search Buffer (m):	500

Site Details

Site at, Cambridge, Cambridgeshire

Landmark Information Group
Tel: 0844 844 9952
Fax: 0844 844 9951
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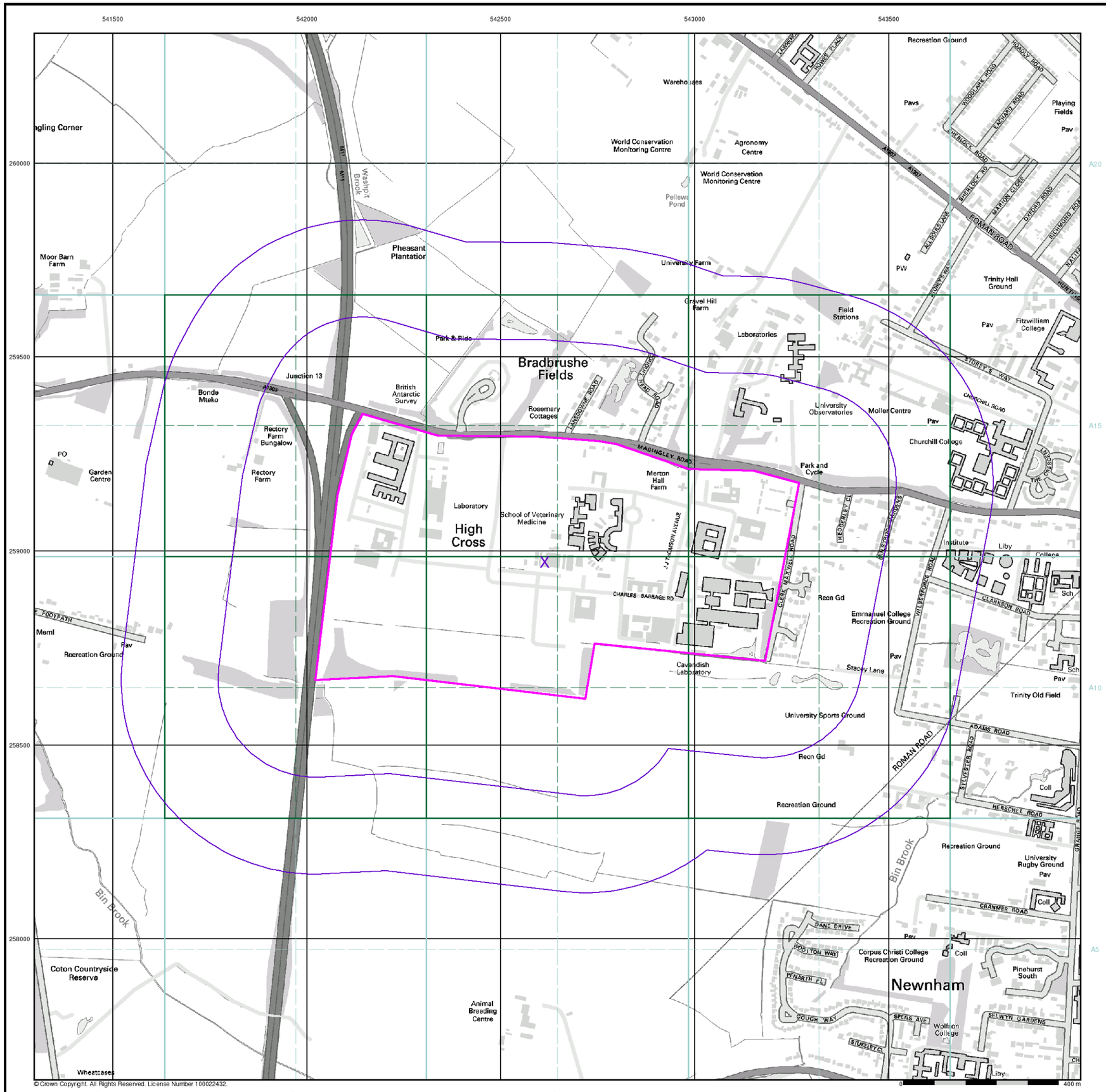


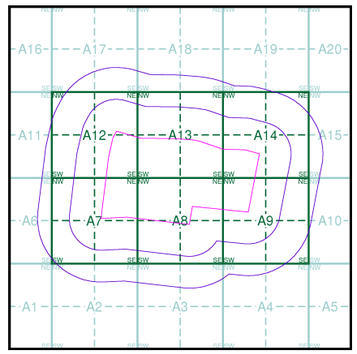
General

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

Agency and Hydrological (Flood)

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

Flood Map - Slice A



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
Search Buffer (m):	500

Site Details

Site at, Cambridge, Cambridgeshire

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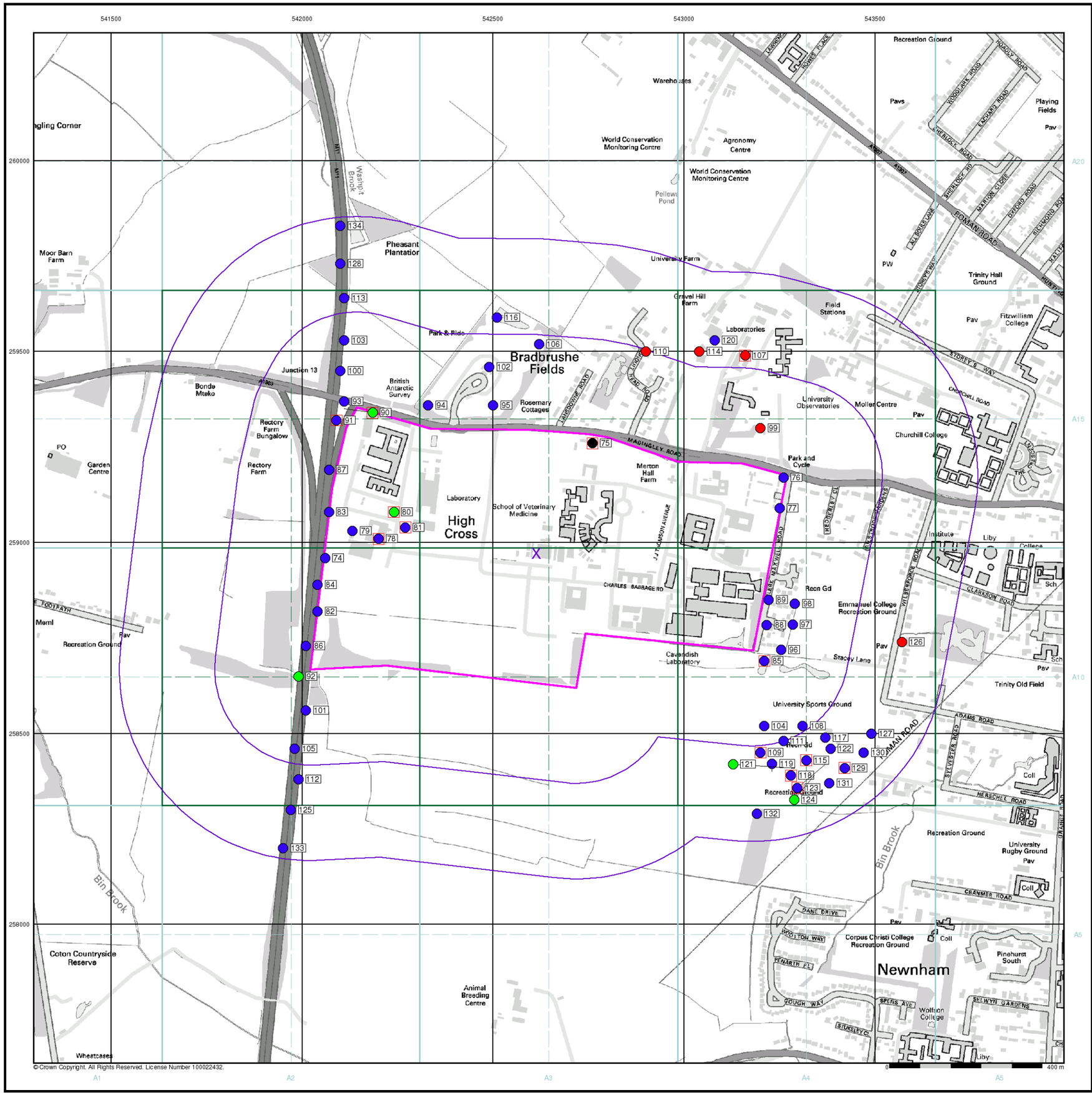

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General

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

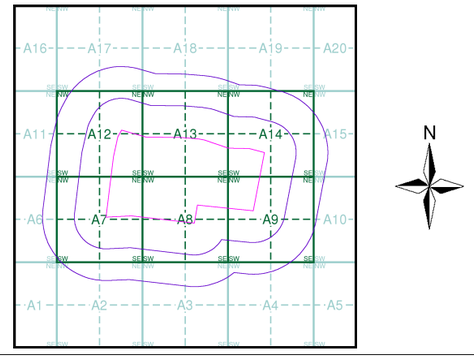
Agency and Hydrological (Boreholes)

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

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

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

Borehole Map - Slice A



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
Search Buffer (m):	500

Site Details

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Fax: 0844 844 9951
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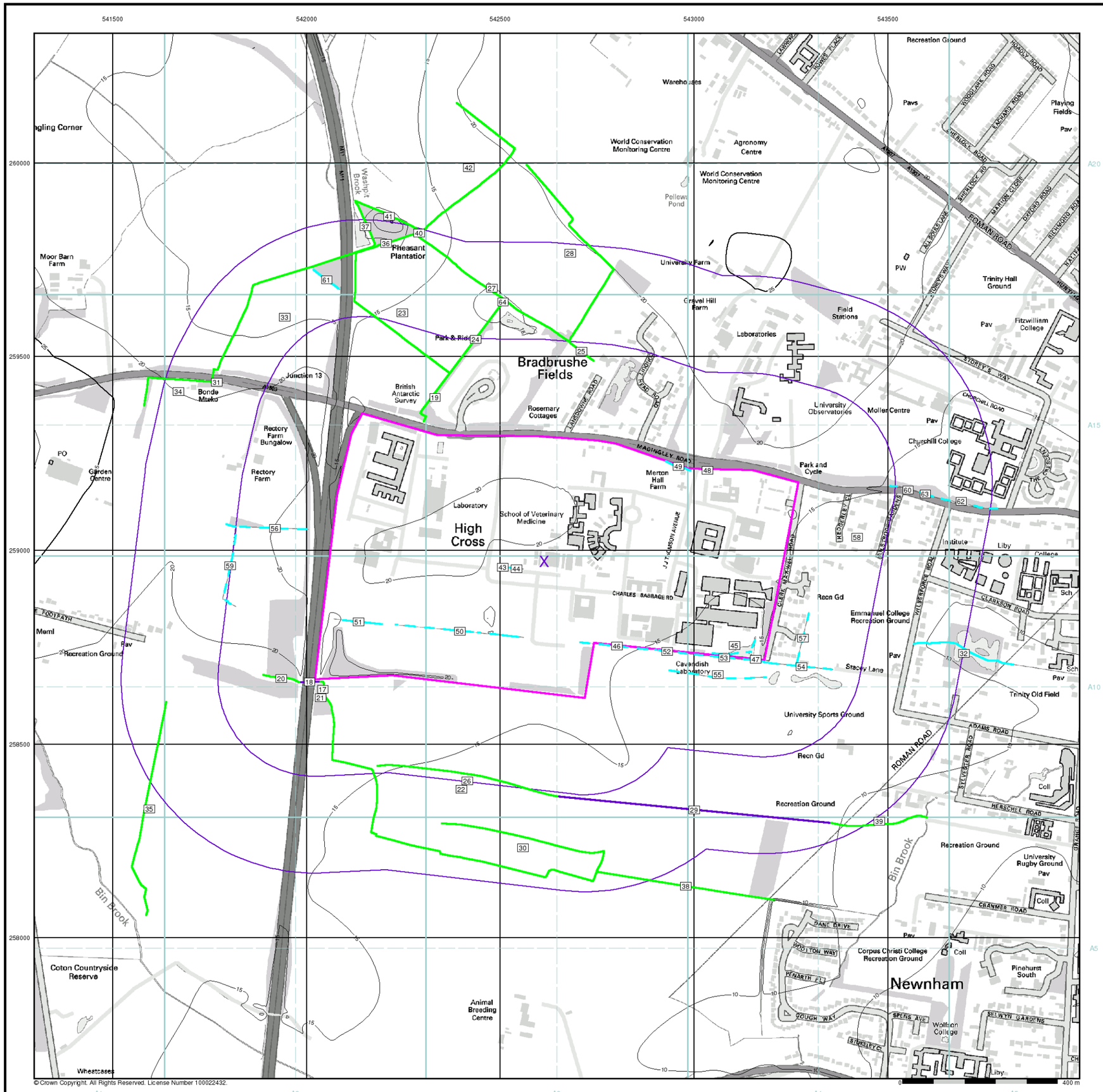

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General

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

Detailed River Network Data

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

Contours (height in metres)

Standard Contour — 105 — 100 — 95

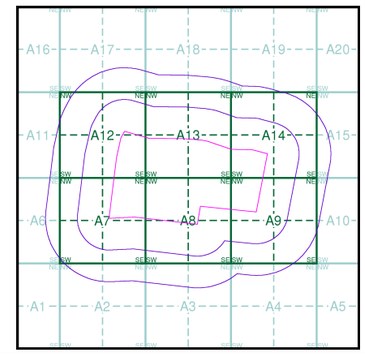
Master Contour

Spot Height *167.3

MLW Mean Low Water

MHW Mean High Water

EA/NRW Detailed River Network Map - Slice A



Order Details

Order Number:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
Search Buffer (m):	500

Site Details

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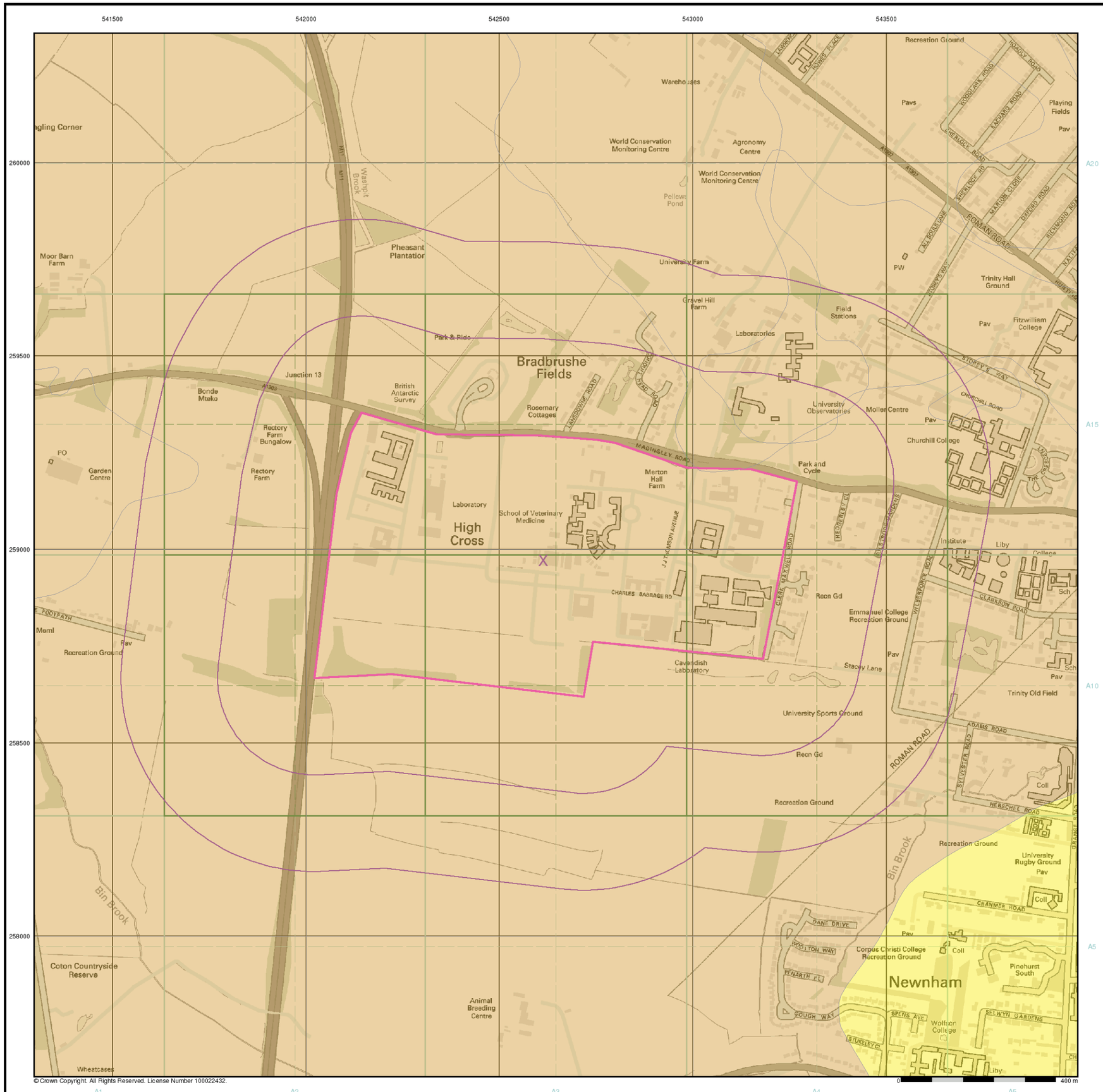


General

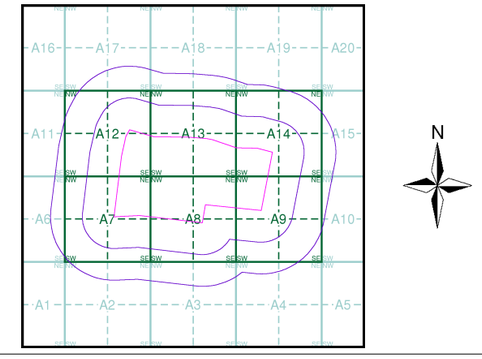
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Arsenic

Arsenic Concentrations mg/kg

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

Estimated Soil Chemistry Arsenic - Slice A



Order Details

Order Details:	66871644_1_1
Customer Ref:	31500
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Slice:	A
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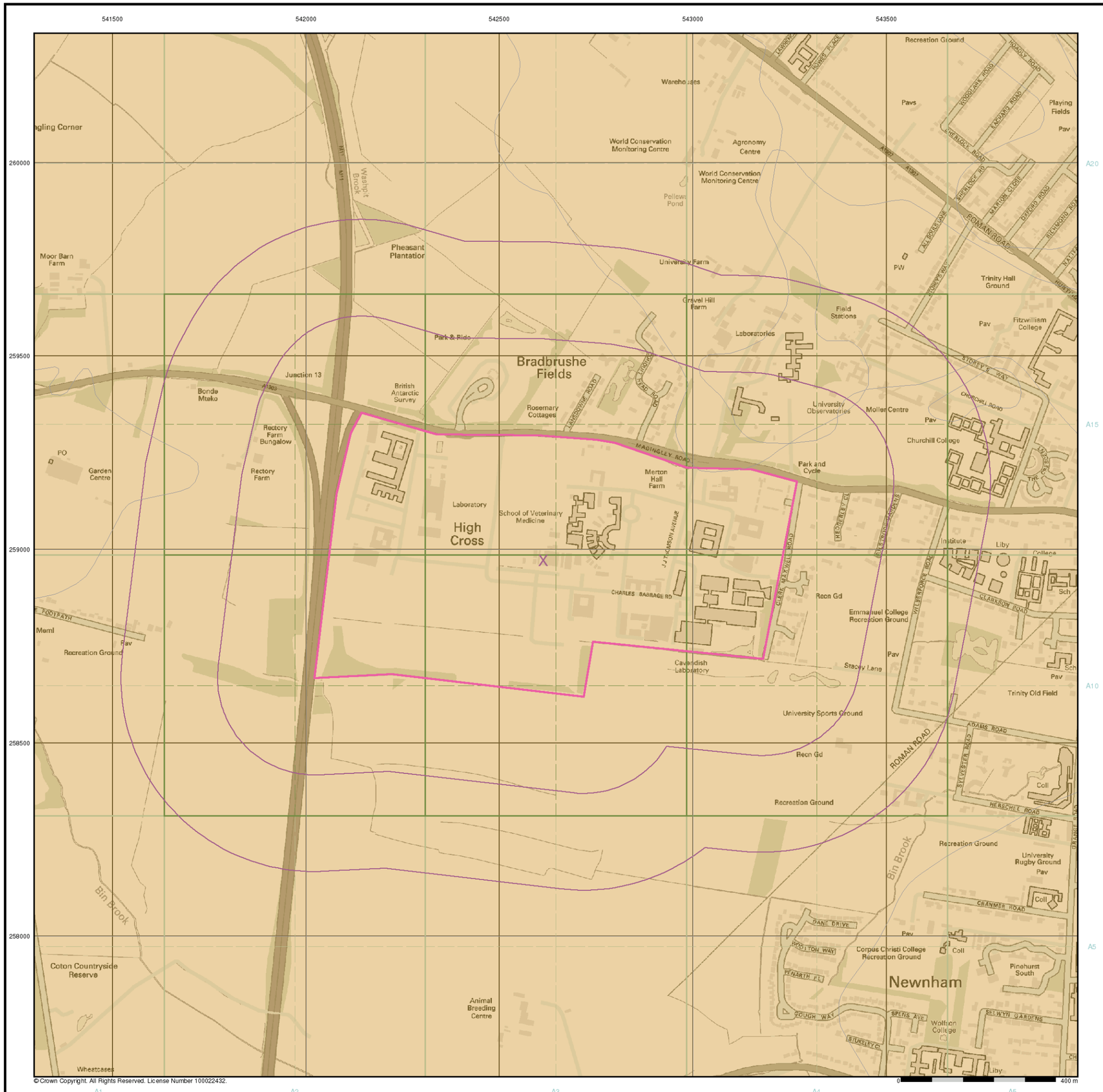


General

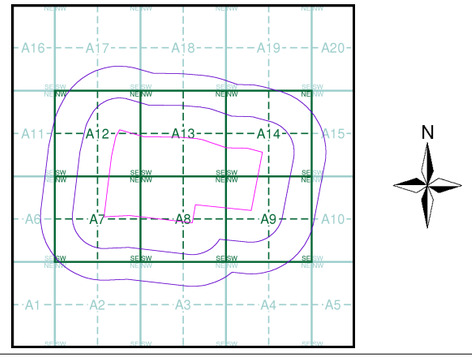
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Cadmium

Cadmium Concentrations mg/kg

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

Estimated Soil Chemistry Cadmium - Slice A



Order Details

Order Details:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
Search Buffer (m):	500

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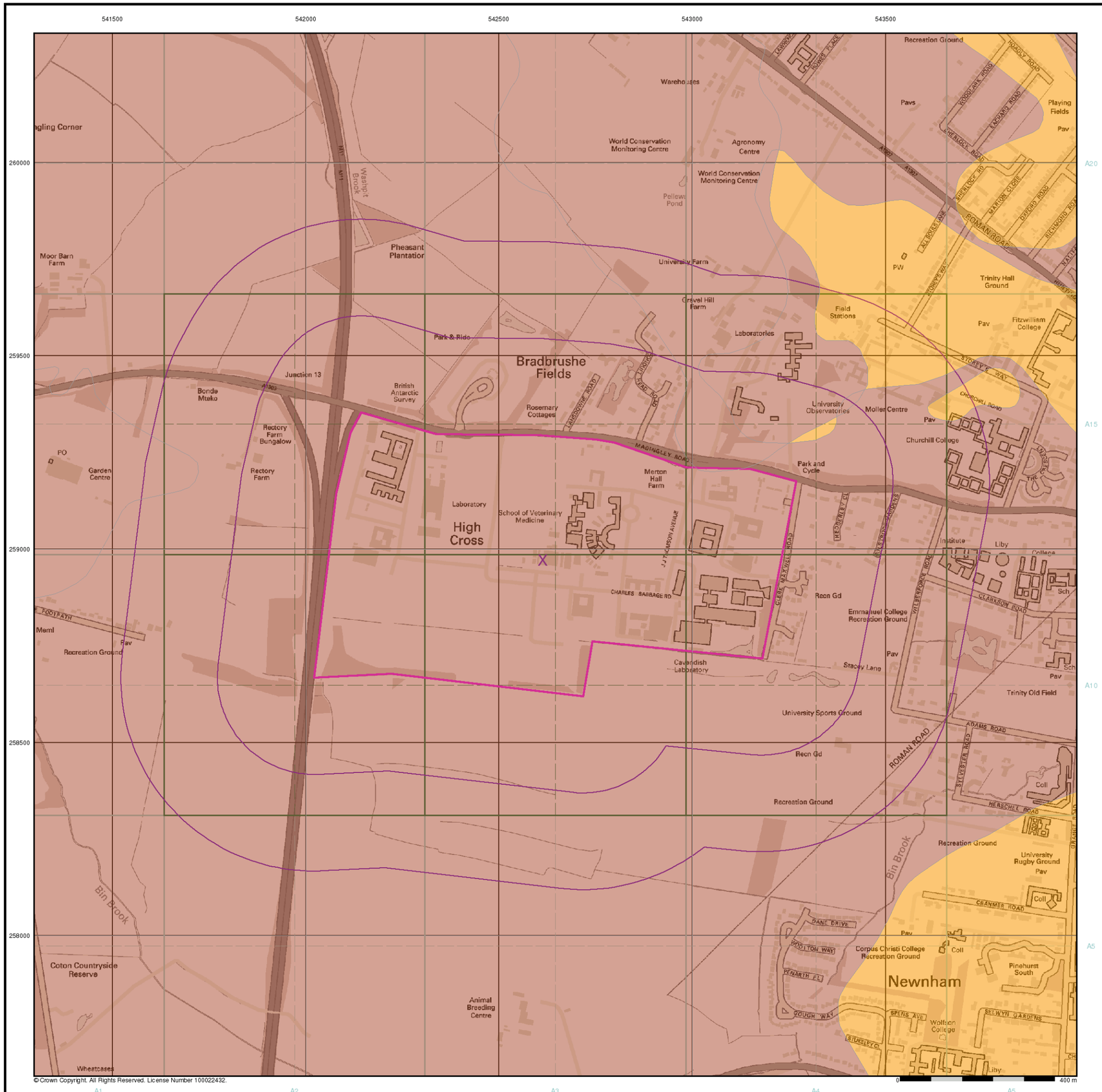

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General

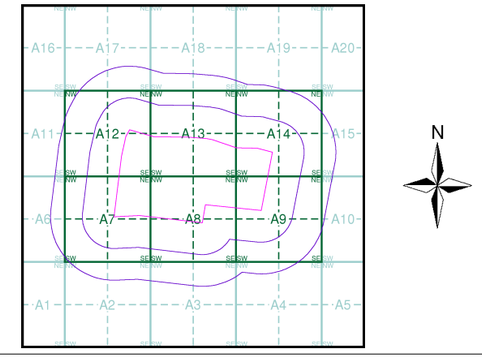
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Chromium

Chromium Concentrations mg/kg

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

Estimated Soil Chemistry Chromium - Slice A



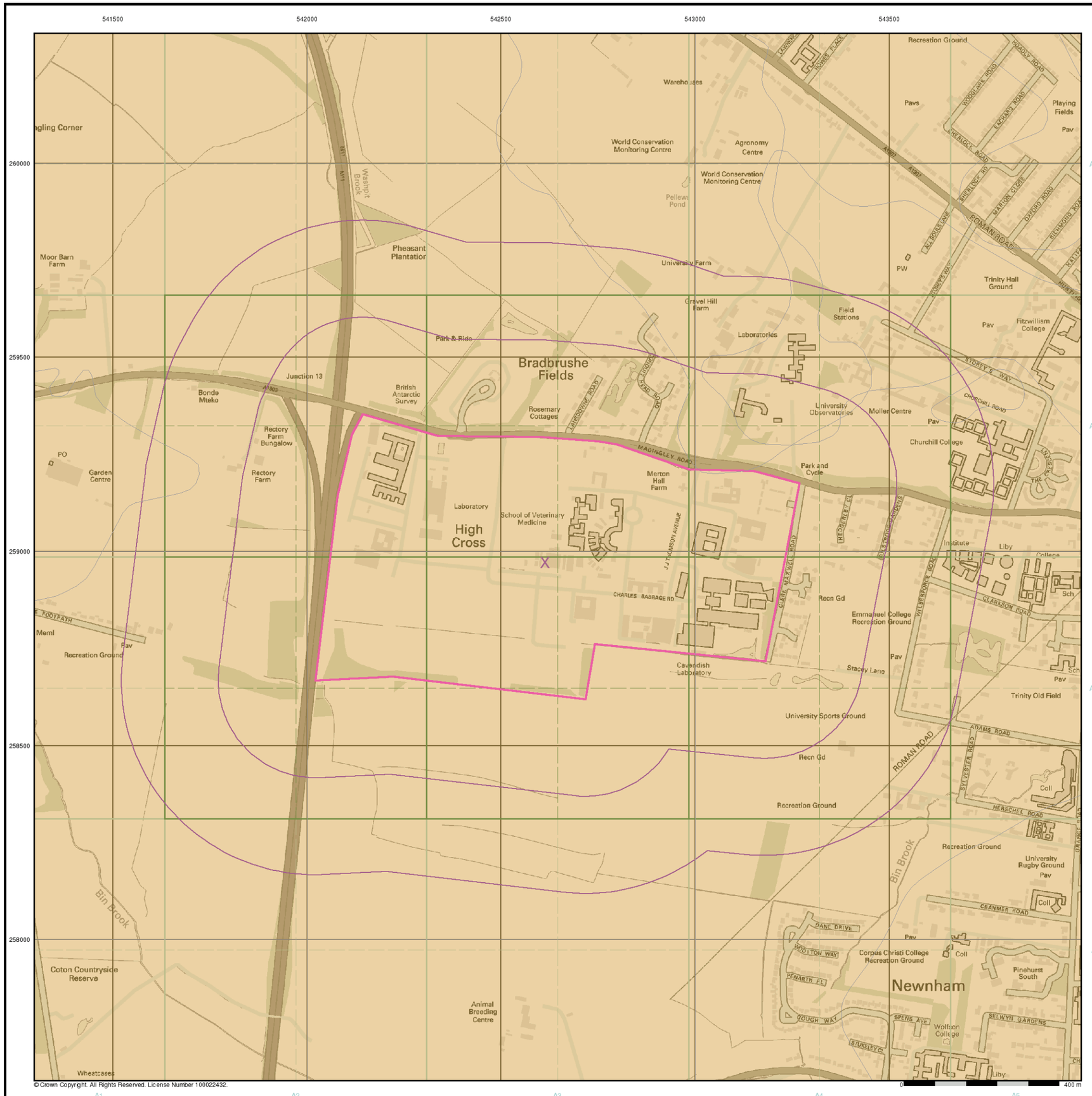
Order Details

Order Details:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
Search Buffer (m):	500

Site Details

Site at, Cambridge, Cambridgeshire

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



pba peterbrett

General

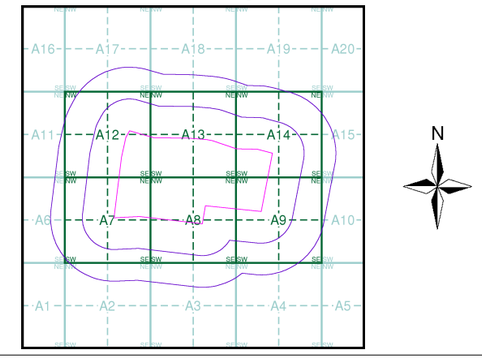
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Lead

Lead Concentrations mg/kg

- < 150
- 150 - 300
- 300 - 600
- 600 - 900
- > 900

Estimated Soil Chemistry Lead - Slice A



Order Details

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Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
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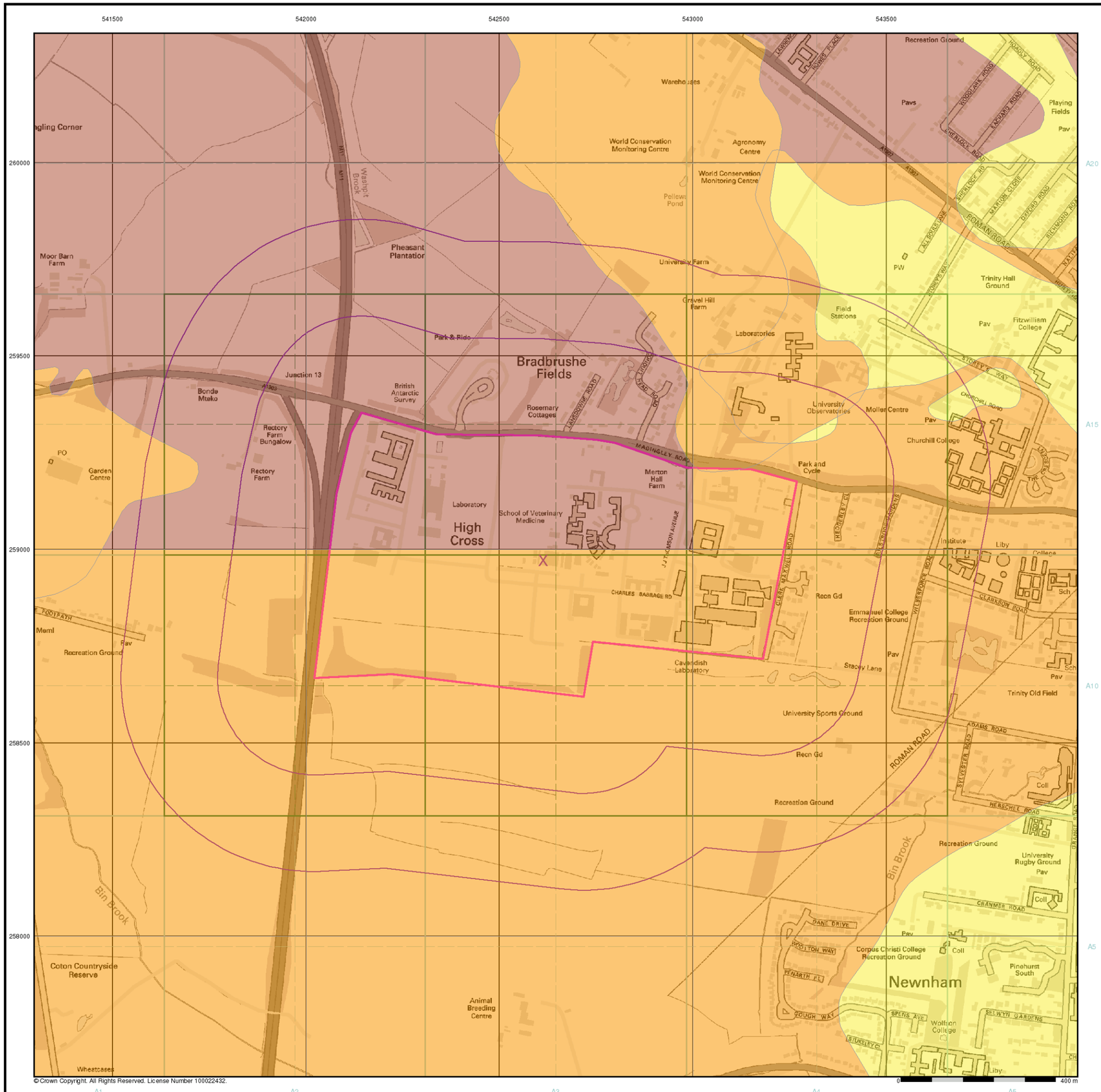


General

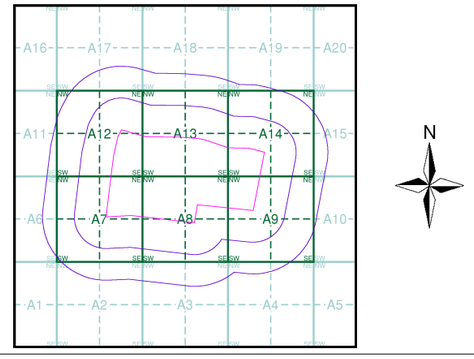
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Nickel

Nickel Concentrations mg/kg

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

Estimated Soil Chemistry Nickel - Slice A



Order Details

Order Details:	66871644_1_1
Customer Ref:	31500
National Grid Reference:	542610, 258970
Slice:	A
Site Area (Ha):	67.92
Search Buffer (m):	500

Site Details

Site at, Cambridge, Cambridgeshire

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

Appendix 6 Responses from Environment Agency and Local Authority

Robert Foster

From: Anglian Central, Customer Contact <ANC.enquiries@environment-agency.gov.uk>
Sent: 16 June 2015 16:49
To: Robert Foster
Subject: CCC/2015/22277 - Development Site, West Cambridge
Attachments: PRCNF00412.pdf; Standard Notice.pdf

Dear Robert

Enquiry regarding Development Site, West Cambridge

Thank you for your enquiry which was received on 28 April 2015 and subsequent payment received on 16 June 2015.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

Please find the following answers to your question –

> **We would like to request a search of your records for any environmental information relating to the site, particularly relating to the location of landfill sites, pollution incidents, discharge consents, abstraction licences etc. located on or in close proximity to the site boundary.**
>
> TL4303058837 – Fire (04/01/2004) – We received report of fire in a lab but we didn't attend, recorded as 'no impact'. No further relevant information available.
>
> TL4309558830 – Containment and Control Failure (22/09/2013) – We received report of a contained spillage in a lab but we didn't attend, recorded as 'no impact'. No further relevant information available.
>
> TL4315858766 – Water Pollution (10/12/2012) – We received a report of short-term discolouration to a surface water system feeding a pond but we didn't attend, recorded as 'minimal impact on water quality'.
>
> TL4314058742 – Water Pollution, general biodegradable materials and wastes (12/12/2001) – We received a report of fish in distress in a pond. We attended and recorded 'natural causes' (i.e. decaying vegetation, stagnant water) resulting in a minimal impact on water quality. Advice re. aerating the pond was given.
>
> TL4327058680 – Discharge consent number PRCNF00412 – Please find a copy of the permit attached.

I have attached our Standard Notice which explains the permitted use of this information.

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours Sincerely

Stuart Maskell
Customers & Engagement Officer
Cambridgeshire and Bedfordshire Area

Tel: 750-3917 (01480 483917)
Email: stuart.maskell@environment-agency.gov.uk

We are now

Cambridgeshire & Bedfordshire Area

From 1 April 2014 Anglian Central Area has a new name. Covering the same geography, we will continue to work with our partners and customers to help protect and improve the environment.

www.gov.uk/environment-agency

–

In case of enquiry contact Elizabeth Bruce
Tel: 01223 457732
Fax 01223 457909
E-mail: elizabeth.bruce@cambridge.gov.uk

CAMBRIDGE CITY COUNCIL

Environmental Health
Refuse & Environment

Robert Foster
Peter Brett Associates
Caversham Bridge House
Waterman Place
Reading
Berkshire
RG1 8DN

2nd June 2015

Your Ref: West Cambridge Masterplan Review
Our Ref: WK/201518014

Dear Robert,

Re: West Cambridge Site, Madingley Road, Cambridge

Enclosed is the Land Use Report for the West Cambridge Site, Cambridge as requested. I hope you find the information useful. Please do not hesitate to contact me if you have any other queries relating to this report or contaminated land in Cambridge City.

Yours sincerely,

Elizabeth Bruce
Scientific Officer

Enc

Land Use History Report for West Cambridge Site, Cambridge

Prepared for Peter Brett Associates, Waterman Place, Reading RG18DNby Environmental Health, Cambridge City Council, PO Box 700, CB1 0JH

Site Location:
542527 Easting, 259288 Northing

Based upon Cities Revealed aerial photography (copyright Cambridge City Council, supplied by The GeoInformation ® Group, 2002) and OS mapping (© Crown copyright. All rights reserved. Cambridge City Council Licence No. 100019730, 2004)

Site History:

1885-1888: County Series OS mapping shows that the site and the immediate surroundings are mostly undeveloped, most likely farmland with Church Hall Farm and associated buildings located to the north east of the site. There are a cluster of buildings of unknown use located on the central northern boundary. There is an Observatory 250m from the northern boundary to the east of the site.

1888-1891: County Series OS mapping shows no change of use for the site and its immediate surroundings.

1902-1903: County Series OS mapping shows that the cluster of buildings on the central northern boundary is now labelled as Merton Hall Farm. Church Hall Farm is now labelled as Vicars Farm. The remainder of the site remains mostly undeveloped with two small isolated buildings of unknown use to the west of Merton Hall Farm on the northern boundary (Madingley Road).

1903-1904: County Series OS mapping shows no change of use for the site and its immediate surroundings.

1926-1927: County Series OS mapping shows that the two small buildings on the central northern boundary to the west of Merton Hall Farm are now labelled as Merton Hall Cottages. Both farms remain unchanged. There is sporadic development to the north and east of the site including buildings, Caius College Sports Ground, Emmanuel College Ground and further development at what is now the labelled as the University Observatory site..

Land Use History Report for West Cambridge Site, Cambridge

Prepared for Peter Brett Associates, Waterman Place, Reading RG18DNby Environmental Health, Cambridge City Council, PO Box 700, CB1 0JH

1927-1928: County Series OS mapping shows no change of use for the site and its immediate surrounding area.

1938-1952: County Series OS mapping shows that there are two large building to the south west of the site plus associated groundworks. The remainder of the site remains unchanged. There is extensive development to the north and east of the site.

1959-1960: County Series OS mapping shows that there is development to the west of the site in the form of two large buildings and numerous small buildings. The remainder of the site remains unchanged. There is further development to the north and the east of the site.

1944-1972: WWII Aerial Photographs show that buildings to the western and south western boundary of the site were used as aircraft facilities with a USAF camouflage building.

1972-74: County Series OS mapping shows that there has been extensive development across the site. The two large buildings to the south west boundary are now labelled as a Depot. The buildings on the western boundary are labelled as the Atlas Centre and a Laboratory. There are now numerous buildings within the centre of the site which are labelled as the University Of Cambridge School Of Veterinary Medicine. Merton Hall cottages are no longer labelled although there are still buildings present on that location. Both Merton Hall Farm and Vicars Farm are still present. Further development has continued to the north and the east of the site.

2002: Aerial photography shows that the two large buildings to the south west boundary have now been cleared. There has been extensive development along the western edge of the site at what is now the 'British Antarctic Survey' premise. There is further development to the right of this. The Veterinary School has continued to expand and Merton Hall Farm appears to still be present. Vicars Farm is no longer present. This area has become developed with numerous buildings known to be associated with the University.

Additional comments

An outline application for the West Cambridge Site (C/97/0961/OP) was approved in September 1997. Subsequent detailed applications have dealt with potential contamination issues on a site by site basis and been assessed against the criteria for end use. Further investigations will be required in order to fill in the gaps. Relevant applications may include:

- *Institute of manufacturing* (07/0813/REM) July 2007 – No Contaminated Land Condition (CLC) recommended

- *Hauser Forum (East Forum)* (C/07/1061/REM) September 2007 – CLC recommended
    - Phase I Desk Study (Mott McDonald, March 2007)
    - Ground Investigation Report (RSA Geotechnics, October 2007)
    - CLC discharged February 2009

Land Use History Report for West Cambridge Site, Cambridge

Prepared for Peter Brett Associates, Waterman Place, Reading RG18DNby Environmental Health, Cambridge City Council, PO Box 700, CB1 0JH

- *Sports Hall* (10/0409/EXP) June 2010 – No CLC recommended
  - Ground Investigation Report (Richard Jackson, September 2008)

- *Department of Materials Science and Metallurgy* (C/10/0538/REM) September 2010 – CLC recommended; ground gas measures in place
  - Ground Contamination Interpretative (Ramboll, January 2010)
  - Site Investigation Addendum Report (Ramboll, September 2010)
  - Ground Investigation Interpretative (Ramboll, January 2011)
  - Verification of Recycled Material (Ramboll, January 2011)
  - Validation Chemical Testing Results (October 2013)
  - CLC discharged October 2013

- *Sports Hall Phase 1 - landscaping* (11/0979/REM) Aug 2011
  - Technical Note (ARUP, July 2011 and October 2011)
  - Ground Investigation' report (Ground Engineering, October 2011)
  - Contaminated Land Condition discharged January 2013

- *Chemical Engineering and Biotechnology* (12/1138/REM) September 2012
  - Geoenvironmental Desk Study Report (Ramboll, February 2012)
  - Ground Contamination Interpretative Report (Ramboll, February 2012)
  - Ground gas membrane installed

- *Physics of medicine building, Maxwell Centre* (13/0967/REM) – July 2012 – CLC recommended
  - Geoenvironmental Desk Study (Ramboll, March 2013)
  - *Data Centre* (13/0034/REM) February 2013 – CLC recommended
  - Geotechnical and Contamination Desk Study by ARUP, June 2012
  - Factual Report on Ground Investigation by BAM, September 2012
  - Generic Quantitative Risk Assessment by ARUP, November 2012
  - Remediation Strategy by ARUP, April 2013

- *New Research Facility* (14/1337/REM) September 2014 – CLC recommended
  - Desktop Study (MIRA, July 2014)
  - Contaminated Land Condition discharged April 2015

Some of the reports completed in relation to these applications can be viewed under public access via the Cambridge City Council Website; other reports can be viewed at the Council offices upon request.

2. As part of it statutory duties Cambridge City Council has issued and adopted a Contaminated Land Strategy. The strategy details how the Council will inspect its district to identify areas of contaminated land and how this will be dealt with. A free electronic copy can be downloaded from the Council's website via the following link:

   http://www.cambridge.gov.uk/ccm/content/environment-and-recycling/pollution-noise-and-nuisance/land-pollution.en

Land Use History Report for West Cambridge Site, Cambridge

Prepared for Peter Brett Associates, Waterman Place, Reading RG18DNby Environmental Health, Cambridge City Council, PO Box 700, CB1 0JH

No areas of the site have been identified as 'contaminated land' under Part IIA of the Environmental Protection Act 1990. It has been remediated to a standard considered to be fit for purpose.

NB: It is recommended that you satisfy yourself as to the actual condition of the land in question. This information is given in good faith but without acceptance by the council of any liability arising from any inaccuracy in the information supplied to the council by third parties concerning possible contamination. More information may be available from private sources and also from records kept by the Development Control Section of the Environment and Planning Department.

Main data sources used:
1:1250, 1:2500 & 1:10000 Ordnance Survey maps 1885-2000
Kelly's Directory of Cambridge 1860-1975
Various City Council and County Council records

UNIVERSITY OF CAMBRIDGE

AECOM