

ENVIRONMENTAL STATEMENT – VOLUME 3 – APPENDIX 11.1

Phase 1 Preliminary Risk Assessment

Drax Bioenergy with Carbon Capture and Storage

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations, 2009 - Regulation 5(2)(a)

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PRELIMINARY ENVIRONMENTAL INFORMATION REPORT - VOL 2 APPENDIX 11.1 PHASE 1 PRELIMINARY RISK ASSESSMENT

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1. INTRODUCTION

1.1. TERMS OF REFERENCE

- 1.1.1. WSP was instructed by Drax Power Limited (the Applicant) to undertake a Preliminary Risk Assessment (PRA) in order to assess the ground conditions and potential constraints associated with the proposed installation of post combustion Carbon Capture technology to capture carbon dioxide from up to two existing 660-megawatt electrical ('MWe') biomass power generating units at the Drax Power Station (Unit 1 and Unit 2) at Drax Power Station, New Road, Drax, Selby, YO8 8PH (the Proposed Scheme).
- 1.1.2. This report is a preliminary risk assessment and forms part of the assessment of Ground Conditions and is appended in the Preliminary Environmental Information Report (PEIR) for the Proposed Scheme.
- 1.1.3. The Proposed Scheme location and current layout are presented as **Figure 1** and **Figure 2** in **Appendix A**.

1.2. AIMS

- 1.2.1. The overall aim is to undertake a desk-based assessment of the Site with respect to ground conditions and contamination.
- 1.2.2. The key objectives of this assessment are to:
 - Develop a preliminary Conceptual Site Model (CSM) to identify potential ground contamination risks associated with the development the Proposed Scheme at the Site; and
 - Evaluate likely exposure and its potential significance on identified receptors and provide risk management advice to support the development.

1.3. DEVELOPMENT PROPOSALS

- 1.3.1. The Applicant understands that the Site is approximately 290 ha comprising a power station complex, agricultural fields, historic landfill Sites, further arable fields and hedgerows.
- 1.3.2. Drax Power Station was originally built, owned and operated by the Central Electricity Generating Board. It had a capacity of just under 2,000 megawatt ('MW') when Phase 1 was completed in 1975, increasing to 4,000 MW from six coal-fired units after the construction of Phase 2 in 1986.
- 1.3.3. It is now owned and operated by Drax Power Limited. Four of the six units run on biomass, making Drax Power Station the UK's largest single Site renewable power generator. The two remaining units run on coal, however they stopped generating electricity commercially in March 2021.

- 1.3.4. It is understood that Drax Power Ltd intend to install post combustion Carbon Capture technology to capture carbon dioxide from up to two existing 660-megawatt electrical ('MWe') biomass power generating units at the Drax Power Station (Unit 1 and Unit 2). The Proposed Scheme is designed to remove approximately 95% (design basis capture rate) of the carbon dioxide from the flue gas from those two units.
- 1.3.5. The carbon dioxide captured will undergo compression and processing before being transported via a proposed new pipeline for storage under the southern North Sea.
- 1.3.6. It is intended that core items of the existing infrastructure at the Drax Power Station are re-used by installing and integrating the Carbon Capture technology onto existing infrastructure including existing power generating units (Units 1 and 2) for extraction of steam, re-using the cooling water systems, Main Stack and electrical connections.
- 1.3.7. The Proposed Scheme is made up of the following:
 - Up to two Carbon Capture Plants (one per existing biomass unit), each made up of:
 - Flue gas pre-treatment section (to include up to two Gas / Gas Heat Exchanger and one Quench Column).
 - One Absorber Column.
 - Solvent Regeneration System (to include up to two Regenerators).
 - Rich Solvent / Lean Solvent Heat Exchangers; and
 - Ancillary systems related to the Carbon Capture process.
 - Common Plant (i.e. infrastructure required for one or both Carbon Capture Plants):
 - Modification of the existing cooling system and distribution of cooling water to the Proposed Scheme.
 - Modification to existing power generating units (Units 1 and 2) for extraction of steam and new infrastructure to meet required process conditions for distribution of steam to the Proposed Scheme.
 - Potential modifications to existing precipitator.
 - Solvent Storage and Make-up System.
 - Carbon Dioxide Compression and Processing Plant; and
 - Carbon Capture Wastewater Treatment Plant.
 - Road modifications; and
 - Environmental Mitigation Area.
- 1.3.8. At the time of writing this report, a final Site Layout Plan has not been established.
- 1.3.9. For the purposes of this report, the following areas of the Site will be referred to as:
 - BECCS plant includes the Carbon Capture Plants and Common Plant.
 - Drax Power Station includes the existing power station site and infrastructure within which the BECCS plant is proposed to be constructed;
 - Environmental Mitigation Area; and

· Laydown Area.

1.4. PROJECT SCOPE

- 1.4.1. To assist in meeting the aims as stated in **Section 1.2**, the scope of this assessment comprised:
 - Completion of a Site walkover;
 - A review of relevant previous reports pertaining to the Site, where available;
 - A review of publicly available historical maps and Site plans (where available) to identify former land uses and potential contaminative activities on and surrounding the Site;
 - A review of relevant regulatory databases;
 - Contact relevant regulators (Environmental Agency and Local Authority);
 - A review of relevant publicly available information relating to hydrological features, hydrogeology, neighbouring land use, ecologically sensitive uses and geology in order to establish the environmental setting of the Site;
 - Development of a preliminary conceptual Site model via the source-pathwayreceptor contaminant linkage approach;
 - Outline of the environmental risks and / or opportunities, with respect to ground, groundwater and ground gas conditions, which may potentially arise as liabilities or constraints associated with future use of the Site; and
 - Preparation of a Geo-Environmental Preliminary Risk Assessment Report.

1.5. LEGISLATIVE CONTEXT AND GUIDANCE

- 1.5.1. The assessment was undertaken in the legislative context of:
 - Part 2A of The Environmental Protection Act (1990); and
 - The National Planning Policy Framework (NPPF) (2021).
- 1.5.2. The following good practice and statutory guidance was considered, and the assessment was undertaken in general accordance with:
 - Environment Agency 'Land Contamination: Risk Management', LCRM (2020); and
 - CIRIA C552 'Contaminated Land Risk Assessment. A Guide to Good Practice' (2001).

1.6. SOURCES OF INFORMATION

- 1.6.1. The following relevant sources of information were used in the production of this report:
 - Google Earth (https://earth.google.com/web) accessed on 13 September 2021;

- British Geological Survey (BGS) Online Viewer (https://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html) accessed 13 September 2021;
- Environment Agency Catchment Data Explorer,
 (https://environment.data.gov.uk/catchment-planning/) accessed 15 June 2021;
- Zetica UXO Risk Maps (https://zeticauxo.com/downloads-and-resources/risk-maps/), accessed 15 June 2021;
- Groundsure Report, ref: GSIP-2021-12199-7640, dated 25 August 2021;
- British Geological Survey (BGS) 'Onshore GeoIndex'. Available at: http://mapapps2.bgs.ac.uk/geoindex/home.html (accessed 24 August 2021);
- BGS 'Geology of Britain' viewer. Available at: http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html (accessed 24 August 2021);
- British Geological Survey (BGS) 1:63,360 / 1:50,000 Geological Map Series, New Series: Sheet No. 79 'Goole' (Drift ed.), 1971;
- British Geological Survey (BGS) 1:63,360 / 1:50,000 Geological Map Series, New Series: Sheet No. 79 'Goole' (Solid ed.), 1972;
- Flood Map for Planning Service. Available at: https://flood-map-for-planning.service.gov.uk/ (accessed 24 August 2021);
- Defra's Multi-Agency Geographic Information for the Countryside MAGIC website.
 Available at: https://magic.defra.gov.uk/MagicMap.aspx (accessed 24 August 2021);
- Public Health England, UK Maps of Radon. Available at: (https://www.ukradon.org/information/ukmaps) (accessed 24 August 2021);
- The Coal Authority Interactive Viewer. Available at: http://mapapps2.bgs.ac.uk/coalauthority/home.html (accessed 24 August 2021);
- Natural England, 2010. Agricultural Land Classification map 'Yorkshire & The Humber Region' (ALC003). Available at: http://publications.naturalengland.org.uk/publication/130043?category=595414853 7204736) (accessed 24 August 2021);
- WSP, 2017. Drax Bioenergy with Carbon Capture Storage: Environmental Impact Assessment Scoping Report. For Drax Repower Ltd. Published January 2021. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010120/EN010120-000017-DBCC%20-%20Scoping%20Report.pdf;
- WS Atkins, 1965. Ref. 4235. Drax Power Station Main Station Site: Site Investigation Volume 2 (extract only) (factual exploratory hole logs and exploratory hole location plan supplied);
- National Power, Ground Condition Information Manual, Drax Power Station, Flue Gas Desulphurisation, dated September 1996 (extract only);

- Dames and Moore, 2000. Figures and Exploratory Hole Records associated with ground investigation carried out in January 2000. Environmental Scientifics Group (ESG), 2011. Report No A1047-11. Drax Power Station – Project Phoenix. Desk Study. Carried out for: Drax Power Limited. June 2011;
- ESG, 2011. Report No A1047-11/2. Drax Power Station Project Phoenix Report on Site Investigation, Volume 2. September 2011;
- Alstom Power Systems S.A., 2014. White Rose Project Oxy Fired Coal & Biomass Power Plant. CPL Document Number 120103-S-CE-002. CPL Revision 02. October 2014 and
- ESG, 2014. Report No. A4048-14. White Rose CCS Project Site Raising, North Yorkshire. Factual Report on Ground Investigation. Carried out for Drax Power Ltd. Engineer: Parsons Brinckerhoff. October 2014.

1.7. LIMITATIONS

- 1.7.1. This report is addressed to and may be relied upon by Drax Power Limited and may not be relied upon or transferred to any other parties without the express written agreement of WSP.
- 1.7.2. This report should be read and used in full. No responsibility will be accepted where this report is used, in its entirety or in part, by any other party. WSP cannot be held liable for third party information. Full details of the limitations are provided as **Appendix B**.

1.8. UNDERSTANDING THE RISK

- 1.8.1. It is important to recognise that any risks identified during a preliminary assessment such as that presented below are perceived risks based on the recorded information reviewed. A more detailed assessment of the actual risks can only be assessed following intrusive investigations. The preliminary assessments presented herein are qualitative based on professional judgements following review of the available data and within the context of the existing/proposed use. Those risk categories presented (Very Low, Low, Low to Moderate, Moderate, High, Very High) follow guidance presented in CIRIA Publication C552, Contaminated Land Risk Assessment A Guide to Good Practice. CIRIA states that risk levels should be based both on an understanding of both the probability (likelihood) of a risk occurring and the magnitude of the potential consequence (severity) of a risk.
- 1.8.2. CIRIA defines four levels of probability and four levels of severity with relation to contaminated land, as presented in **Appendix C**.

2. SUMMARY OF THE SITE AND SURROUNDING AREA

2.1. SITE DESCRIPTION

- 2.1.1. Site location and current layout plans are presented as **Figure 1** and **Figure 2** in **Appendix A**.
- 2.1.2. Site photo plates are presented in **Appendix D**.
- 2.1.3. A summary of relevant Site details is provided below in **Table 2.1**. A Site reconnaissance visit was undertaken on 28 September 2021.

Table 2.1 – Summary of the Site Details

Detail	Comment
Name and Address of Site	Drax Power Station, New Road, Drax, Selby, YO8 8PH
National Grid Reference	467037 428882 – Centre of Environmental Mitigation Area (northern section)
	466705 428232 – Centre of Environmental Mitigation Area (central section), Laydown Area and northern section of Drax Power Station (southern section)
	466173 426786 – Southern section of Drax Power Station (southern section)
Site Description and Current	The Site is approximately 290 ha and is split into the following parcels:
Use	BECCS plant – located within the footprint of Drax Power Station and includes the Carbon Capture Plants and Common Plant;
	Drax Power Station – the land occupied by the Drax Power Station;
	Environmental Mitigation Area – the land within the Site Boundary that may be used for environmental mitigation for the Proposed Scheme. This parcel is located to the north / north west of the Drax Power Station; and
	Laydown Area – temporary area required during the construction phase of the Proposed Scheme for the short-term storage of materials and temporary locations of construction offices, warehouses, workshops, open air storage areas, parking and related activities, which will be reinstated to its original state following demobilisation. Laydown Areas are situated to the east of the Drax Power Station, across New Road and within the Drax Power Station.
	During the Site walkover, twelve cooling towers were observed within the Drax Power Station area, six in the northern part of the

Detail	Comment
	power station area, and six in the south. Four large biofuel storage units were observed to be present in the south west of the Drax Power Station area.
	The south-western extent of the Drax Power Station area is dominated by a former coal storage area which appeared to be uncapped ground. Anecdotal evidence from the Site visit indicated the area was underlain by a drainage network, however specific details or the condition were not known. In addition, it was indicated that coal was not widely stored, or utilised at the power station.
	A railway line was noted to be present in the western part of the Drax Power Station area, entering the south of the area, looping around the former coal storage area in the south-west of the Site and exiting in the south. Information from the reconnaissance visit indicated that the railway line is primarily utilised to import biofuels to the power station.
	The BECCS plant is proposed to be constructed in the central western part of the Drax Power Station area. The area is currently occupied by a Flue Gas Desulphurisation (FGD) plant, as well as ash storage tanks. It is understood that these areas will be demolished prior to the construction of the BECCS plant.
	The Environmental Mitigation Area located to the north of the Drax Power Station Site was noted to be dominated by agricultural land with farm buildings located in the central and eastern part of the area.
	Other than the power station complex, the remainder of the Site is predominantly rural and agricultural north of the power station complex up to the southern embankment of the River Ouse.
Area	Approximately 63 Ha - Environmental Mitigation Area (northern section)
	Approximately 109 Ha - Centre of Environmental Mitigation Area (southern section), Laydown Area and northern section of Drax Power Station
	Approximately 121 Ha - Southern section of Drax Power Station
Site Setting and Surrounding Area	The Drax Power Station Complex is predominantly surrounded by agricultural land. There are a number of villages within the vicinity of the Site; Drax located approximately 700 m to the south east, Long Drax approximately 1 km north east, Hemingbrough approximately 1.2 km north and Camblesforth approximately 1 km south west. Larger towns in the vicinity of the Drax Power Station are Selby approximately 5 km north west and Goole approximately 8 km south east.
	Rusholme Wind Farm is located approximately 3 km to the east of Drax Power Station and Drax Golf Club is across the A645 to

Detail	Comment		
	the south. There is an industrial Site adjacent to the Existing Drax Power Station Complex to the south west. Drax Skylark Centre and Nature Reserve are located to the north west.		
	The nearest major surface water feature is the River Ouse, located adjacent to the north east of the Site (adjacent to the Environmental Mitigation Area).		
	The road network adjacent to the Existing Drax Power Station Complex includes the A1041 and the A645, which connect the Drax Power Station to the wider road network including the M62 Junction 36, approximately 6 km south. Minor roads connect the Drax Power Station to the villages of Drax, Newland and isolated properties.		
Boundaries	The boundaries of the Site consist of:		
	North – River Ouse		
	East – Agricultural Fields		
	South East – New Road		
	South – A645		
	South West – A railway line		
	West / North West – Access roads, refuse tips, Hooks Field and agricultural land.		
	The main access to the Power Station Complex is gained from the A645 to the south .		

3. SUMMARY OF HISTORICAL SITE INFORMATION

3.1.1. The following sections summarise historical information relevant to the Site.

DRAX POWER STATION MAIN STATION SITE INVESTIGATION VOLUME 2, WS ATKINS, 1965

3.1.2. A ground investigation (GI) was undertaken in 1965 prior to construction of Drax Power Station in 1975 and factual data was obtained (exploratory hole plan and records). No information on groundwater monitoring, in-situ testing or chemical laboratory test data was included within the information received by WSP.

FIGURES AND EXPLORATORY HOLE PLANS RELATED TO GROUND INVESTIGATION (JANUARY 2000)

- 3.1.3. A GI commissioned by AES Electric Ltd. and undertaken by Dames & Moore. The GI was completed at Drax Power Station and reported in January 2000. This study included exploratory hole logs from various areas within the Drax Power Station Site. Site areas investigated included the following:
 - Railyards, fuel off-loading and fuel above ground storage tanks (ASTs);
 - Turbine House and Precipitators;
 - Fuel Oil Above Ground Storage Tanks;
 - North Cooling Towers;
 - FGD plant; and
 - Former Laydown Area for Site Construction (current west of Environment Mitigation Area)
- 3.1.4. A ground profile of the Site was derived from the borehole logs. Made Ground was encountered in all boreholes with a maximum depth of 5.0 m bgl encountered in WS104 within the FGD related plant area. Made Ground was underlain by a mixture of sand, soft clay and silt clay lithologies in the south of the Site (within railyards area) and underlain by Silt/Clay across the remainder of the investigation area.

URS CORPORATION, SITE ENVIRONMENTAL CONTAMINATION INVESTIGATION, DRAX POWER STATION (SEPTEMBER 2003)

- 3.1.5. URS (formerly Dames & Moore) was commissioned on behalf of Stone & Webster to assess major liabilities with the Site and provide an update to the 2000 survey report. The intrusive investigation included:
 - Seven window sampler boreholes to identify new areas of potential contamination identified during the walkover (waste pit and transformer fire area);
 - Two cable percussive boreholes to replace former groundwater monitoring wells installed into the Sandstone Aquifer;
 - Installation of wells for gas and groundwater monitoring; and

- Sampling of soils, groundwater and surface water for a laboratory analysis of chemical contaminants.
- 3.1.6. The geological sequence comprises Made Ground (ash, sand, concrete, siltstone and sandstone fragments) to a depth of 0.5 m bgl to 5.0 m bgl, Vale of York Drift (firm to stiff brown clay extending to depths of 16.0 m bgl and Sherwood Sandstone Group (fine to medium grained fractured sandstone).
- 3.1.7. Groundwater levels measured in shallow window sampler holes indicate a general flow direction to the north east. Groundwater in the deeper Sherwood Sandstone Aquifer is indicated to flow in the southwest direction.
- 3.1.8. A small number of isolated elevated concentrations include benzo (a) pyrene concentration at 0.5-0.6 m bgl in WS206 and excess of Diesel Range Organics (DRO) in excess of 8000 mg/kg decreasing to 6000 mg/kg from 0.3-0.4 m bgl to 4.8 4.9 m bgl respectively.
- 3.1.9. Groundwater contamination was identified within several boreholes that had exceedances in DRO around areas of fuel storage as well as arsenic, cadmium, chromium, nickel, selenium and boron. These results are similar to results of the previous 2000 GI with the exception of an increase in dissolved DRO concentrations.

GEOTECHNICAL INVESTIGATION FOR PROPOSED PFA STORE, DRAX POWER STATION, EASTWOOD AND PARTNERS (JULY 2006)

- 3.1.10. Eastwood and Partners were instructed by Drax Power Limited to carry out a Site investigation of a Site adjacent to ash lagoon No. 2 at Drax Power Station. The ground investigation consisted of four boreholes excavated to a maximum depth of 21.7 m bgl.
- 3.1.11. The ground model highlights the following:
 - Made Ground encountered in all boreholes typically comprising granular loose black slightly sandy gravel with cohesive firm brown sandy gravelly clay with gravel of chalk, concrete and quartzite up to a maximum thickness of 2.5 m;
 - Lacustrine laminated clays and silts with a thickness of 16.0 m overlying a 1.0 m to 1.5 m thick layer of dense red slightly gravelly sand;
 - Weathered sandstone rockhead encountered at 21.0 m to 21.6 m bgl comprising weak weathered sandstone; and
 - Groundwater seepages were encountered at 10.0 m bgl within the firm laminated clays.

GROUND INVESTIGATION INTERPRETATIVE REPORT, MORGAN EST ENGINEERING SERVICES (AUGUST 2008)

3.1.12. Morgan Est was instructed on behalf of Alstom Power to produce an interpretative ground investigation report for proposed construction of a new biomass transportation system. The ground investigation included nine cable percussive boreholes to depths of 10.05 m bgl to 25.25 m bgl and carried out by contractor Strata Surveys Limited

- between May and June 2008. Boreholes were drilled in the location of the coal stock ground in the south west of the Site.
- 3.1.13. Made Ground was encountered at ground level and from 0.5 m to 3.7 m bgl in the coal storage area and 0.5 m to 2.9 m in the existing plant area. This is underlain by Vale of York drift, Glacial Sand and Sherwood Sandstone.
- 3.1.14. Groundwater was encountered during drilling at several boreholes ranging from 8.3 m to 10.35 m bgl.
- 3.1.15. A total of 5 No soil samples taken from the Made Ground were selected for indicative contamination testing including hydrocarbons. The samples did not exceed the relevant Soil Guideline Value (SGV) for an industrial end use.

OUSE RENEWABLE ENERGY PLANT, GEO-ENVIRONMENTAL DESK STUDY REPORT, SINCLAIR KNIGHT MERZ (SKM), JULY 2009

- 3.1.16. SKM was commissioned by Drax Power Limited to provide a preliminary risk assessment in relation to a proposed land development of a 290MW biomass power generation plant adjacent to Drax Power Station. At the time of the report, the Site was used for storage of wood fuel for the power station.
- 3.1.17. The geological sequence included grass over Glacial Till (Vale of York Deposits) with a strip of Alluvium trending west south west to east north east running through the centre of the Site and sands to the north. Solid geology beneath the Site consisted of Permo-Triassic sandstones of Sherwood Sandstone Group.
- 3.1.18. Potential sources of ground gas have been identified on the Site including Made Ground and areas of infilled land. Adjacent sources of ground gas include landfill to the southeast and Barlow Ash Mound to the north and west. Based on the desk study findings, there is considered to be a 'moderate risk' to Site users, construction workers, minor and major aquifers, surface waters and building structures.
- 3.1.19. Further ground investigation was recommended to establish soil and groundwater conditions at the Site to enable risk assessment and a remediation strategy to be undertaken, if required.

REPORT ON A GROUND INVESTIGATION AT PROJECT OUSE BIOMASS POWER PLANT (MARCH 2010)

- 3.1.20. Norwest Holt Soil Engineering (NHSE) were instructed by Drax Power Limited to carry out a ground investigation for a proposed biomass power plant and wood storage area.
- 3.1.21. 10 No. cable percussive boreholes were formed to depths between 20.45 m to 24.0 m bgl. All boreholes were then extended with rotary core follow on between depths of 26.20 m to 41.0 m bgl. 24 No. trial pits were excavated between 2.70 m to 4.50 m bgl. The following conditions were identified:

- Made Ground was encountered in all locations to depths of 1.0 m to 3.0 m bgl generally comprising limestone gravel, reddish brown sand, ash, sandstone and PFA;
- Superficial deposits included mottled grey and orangish brown silty clay to depths between 16.5 to 19.0 m bgl.;
- Permo-Triassic deposits (Sherwood Sandstone) included very weak laminated reddish brown or orangish brown fine and coarse grained sandstone to a maximum depth of 41.0m bgl; and
- Ground gas monitoring: No detectable methane noted, however, carbon dioxide was recorded to a maximum level of 1.2% and oxygen levels were in the range 15.2% to 20.7%.

ESG/SOIL MECHANICS DRAX POWER STATION, PROJECT PHOENIX DESK STUDY (JUNE 2011)

3.1.22. In June 2011, Soil Mechanics was commissioned to complete a desk study by Drax Power (part of Project Phoenix). The study area was limited to the coal stockpile in the west of the Drax Power Station Site. Project Phoenix related to a historical redevelopment of the fuel storage area of Drax Power Station.

ESG/SOIL MECHANICS DRAX POWER STATION, PROJECT PHOENIX REPORT ON SITE INVESTIGATION VOL.2: INTERPRETATIVE REPORT (SEPTEMBER 2011)

3.1.23. In September 2011, Soil Mechanics was commissioned to complete a GI by Drax Power (part of Project Phoenix). The area of investigation was limited to the coal stockpile in the west of the Drax Power Station Site. The GI comprised advancement by cable percussion of 13 boreholes which were installed for groundwater and ground gas monitoring.

SCR AND UNIT 1 REHEATER DRUM REPLACEMENT GROUND INVESTIGATION REPORT – STRATA SURVEYS LIMITED (SEPTEMBER 2011)

3.1.24. A Site investigation was undertaken within the Drax Power Station Site in connection with the SCR scrubber unit and Unit 1 Reheater Drum replacement in order to provide information for foundation design. Three boreholes were advanced and plate bearing tests undertaken in order to confirm outrigger requirements for heavy mobile cranes. Two boreholes were also undertaken to the north of the main generator buildings and around the storage tank facility. Limited chemical analysis was undertaken as part of the investigation.

WHITE ROSE PROJECT OXY FIRED COAL AND BIOMASS POWER PLANT FACTUAL REPORT (APRIL 2014) AND GEOTECHNICAL INTERPRETATIVE REPORT (OCTOBER 2014) – ALSTOM POWER SYSTEMS S.A

3.1.25. A phased GI was completed to generate geotechnical and hydrogeological data to inform conception of the biomass power plant at Drax Power Station. The area of investigation was in the north of the Drax Power Station Site. The results were subject

to factual and interpretive reporting by Alstom in April and October 2014. Phase 1 of the GI was undertaken by Norwest Holst in 2009-2010 and comprised advancement of 10 boreholes, standard penetration testing (SPTs), mechanical excavation of 24 trial pits and completion of 10 cable percussion tests. The results were reported within the interpretive reporting completed by Alstom in October 2014. Phase 2 of the GI was undertaken and reported by Structural Soils in 2014 and comprised advancement of 36 cable percussion boreholes (of which 11 were extended by rotary drilling), three rotary open hole boreholes, permeability testing, cone penetration testing (CPTs) and geophysical testing to aid interpolation between exploratory locations. Seven of the boreholes were installed for groundwater monitoring and subject to eight groundwater monitoring rounds between March and May 2014. A number of soil and groundwater samples were collected for geotechnical purposes. The results were factually reported by Structural Soils in May 2014 and included within the interpretive reporting completed by Alstom in October 2014.

4. SITE HISTORY

4.1. HISTORICAL LAND USE

Historical maps were obtained as part of the Groundsure Reports (**Appendix E**) and were reviewed to identify potentially contaminative former land uses on Site and within a 250 m radius of the Site boundary.

Table 4.1 - Summary of Historical Land Use

Historical Map (Scale and Date)	On-Site Feature(s)	Off-Site Feature(s)		
1853 – 1855 (1:10,560) 1853 – 1854 (1:10,560) 1853 (1:10,560)	The Site is predominantly undeveloped agricultural land with the exception of Wood House in south east.	The area surrounding the Site is predominantly undeveloped agricultural land with occasional farm buildings. Drax Abbey is located in the central north of the Site (albeit outside of the Site boundary).		
1890 (1:2,500) 1891 (1:10,560) 1907 (1:2,500) 1908 (1:10,560)	Carr Dike drain enters the Site in the west and travels north south along the western perimeter, turns and moves north-east through the centre of the Site. Railway sidings cross the most southerly extent of the Site. Lendall Drain running south-west to north-east in north east appearing to discharge to the River Ouse.	Carr Dike drain is located adjacent to the west of Site running east to west within an area 'liable to floods.' 'Fishpond' in north centre of Site (outside the Site boundary). River Ouse running north south immediately east of north east perimeter. Drax Station and fuel handling plant 100 m south east with railway sidings traversing south-west to north-east. Camblesforth Brick Yard and a Windmill pump is located 550 m south west.		
1950 (1:10,560) 1958 (1:10,560)	No significant changes.	Depot 220 m west.		

Historical Map (Scale and Date)	On-Site Feature(s)	Off-Site Feature(s)
1971 (1:2,500) 1972 (1:2,500) 1973 – 1974 (1:10,000)	The railway sidings no longer exist in the south of the Site. Wood House replaced with multiple 'gantry's', a Tank and unlabelled buildings. Drax Power Station in south including unspecified buildings. Chimneys and Cooling Towers are present in south. Railway sidings traversing north south from the south west of the Site. A drain is present along the south west perimeter. Sewage Works and a Travelling Crane in the west. Sludge Lagoons and a drain traversing east west in centre. Pump House on bank adjacent to River Ouse in the north east.	A 'Dismantled Railway' is present running immediately parallel to the south west boundary. A Tank is located immediately to the south. Drax Station, Goods Shed and railway sidings no longer exist to the south east. A Refuse Tip is present 80 m west of the Sire. Electricity Sub-Station and Caravan Site 100 m south east. Transformer and Electricity Sub-Station 120 m south west. Settling Tanks and Tanks 135 m west. Dismantled Railway 175 m south. Tank 275 m west within Depot. Tank 250 m and 425 m north west. Tank 400 m west. Tank, Incinerators and Pump House 500 m north west.
1982 (1:2,500) 1984 (1:2,500) 1982 - 1984 (1:2,500) 1982 -1987 (1:2,500) 1984 - 1989 (1:2,500)	Addition of large circular tanks west of the Cooling Tower's in the south. More unspecified buildings added in the south. Settling Ponds to the south of the Sewage Works in the west. A number of Cooling Tower's, multiple Tanks and new unspecified buildings now present in the centre of the Power Station area.	Depot 220 m west no longer present. Area labelled 'Ash Tip.' Square building labelled 'glass' that appears to be greenhouses 75 m south west. Ponds 100 m south. Ponds 175 m south west.

Historical Map (Scale and Date)	On-Site Feature(s)	Off-Site Feature(s)	
1987 (1:2,500) 1987 – 1989 (1:2,500) 1988 (1:10,000) 1989	New road built with multiple large Tanks in the east.	All Tanks, the Incinerator and Pump House no longer exist in the north west.	
(1:2,500)			
1990 – 1994 (1:2,500)	Sewage Works no longer present in the west. New buildings and Tanks built in its place and immediately	Ash Tip 100 m north west in Hook's Fields.	
1991 – 1994 (1:2,500)	south until the Settling Ponds.	Tank immediately south no longer exists. Replaced with	
1994 (1:2,500)	Roundabout added in the very southern part of the Site.	a tennis court and bowling green.	
1994 – 1995 (1:2,500)	Additional unspecified buildings added around the Cooling Towers	Two 'heaps' with an access road 170 m north west.	
1995 (1:2,500)	in the centre of the Site. Surface water pond in the north west.	Caravan Site and Electricity Sub-Station no longer present 100 m south east.	

5. ENVIRONMENTAL SETTING

5.1. GEOLOGY

5.1.1. The British Geological Survey (BGS) Map No. 72 (Goole, 1:63,360) and the BGS online interactive viewer indicates that the Site is underlain by superficial deposits comprising Alluvium, the Hemingbrough Glaciolacustrine Formation, the Breighton Sand Formation and Warp. The bedrock geology underlying the entire Site is recorded as the Sherwood Sandstone Formation.

MADE GROUND

5.1.2. It is highly likely that the the Site contains Made Ground associated with all current and historical developments including the Drax Power Station Site. The study area contains rural and agricultural land and may therefore contain localised areas of artificial ground; for example, where depressions have been infilled to aid farming. These soils are likely to exhibit a certain degree of heterogeneity. The nature of the material can be expected to vary substantially in both composition and thickness over short distances. No known artificial ground is identified within the study area in the BGS 'Onshore GeoIndex.

SUPERFICIAL DEPOSITS

- 5.1.3. The majority of the Site is underlain by the Hemingbrough Glaciolacustrine Formation (glacigenic silty clay) and the Breighton Sand Formation (fluvial and aeolian sands). These units were formed up to 2 million years ago in the Quaternary Period in a local environment characterised by ice age conditions.
- 5.1.4. The northern part of the Site (in the Environmental Mitigation Area) is underlain by alluvium (clay, silt, sand and gravel) associated with a minor tributary of the River Ouse. In the north extent of the Site, adjacent to the River Ouse, the superficial deposits comprise by warp (clay and silt). These units were formed up to 2 million years ago in the Quaternary Period in a local environment characterised by rivers.

BEDROCK GEOLOGY

- 5.1.5. The Site is located on the East Midlands Shelf. In 1:50,000 geological mapping published by the BGS, the Site is shown underlain by the Sherwood Sandstone Group (SSG). This is sedimentary bedrock formed approximately 229 to 271 million years ago in the Triassic and Permian Periods in a local environment previously dominated by rivers, floodplain and lacustrine environments.
- 5.1.6. Publicly available BGS borehole logs from the Site were reviewed. The borehole records reviewed are summarised in **Table 5.1**.

Table 5.1 - Historical Borehole Records

Borehole Reference	Location (NGR)	Area – Direction within Area
SE62NE29	466694, 427703	Drax Power Station – North East
SE62NE30	466597, 427501	Drax Power Station – North East
SE62NE49	466671, 427102	Drax Power Station - East
SE62NE122	466054, 427753	Drax Power Station – North West
SE62NE123	466612, 428037	Environmental Mitigation Area - South
SE62NE124	466975, 428497	Environmental Mitigation Area - Centre
SE62NE125	467306, 428851	Environmental Mitigation Area - North
SE62NE197	465870, 427760	Drax Power Station – North West
SE62NE198	466050, 427820	Drax Power Station – North West
SE62NE199	466140, 42790	Drax Power Station – North West
SE62NE200	466130, 427860	Drax Power Station – North West
SE62NE202	466310, 428000	Drax Power Station – North
SE62NE203	466490, 428020	Environmental Mitigation Area - South
SE62NE204	466630, 428110	Environmental Mitigation Area - South
SE62NE206	467070, 428210	Laydown Area - North
SE62NE207	467200, 428280	Environmental Mitigation Area - East

5.1.7. The BGS borehole logs were reviewed and a summary of the ground conditions in the logs is presented in **Table 5.2.**

Table 5.2 - Summary of Borehole Records

Strata	Depth to Top of Strata (m bgl)	Thickness (m)	Typical Strata Description
Made Ground	0.00	0.20 – 2.00	Topsoil Fill
Warp	0.40	9.66	Spongey peat with fragments of decaying timber. Very silty clay and clayey silt.
Alluvium	0.20 - 0.90	0.50 – 3.20	Mottled brown and grey silty clay. Grey and brown clayey sand.
Hemingbrough Glaciolacustrine Formation	0.00 – 10.05	0.50 – 17.10	Stiff laminated clay. Stiff mottled red and grey clay
Breighton Sand Formation	0.90 - 17.40	1.00 – 4.10	Grey / brown sand.
Sherwood Sandstone	18.75 – 20.00	Not proven	Sandstone.

5.2. SOIL QUALITY – AGRICULTURAL LAND CLASSIFICATION

- 5.2.1. The ALC map for the 'Yorkshire & The Humber Region' (ALC003) (Natural England, 2021) published by Natural England in August 2010 (based on data obtained between 1967 and 1974) shows agricultural land within the Site of ALC Grade 3 'Good to Moderate', Grade 2 'Very Good' and Grade 1 'Excellent'. However, the majority of the Site is non-agricultural land.
- 5.2.2. It is acknowledged that this map is not of sufficient accuracy for the assessment of individual sites and forms part of a series at 1:250,000 scale intended for strategic use only.

5.3. HYDROGEOLOGY

- 5.3.1. The geological units on the Site are assigned the following aquifer classifications by the Environment Agency (EA):
 - The Warp is a Secondary A Aquifer;
 - The Alluvium is a Secondary A Aquifer;
 - The Hemingbrough Glaciolacustrine Formation is unproductive strata;
 - The Breighton Sand Formation is a Secondary A Aquifer; and
 - The Sherwood Sandstone Group is a Principal Aquifer.
- 5.3.2. The Applicant holds a licence for two active groundwater abstractions within the 250 m study area (Licence No. 2/27/24/199). These are located between 96 m (Borehole 2) and 188 m (Borehole 1) north west of the Site Boundary. The record details that the abstractions are used for 'General Use Relating to Secondary Category (Medium Loss)' from boreholes within the Sherwood Sandstone.
- 5.3.3. In addition, a further two active groundwater abstractions are located within the 1 km study area both relating to abstraction for spray irrigation sourced from the Sherwood Sandstone; APS Growers Ltd (Licence No. 2/27/24/197) operate an abstraction point located 377 m south west of the Site Boundary and the Hambleton Abstraction Partnership hold a licence for an abstraction located 977 m north west of the Site Boundary (Licence No. NE/027/0024/003/R01). The EA provided details of two abstraction locations within the 250 m study area, between approximately 25 m and 200 m south of the Site, the abstractions are both recorded as being sourced from the Sherwood Sandstone and utilised for spray irrigation direct.
- 5.3.4. The majority of the Site is located within a groundwater Source Protection Zone (SPZ) 3 (total catchment). The protected groundwater sources are located to the south at Carlton.

5.4. HYDROLOGY

- 5.4.1. The nearest major surface water feature is the River Ouse, located adjacent to the north east of the Site. The river flows eastwards into the Humber Estuary. The River Ouse is a 'main river' as defined by the EA (a river for which the EA has powers to carry out maintenance, improvement or construction work to manage flood risk).
- 5.4.2. There are a number of field drains and other minor river channels within the Study Area, including Carr Dyke drain in the centre of the Study Area, Lendall Drain in the north of the Environmental Mitigation Area and a number of ponds associated with Drax Power Station and the Environmental Mitigation Area.

Table 5.3 - Surface Water Abstractions

NGR	Source	Details	Status
466300, 430300	River Ouse	Spray Irrigation – Direct	Historical
466300, 428000	Carr Dyke / Lendall Drain	Spray Irrigation – Direct	Historical
466998, 428510	Lendall Drain at Drax Abbey Farm	Spray Irrigation – Direct	Historical
466998, 428510	Lendall Drain at Drax Abbey Farm	Spray Irrigation – Direct	Active
467580, 428700	Tidal River Ouse – Long Drax	Process Water	Historical
467580, 428700	Tidal River Ouse – Long Drax	Boiler Feed	Historical
467580, 428700	Tidal River Ouse – Long Drax	General Use	Historical

5.5. FLOODING

- 5.5.1. The northern part of the Site, adjacent to the River Ouse, is located within Flood Zone 3, indicating a high probability of flooding. The central areas of the Site are located within Flood Zone 3 within an area that benefits from flood defences. The majority of the southern part of the Site (around the Drax Power Station area) is located within Flood Zone 1 indicating a low probability of flooding.
- 5.5.2. The Groundsure report indicates the discrete areas across the Site are susceptible to surface water flooding with the highest risk being present in the centre of the Study area which has a risk of flooding greater than 1m with a return period of 1 in 30 years.
- 5.5.3. The Groundsure report indicates that the majority of the southern part of the Drax Power Station Area has a Moderate risk of groundwater flooding, whereas the northern portion of the Drax Power Station Area and the majority of the Environmental Mitigation Area have a high risk from groundwater flooding.

5.6. ENVIRONMENTAL DESIGNATIONS

5.6.1. There are no geological Sites of Special Scientific Interest (SSSIs) located within the Site Boundary. There are no known regionally important geological Sites (RIGS) located on the Site.

5.7. REGISTERED LANDFILLS

- 5.7.1. The following registered landfills are present on the Site and within 250 m of the Site:
 - New Road Landfill Site, located in the centre of the Site at the southern end of the Environmental Mitigation Area (license ref. 0700/NYCC/075, operational between 1978 and 1982). The landfill is recorded as accepting 'non-biodegradable waste' and 'inert' wastes.
 - Camblesforth By-Pass Tipping Site, located adjacent to the south of the Study Area (licence ref. 0700/NYCC/076, operational between 1978 and 1982). The landfill is recorded as accepting inert and industrial wastes.
 - Barlow Mound Ash Disposal Site, located to the west of the Study Area and
 extending into the west of the Study Area. This is a 'very large' landfill (maximum
 input rate ≥250,000 tonnes per year) operational since 1977. Deposited wastes
 included industrial wastes and principally pulverised fuel ask and furnace bottom
 ash.

5.8. RADON

5.8.1. Public Health England records that the Site is located within a lower probability Radon area (less than 1% of properties affected).

5.9. MINING

- 5.9.1. The Coal Authority interactive viewer indicates that the northern part of the Site (predominantly in the Environmental Mitigation Area) is located within a coal mining reported area.
- 5.9.2. The Groundsure report indicates that the Site is not located within an area where non-coal mining activities have occurred.
- 5.9.3. Despite this, the Groundsure report reports a number of surface ground workings and British Pits located on the Site associated with a refuse heap, settling ponds and the production of pulverised fuel ash, desulphogypsum and furnace bottom ash by Drax Power Station.

5.10. ECOLOGICAL DESIGNATIONS

5.10.1. The River Derwent SSSI and SAC is present 0.1 km to the north of the Site. There are non-statutory designated sites within the 250 m of the Site, namely Disused Railway Embankment SINC (no longer designated) immediately adjacent to the Site boundary and Barmby-on-the-Marsh Local Wildlife Site (LWS) 0.05 km east of the Site boundary. Based on the Groundwater Dependent Terrestrial Ecosystems (GWDTE) Map of England, the closest GWDTE is the River Derwent SSSI.

5.11. PRELIMINARY HYDROGEOLOGICAL MODEL

Groundwater may be present within Made Ground deposits underlying the Site as isolated pockets of perched water but is unlikely to be present as a coherent

groundwater body. Shallow groundwater is likely to be present within the Warp and Alluvium strata, as well as the deeper Breighton Sand Formation and Sherwood Sandstone which may be in hydraulic continuity. The Hemingbrough Glaciolacustrine Formation is classified as unproductive strata, and where present in sufficient thickness, is likely to act as an aquiclude restricting the vertical flow of groundwater between the shallow and deeper aquifers. Shallow groundwater (within the Warp and Alluvium) is considered likely to flow broadly towards the east / northeast towards the River Ouse. Groundwater flow direction within the deeper groundwater (Breighton Sand Formation and Sherwood Sandstone) is likely to be greatly influenced by the abstraction boreholes (discussed in further detail below), and therefore the groundwater flow direction may vary over time.

6. REGULATORY INFORMATION AND CONSULTATION

6.1. REGULATORY DATABASE

- 6.1.1. The Groundsure report includes information and data collected from several organisations including Ambiental Risk Analytics, the Coal Authority, the Environmental Agency (EA), Groundsure Limited, the Local Authority, Historic England, Natural England, the British Geological Survey (BGS, Department of Environment and Rural Affairs (DEFRA) and Health & Safety Executives (HSE).
- 6.1.2. It is considered that the information listed in **Table 6.1** represents those of potential concern in relation to contamination of the Site. The full Groundsure report is provided in **Appendix E**.

Table 6.1 – Summary of Database Searches (all distances are approximate)

Descriptor	On- Site	0- 250 m	251- 500 m	Details
Historical Land Uses	26	29	17	Historical land uses include pump houses, power station, unspecified heaps and tanks, sewage works, chimneys and railway sidings related to the power station infrastructure identified on historical maps from 1957 to 1995.
Historical Tanks	51	32	9	Unspecified tanks identified across the power station site on historical maps from 1971 to 1994.
Historical Energy Features	4	5	2	On Site historical energy features include the power station and electricity sub stations.
Active or recent Landfill	1	0	1	Drax Power Limited highlight an active landfill immediately north west of the Site (adjacent to and including Hook's Fields) which is classified as Waste Landfilling; >10T/D with a capacity of >25,000 tonnes excluding inert waste.
Historical Landfill	1	1	2	The Central Electricity Generating Board North Eastern Region was the licence holder for a historical landfill located in the central east. It was recorded as operating from October 1978 till December 1982. Inert wastes were recorded as being placed within the landfill.
Licensed Waste Sites	4	8	10	Drax Power Station hold a permit for a Landfill taking Non-Biodegradable Wastes.

Descriptor	On- Site	0- 250 m	251- 500 m	Details
				The permit has undergone three variations and have been related to a change in size from 25,000 tonnes to 75,000 tonnes and an annual tonnage of 150,000.
Waste Exemptions	5	41	16	Five exemptions on Site indicate the use of non-agricultural waste for waste use of mulch (ref EPR/JE5689VU/A001 and ref EPR/FE5088VF/A001), waste for a spreading of plant matter to confer benefit (EPR/JE5689/A001 and EPR/FE5088VF/A001) and use of waste in construction (EPR/JF0108SL/A001).
Recent Industrial Land Uses	75	50	0	Current potentially contaminative industrial features on Site include pylons, pumping stations, travelling cranes, cooling towers, slurry beds, sludge lagoons, tanks, Drax Biomass Power Station – Unit 3 – Biomass, settling ponds, mast (telecommunication), concrete products, mechanical engineers. Pertinent off-Site industrial land uses include pylons, tanks, travelling cranes, chimney, distribution and haulage and electrical substations.
Electricity Cables	12	4	6	Six underground high voltage 400KV electricity cables were noted with installation dates in 1985 and six underground 66KV electricity cables installed in 2004.
Control of Major Accident Hazards (COMAH)	3	0	1	In two areas on Site, Drax Power Limited have an operational status as a COMAH Site and area a Lower Tier Operator. The Central Electricity Generating Board (CEGB) have a historical Notification of Installations Handling Hazardous Substances (NIHHS) record on Site.
Hazardous substance storage/usage	4	1	4	The records relate to consents granted to hold certain quantities of hazardous substance at or above defined limits in accordance with the Planning (Hazardous Substances) 2015 Regulations. In 2011, an application for consent under the Planning (Hazardous Substances) Act 1990 was

Descriptor	On- Site	0- 250 m	251- 500 m	Details
				noted to be in place. In 2012, the historical consent was put in place and approved for the storage and use of substance. In 2013, an application for the use of substances at the White Rose Carbon Capture Project was approved.
Historical licensed industrial activities (IPC)	36	34	0	Drax Power Limited report on records of substances release to air, land and water. There are noted to be 36 variations for combustion processes across the Site with dates ranging from 1993 to 2007.
Licensed industrial activities (Part A(1))	102	0	70	There are 102 different licensed industrial activities that take place on Site. These include loading, unloading of storing of pulverised ash, other waste disposal for non-hazardous waste by biological treatment, fuel combustion, inorganic chemicals, storage of chemicals in bulk, disposal of non-hazardous waste involving physico-chemical treatment, recovery or a mix of recovery and disposal of non-hazardous waste involving treatment of slags and ashes.
Licensed pollutant release (Part A(2)/B)	0	1	1	The nearest pollutant release is for quarry processes and is located 104 m northwest of the Site.
Licensed Discharge to Controlled Waters	42	25	15	There are numerous licensed discharges to controlled waters which include historic sewage discharge and trade discharge to Carr Dyke, further trade discharges to Northern Perimeter drains, Abbey Dyke, tributaries of the River Ouse and tributaries of Carr Dyke, Lendall Drain and trade discharge to land. Additionally, there were unspecified trade discharges via land drain outlet C to an unknown receiving water.
List I Dangerous Substances	1	1	1	On Site: Authorised substances on List I regulated under the Environmental Damage (Prevention and Remediation) Regulations

Descriptor	On- Site	0- 250 m	251- 500 m	Details
				included Mercury (other) and Cadmium which were noted to flow into receiving water (Humber, Green Dyke, Ouse).
Pollution Incidents (EA/NRW)	2	3	1	There have been two pollution incidents on the Site; one incident relating to air in August 2001 involving the release of smoke, and the other pollution incident relating to the release of contaminated water. The events were classified as Category 3 (Minor Incident). The next closest incident occurred 19 m to the south in November 2019, involving inert materials and wastes which impacted land and was classified as Category 2 (Significant).
Pollution Inventory Substances	32	0	0	Drax Power Limited report on annual emissions of certain regulated substance to land, air and water. Arsenic, copper, nickel, carbon dioxide, nitrous oxide, carbon dioxide from qualifying renewable fuel sources, chlorine and inorganic chlorine compounds, particular matter, naphthalene, mercury, benzo(a)pyrene, polychlorinated biphenyls, fluorine and inorganic fluorine compounds, zinc, nitrous oxide and cadmium were all emitted to air above the reporting threshold.
Pollution Inventory Waste Transfers	1	0	0	The pollution inventory waste transfers include the reporting on annual transfers and recovery/disposal of controlled wastes from a Site. Those that exceeded the hazardous value include: oil of other refuses of oil, lead batteries, aqueous liquids containing dangerous substances, glass, plastics and wood containing or contaminated with dangerous substances, insulating and construction materials containing asbestos, acids, fluorescent tubes and other mercury containing waste, organic waste containing dangerous substances, fuel oil and diesel, gas in pressurised container, inorganic wastes, other halogenated solvents and solvent mixtures, antifreeze, sludges from oil/water separators, waste adhesives and sealants

Descriptor	On- Site	0- 250 m	251- 500 m	Details
				containing organic solvents and sodium and potassium hydroxide.

6.1.3. There are no regulated explosive sites, recent or current petrol stations, gas pipelines registered radioactive substances, sites determined as contaminated land (under part 2A), radioactive substances authorisations, pollutant release to surface waters and public sewers, List 2 dangerous substances and pollution inventory radioactive waste within 500 m of the Site.

6.2. LOCAL AUTHORITY

- 6.2.1. Selby District Council (SDC) was contacted on 16 April 2021 via email regarding environmentally pertinent information held relating to the Site. A response was received on the 1 June 2021.
- 6.2.2. An environmental information request was carried out by SDC on 10 June 2021 which included the following:
 - Areas of potentially contaminated land were noted in the area of Drax Power Station, in the adjacent Barlow Ash Tip and landfill sites to the northwest of the site:
 - Historical landfill noted on site in the north east of power station (New Road Landfill). Offsite landfills relate to Camblesforth Bypass Tip in the northwest and another to the south of the power station;
 - The geology of the site is presented as superficial Alluvium in the north (adjacent to the River Ouse), occasional superficial Breighton Sand Formation and superficial Hemingbrough Glaciolacustrine Formation over the remainder of the site area. The entire site superficial geology is shown to be underlain by Sherwood Sandstone:
 - Published records from Public Health England (PHE) indicate all areas within the site boundary are in the lowest band of radon potential (less than 1% of homes in the area above the action level); and
 - The central to southern portion of the site (Drax Power Station and lower half of the Environment Mitigation Area are within a Source Protection Zone 3.
- 6.2.3. A copy of the response is included in **Appendix F**.

6.3. ENVIRONMENT AGENCY

6.3.1. The EA was contacted via email on several occasions between May and July 2021 regarding environmentally pertinent information held relating to the Site.

- 6.3.2. A response was received by the EA on 28 May 2021, 29 June 2021 and 30 July 2021 respectively and highlighted the following:
 - There are two recorded historic landfill Sites in the vicinity of the Site including:
 - ➤ Camblesforth Bypass Tip Site operational from August 15, 1978 to March 26, 1982. The licence was issued October 26, 1978 and surrendered December 31, 1982; and
 - ➤ New Road Landfill took inert construction waste and was operational from August 15, 1978 to December 31, 1982. The licence was issued October 26, 1978 surrendered December 31, 1982.
- 6.3.3. There are 2 permitted and active waste recovery and management facilities within the area of interest, details are below:
 - Site Name: Aggregate Industries U K Limited; Registration number: EB3602HM;
 Site type: A15: Material Recycling Treatment Facility;
 - Site Name: Barlow Ash Disposal Site; Registration number: CP3790ZG; Site Type: A7: Industrial Waste Landfill (Factory curtilage); and
- 6.3.4. The Environment Agency is not aware of any Special Sites in the vicinity of the Site.
- 6.3.5. A copy of the response is included in **Appendix F**.

6.4. UNEXPLODED ORDNANCE (UXO)

6.4.1. The Zetica online bomb map for the Site indicates that there is a low risk from encountering a UXO on-Site. Therefore, the risk should be considered to be **Low**. A copy of the map is included in **Appendix G**.

7. PRELIMINARY CONCEPTUAL SITE MODEL

7.1. INTRODUCTION

- 7.1.1. The preliminary CSM is based upon the environmental conditions of the Site as described in the previous sections and was developed in the context of the development of the Proposed Scheme at the Site.
- 7.1.2. The assessment followed a risk-based approach; with the potential environmental risk assessed qualitatively using the 'source-pathway-receptor' contaminant linkage concept introduced in the guidance documents (principally the EA's LCRM 2021 guidance) on the practical implementation of the Environmental Protection Act 1990.
- 7.1.3. Environmental risk can be defined as the combination of the consequence of a harmful effect and the probability of its occurrence. The existence of a contaminant linkage is primarily dependent on Site usage and environmental conditions.
- 7.1.4. The environmental risk assessment has been carried out by identifying and evaluating the significance of the following:
 - Potential sources of contamination: these include actual or potentially contaminating materials and activities, located either on or in the vicinity of the Site:
 - Potential receptors of contamination: these include Site users, groundwater and surface waters; and
 - Potential pathways for contamination migration: these are the routes or mechanisms by which contaminants may migrate from the source to the receptor.

7.2. POTENTIAL SOURCES OF CONTAMINATION

7.2.1. **Table 7.1** provides a summary of the potential sources of contamination that may be present at the Site, as well as the likely nature of such sources.

Table 7.1 - Potential Sources of Contamination

Potential Source	Potential Contaminants of Concern	Likely / Anticipated Distribution
On-Site		
Made Ground associated with historical development on the Site and landfilling	Petroleum hydrocarbons, Polycyclic Aromatic Hydrocarbons (PAHs), Benzene Ethylbenzene, Toluene, Xylene (BTEX), Volatile Organic Compounds (VOCs), Semi Volatile Organic Compounds (SVOCs), heavy metals, inorganics (i.e. cyanide),	Made Ground likely to be encountered across the area occupied by Drax Power Station (south). Landfilling noted from registered landfills in the west of the Environment Mitigation Area (central section).

Potential Source	Potential Contaminants of Concern	Likely / Anticipated Distribution				
	asbestos, ground gas (methane and carbon dioxide) and vapours.					
Drax Power Station and associated processes	Range of contaminants including petroleum hydrocarbons, PAHs, heavy metals, VOCs, SVOCs and inorganics	Drax Power station complex including all buildings and coal stock ground (southern section).				
Historical Sewage Works including sludge lagoons and settling ponds	Asbestos, heavy metals, inorganics, petroleum hydrocarbons, PAH pathogens, pesticides.	Drax Power station complex (southern section).				
Various tanks	Depending on contents, range of contaminants including petroleum hydrocarbons, mineral oils, PAHs.	Drax Power station complex (southern section).				
Railway sidings	Asbestos, petroleum hydrocarbons, BTEX, PAH, VOCs, SVOCs, heavy metals, inorganics (i.e. cyanide), creosotes and phenols.	South west section of Drax Power Station.				
Agricultural Uses	Inorganics, pesticides and fertilisers.	Environmental Mitigation area and laydown area (north and central sections).				
Off-Site						
Made Ground and Landfilling	Petroleum hydrocarbons, BTEX, Polycyclic Aromatic Hydrocarbons (PAHs), heavy metals, inorganics (i.e cyanide), ground gas (carbon dioxide and methane), VOCs, SVOCs, and asbestos.	To the south and west of the Site highlighting the potential for migration of contaminated groundwater and ground gases beneath the Site from these off-Site sources.				
Various tanks	Depending on contents, range of contaminants including petroleum hydrocarbons, mineral oils, PAHs.	North West, West and South West of the Site.				

Potential Source	Potential Contaminants of Concern	Likely / Anticipated Distribution
Various ash and refuse tips	Asbestos, heavy metals, PAH.	North West and West of the Site.
Historical land uses including: Railways/sidings/station Goods Shed Depots	Asbestos, heavy metals, PAH, petroleum hydrocarbons, VOCs, SVOCs, inorganics (i.e. cyanide), creosotes and phenols.	West and South west of Drax Power Station.
Transformers and Substations	Polychlorinated bi-phenyls (PCBs) and mineral oils.	120 m south west.

7.3. POTENTIAL RECEPTORS

7.3.1. In the context of the proposed redevelopment of the Site, the following potential receptors were identified:

Human Health

- Future Site users, Site workers and visitors (within the area of the Proposed Scheme);
- · Construction and maintenance workers; and
- Third party neighbours (including the wider Drax Power Station, Environmental Mitigation Area, Laydown area and neighbouring land).

Controlled Waters

- Groundwater within the Breighton Sand Formation, Alluvium and Warp (Secondary A Aquifers) and the Sherwood Sandstone Formation (Principal Aquifer);
- Surface Water (e.g. River Ouse, Carr Dyke and Lendall Drain); and
- Ecological receptors (Groundwater Dependant Terrestrial Ecosystems).

Building Fabric and Services

- Below ground structures; and
- Building services.

Other

Agricultural Soils.

7.4. PLAUSIBLE PRELIMINARY CONTAMINANT LINKAGES

7.4.1.	Table 7.2 provides an evaluation of the potential contaminant linkages that are
	considered to be plausible on the basis of the information currently available for the
	Site and the proposed end use.

Table 7.2 - Plausible Contaminant Linkages

Potential Contaminants	Potential Pathways	Potential Receptors	Probability	Consequences	Comments
Made Ground associated with historical development on the Site and landfilling. Drax Power Station and associated processes Historical Sewage Works including sludge lagoons and settling ponds Various tanks Railway sidings Agricultural land uses Off Site sources including ash tips, landfills, sidings,	Inhalation of asbestos fibres	Future Site users, workers and visitors (to the BECCS plant) Third party neighbours (including the wider Drax Power Station, Environmental Mitigation Area and Laydown Area).	Low	Medium	Based on historical uses of the Site, asbestos may be present within Made Ground deposits and within the current building fabric. However, the majority of the Site is covered by hardstanding and the development of the Proposed Scheme is anticipated to include hardstanding cover therefore providing a pathway break between potential asbestos in shallow soils. Therefore, the exposure of Site users and third party neighbours in areas covered by hardstanding is unlikely to be a significant risk. There is limited hardstanding cover in the south west of the Drax Power Station Site, the Environmental Mitigation Area and the Laydown Area, therefore there is the potential for there to be a pathway between potential asbestos in shallow soils and human health receptors.

Potential Pathways	Potential Receptors	Probability	Consequences	Comments
substations and depots		Construction / maintenance workers	Medium	Low to Moderate Risk Construction and maintenance workers are more likely to encounter asbestos fibres during any excavation and any potential earthworks required for the new development. As such, this would pose a Moderate risk to construction/maintenance workers during the construction phase. However, the risks should be managed through the appropriate use of PPE and RPE. It is assumed that construction/maintenance workers would undertake work in line with Health and Safety
Dermal contact, ingestion and inhalation of impacted Made	Future Site users, workers and visitors (to	Low	Medium	Protocols outlined in the Health and Safety at Work Act 1974 and under Construction (Design and Management) Regulation 2015, therefore the risk is considered to be Low to Moderate. Low to Moderate Risk Due to historical processes and development of the buildings on-Site and off-Site, there is
	Dermal contact, ingestion and	Pathways Construction / maintenance workers Dermal contact, ingestion and inhalation of impacted Made Receptors Construction / maintenance workers Future Site users, workers and visitors (to the BECCS	Pathways Construction / maintenance workers Low Dermal contact, ingestion and inhalation of impacted Made Construction / maintenance workers Low Low Low Low Low Low Low Lo	Pathways Construction / maintenance workers Low Medium Dermal contact, ingestion and inhalation of impacted Made Receptors Low Medium Medium Medium

Potential Contaminants	Potential Pathways	Potential Receptors	Probability	Consequences	Comments
	particles and ingestion of contaminated water	Third party neighbours (including the wider Drax Power Station, Environmental Mitigation Area and Laydown Area).			contaminants to be present such as hydrocarbons, PAHs and heavy metals within soils at the location of the Proposed Scheme, however the existing soil will be capped by hardstanding post Site development. There is limited hardstanding
		,			cover in the south west of the Drax Power Station Site, the Environmental Mitigation Area and the Laydown Area, therefore there is the potential for there to be a pathway between potential contaminants in shallow soils and human health receptors.
		Construction / maintenance workers.	Low	Medium	Low to Moderate Risk Construction and maintenance workers are more likely to encounter potential contaminants during any excavation and or any potential earthworks processes required for the new development. As such, this would pose a Moderate risk to construction/maintenance workers during the construction

Potential Contaminants	Potential Pathways	Potential Receptors	Probability	Consequences	Comments
	•				phase. However, the risks should be managed through the appropriate use of PPE and RPE. It is assumed that construction/maintenance workers would undertake work in line with Health and Safety Protocols outlined in the Health and Safety at Work Act 1974 and under Construction (Design and Management) Regulation 2015, therefore the risk is considered to be Low to Moderate.
	Vertical and lateral leaching from impacted soil and lateral migration of impacted groundwater derived from on-Site and off-Site sources.	Surface Water: River Ouse, Carr Dyke, Lendall Drain and Ecological receptors (Groundwater Dependant Terrestrial Ecosystems) Groundwater: Breighton Sand Formation, Alluvium and Warp (Secondary A Aquifers) and	Low	Medium	Low to Moderate Risk Based on the hydrogeological model, the Site is anticipated to be overlying Secondary A Aquifers (Warp, Alluvium and Breighton Sand Formation) and a Principal aquifer (Sherwood Sandstone). Historical reports from previous Site investigations has highlighted that Made Ground is present beneath the Site and has been shown to contain perched water within the unit. Therefore, there is the potential for contaminants to leach from Made Ground soils into

Potential Contaminants	Potential Pathways	Potential Receptors	Probability	Consequences	Comments
		the Sherwood Sandstone Formation			underlying permeable layers. This has the potential to facilitate lateral migration off Site, potentially to nearby surface water receptors and GWDTE. There are a number of surface water features located on the Site (Carr Dyke, Lendall Drain and various field drains) which have the potential to be in continuity with shallow groundwater. Therefore, there is the potential contaminants within shallow groundwater to migrate and impact these surface water receptors.
					Drax holds a licence for two active groundwater abstractions from the Sherwood Sandstone. In addition, there are two abstraction points located 96 m and 188 m north west of the Power Station Site which are operated by Drax. There is the potential for the groundwater abstractions on the Site to influence the groundwater flow direction and therefore the migration of potential contaminants within

Potential Contaminants	Potential Pathways	Potential Receptors	Probability	Consequences	Comments
					groundwater underlying the Site.
					Due to the surrounding permeable geology, there is also potential for contaminants to migrate onto the Site from the immediate surrounding area.
					Given that the Proposed Scheme may include piling, this may create a vertical pathway from the Made Ground, through the Warp/Alluvium and into the underlying Breighton Sand Formation and Sherwood Sandstone aquifers. Given this, a piling risk assessment would be required to assess the risks to the aquifers underlying the Site and ensure that additional pathways are not being created by piling activities.
	Inhalation of	Human Health	Unlikely	Medium	Low Risk
	hazardous ground gases or vapours	gases or construction and			Accumulation of hazardous gases in confined spaces may increase the risk of explosion from methane and asphyxiation by carbon dioxide under extreme weather conditions such as low and falling

Potential Contaminants	Potential Pathways	Potential Receptors	Probability	Consequences	Comments
					atmospheric pressure. There are ground gas sources from Made Ground and landfilling from on and off-Site sources, however, the Proposed Scheme is anticipated to be situated on hardstanding and be un-occupied by Site users, the risk is considered to be Low.
	Direct contact with impacted soils and groundwater (chemical attach and degradation from aggressive contaminants)	Below ground construction materials including concrete and plastic water pipes	Low	Mild	Low Risk There is the potential for contaminants to pose risks to water pipes and below ground structures. Soils with high sulphate or sulphide contents and petroleum hydrocarbons may exist and may present a risk to buried concrete.
	Migration of potential contaminants within soil or groundwater onto agricultural land	Agricultural soils	Low	Mild	Low Risk Based on the area of Proposed Scheme within the Drax Power Station complex and distance to agricultural land (< 500 m), there is unlikely to a significant impact. However, the Environmental Mitigation Area and Laydown

Potential Contaminants	Potential Pathways	Potential Receptors	Probability	Consequences	Comments
					Area comprise agricultural land, therefore there is a risk from proposed activities within these areas.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1.1. Based on the findings of the Site walkover and the desk-based assessment, the following conclusions and recommendations are made in the context of the Proposed Scheme.

8.2. CONCLUSIONS

- 8.2.1. The Site is approximately 290 ha and comprises the Drax Power Station complex, agricultural fields and hedgerows.
- 8.2.2. It is understood that the Applicant intends to install post combustion Carbon Capture technology to capture carbon dioxide from up to two existing 660-megawatt electrical ('MWe') biomass power generating units at the Drax Power Station (Unit 1 and Unit 2). The Proposed Scheme is designed to remove approximately 95% (design basis capture rate) of the carbon dioxide from the flue gas from those two units.
- 8.2.3. WSP has undertaken a historical review for the Site and surrounding area. The earliest map from 1853 shows that the Site was predominantly undeveloped agricultural land with the exception of Wood House in south east. Several dykes and drains were noted in the Site area from the late 1800s with railway sidings noted in the most southerly extent of the site by the early 1900's. No further significant changes were noted on historical maps until the early 1970s when Drax Power Station was developed with associated tanks, gantry's (which replaced Wood House), sewage works, sludge lagoons, chimneys, cooling towers and railway siding which traversed north -south from the south west. Further expansion of the Drax Power Station in the early 1980s with the addition of large circular tanks in the south west, settling ponds adjacent to the sewage works and the addition of a number of Cooling Tower's. During the early to mid-1990s, the sewage works was no longer present in the west appearing to have been replaced with buildings and tanks.
- 8.2.4. Pertinent historic and current surrounding land features includes Drax Abbey, fuel handling plants, railway sidings, Drax Station, Camblesforth brickyard, windmill pumps, depots, several tanks, settling tanks, incinerators, ponds, ash tips and electrical substations.
- 8.2.5. The BGS Maps and the BGS online interactive viewer indicates that the Site is underlain by superficial deposits comprising Alluvium, the Warp, the Hemingbrough Glaciolacustrine Formation, the Breighton Sand Formation. The bedrock geology underlying the entire Site is recorded as the Sherwood Sandstone Formation.
- 8.2.6. The superficial deposits of the Warp, Alluvium and Breighton Sand Formation are classified by the Environment Agency as Secondary A Aquifers and the Hemingbrough Glaciolacustrine Formation is classified as unproductive strata. The Sherwood Sandstone Group is classified as a Principal Aquifer.
- 8.2.7. Groundwater may be present within Made Ground deposits underlying the Site as isolated pockets of perched water but is unlikely to be present as a coherent

groundwater body. Shallow groundwater is likely to be present within the Warp and Alluvium strata, as well as the deeper Breighton Sand Formation and Sherwood Sandstone which may be in hydraulic continuity. The Hemingbrough Glaciolacustrine Formation is classified as unproductive strata, and where present in sufficient thickness, is likely to act as an aquiclude restricting the vertical flow of groundwater between the shallow and deeper aquifers. Shallow groundwater (within the Warp and Alluvium) is considered likely to flow broadly towards the east / northeast towards the River Ouse. Groundwater flow direction within the deeper groundwater (Breighton Sand Formation and Sherwood Sandstone) is likely to be greatly influenced by the abstraction boreholes, and therefore the groundwater flow direction may vary over time.

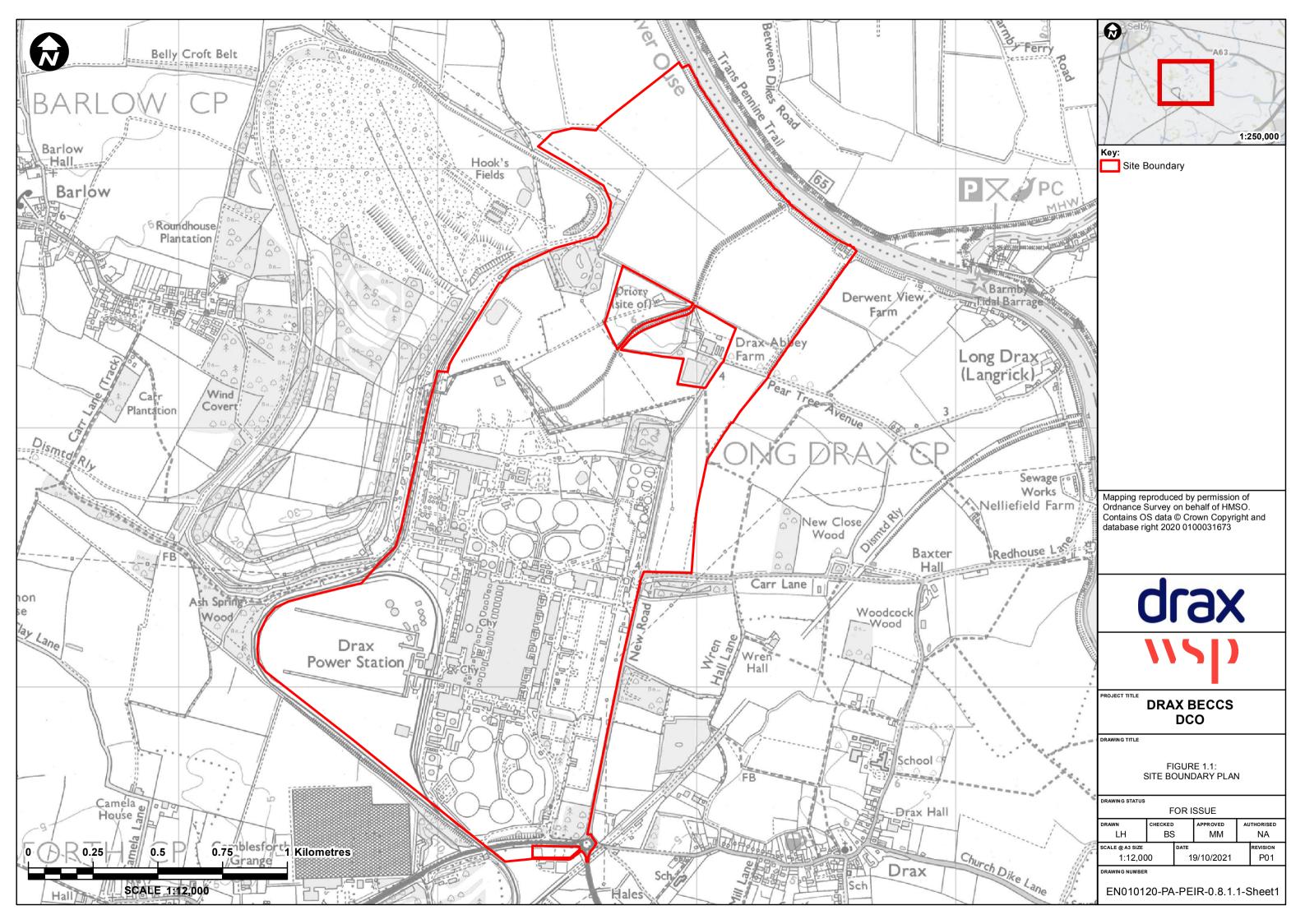
- 8.2.8. The nearest major surface water feature is the River Ouse, located adjacent to the north east of the Site. The river flows eastwards into the Humber Estuary. There are a number of field drains and other minor river channels located on the Site, including Carr Dyke, Lendall Drain in the north of the Environmental Mitigation Area and a number of ponds associated with Drax Power Station and the Environmental Mitigation Area. The River Derwent SSSI, SAC and GWDTE is located 100 m to the north of the Site.
- 8.2.9. Following assessment of plausible pollutant linkages, there is a **Low to Moderate Risk** to future Site users and adjacent Site users from potential contaminants within soil. Risks to construction workers during excavation/earthworks from asbestos is considered to be **Moderate** However, these risks to workers should be managed through health and safety protocols under Construction (Design and Management) Regulation 2015 and would reduce the risk to **Low to Moderate**.
- 8.2.10. There is an overall **Low to Moderate Risk** to controlled waters and a **Low Risk** to buildings and underground structures.
- 8.2.11. Risks to future Site users from potential ground gas ingress area considered to be **Low.**

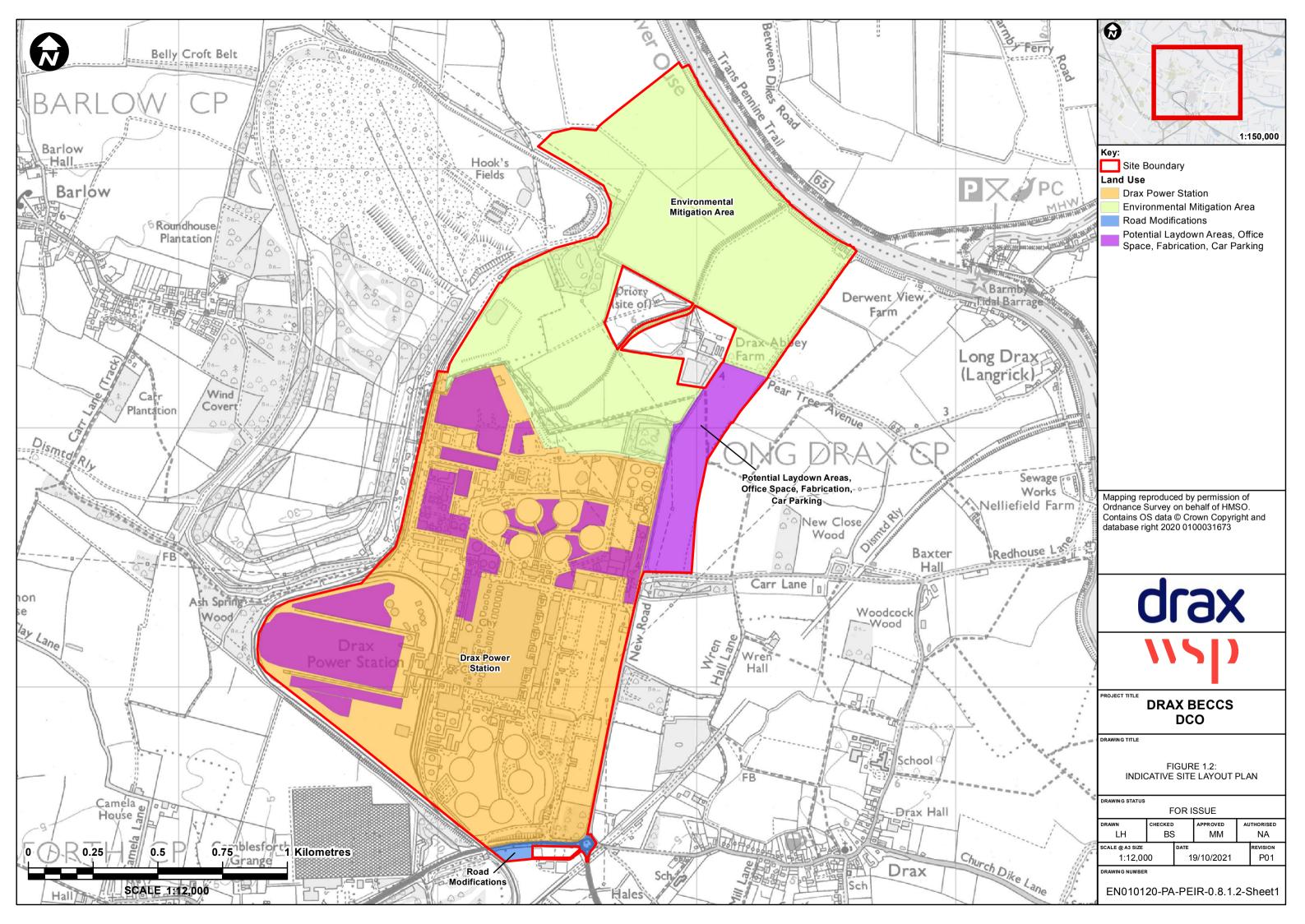
8.3. RECOMMENDATIONS

- 8.3.1. The following is recommended based on this Preliminary Contaminated Land Risk Assessment.
- 8.3.2. An intrusive ground investigation should be undertaken in the area of the Proposed Scheme. The ground investigation should be compliant with current UK guidance e.g. BS10175 and include a Generic Quantitative Risk Assessment (GQRA) to allow the assessment of identified plausible contaminant linkages and if remedial measures may be required. Geotechnical testing should also be undertaken to inform foundation design. It is recommended that the ground investigation is designed based on the following technical objectives:
 - Characterisation of the ground and groundwater conditions;
 - Soil and groundwater sampling for contamination and geotechnical testing;

- Groundwater and ground gas monitoring;
- Provision of a GQRA to assess risks to human health and controlled waters;
- An assessment of potential foundation design and geotechnical constraints (if required); and
- Given that the Proposed Scheme may include piling, a piling risk assessment should be undertaken to assess the risks to the deeper underlying aquifers.

APPENDIX A - FIGURES AND DRAWINGS





APPENDIX B - LIMITATIONS



GENERAL

- 1. WSP UK Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.
- Unless explicitly agreed otherwise, in writing, this report has been prepared under WSP UK Limited standard Terms and Conditions as included within our proposal to the Client.
- 3. Project specific appointment documents may be agreed at our discretion and a charge may be levied for both the time to review and finalise appointments documents and also for associated changes to the appointment terms. WSP UK Limited reserves the right to amend the fee should any changes to the appointment terms create an increase risk to WSP UK Limited.
- 4. The report needs to be considered in the light of the WSP UK Limited proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

PHASE 1 GEO ENVIRONMENTAL AND PRELIMINARY RISK ASSESSMENTS

Coverage: This section covers reports with the following titles or combination of titles: phase 1; desk top study; geo environmental assessment; development appraisal; preliminary environmental risk assessment; constraints report; due diligence report; geotechnical development review; environmental statement; environmental chapter; project scope summary report (PSSR), program environmental impact report (PEIR), geotechnical development risk register; and, baseline environmental assessment.

- 5. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. WSP UK Limited cannot be held responsible for any disclosures that are provided post production of our report and will not automatically update our report.
- 6. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, WSP UK Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly.
- 7. It should be noted that any risks identified in this report are perceived risks based on the information reviewed. Actual risks can only be assessed following intrusive investigations of the site.
- 8. WSP UK Limited does not warrant work / data undertaken / provided by others.



INTRUSIVE INVESTIGATION REPORTS

Coverage: The following report titles (or combination) may cover this category of work: geo environmental site investigation; geotechnical assessment; GIR (Ground Investigation reports); preliminary environmental and geotechnical risk assessment; and, geotechnical risk register.

- 9. The investigation has been undertaken to provide information concerning either:
 - i. The type and degree of contamination present at the site in order to allow a generic quantitative risk assessment to be undertaken; or
 - ii. Information on the soil properties present at the site to allow for geotechnical development constraints to be considered.
- 10. The scope of the investigation was selected on the basis of the specific development and land use scenario proposed by the Client and may be inappropriate to another form of development or scheme. If the development layout was not known at the time of the investigation the report findings may need revisiting once the development layout is confirmed.
- 11. For contamination purposes, the objectives of the investigation are limited to establishing the risks associated with potential contamination sources with the potential to cause harm to human health, building materials, the environment (including adjacent land), or controlled waters.
- 12. For geotechnical investigations the purpose is to broadly consider potential development constraints associated with the physical property of the soils underlying the site within the context of the proposed future or continued use of the site, as stated within the report.
- 13. The amount of exploratory work, soil property testing and chemical testing undertaken has necessarily been restricted by various factors which may include accessibility, the presence of services; existing buildings; current site usage or short timescales. The exploratory holes completed assess only a small percentage of the area in relation to the overall size of the Site, and as such can only provide a general indication of conditions.
- 14. The number of sampling points and the methods of sampling and testing do not preclude the possible existence of contamination where concentrations may be significantly higher than those actually encountered or ground conditions that vary from those identified. In addition, there may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.
- 15. The inspection, testing and monitoring records relate specifically to the investigation points and the timeframe that the works were undertaken. They will also be limited by the techniques employed. As part of this assessment, WSP UK Limited has used reasonable skill and care to extrapolate conditions between these points based upon assumptions to develop our interpretation and conclusions. The assumption made in forming our conclusions is that the ground and groundwater conditions (both chemically and physically) are the same as have been encountered during the works undertaken at the specific points of investigation. Conditions can change between investigation points and these interpretations should be considered indicative.
- 16. The risk assessment and opinions provided are based on currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective



effects of any future changes or amendments to these values. Specific assumptions associated with the WSP UK Limited risk assessment process have been outlined within the body or associated appendix of the report.

- 17. Additional investigations may be required in order to satisfy relevant planning conditions or to resolve any engineering and environmental issues.
- 18. Where soil contamination concentrations recorded as part of this investigation are used for commentary on potential waste classification of soils for disposal purposes, these should be classed as indicative only. Due consideration should be given to the variability of contaminant concentrations taken from targeted samples versus bulk excavated soils and the potential variability of contaminant concentrations between sampling locations. Where major waste disposal operations are considered, targeted waste classification investigations should be designed.
- 19. The results of the asbestos testing are factually reported and interpretation given as to how this relates to the previous use of the site, the types of ground encountered and site conceptualisation. This does not however constitute a formal asbestos assessment. These results should be treated cautiously and should not be relied upon to provide detailed and representative information on the delineation, type and extent of bulk ACMs and / or trace loose asbestos fibres within the soil matrix at the site.
- 20. If costs have been included in relation to additional site works, and / or site remediation works these must be considered as indicative only and must be confirmed by a qualified quantity surveyor.

EUROCODE 7: GEOTECHNICAL DESIGN

- 21. On 1st April 2010, BS EN 1997-1:2004 (Eurocode 7: Geotechnical Design Part 1) became the mandatory baseline standard for geotechnical ground investigations.
- 22. In terms of geotechnical design for foundations, slopes, retaining walls and earthworks, EC7 sets guidance on design procedures including specific guidance on the numbers and spacings of boreholes for geotechnical design, there are limits to methods of ground investigation and the quality of data obtained and there are also prescriptive methods of assessing soil strengths and methods of design. Unless otherwise explicitly stated, the work has not been undertaken in accordance with EC7. A standard geotechnical interpretative report will not meet the requirements of the Geotechnical Design Report (GDR) under Eurocode 7. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. The report is likely to represent a Ground Investigation Report (GIR) under the Eurocode 7 guidance.

DETAILED QUANTITATIVE RISK ASSESSMENTS AND REMEDIAL STRATEGY REPORTS

23. These reports build upon previous report versions and associated notes. The scope of the investigation, further testing and monitoring and associated risk assessments were selected on the basis of the specific development and land use scenario proposed by the Client and may not be appropriate to another form of development or scheme layout. The risk assessment and opinions provided are based on currently available approaches in the generation of Site Specific Assessment Criteria relating to contamination concentrations and are not considered to represent a risk in a specific land use scenario to a specific receptor. No liability can be accepted for the retrospective effects of any future changes or amendments to these values, associated models or associated guidance.



- 24. The outputs of the Detailed Quantitative Risk Assessments are based upon WSP UK Limited manipulation of standard risk assessment models. These are our interpretation of the risk assessment criteria.
- 25. Prior to adoption on site they will need discussing and agreeing with the Regulatory Authorities prior to adoption on site. The regulatory discussion and engagement process may result in an alternative interpretation being determined and agreed. The process and timescales associated with the Regulatory Authority engagement are not within the control of WSP UK Limited. All costs and programmes presented as a result of this process should be validated by a quantity surveyor and should be presumed to be indicative.

GEOTECHNICAL DESIGN REPORT (GDR)

26. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. All the relevant information needs to be provided to allow for a GDR to be produced.

MONITORING (INCLUDING REMEDIATION MONITORING REPORTS)

- 27. These reports are factual in nature and comprise monitoring, normally groundwater and ground gas and data provided by contractors as part of an earthworks or remedial works.
- 28. The data is presented and will be compared with assessment criteria.

APPENDIX C - CIRIA DEFINITIONS



CIRIA RISK DEFINITIONS

Table A1 - Classifications of Probability

Classification	Definition
High Likelihood	There is a pollution linkage / identified geotechnical hazard and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	There is a 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 A2 - Classifications of Consequence

Classification	Definition
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resource. Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem.
Medium	Chronic damage to Human Health ("significant harm" as defined in DETR, 2000). Pollution of sensitive water resources. A significant change in a particular ecosystem, or organism forming part of such ecosystem.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services (significant harm as defined m the Draft Circular on Contaminated Land, DETR, 2000). Damage to sensitive buildings/structures/services or the environment.
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve, Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.). Easily repairable effects of damage to buildings, structures and services

The risk categories presented in this report, taking into account both probability and severity, are based on the matrix presented in **Table A3** below, following CIRIA C552.

Table A3 - Adopted Risk Categories / Comparison of Consequence Against Probability

Probability	Consequence						
	Severe	Medium	Mild	Minor			
High Likelihood	Very High Risk	High Risk	Moderate Risk	Low to Moderate Risk			
Likely	High Risk	Moderate Risk	Low to Moderate Risk	Low Risk			
Low Likelihood	Moderate Risk	Low to Moderate Risk	Low Risk	Very Low Risk			
Unlikely	Low to Moderate Risk	Low Risk	Very Low Risk	Very Low Risk			

APPENDIX D - PHOTOPLATES



Photo 1: Cooling towers located in the northern section of the Drax Power Station site. Photo taken looking towards the north.





Photo 2: View of the western part of Drax Power Station. Photo is taken from the south west of the Site, looking towards the north east.





Photo 3: View of turbines within the turbine hall. The turbine hall is located in the centre of the Drax Power Station Site.

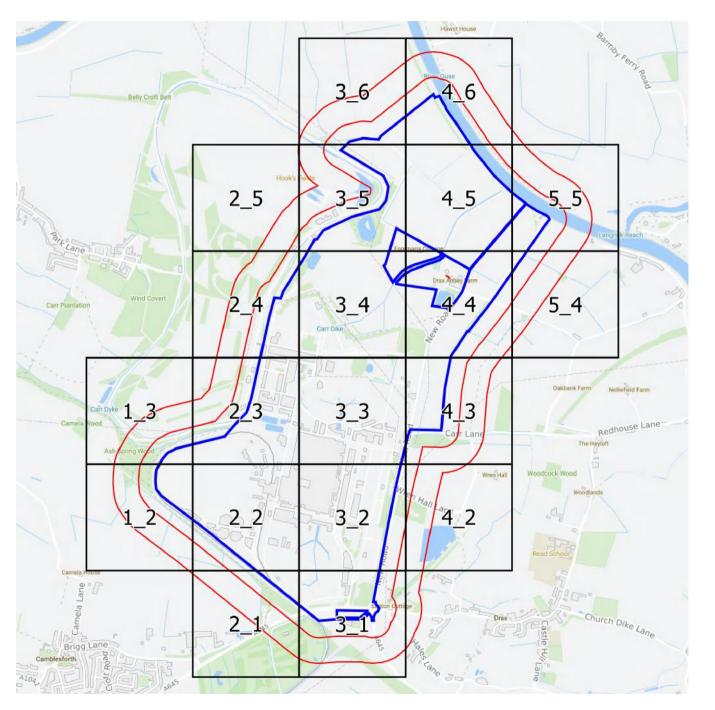




Photo 4: View of condenser units within the turbine hall.



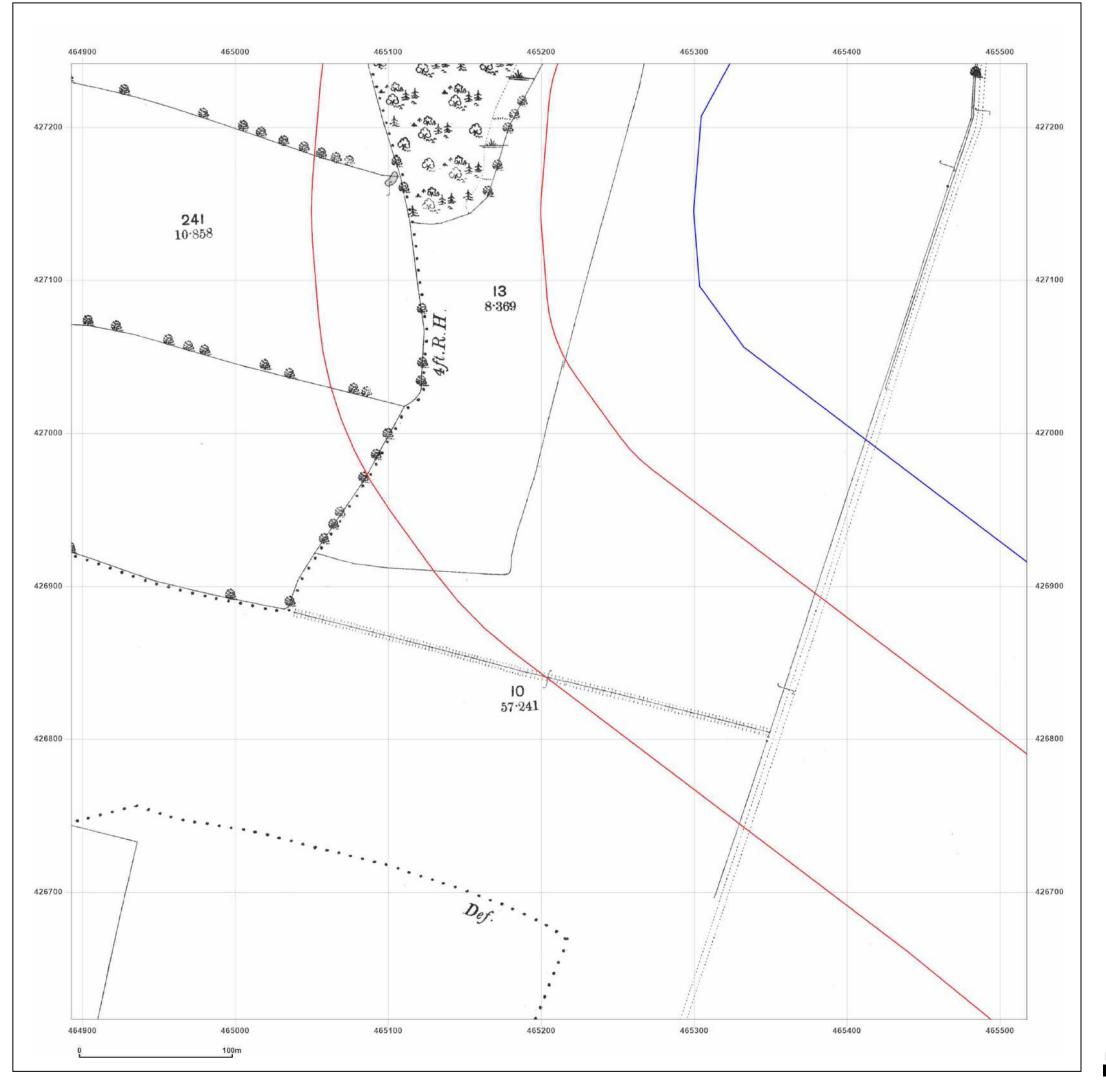
APPENDIX E - GROUNDSURE REPORT



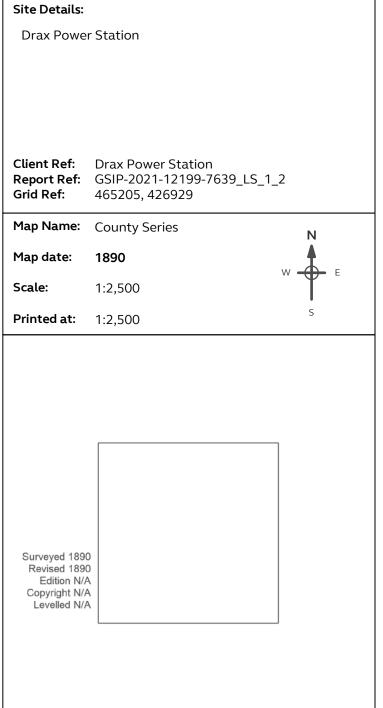


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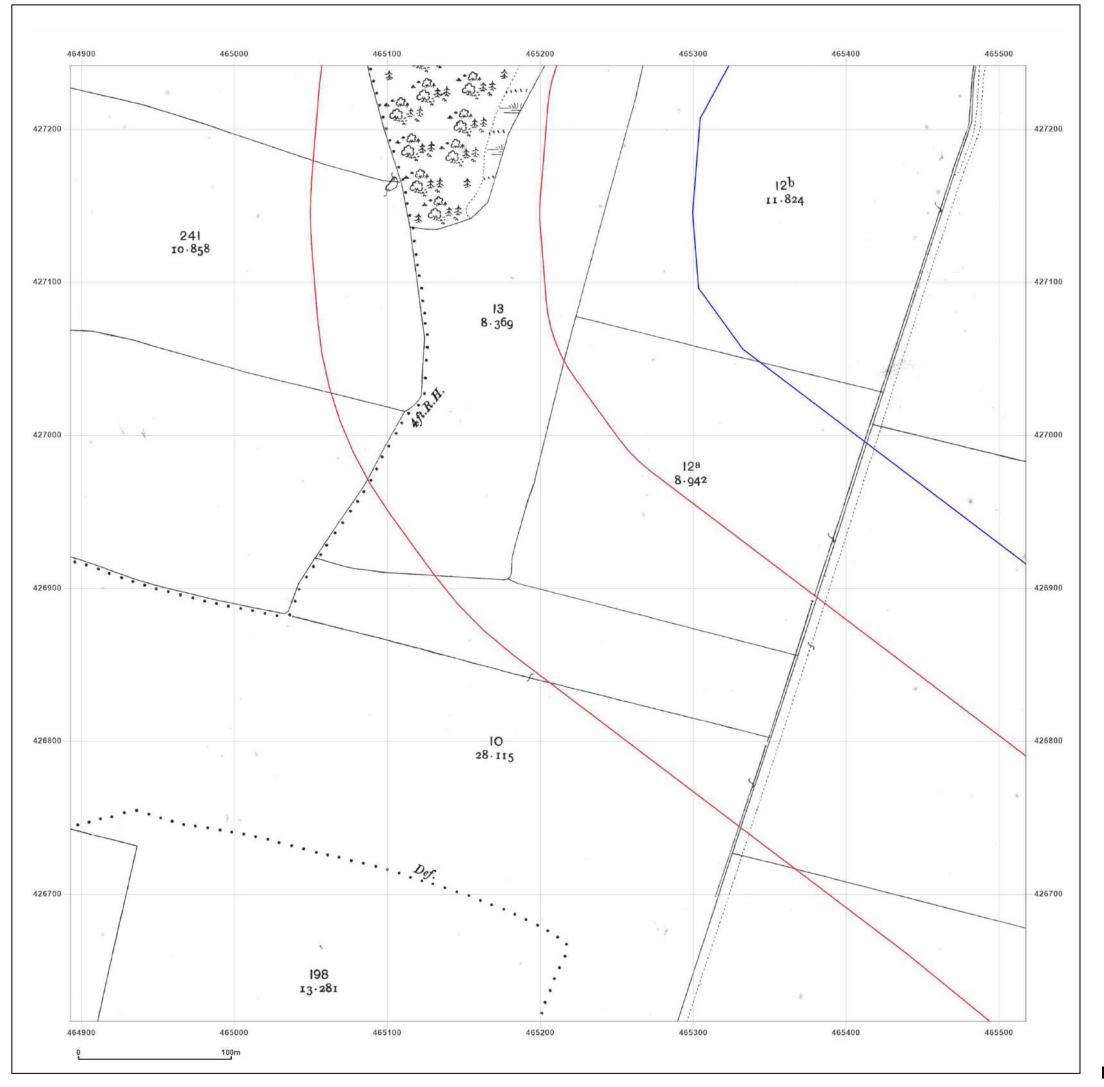




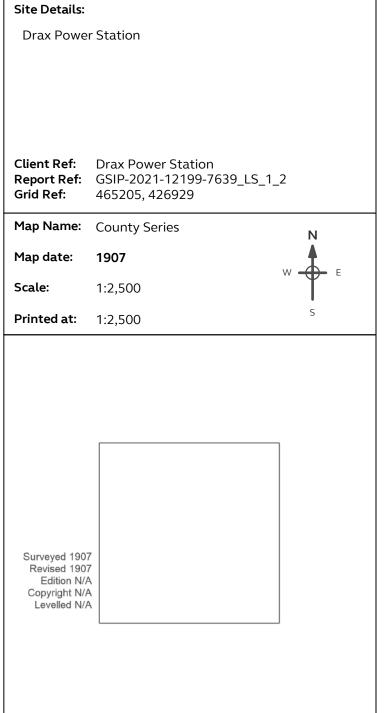


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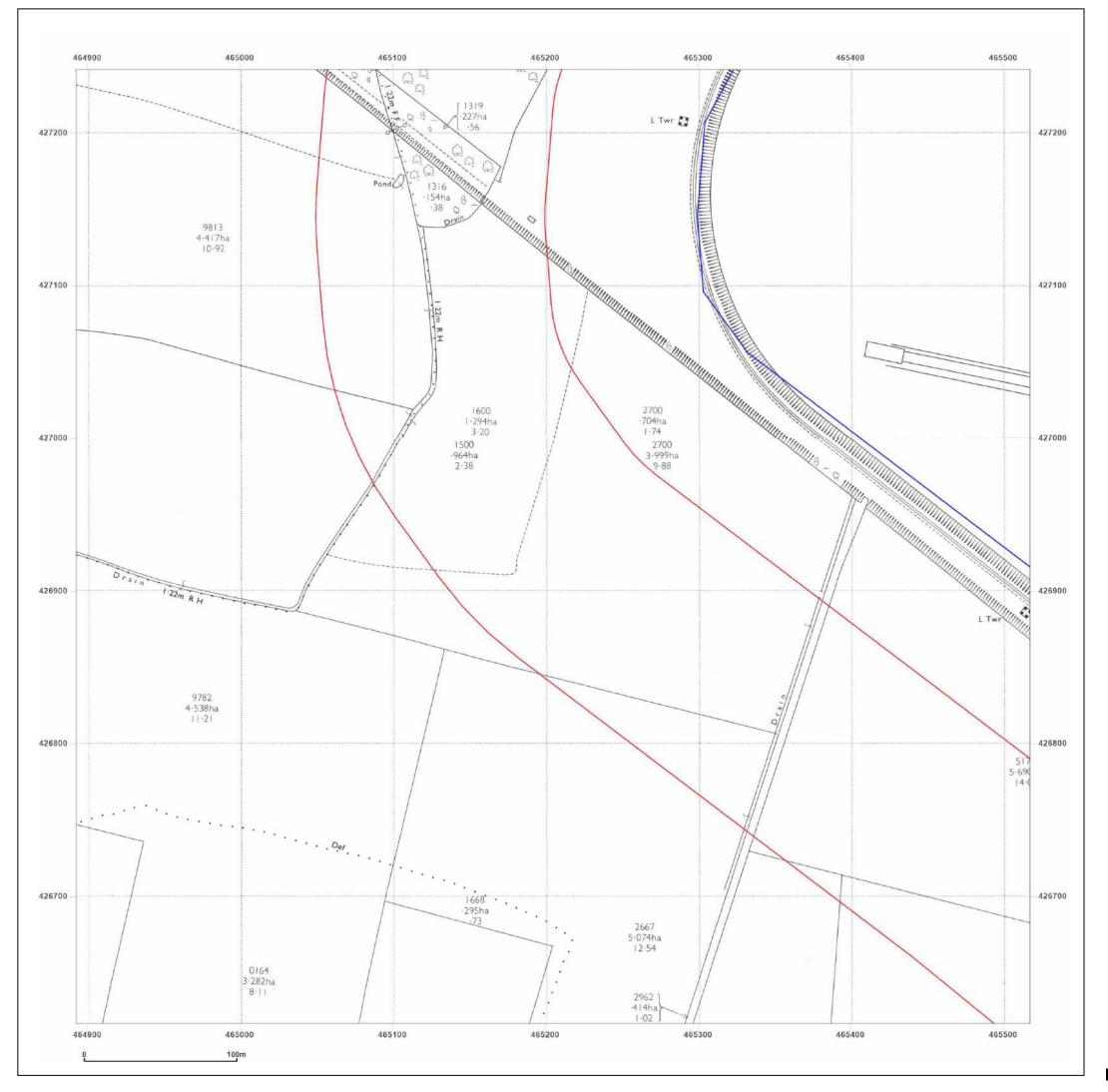






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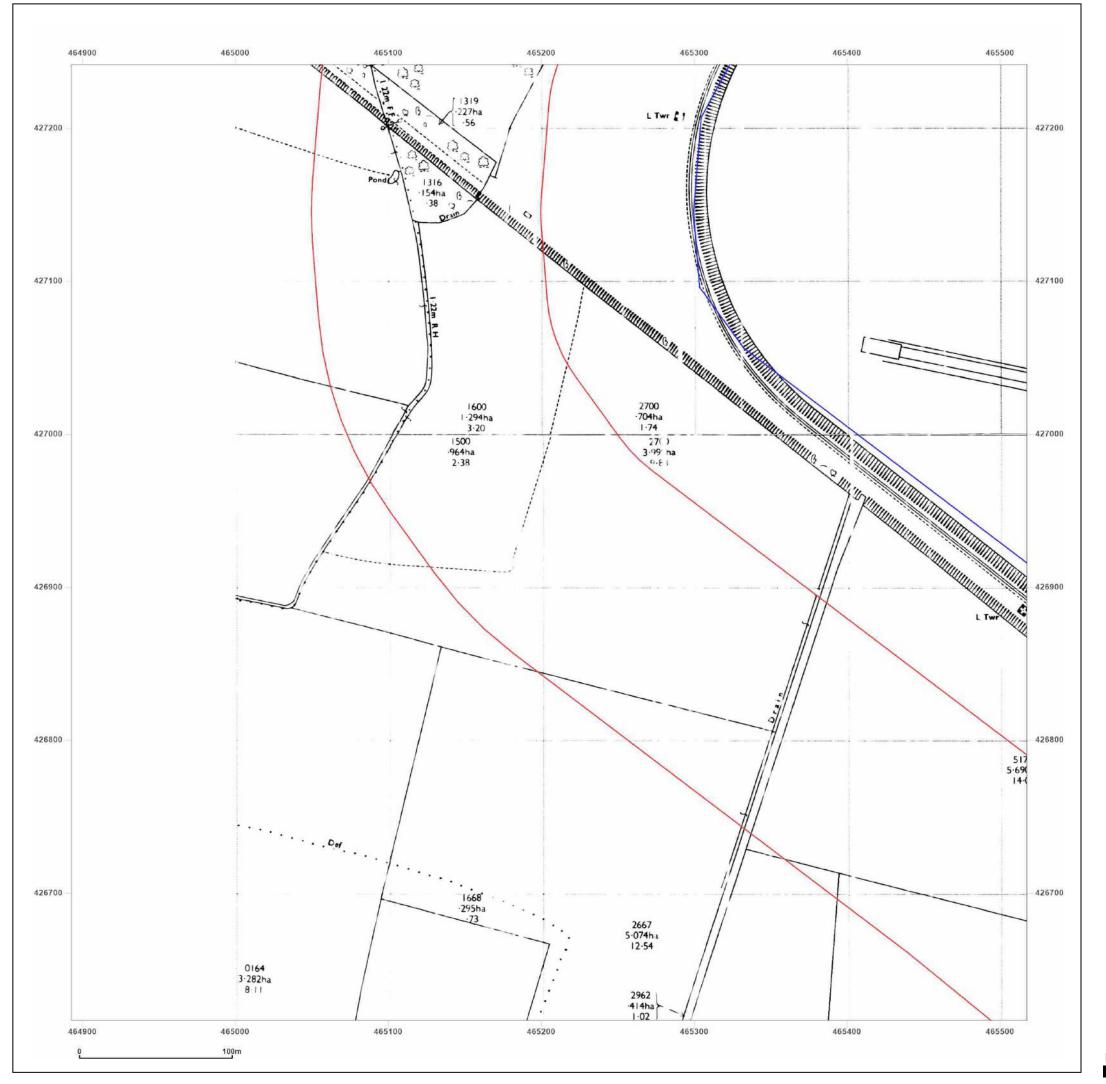


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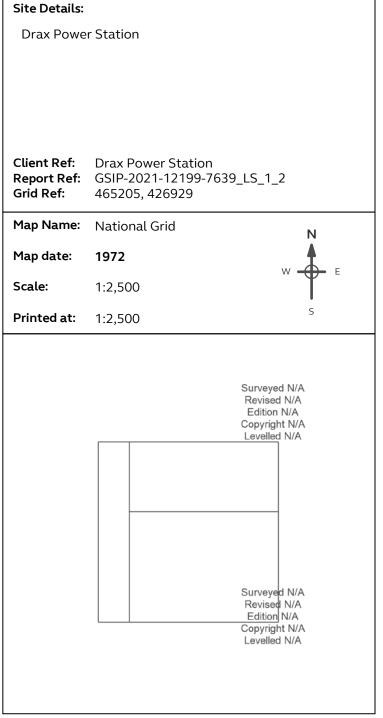


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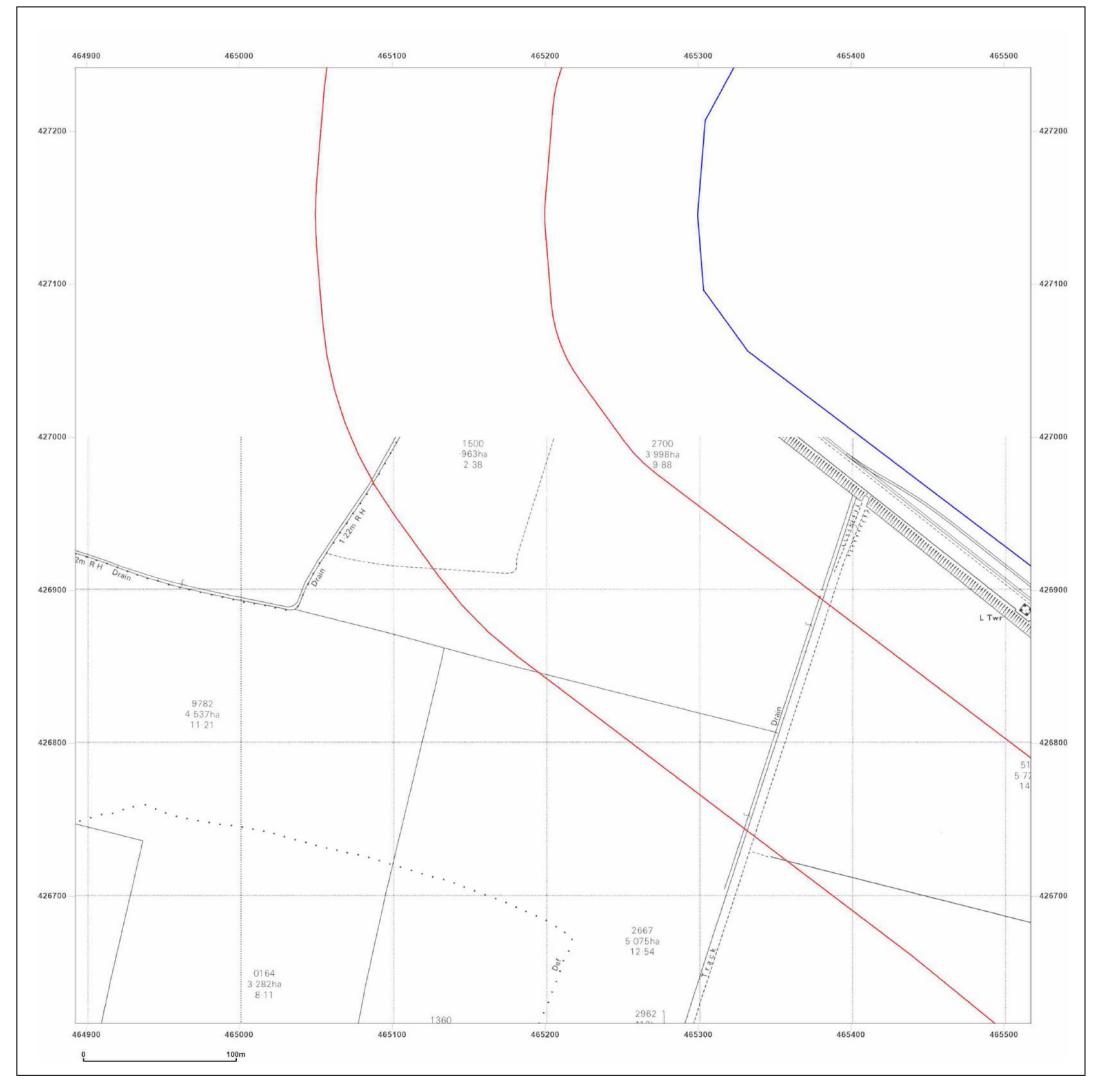




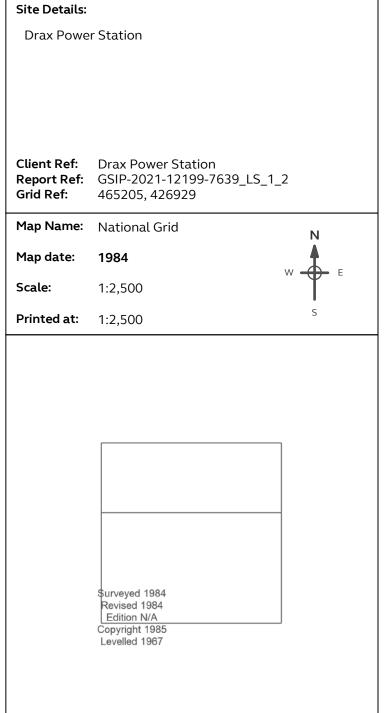


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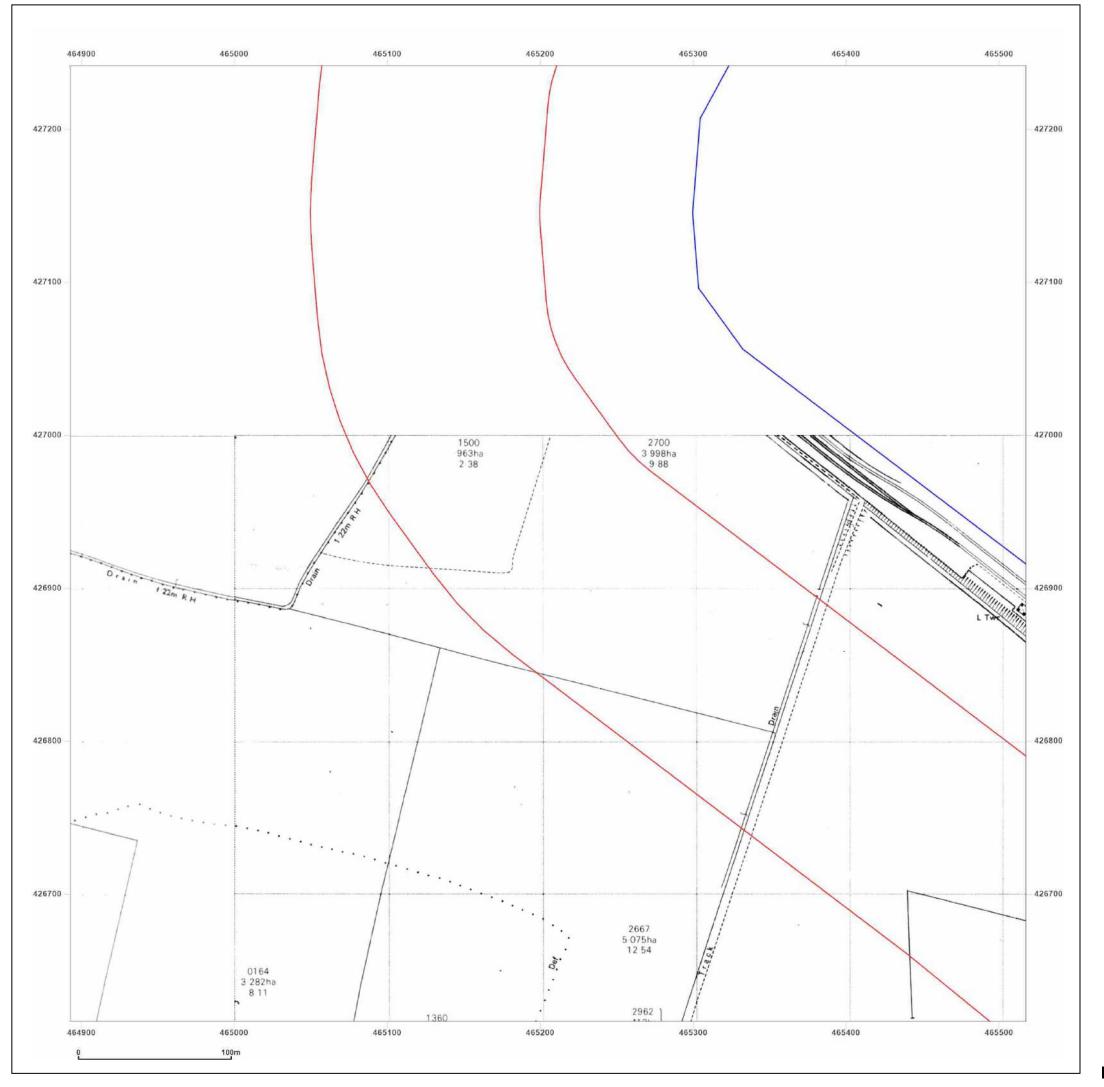




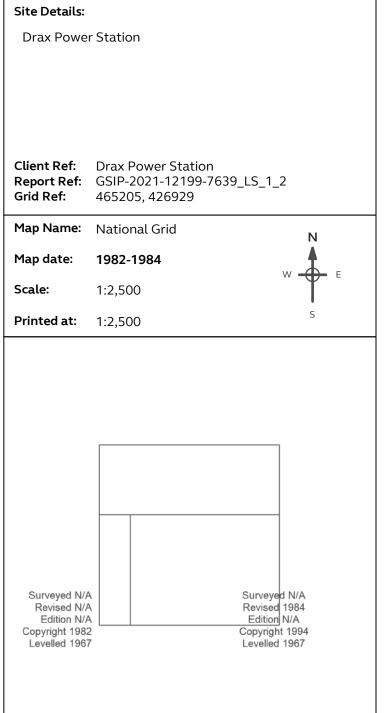


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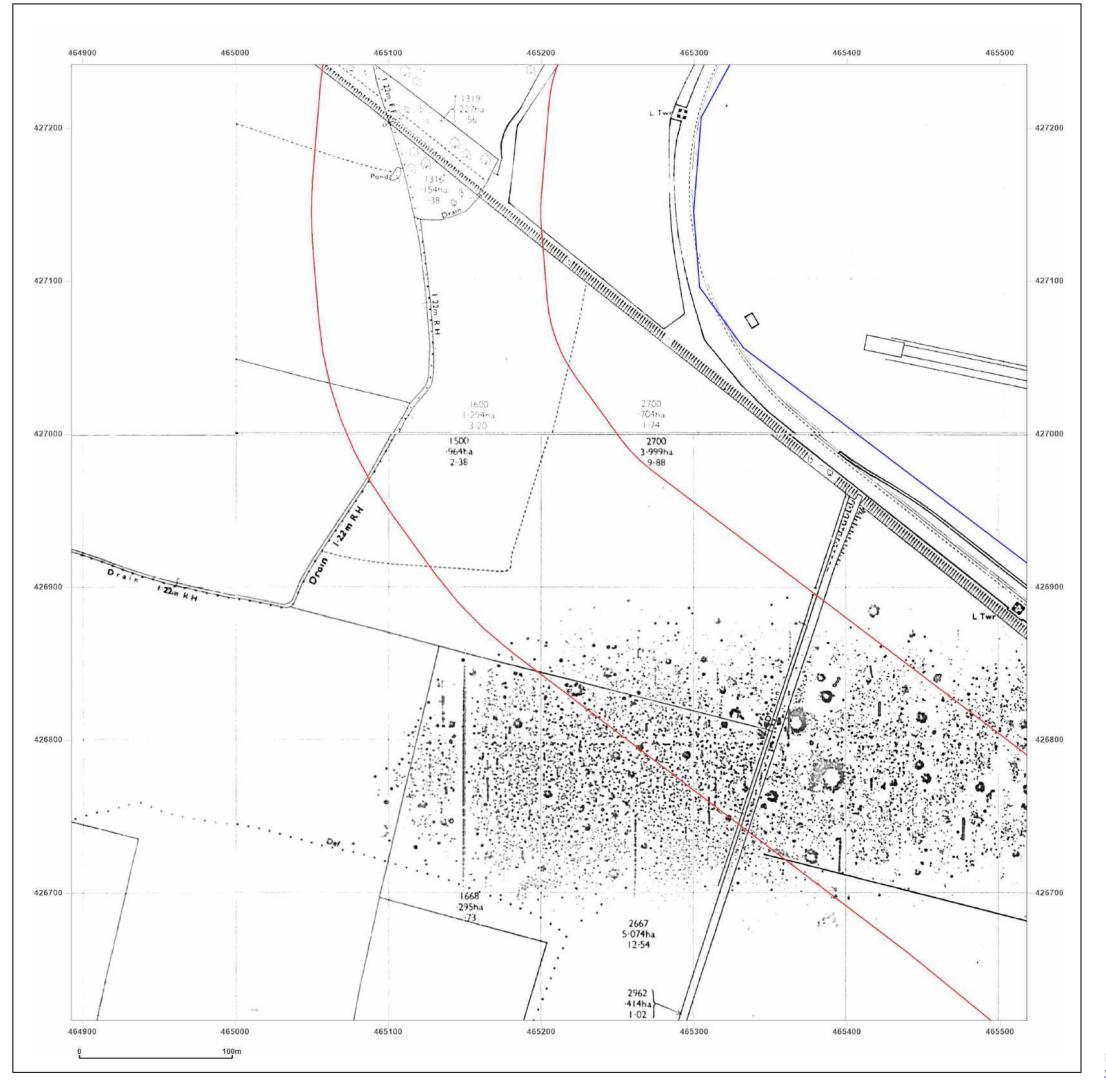




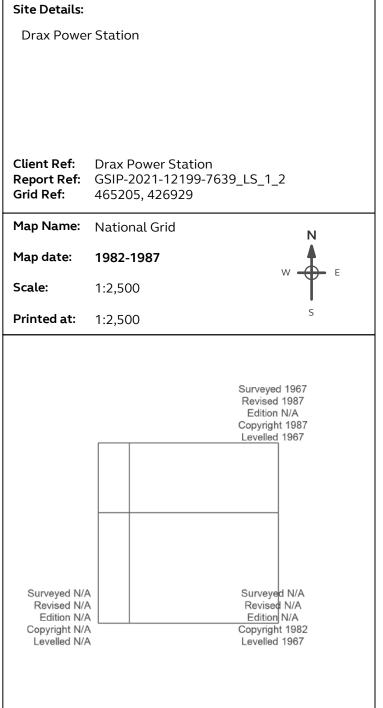


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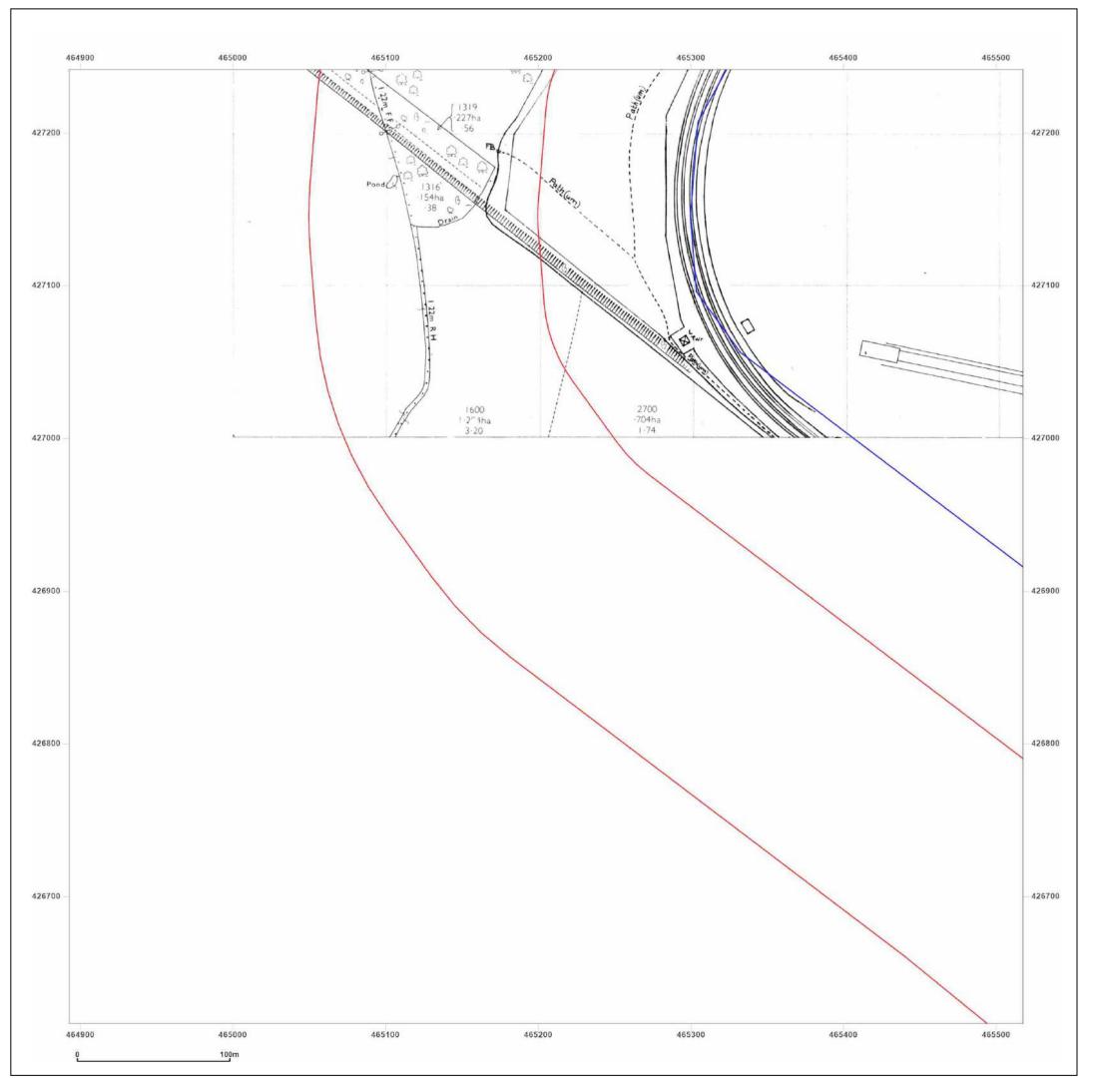


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Map legend available at:

www.groundsure.com/sites/default/files/groundsure_legend.pdf





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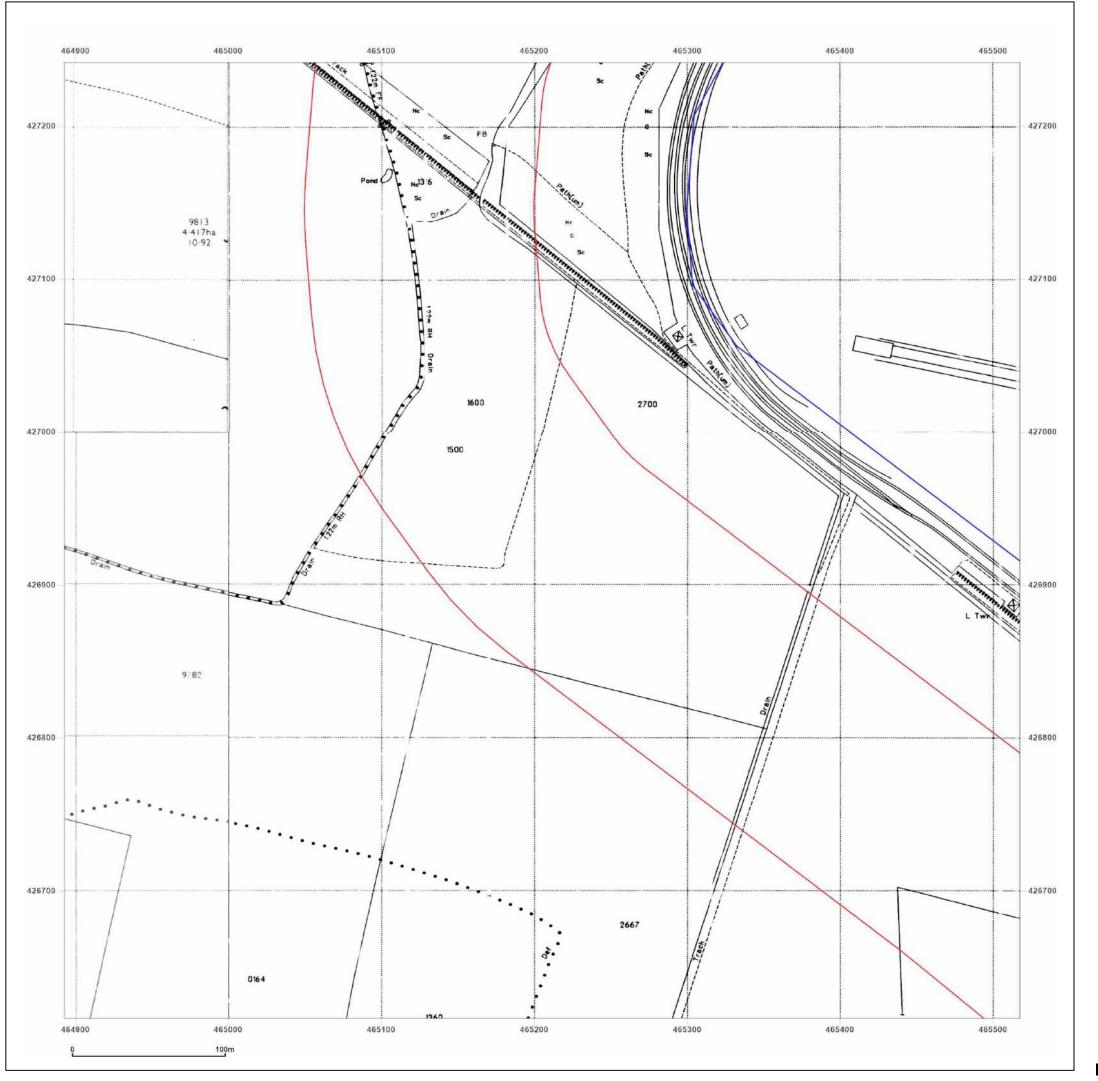
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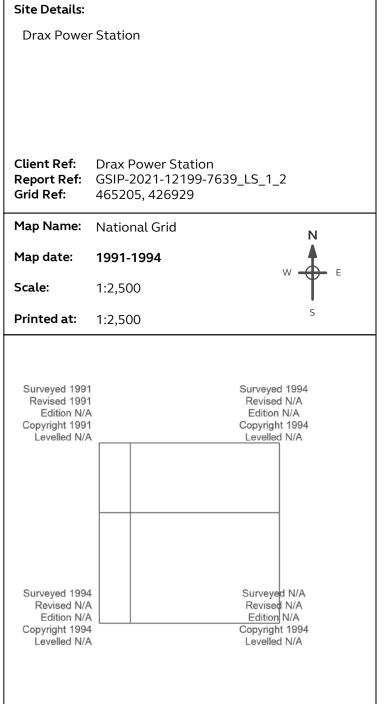
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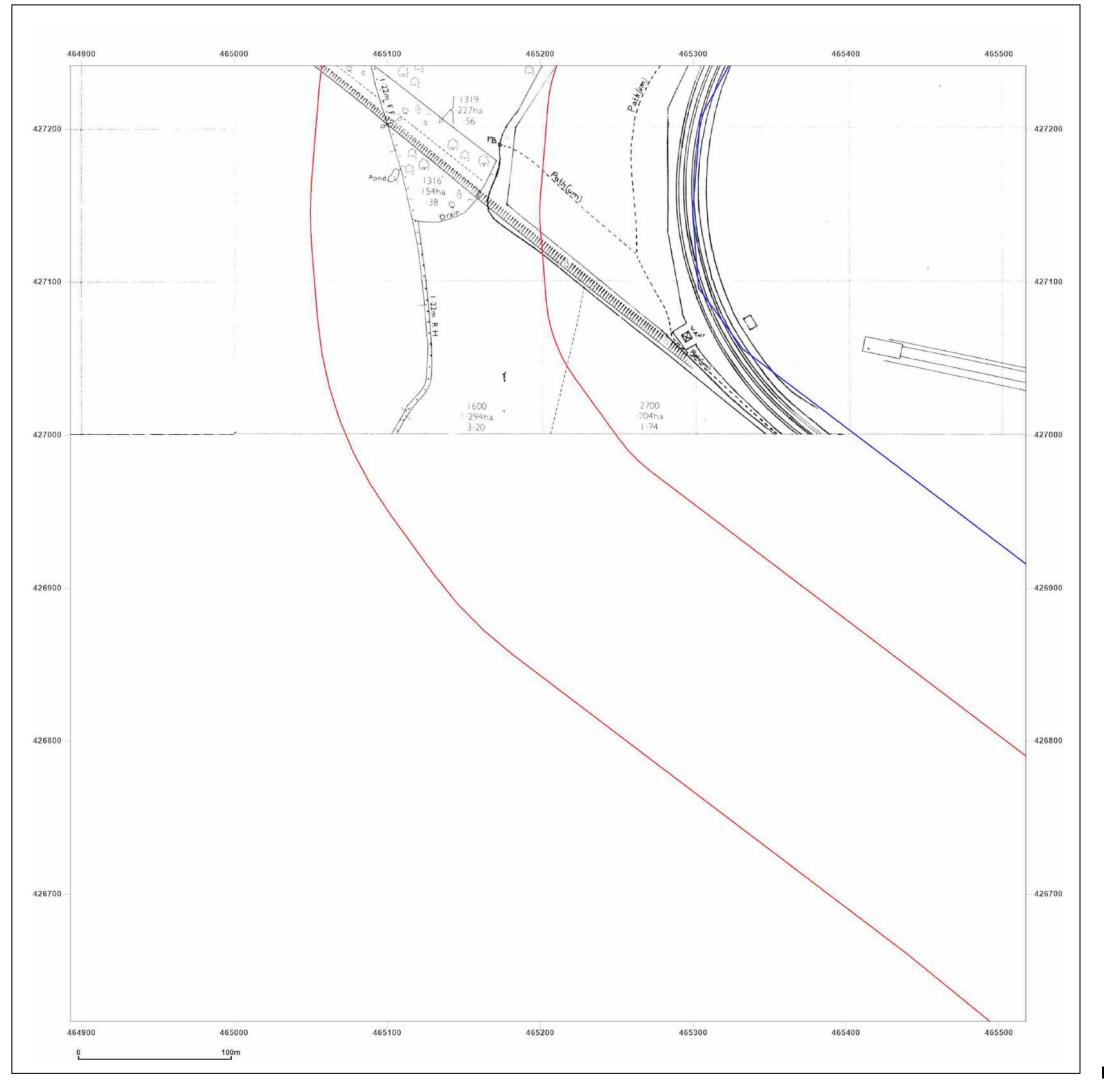




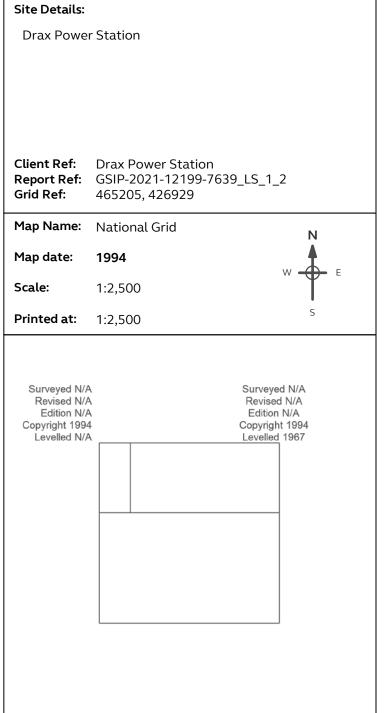


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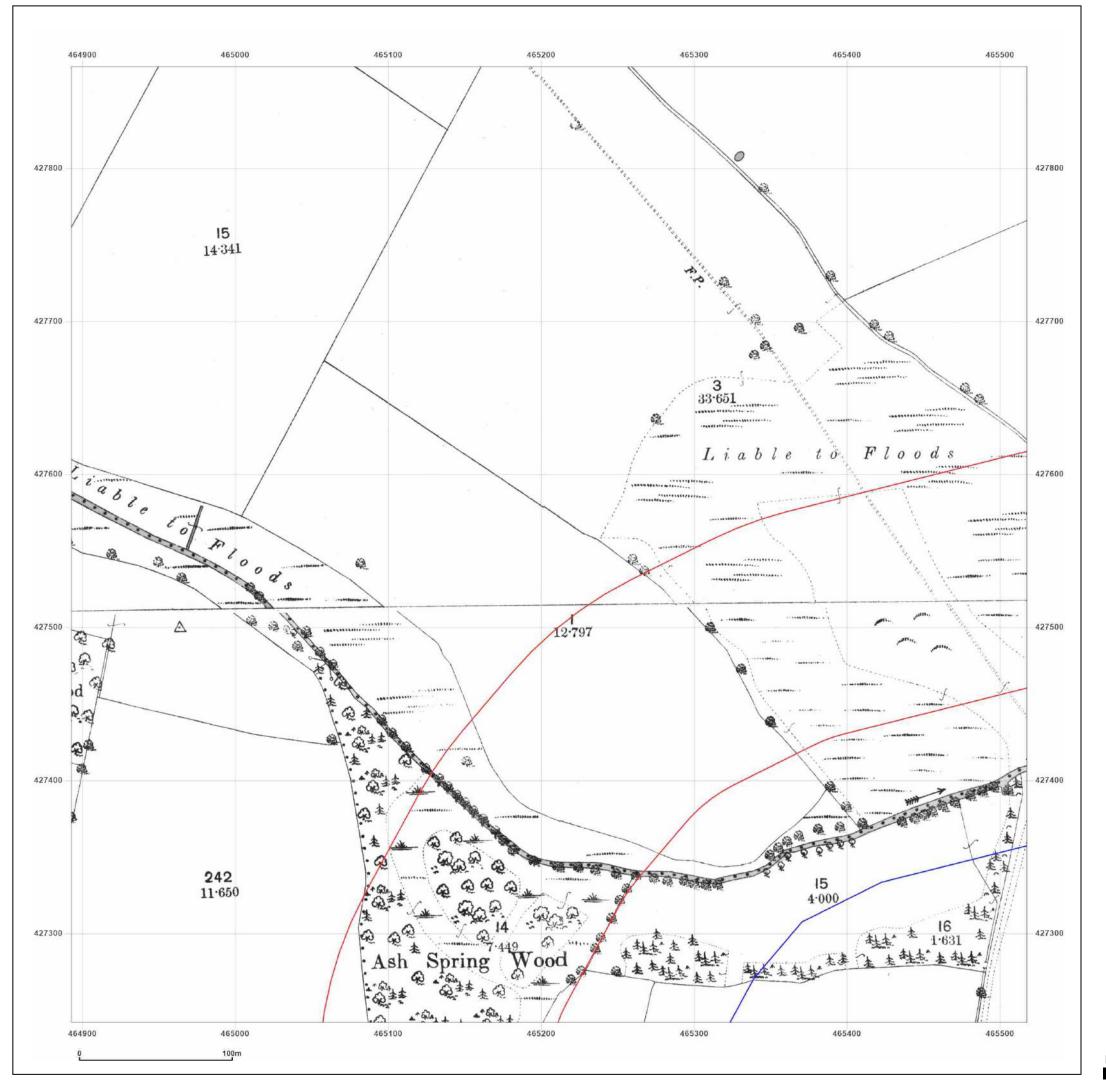




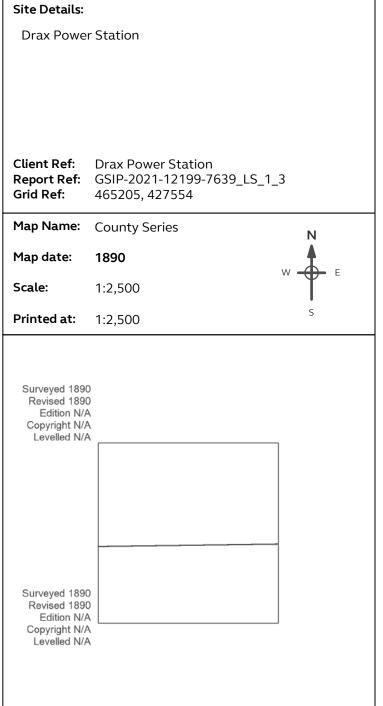


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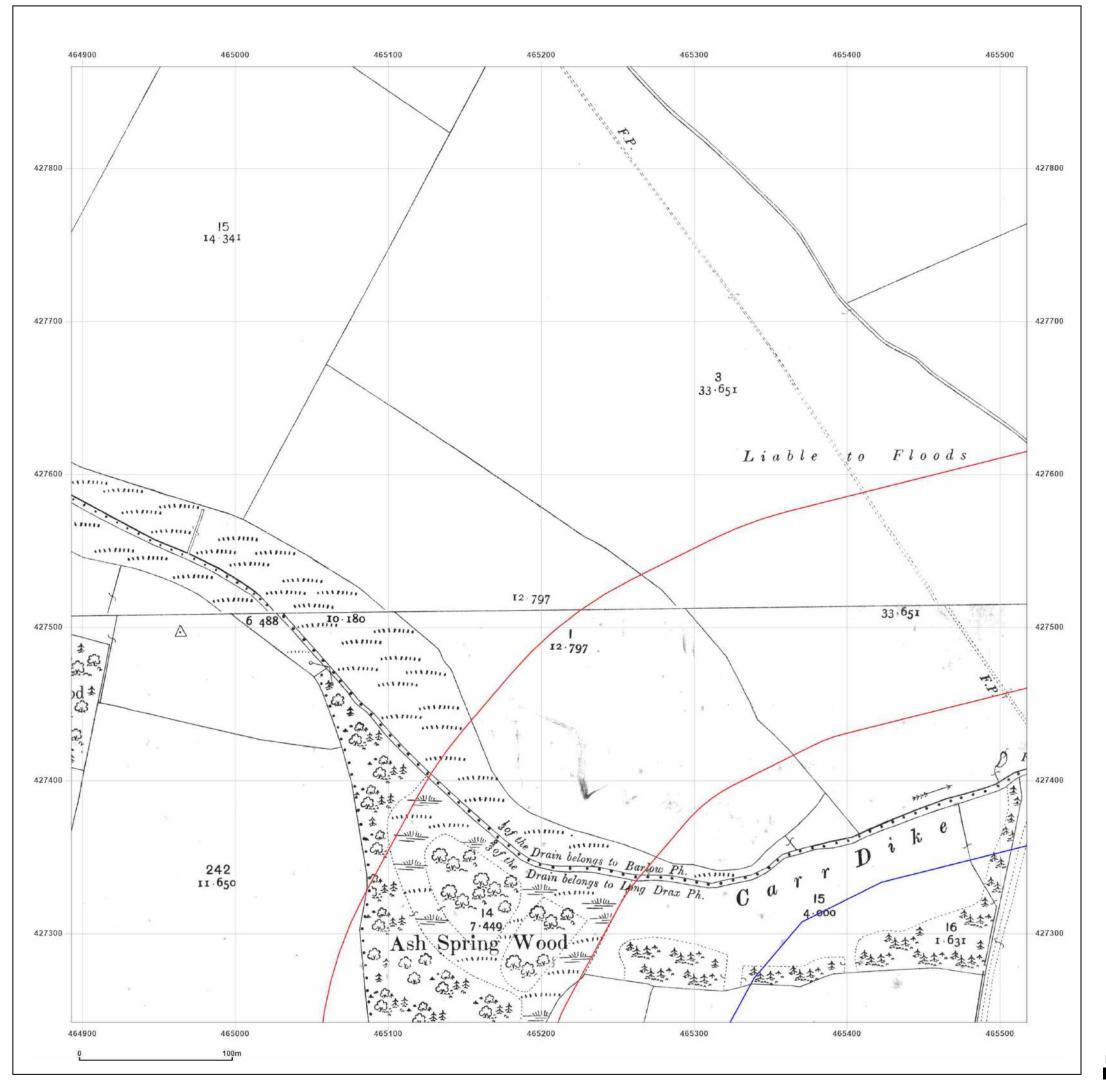




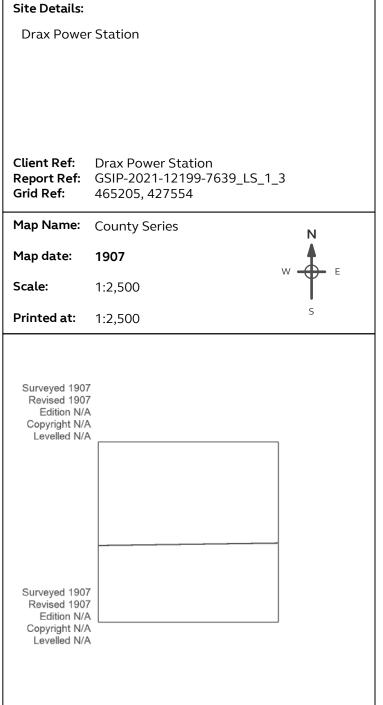


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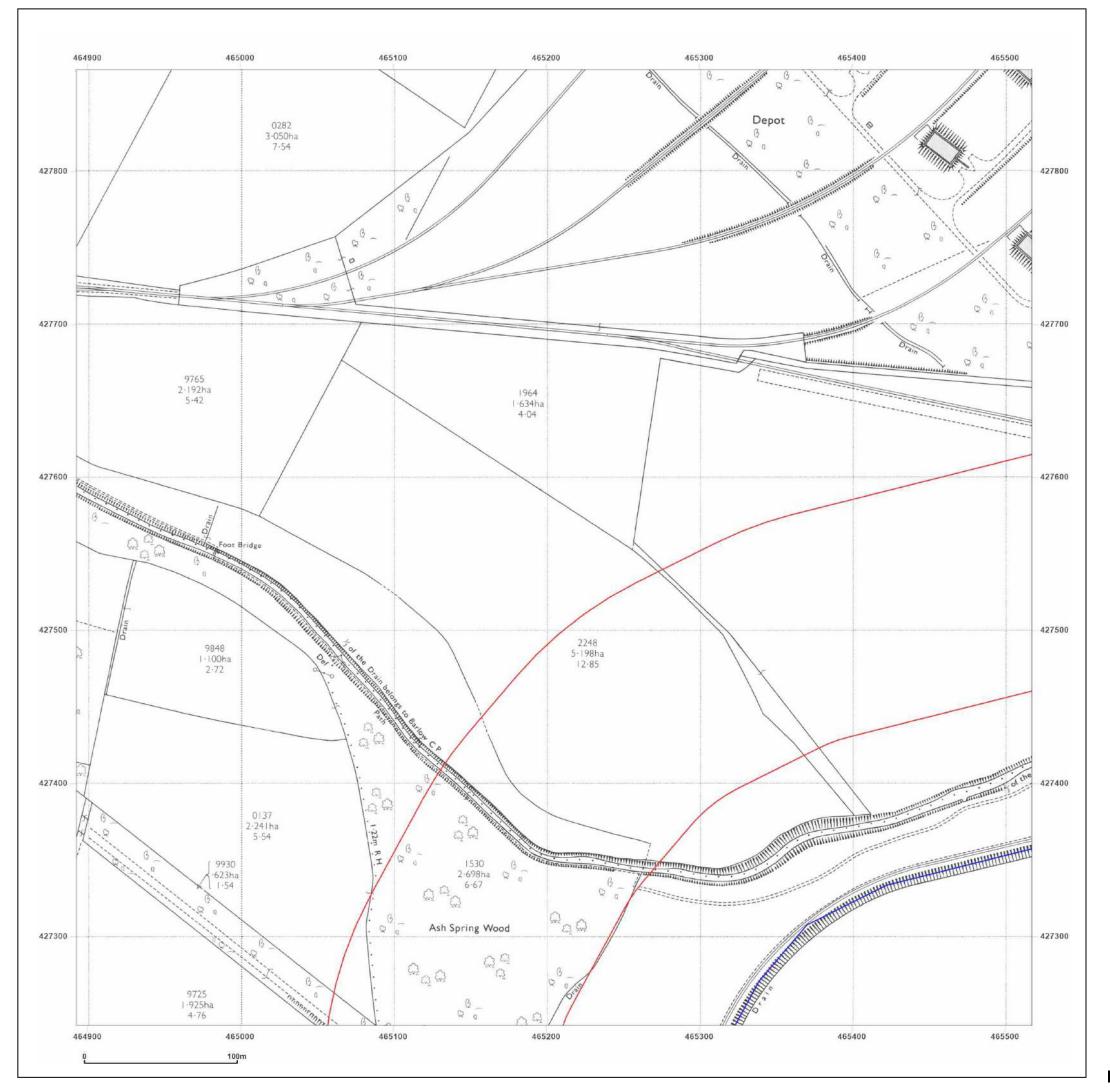




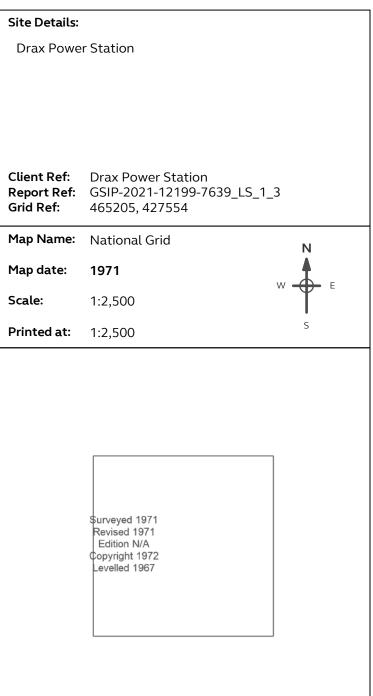


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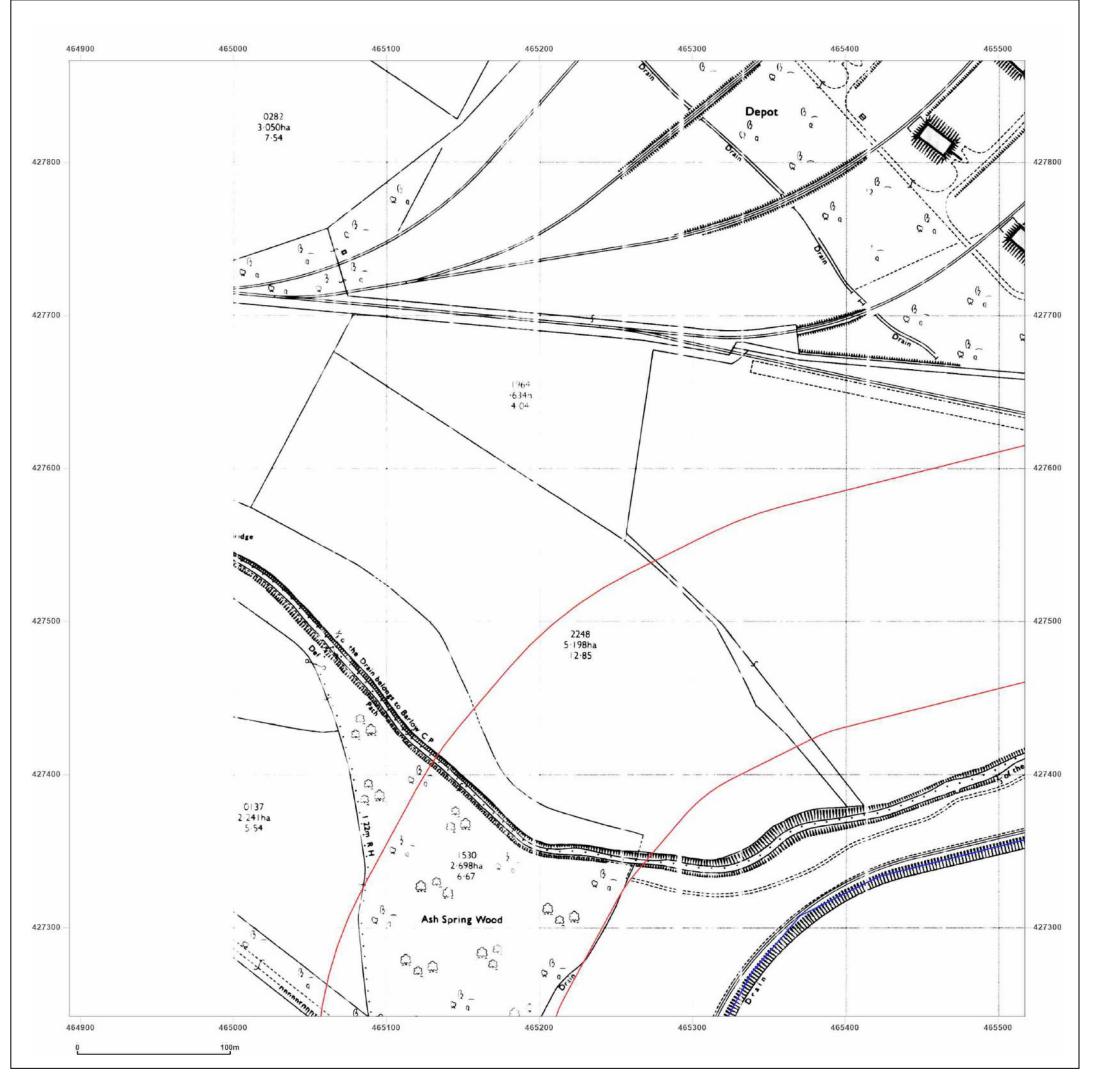




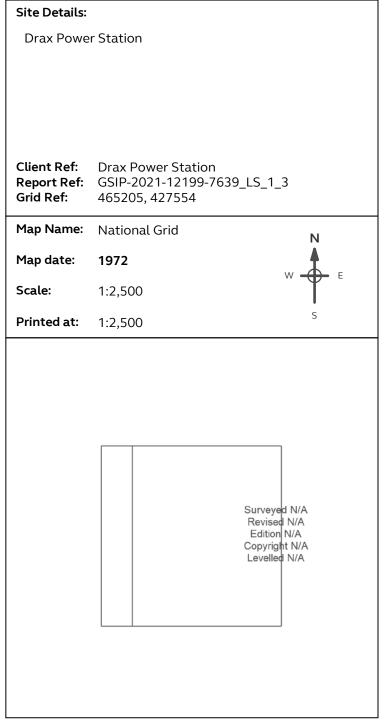


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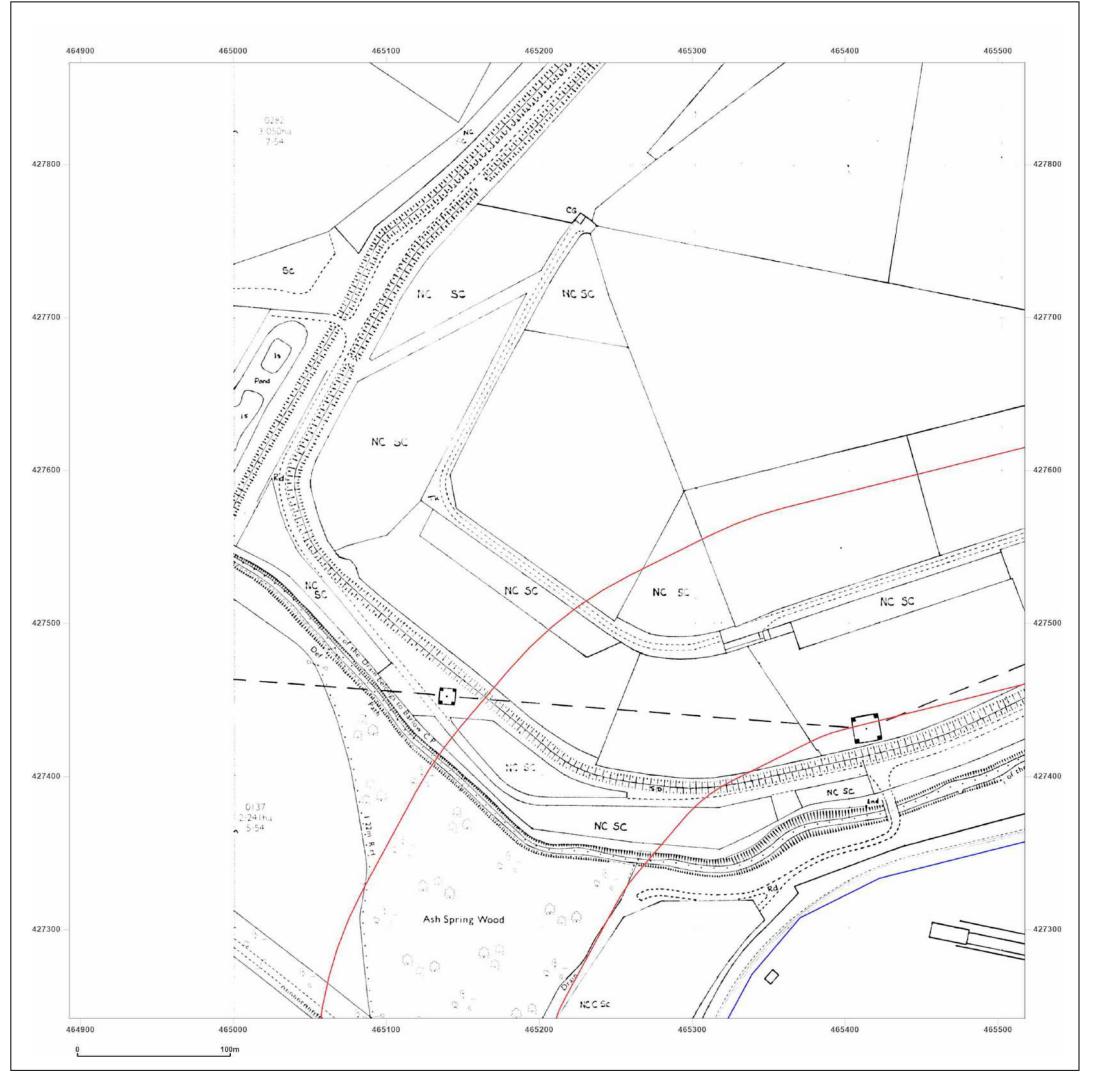




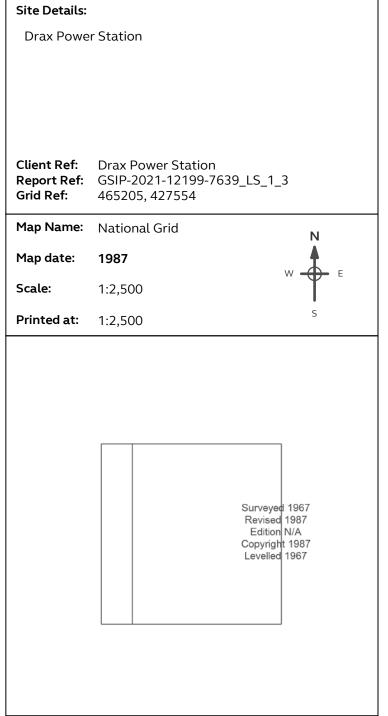


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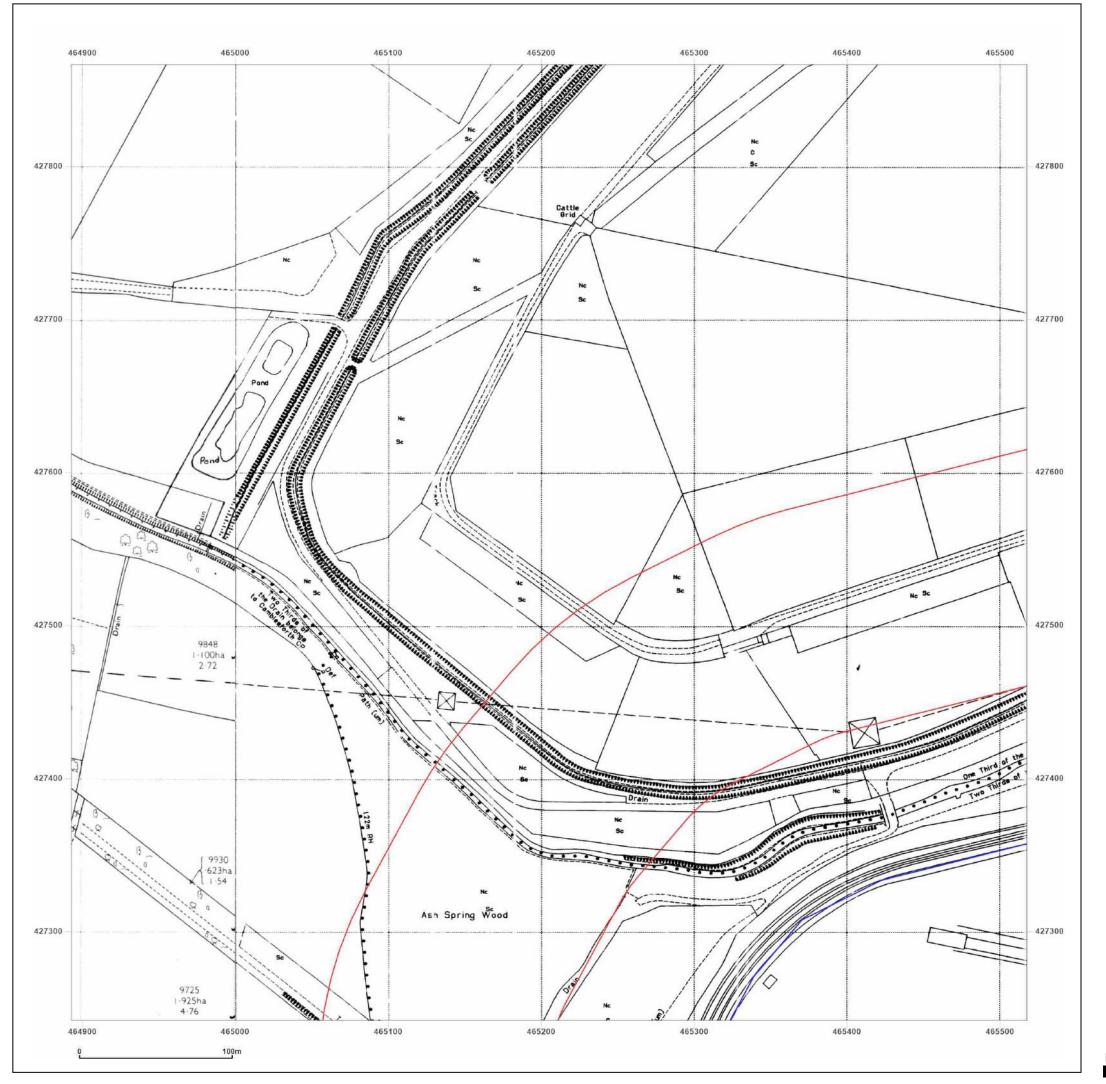




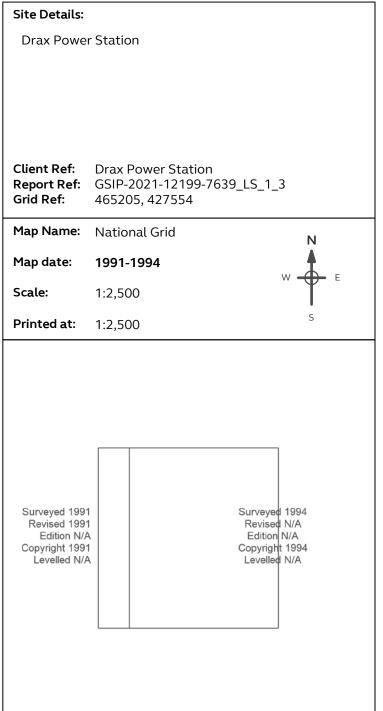


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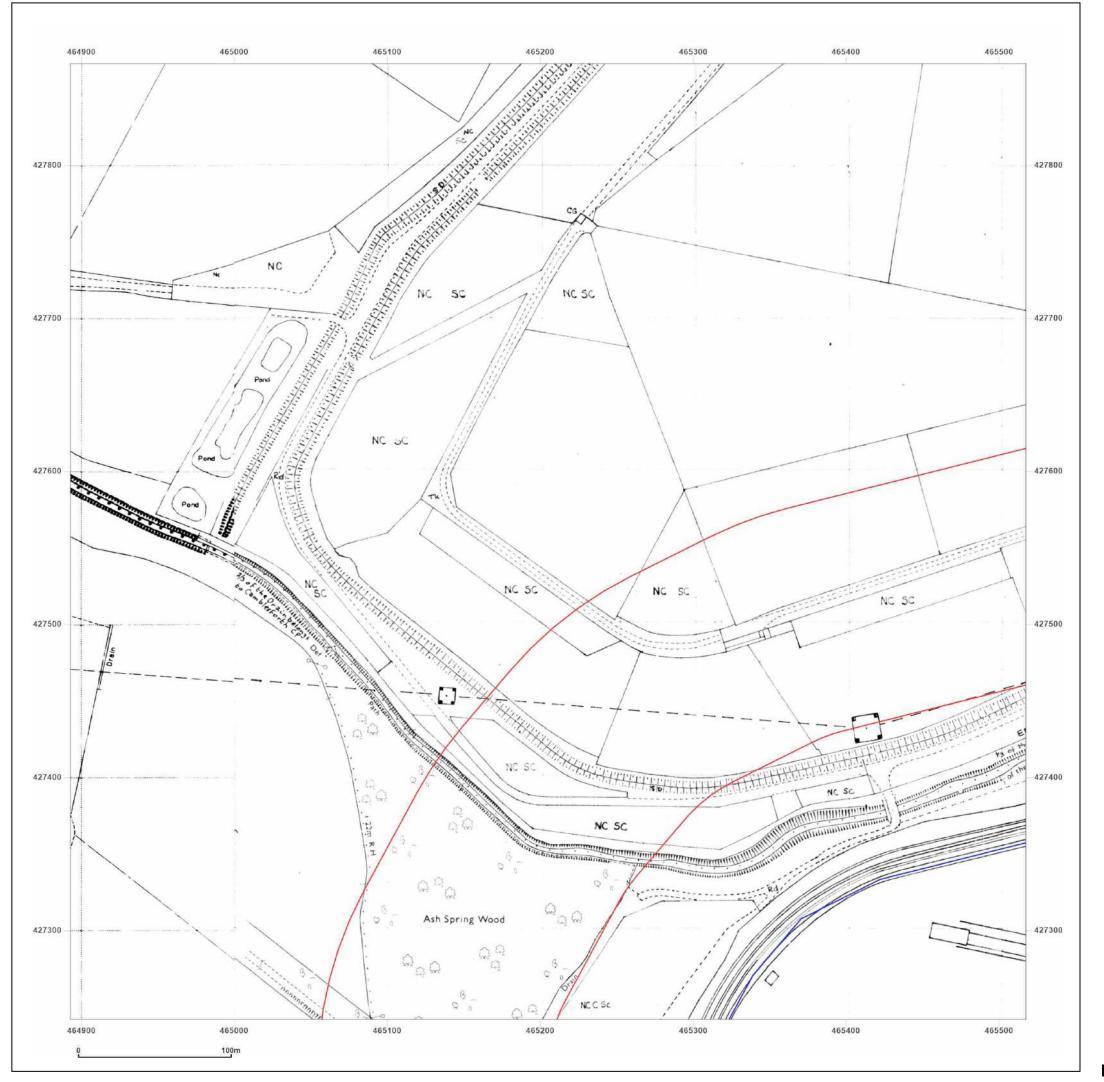




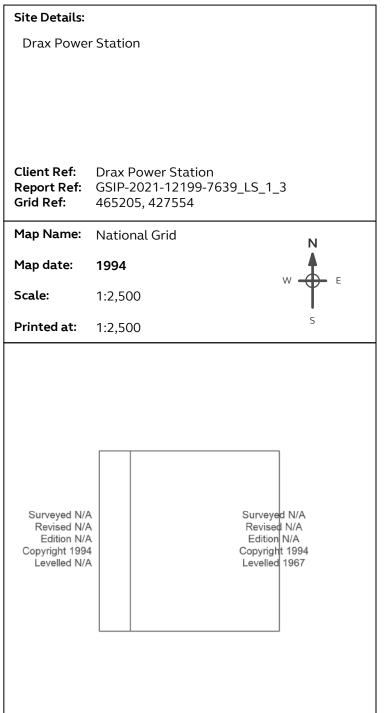


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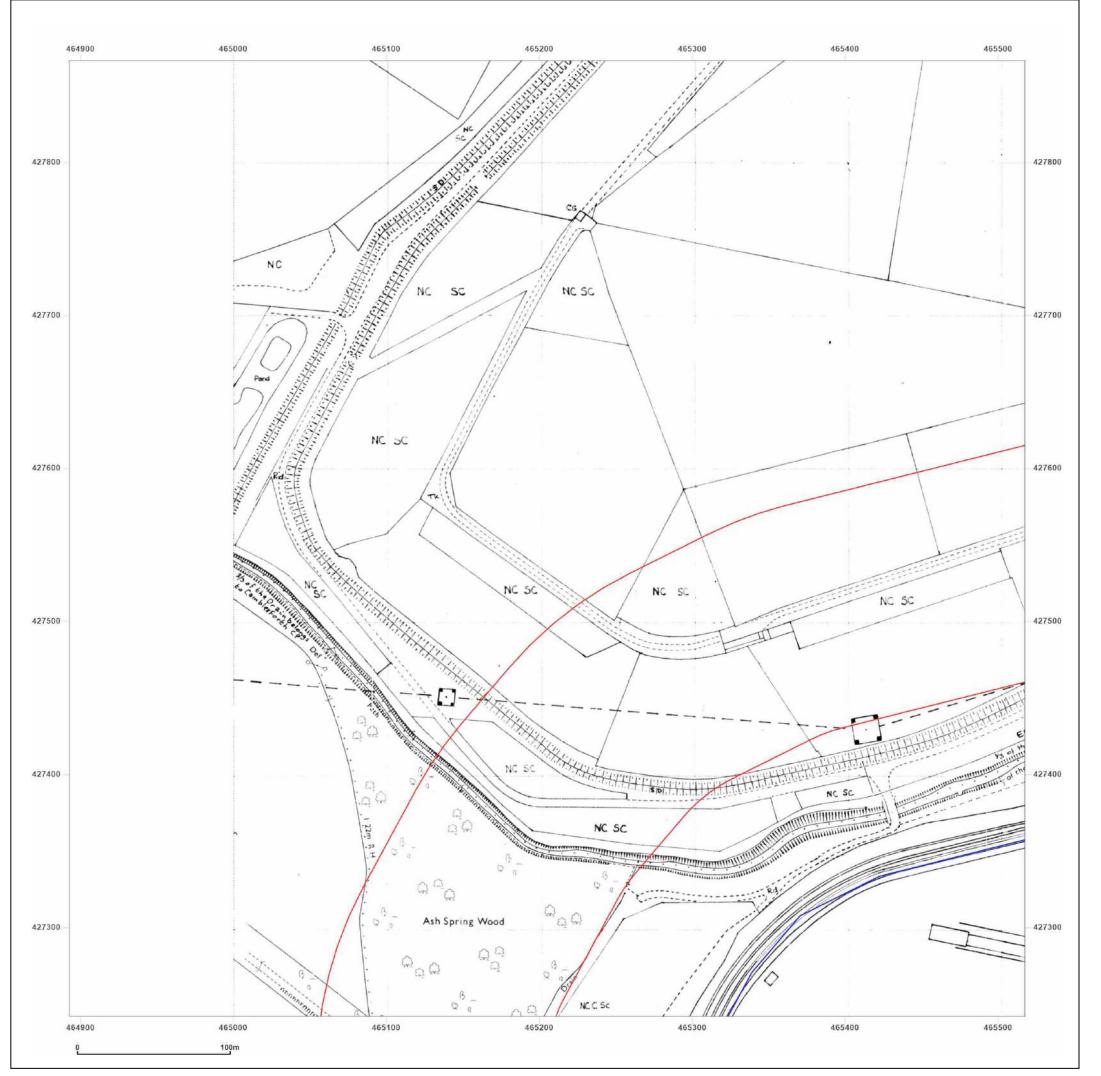




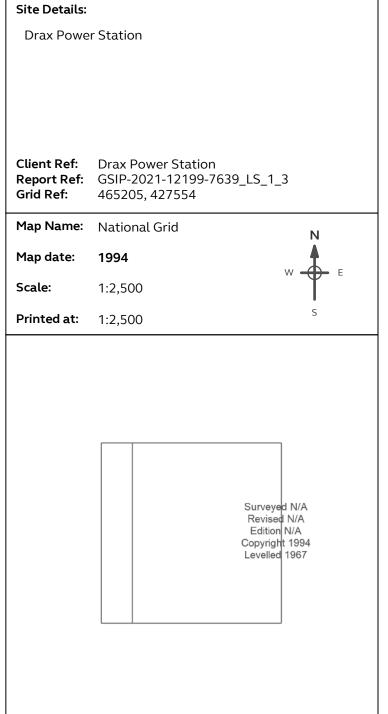


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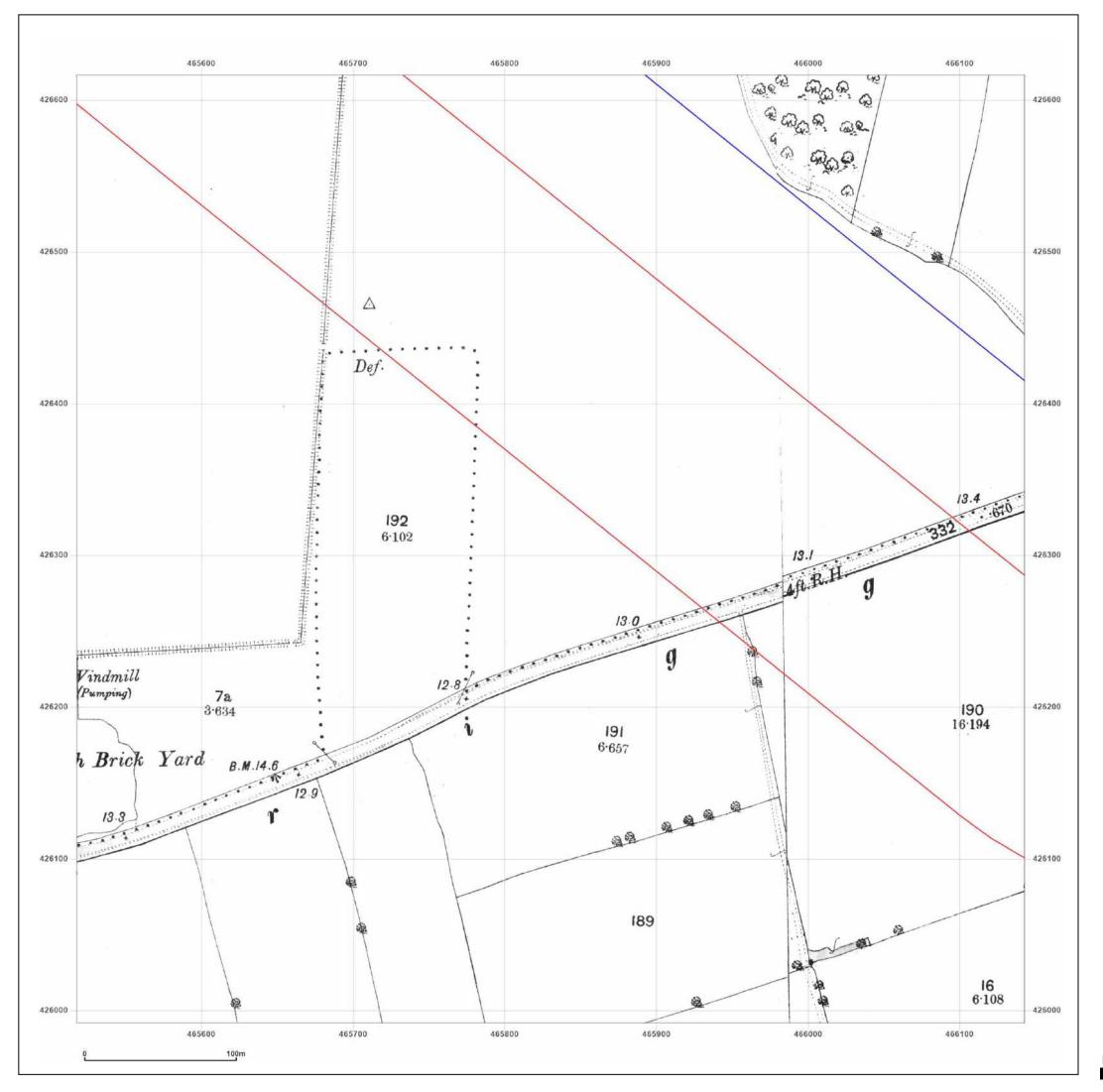




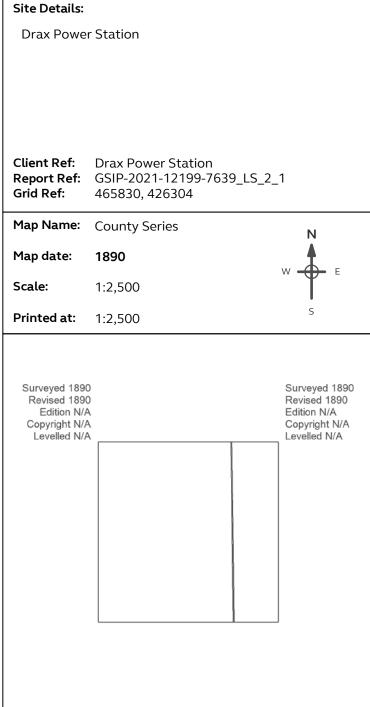


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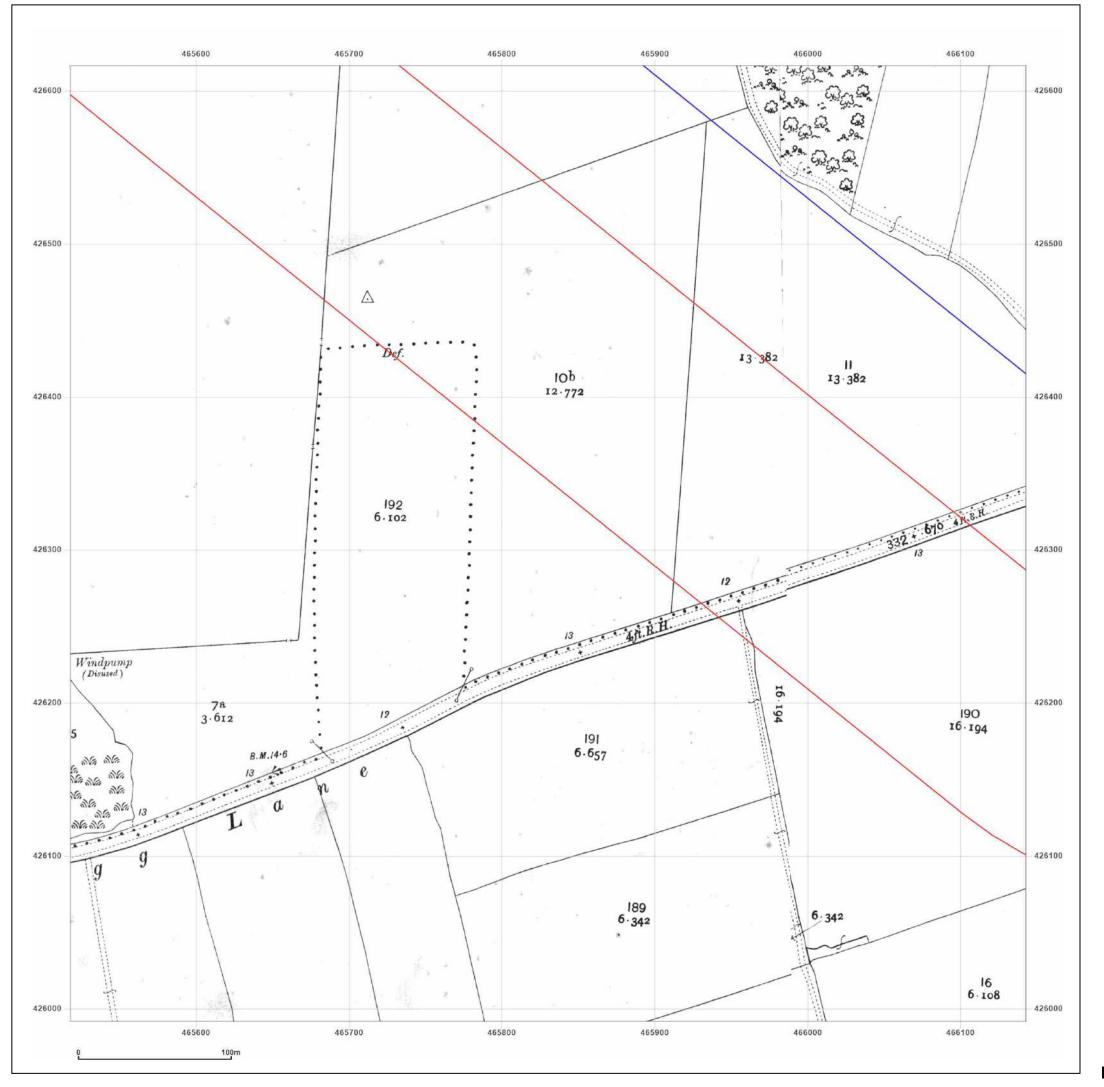




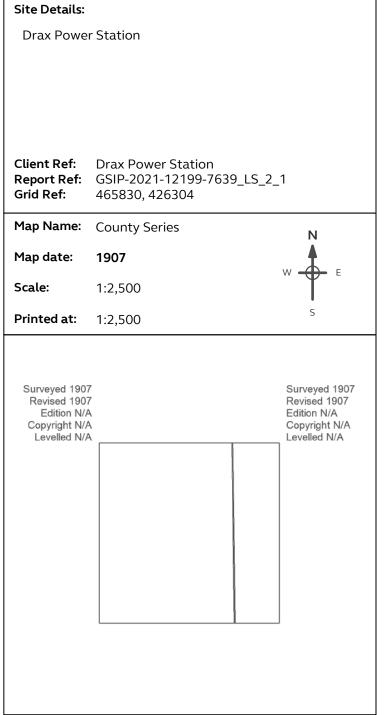


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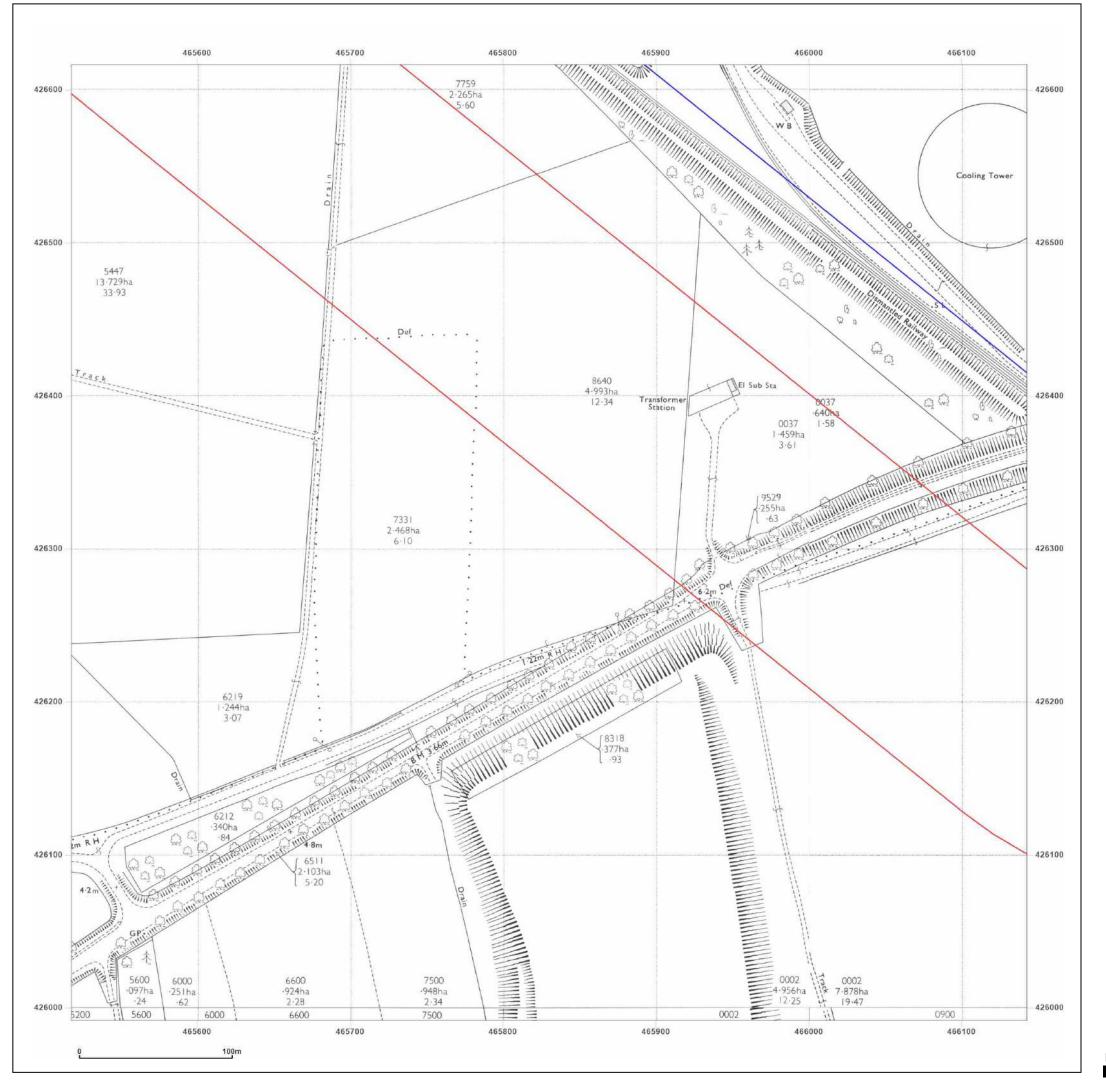




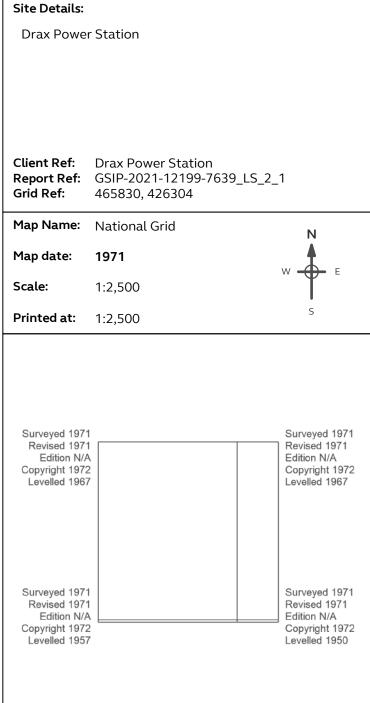


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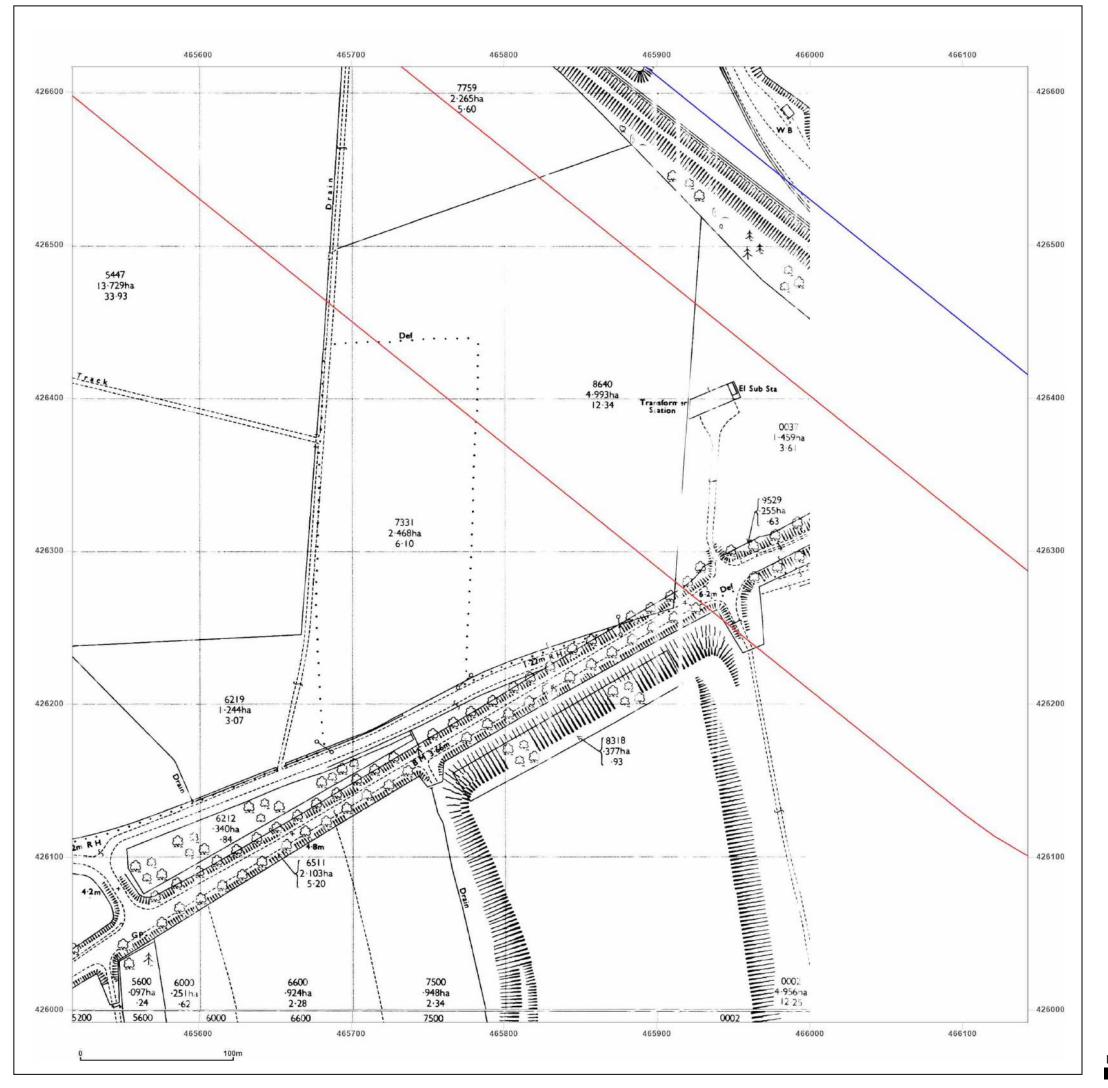






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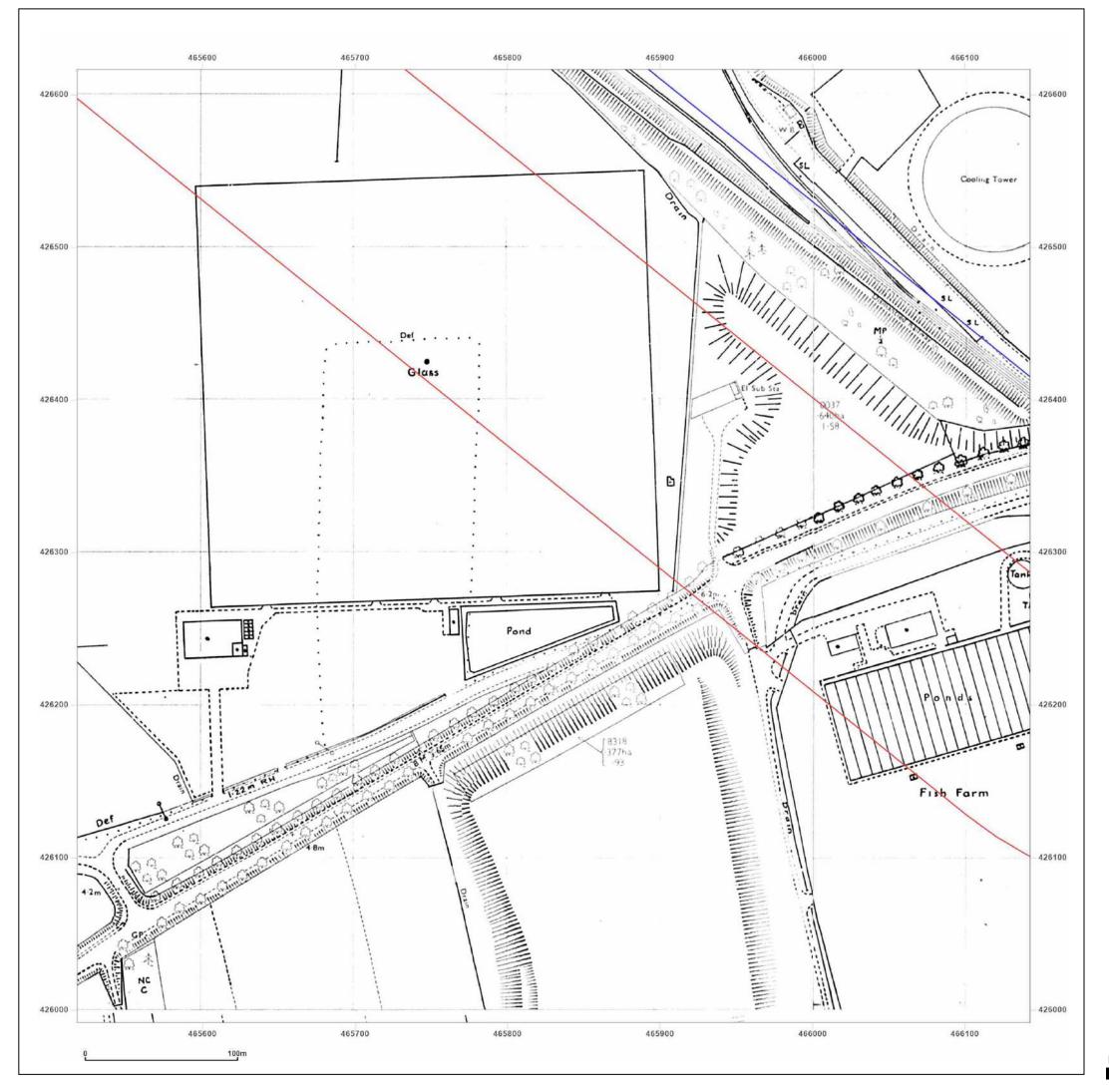


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Client Ref: Report Ref: Grid Ref:	Drax Power Station GSIP-2021-12199-7639_LS_2_1 465830, 426304			
Map Name:	National Grid N			
Map date:	1972			
Scale:	1:2,500			
Printed at:	1:2,500			
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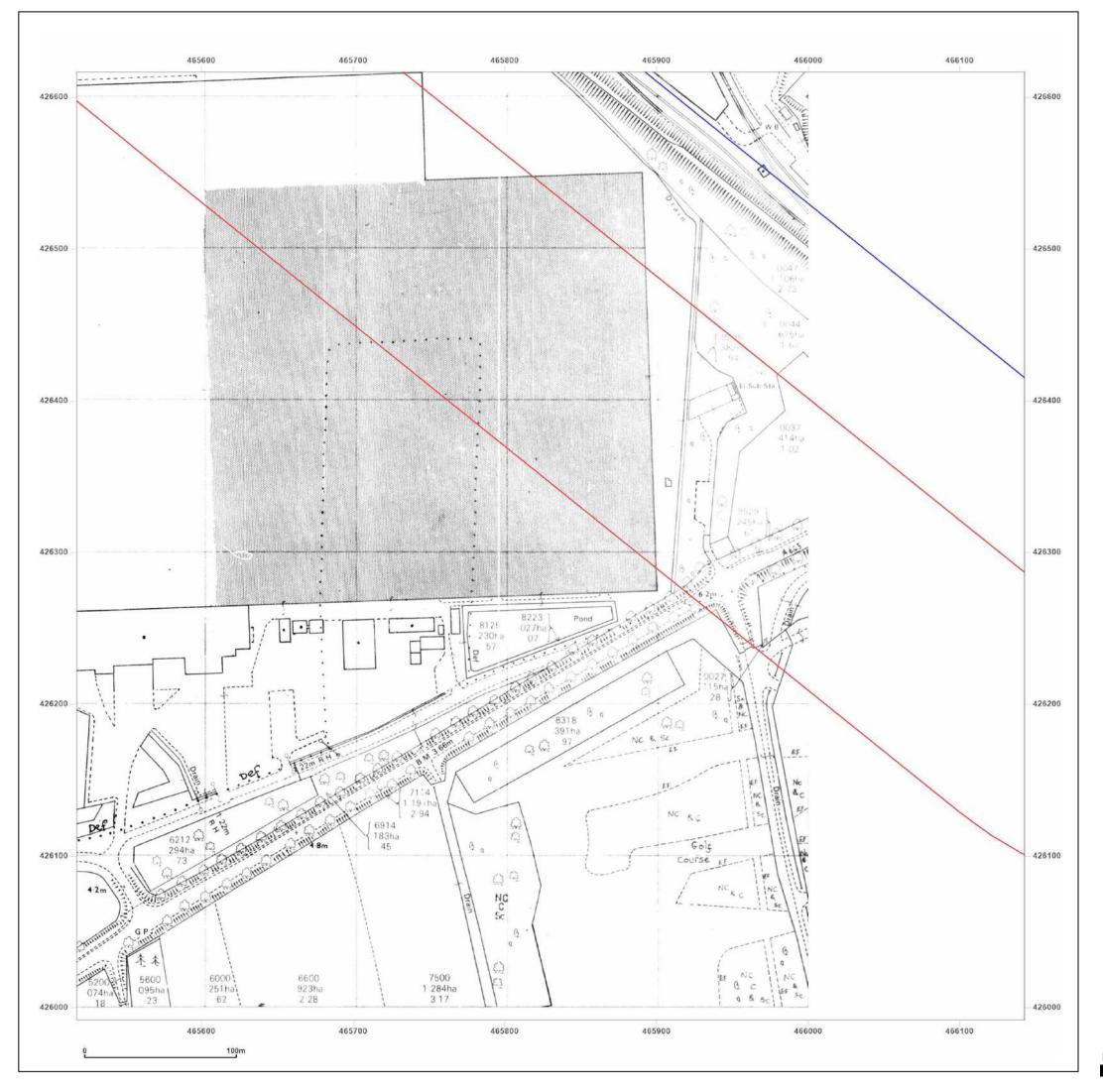


Site Details:				
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Client Ref: Report Ref: Grid Ref:	Drax Power Station GSIP-2021-12199-7639_LS 465830, 426304	_2_1		
Map Name:	National Grid	N		
Map date:	1982-1984	W F		
Scale:	1:2,500	" Y		
Printed at:	1:2,500	S		
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Edition N/A Copyright 1982	A 2	Edition N/A Copyright 1982		
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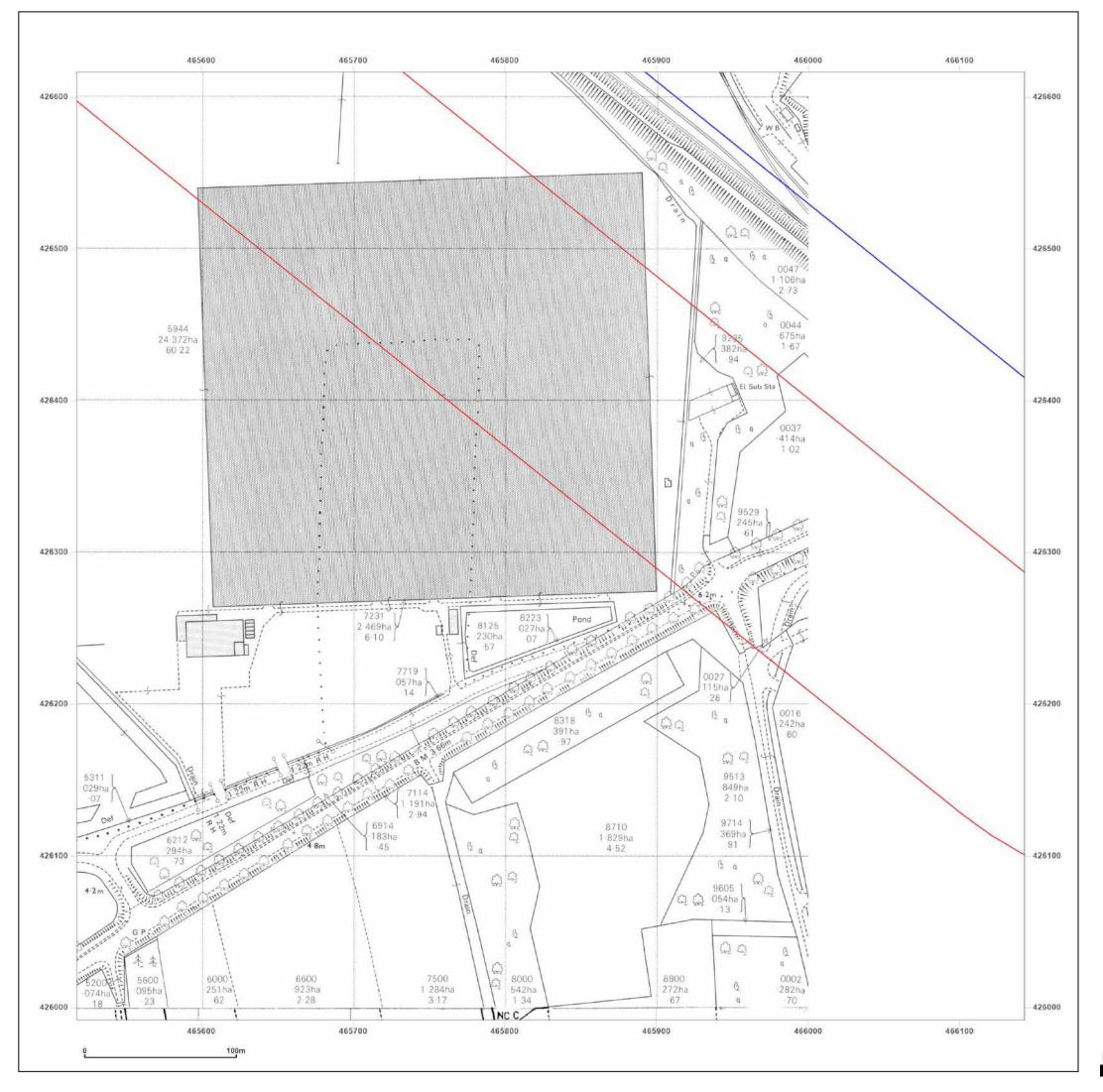


Site Details:				
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Map date:	1984			
Scale:	1:2,500			
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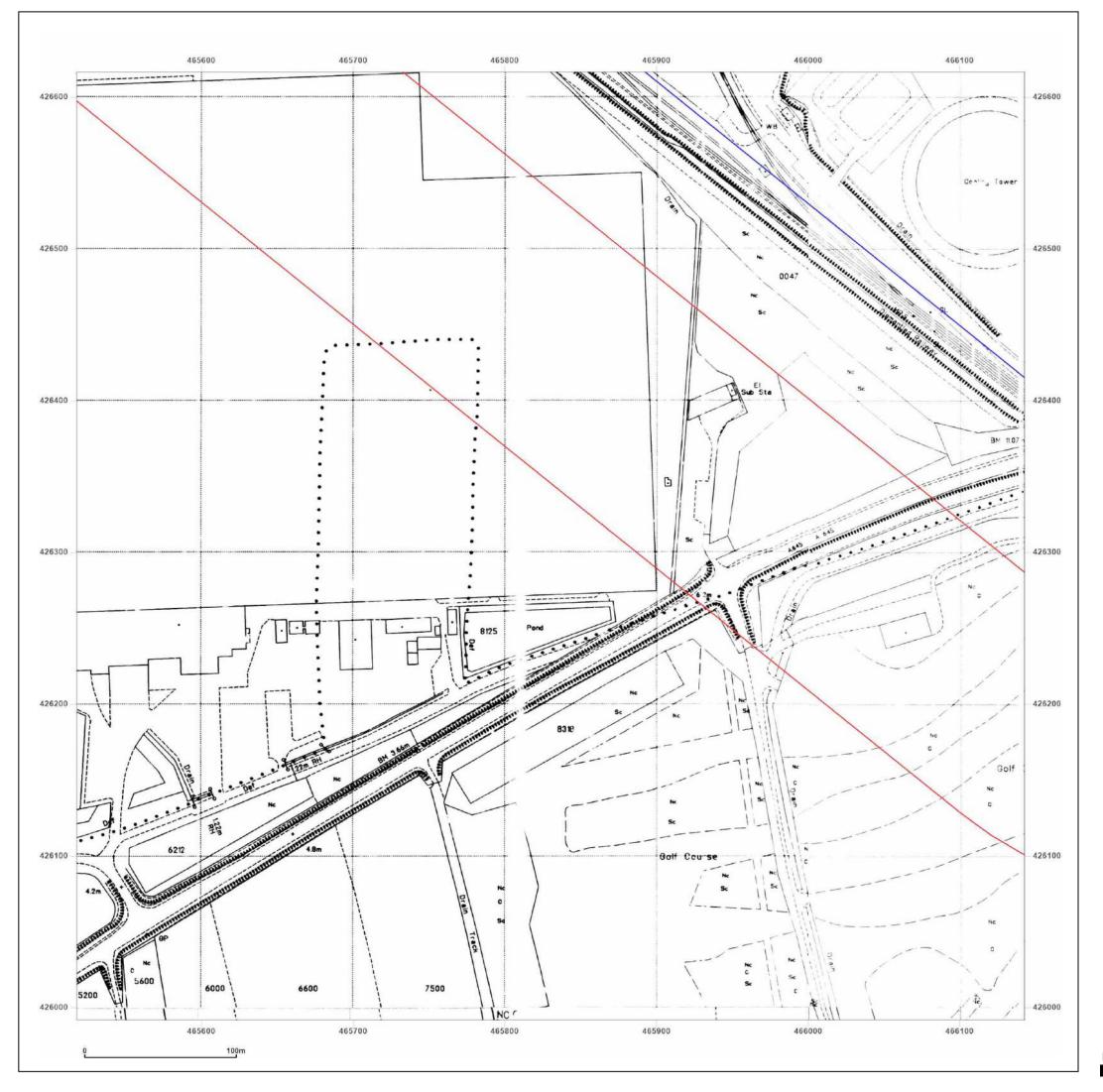


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Report Ref: Grid Ref:	GSIP-2021-12199-7639_LS_2_1 465830, 426304			
Map Name:	National Grid N			
Map date:	1984-1989			
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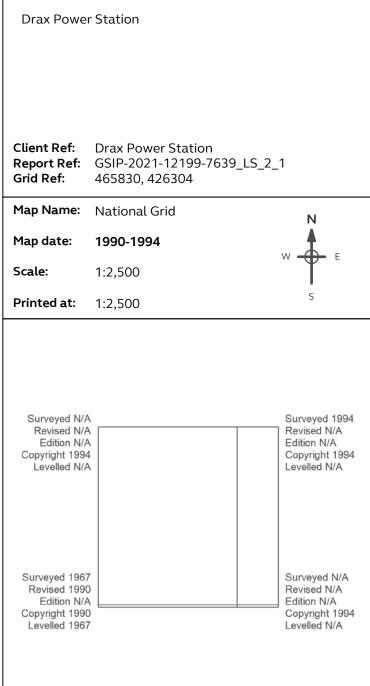
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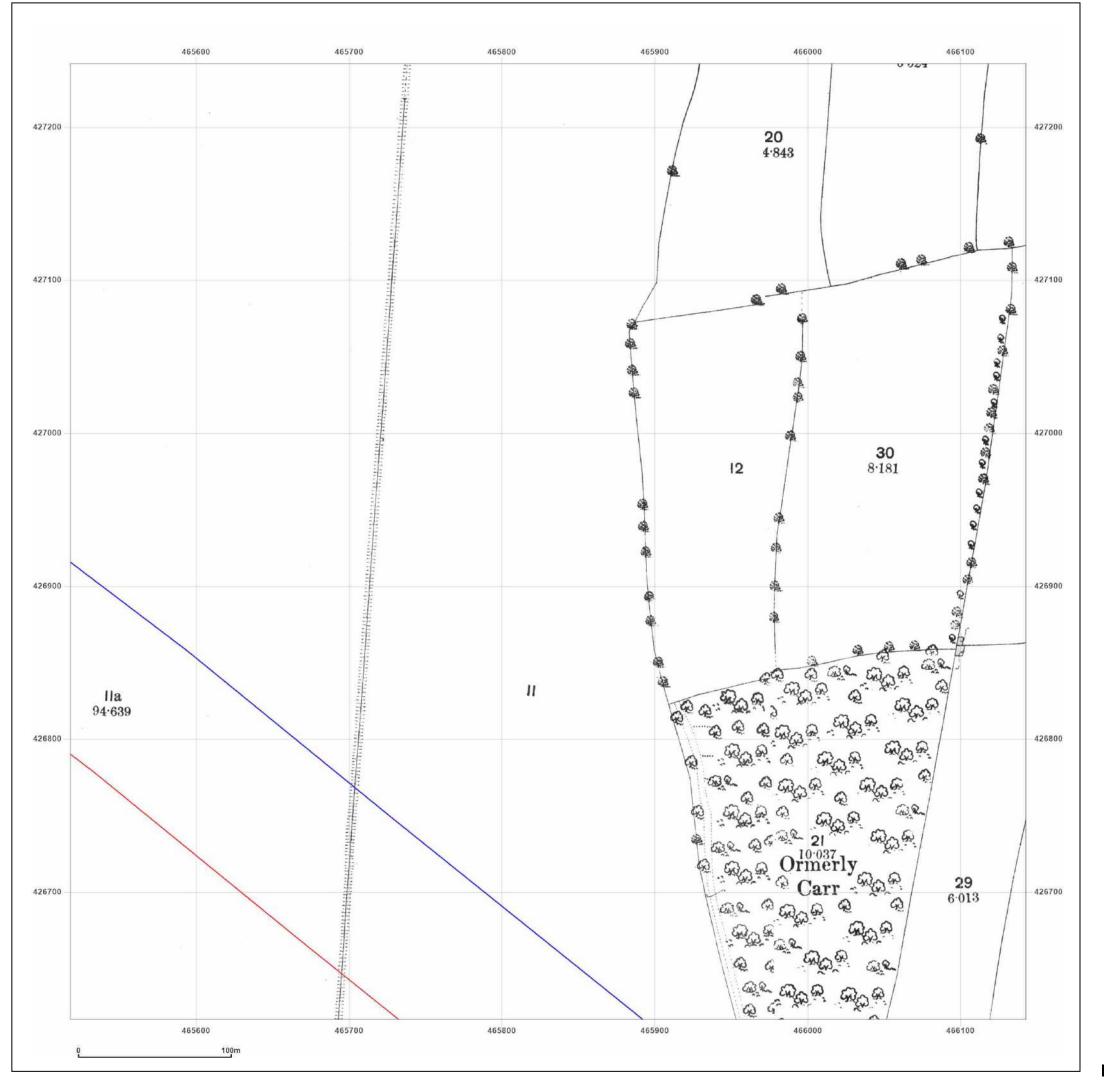




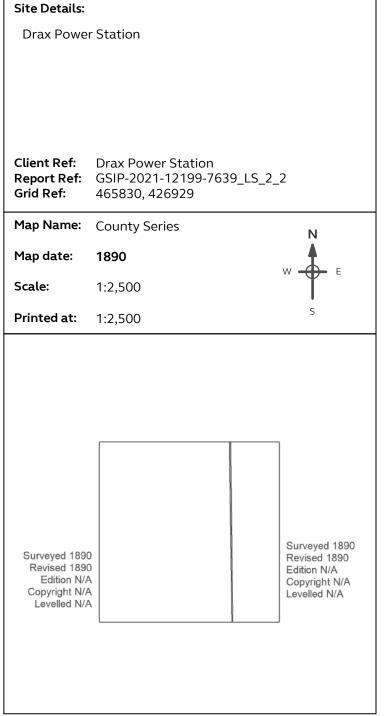
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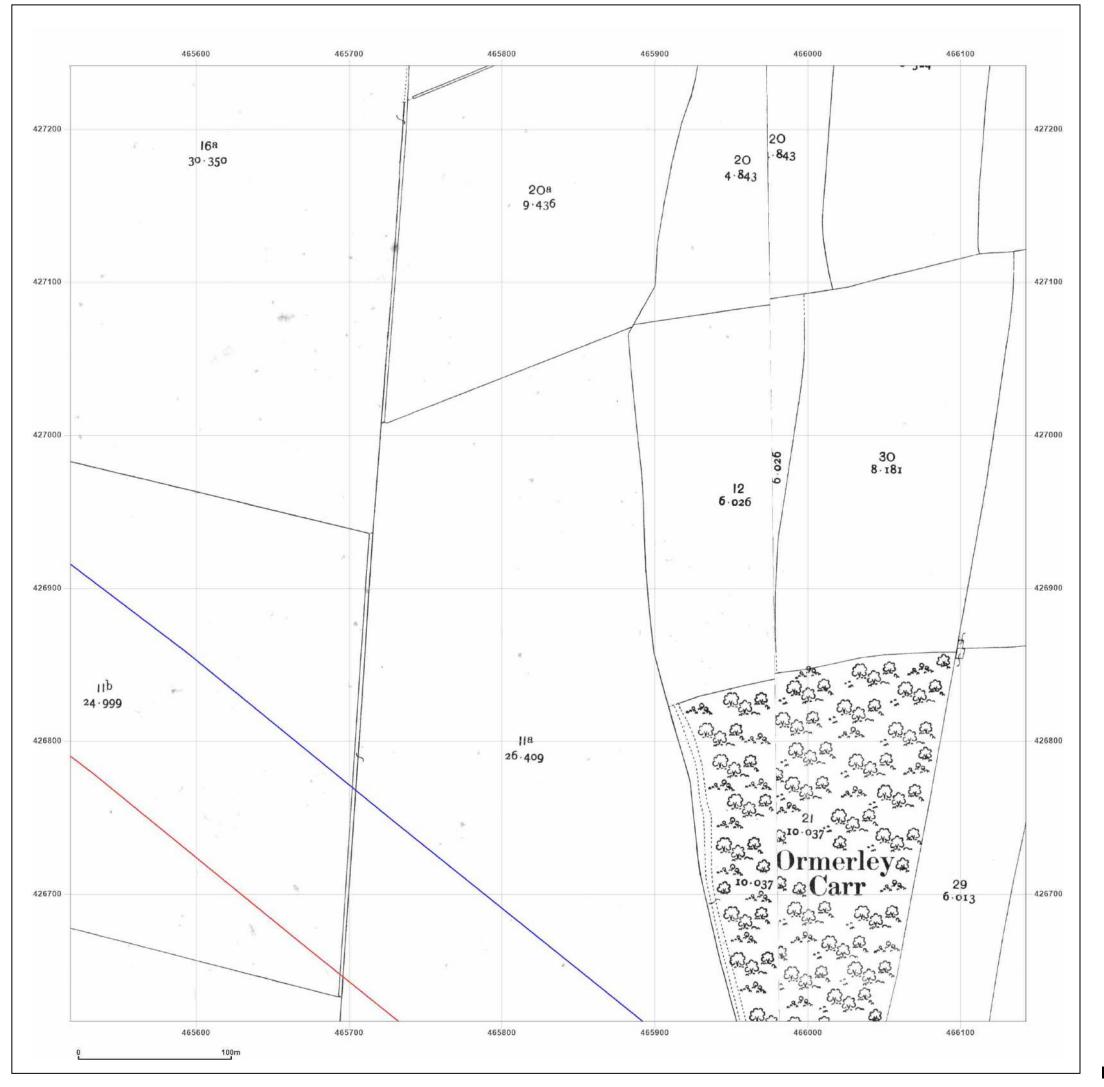




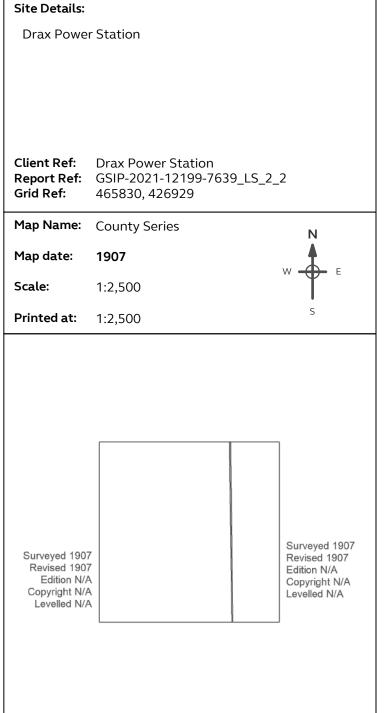


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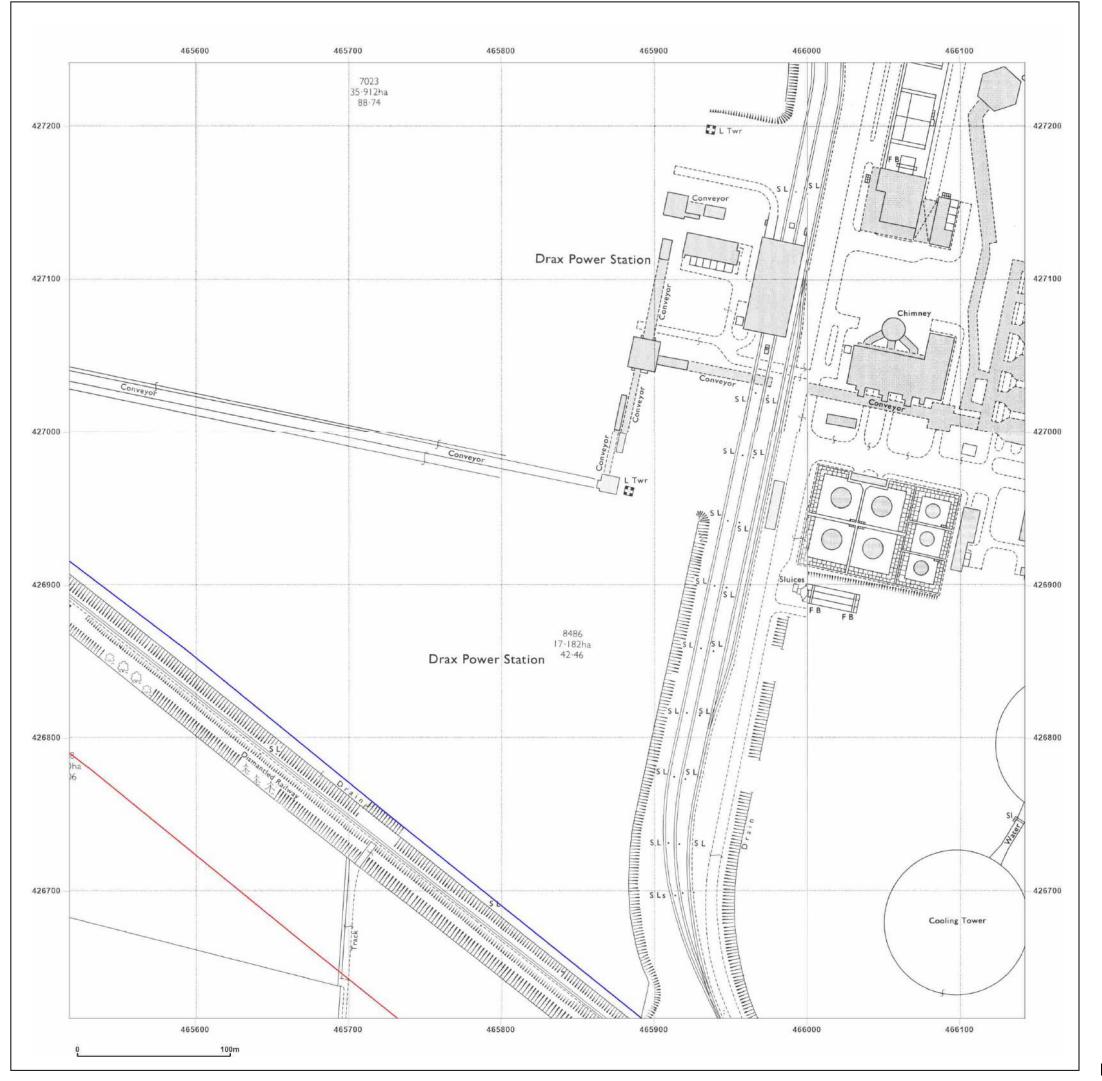






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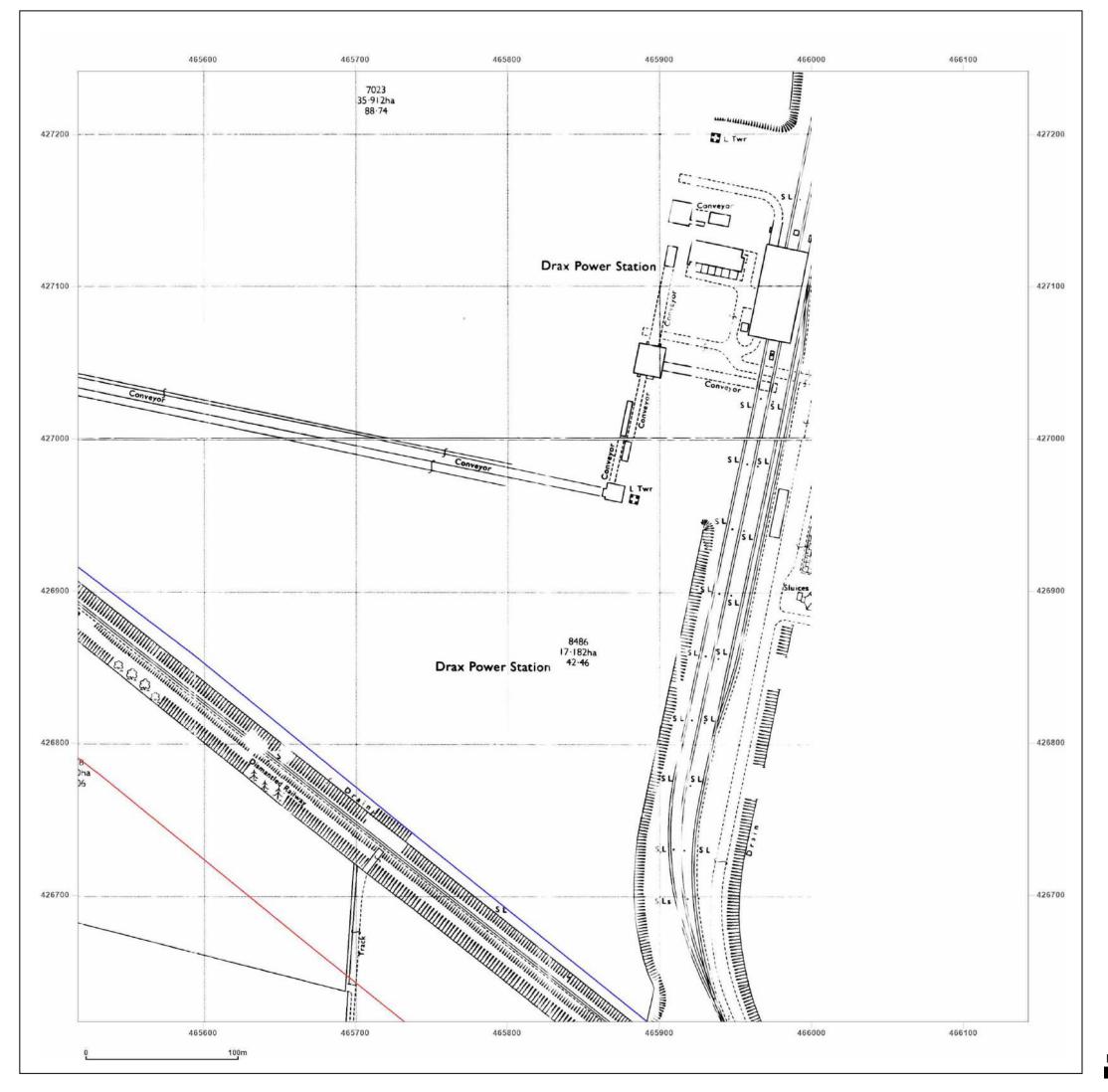


Site Details:				
Drax Power Station				
Client Ref:	Drax Power Station			
Report Ref:	GSIP-2021-12199-7639)_LS_2_2		
Grid Ref:	465830, 426929			
Map Name:	National Grid	N		
Map date:	1971	W F		
Scale:	1:2,500	w T -		
Printed at:	1:2,500	S		
Surveyed 197 Revised 197	1	Surveyed 1971 Revised 1971		
Edition N/A Copyright 1972	2	Edition N/A Copyright 1972		
Levelled 196	7	Levelled 1967		
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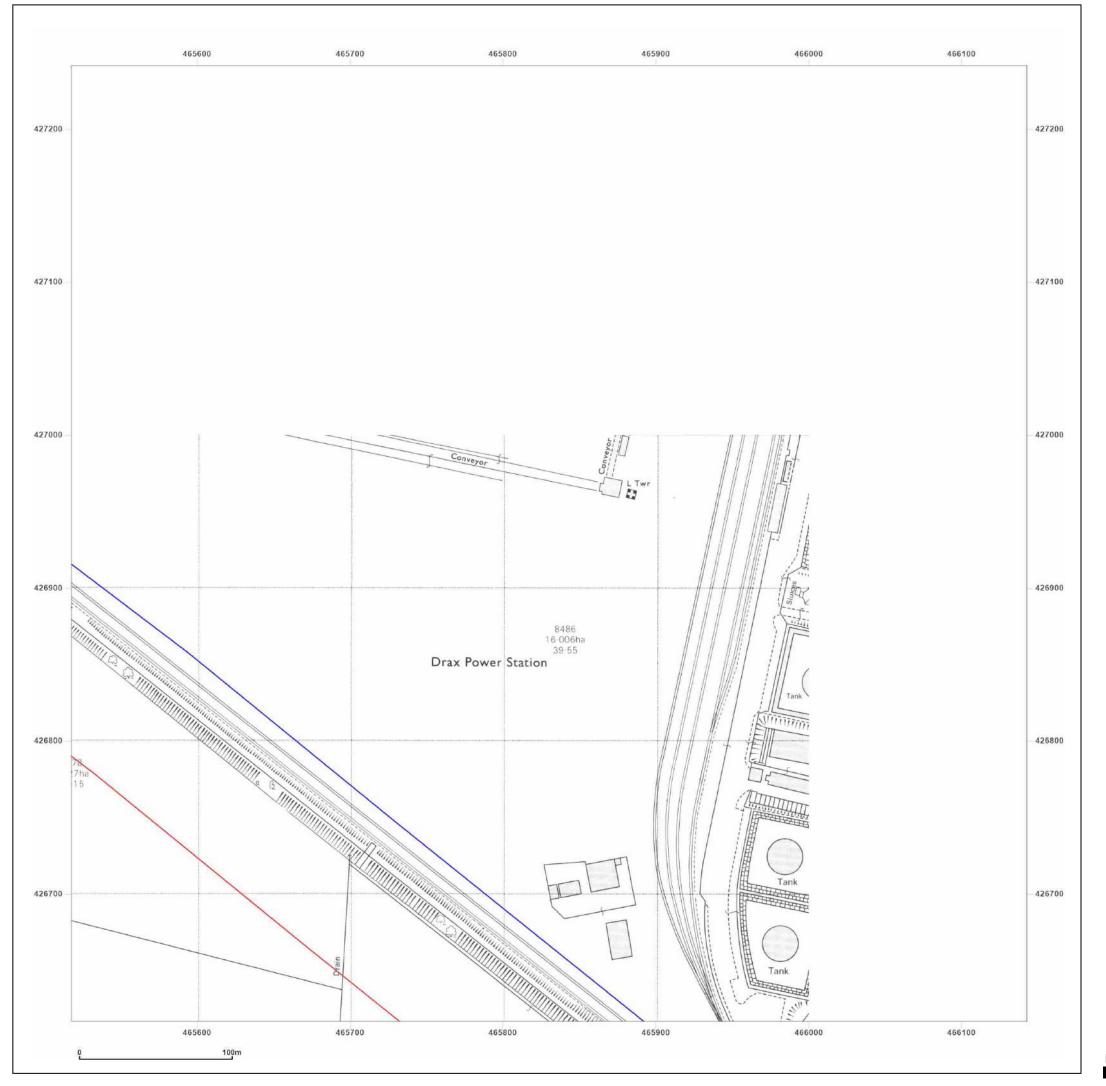


Site Details:	
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Map Name:	National Grid N
Map date:	1972
Scale:	1:2,500
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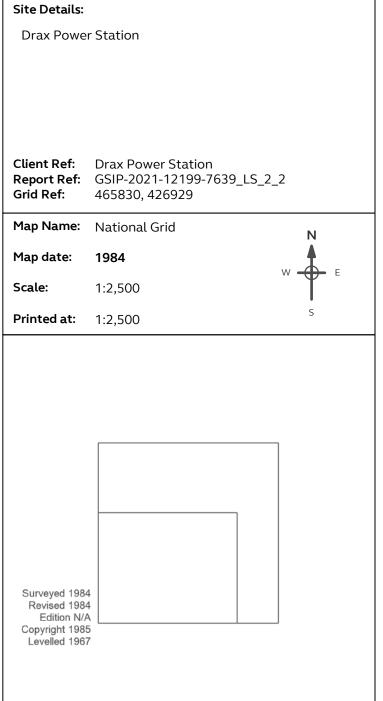


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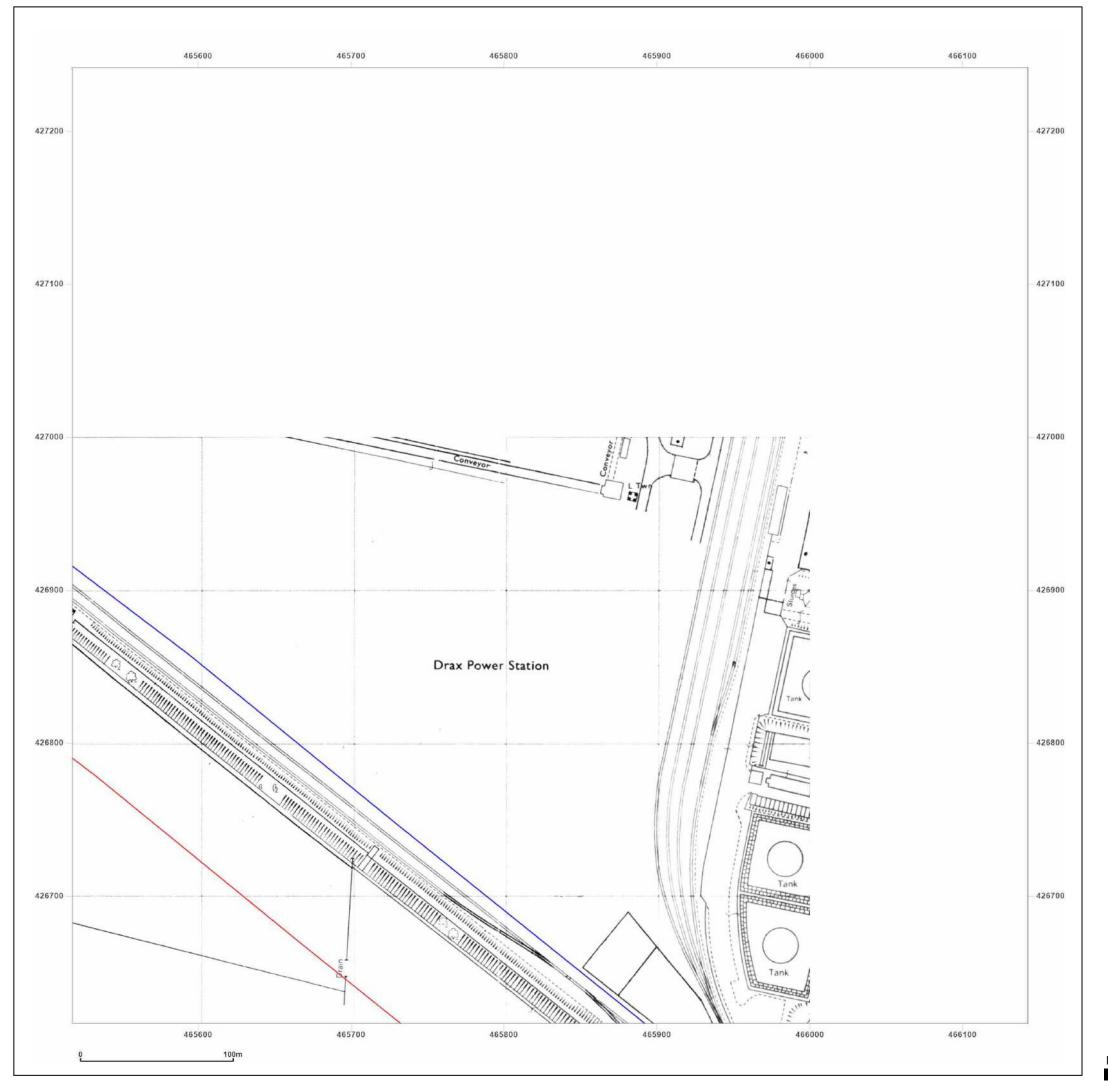




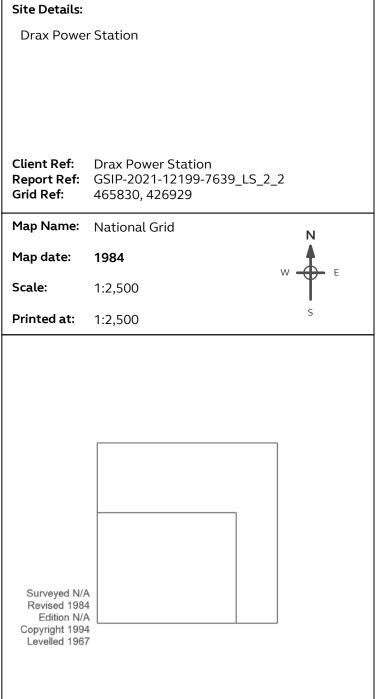


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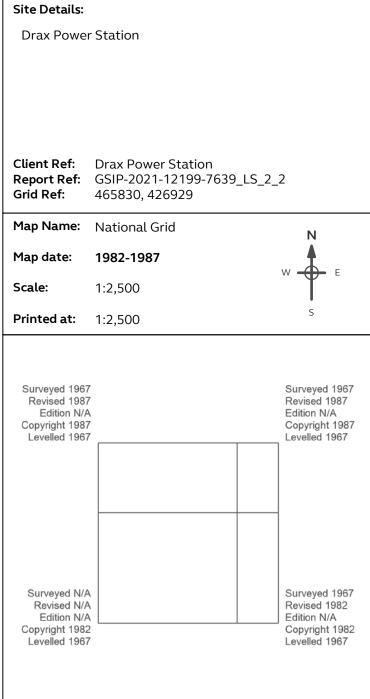


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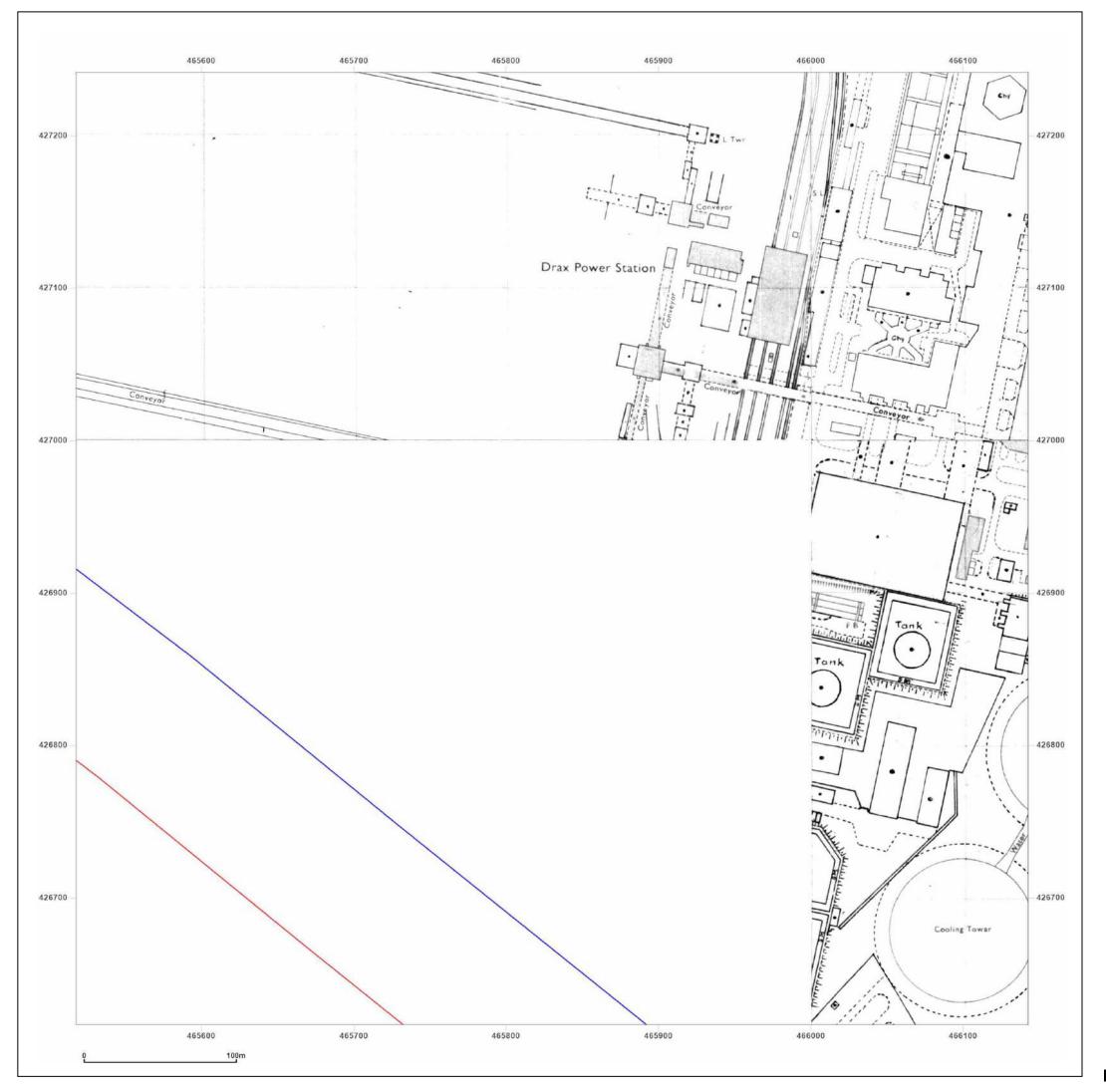
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Grid Ref:	465830, 426929	/ 033_L3_2_2		
Map Name:	National Grid	N		
Map date:	1994	W E		
Scale:	1:2,500	· Y -		
Printed at:	1:2,500	S		
Surveyed 1994 Revised N/A Edition N/A Copyright 1994 Levelled N/A	A A 4	Surveyed 1994 Revised N/A Edition N/A Copyright 1994 Levelled N/A		
Surveyed N/A Revised N/A Edition N/A Copyright 1994 Levelled N/A	A 4	Surveyed 1994 Revised N/A Edition N/A Copyright 1994 Levelled N/A		



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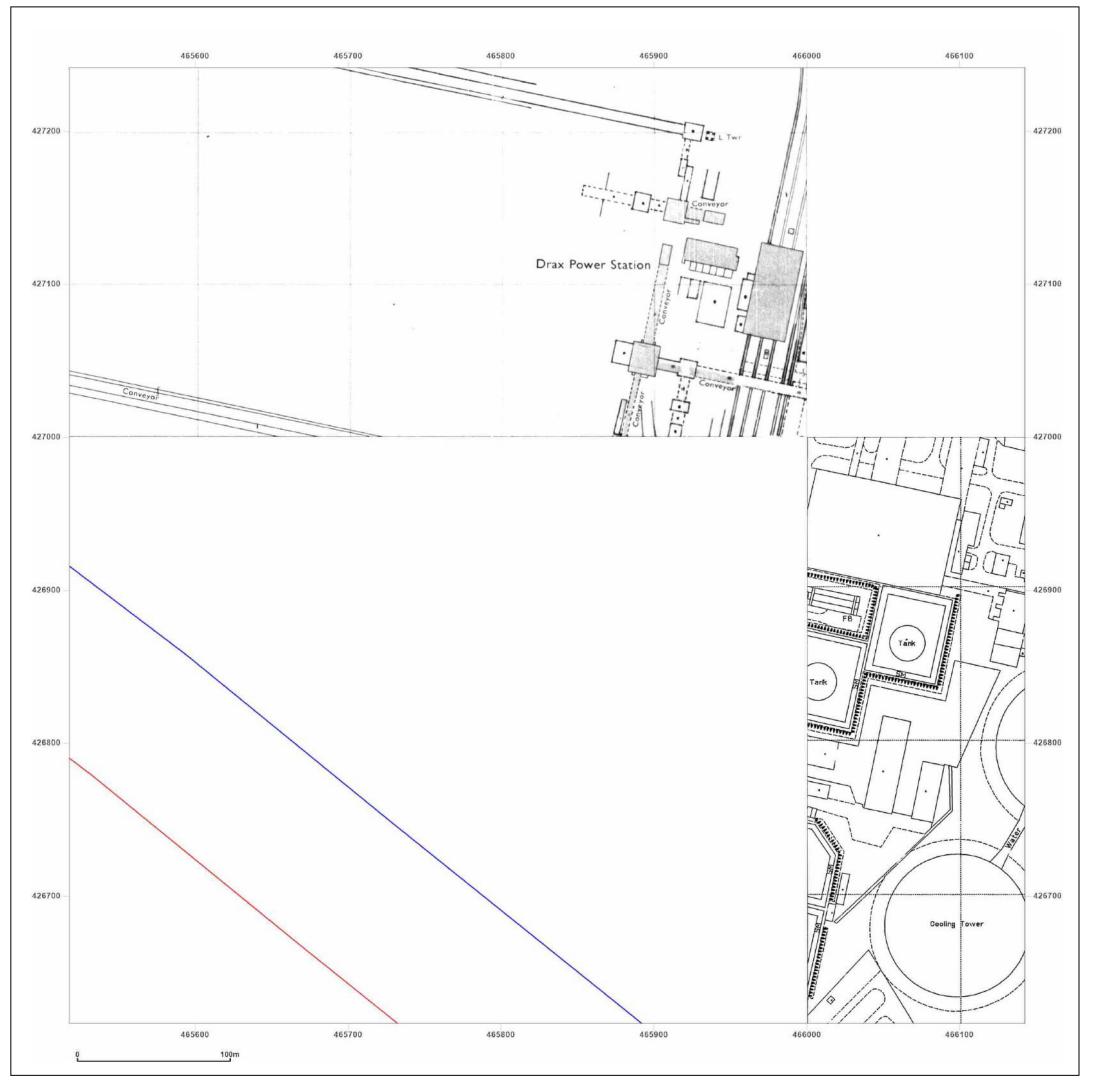


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Map date:	1994	W F		
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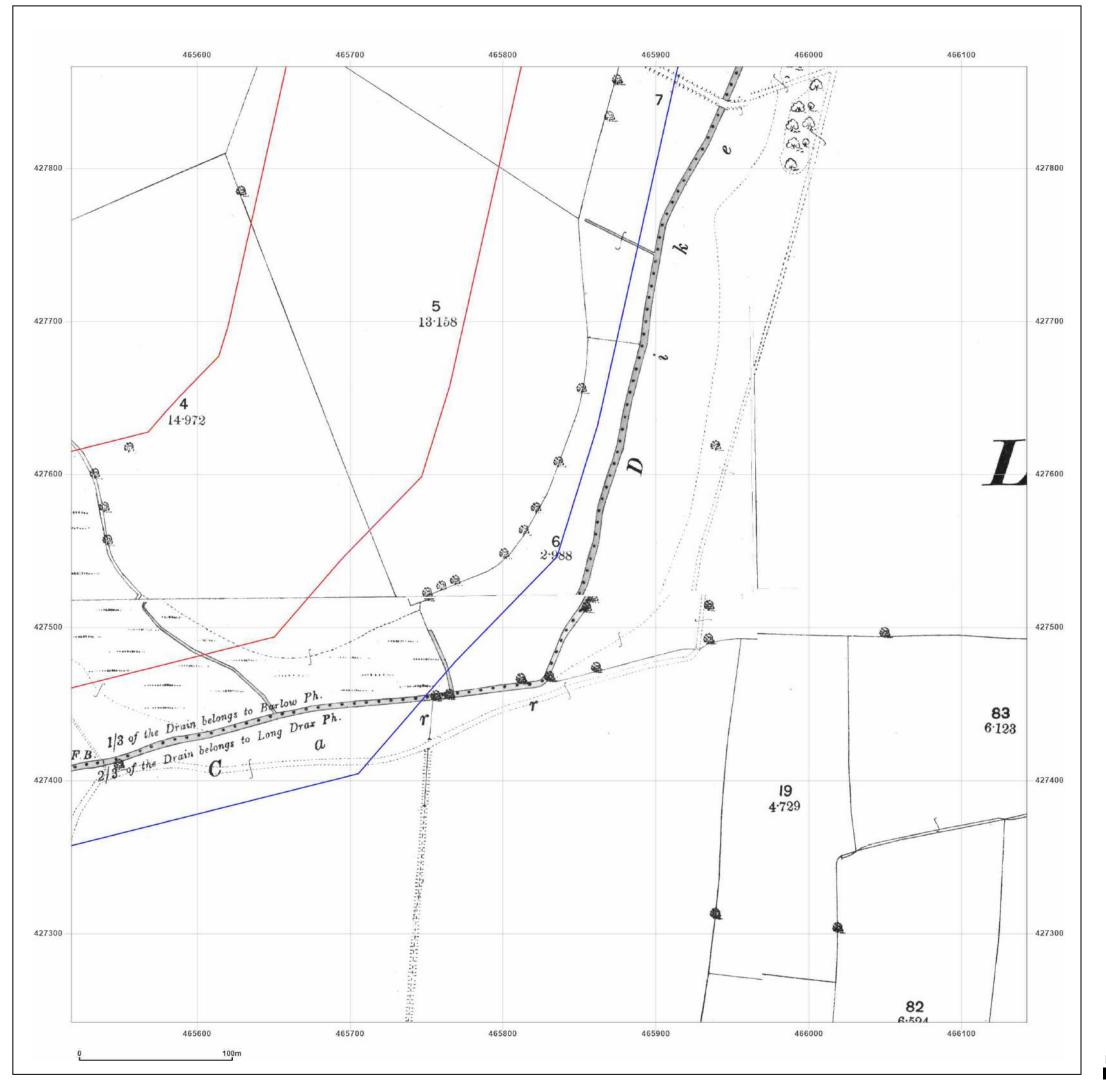


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Map Name:	National Grid	N		
Map date:	1994-1995	W		
Scale:	1:2,500	W F		
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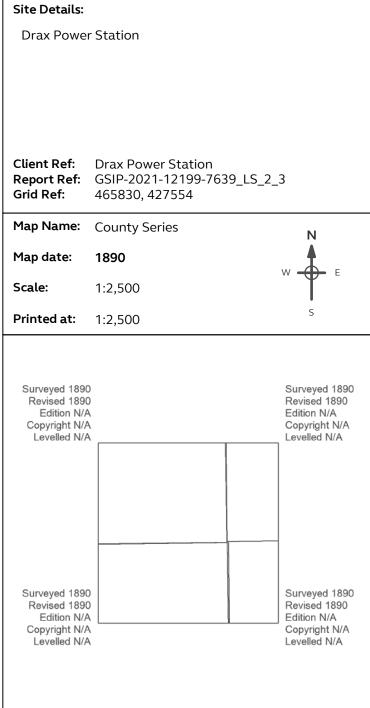


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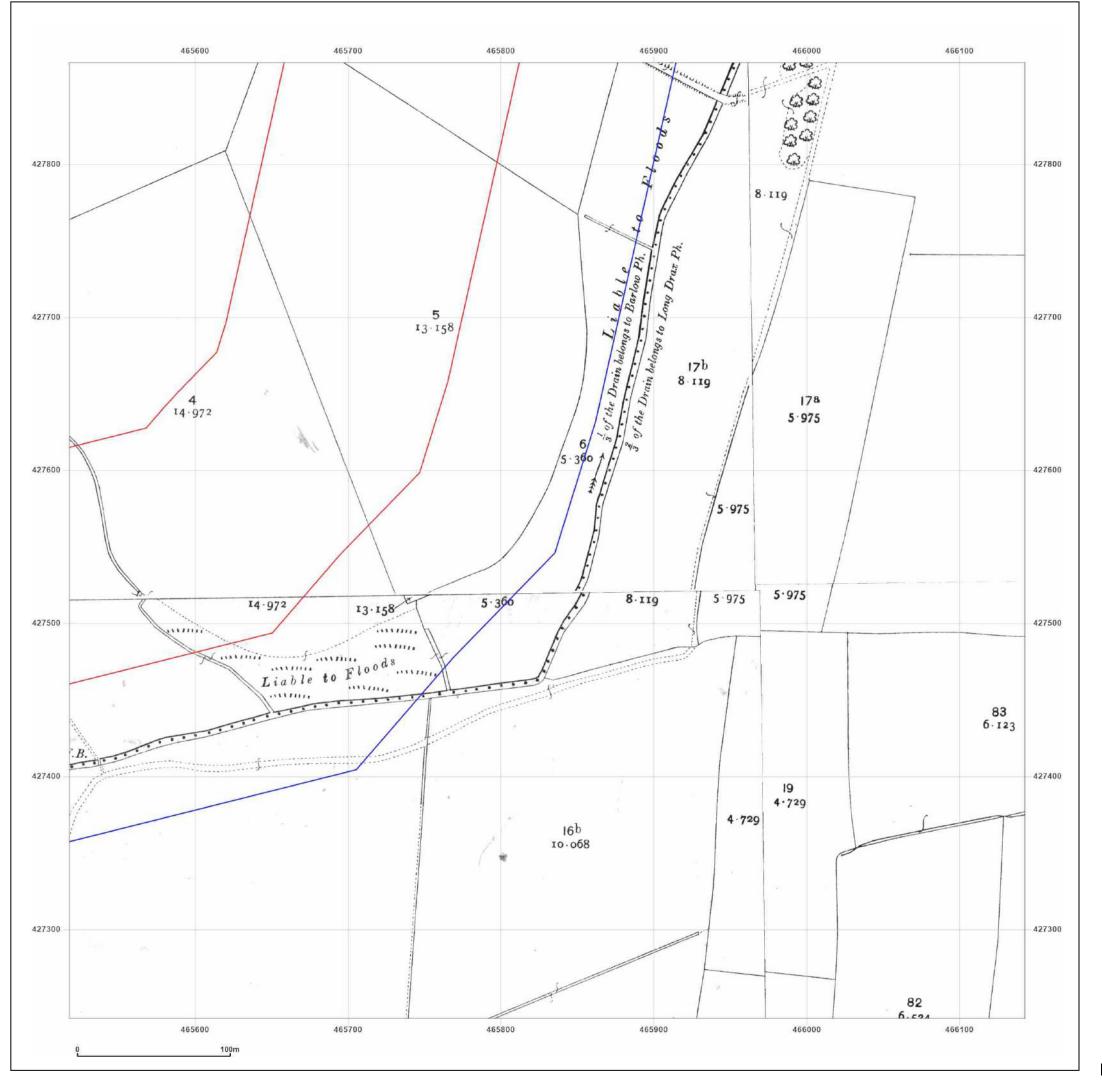




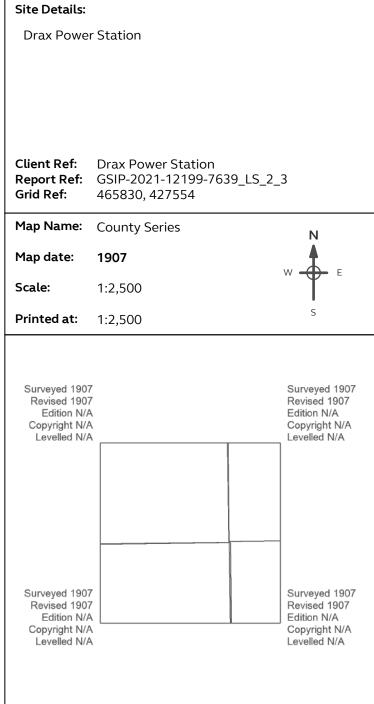


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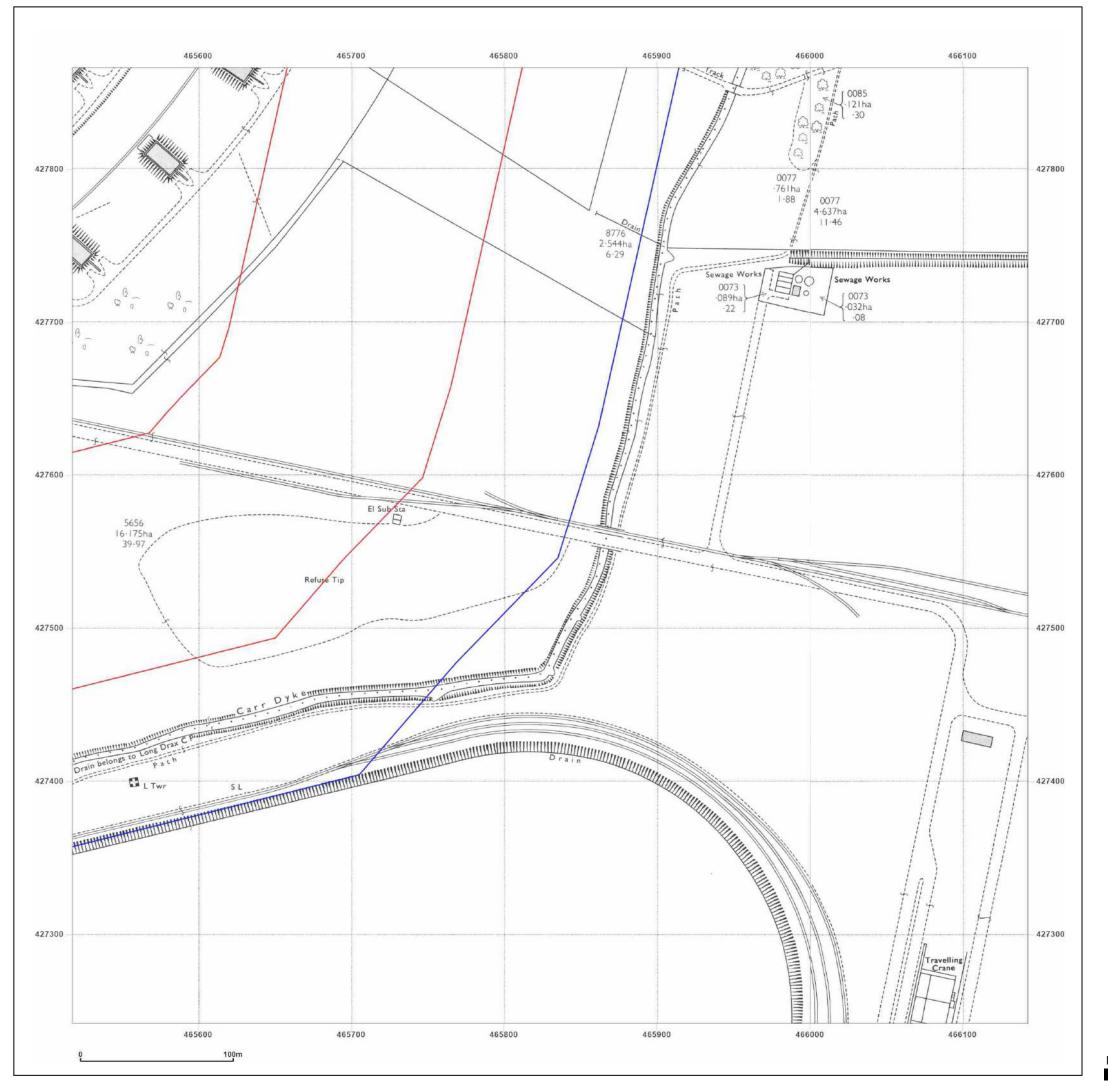




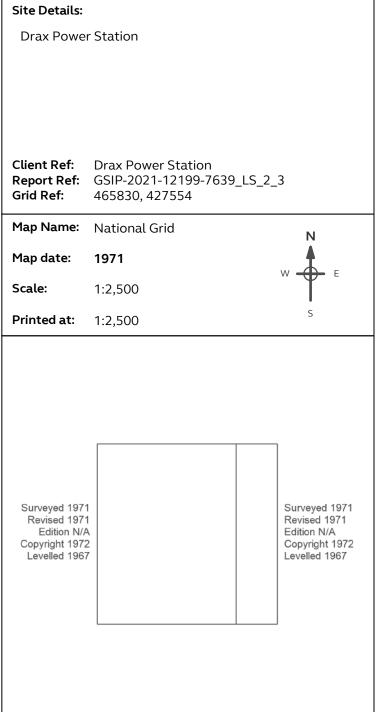


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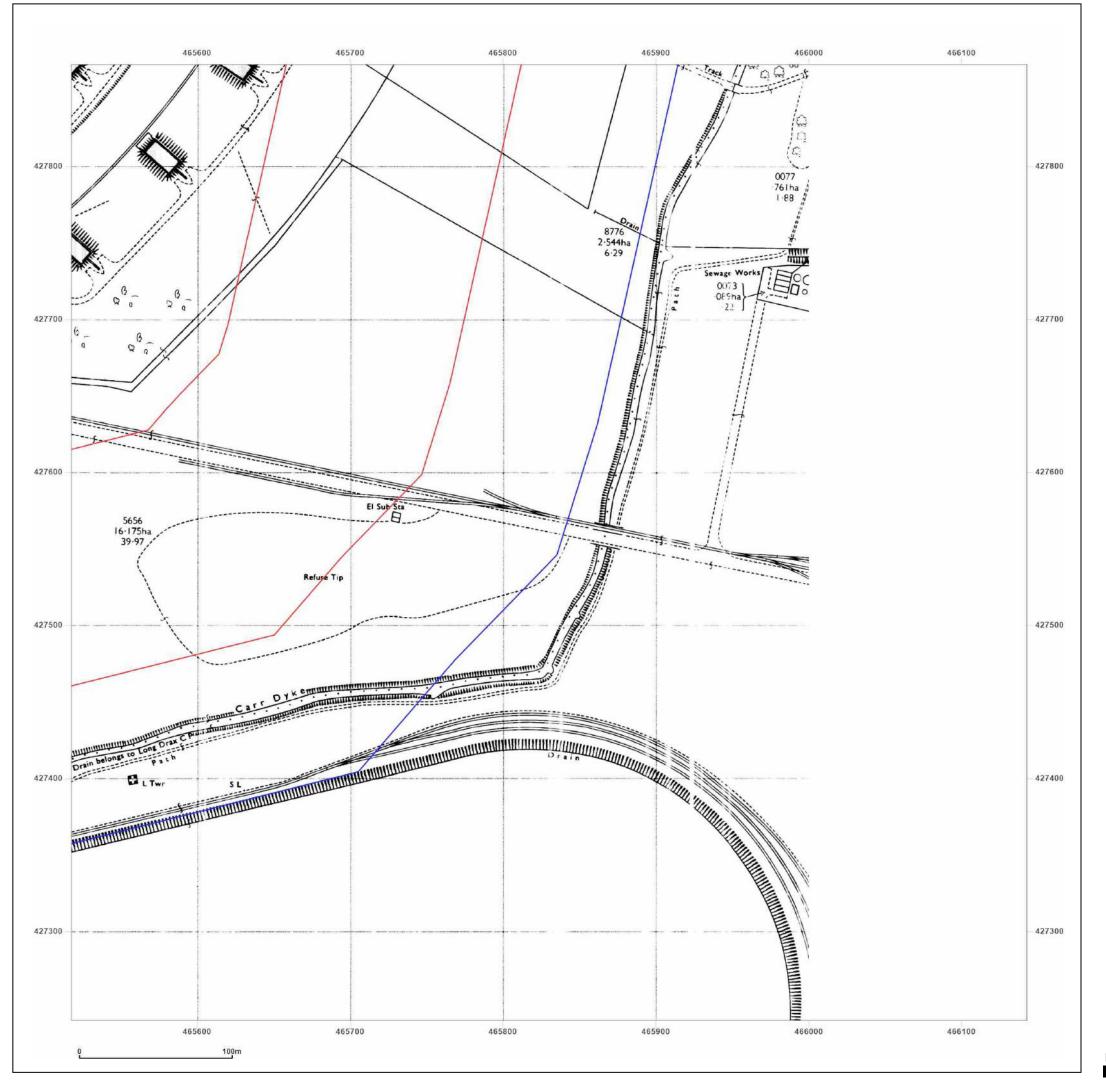






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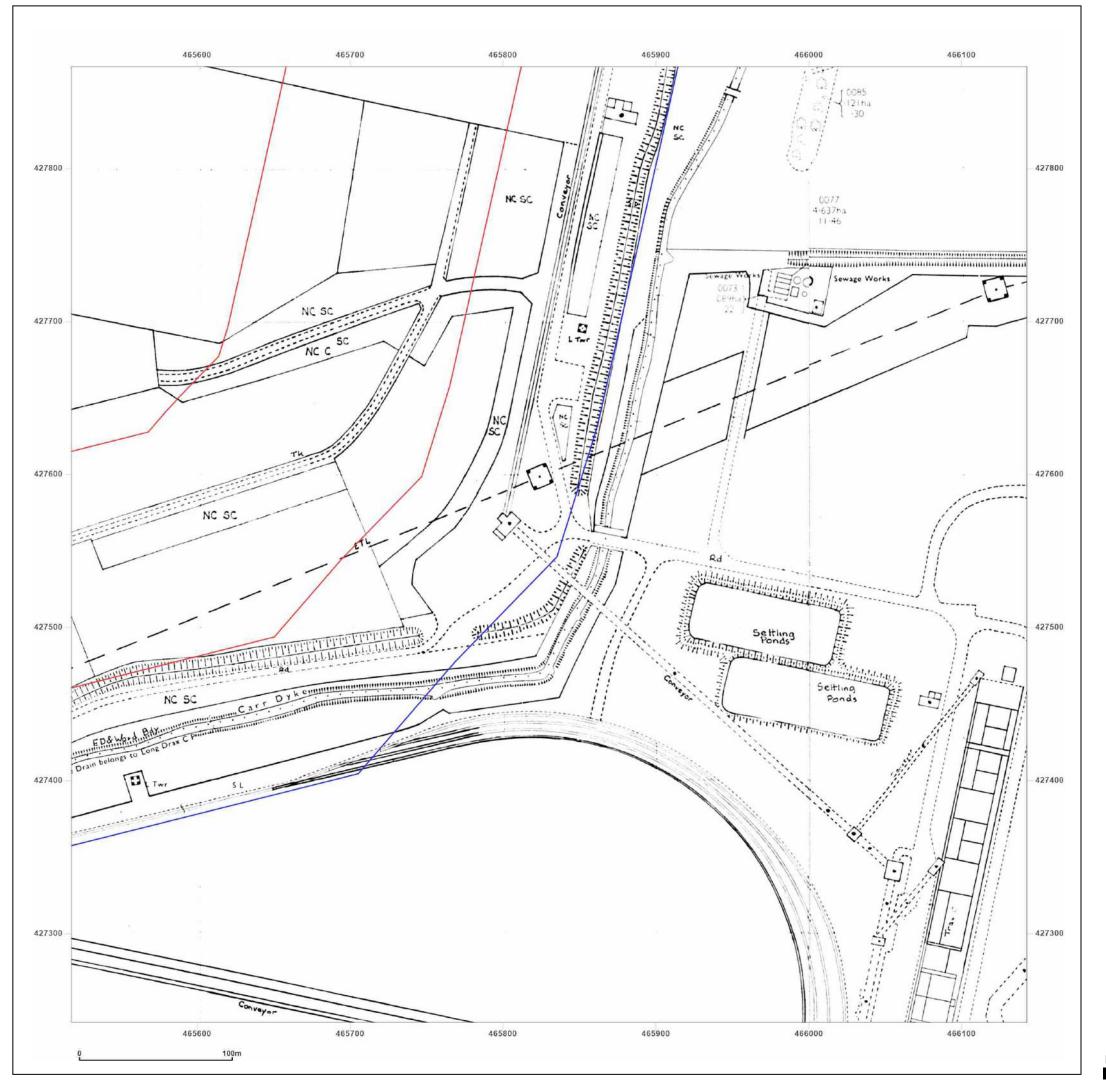


Site Details:				
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Map Name:	National Grid N			
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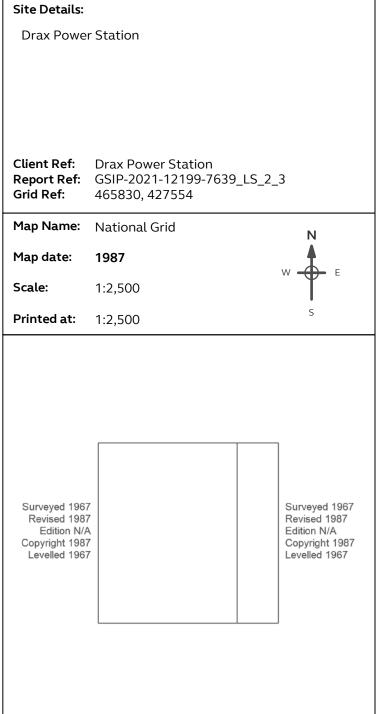


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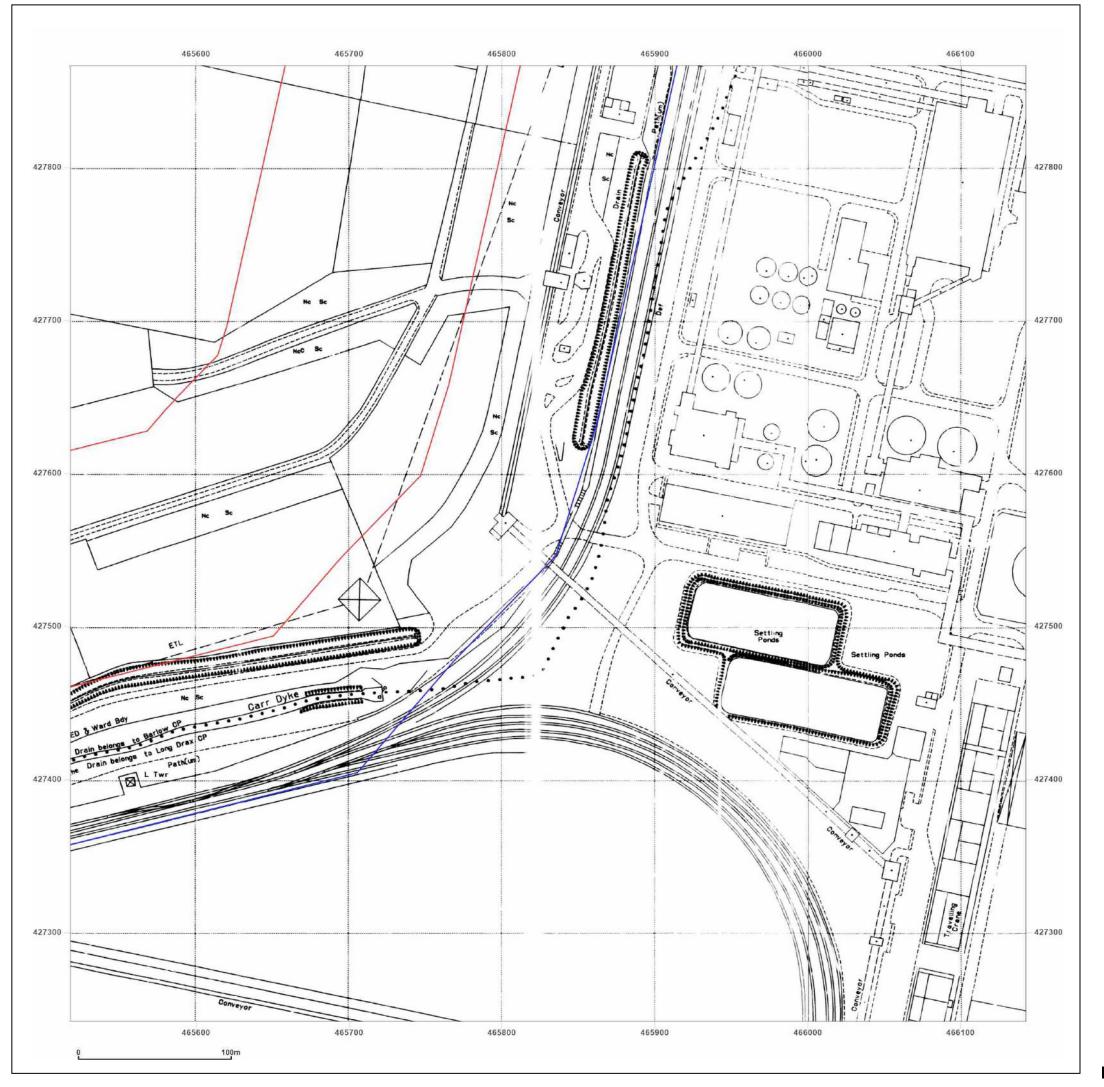




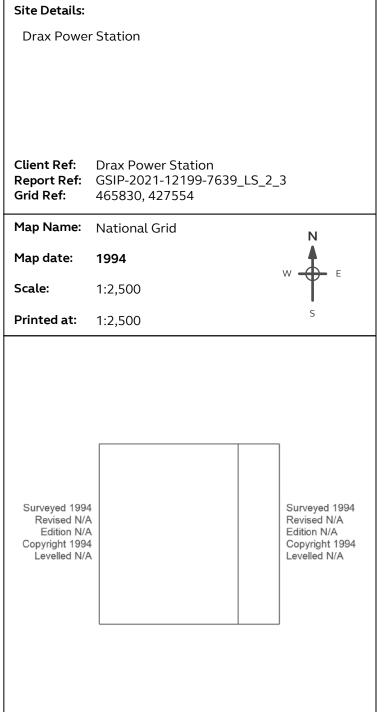


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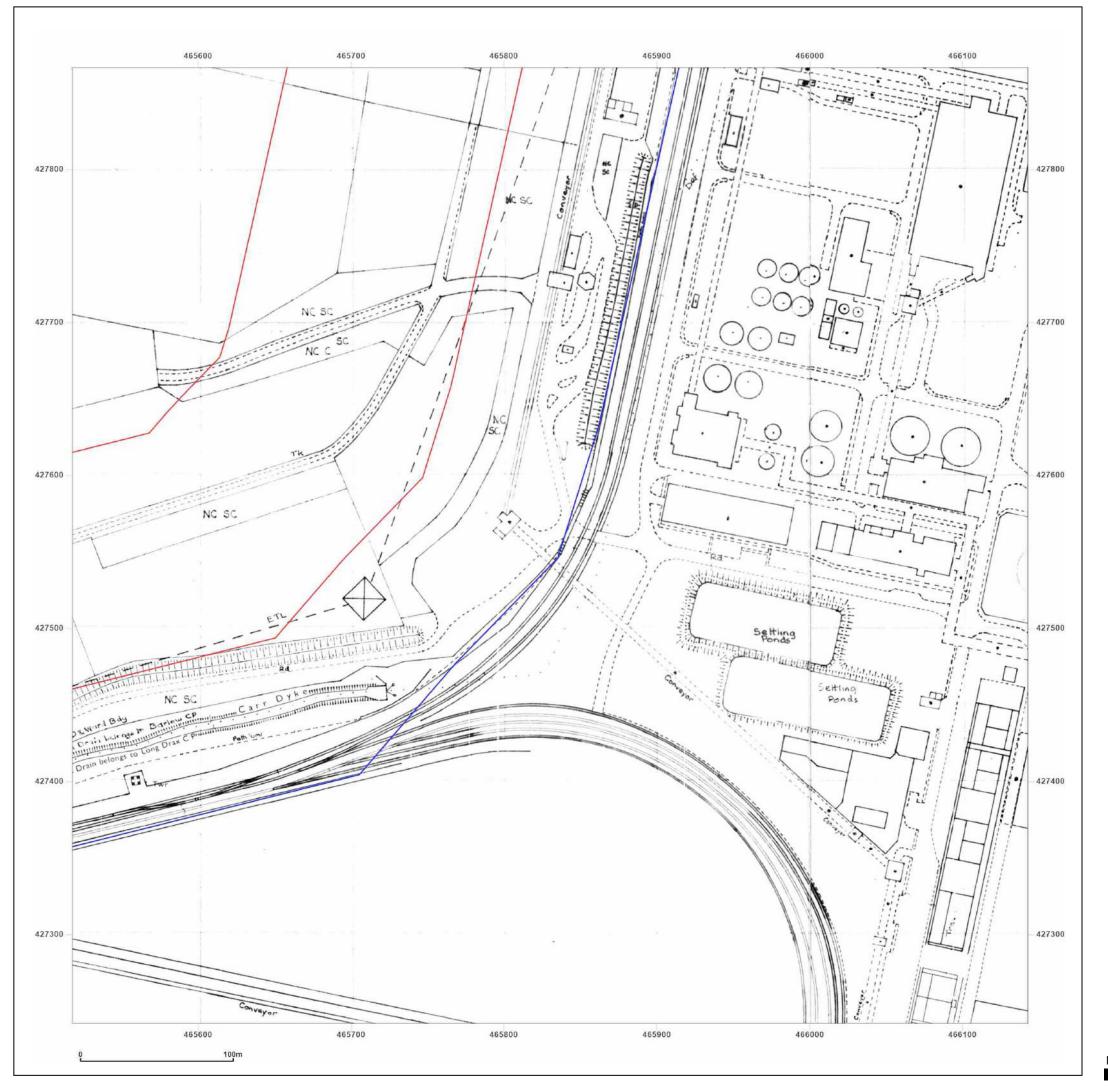




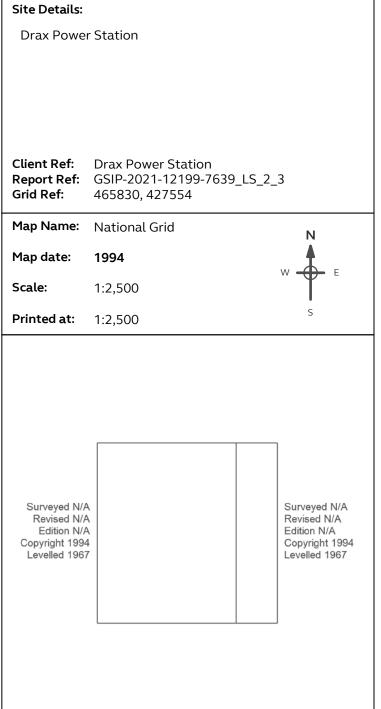


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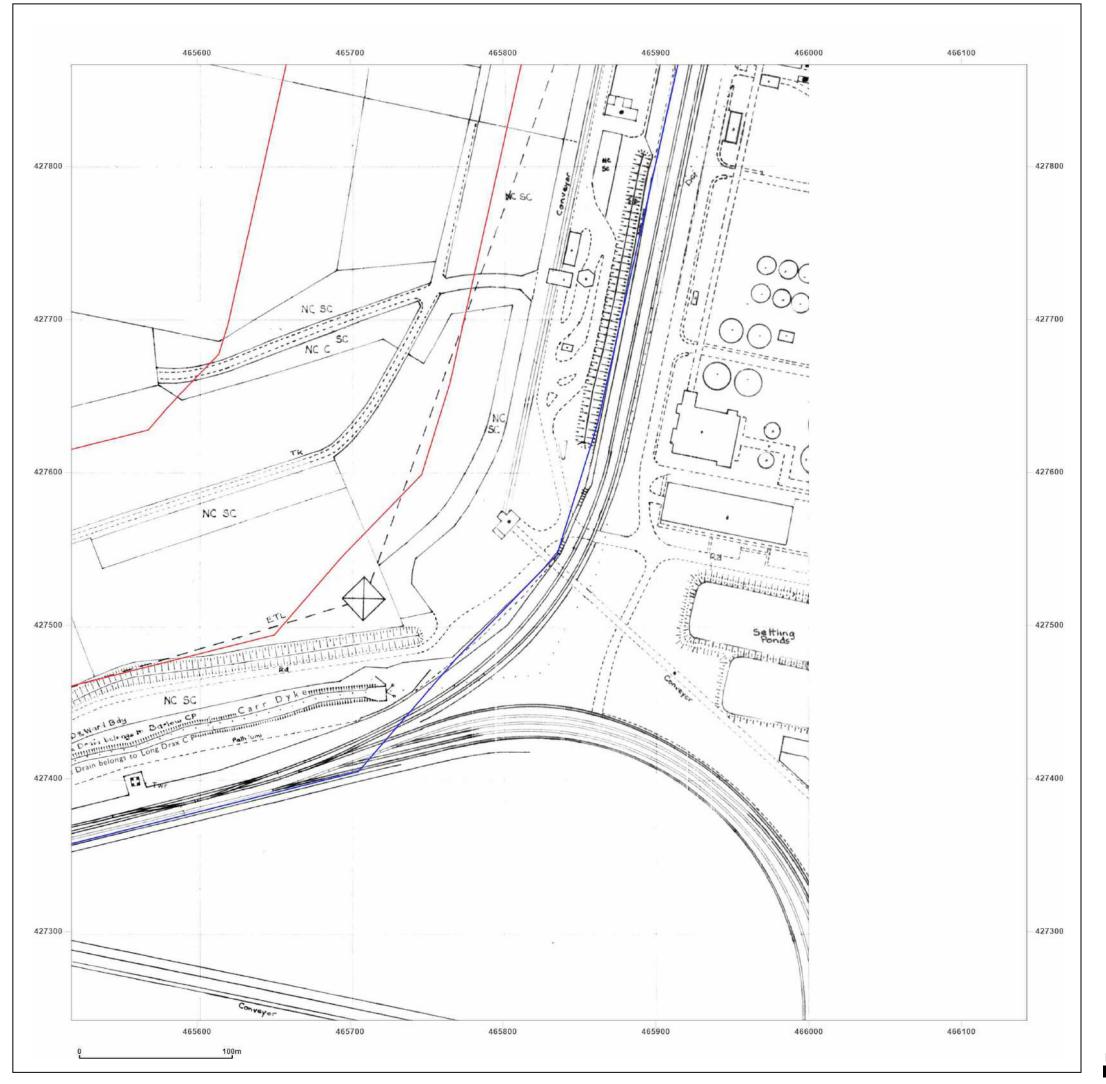






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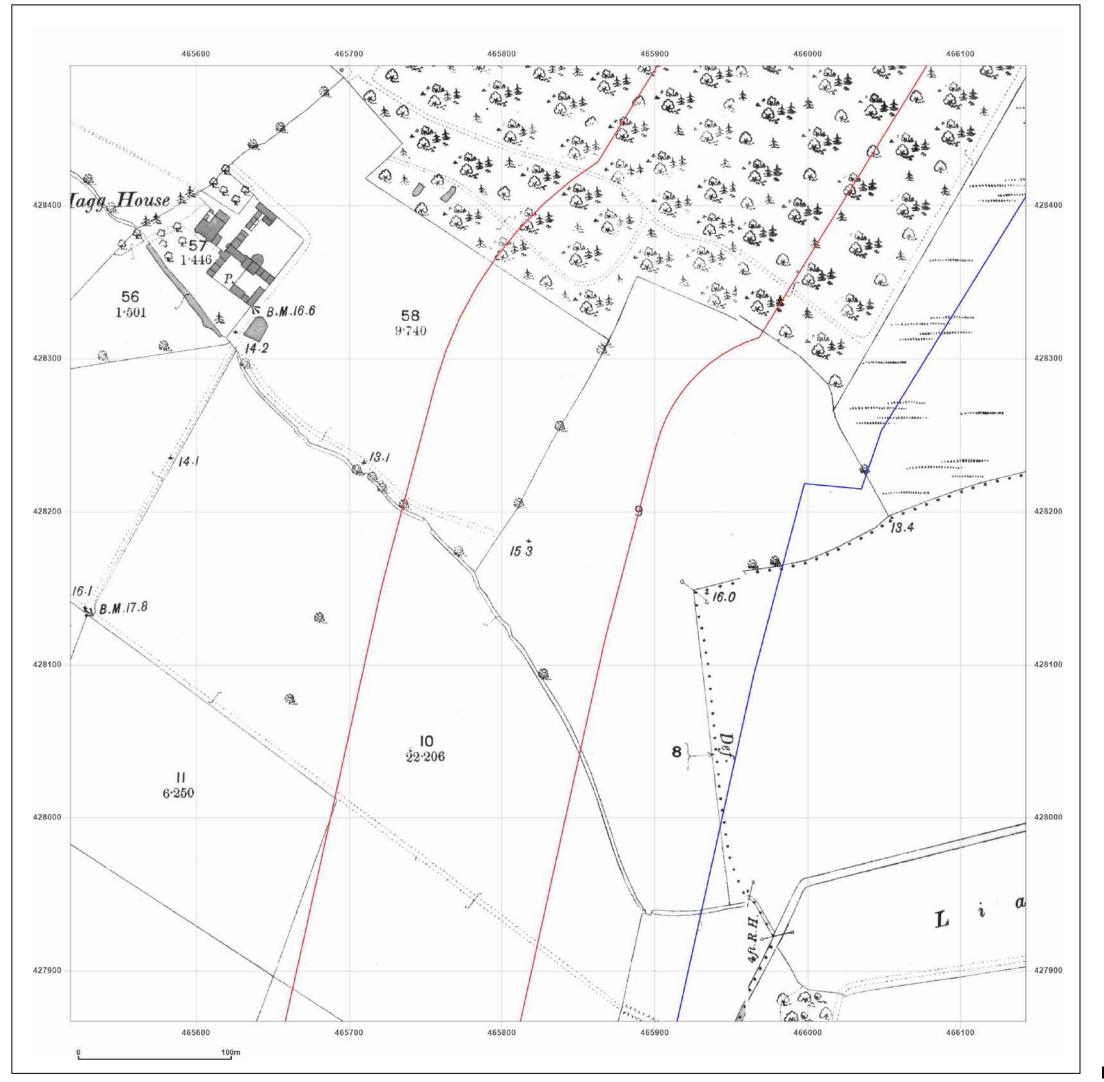


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Map Name:	National Grid N
Map date:	1994
Scale:	1:2,500
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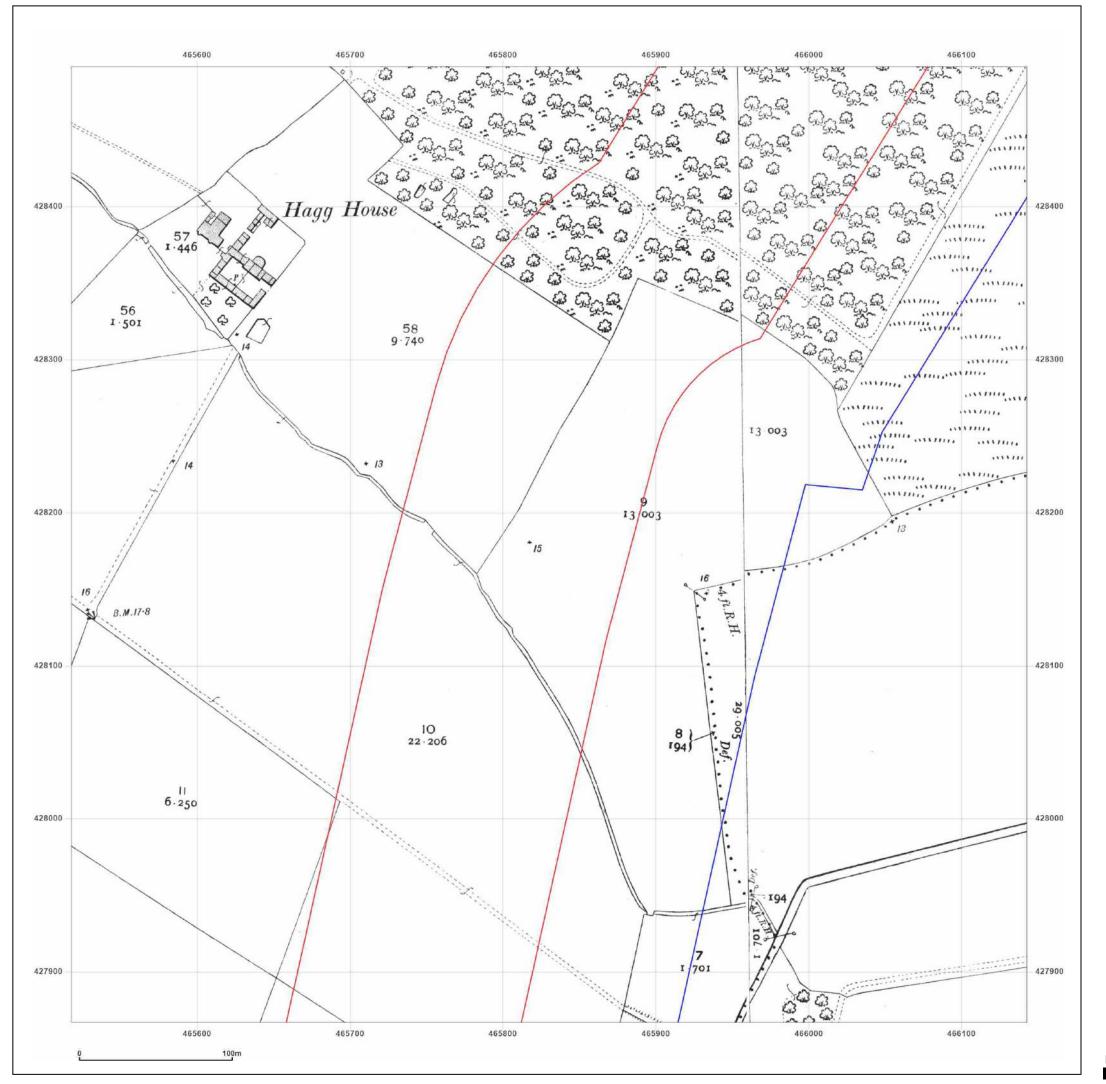


Station		
		4
County Series		N
1890		
1:2,500		W F
1:2,500		S
		Surveyed 1890 Revised 1890 Edition N/A Copyright N/A Levelled N/A
	GSIP-2021-12199 465830, 428179 County Series 1890 1:2,500	Drax Power Station GSIP-2021-12199-7639_LS_2_ 465830, 428179 County Series 1890 1:2,500 1:2,500



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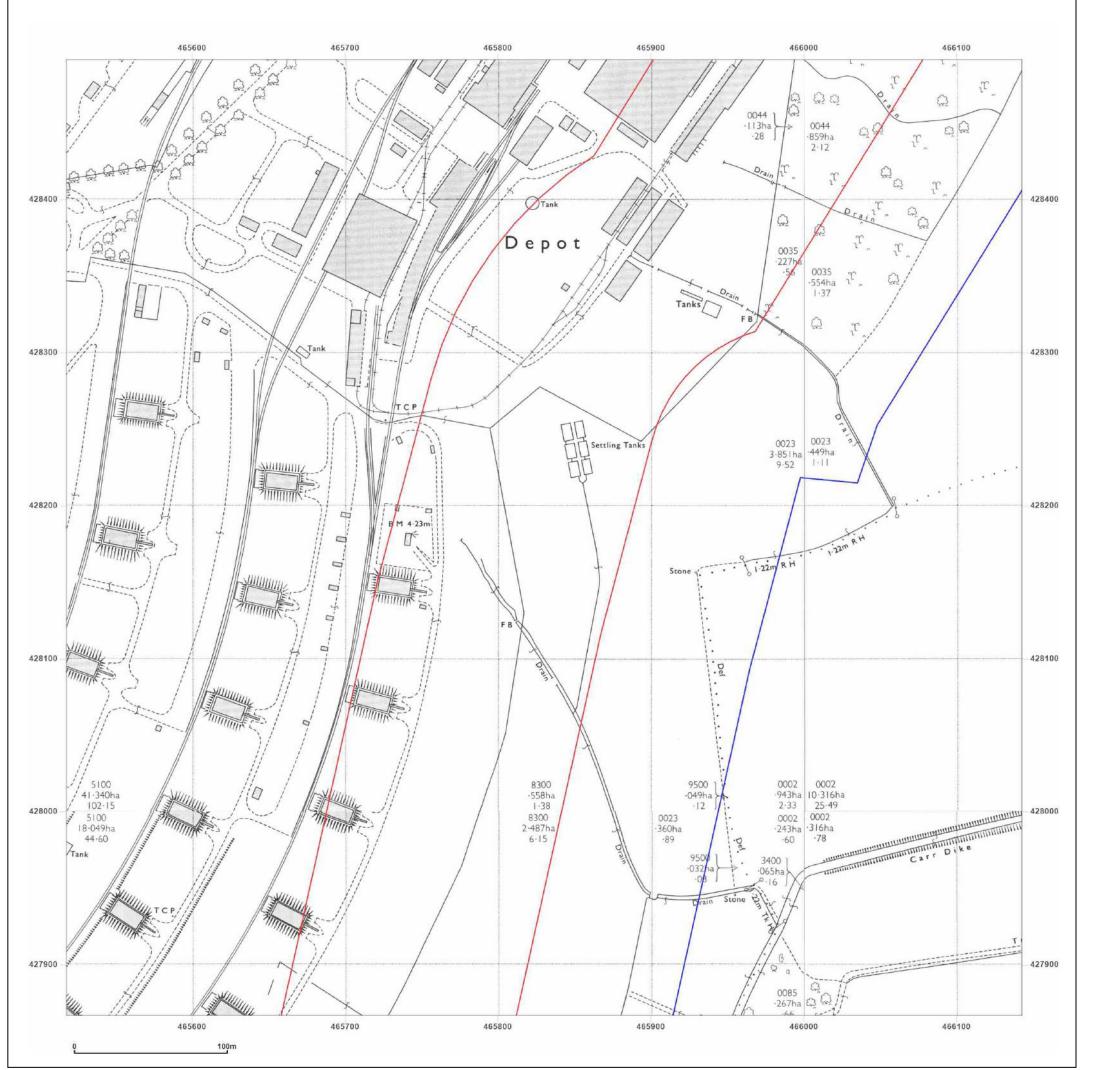
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Map date:	1907		W E
Scale:	1:2,500		T Y
Printed at:	1:2,500		S
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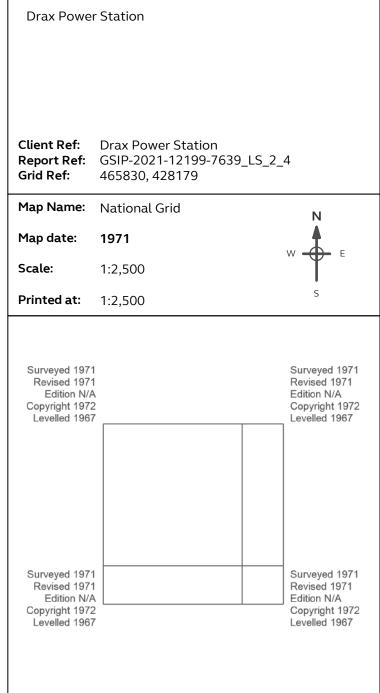
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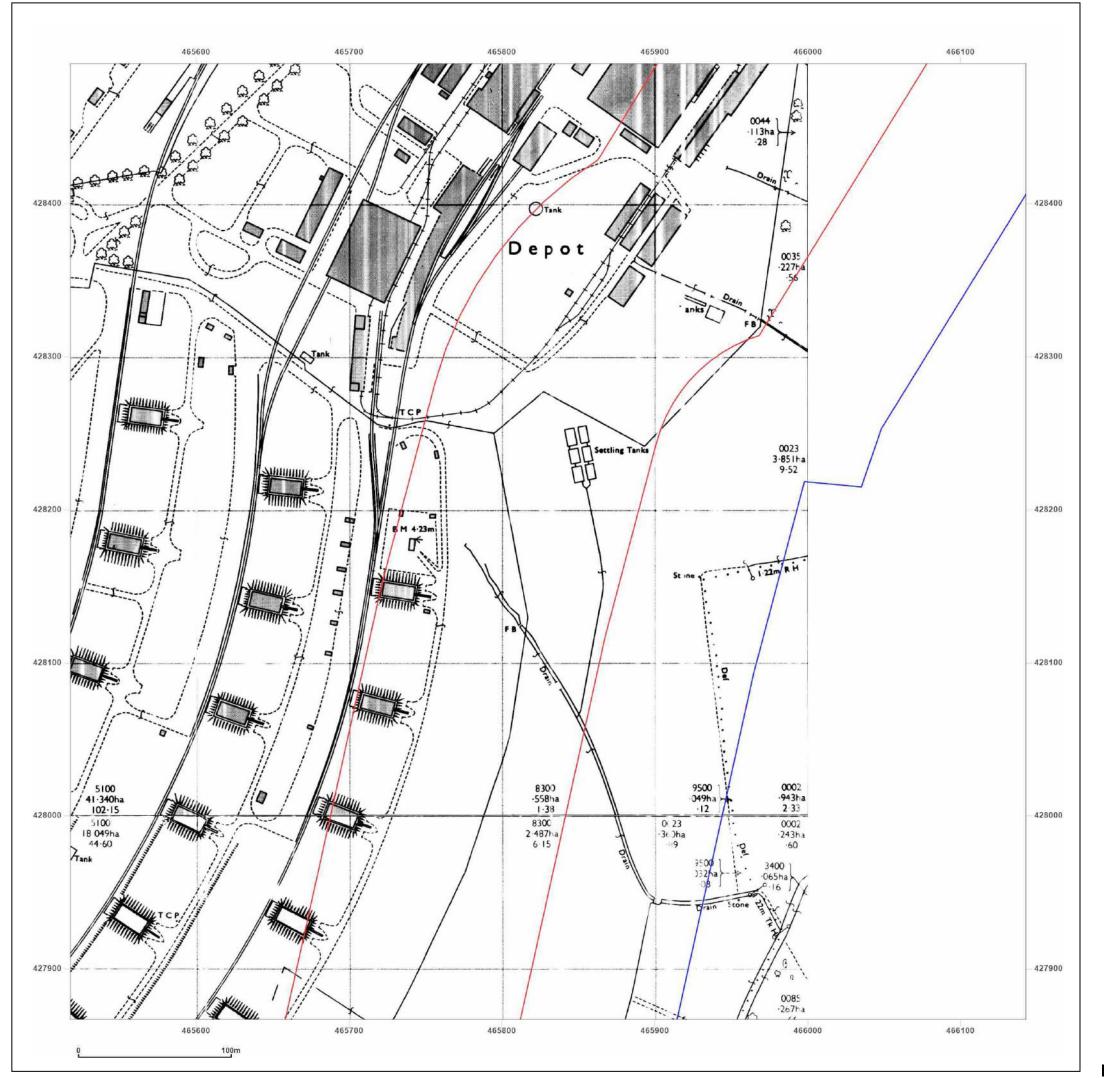




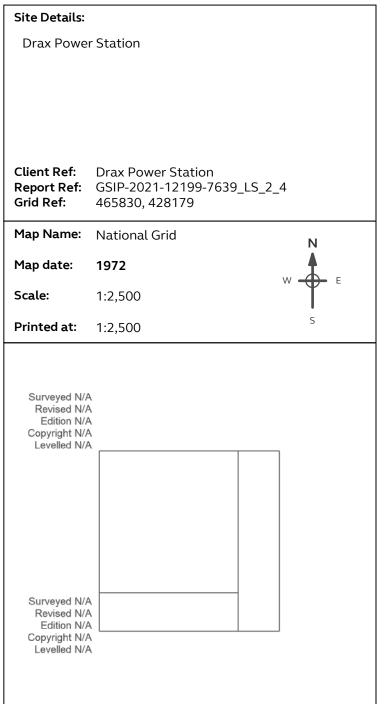
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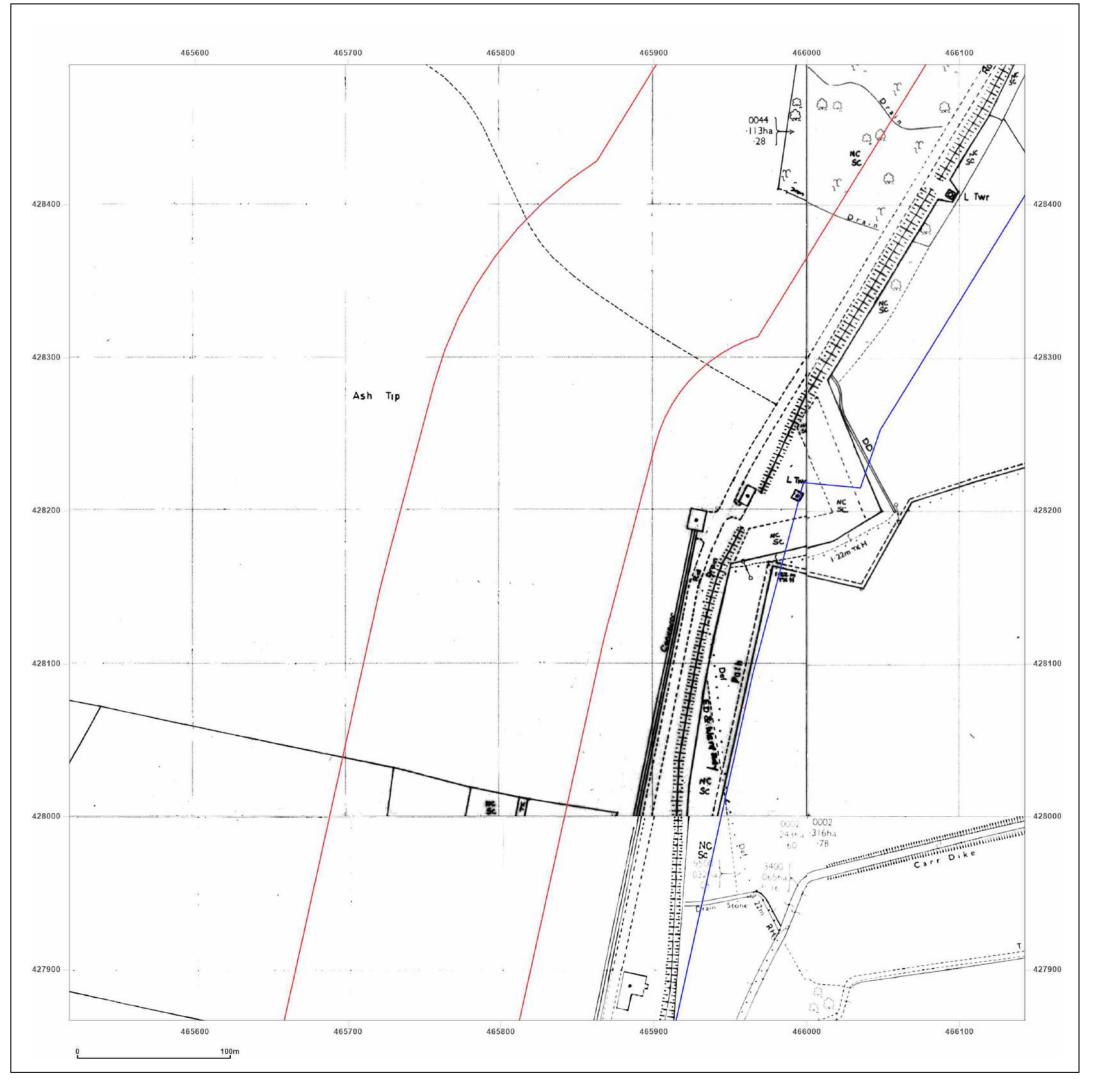




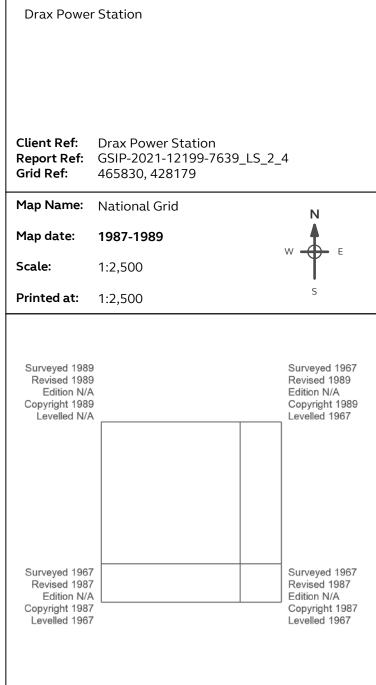


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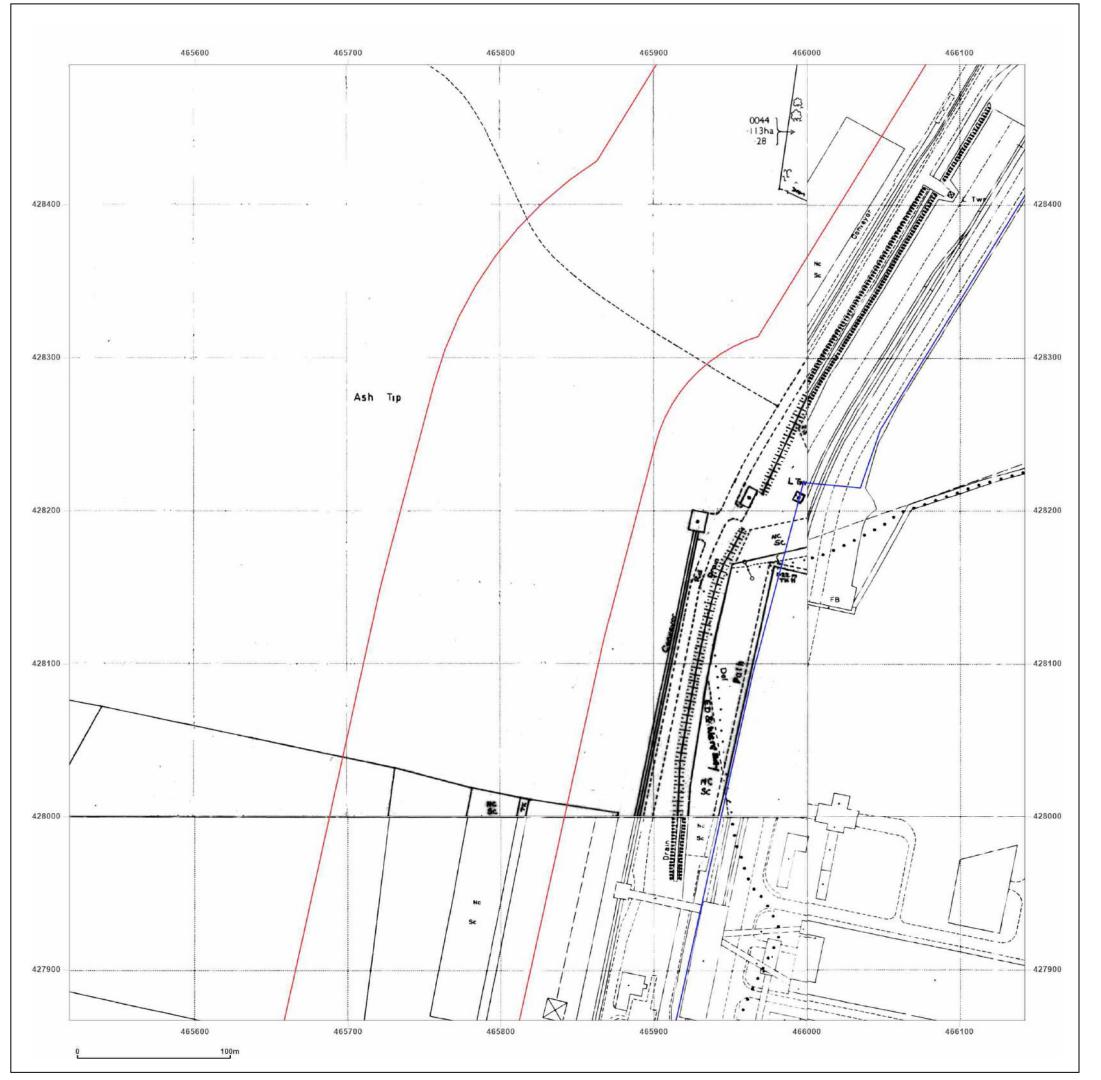




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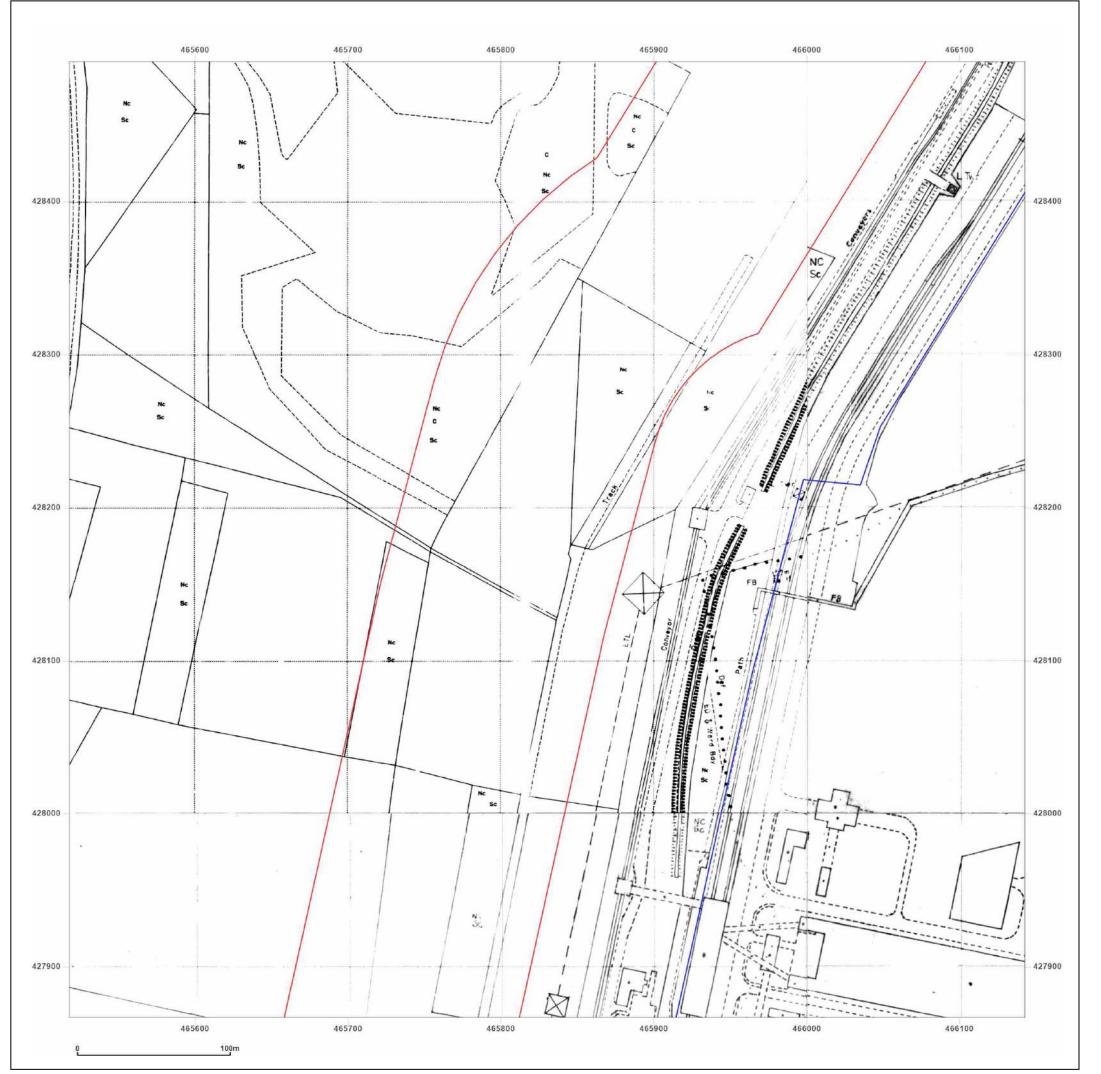
Drax Power Station			
Client Ref: Report Ref: Grid Ref:	Drax Power Station GSIP-2021-12199-7 465830, 428179		
Map Name:	National Grid		N
Map date:	1989-1994	W	A F
Scale:	1:2,500	VV	T
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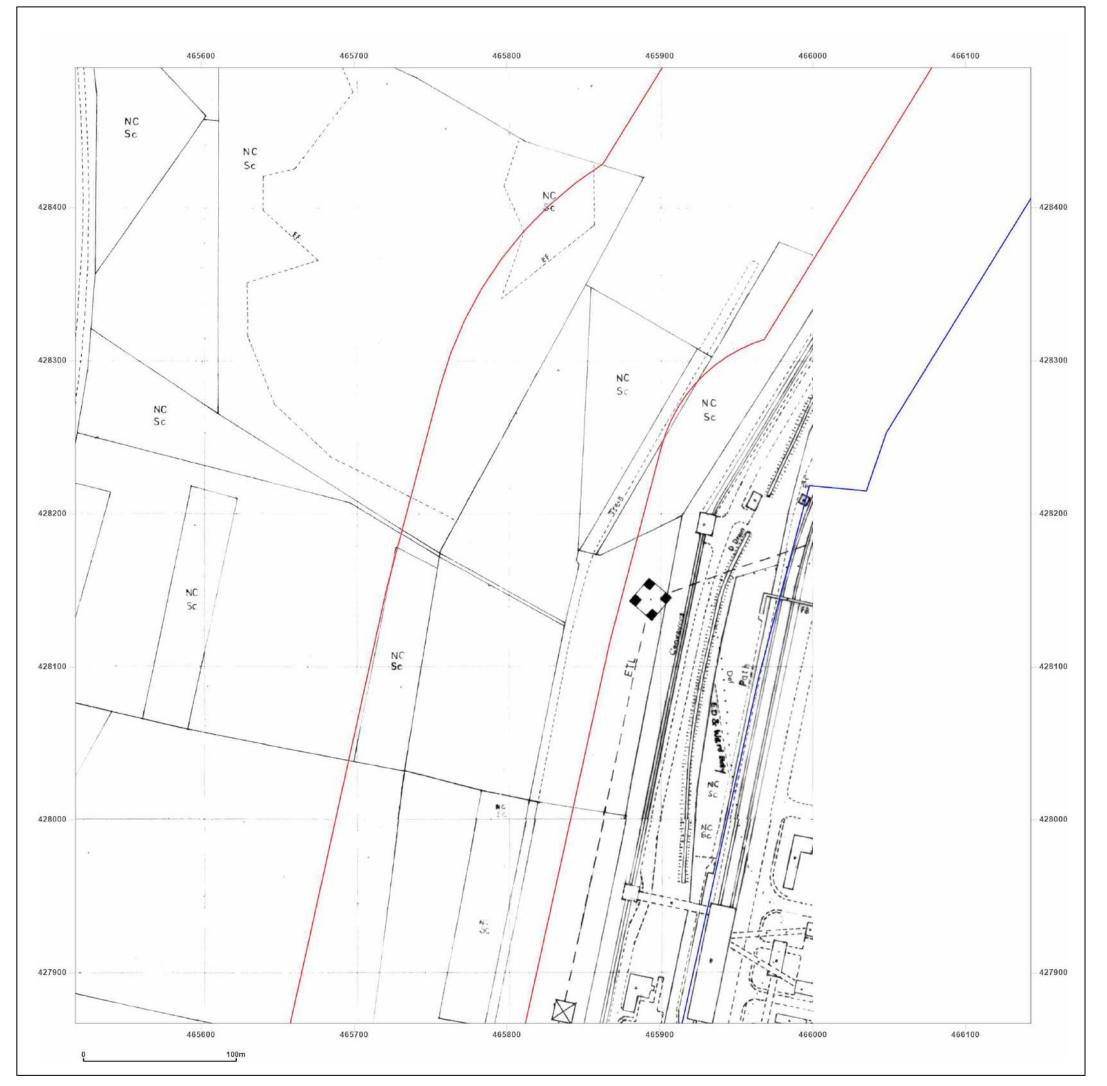
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Map Name:	National Grid	N	
Map date:	1994	W F	
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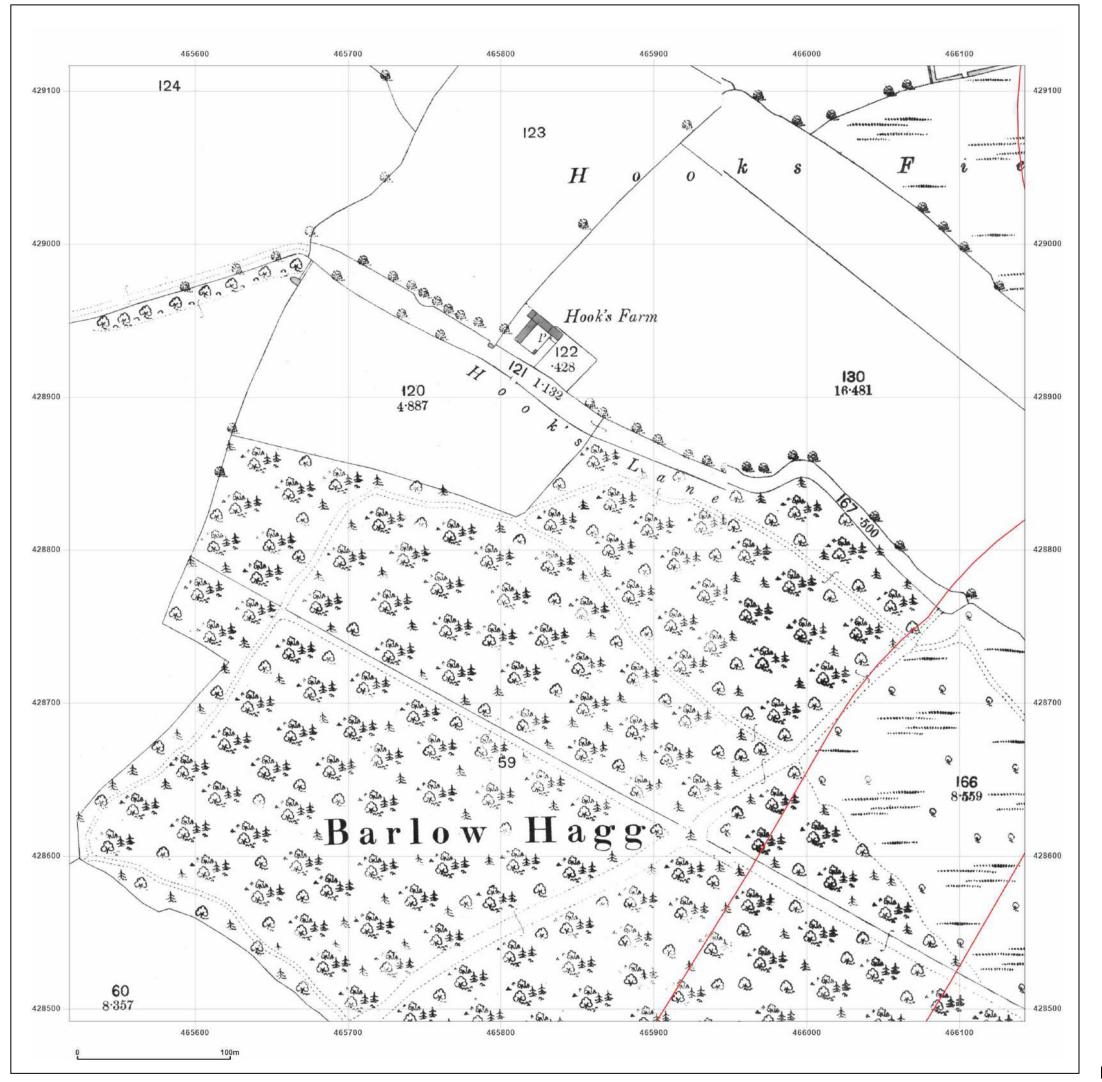


Site Details:			
Drax Power Station			
Client Ref: Report Ref: Grid Ref:	Drax Power Station GSIP-2021-12199-7639_LS_2_4 465830, 428179		
Map Name:	National Grid N		
Map date:	1994		
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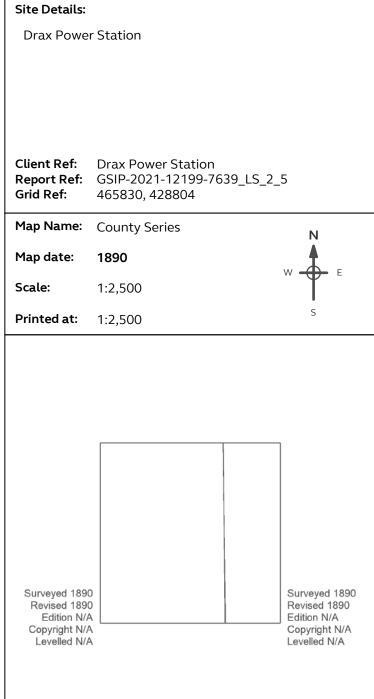


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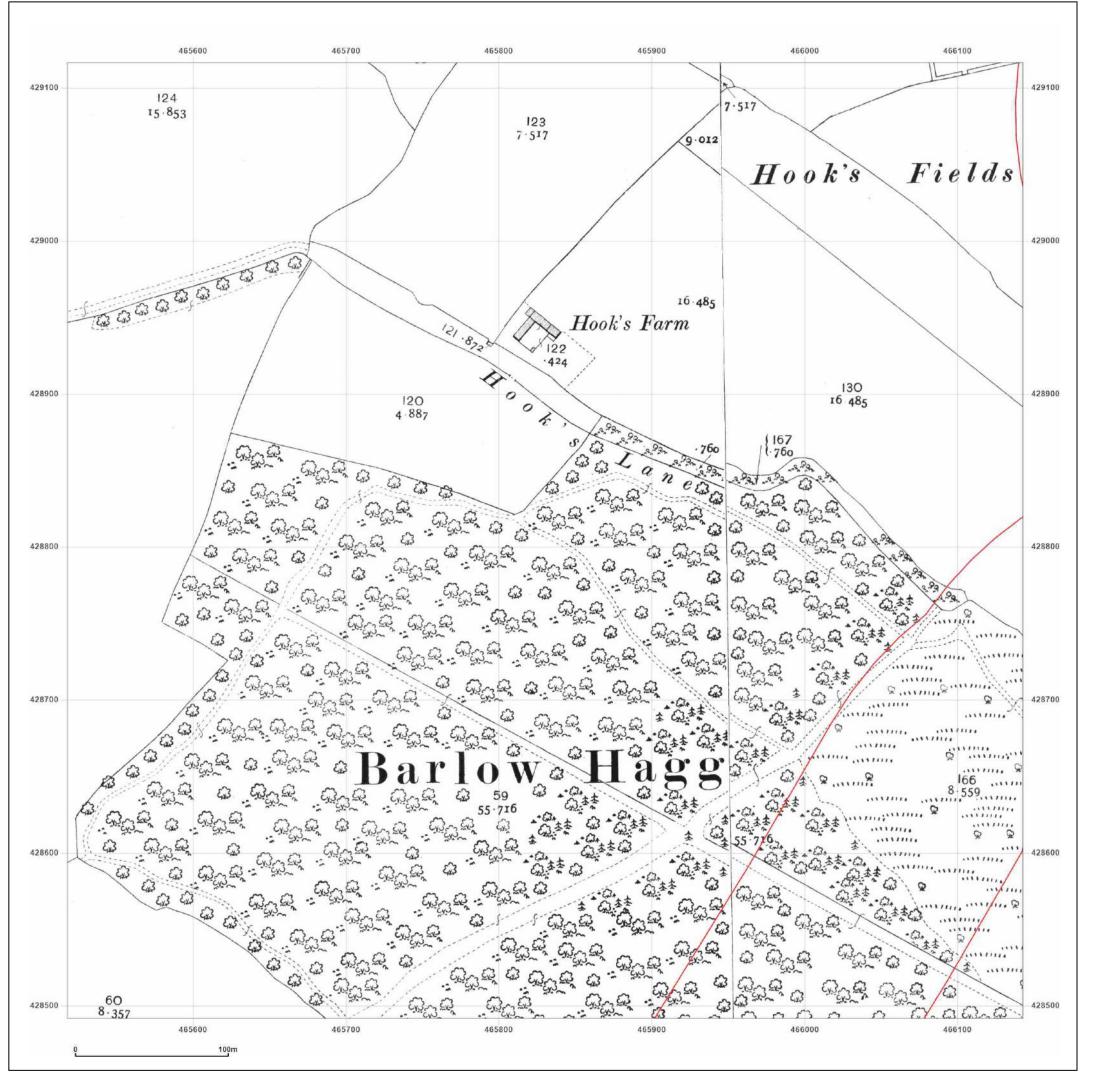




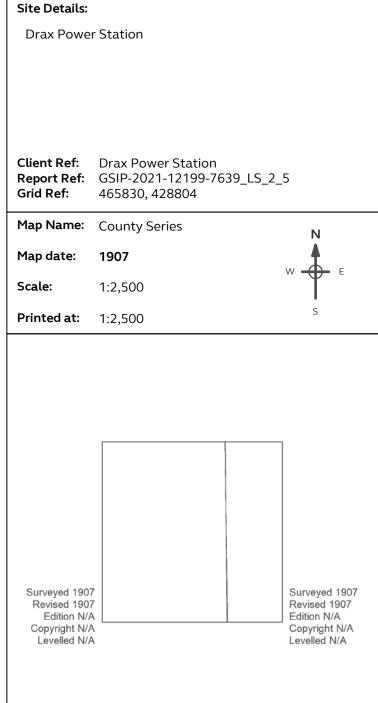


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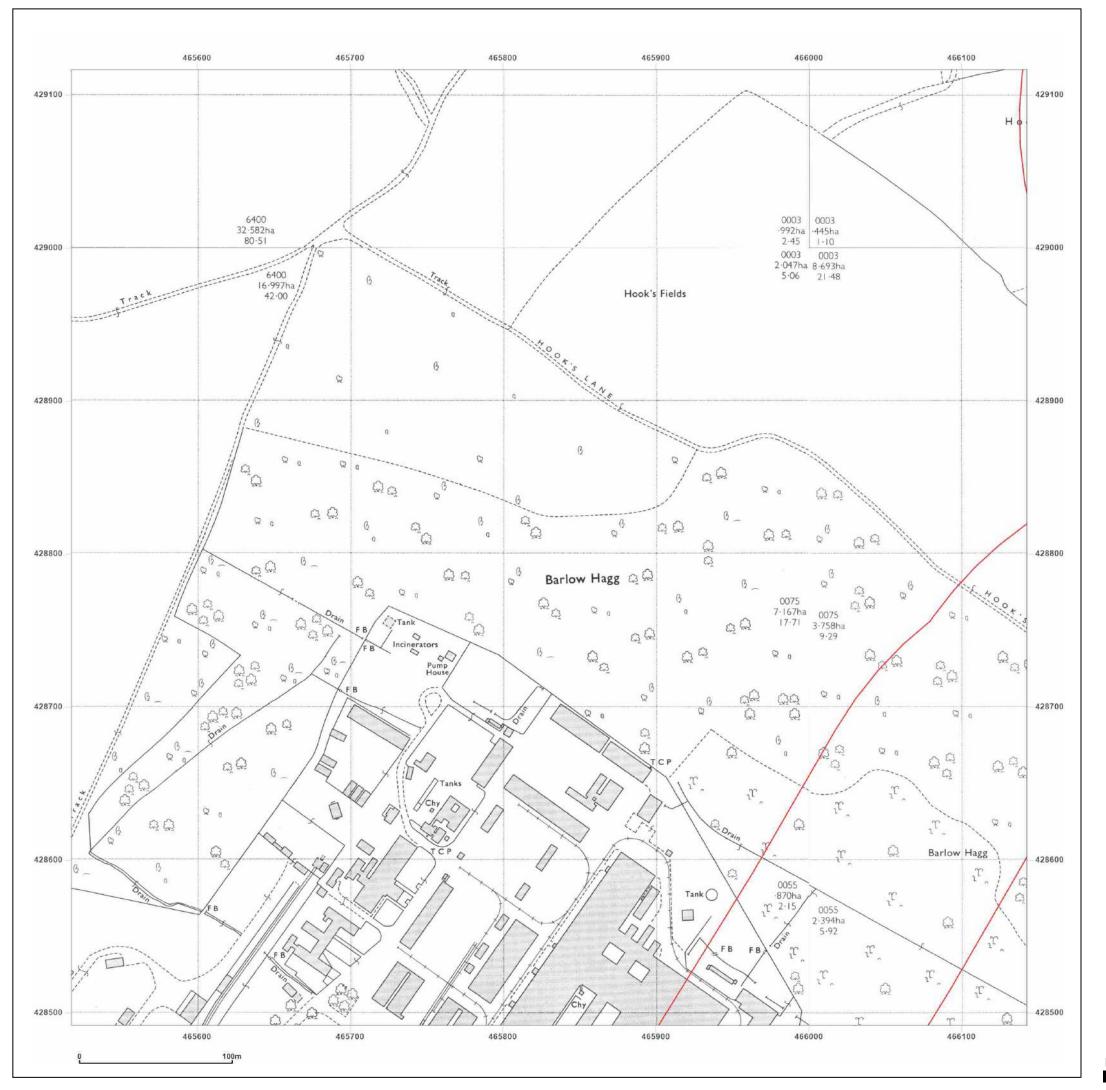




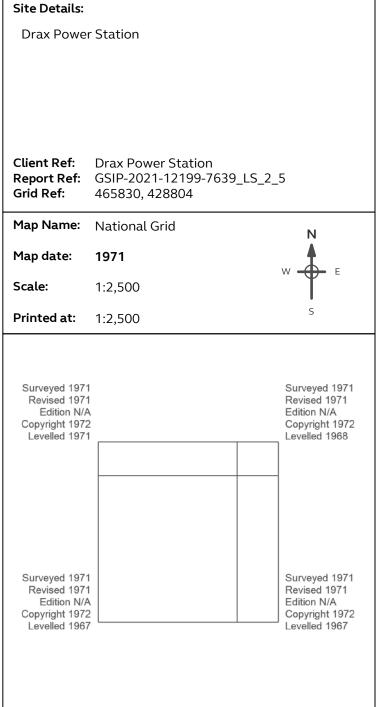


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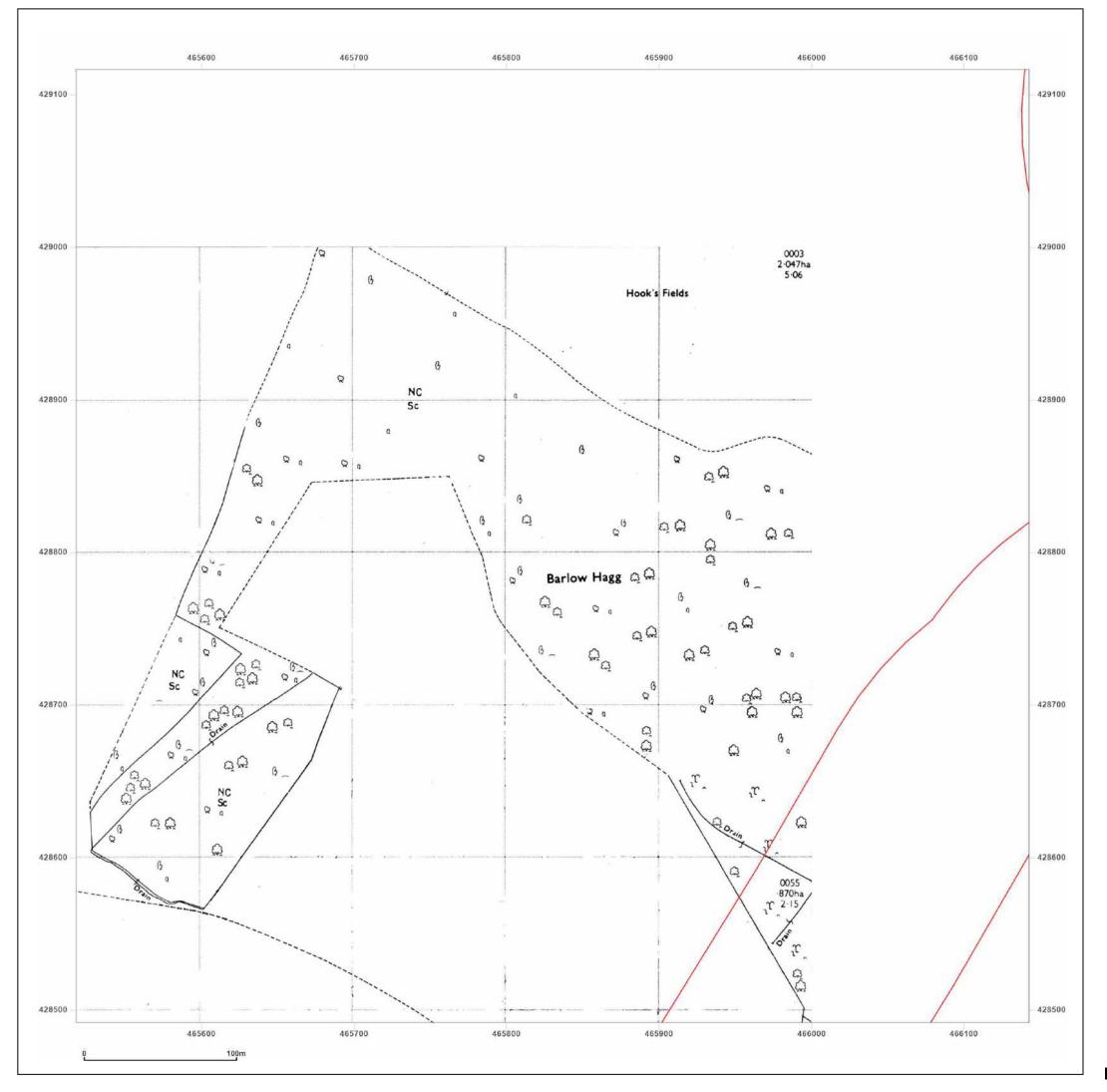


Site Details:			
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Client Ref: Report Ref: Grid Ref:	Drax Power Station GSIP-2021-12199-7639_LS_2_5 465830, 428804		
Map Name:	National Grid N		
Map date:	1972		
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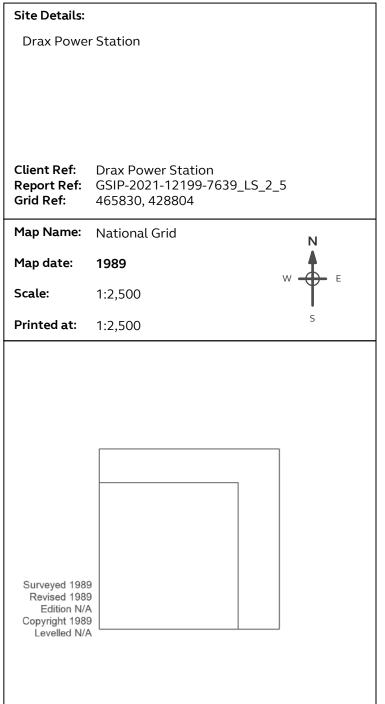


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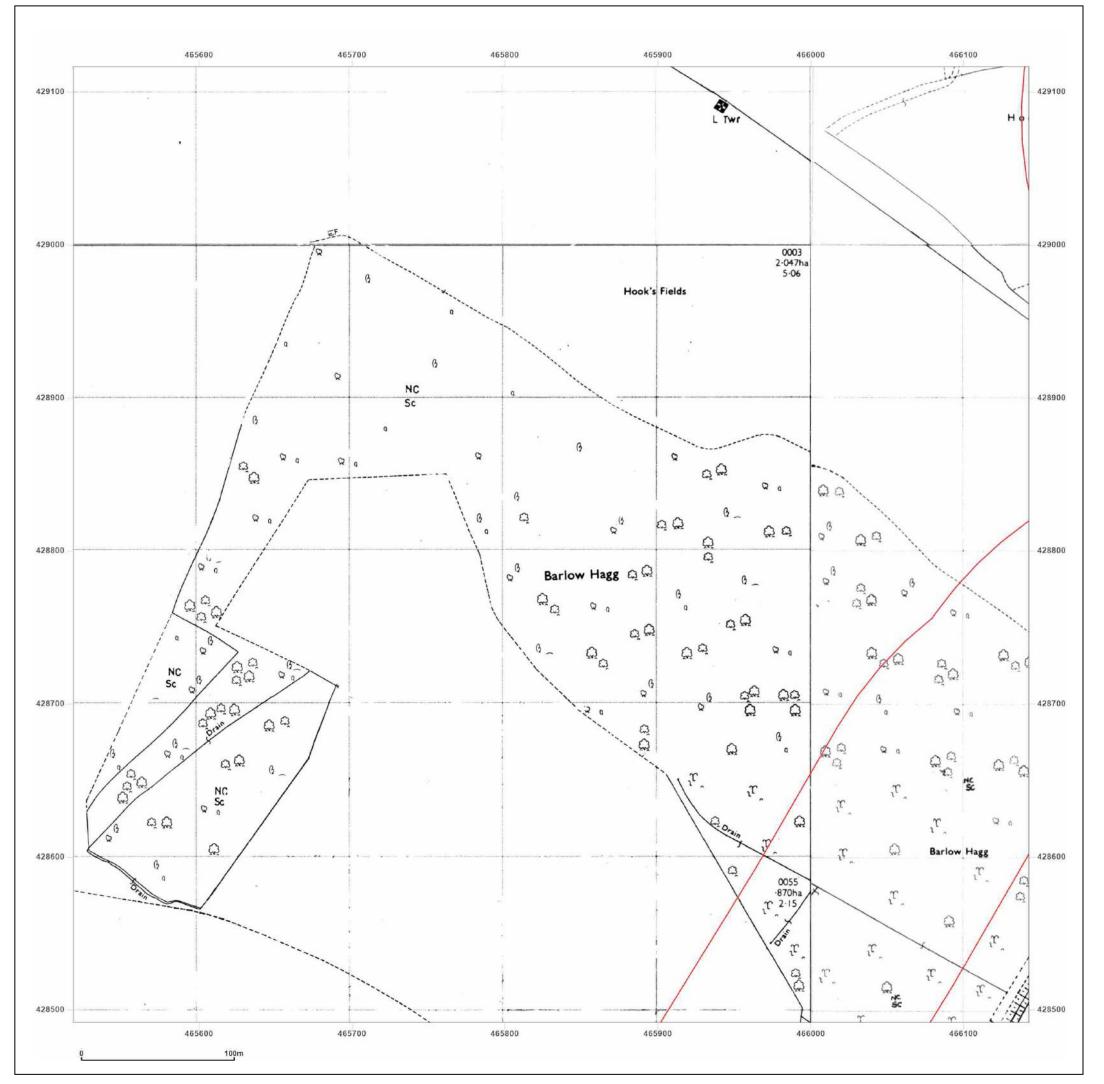




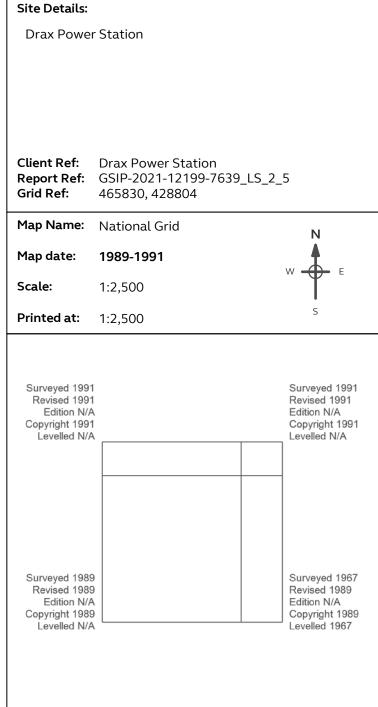


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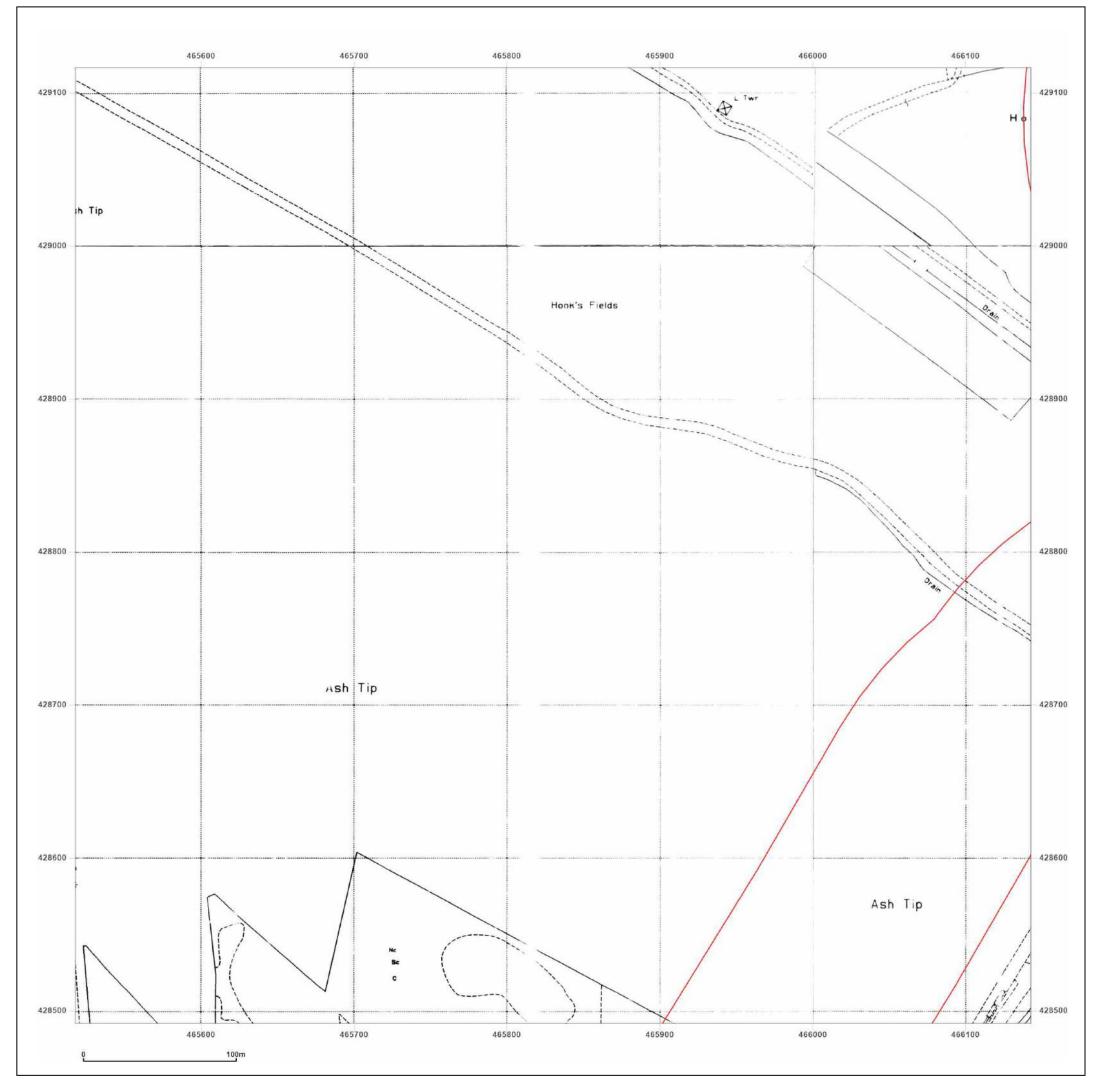






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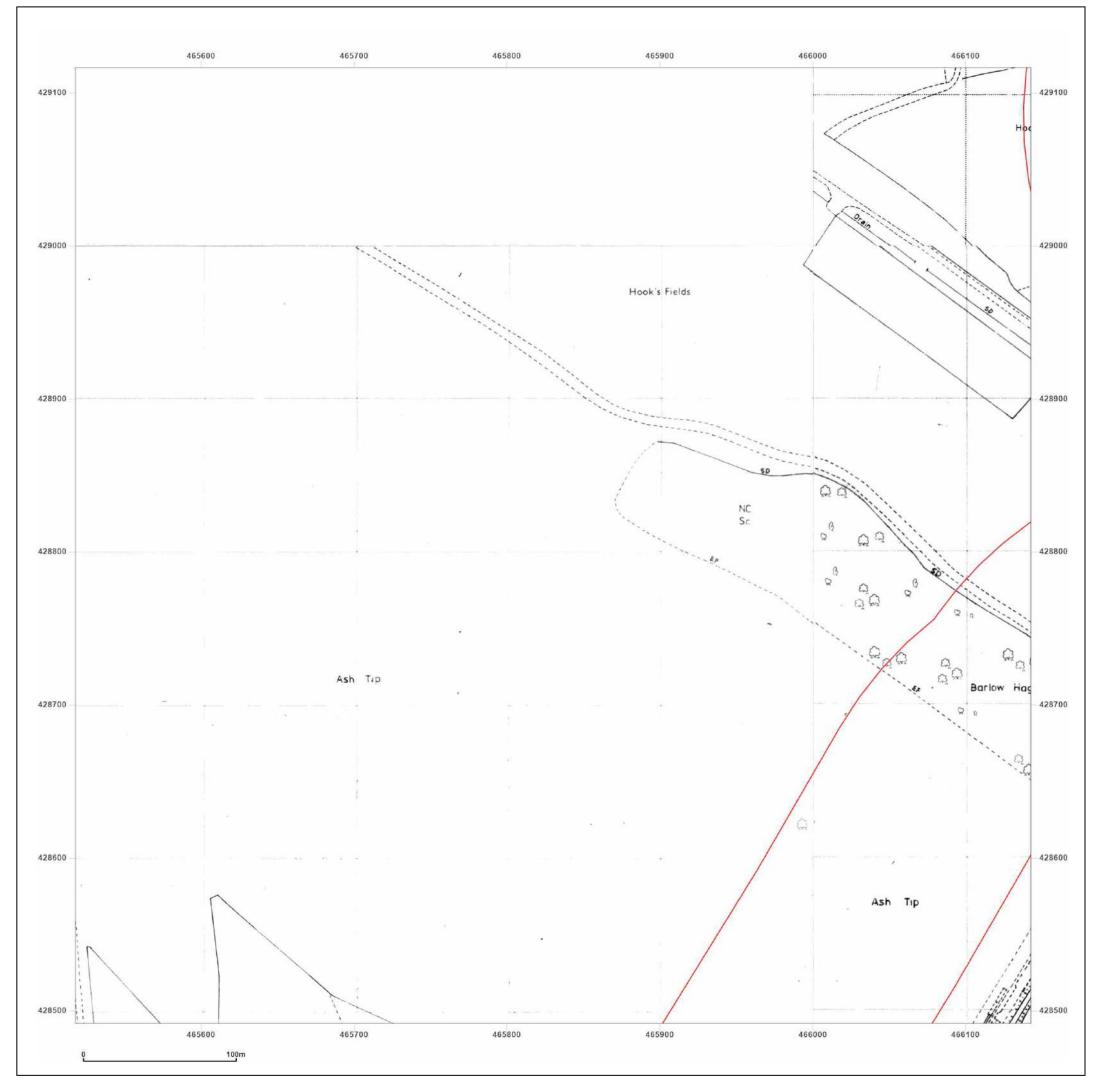


Site Details:		
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Grid Ref:	465830, 428804	033_13_1
Map Name:	National Grid	N
Map date:	1991-1994	Ā
Scale:		W + E
Scale:	1:2,500	
Printed at:	1:2,500	S
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Edition N/A Copyright 1994		Edition N/A Copyright 1991
Levelled N/A		Levelled N/A
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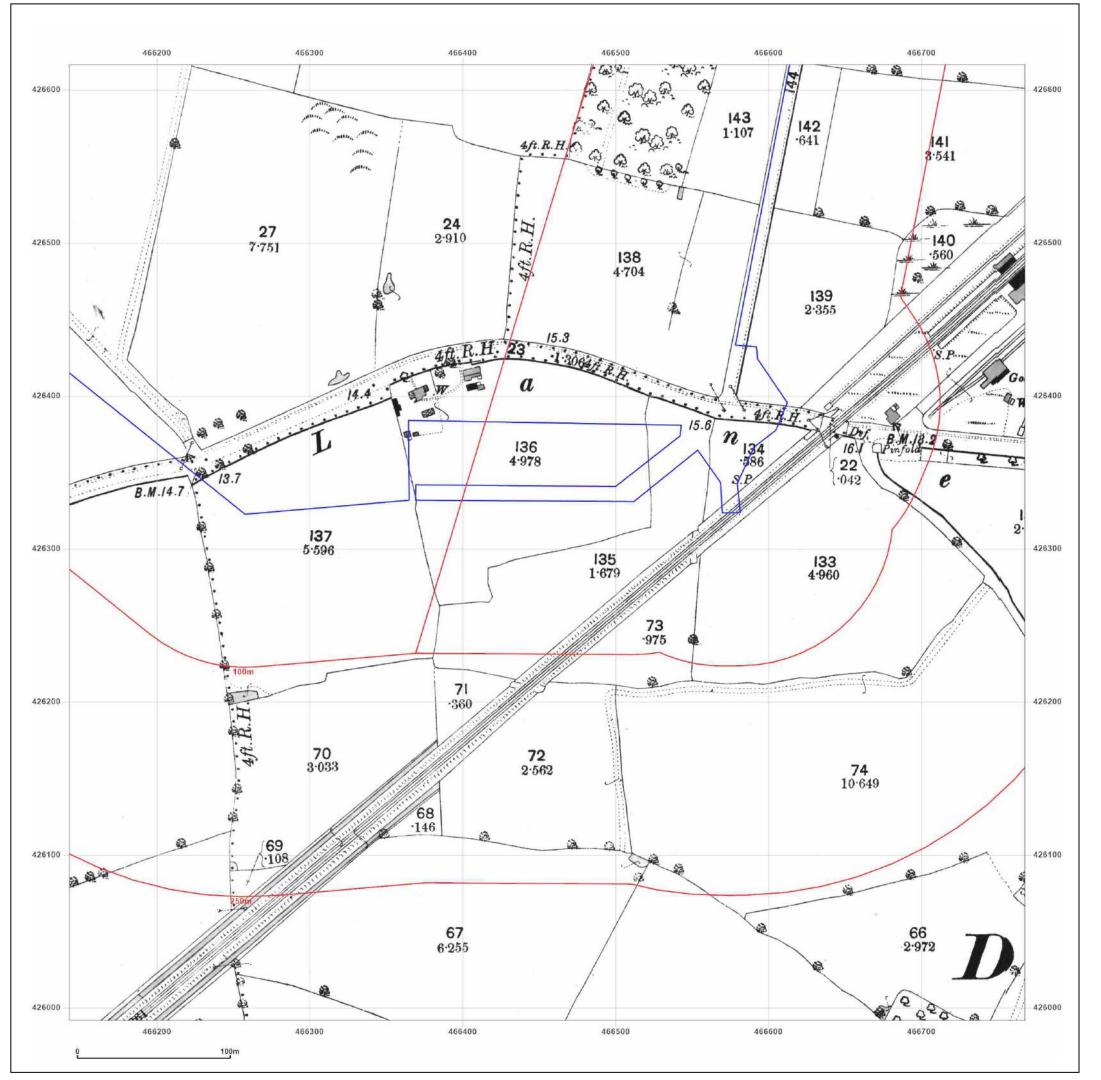
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Client Ref: Report Ref: Grid Ref:	Drax Power Statio GSIP-2021-12199- 465830, 428804	
Map Name:	National Grid	N
Map date:	1994	W F
Scale:	1:2,500	· T
Printed at:	1:2,500	S
		Surveyed N/A Revised N/A Edition N/A Copyright 1994 Levelled N/A
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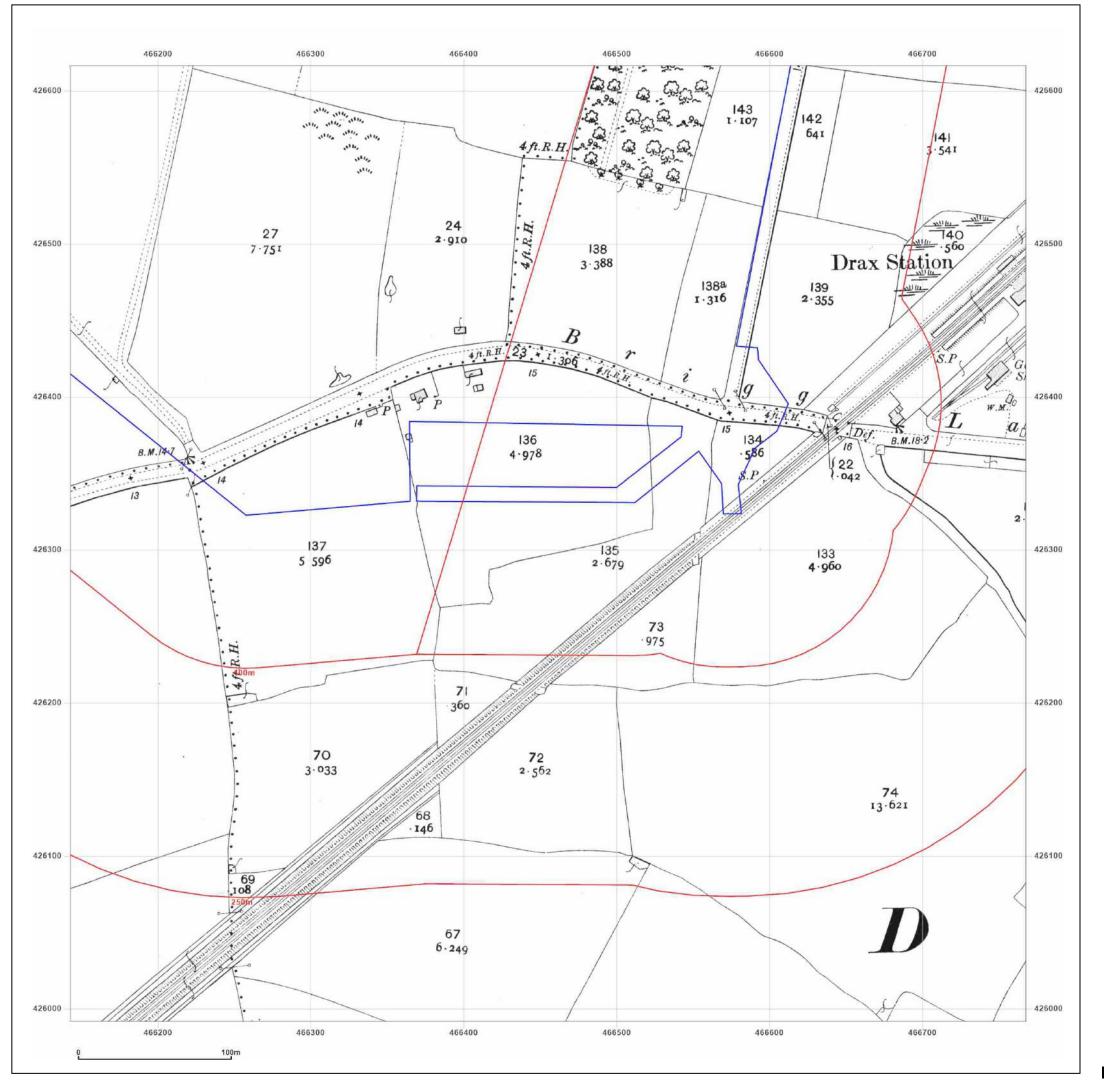
Drax Power Station		
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Map Name:	County Series	N
Map date:	1890	
Scale:	1:2,500	W E
Printed at:	1:2,500	S
		Surveyed 1890 Revised 1890 Edition N/A Copyright N/A Levelled N/A



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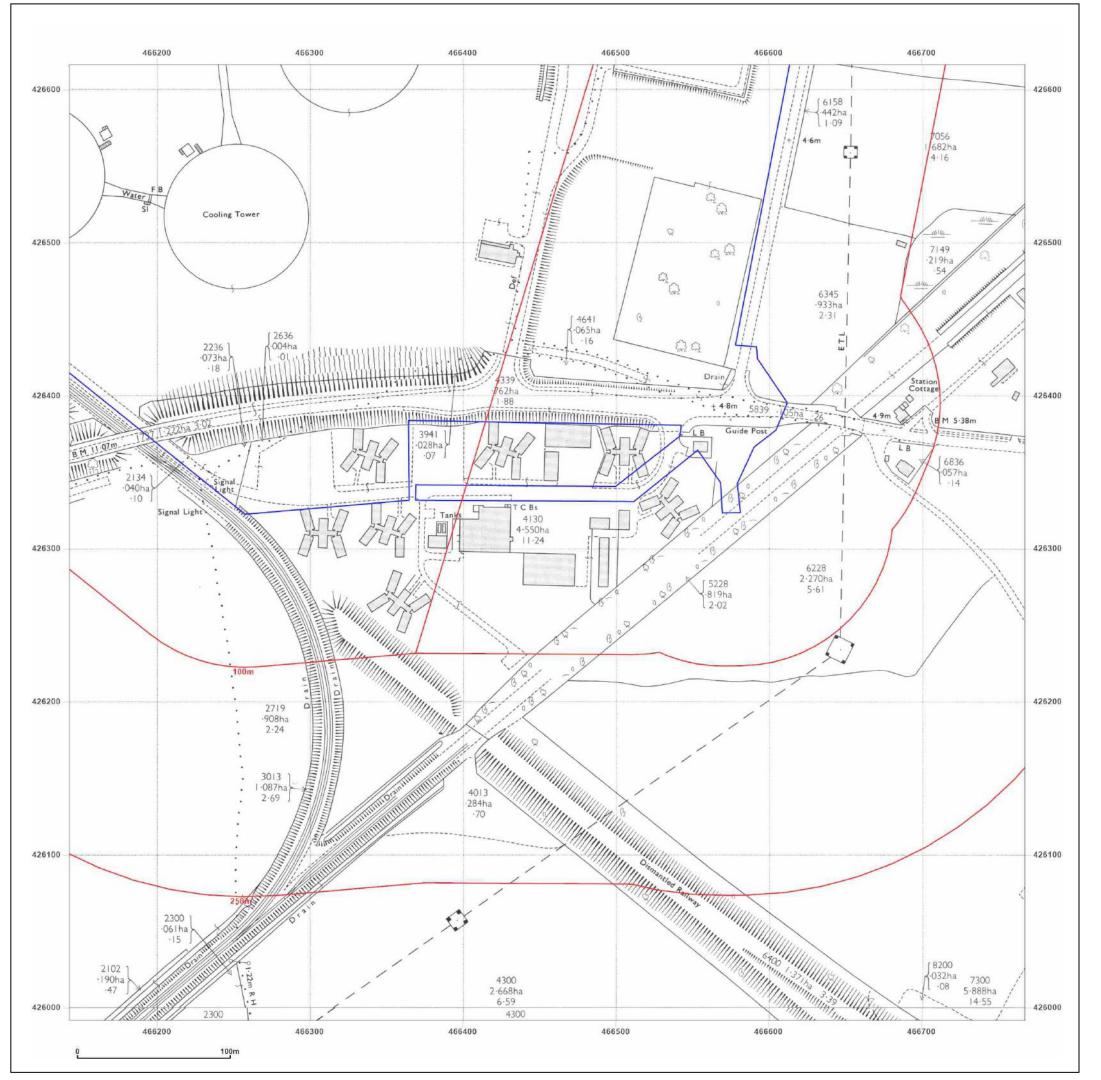
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Client Ref: Report Ref: Grid Ref:	Drax Power Station GSIP-2021-12199-7639_L 466455, 426304	.S_3_1
Map Name:	County Series	Ν
Map date:	1907	W E
Scale:	1:2,500	" T
Printed at:	1:2,500	S
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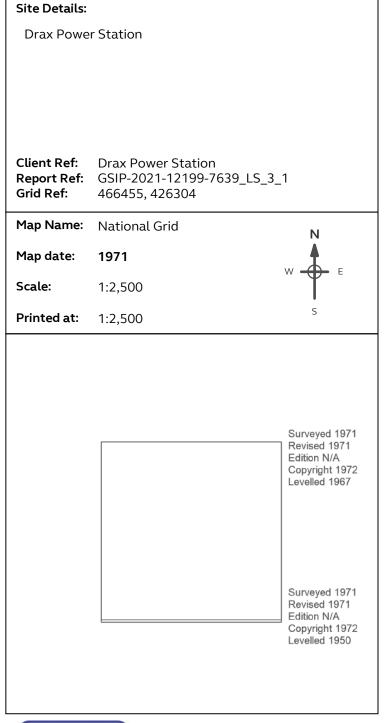
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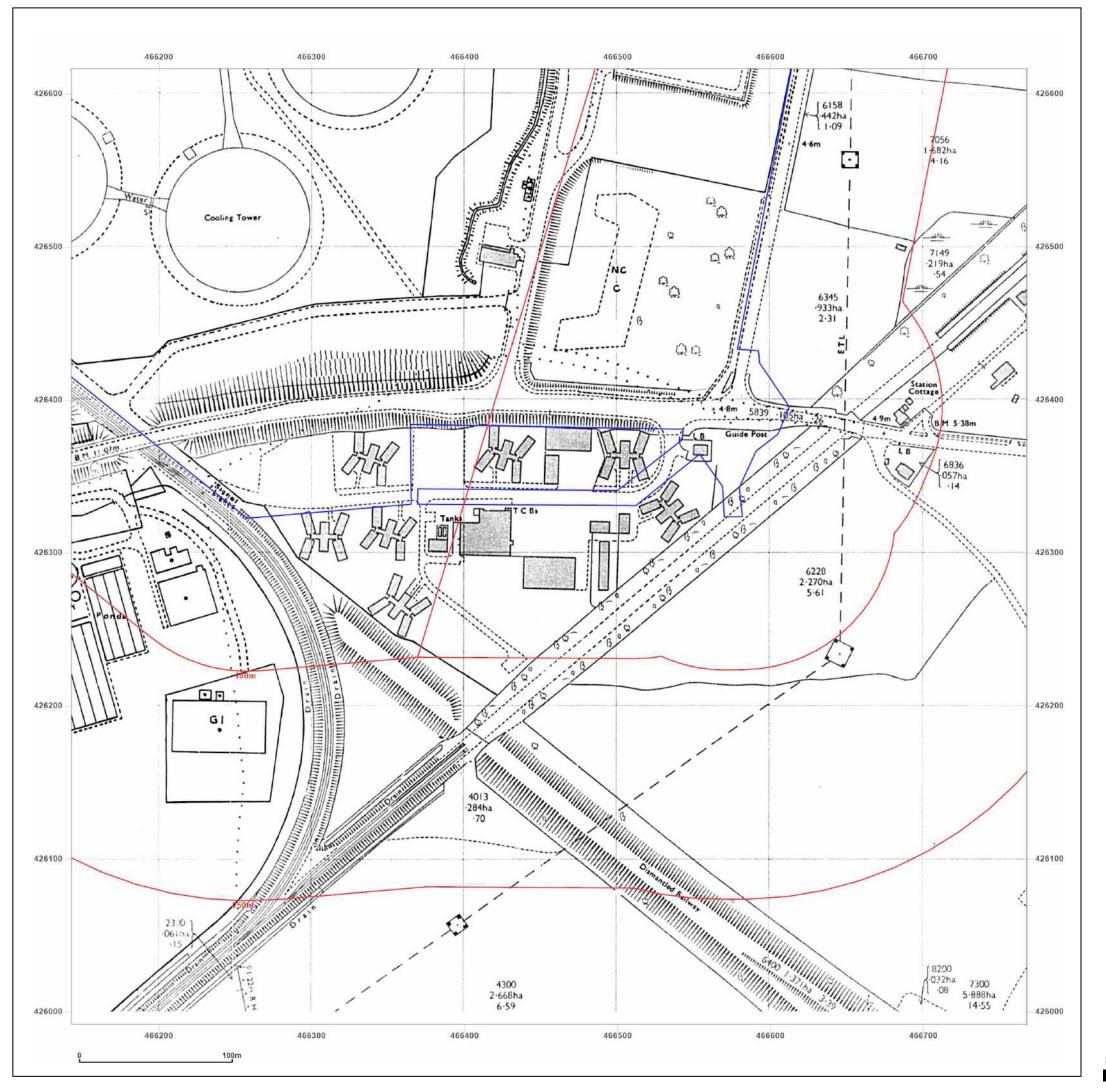




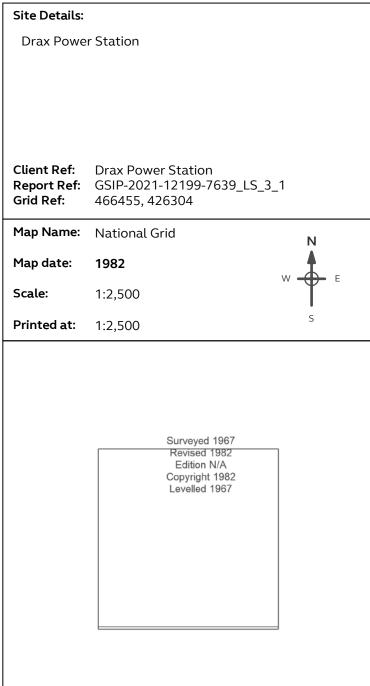


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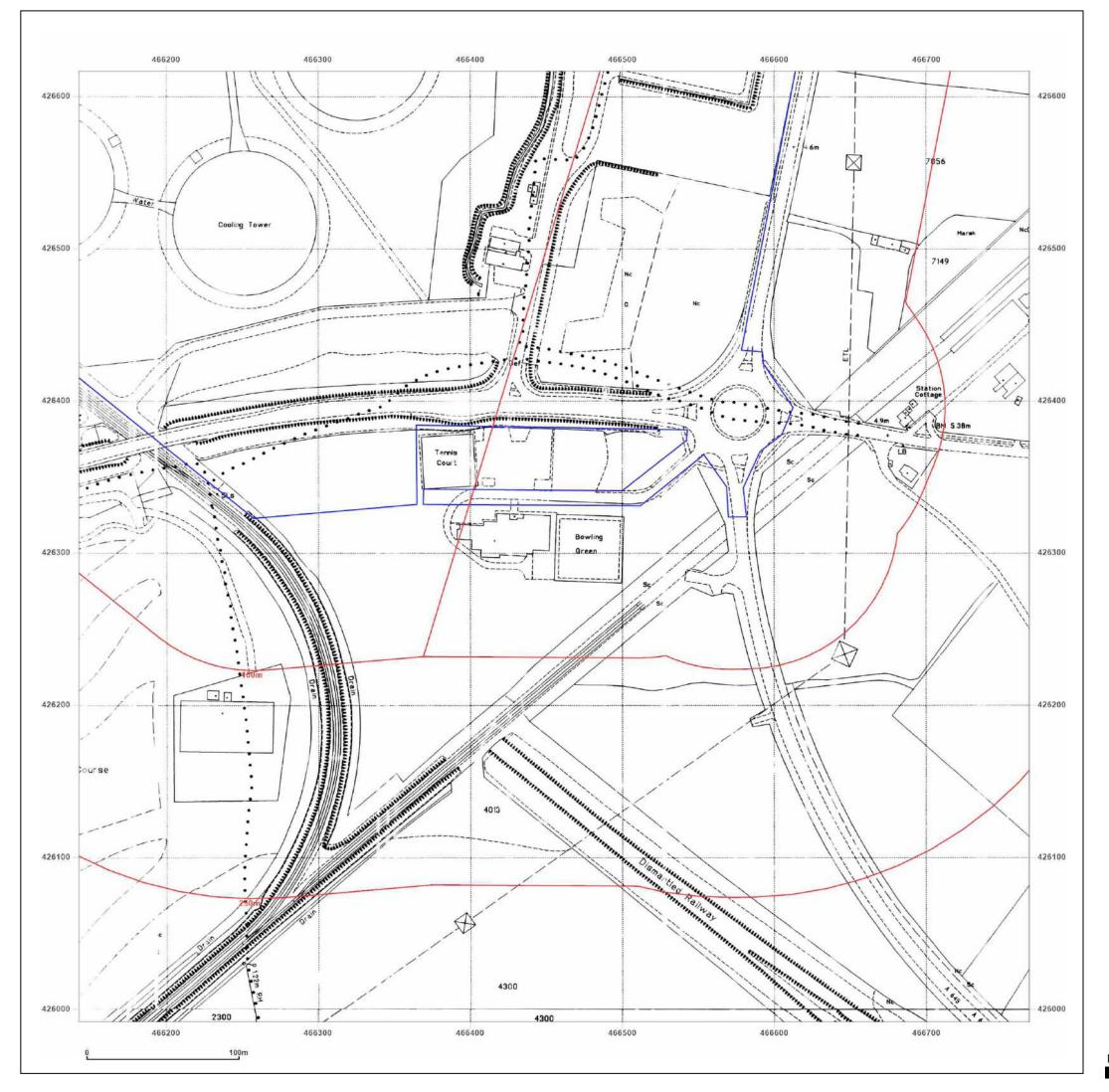




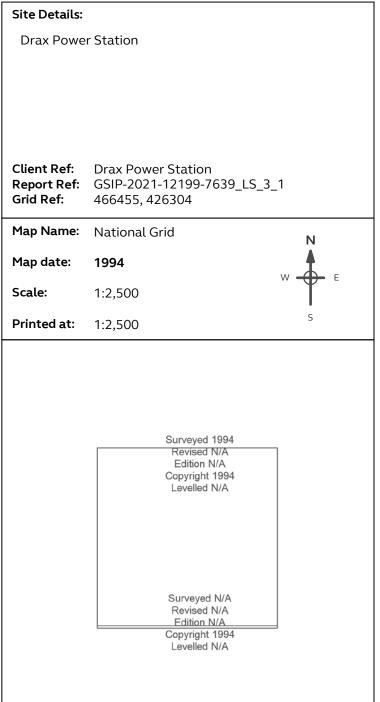


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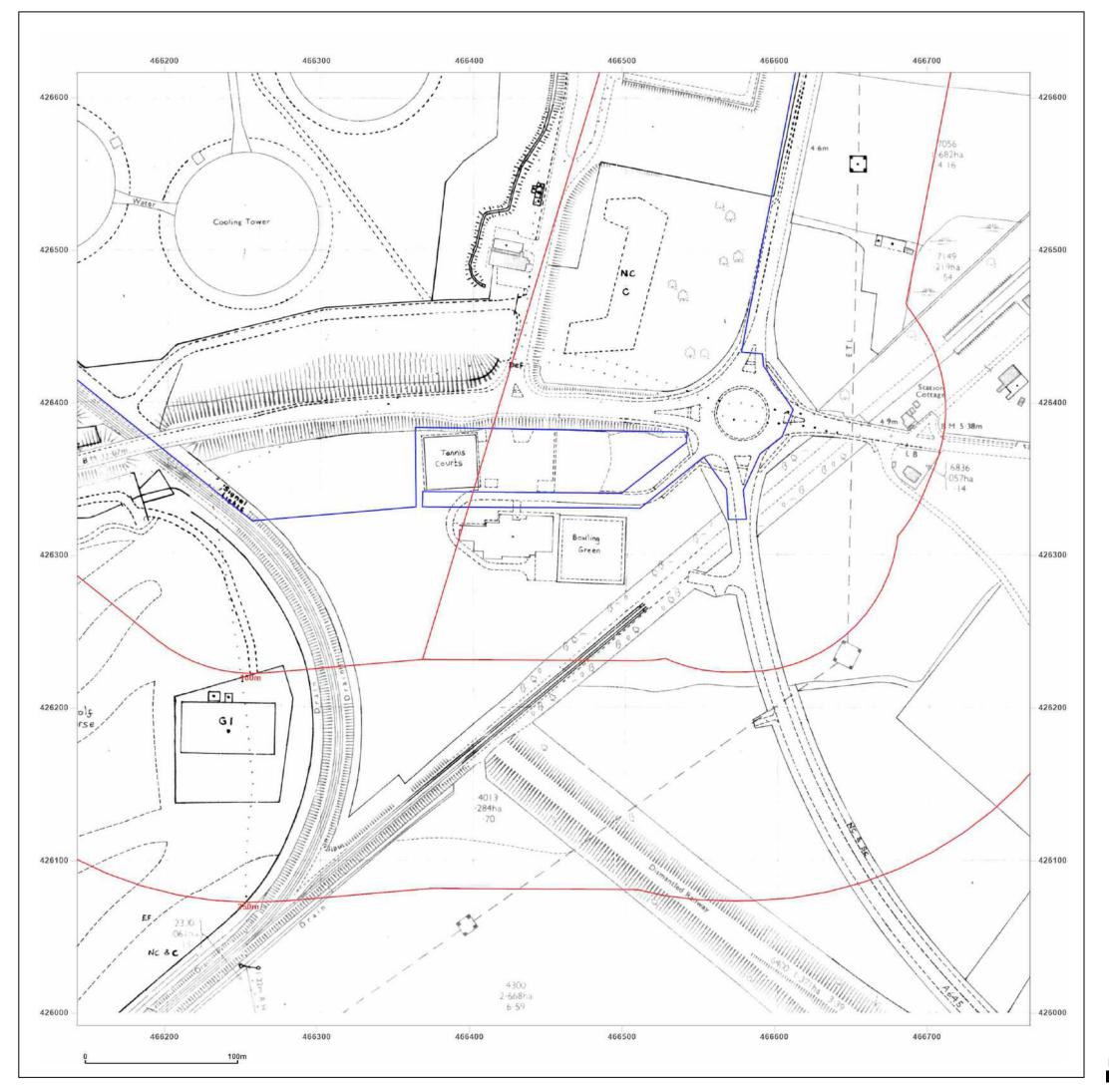




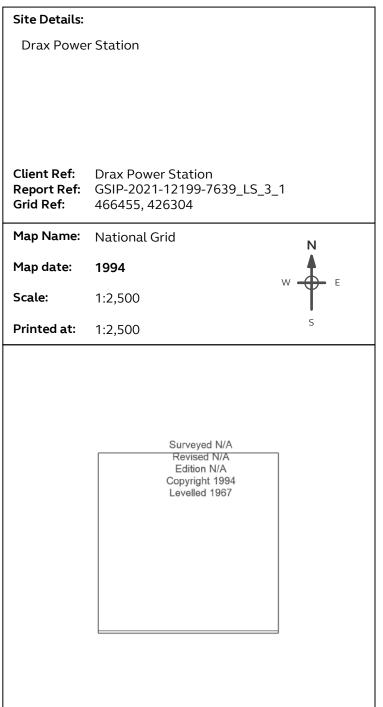


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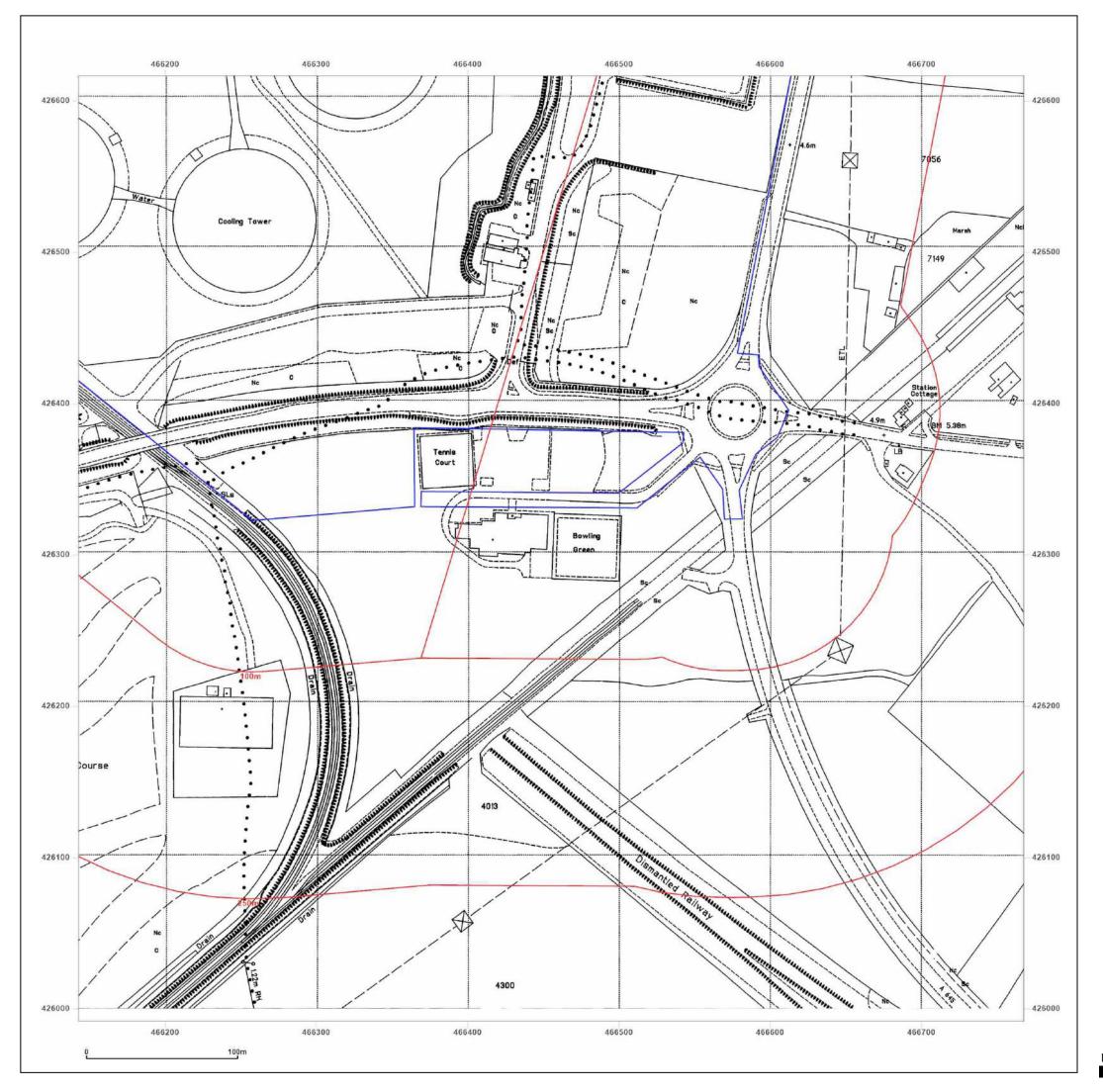




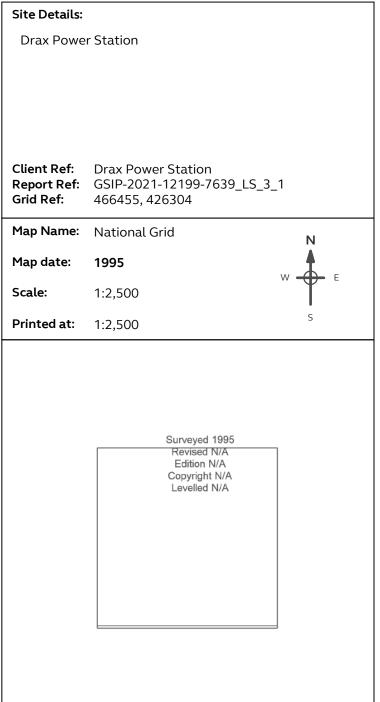


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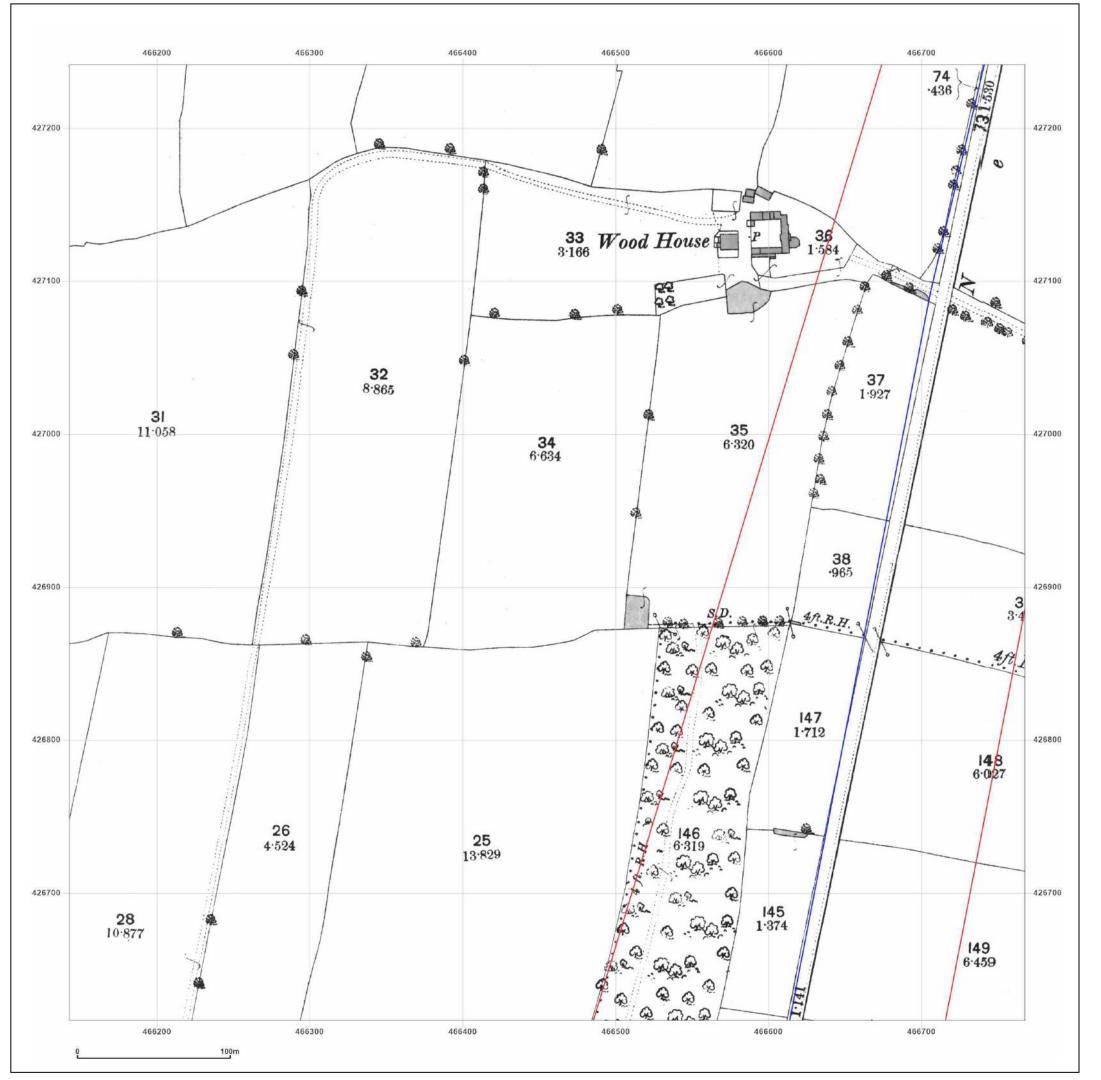




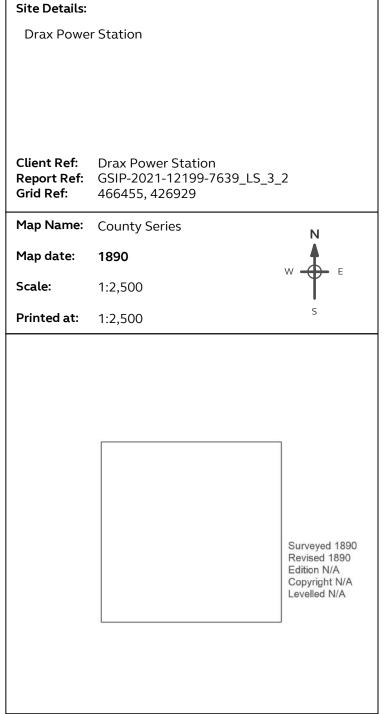


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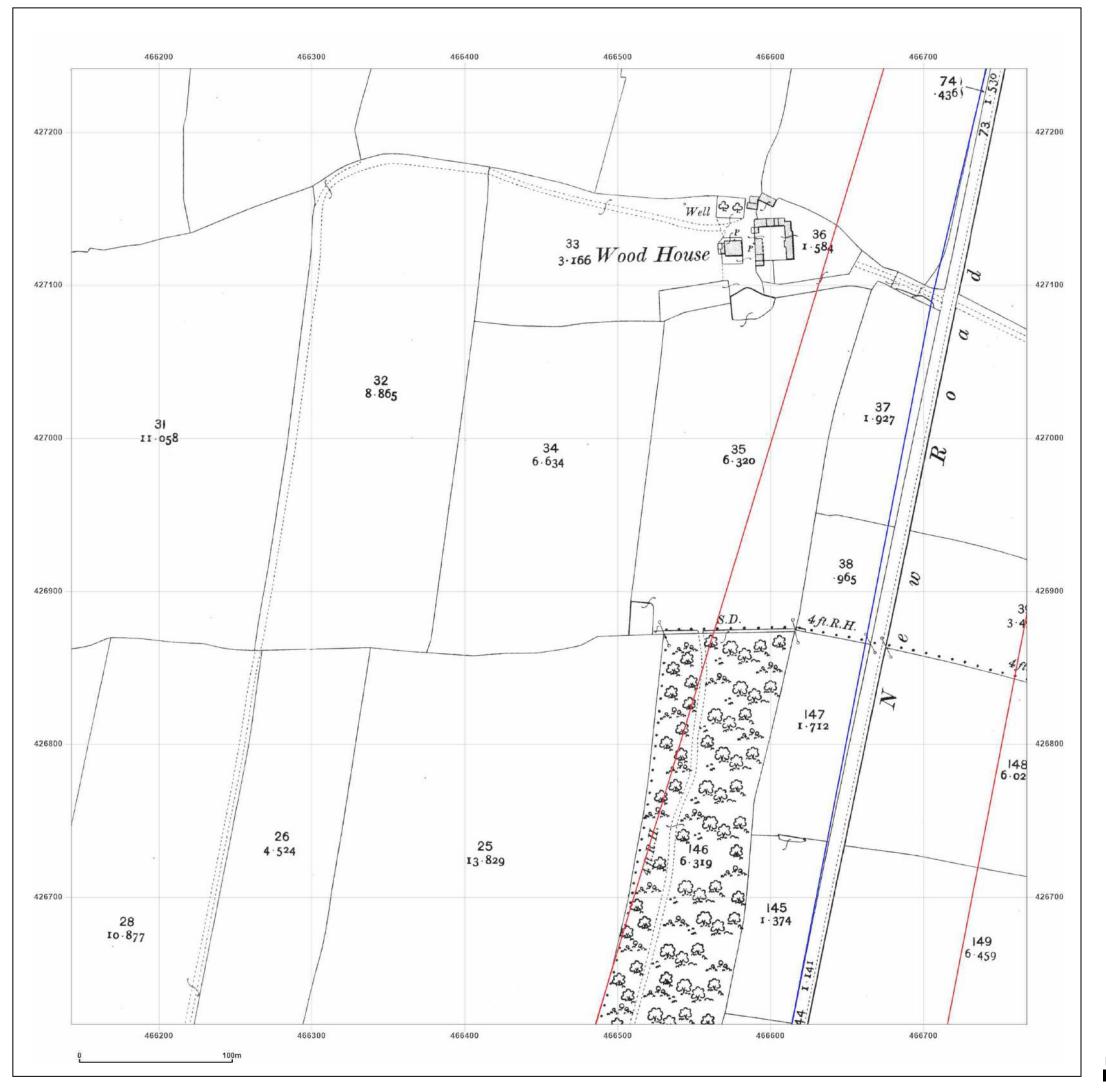




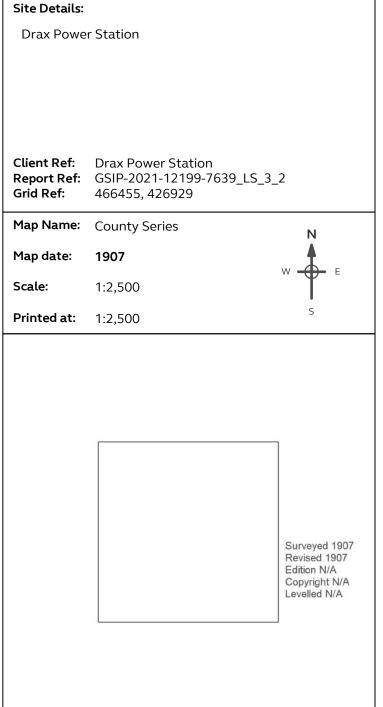


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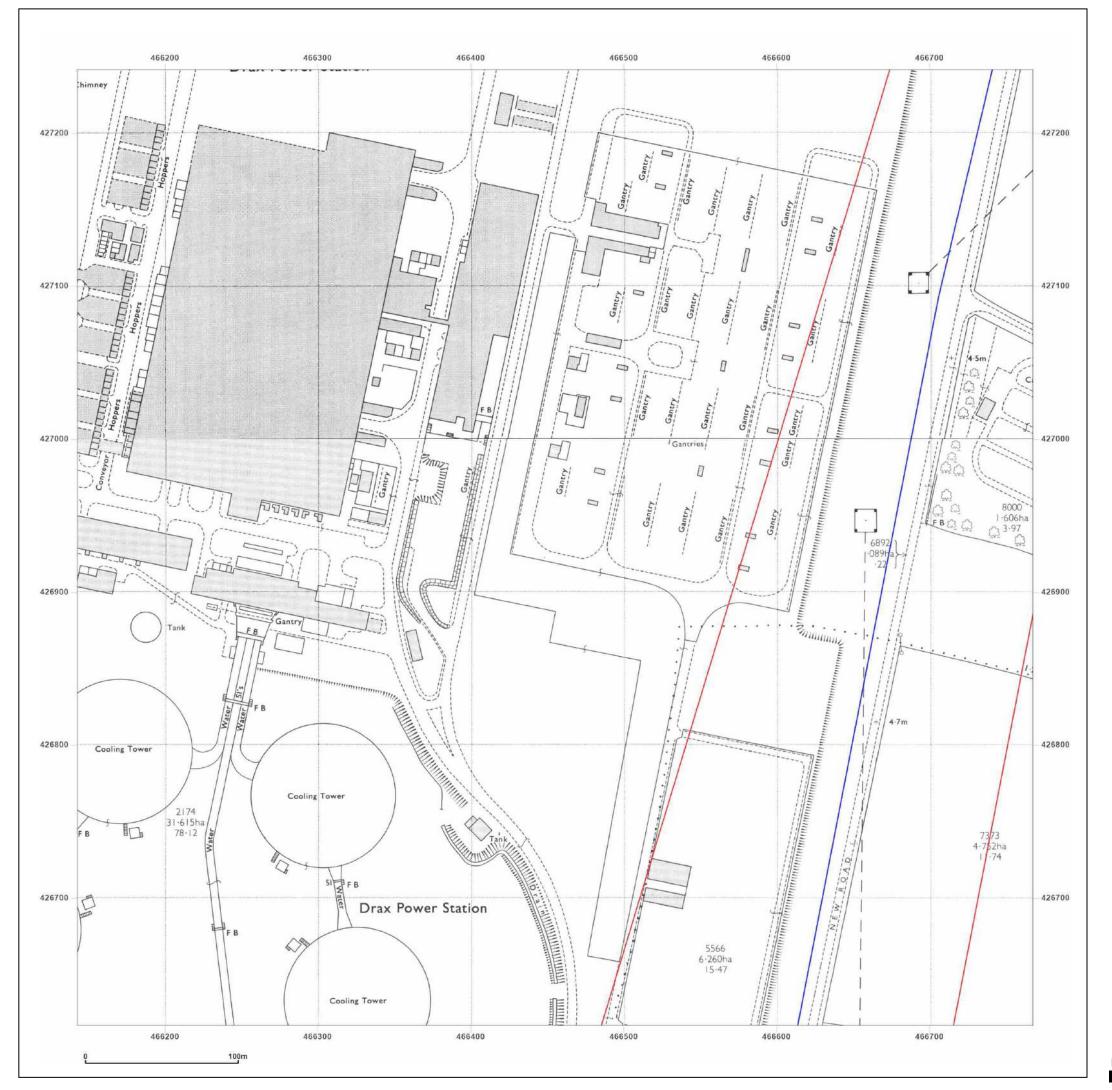




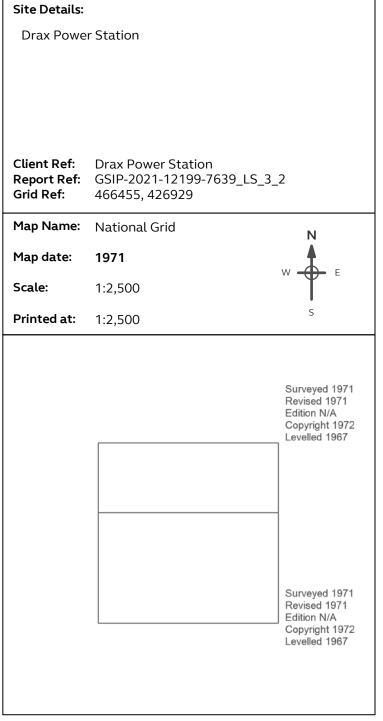


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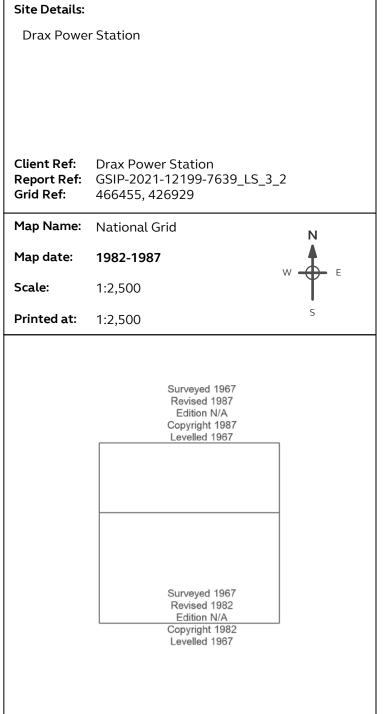


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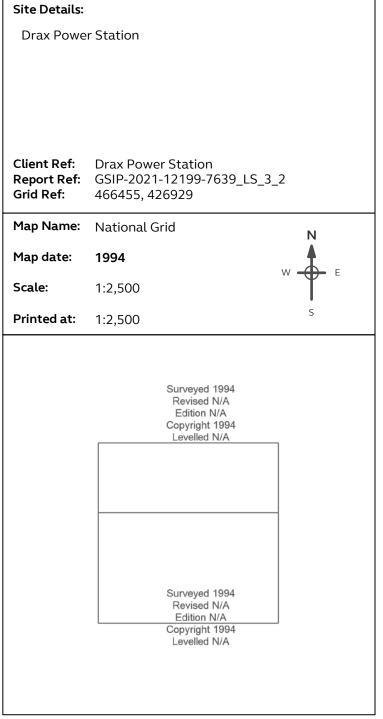


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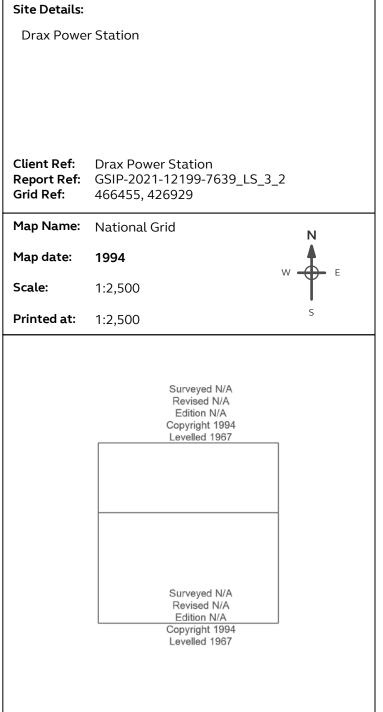


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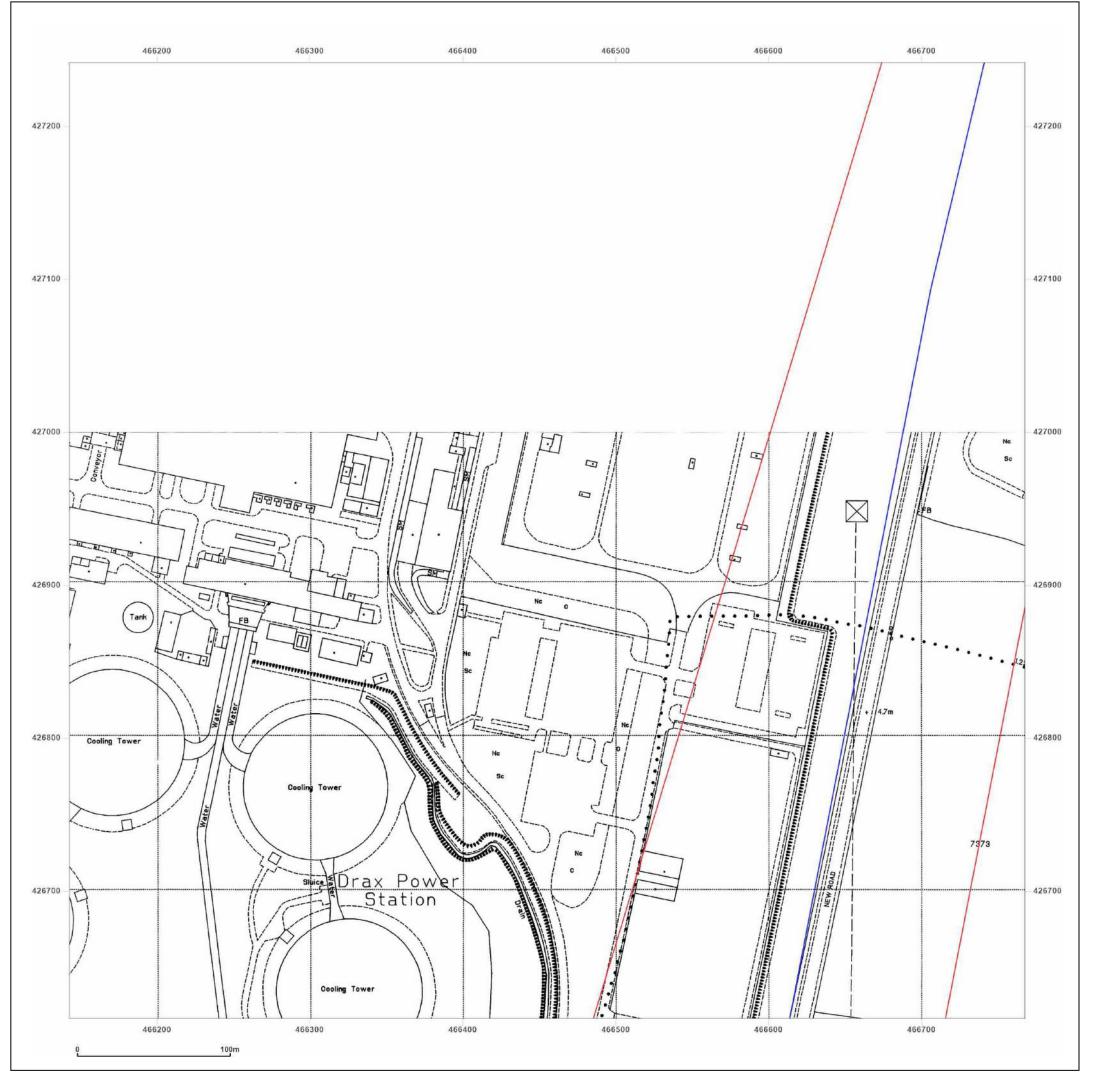




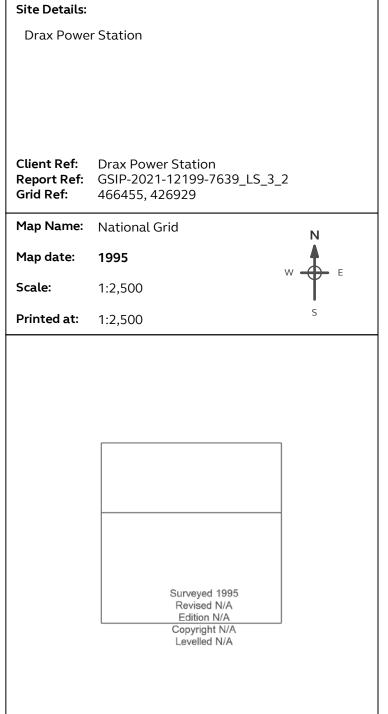


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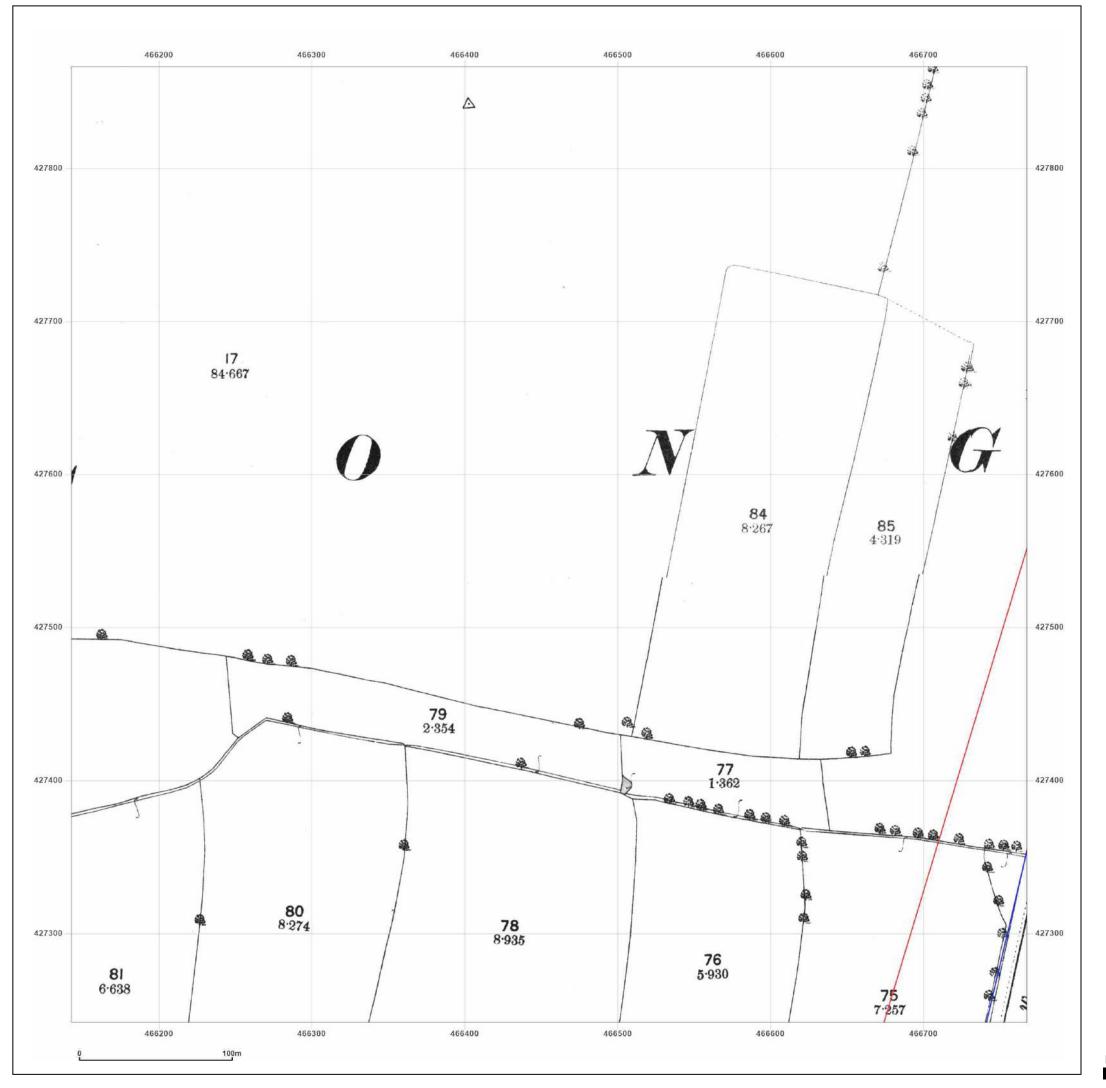






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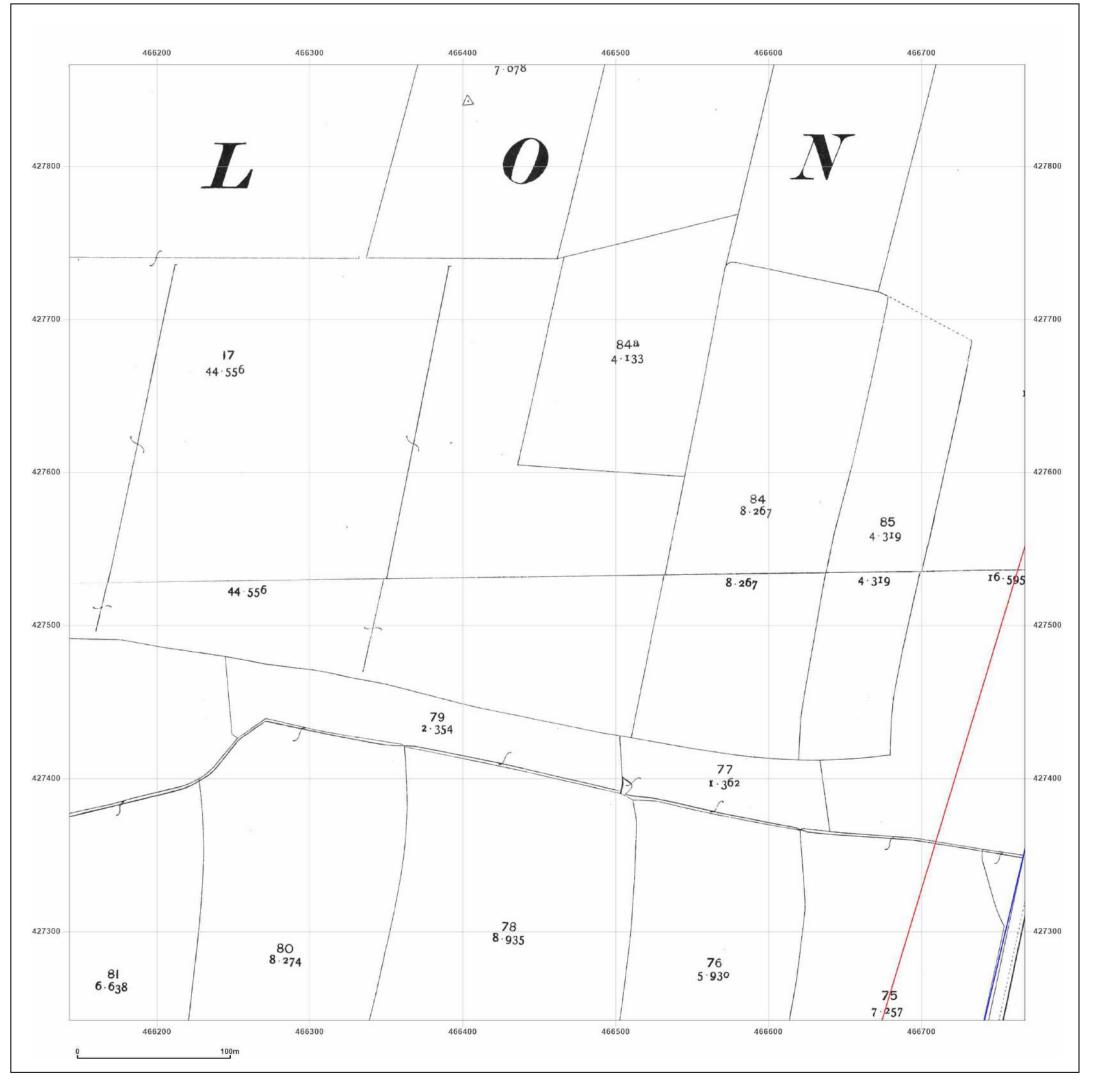


Site Details:				
Drax Powe	r Station			
Client Ref: Report Ref: Grid Ref:	Drax Power Station GSIP-2021-12199-7639_LS_3_ 466455, 427554	_3		
Map Name:	County Series	N		
Map date:	1890			
Scale:	1:2,500	W E		
Printed at:	1:2,500	S		
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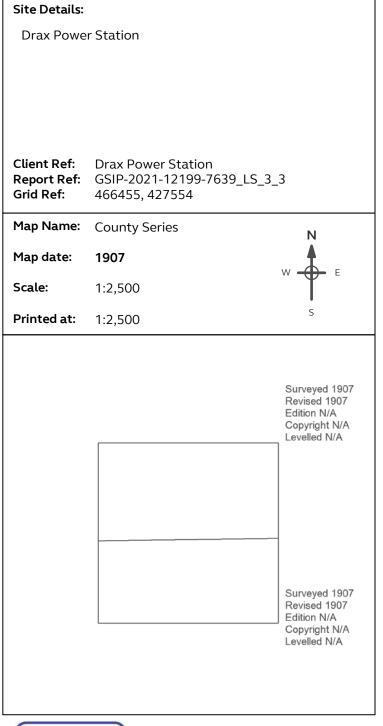


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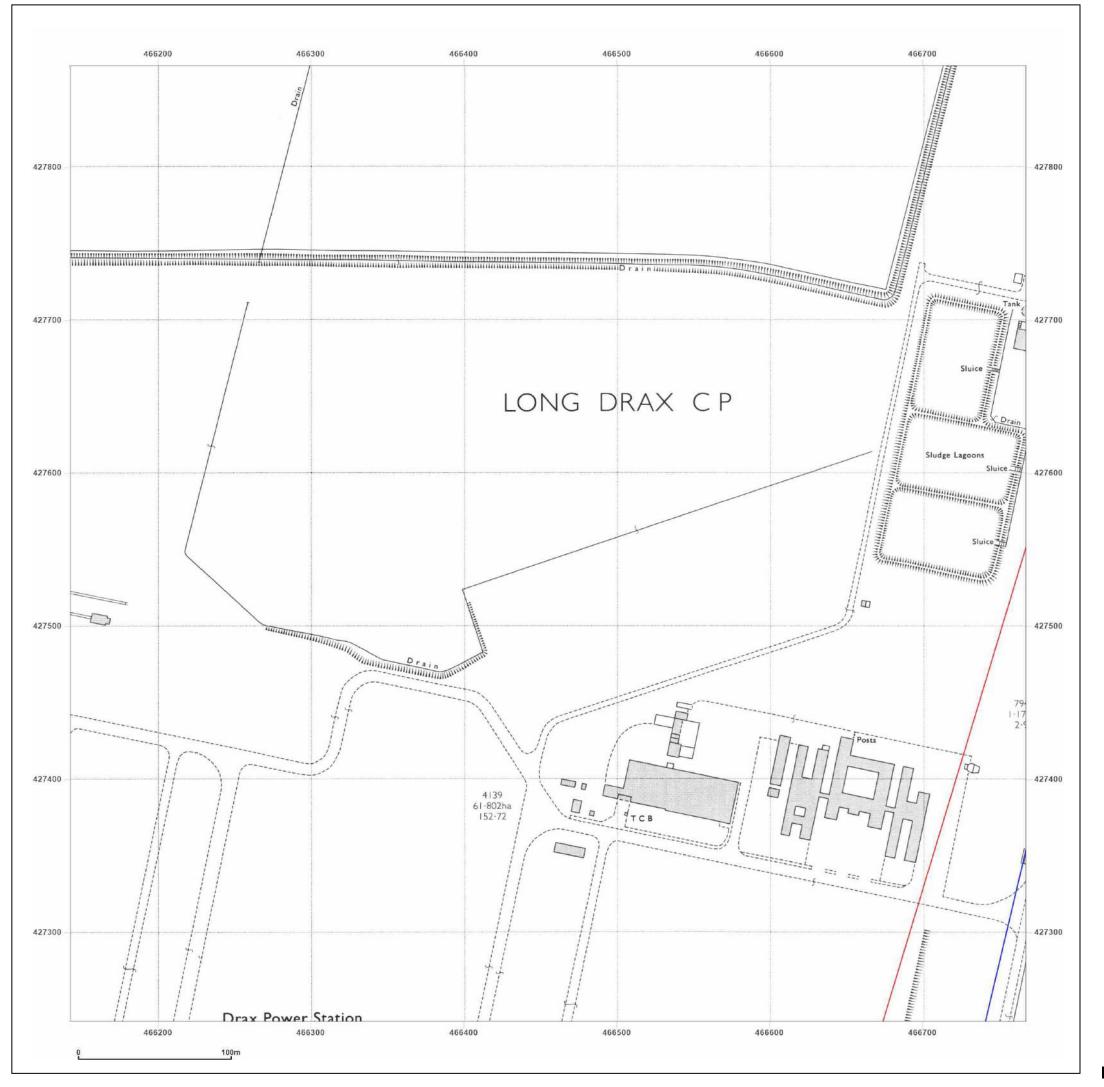




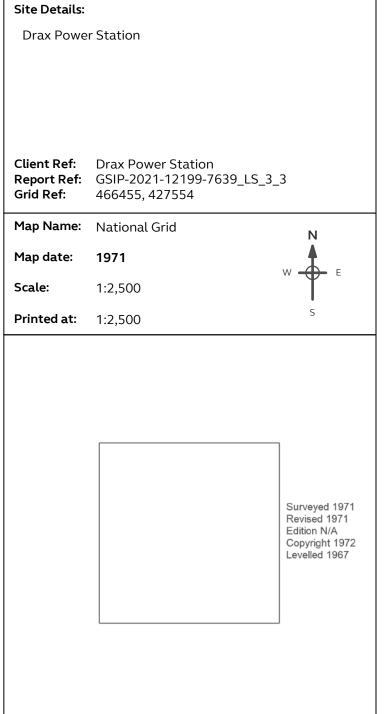


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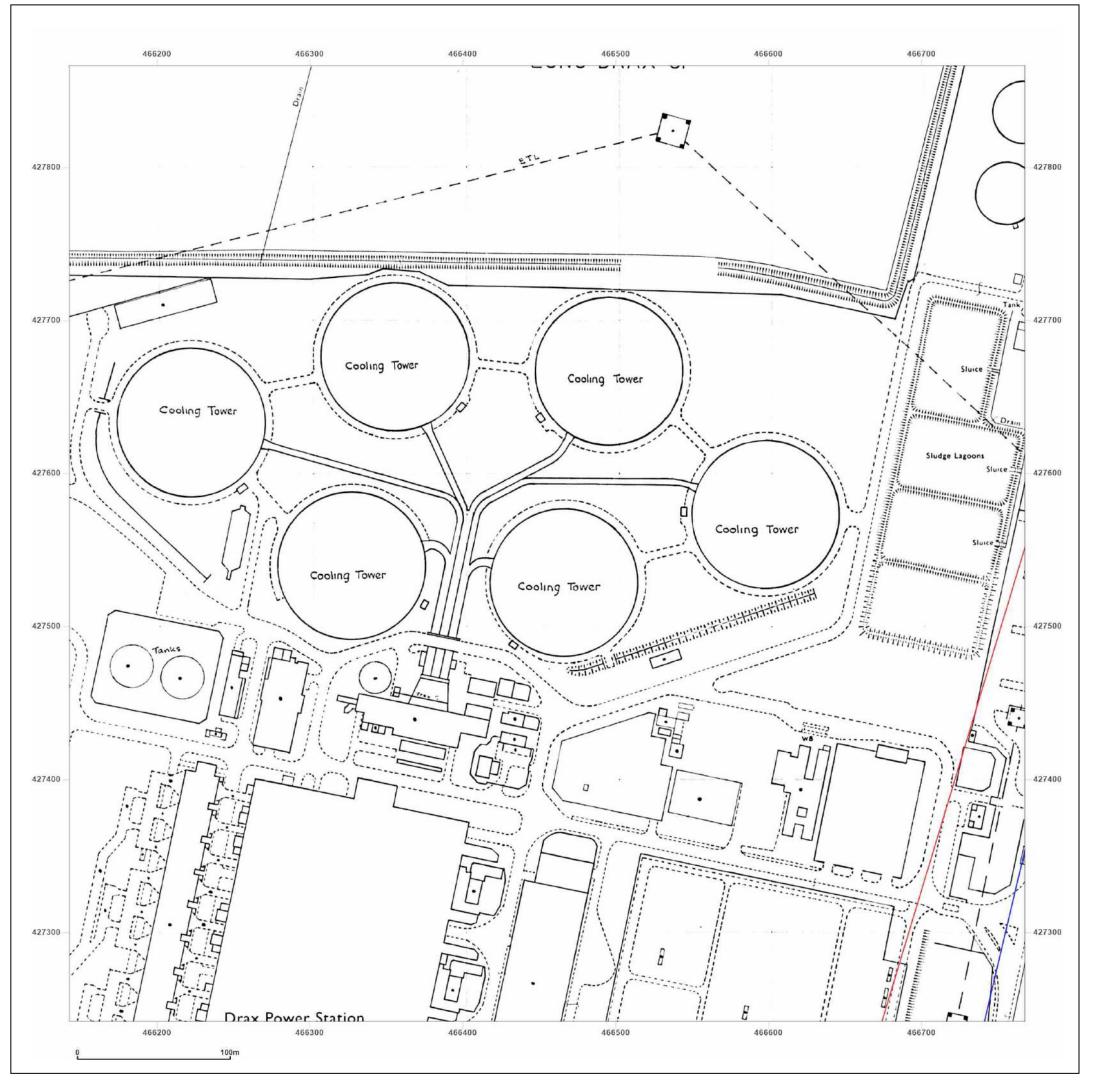






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Client Ref: Drax Power Station

Report Ref: GSIP-2021-12199-7639_LS_3_3

Grid Ref: 466455, 427554

Map Name: National Grid

Map date: 1987

Scale: 1:2,500

Printed at: 1:2,500

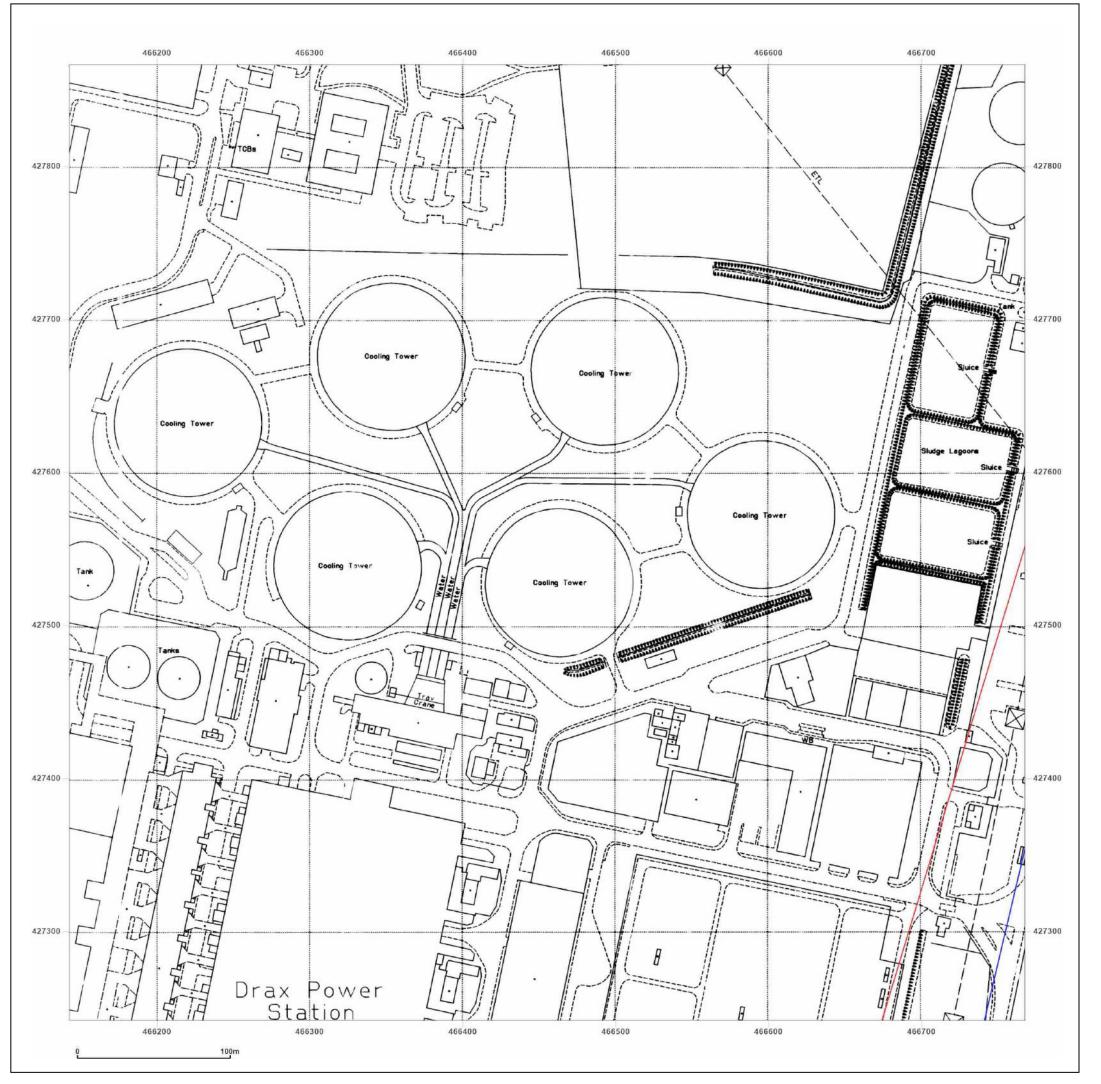
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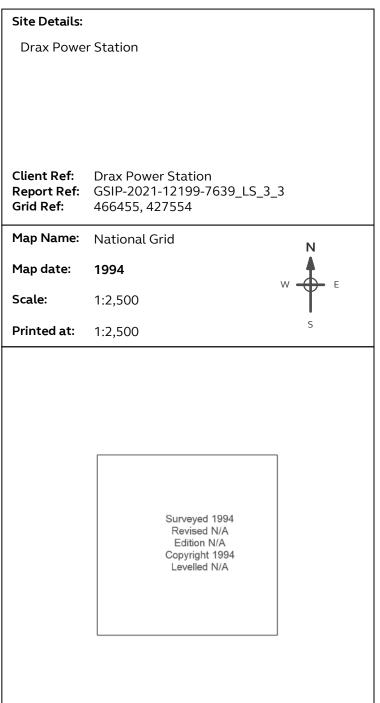
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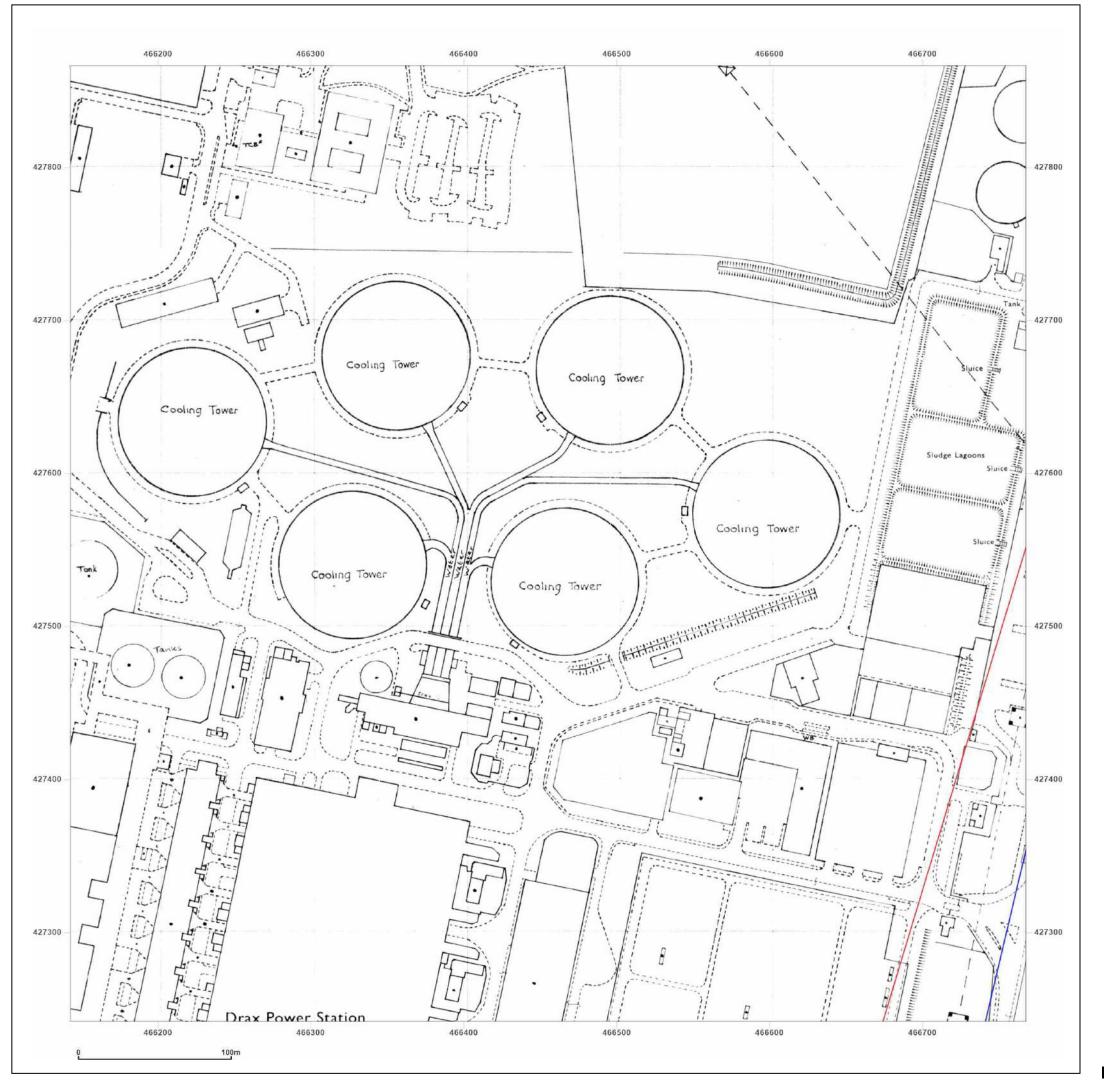




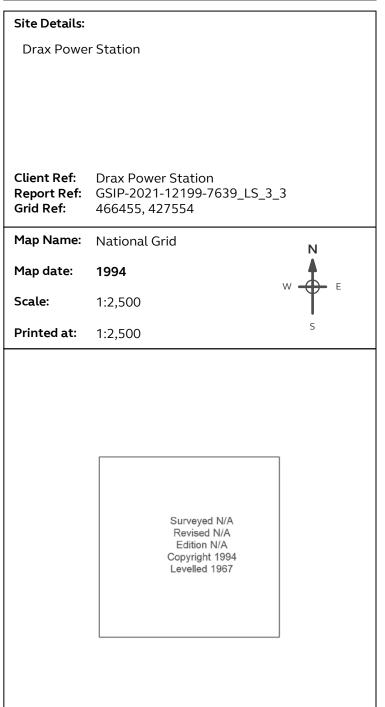


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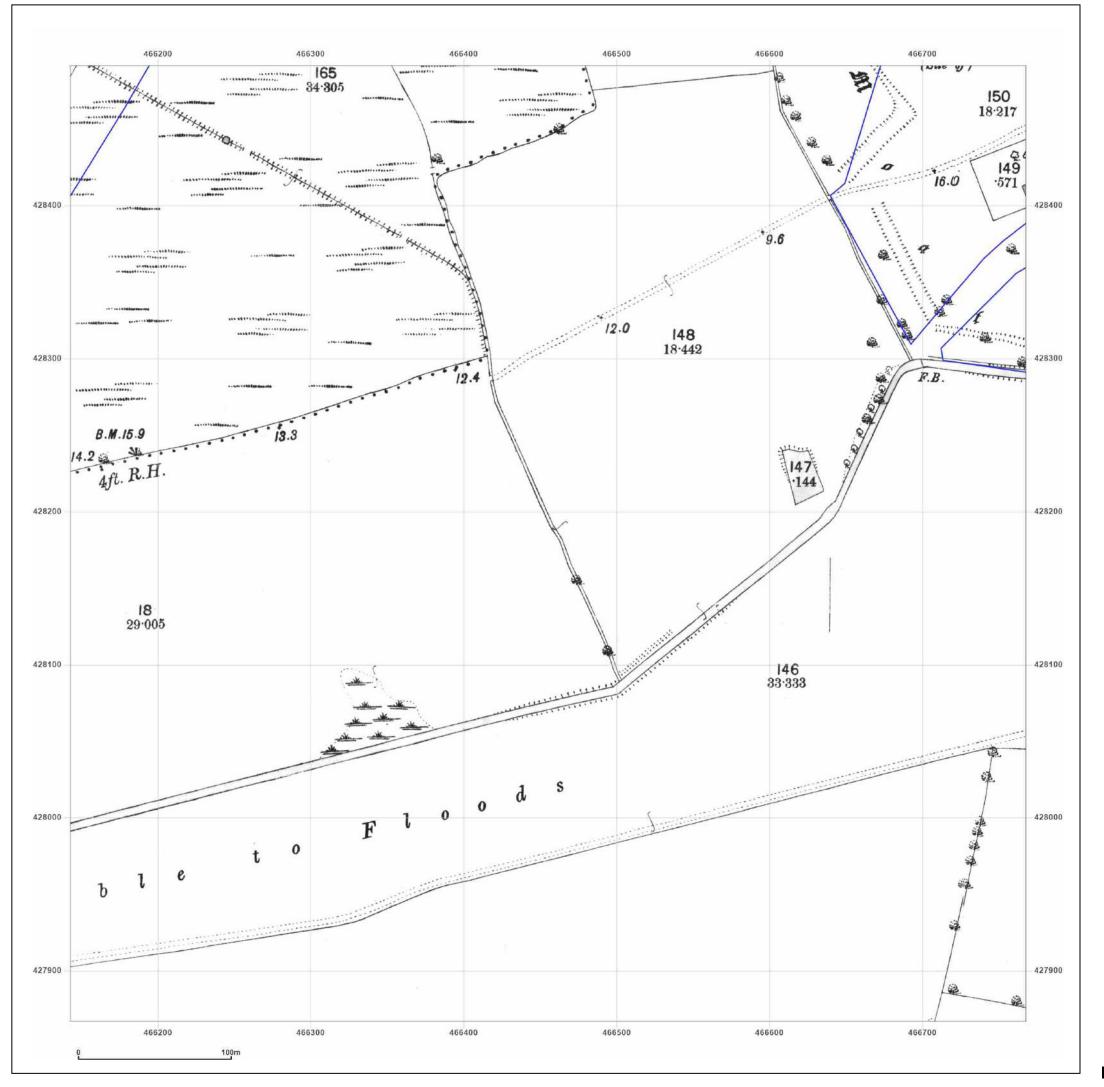




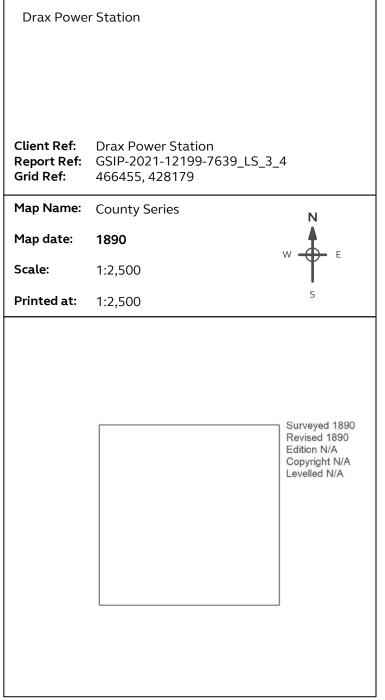


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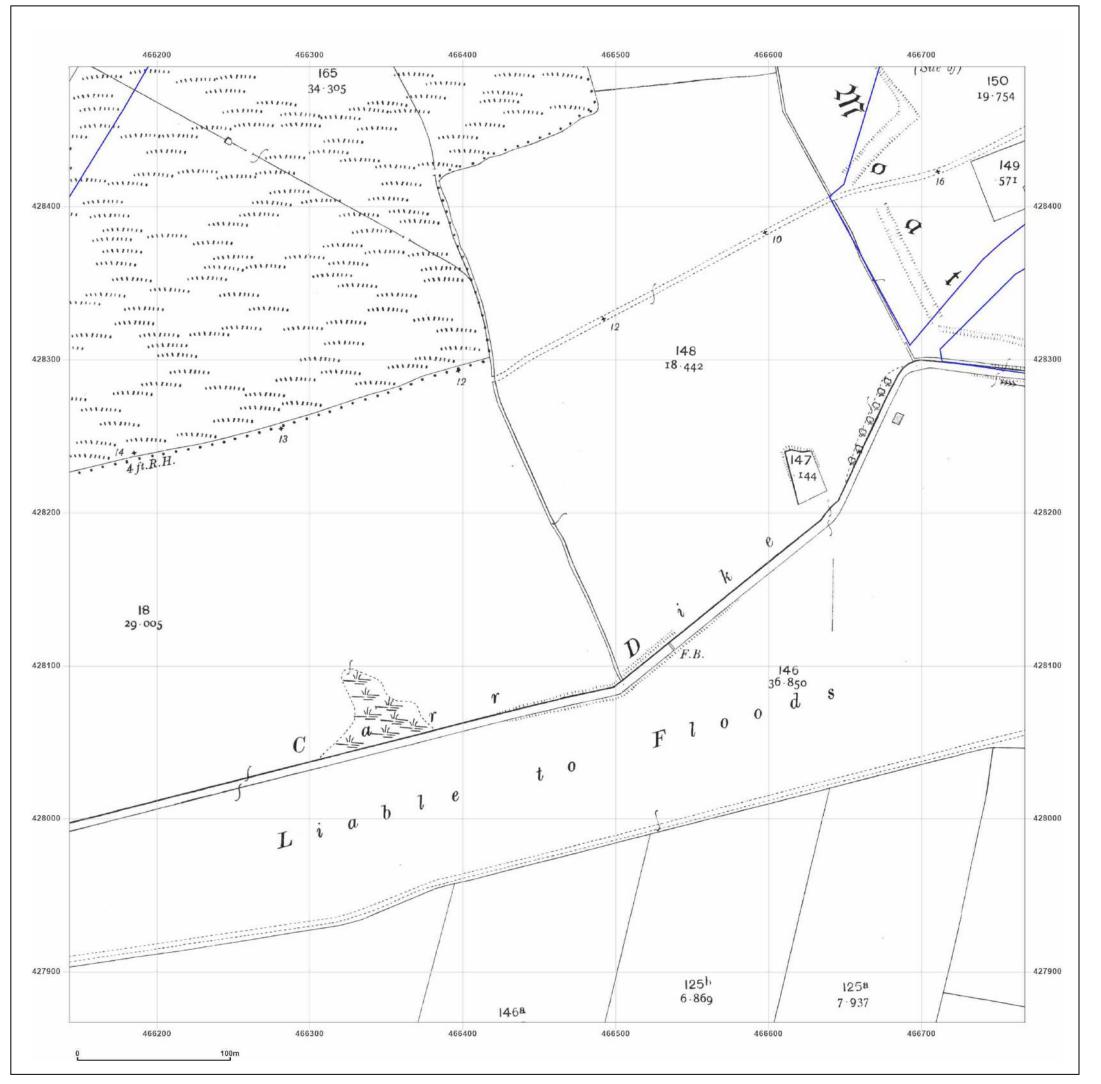




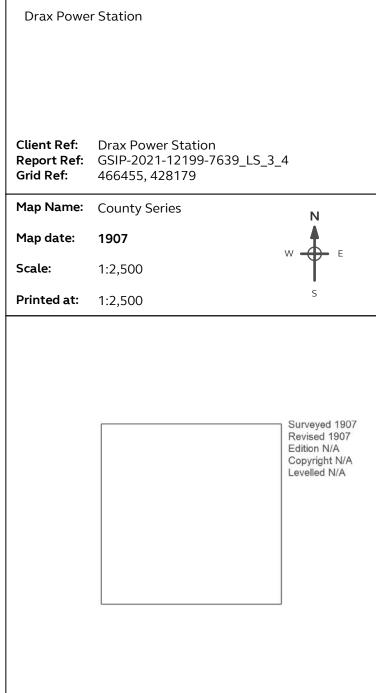
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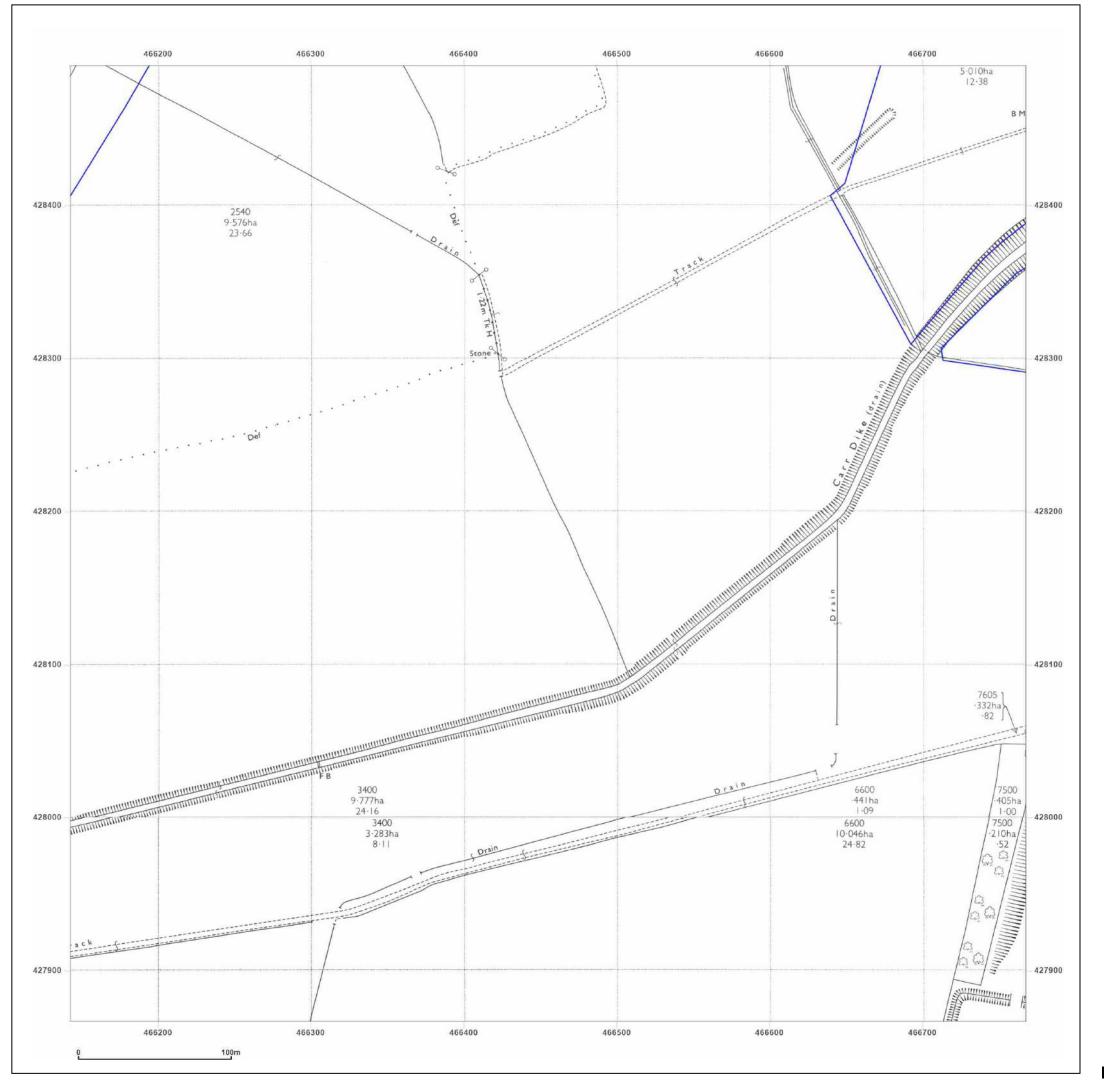




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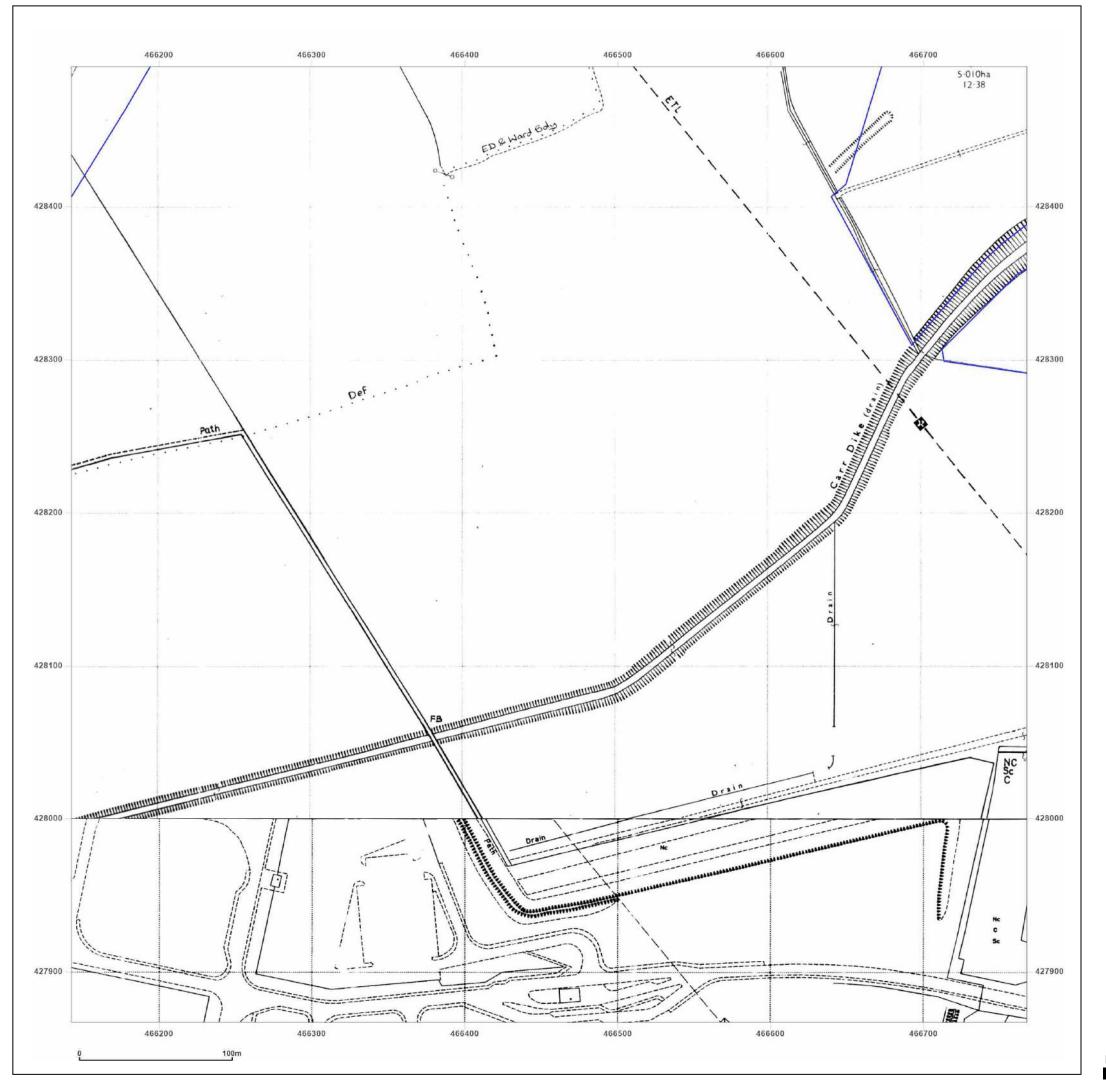
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Map Name:	National Grid	N
Map date:	1971	W F
Scale:	1:2,500	Ψ -
Printed at:	1:2,500	S
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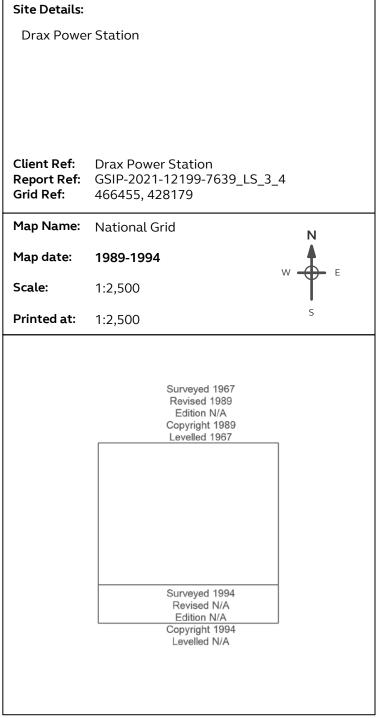
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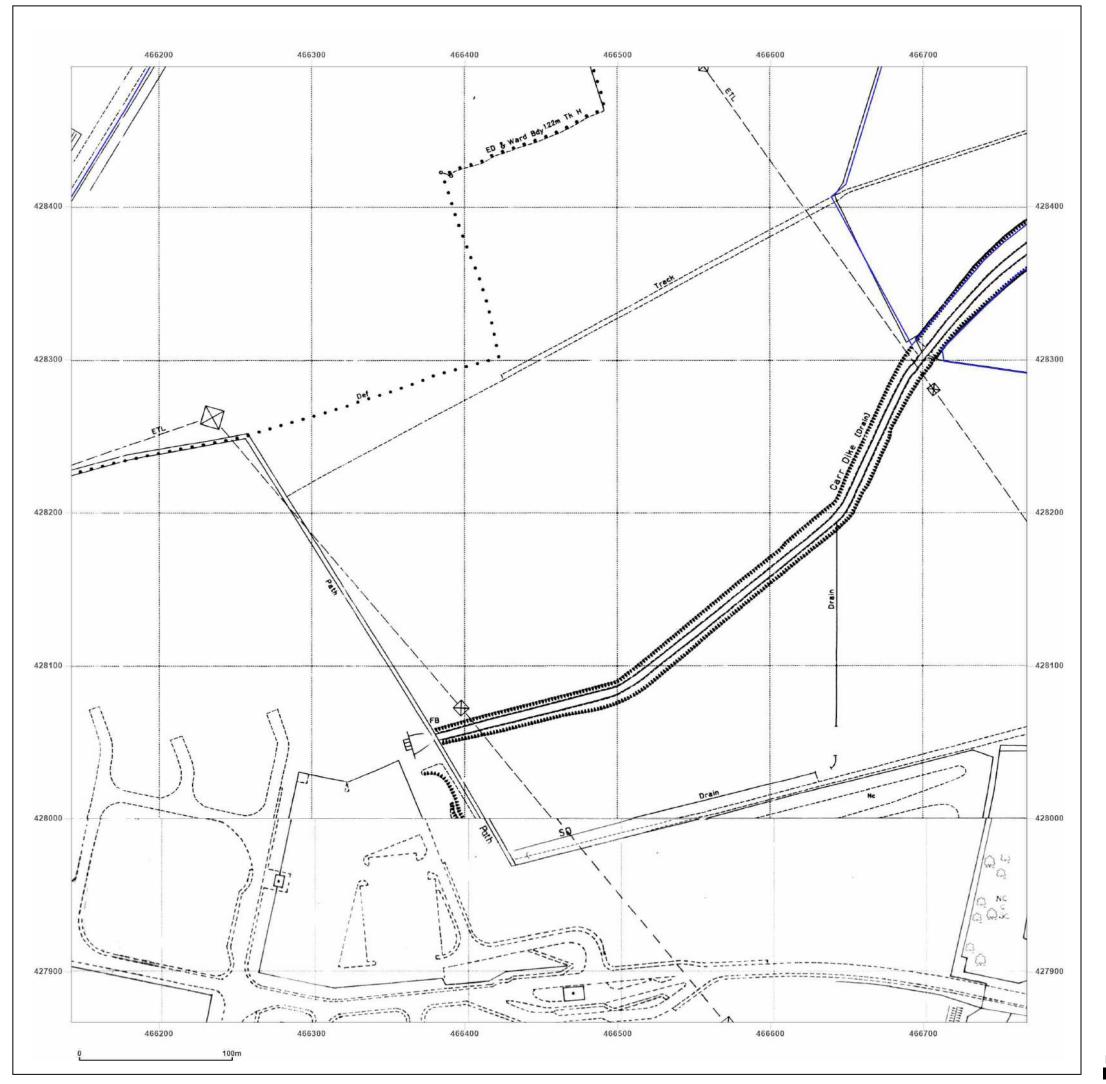




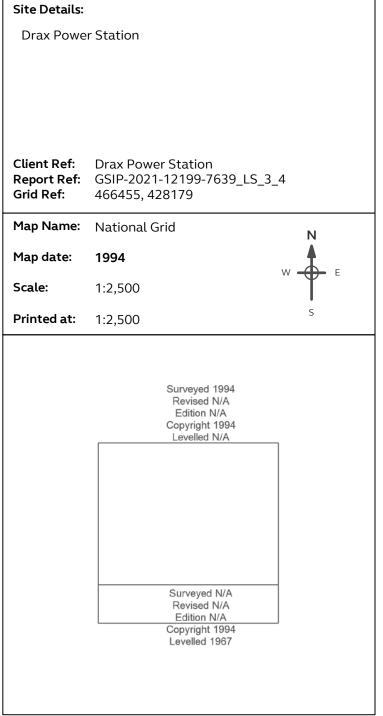


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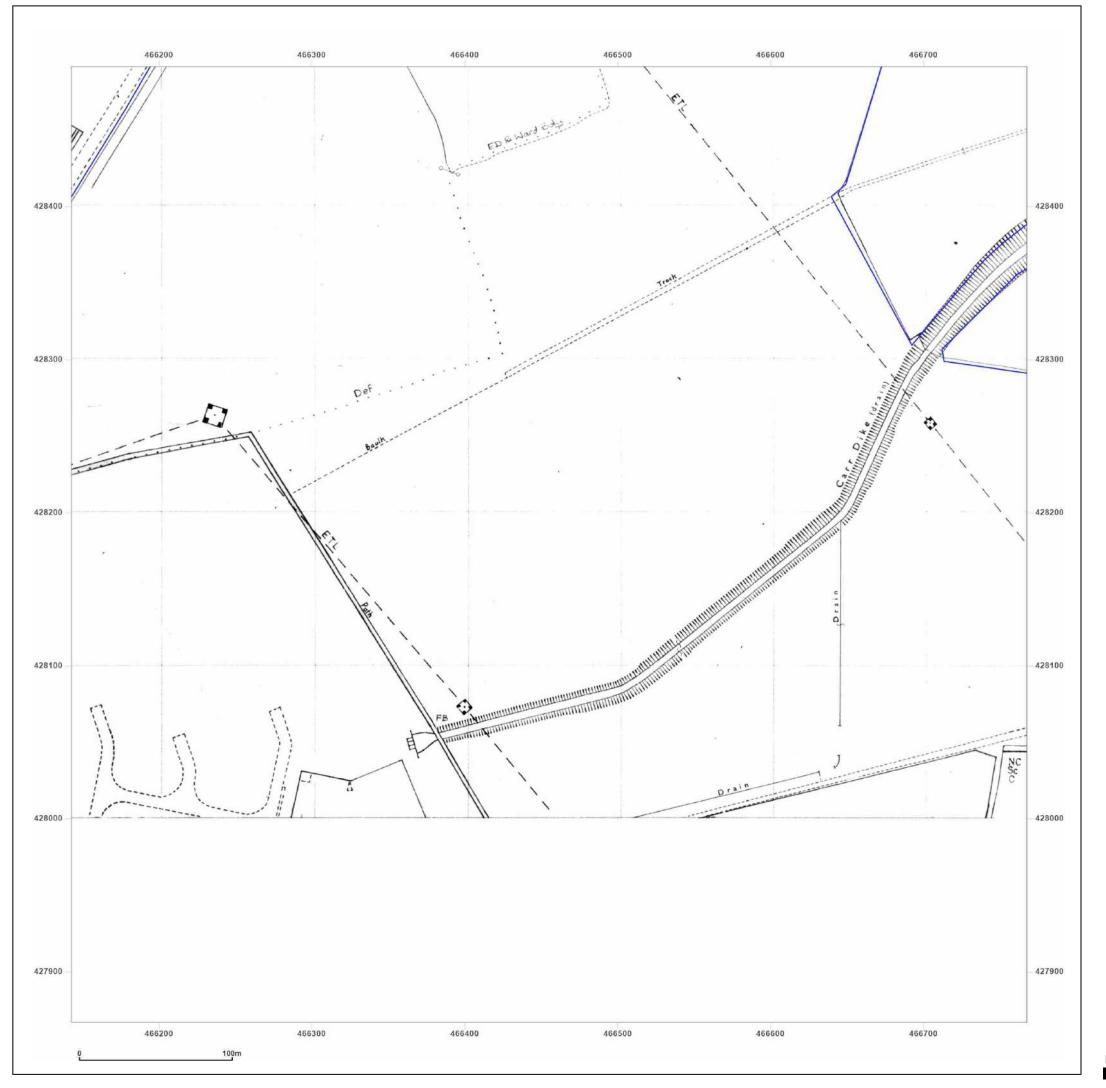






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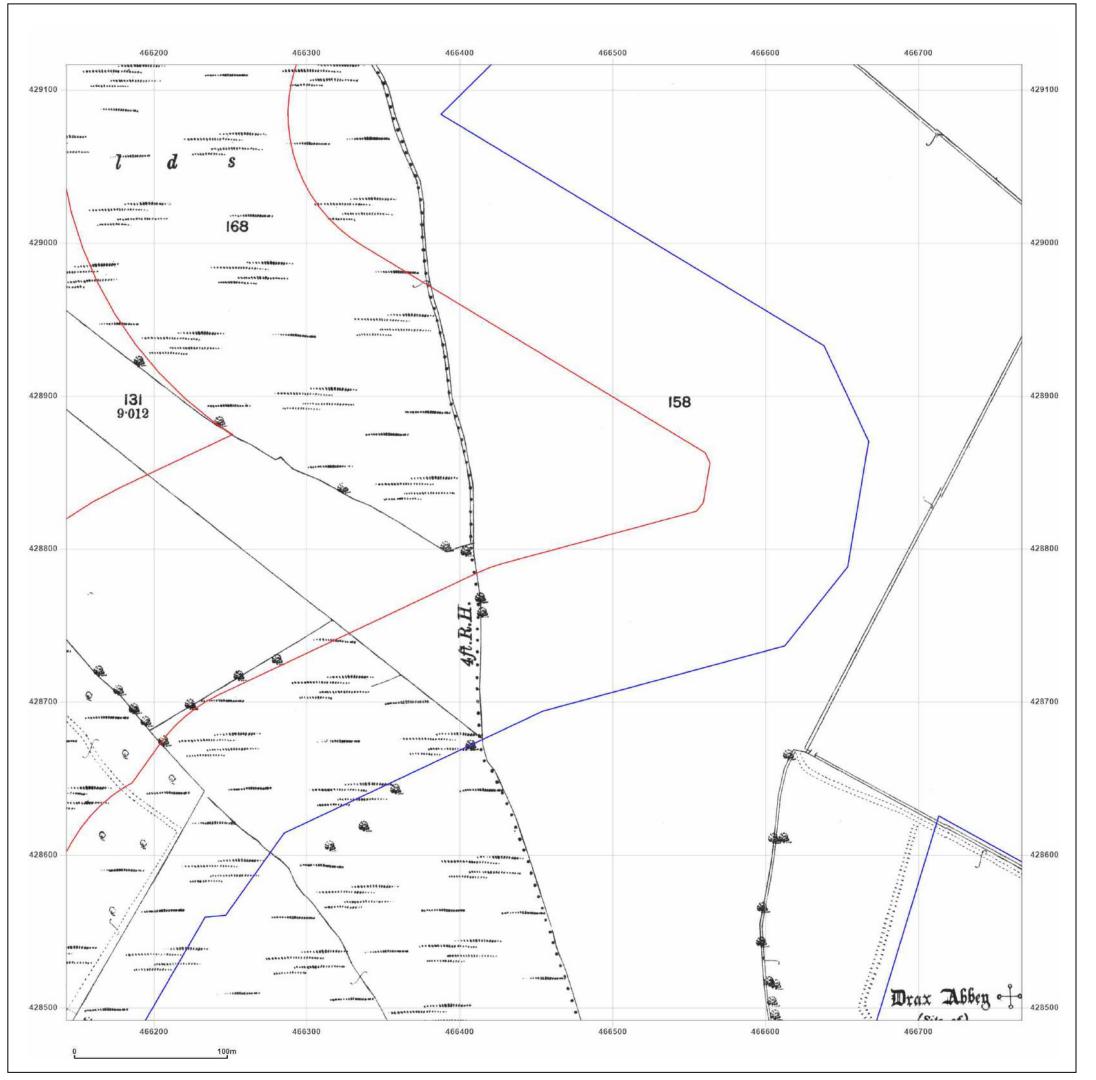
Drax Power Station		
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Map Name:	National Grid N	
Map date:	1994	
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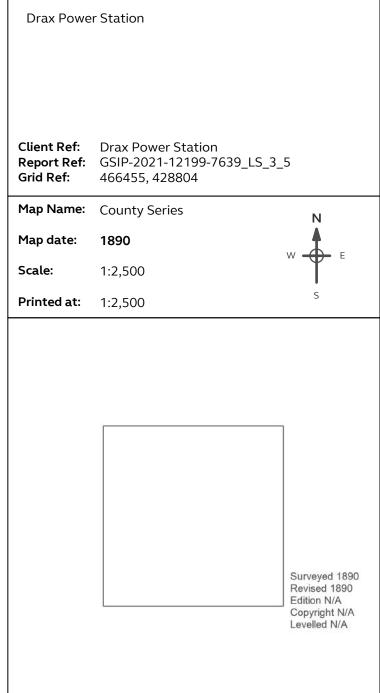
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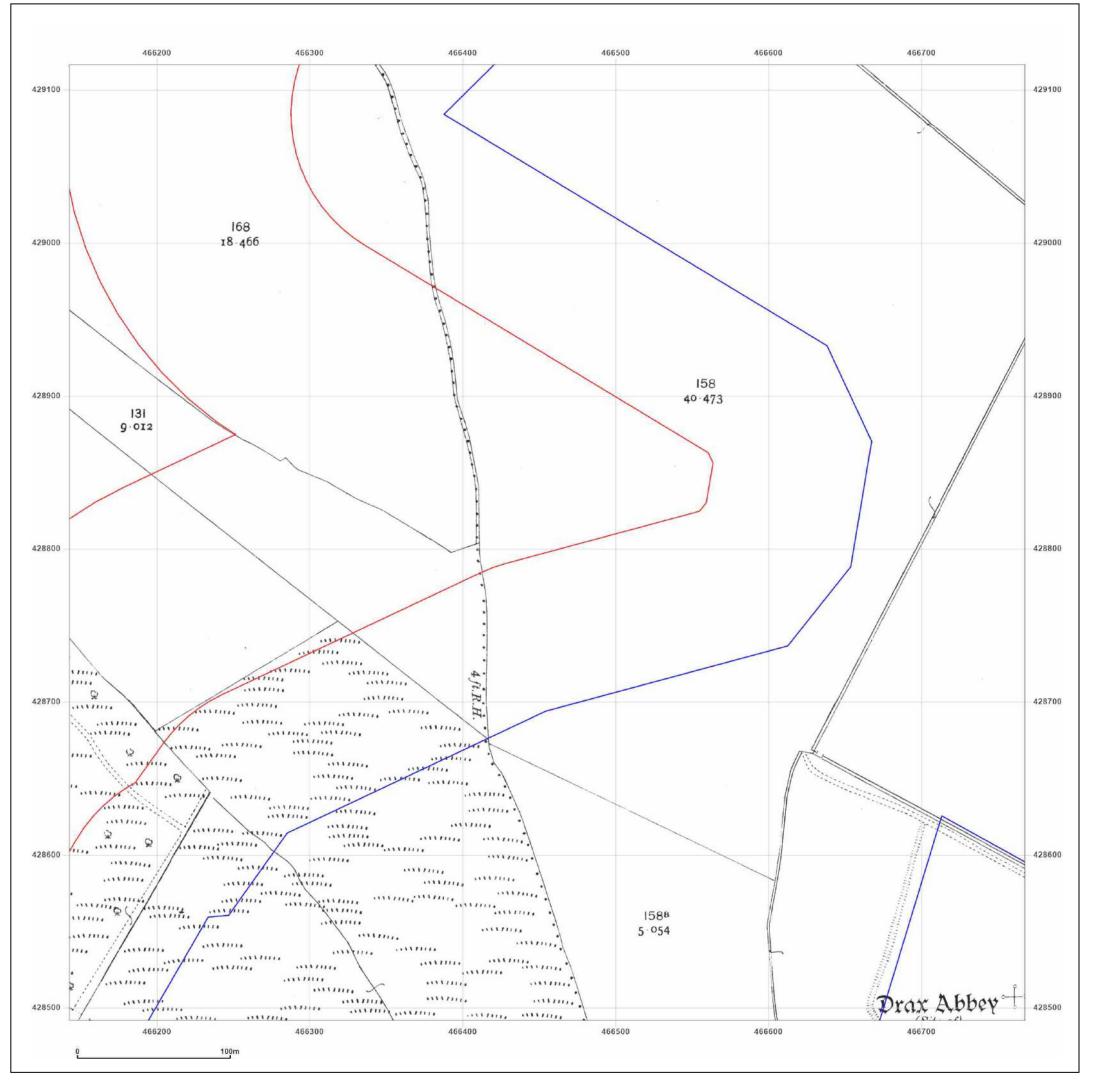




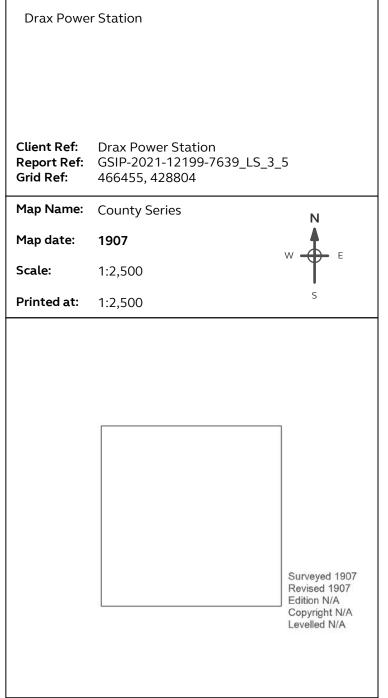
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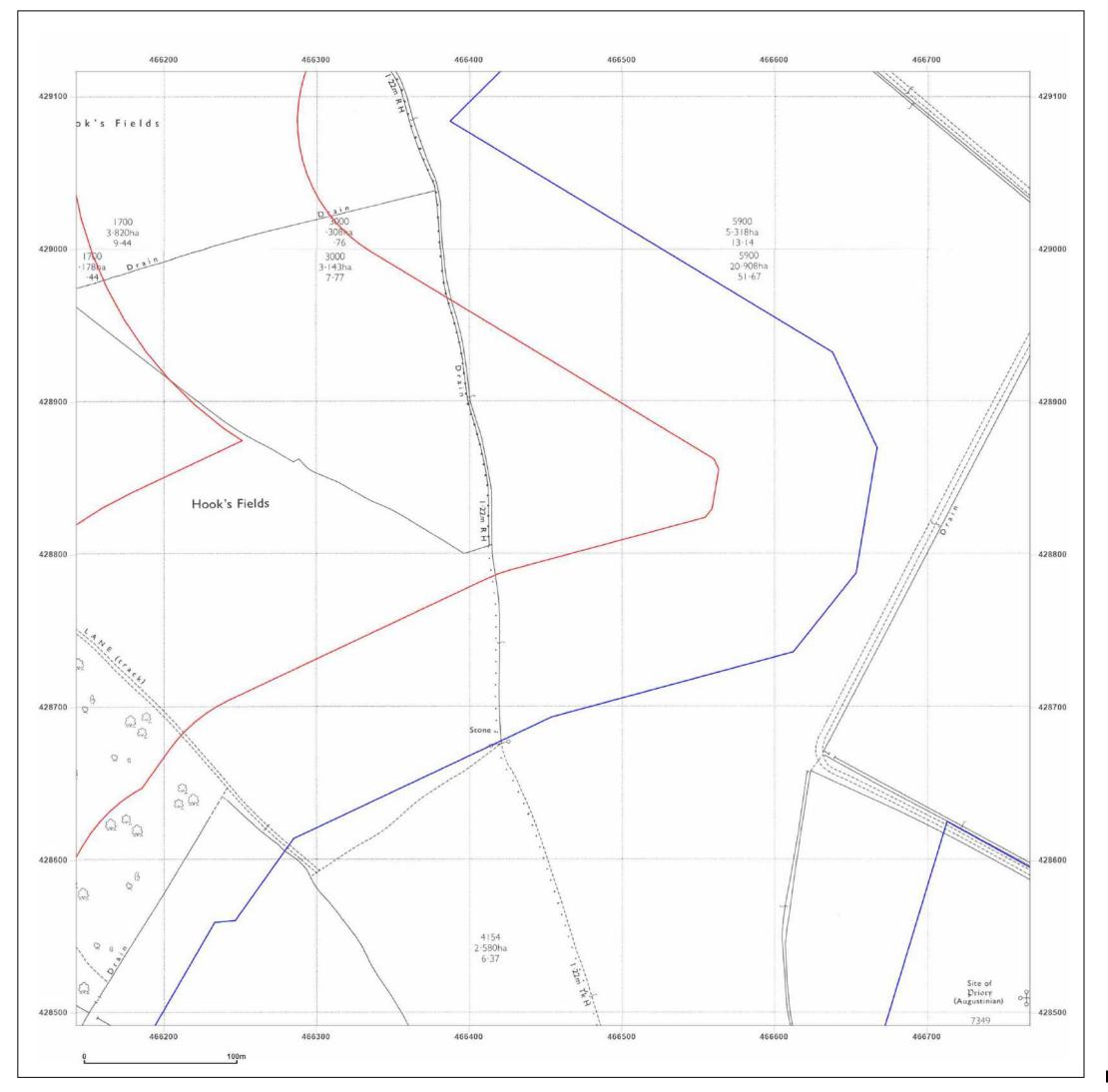




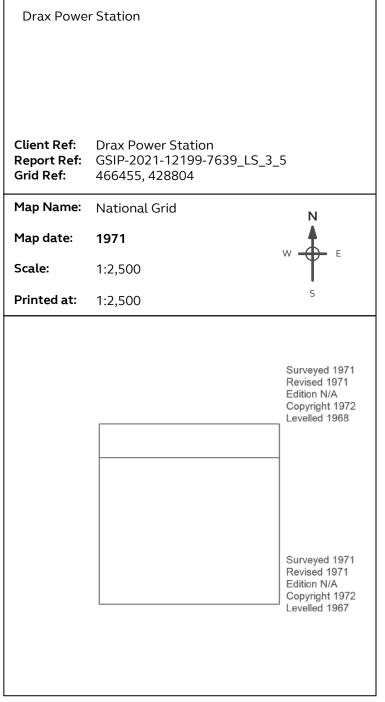
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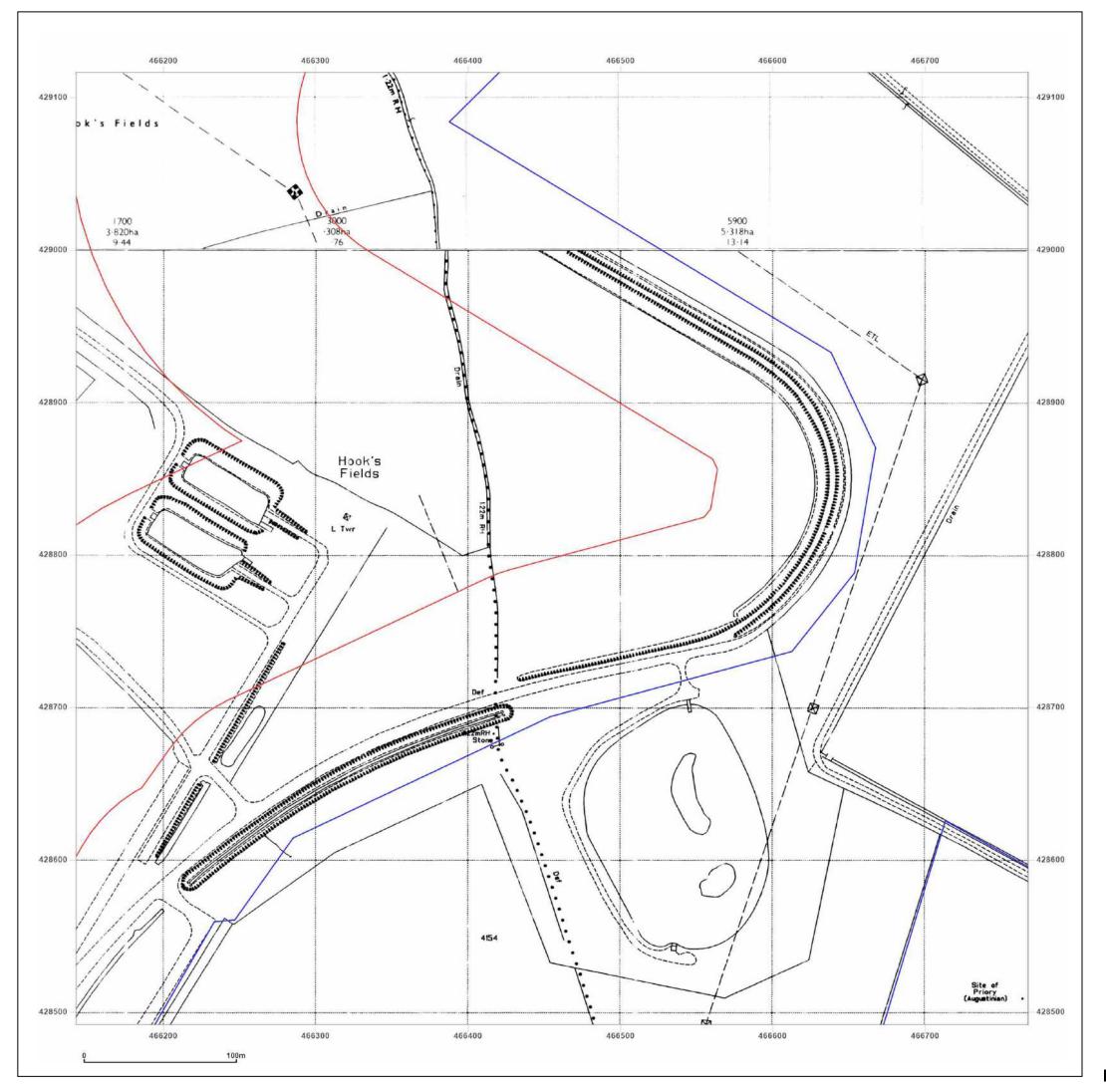




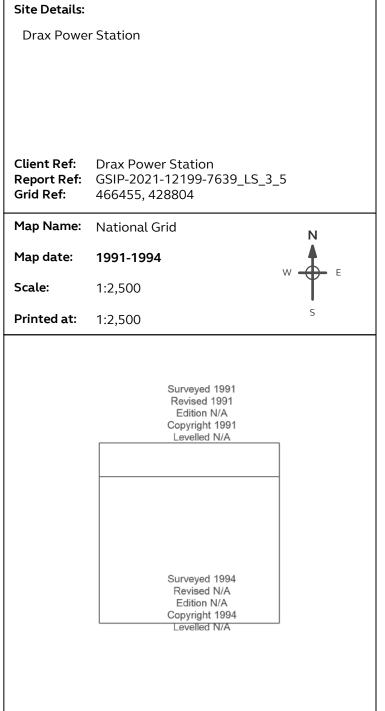
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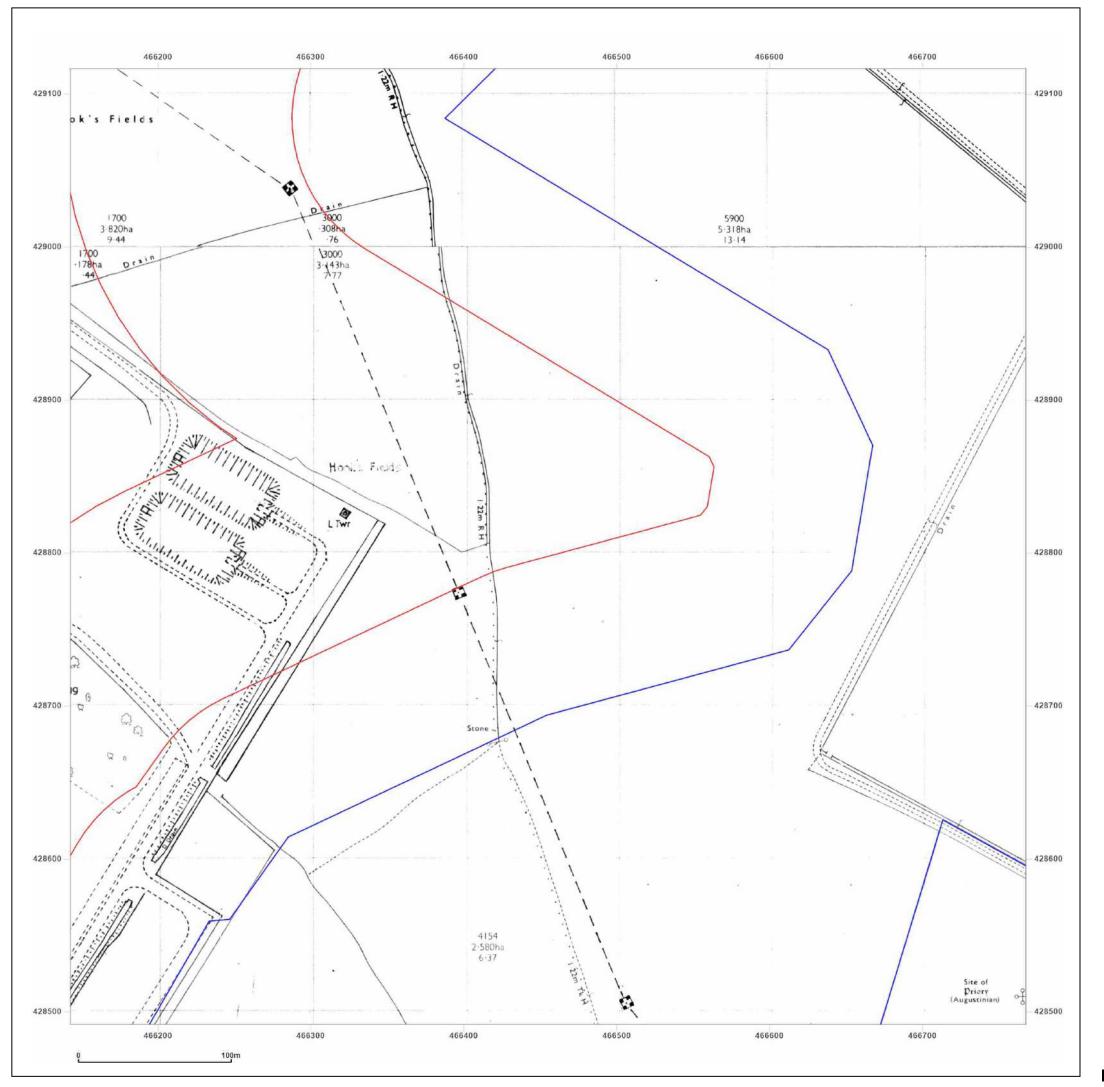




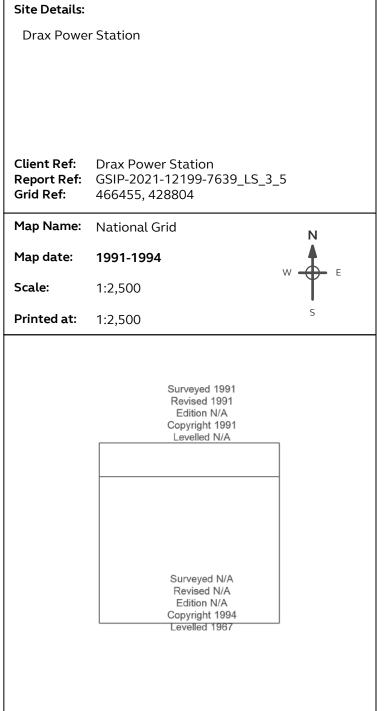


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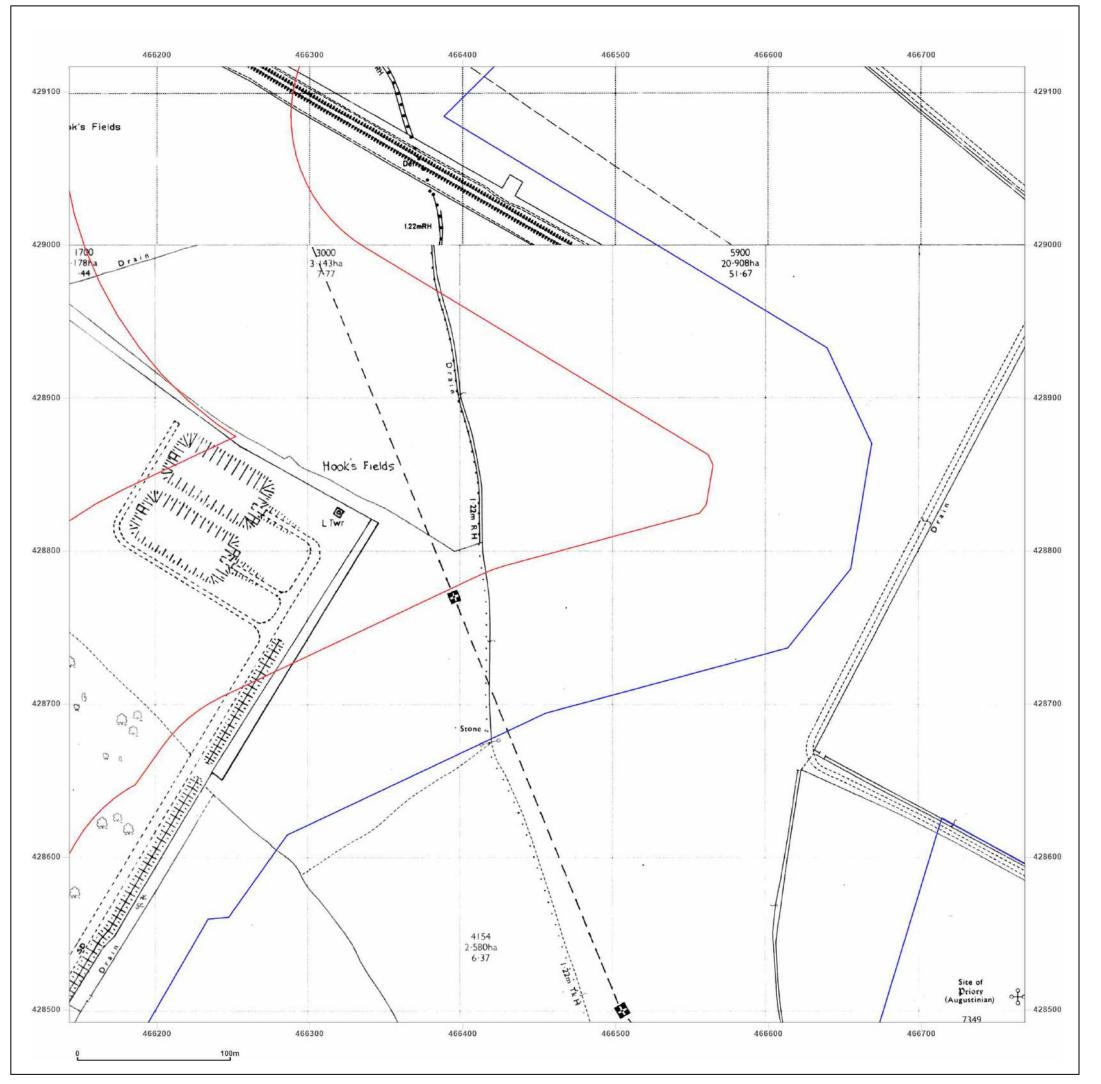




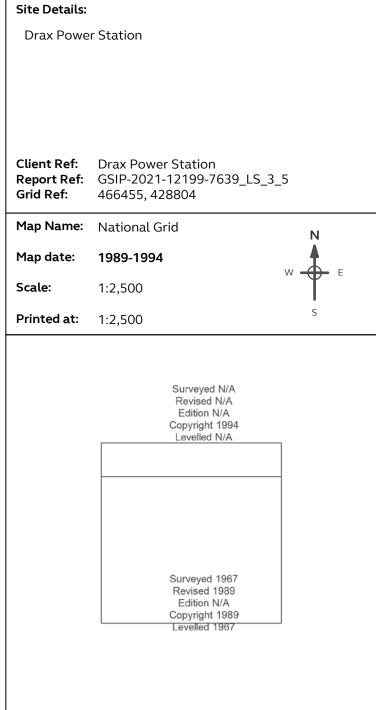


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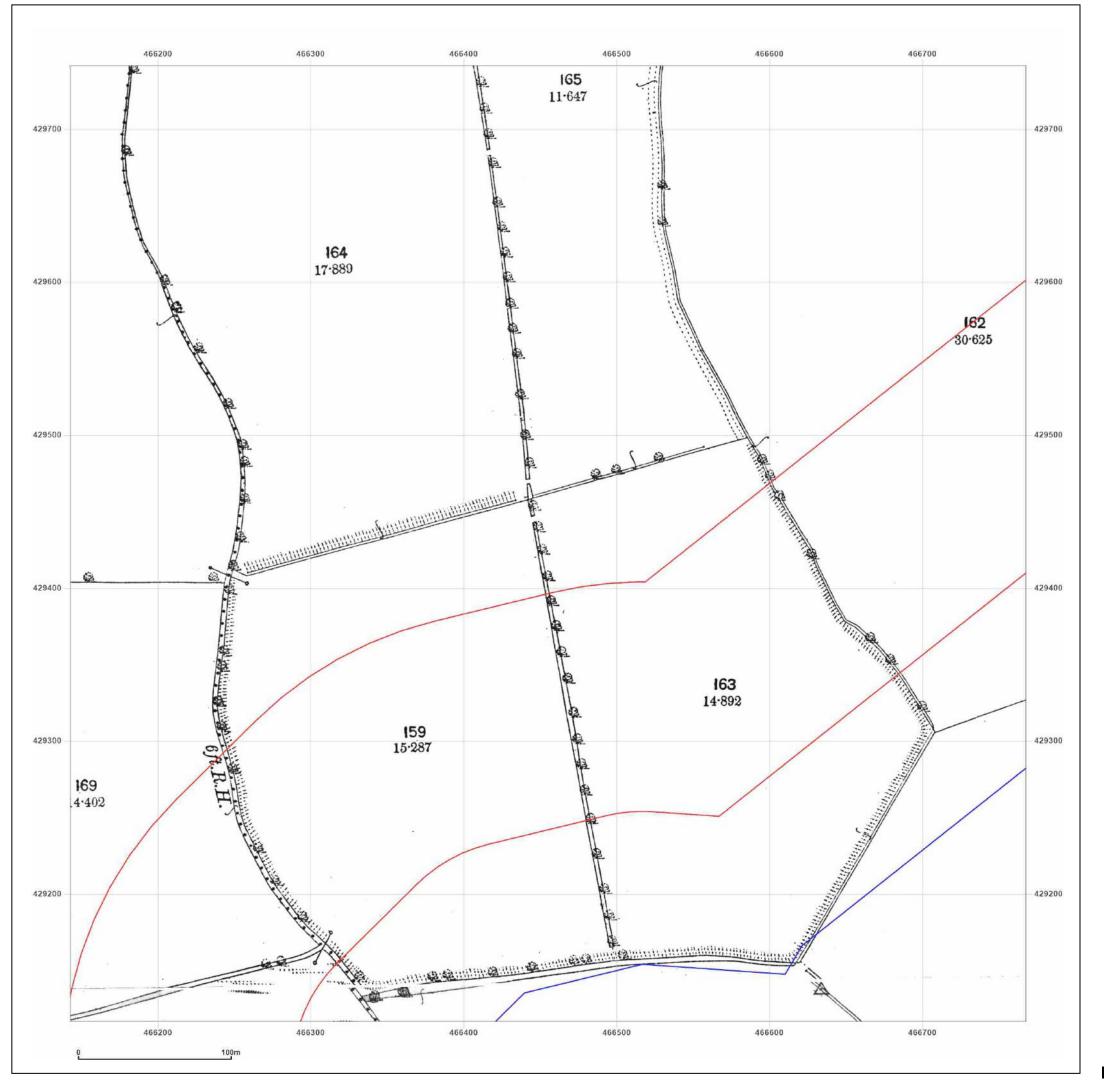




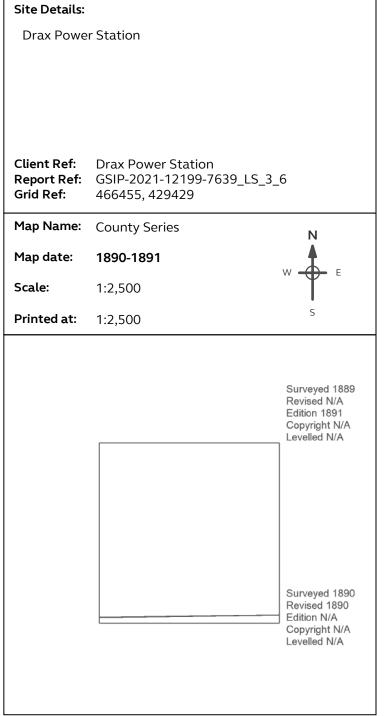


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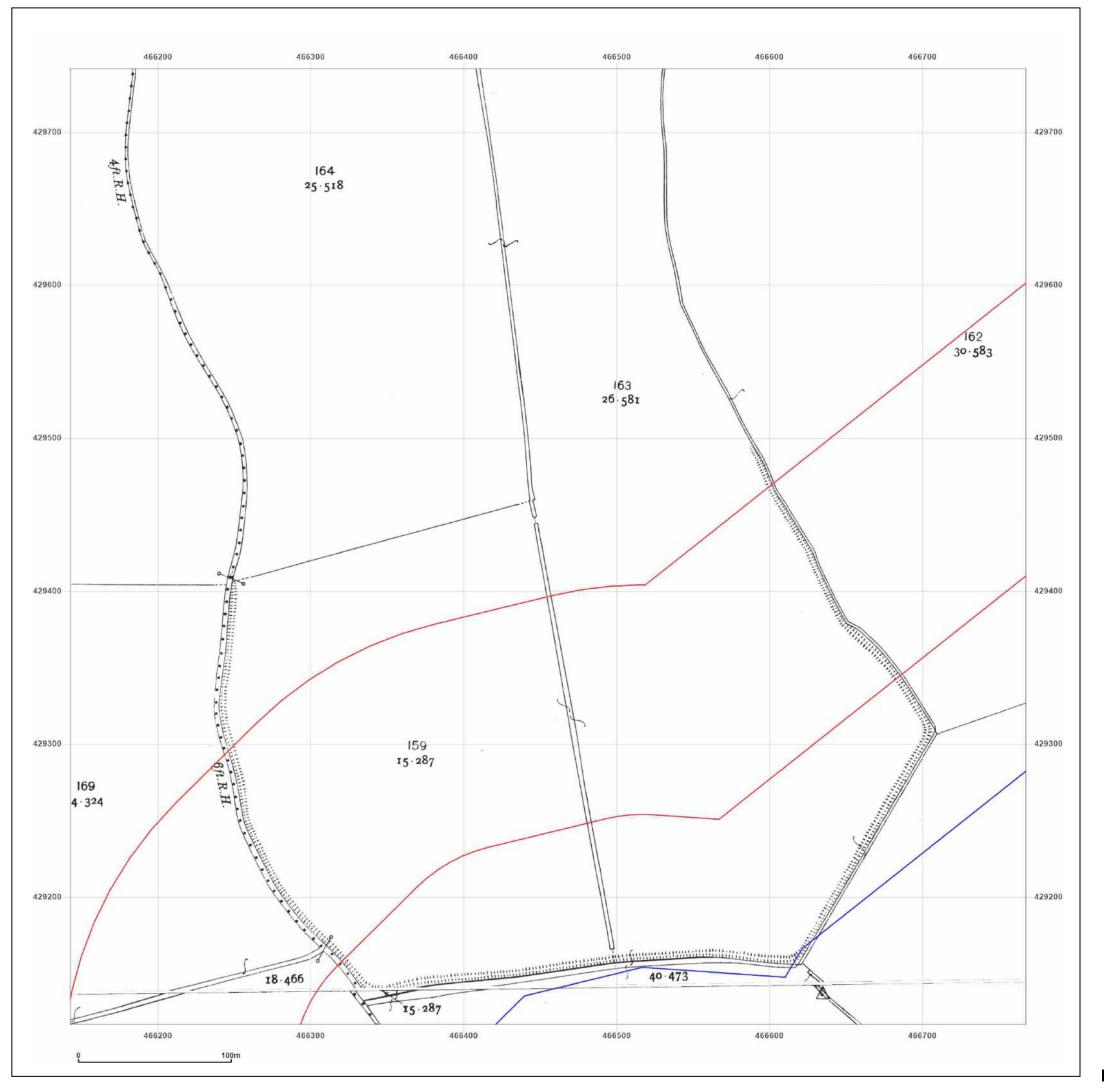




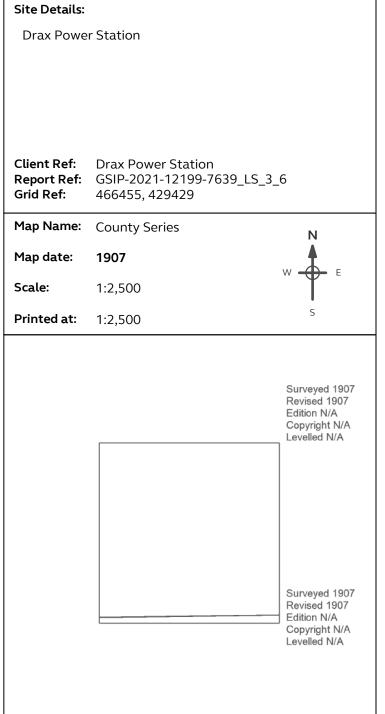


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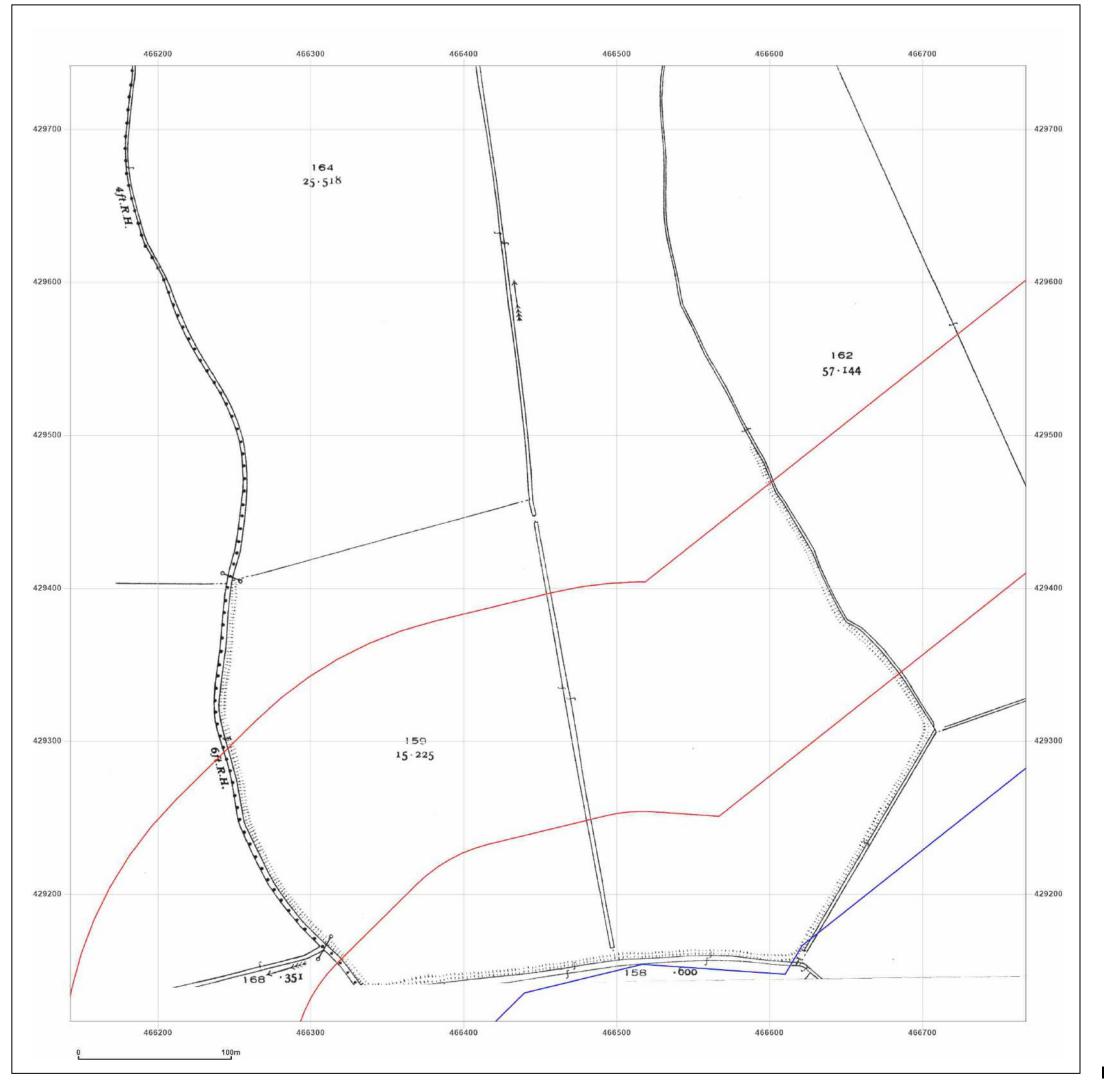




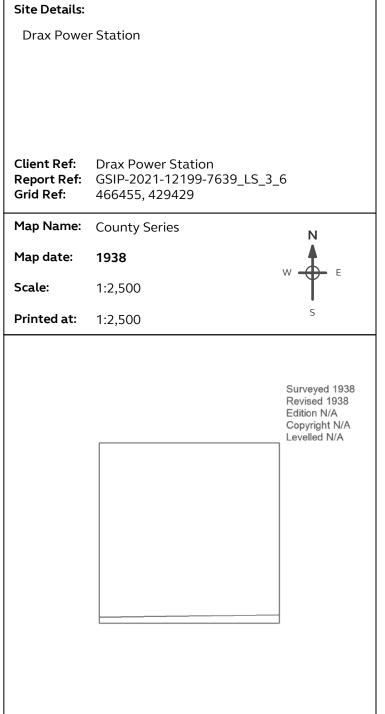


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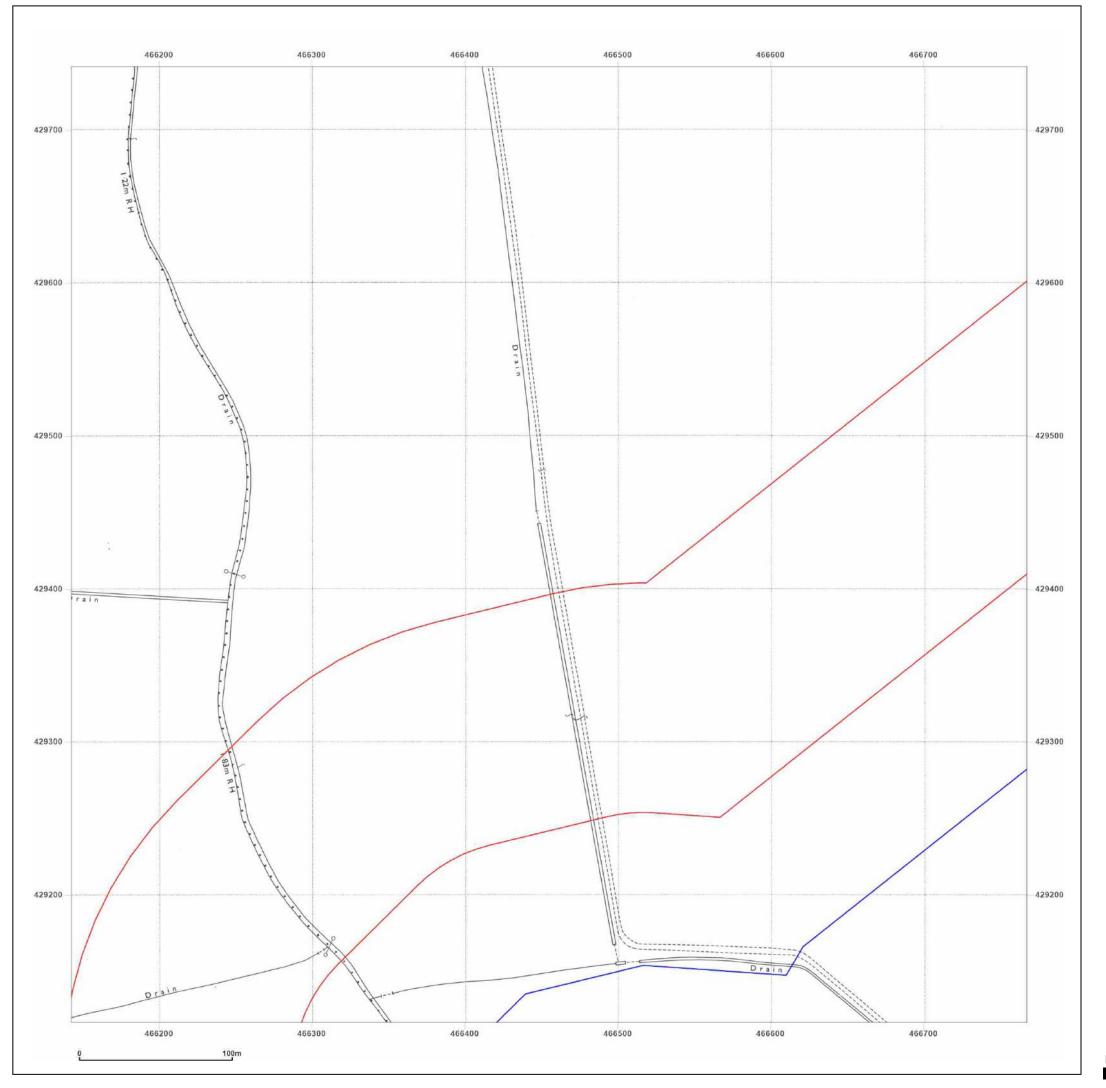




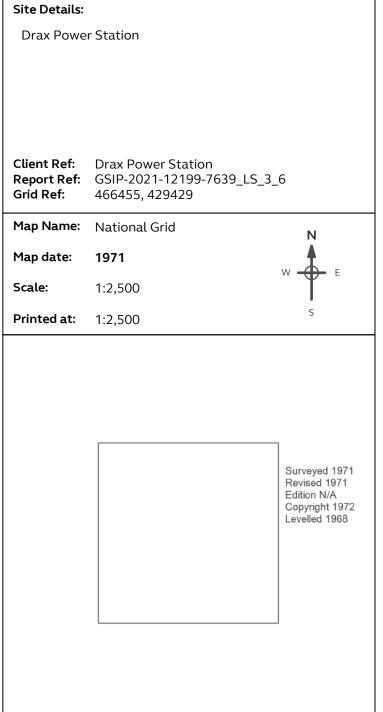


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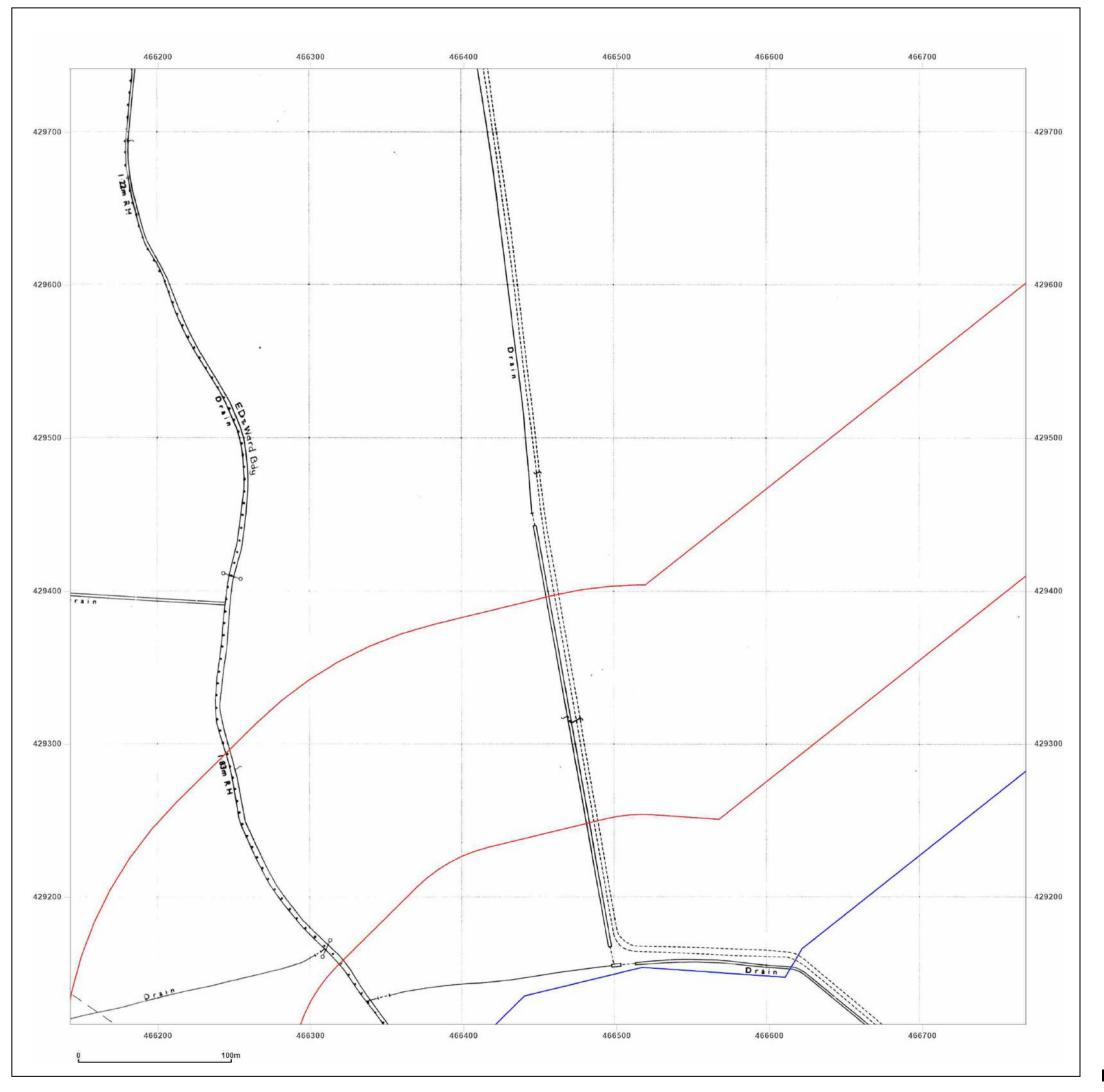




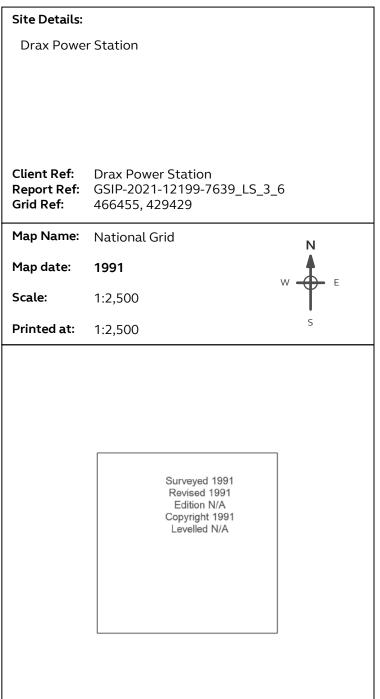


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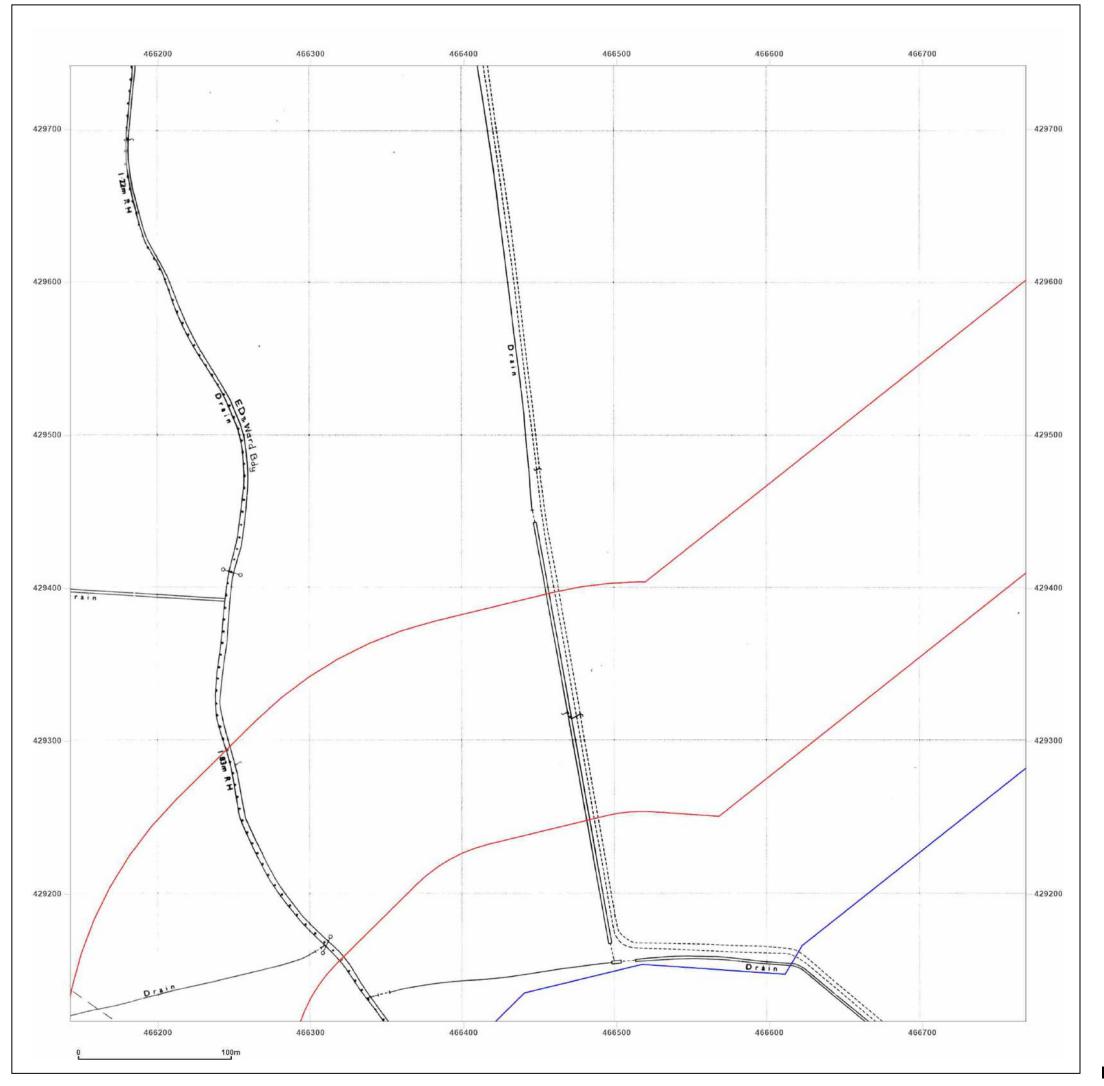




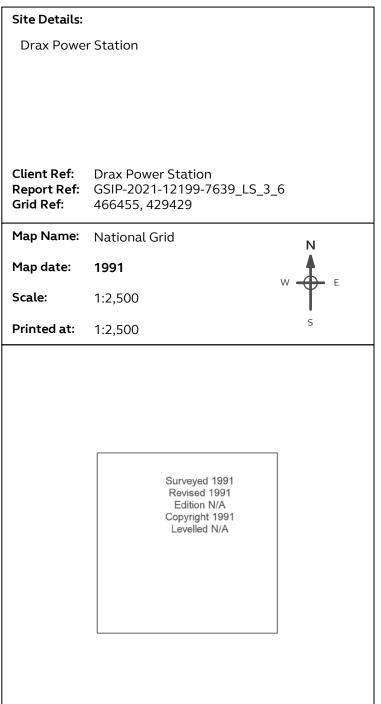


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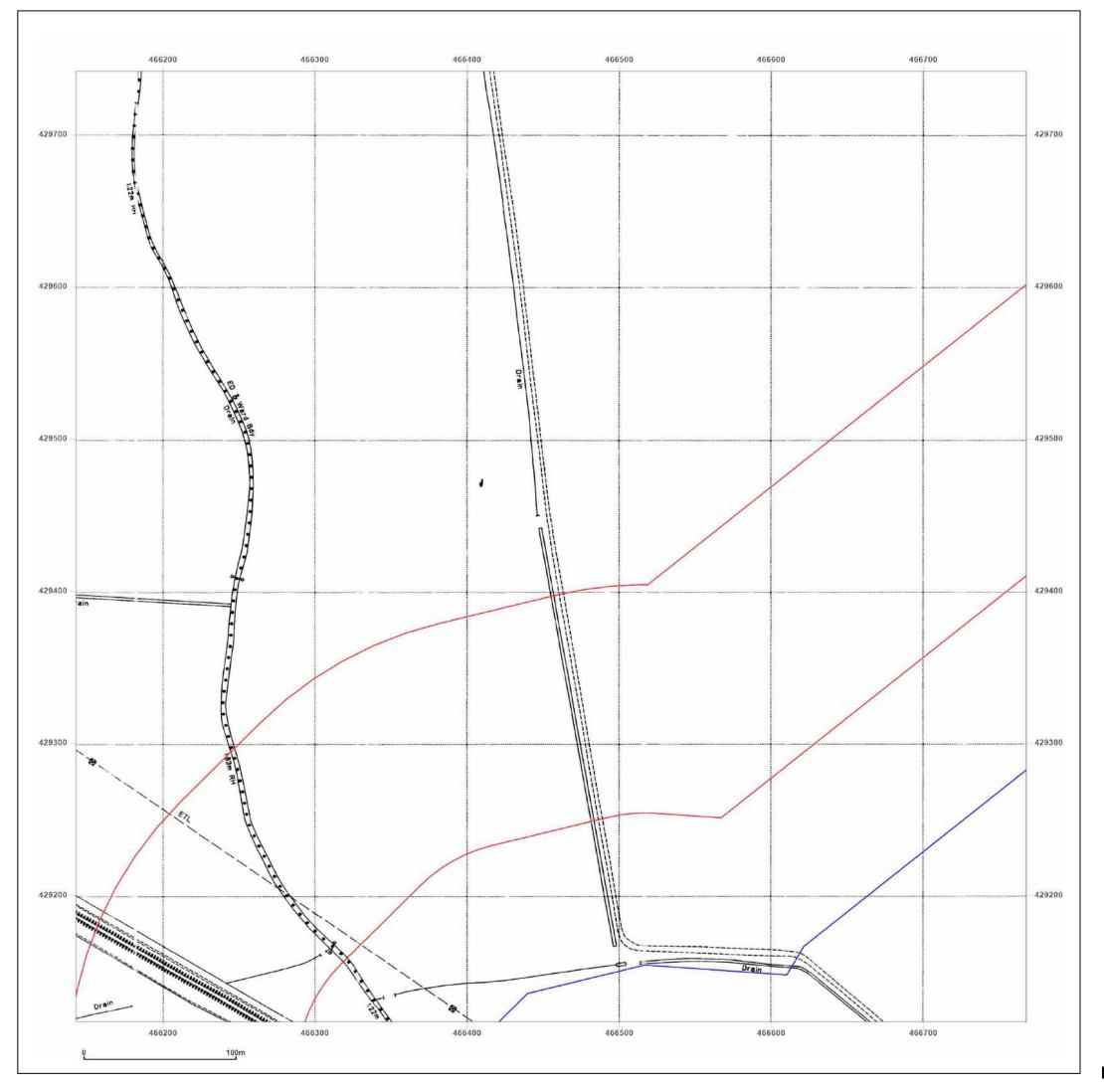




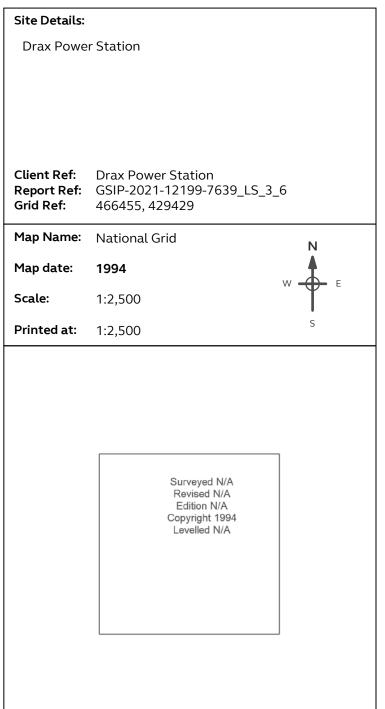


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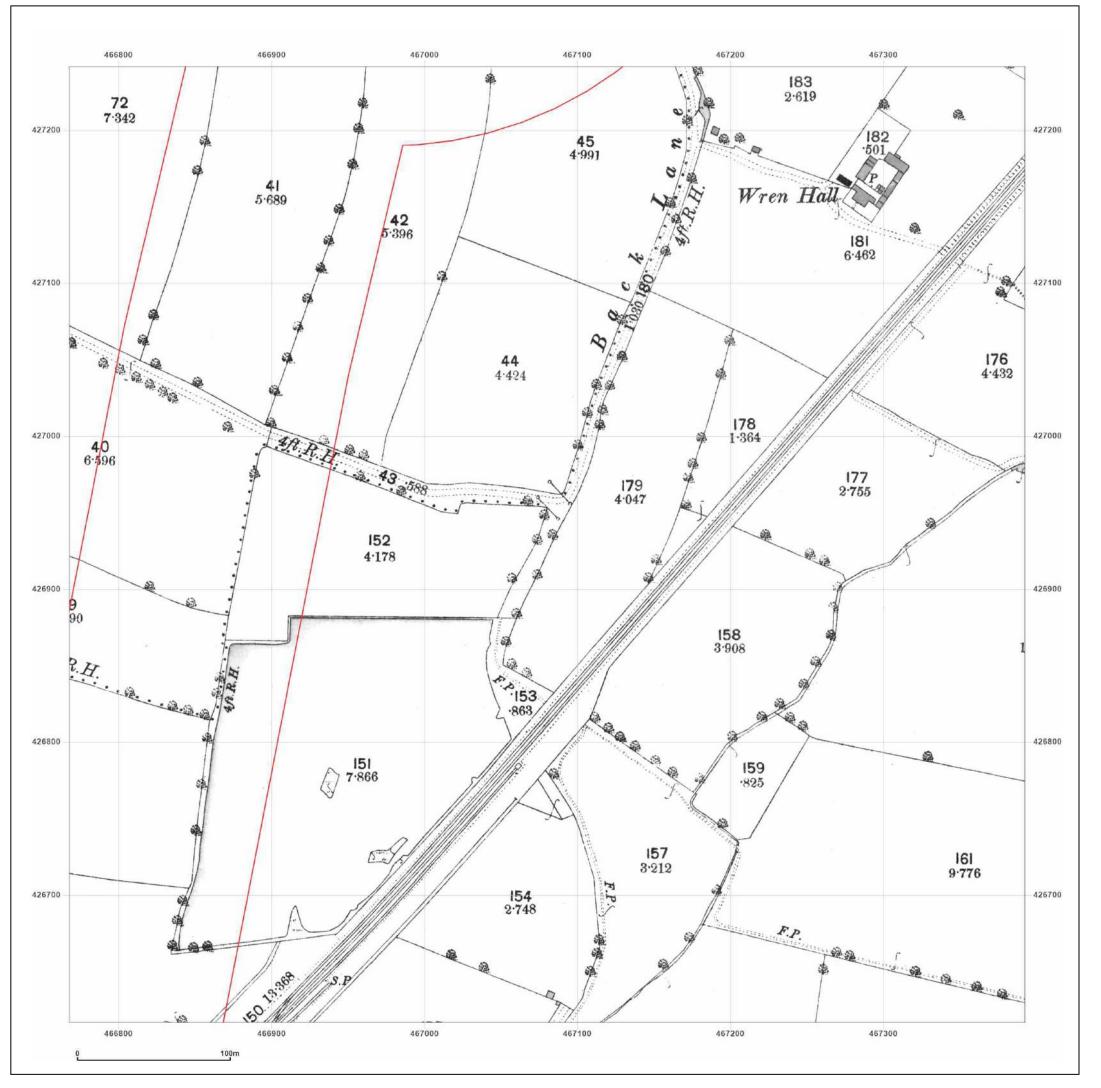




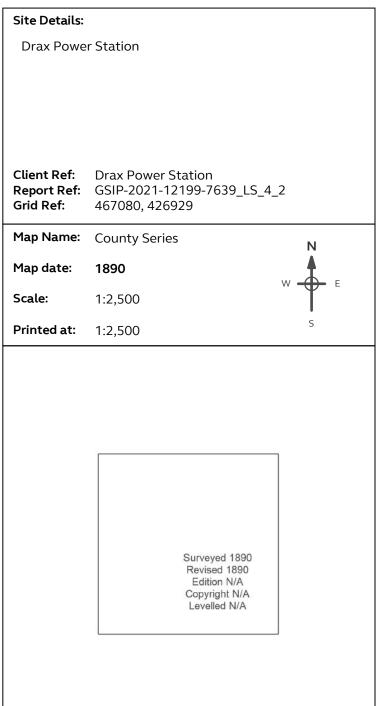


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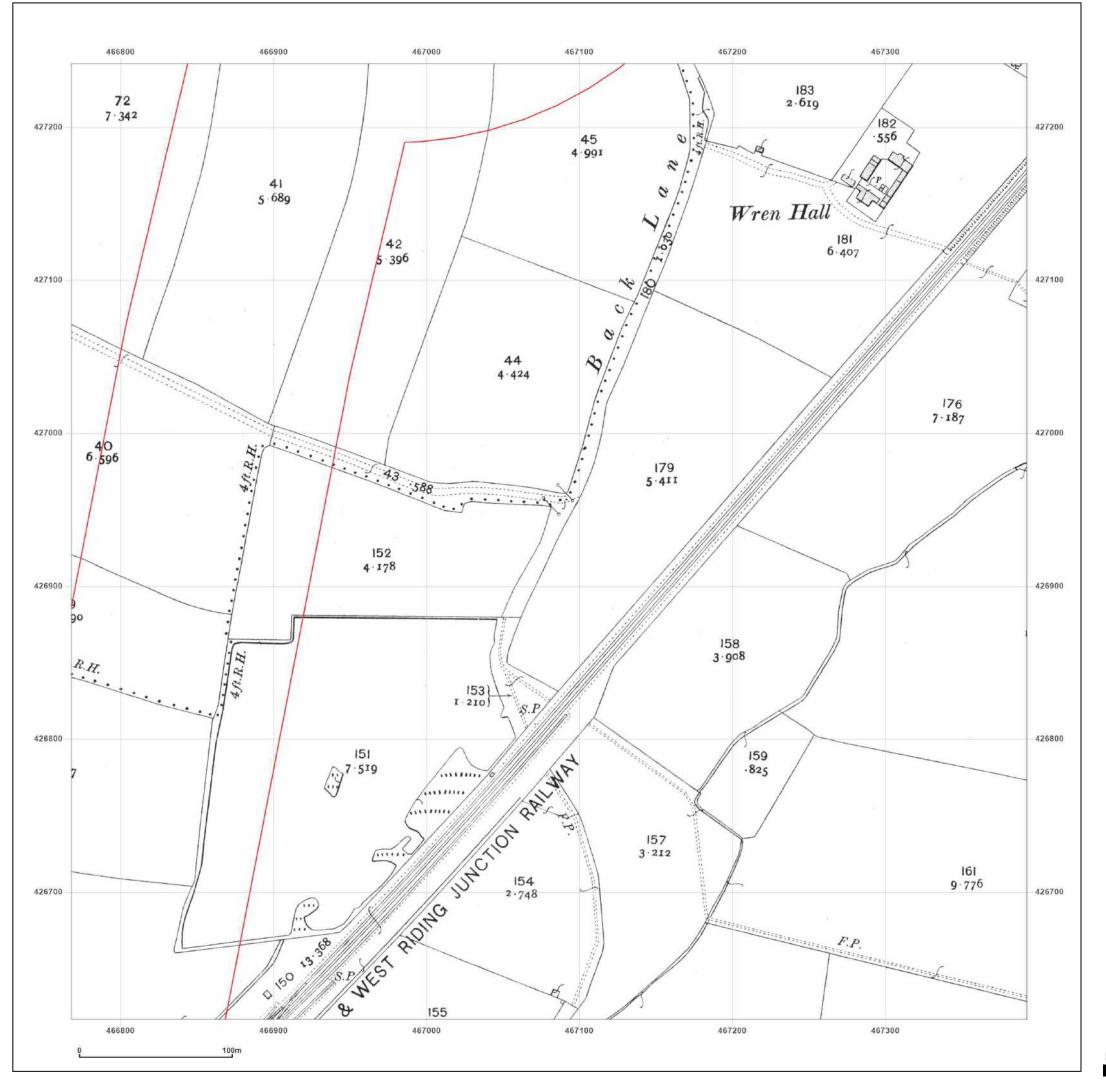




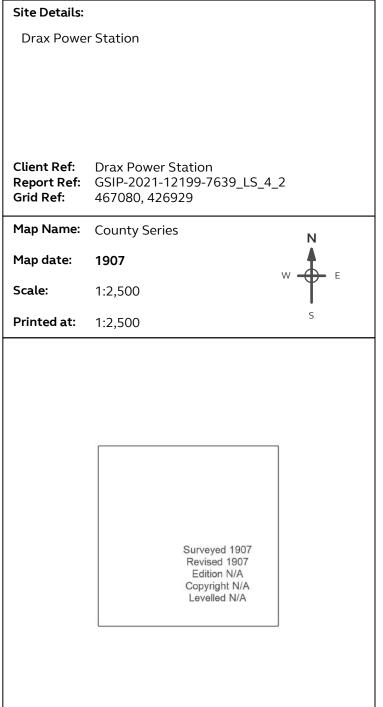


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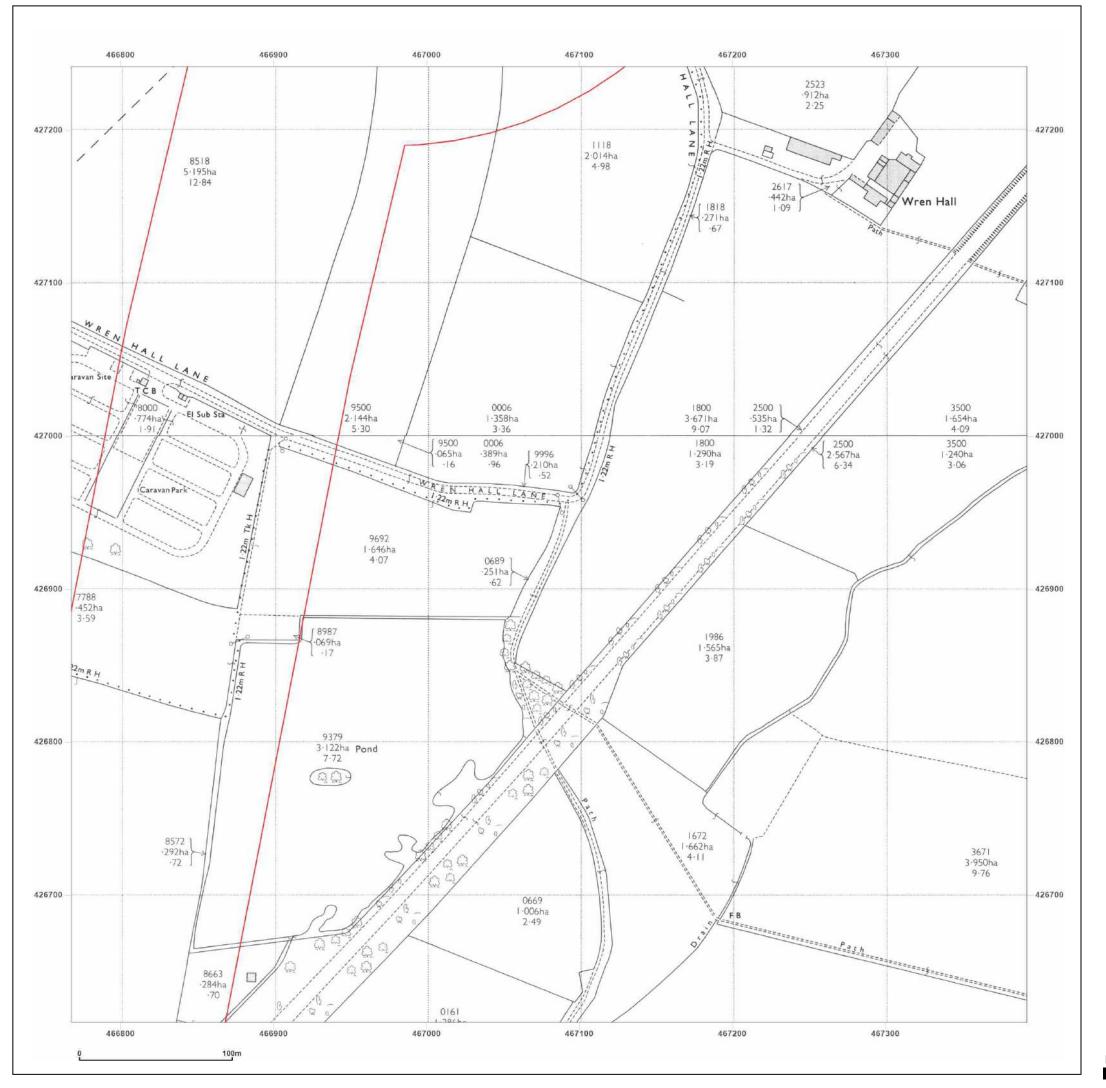




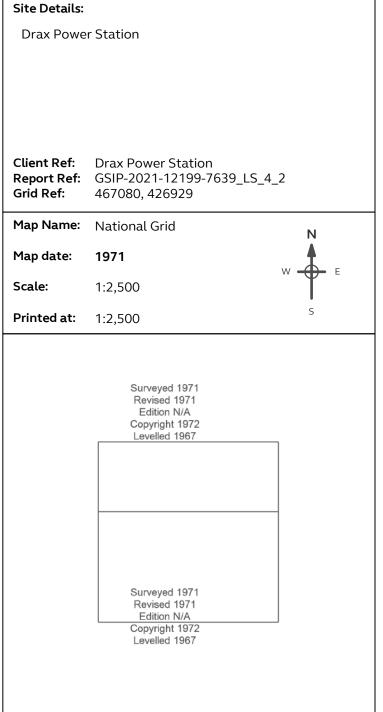


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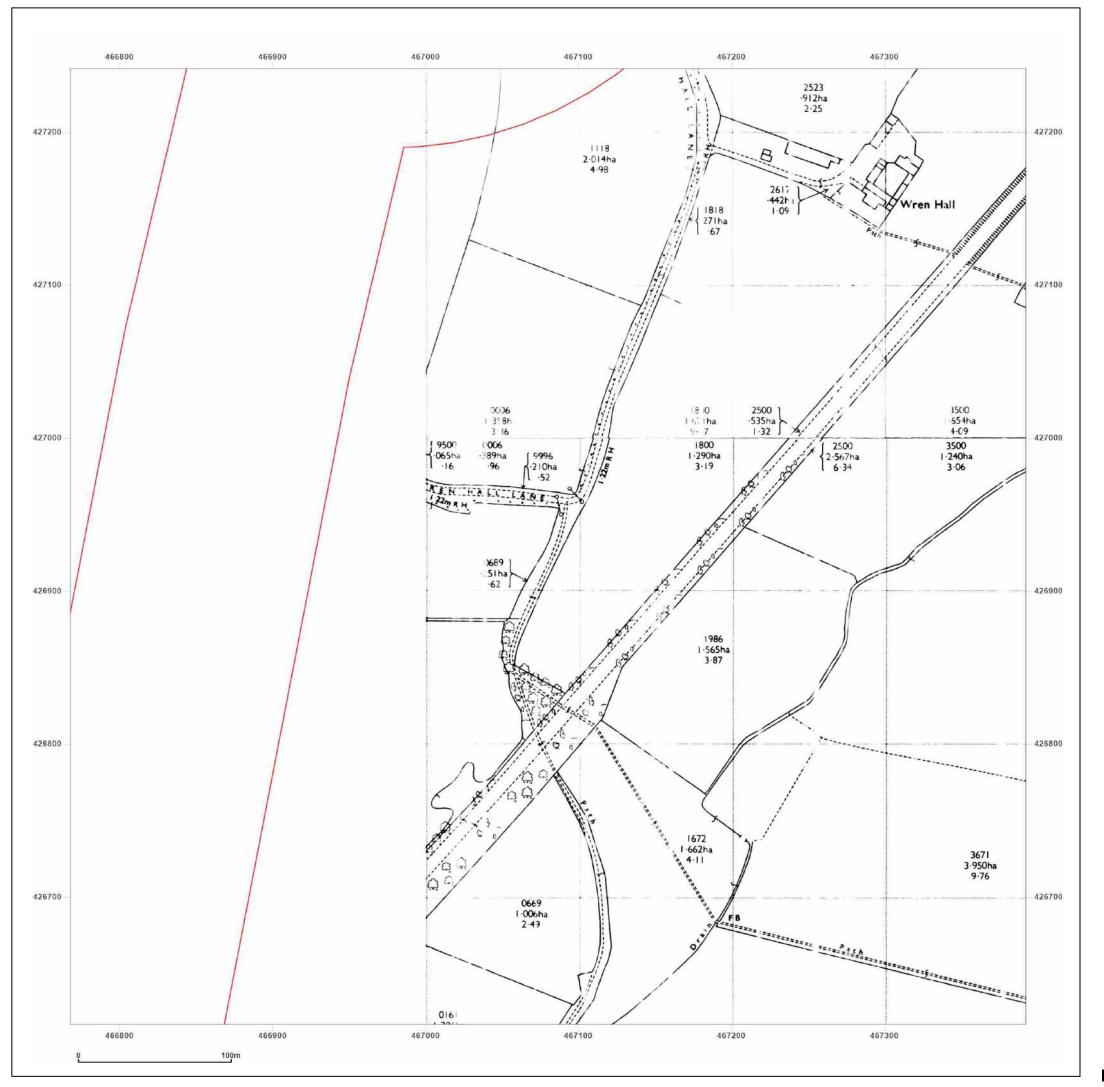




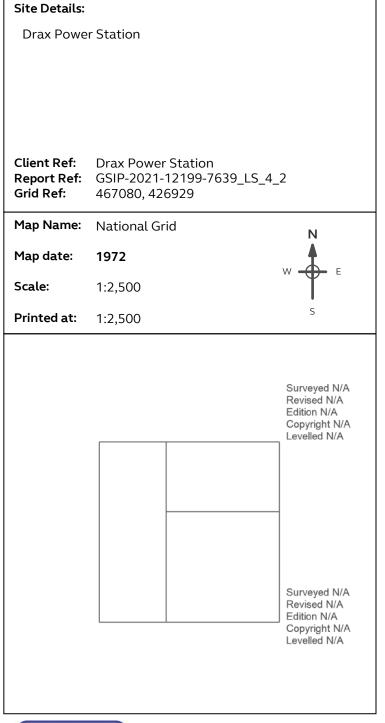


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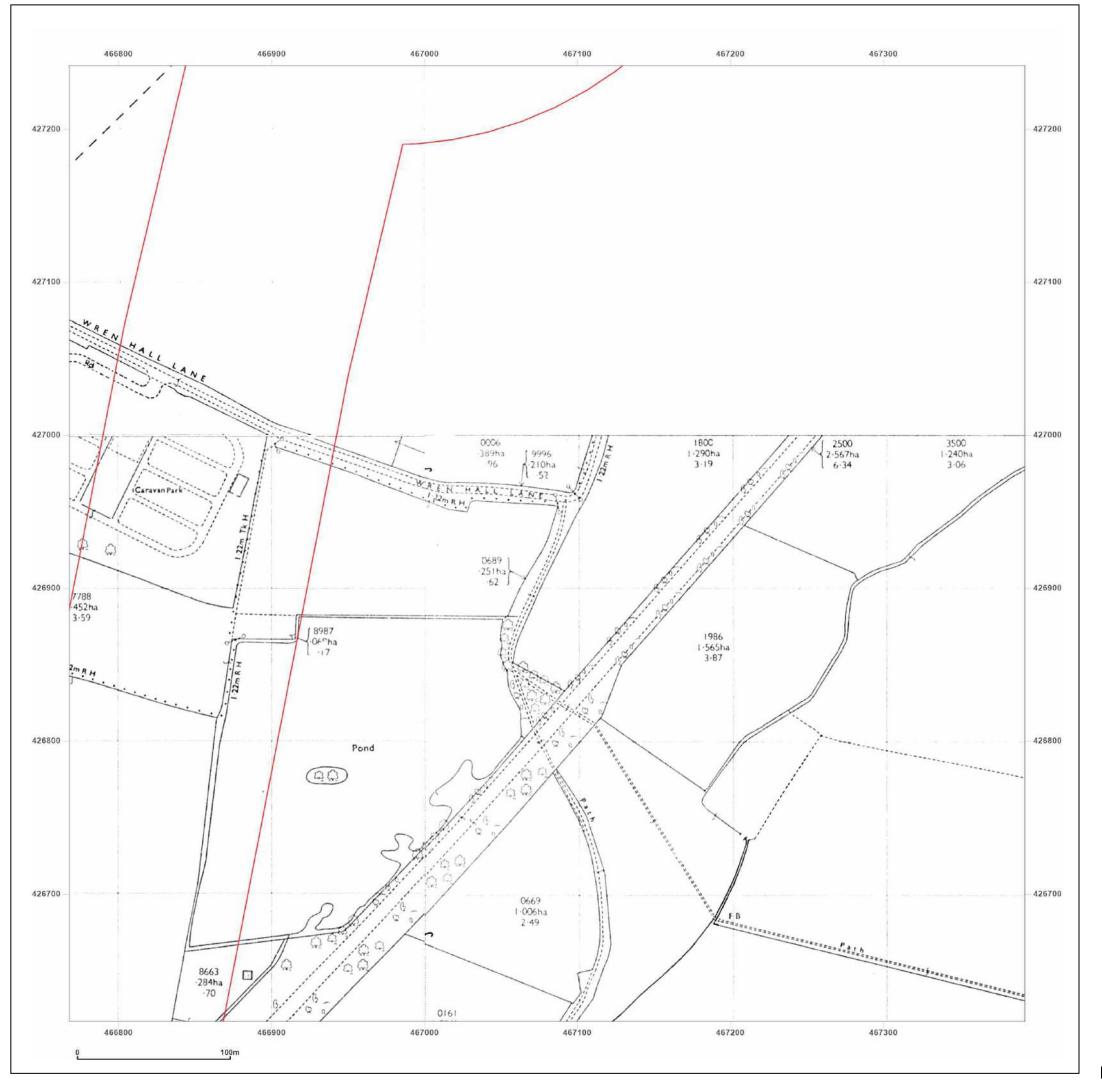




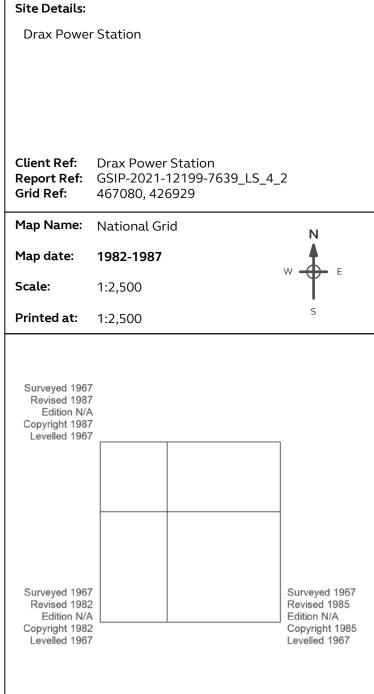


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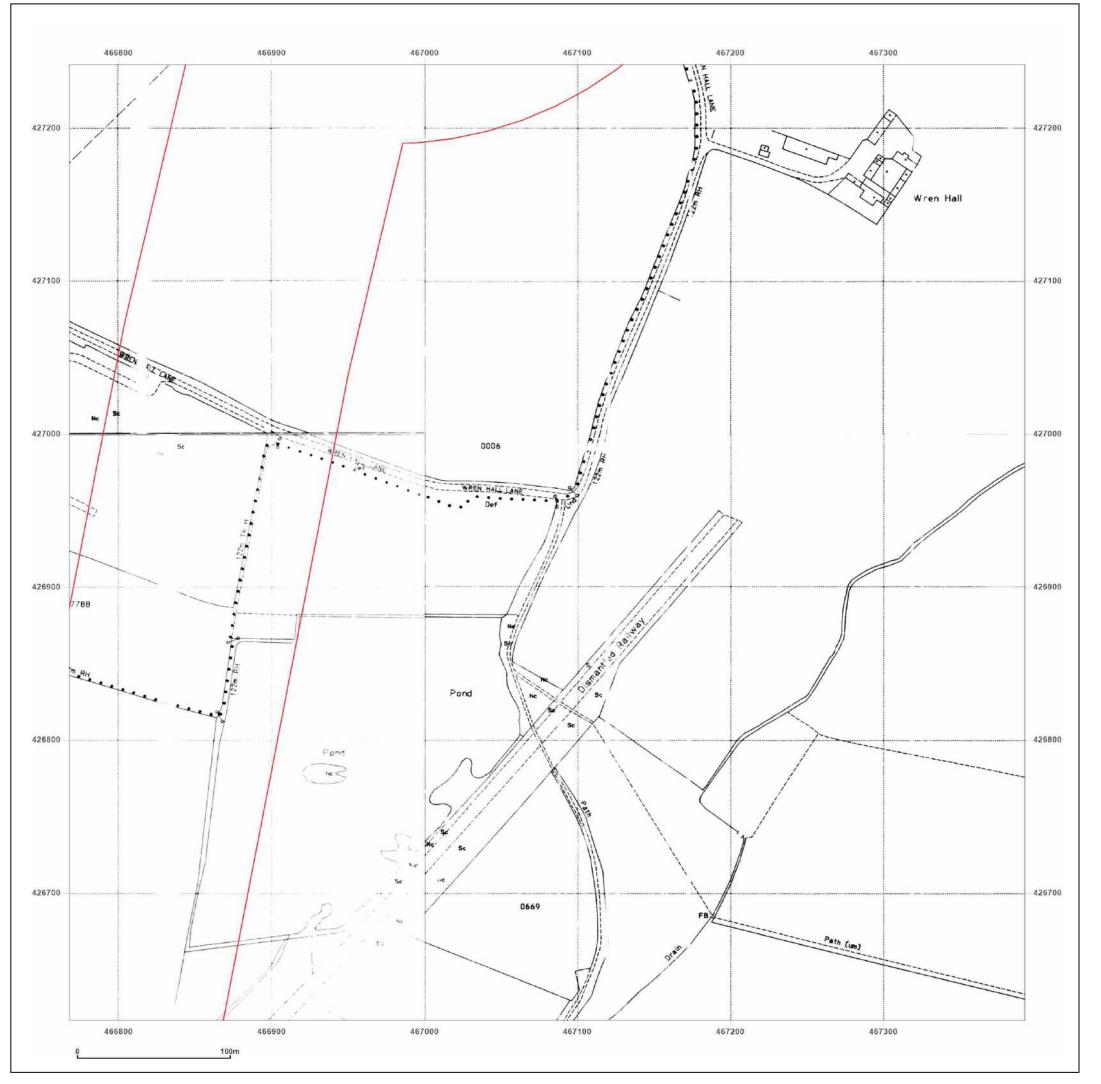




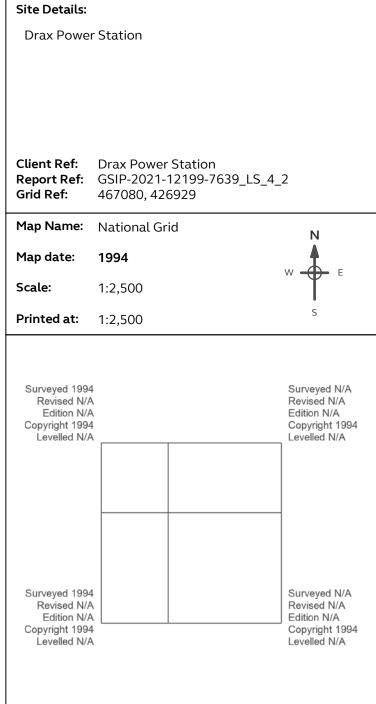


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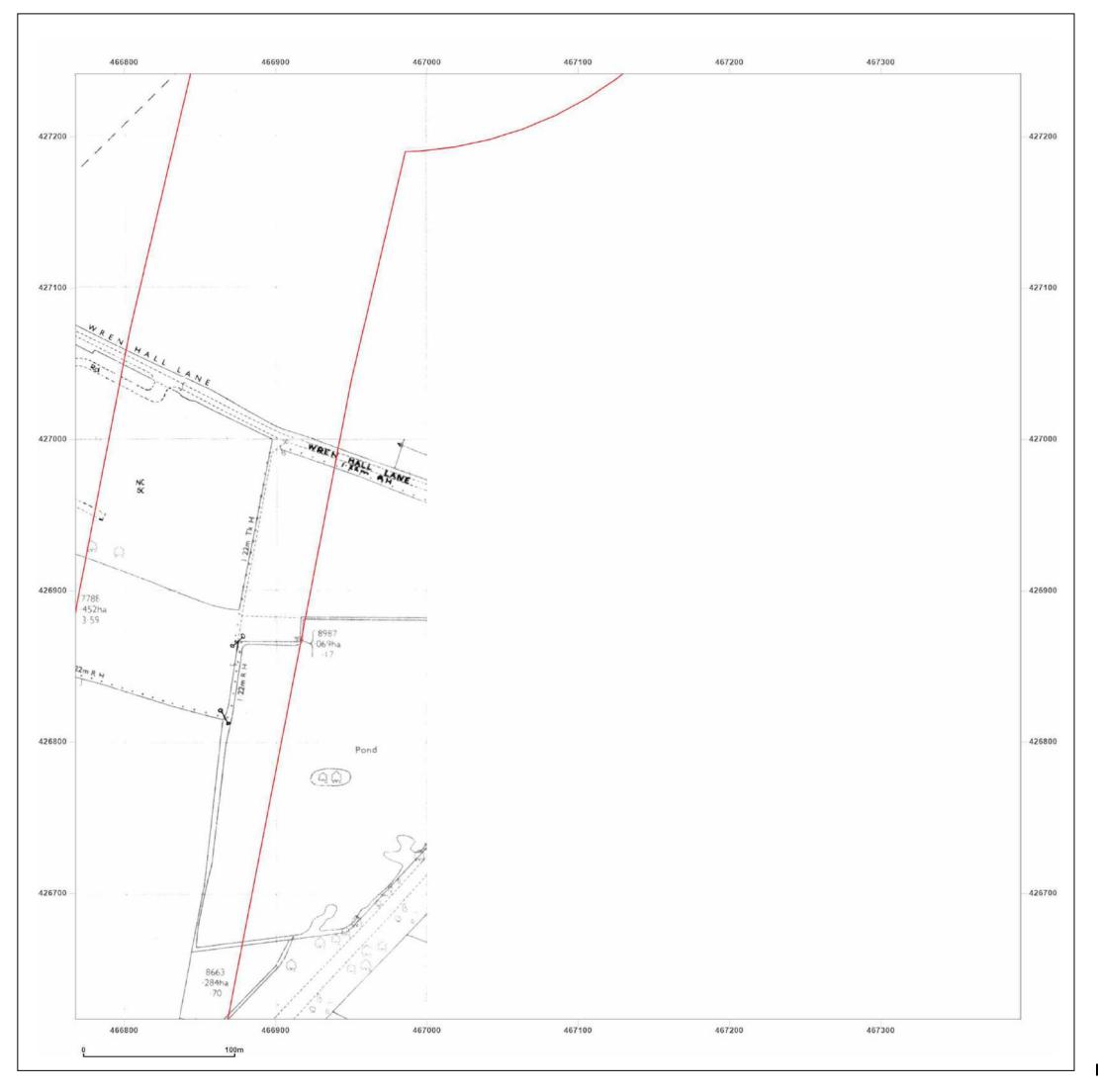






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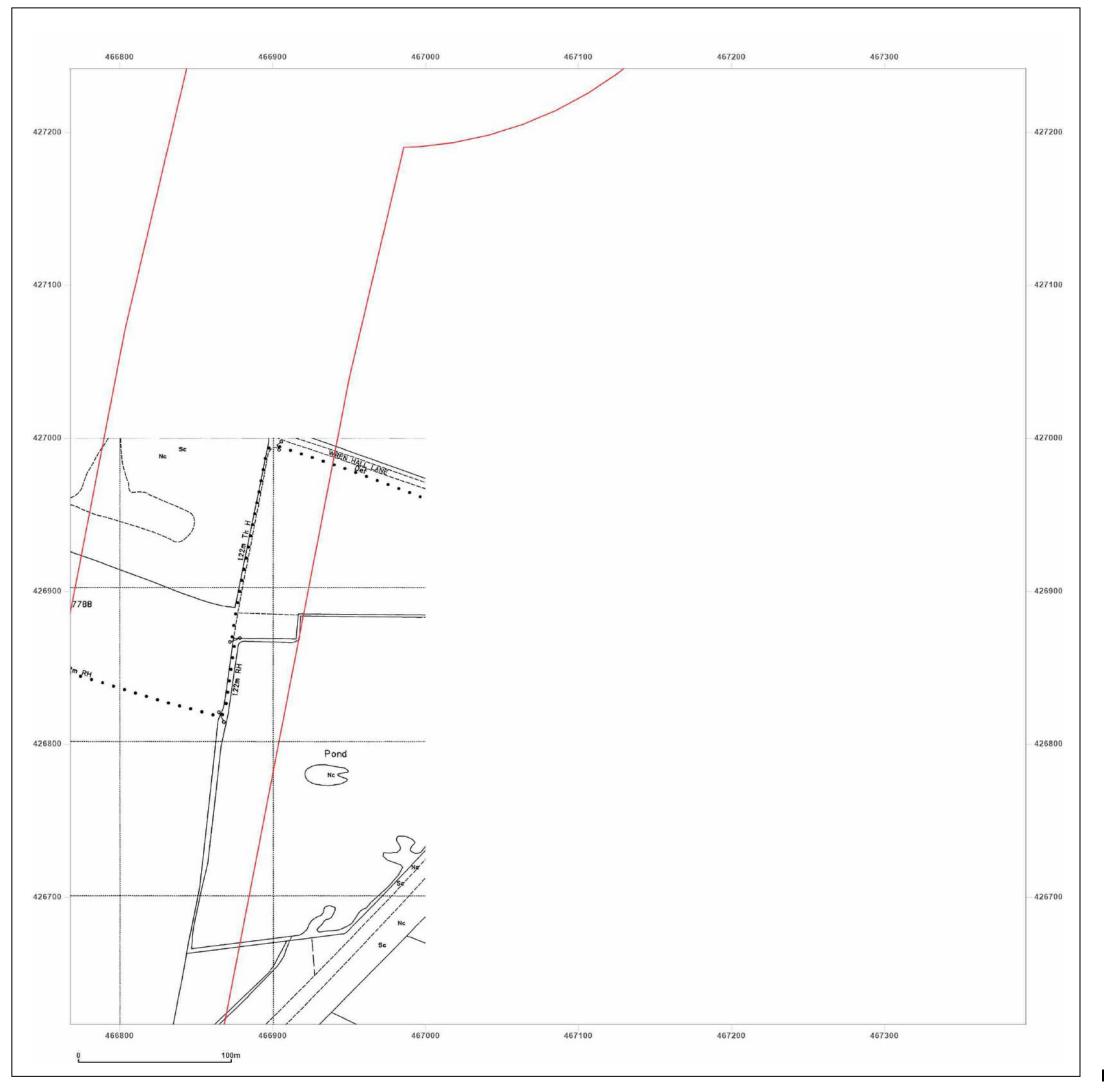


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Map Name:	National Grid N	
Map date:	1994	
Scale:	1:2,500	
Printed at:	1:2,500 S	
Surveyed N/A Revised N/A Edition N/A Copyright 1994 Levelled 1967	A A	
Surveyed N/A Revised N/A Edition N/A Copyright 1994 Levelled 1967		

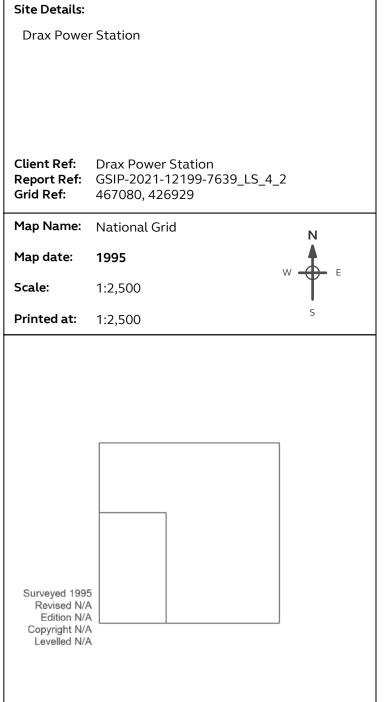


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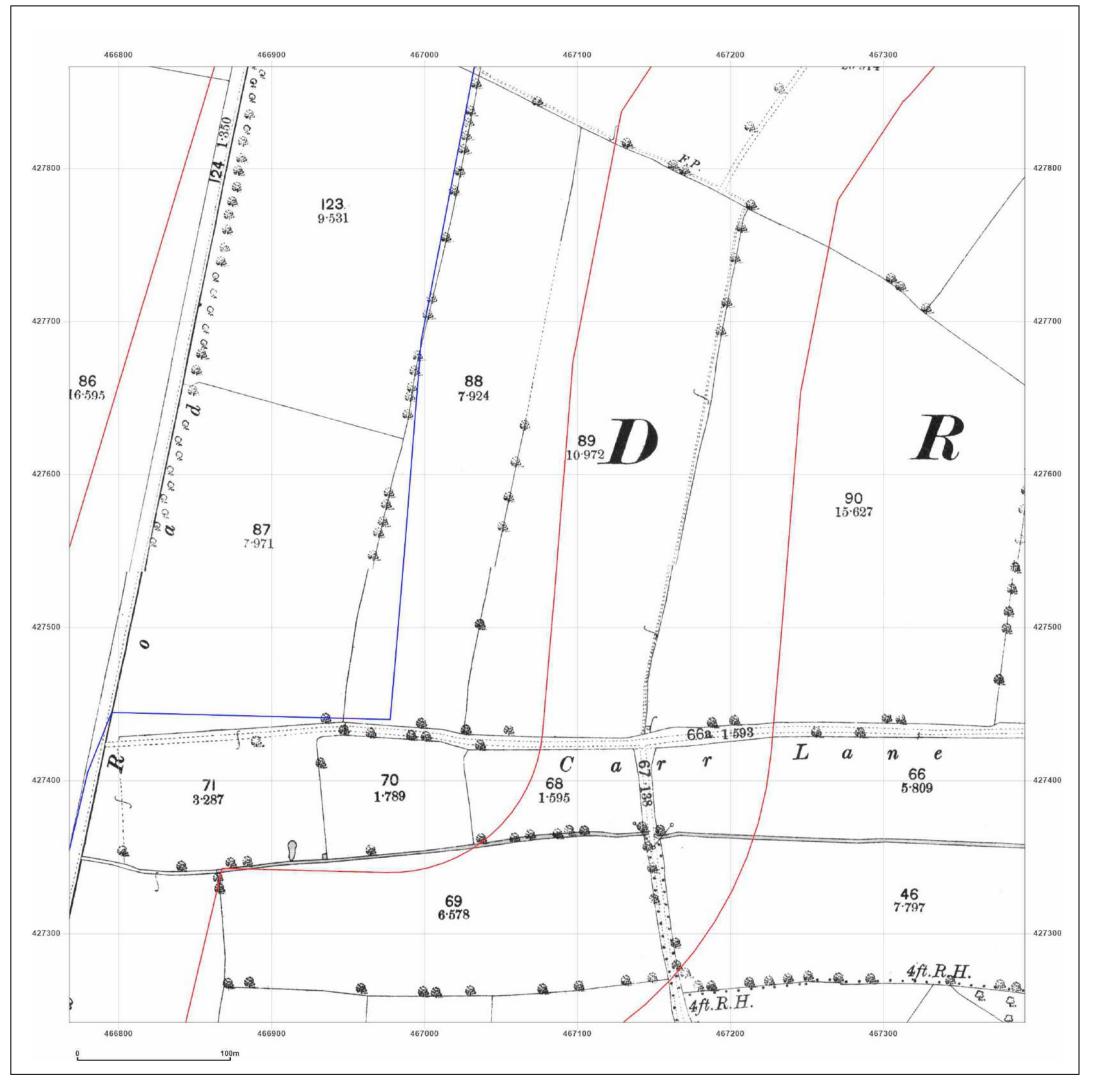




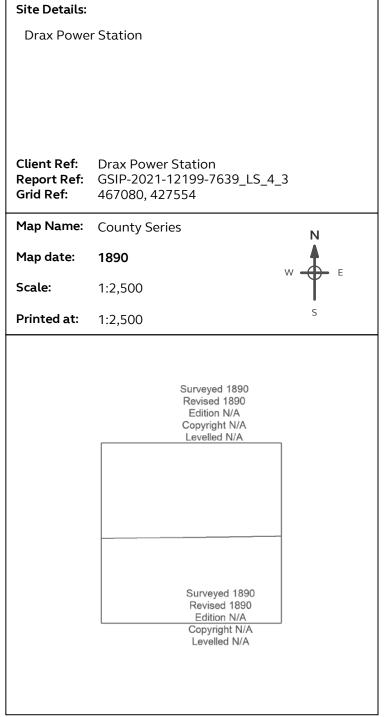


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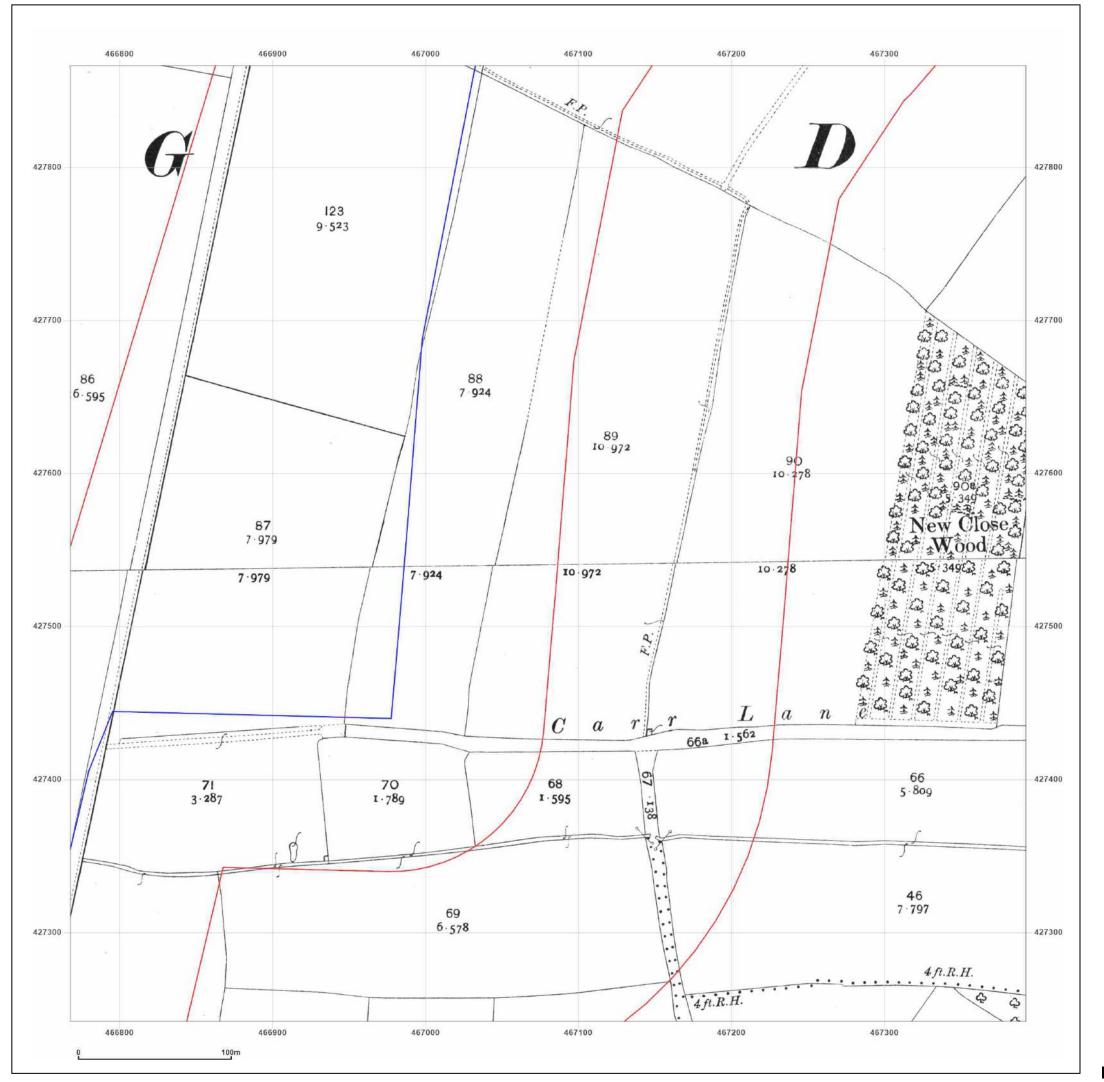




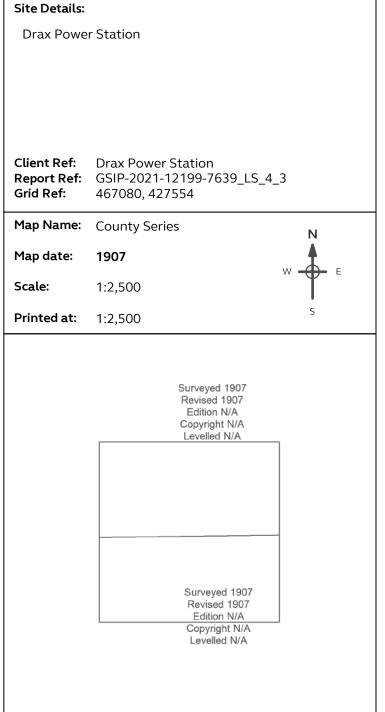


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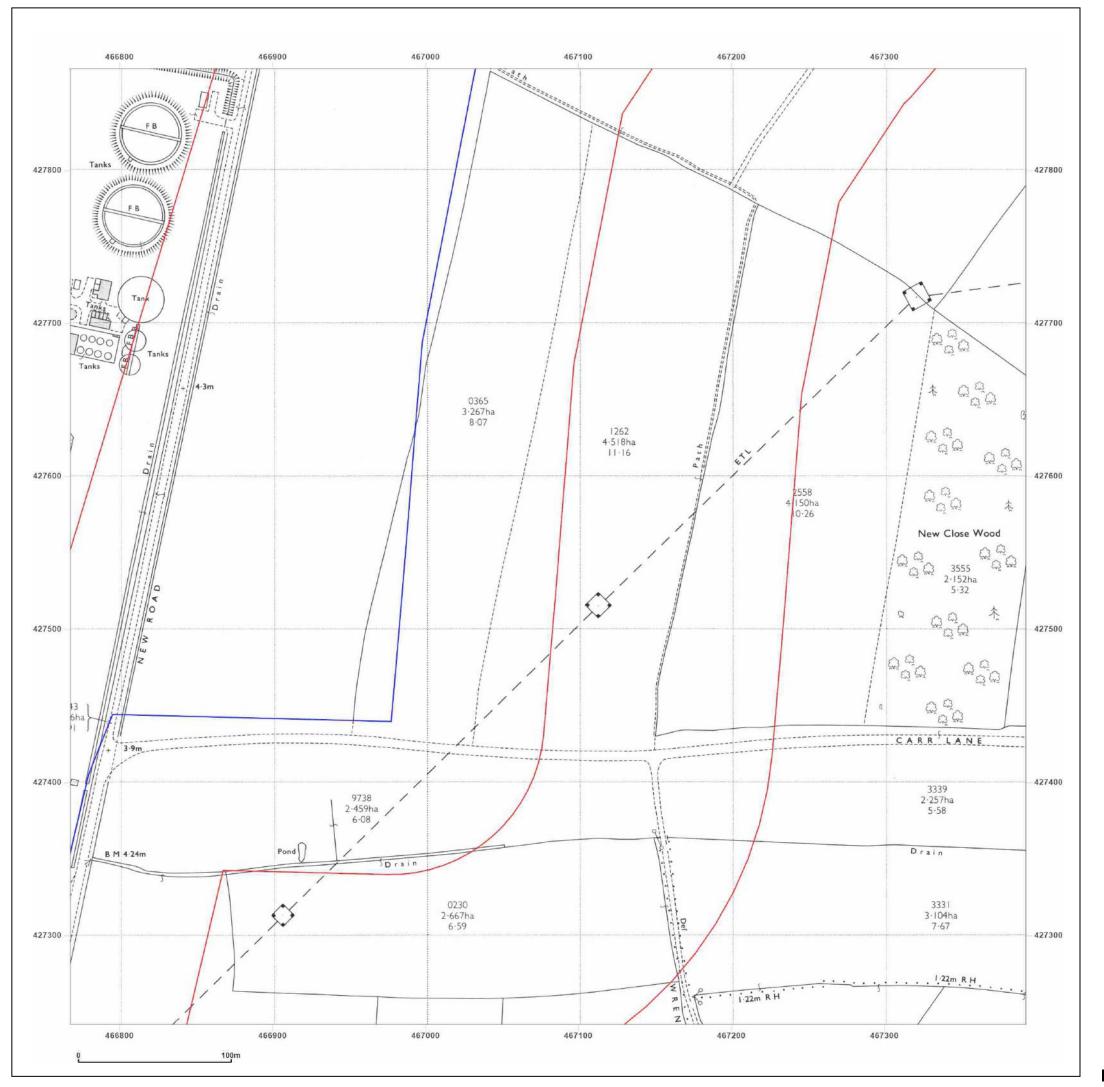




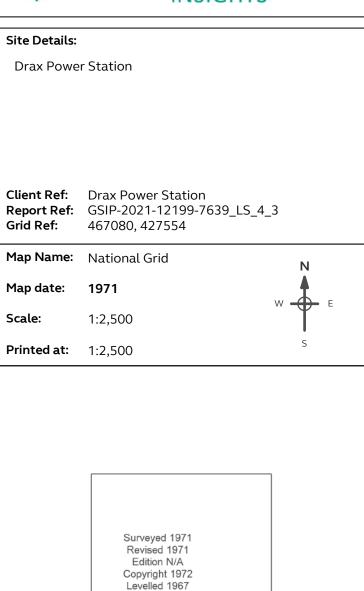


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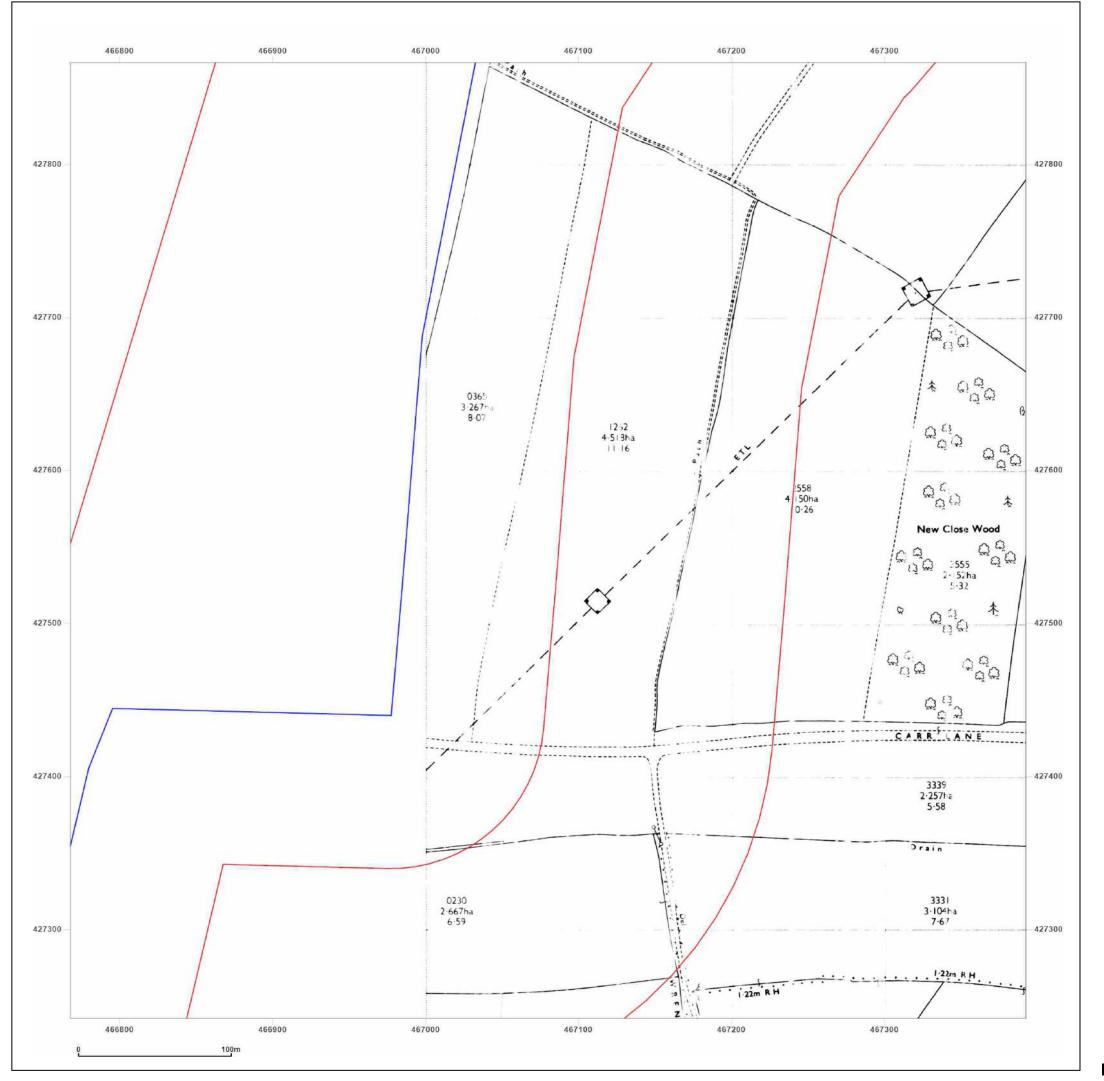




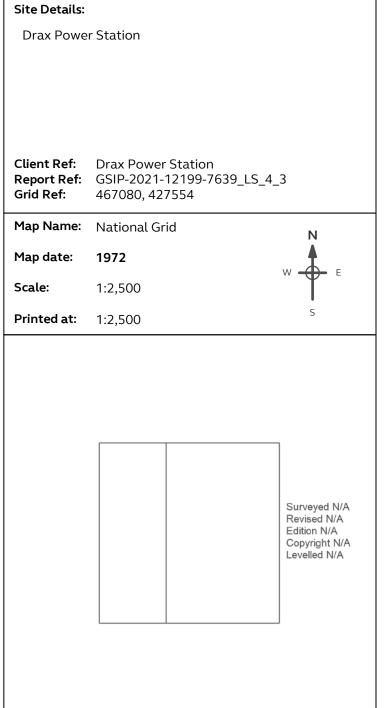


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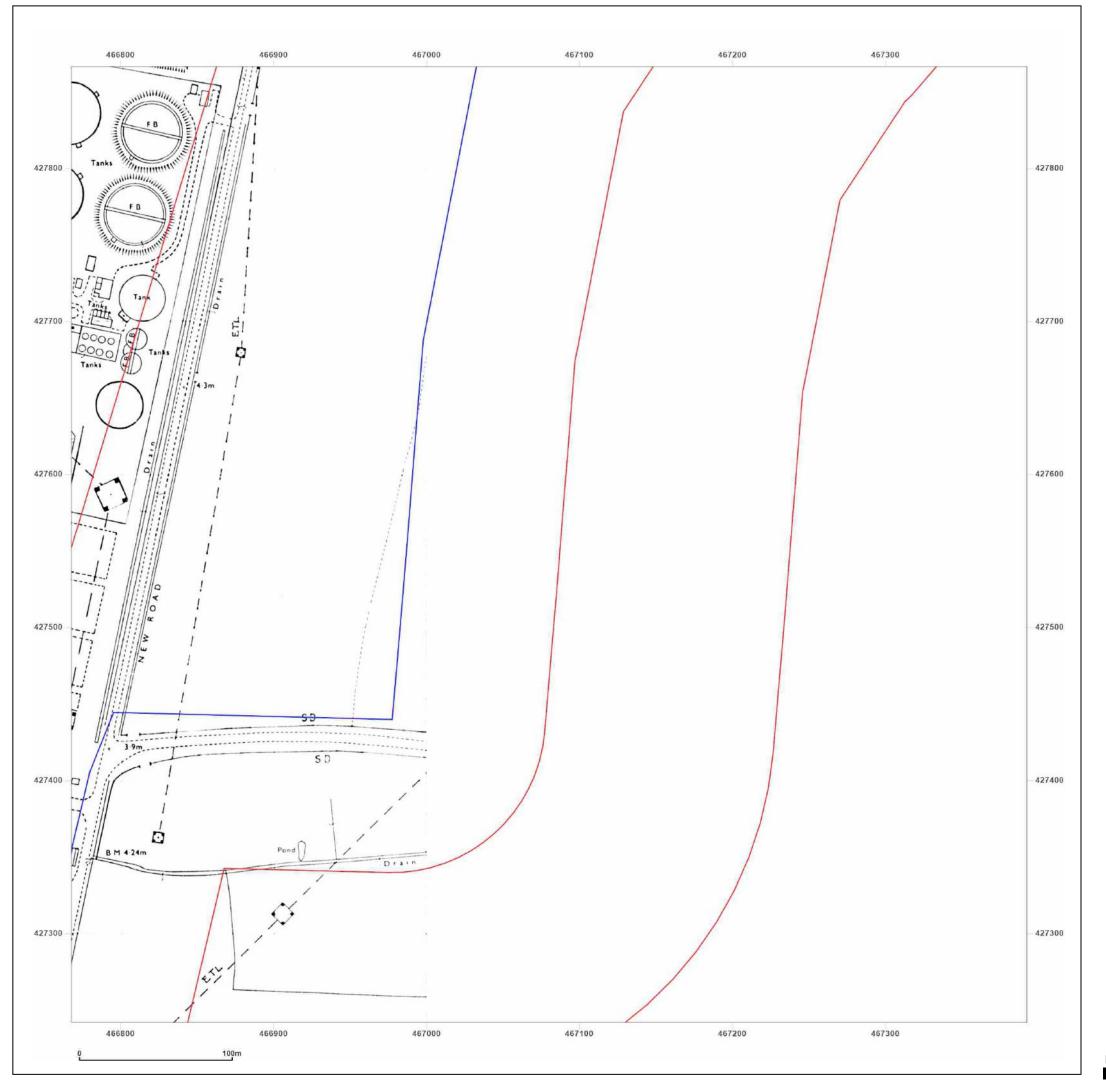






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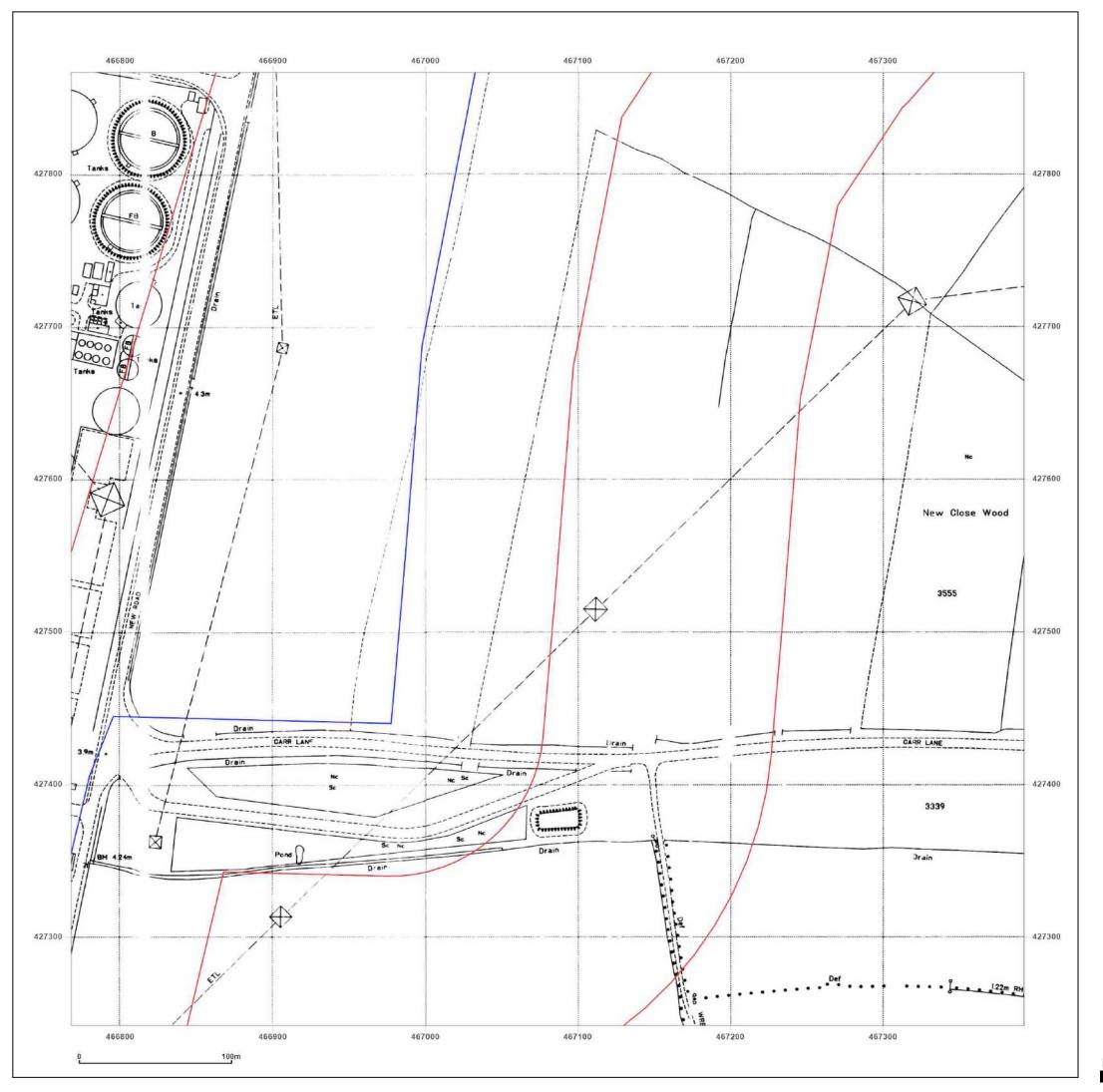


Site Details:	
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Map date:	1987
Scale:	1:2,500
Printed at:	1:2,500 S
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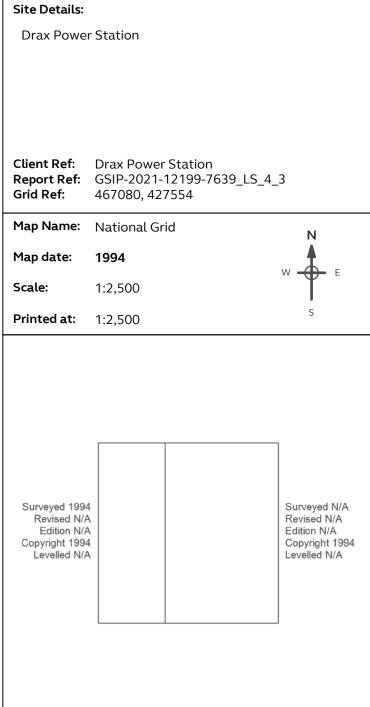


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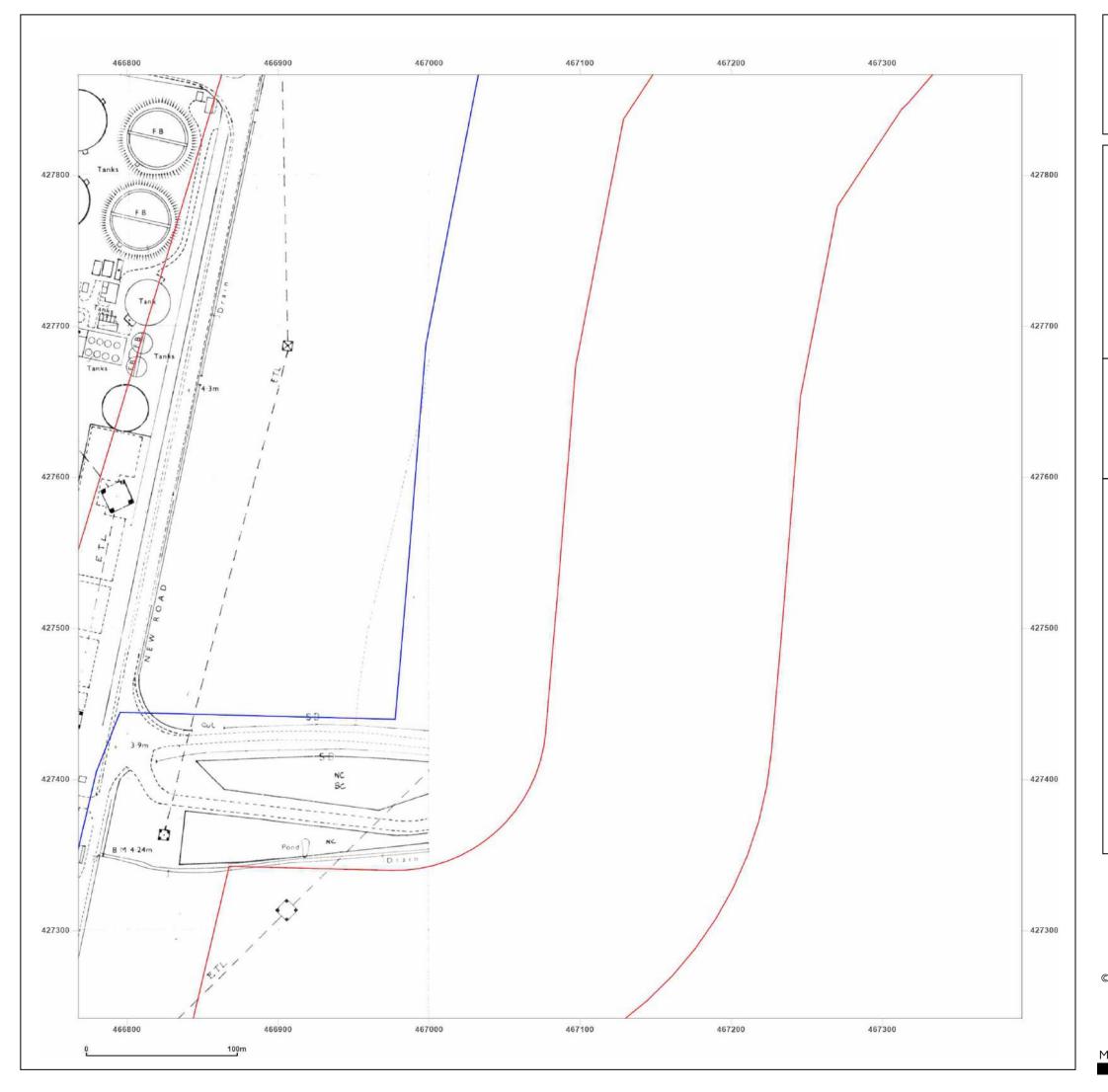






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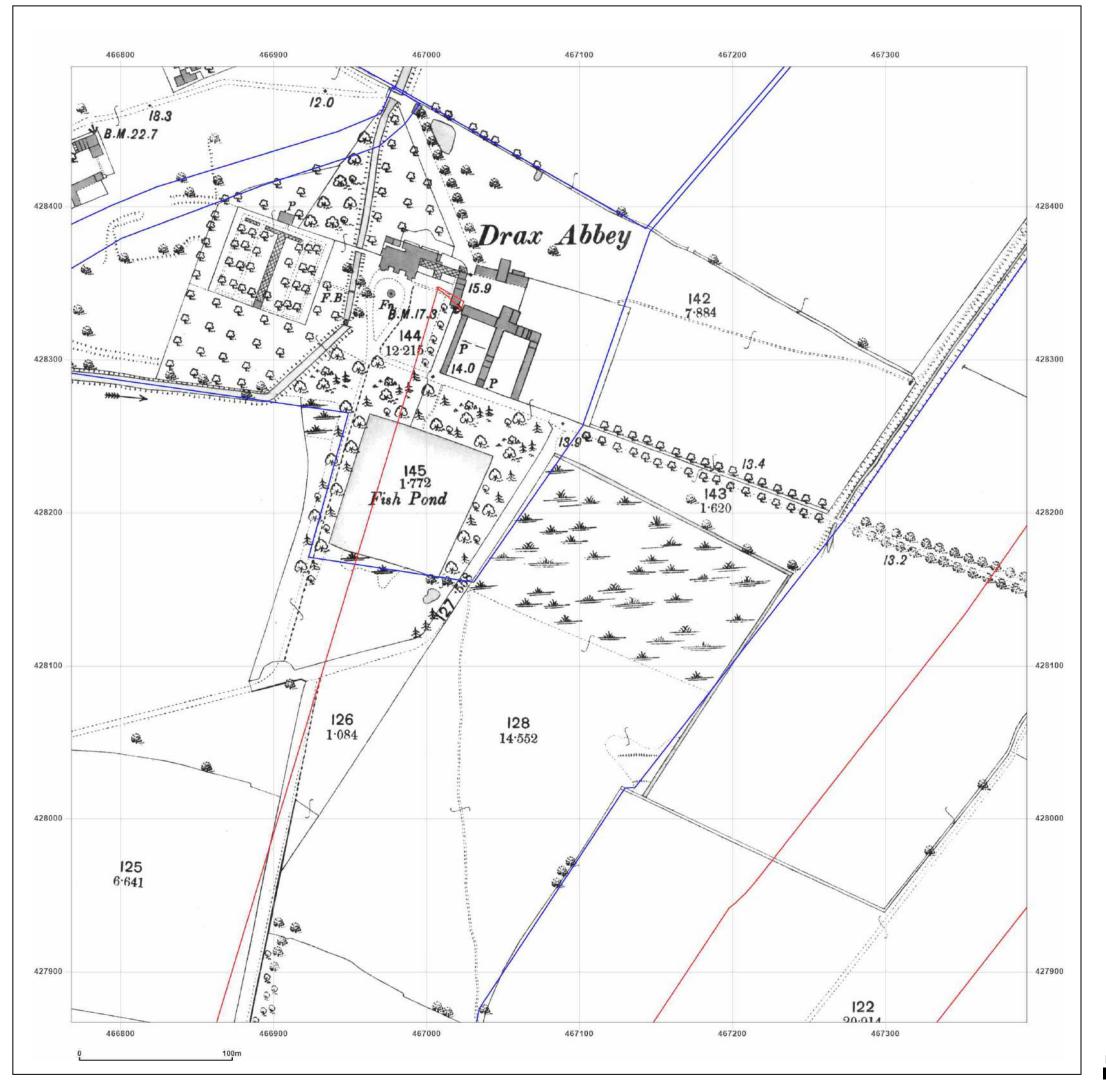


Site Details:	
Drax Powe	Station
Client Ref: Report Ref: Grid Ref:	Drax Power Station GSIP-2021-12199-7639_LS_4_3 467080, 427554
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Map date:	1994
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Printed at:	1:2,500
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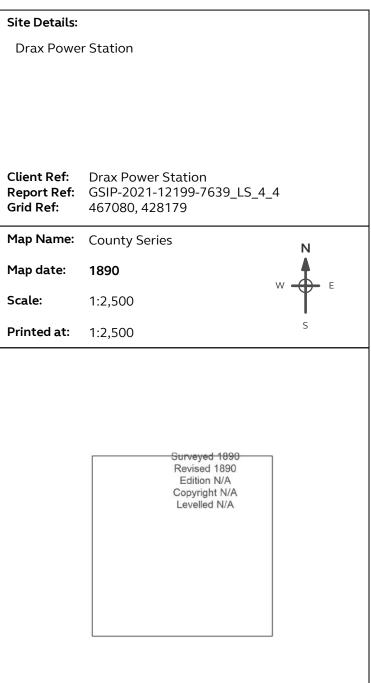


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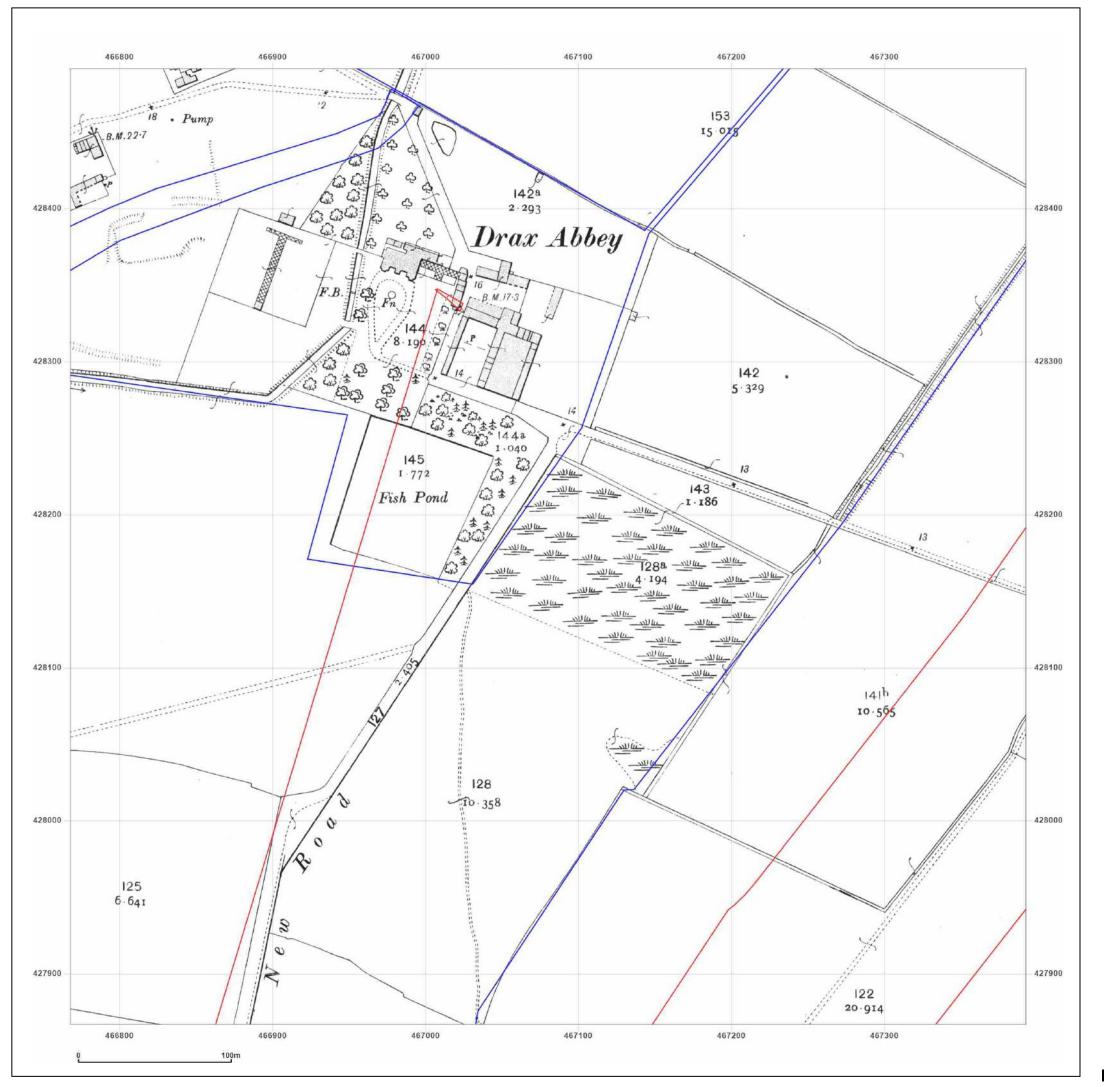




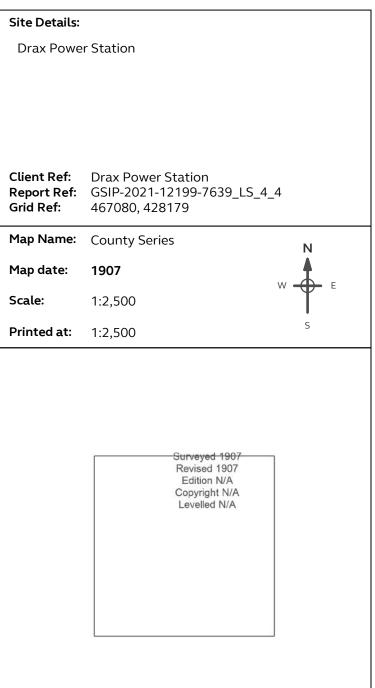


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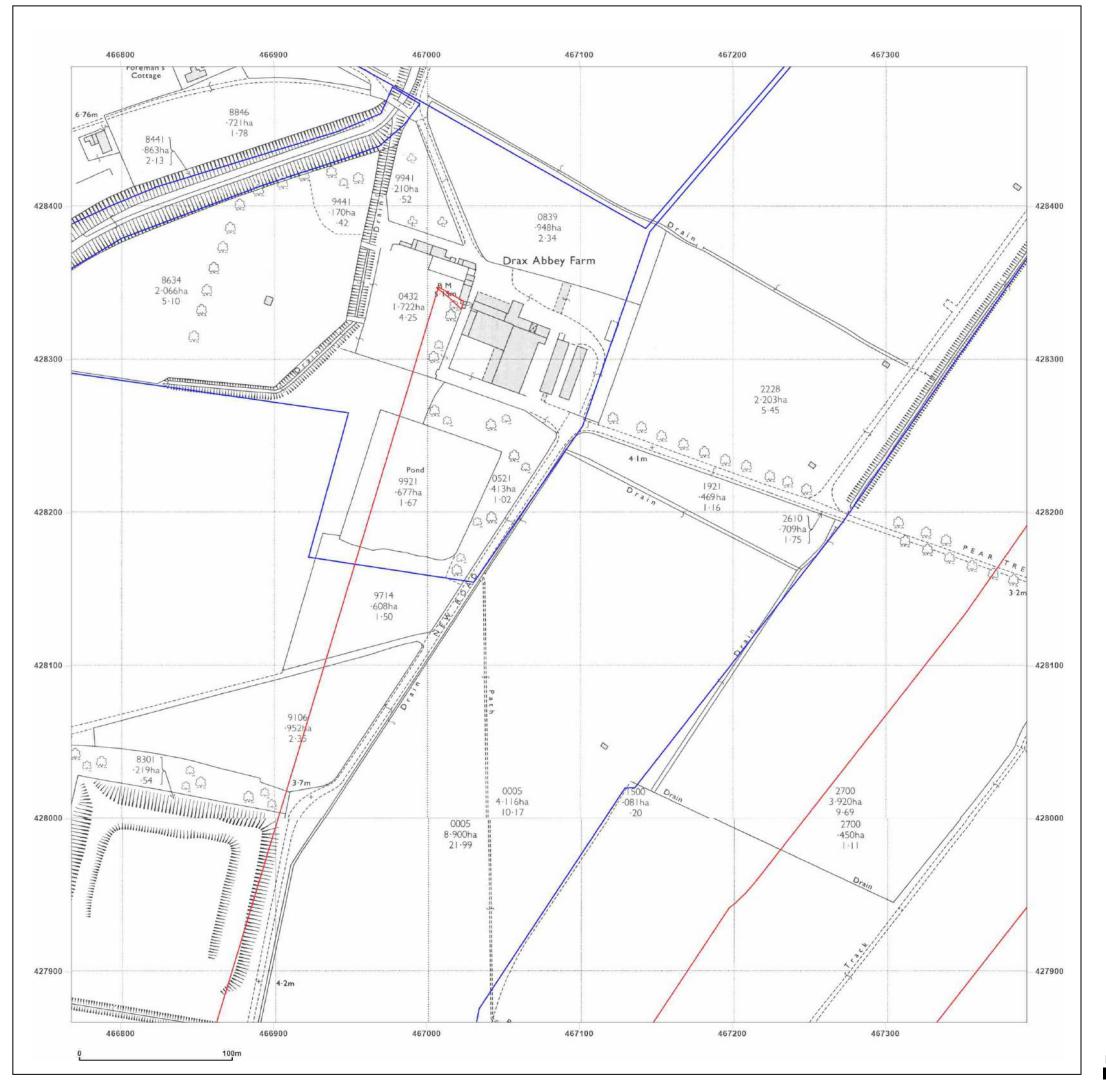




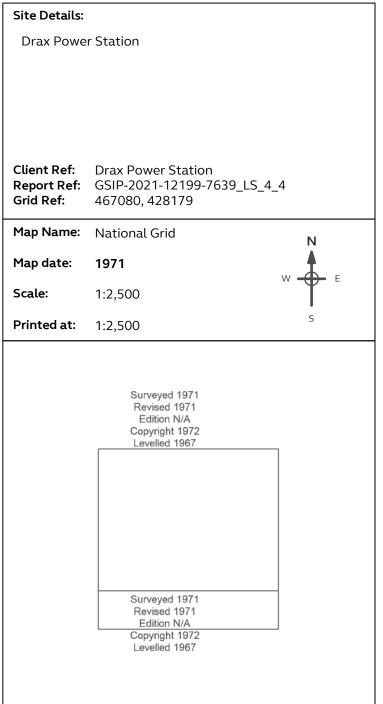


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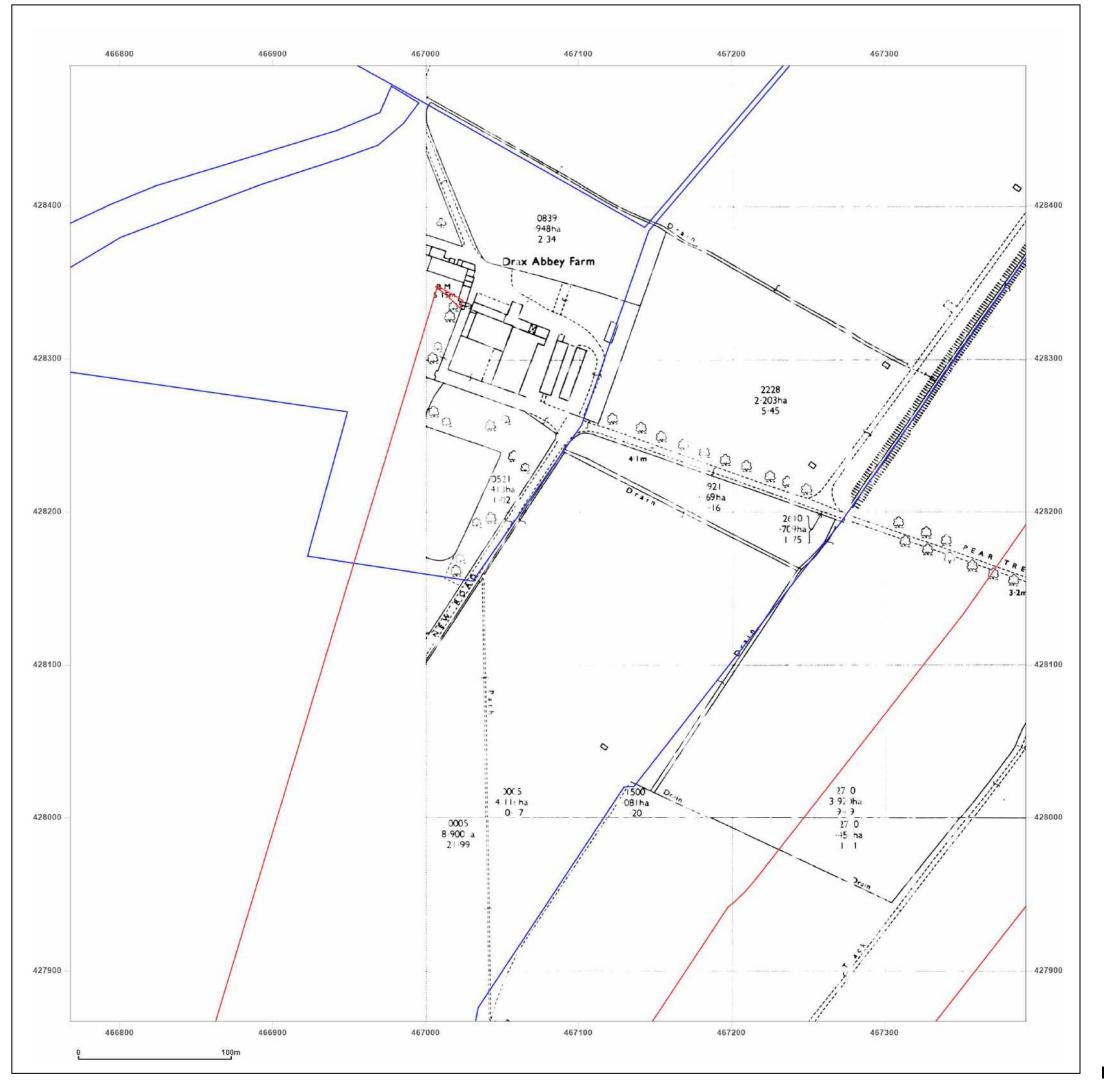






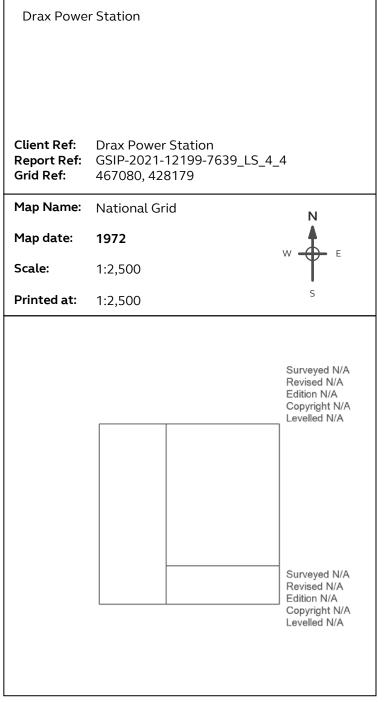
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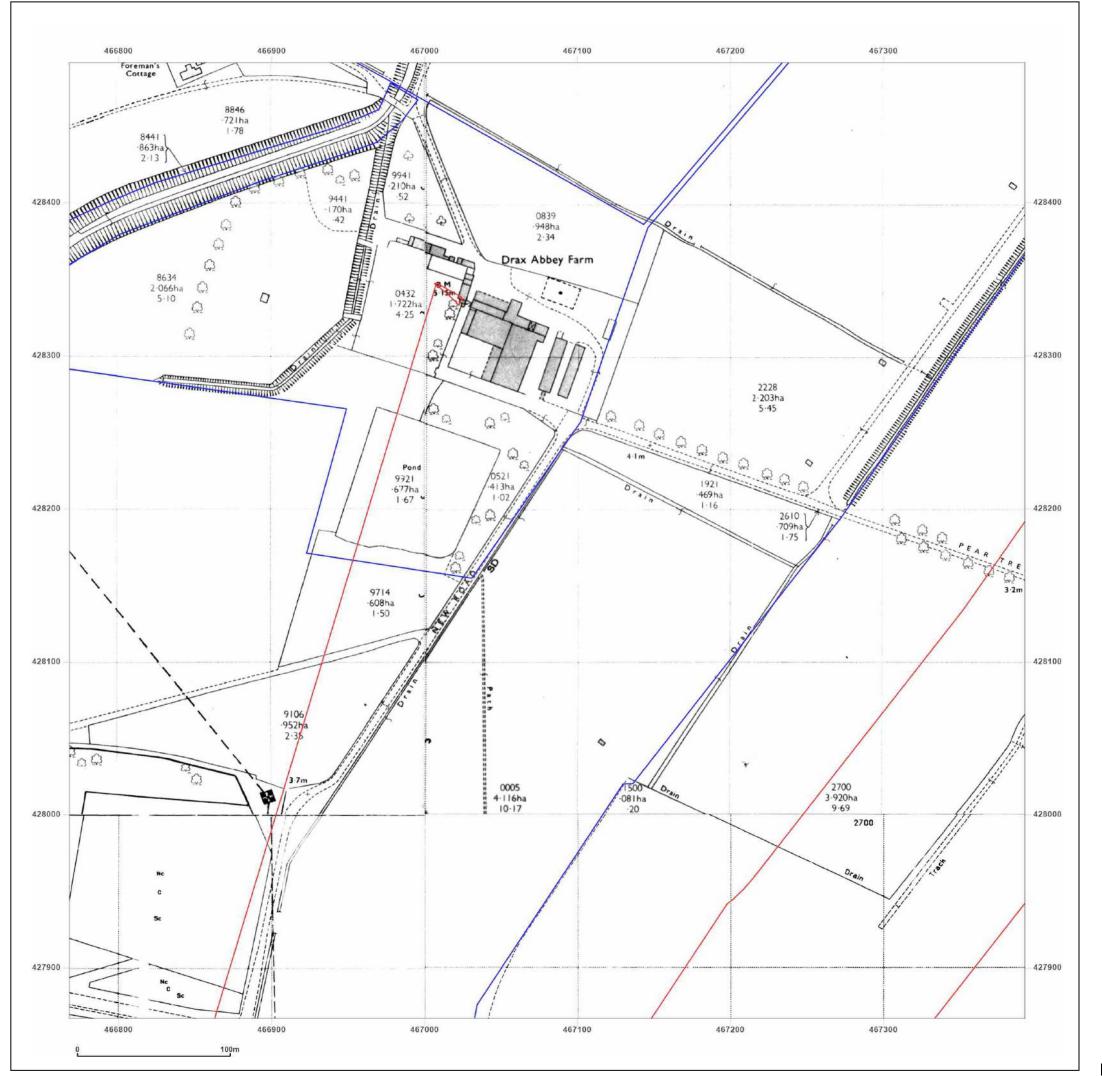




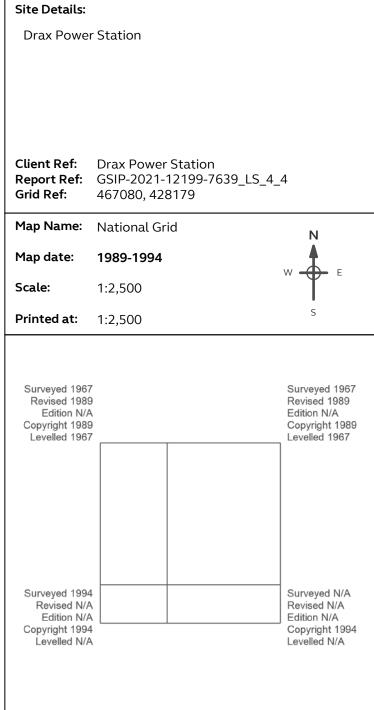
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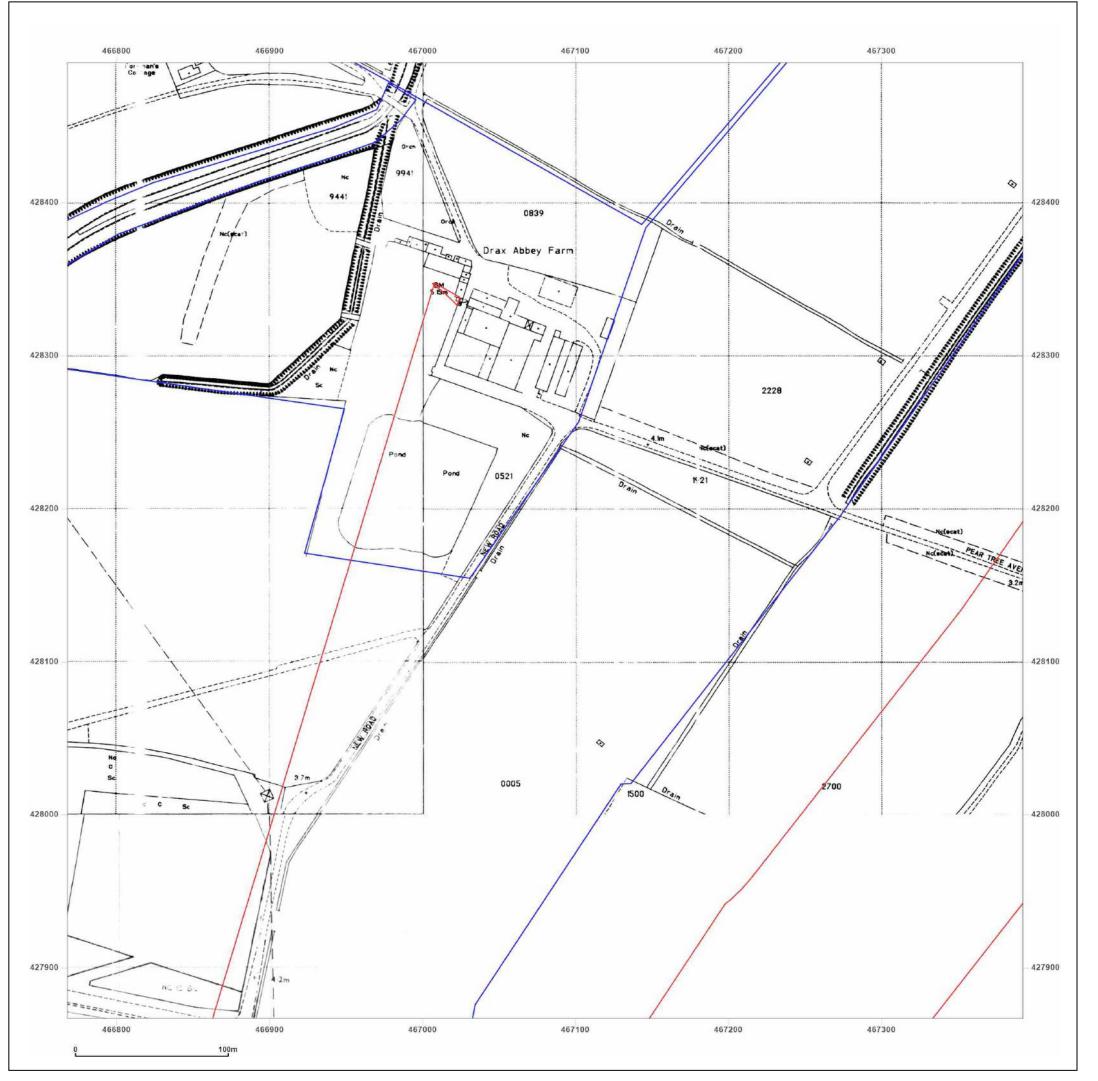






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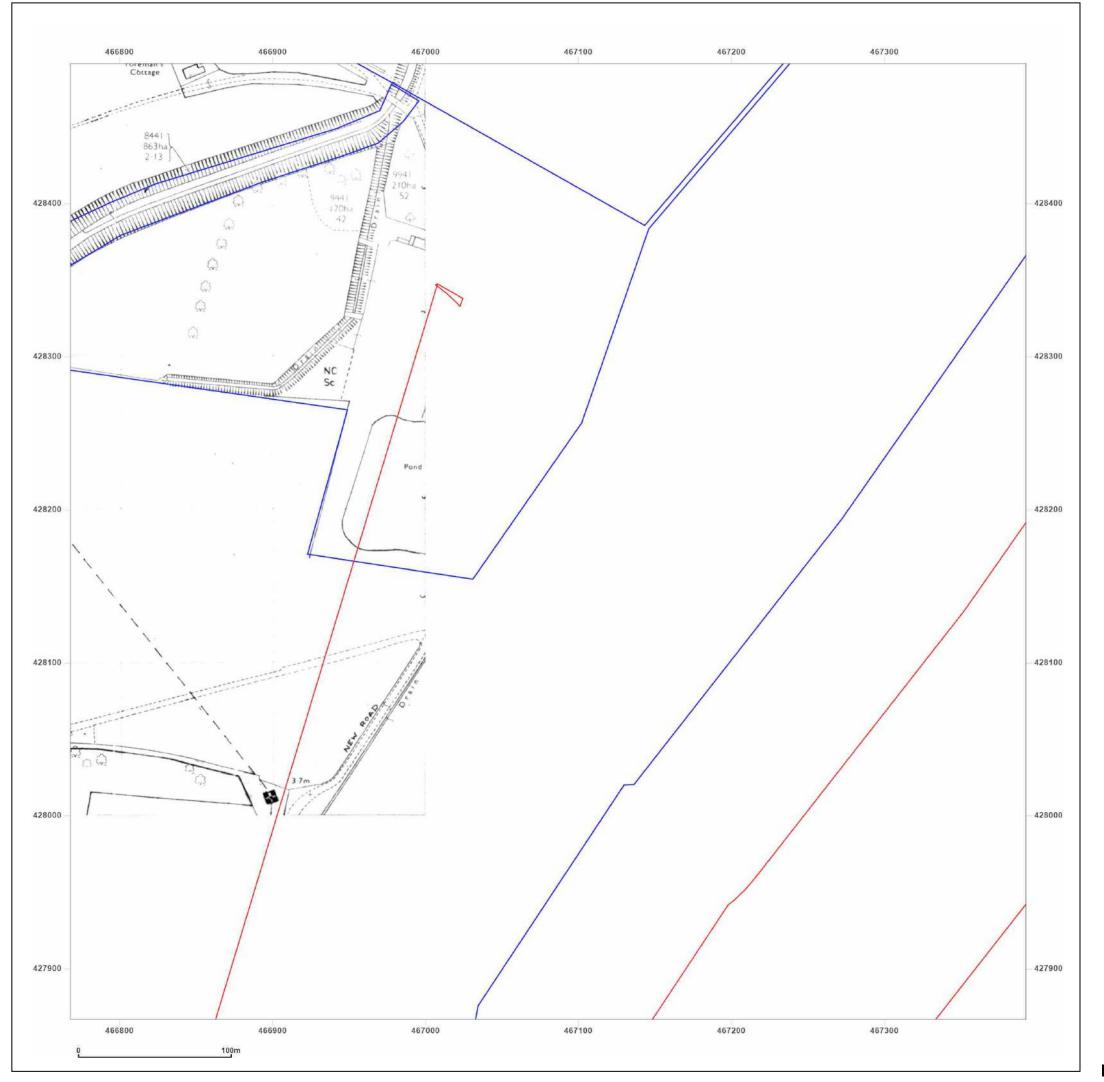


Site Details:		
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	Drax Power Station GSIP-2021-12199-7639_LS_4 467080, 428179	_4
Map Name:	National Grid	N
Map date:	1994	W E
Scale:	1:2,500	" T
Printed at:	1:2,500	S
Surveyed 1994 Revised N/A Edition N/A Copyright 1994 Levelled N/A		Surveyed 1994 Revised N/A Edition N/A Copyright 1994 Levelled N/A
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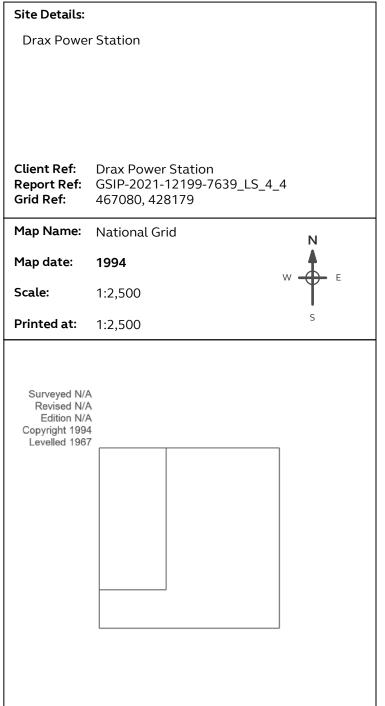


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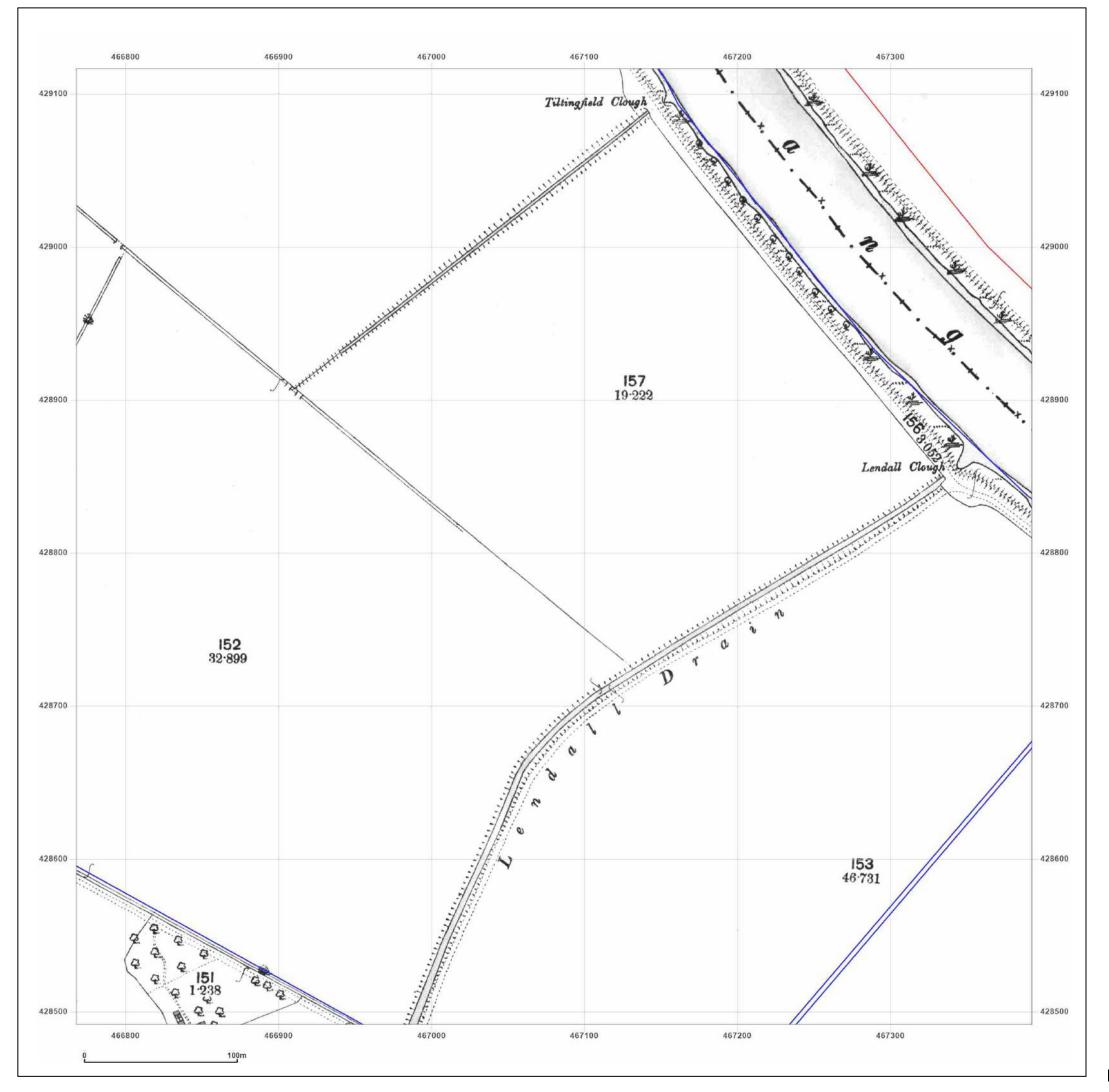






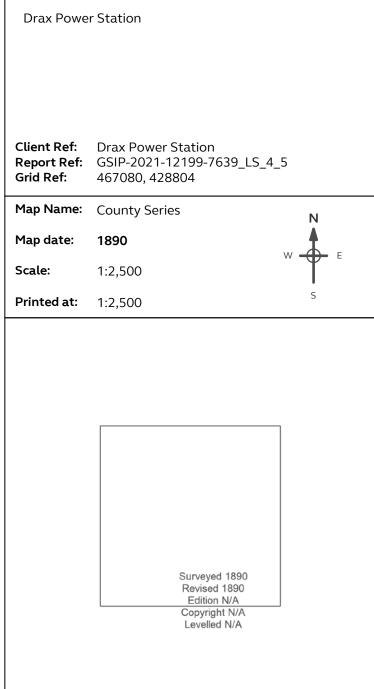
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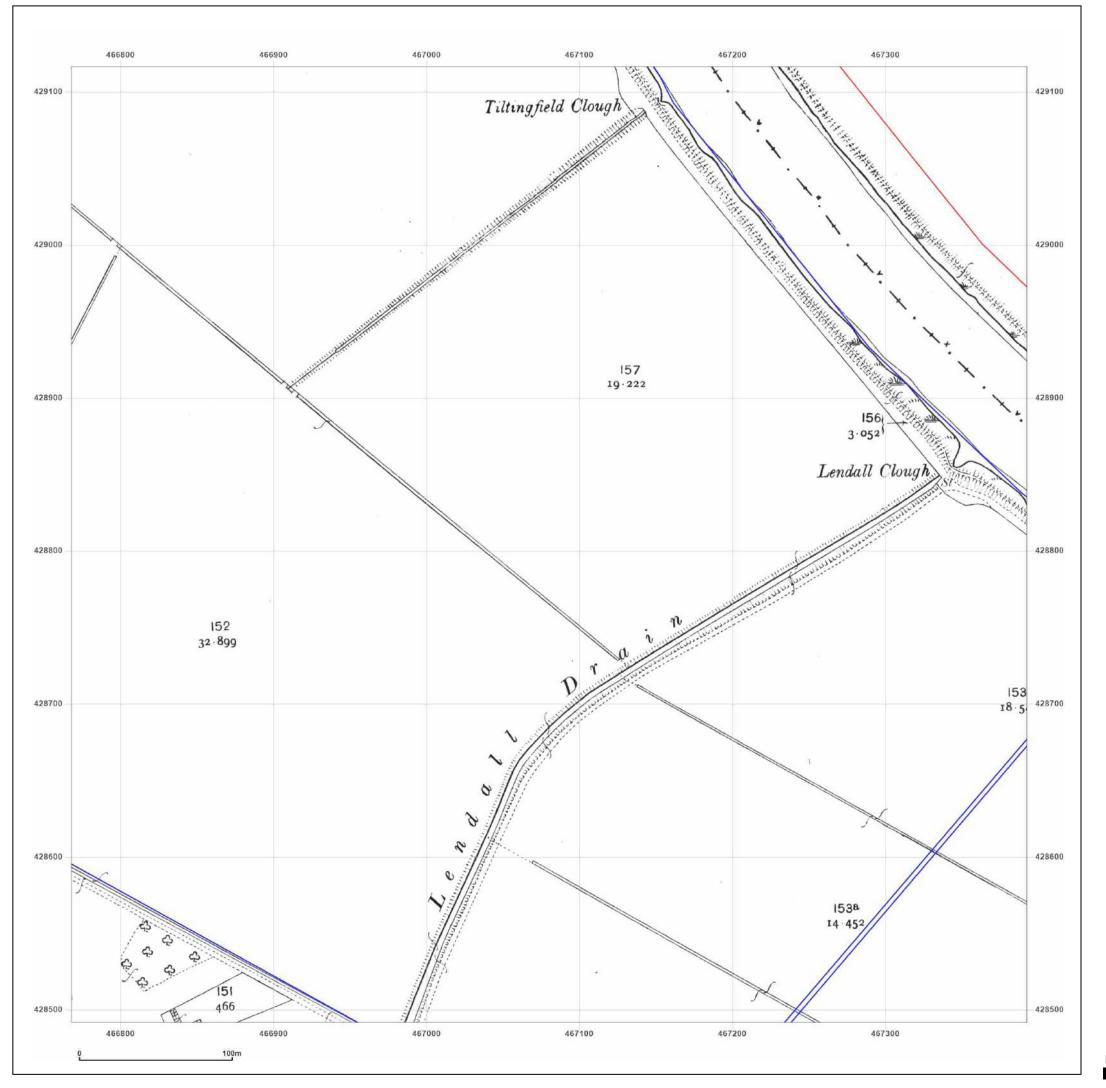




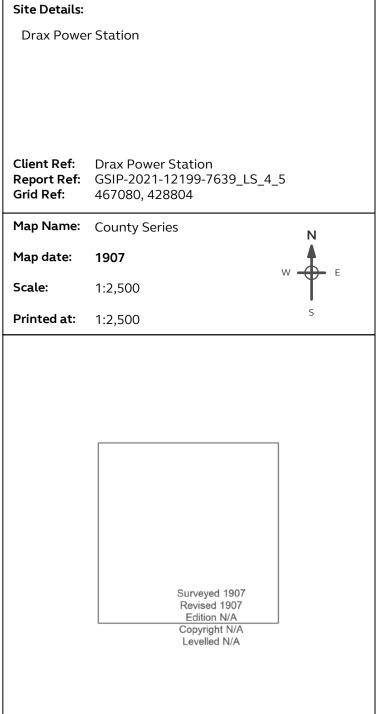
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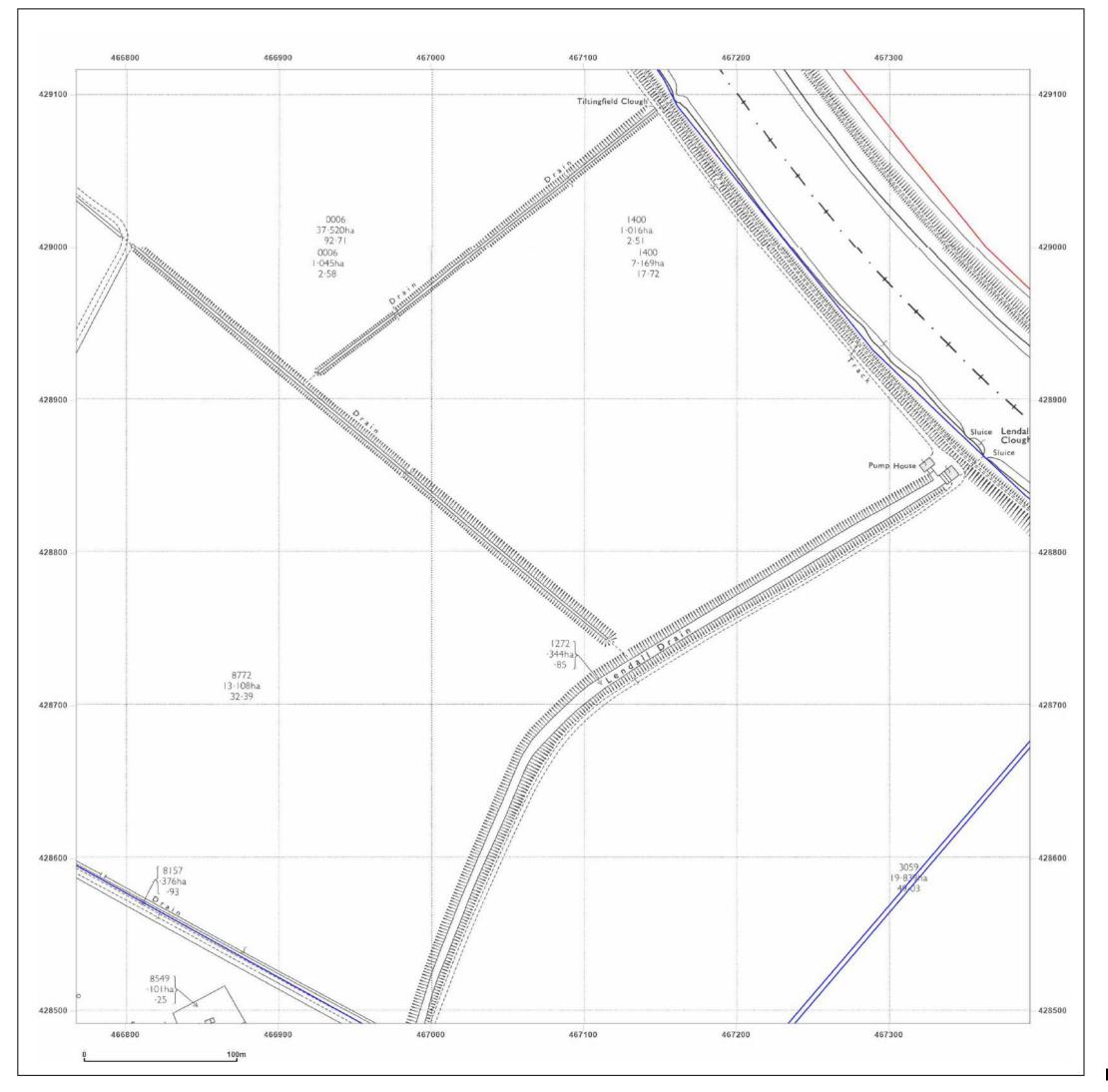




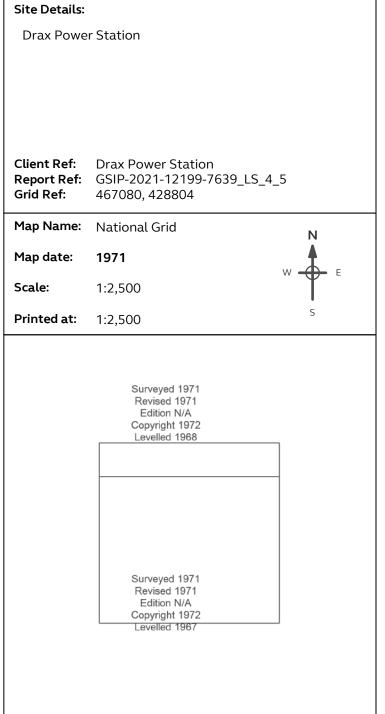


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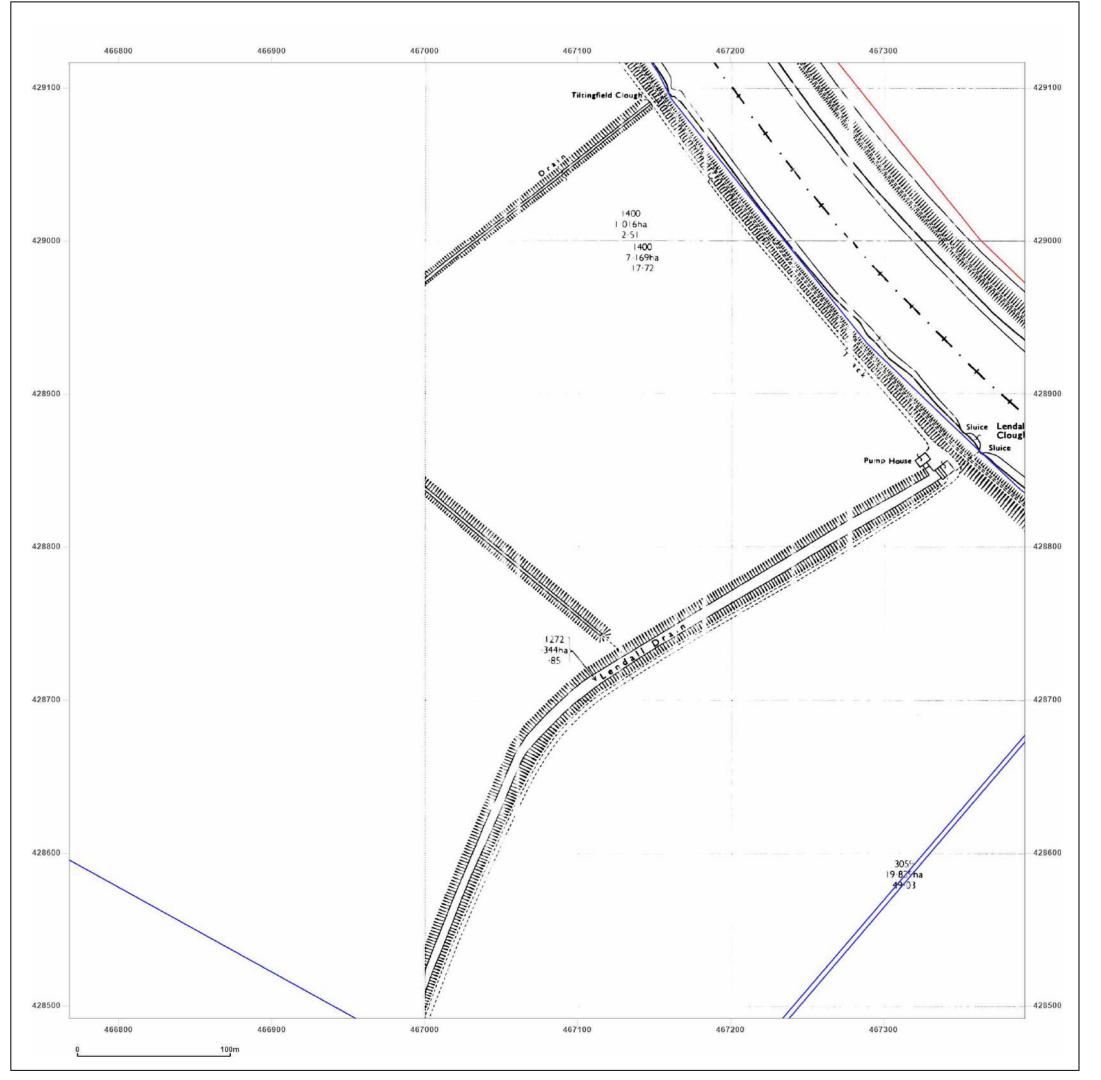




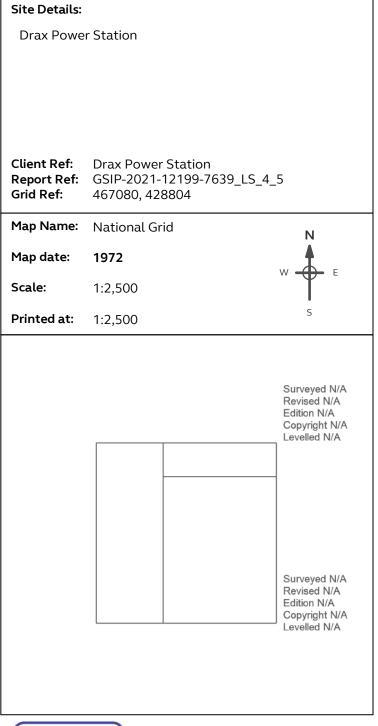


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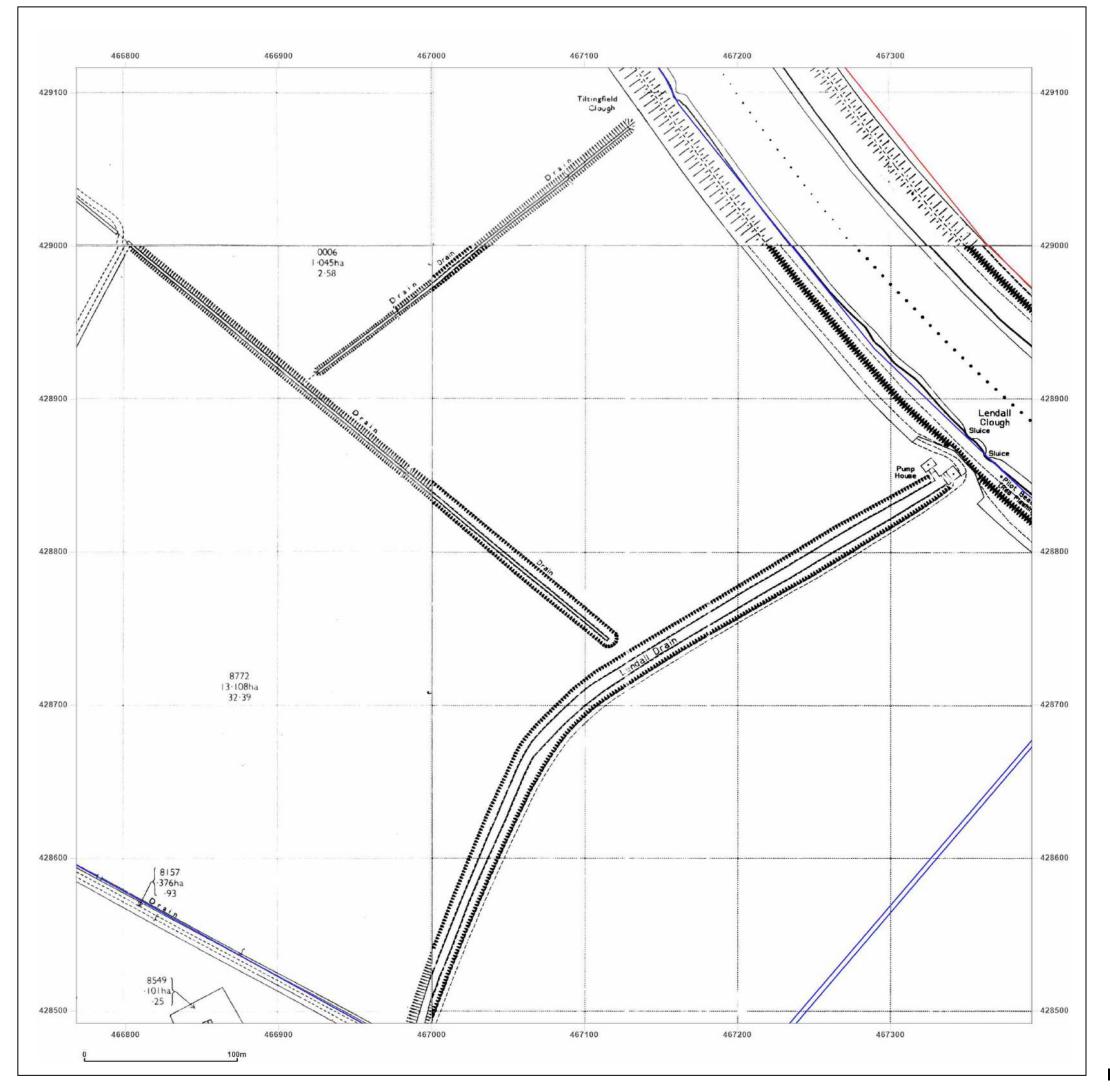






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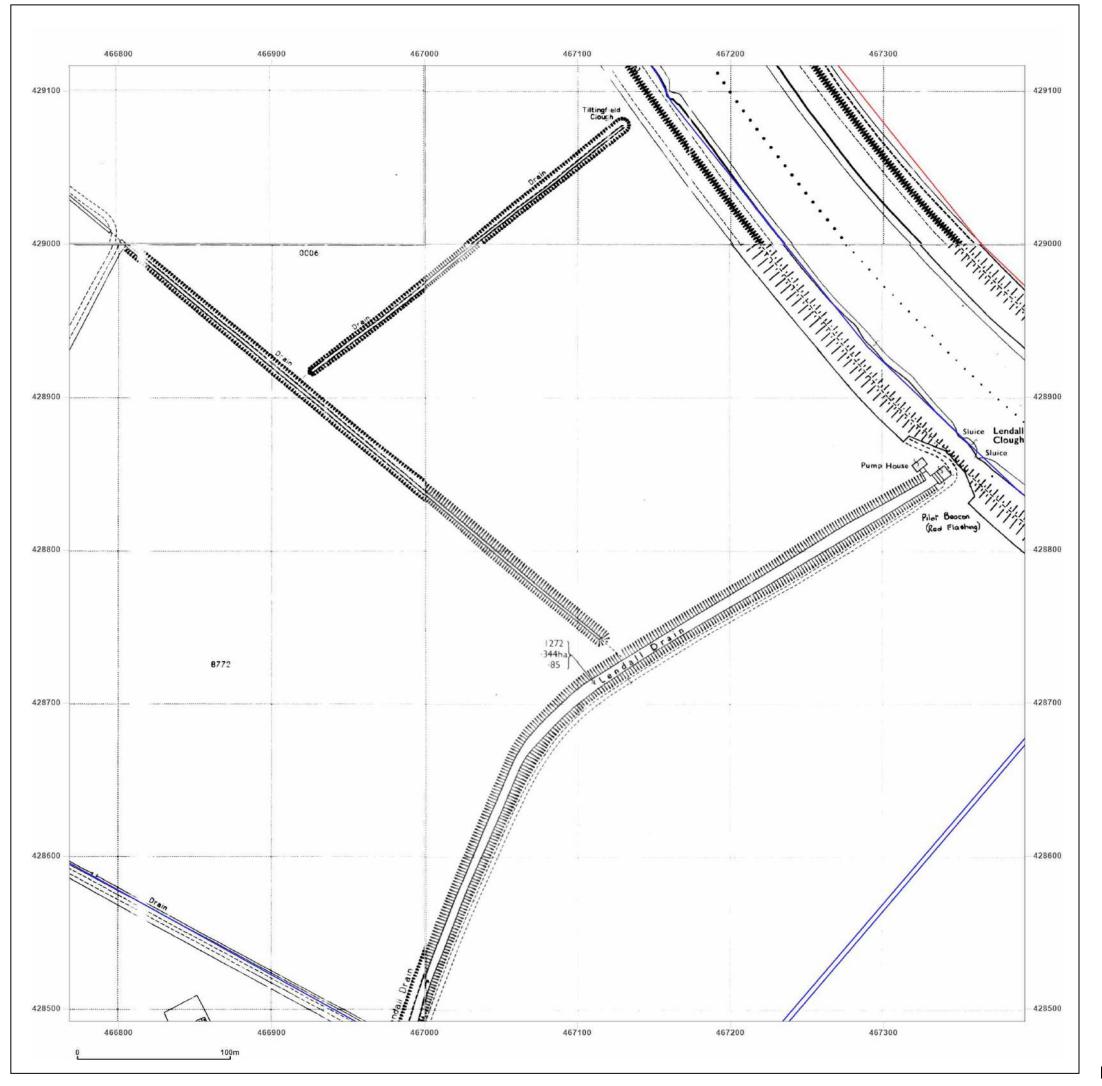


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Client Ref: Report Ref: Grid Ref:	Drax Power Station GSIP-2021-12199-7639_LS_4 467080, 428804	4_5
Map Name:	National Grid	N
Map date:	1989-1994	W - 5
Scale:	1:2,500	W F
Printed at:	1:2,500	S
Surveyed 1997 Revised 1997 Edition N/A Copyright 1997 Levelled N/A	1 A 1	Surveyed 1991 Revised 1991 Edition N/A Copyright 1991 Levelled N/A
Surveyed 1967 Revised 1989 Edition N/A Copyright 1989 Levelled 1967	0 A 0	Surveyed 1994 Revised N/A Edition N/A Copyright 1994 Levelled N/A



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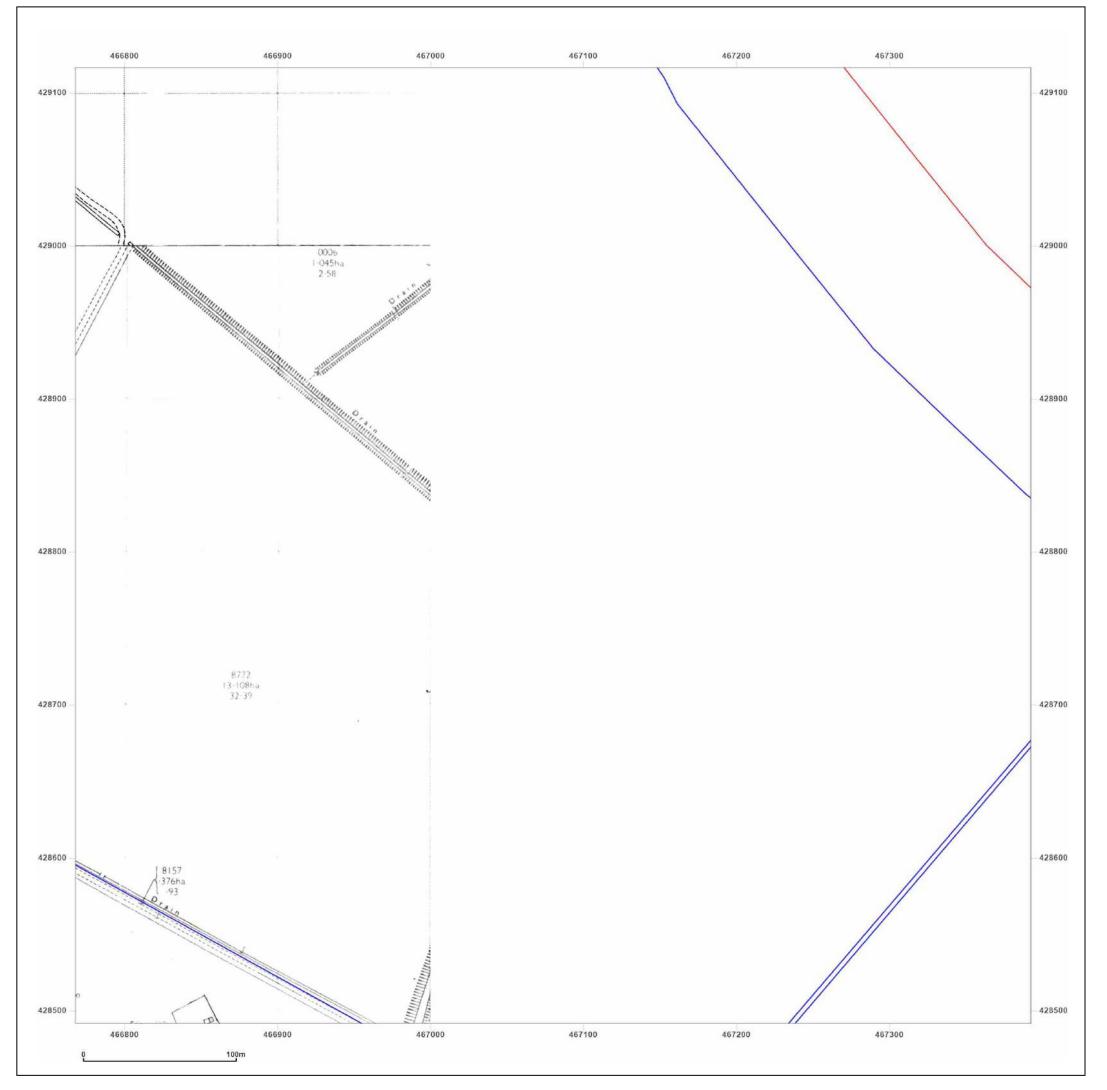


Site Details:		
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Map Name:	National Grid	N
Map date:	1989-1994	W E
Scale:	1:2,500	
Printed at:	1:2,500	S
Surveyed 1991 Revised 1991 Edition N/A Copyright 1991 Levelled N/A		Surveyed N/A Revised N/A Edition N/A Copyright 1994 Levelled N/A
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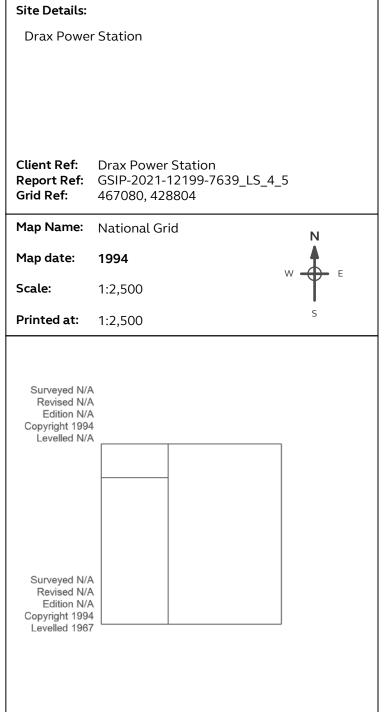


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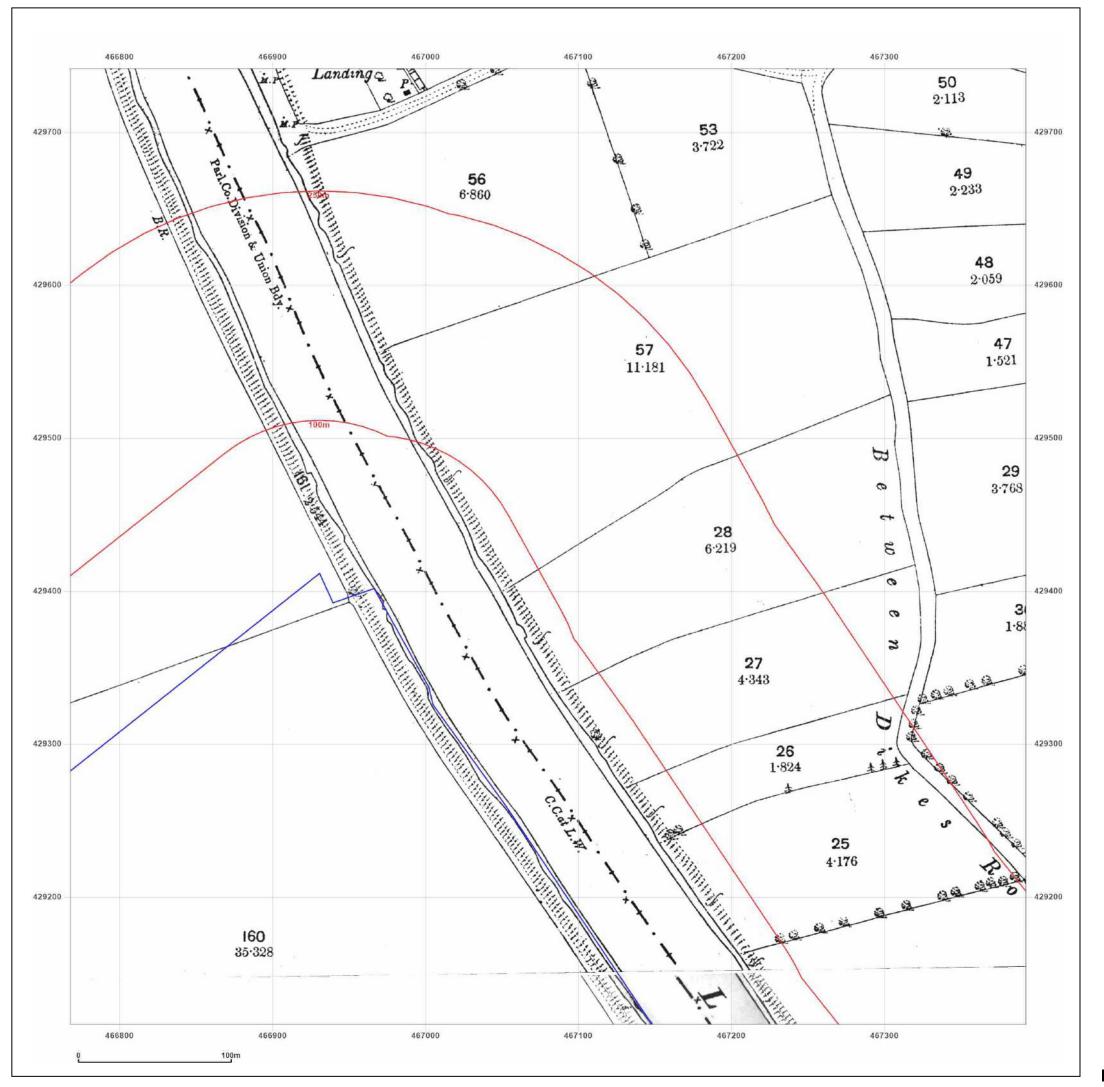




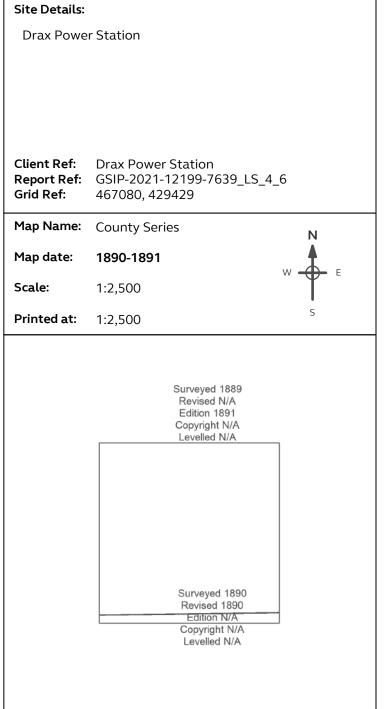


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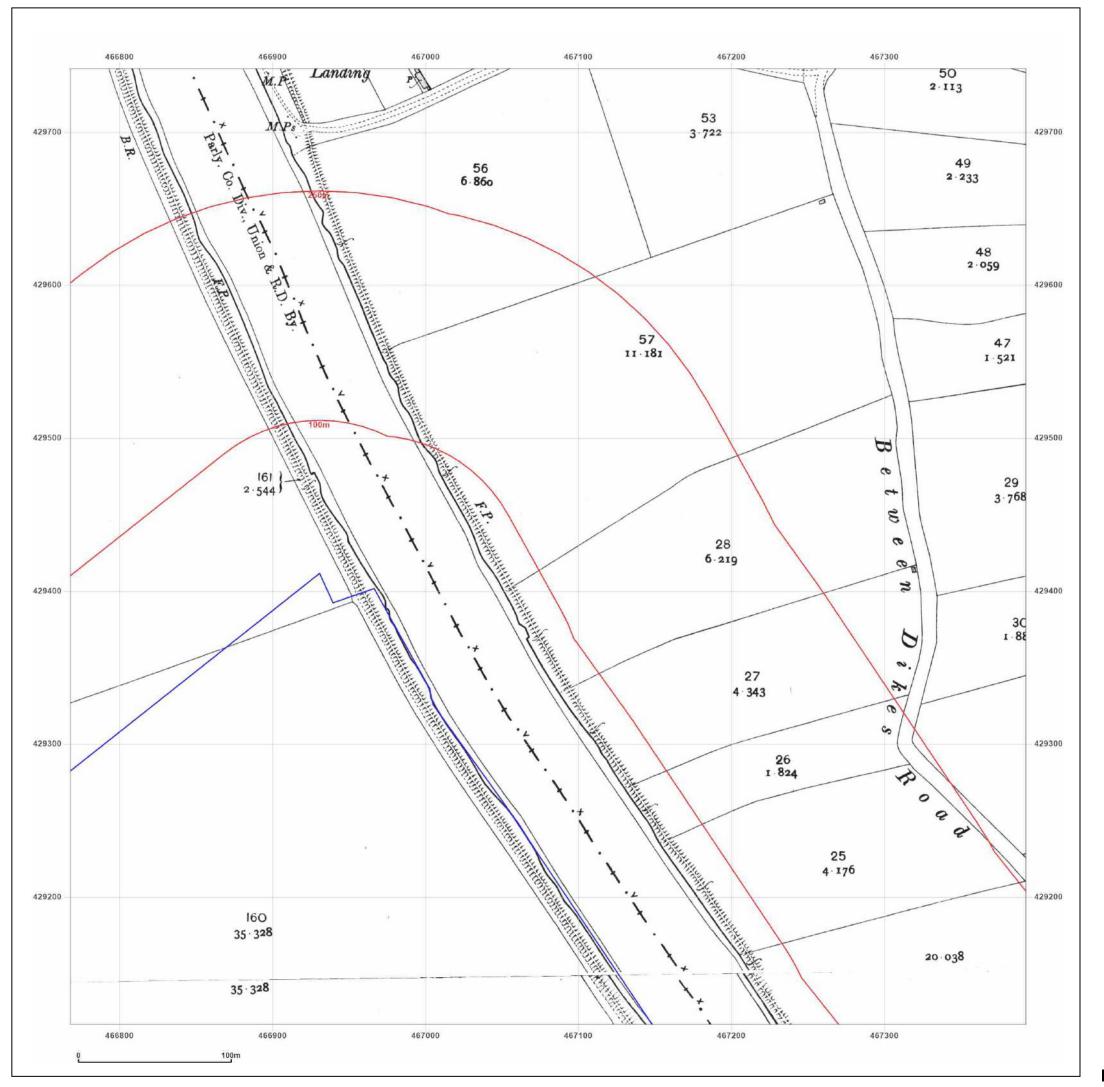




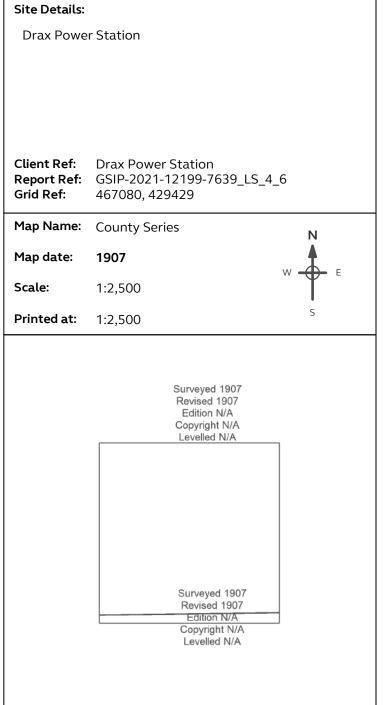


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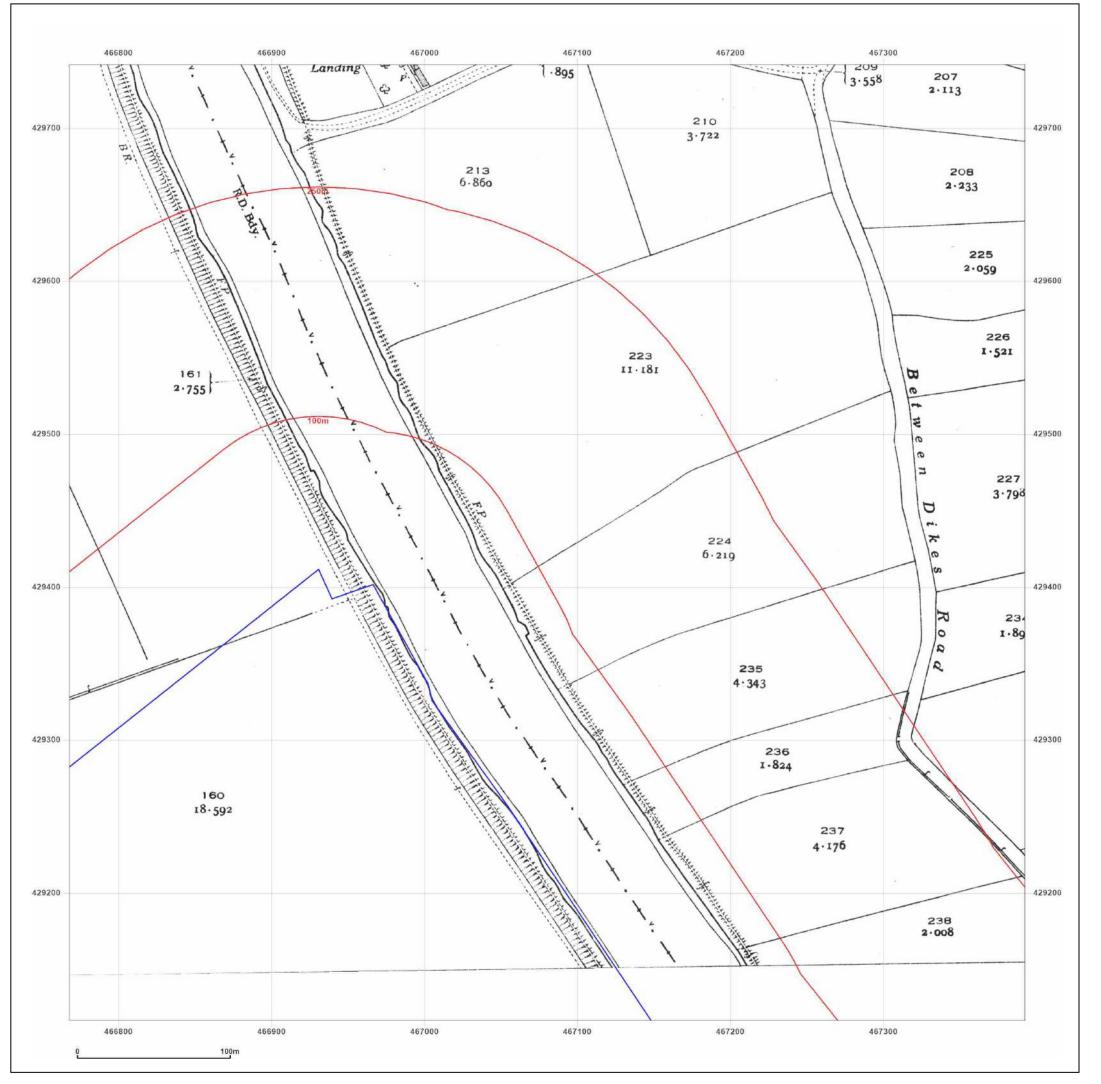




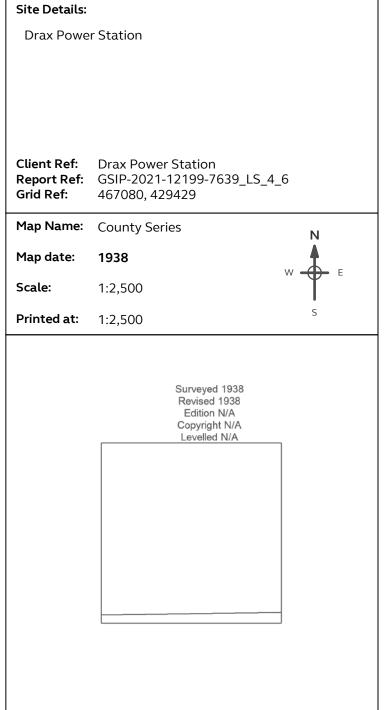


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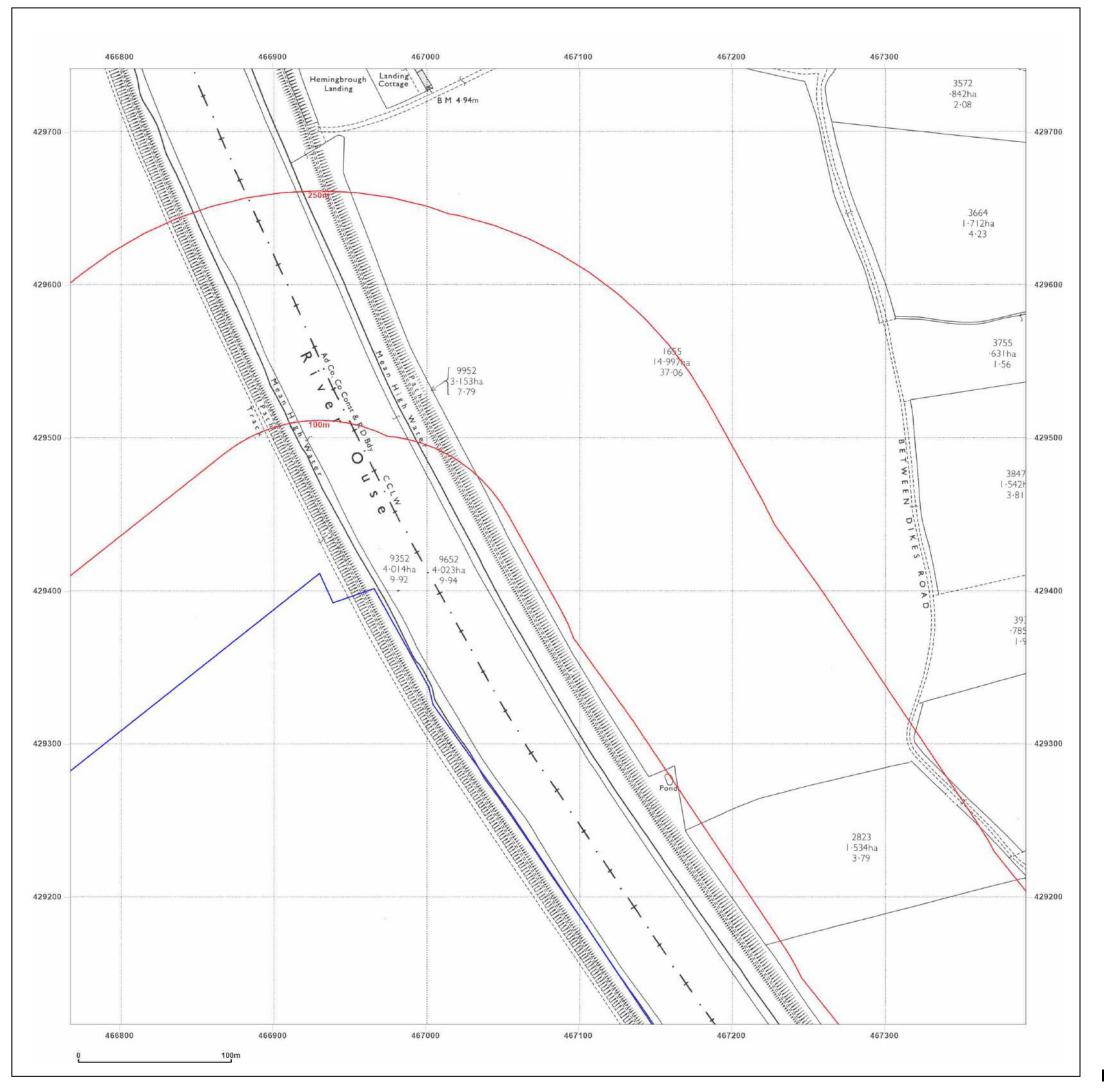




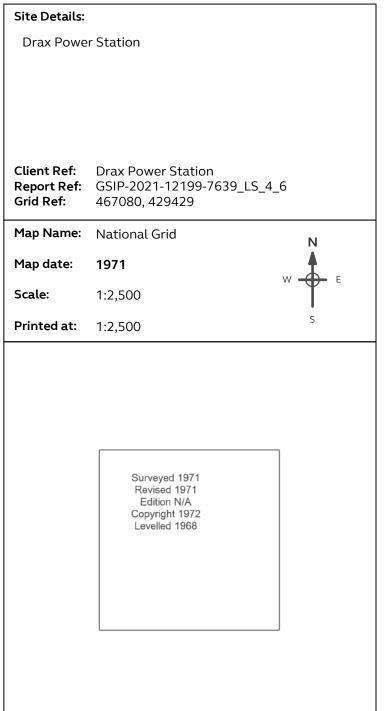


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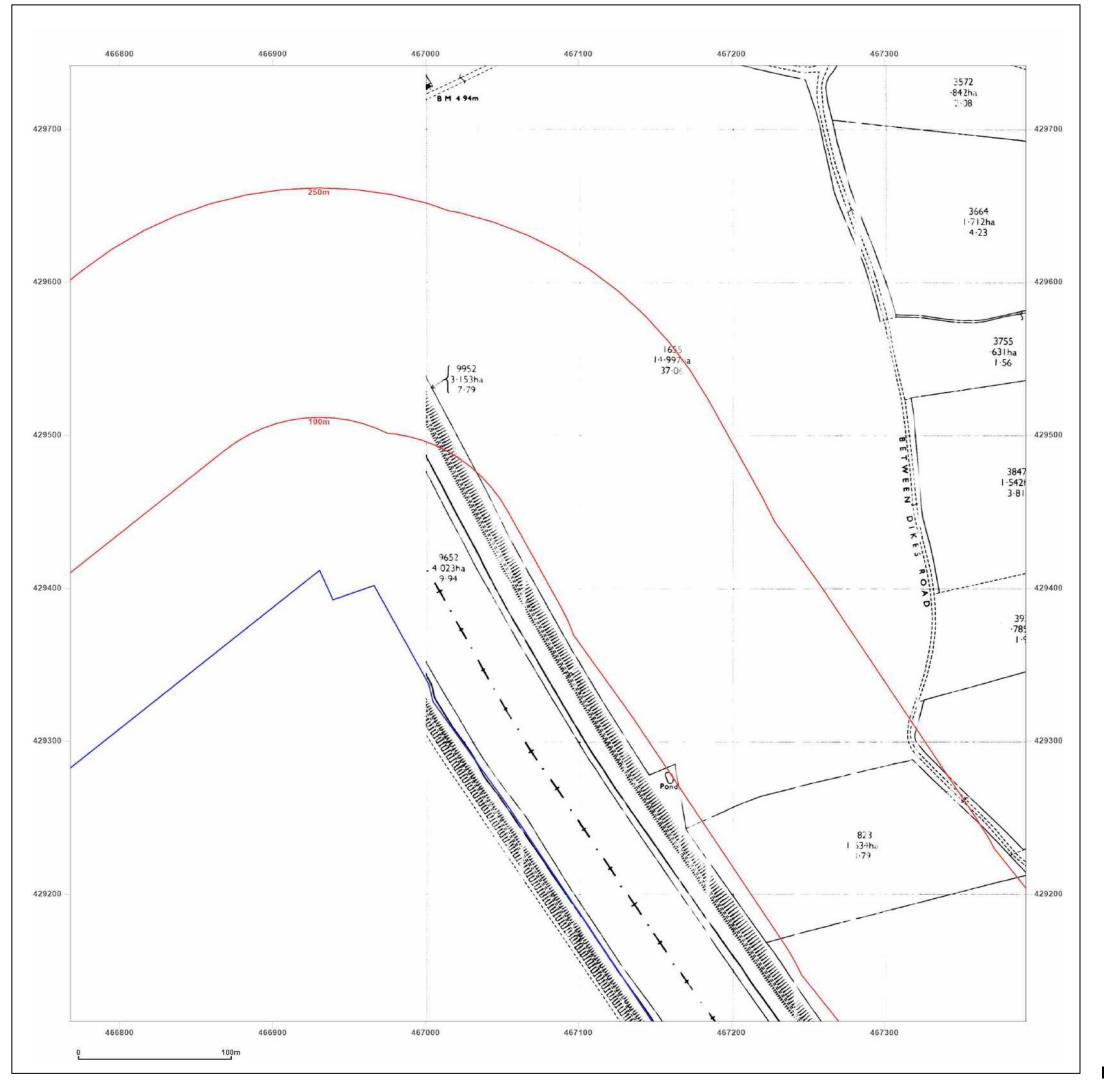




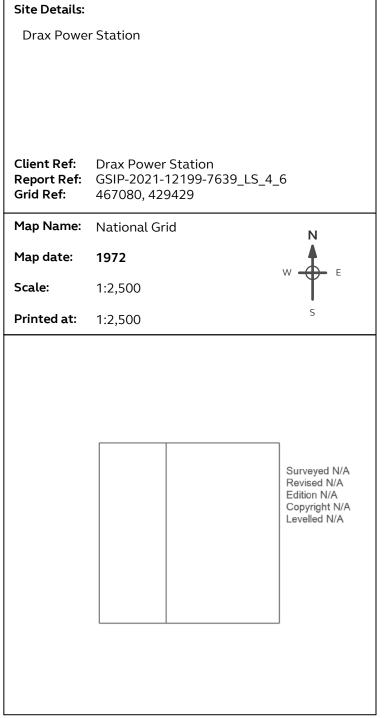


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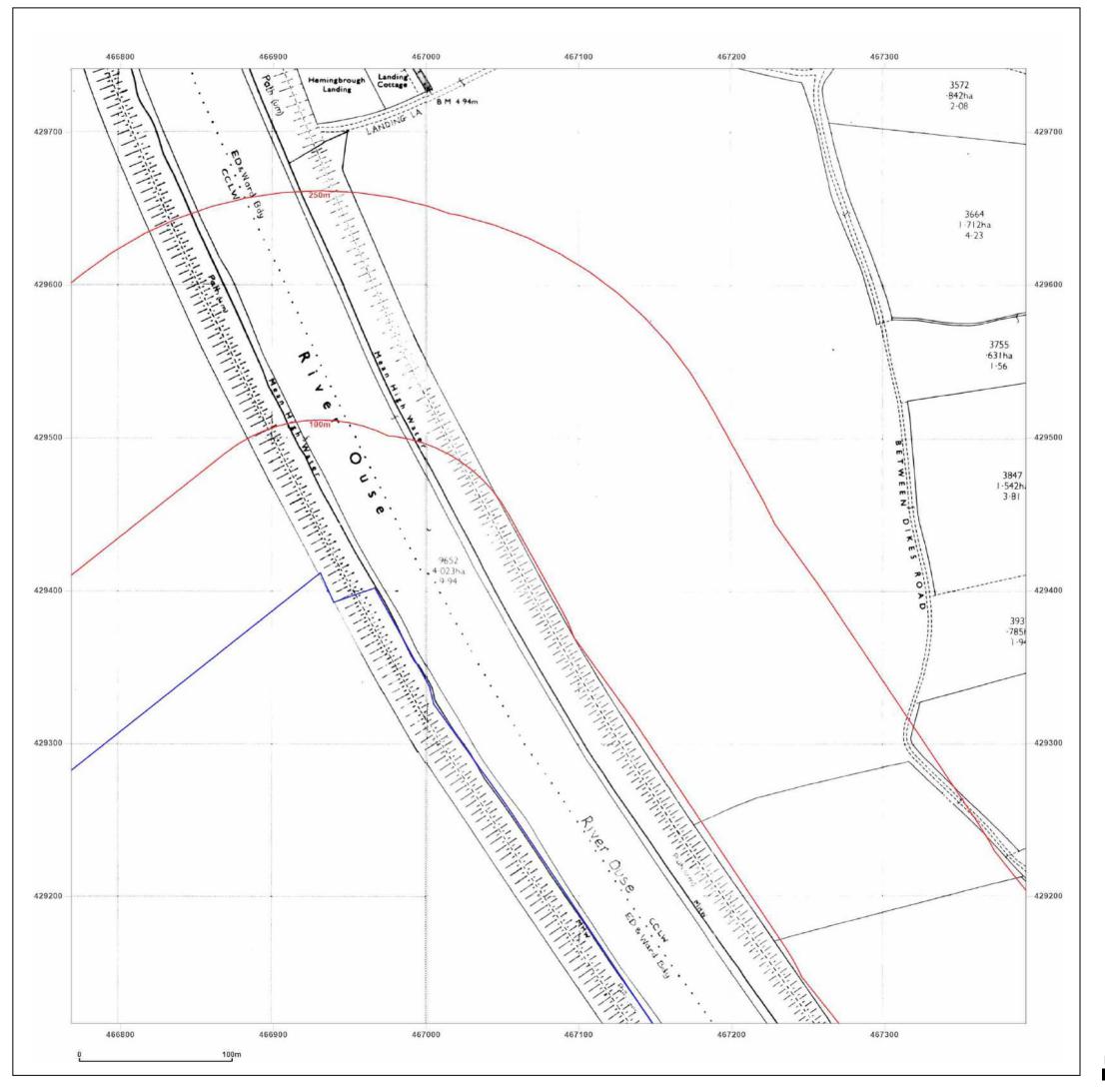




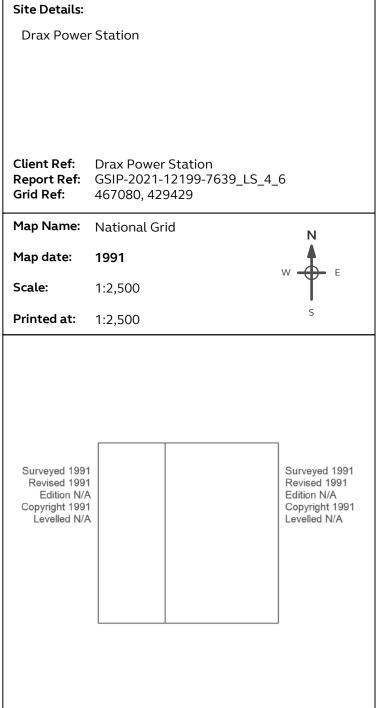


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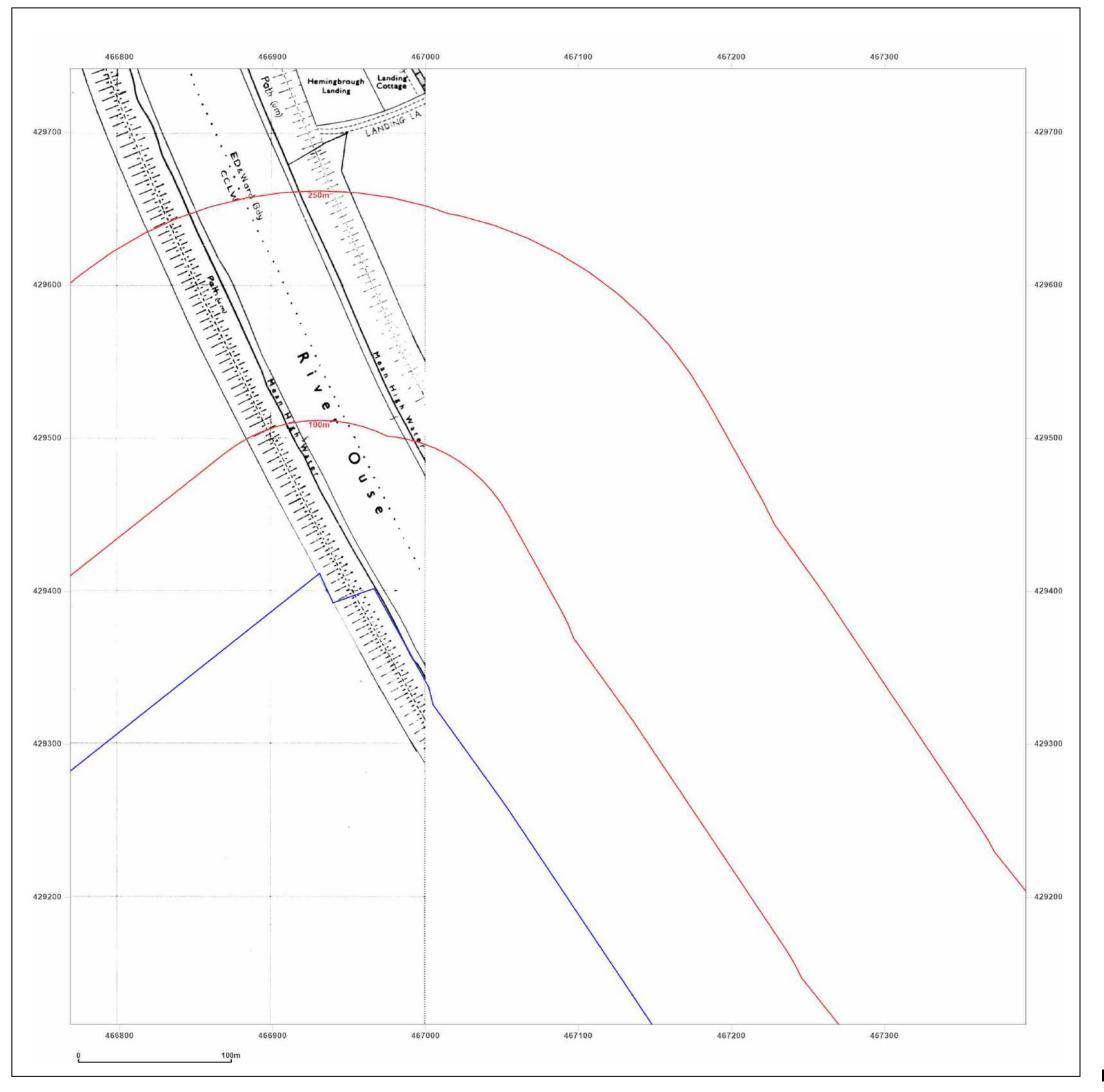






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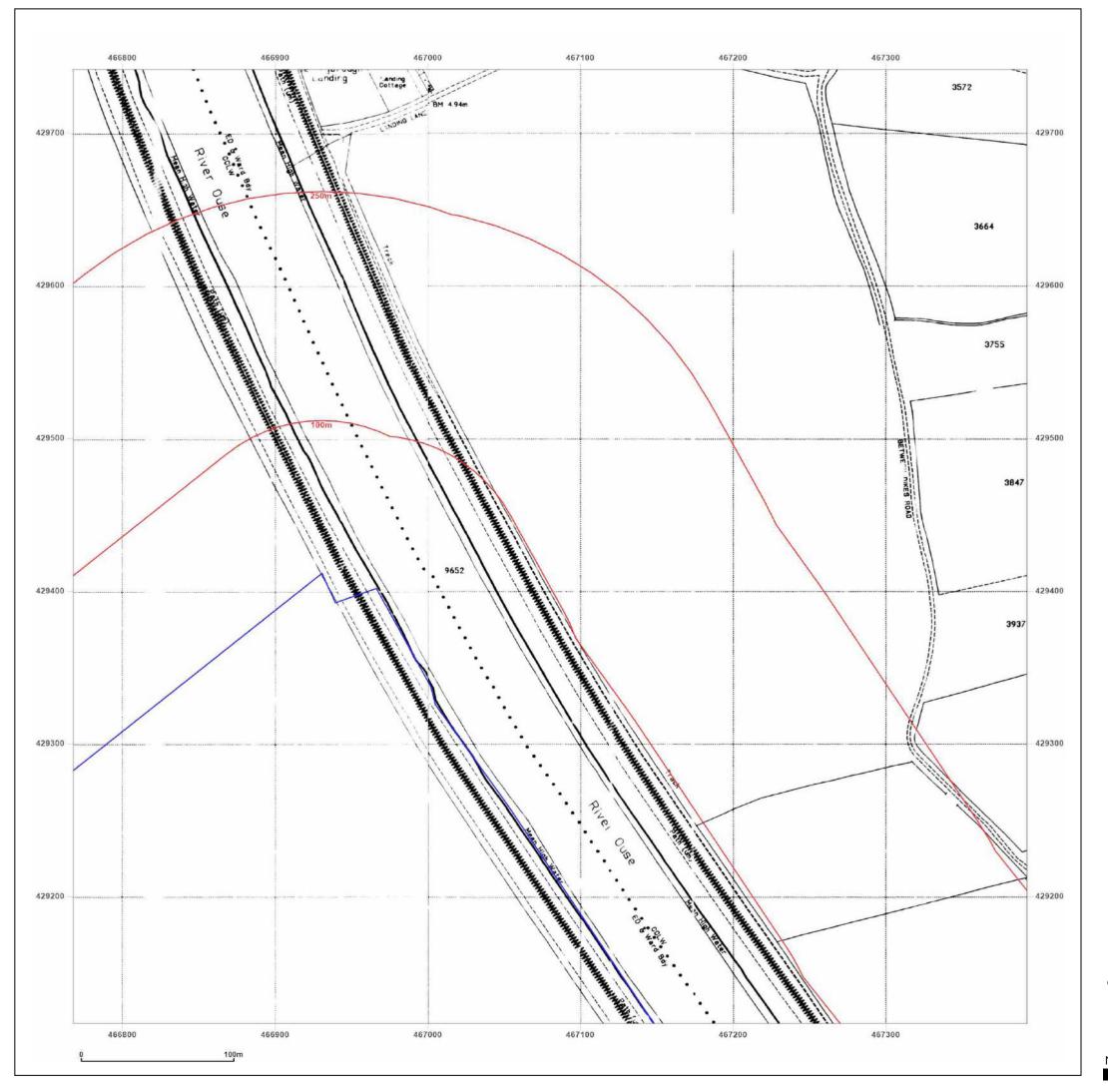


Site Details:		
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Map Name:	National Grid N	
Map date:	1991	
Scale:	1:2,500	
Printed at:	1:2,500 S	
Surveyed 1991 Revised 1991 Edition N/A Copyright 1991 Levelled N/A		

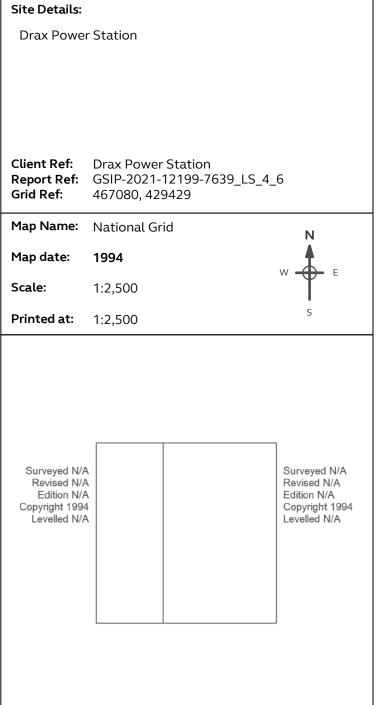


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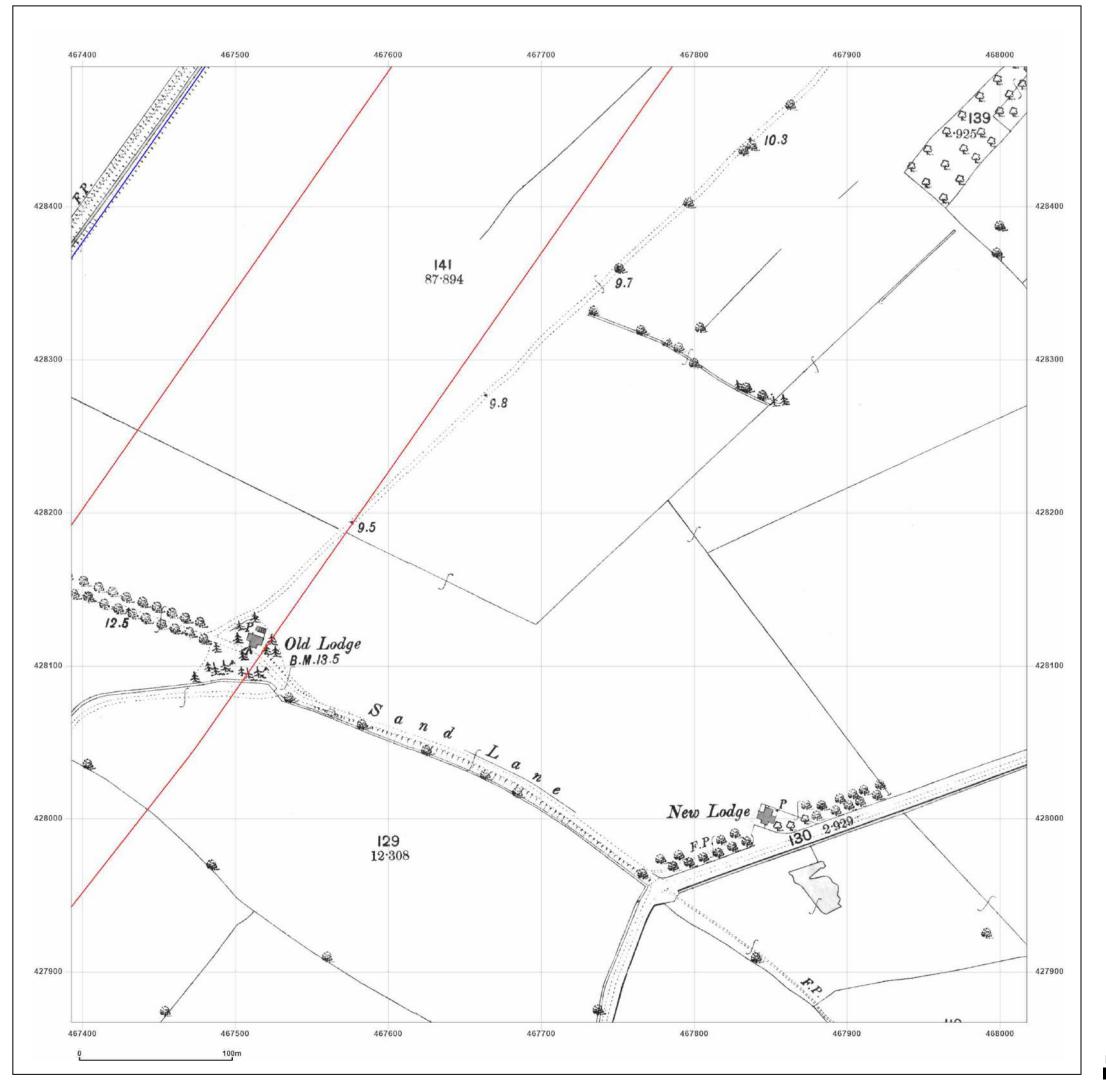






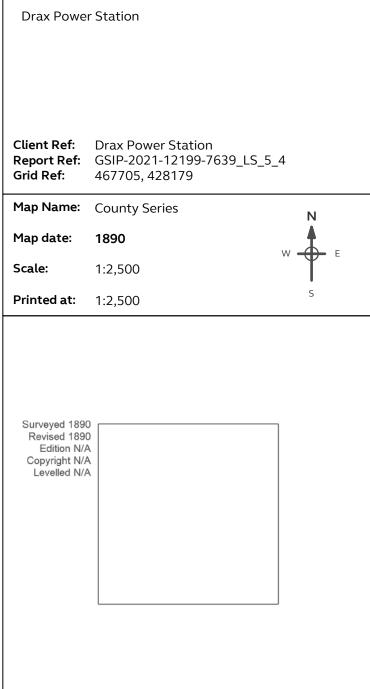
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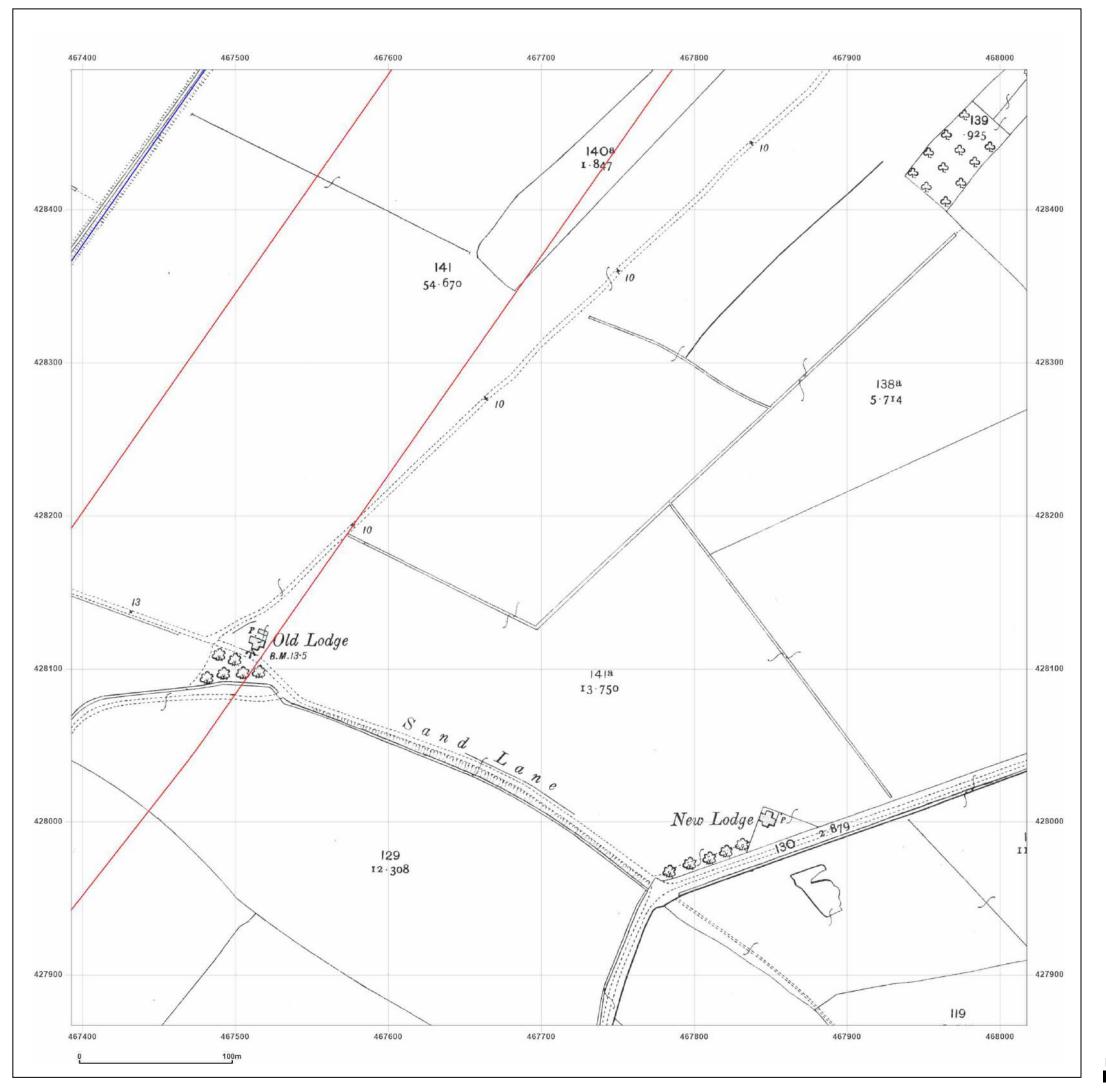




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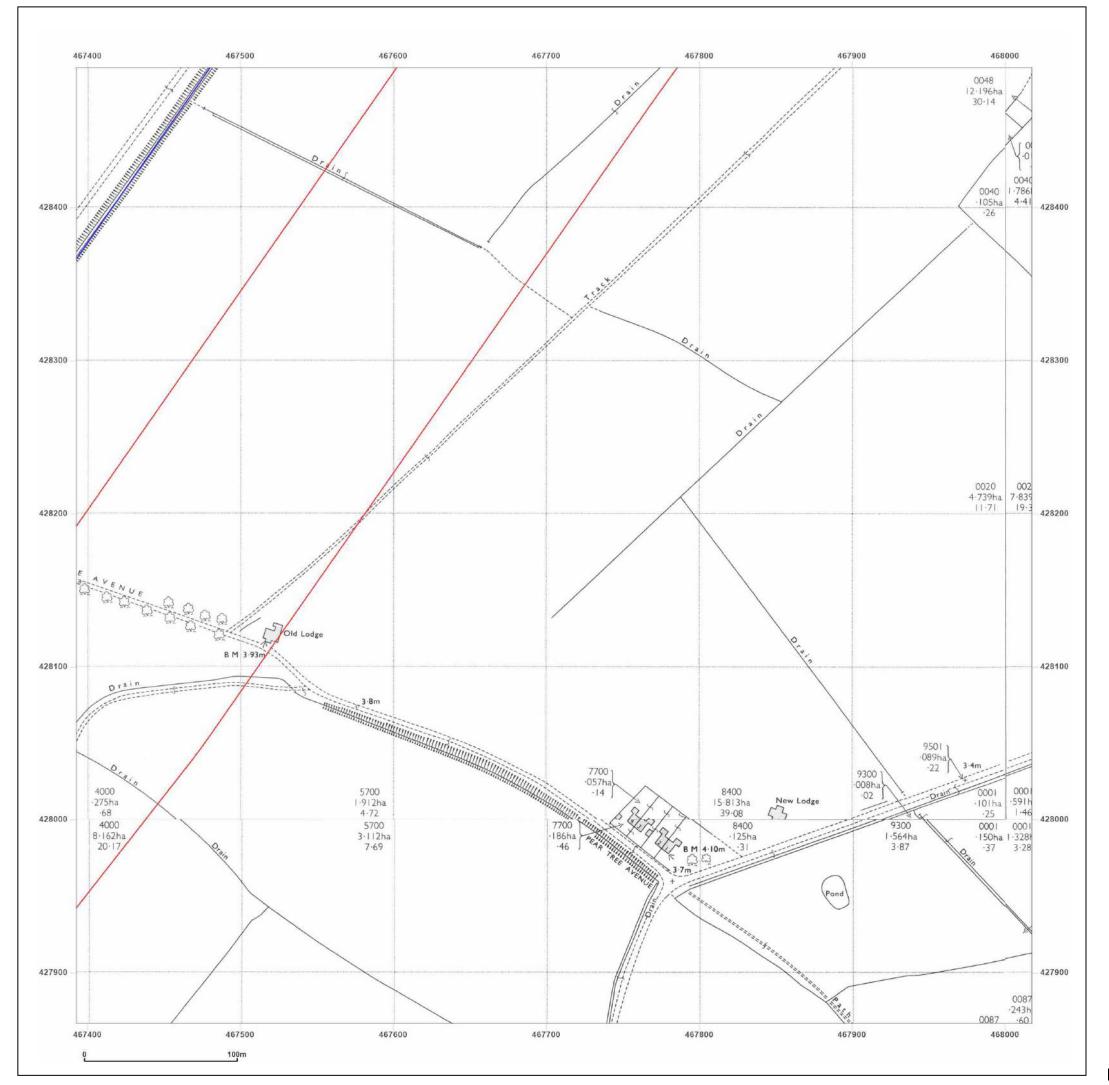


Site Details:		
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Map Name:	County Series N	
Map date:	1907	
Scale:	1:2,500	
Printed at:	1:2,500 s	
Surveyed 1907 Revised 1907 Edition N/A Copyright N/A Levelled N/A		

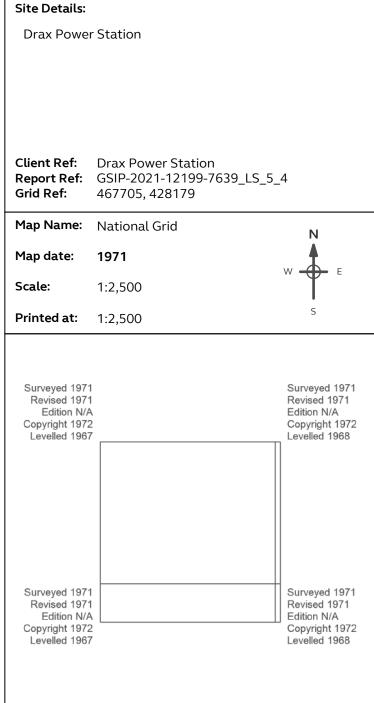


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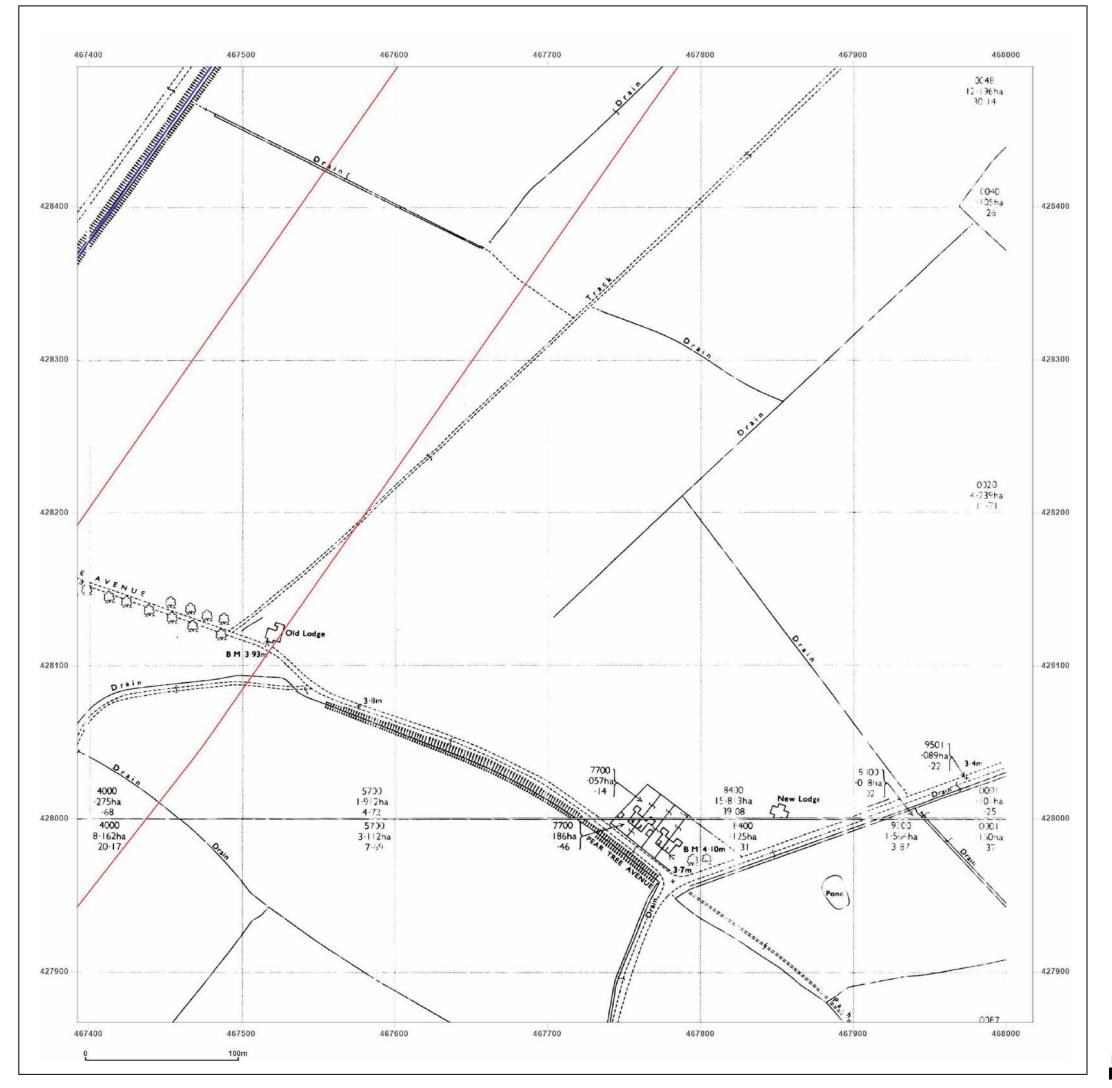




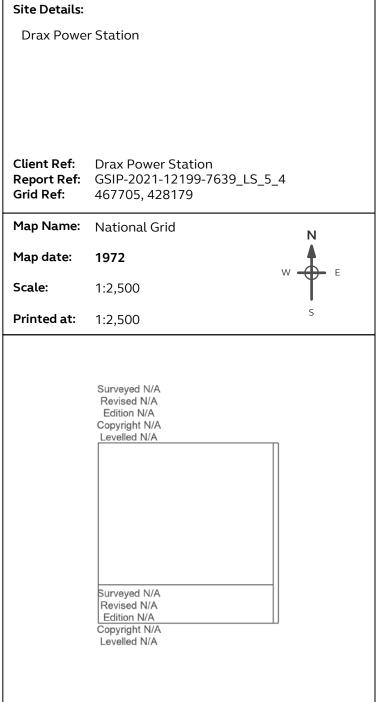


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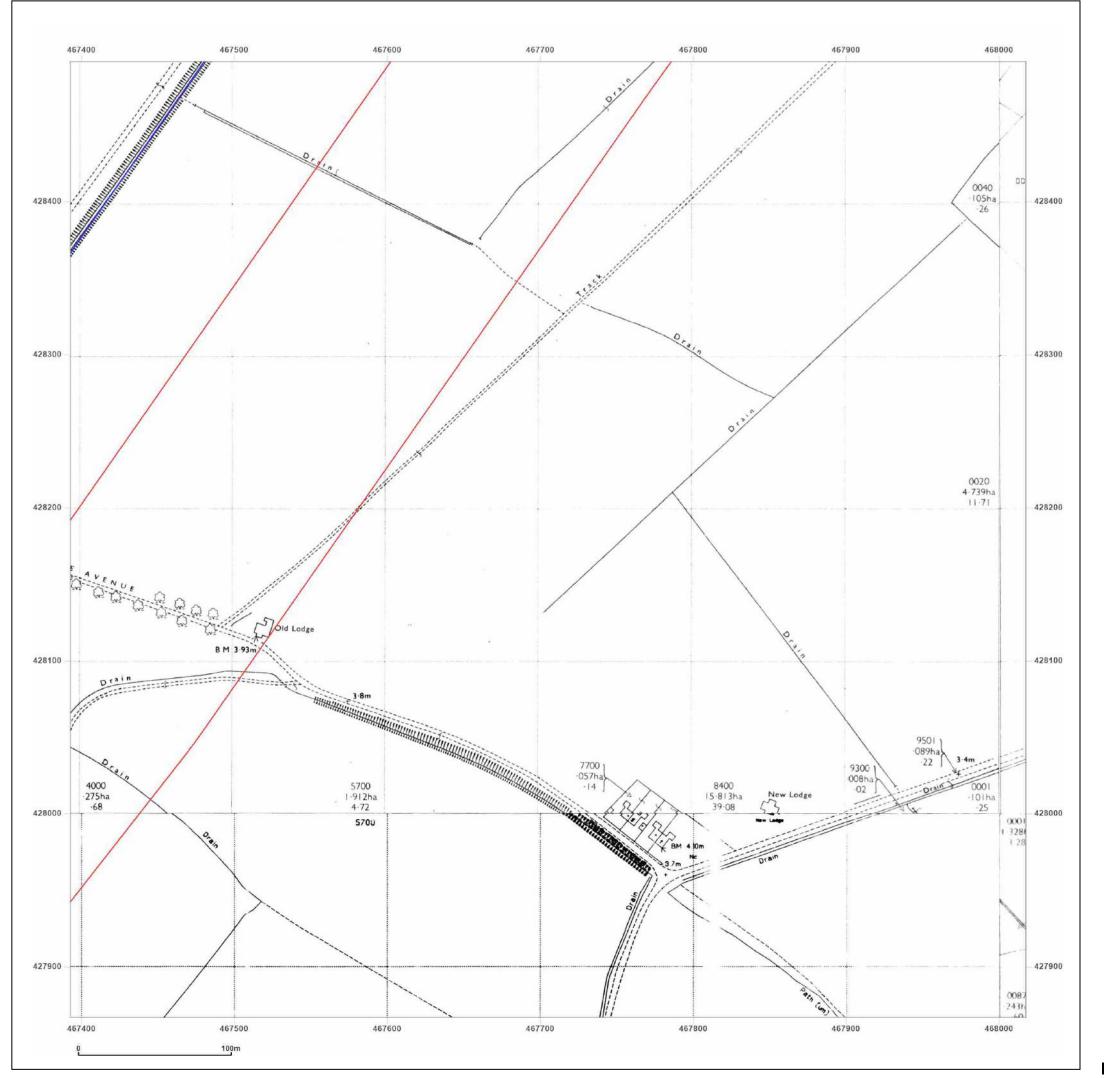




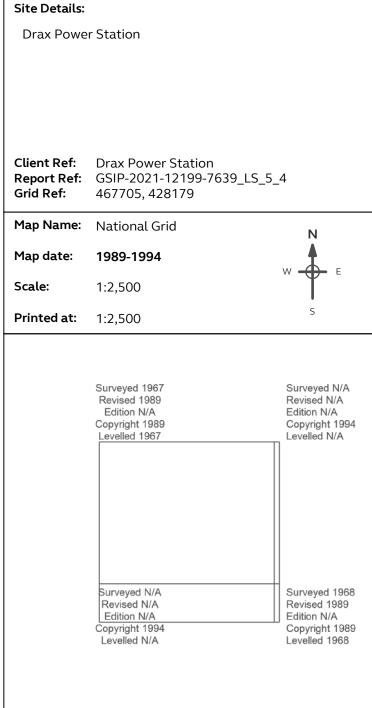


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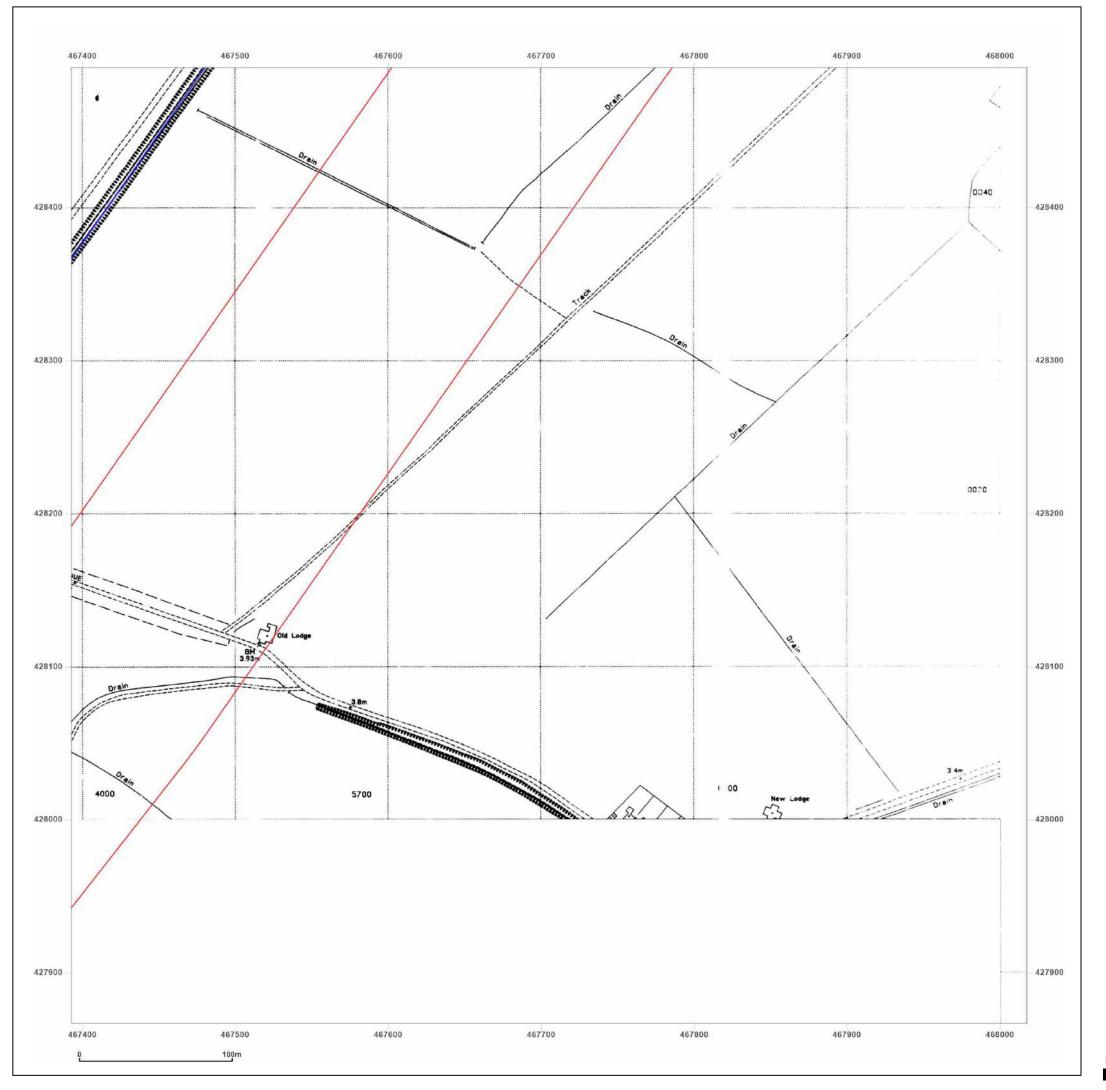




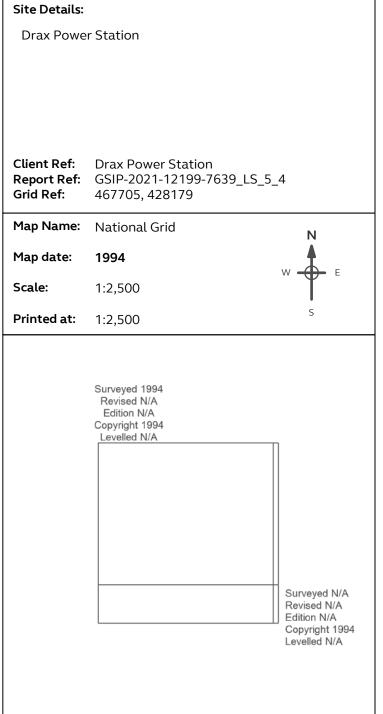


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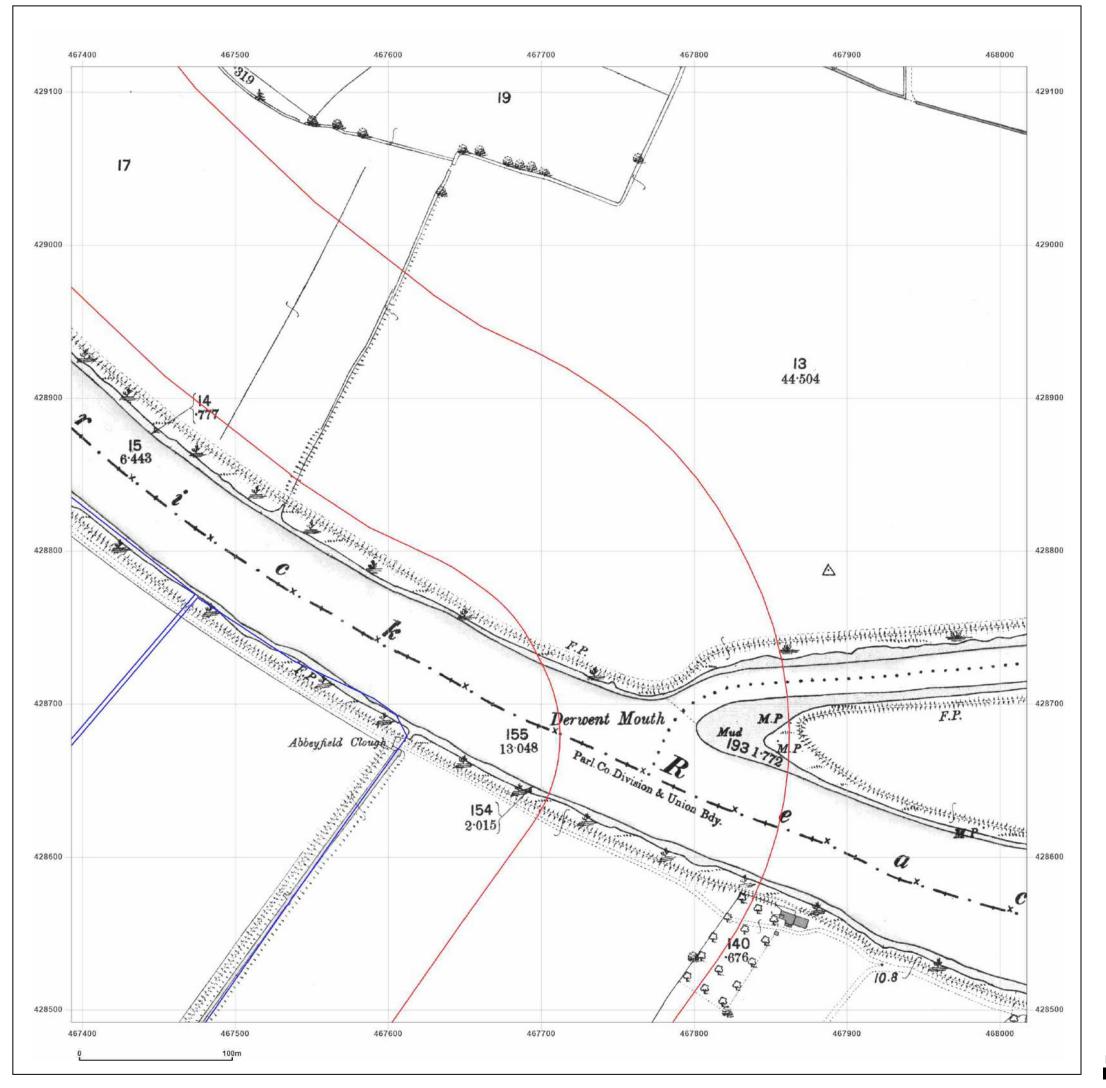




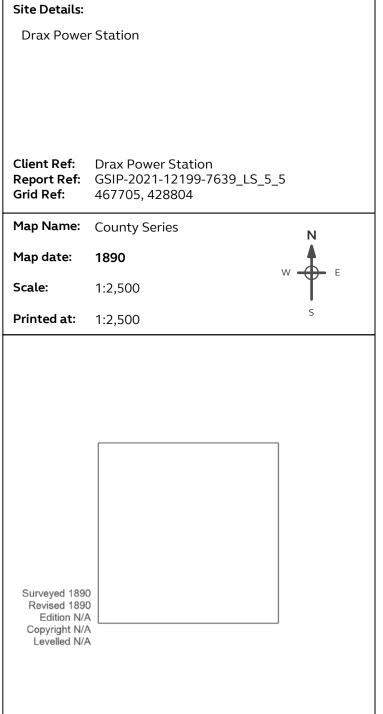


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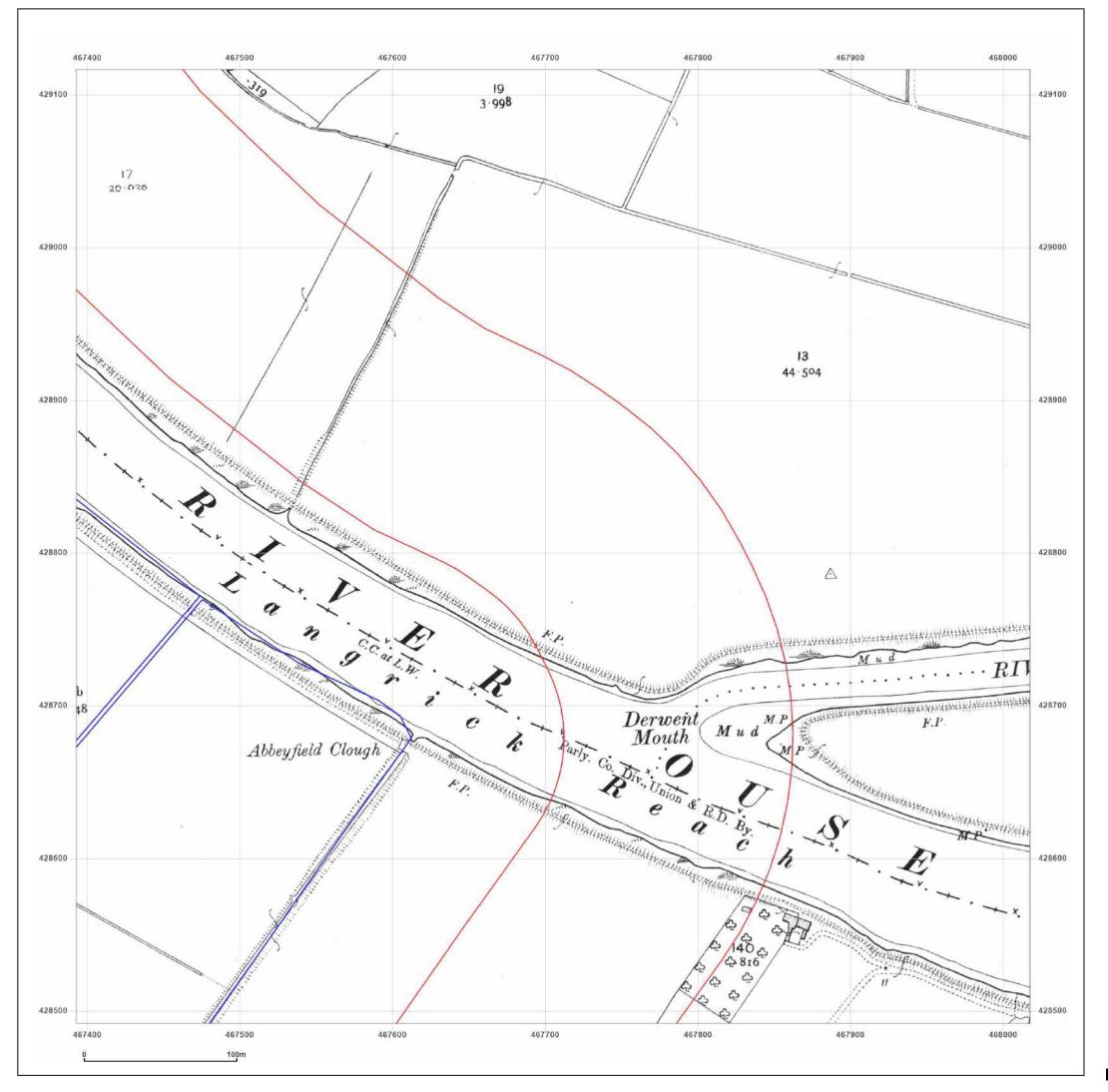




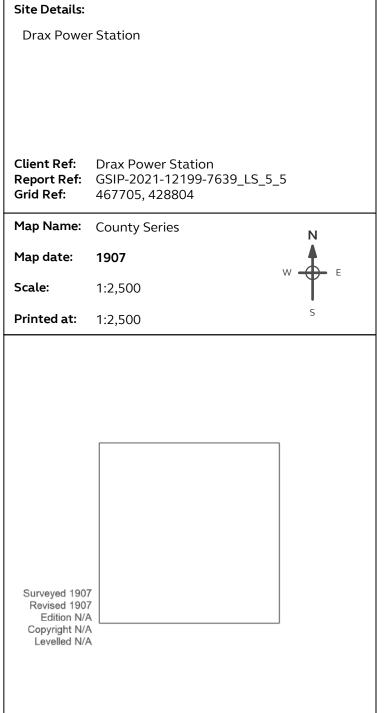


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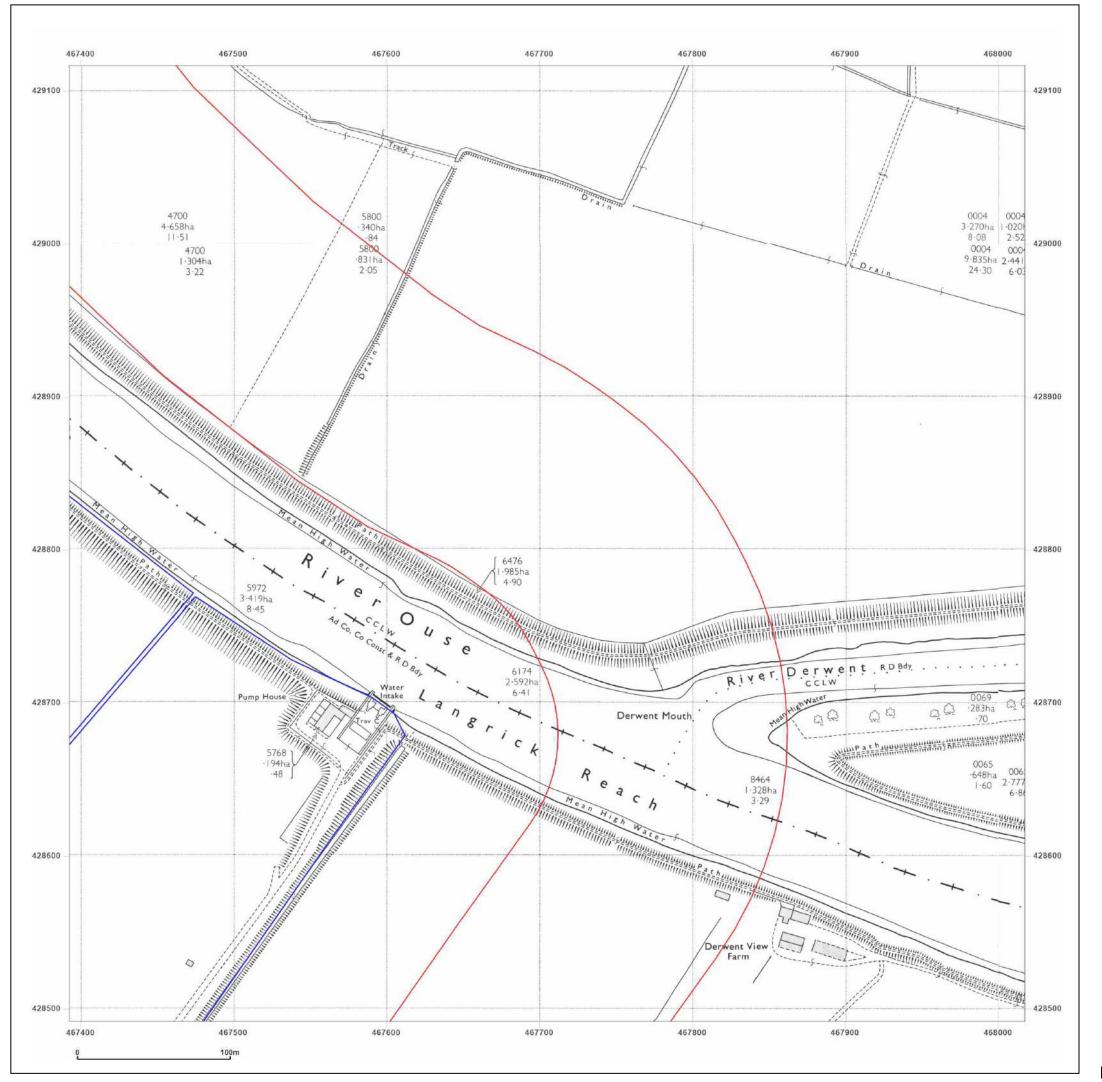




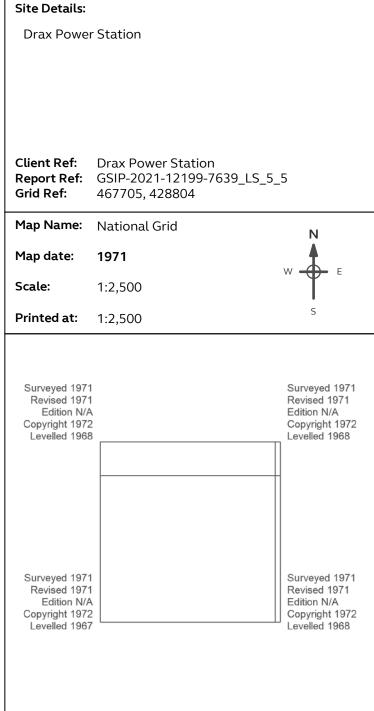


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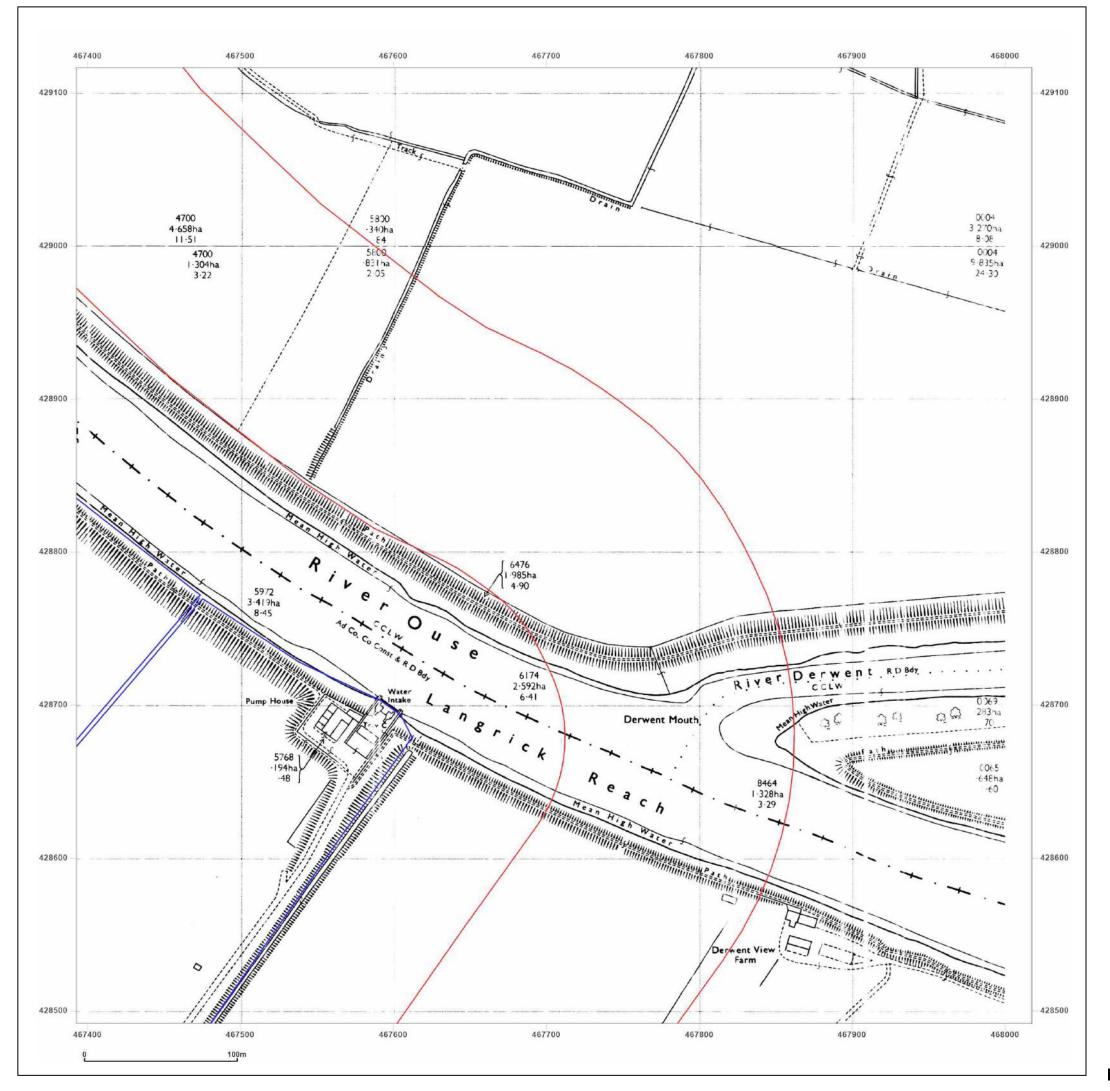




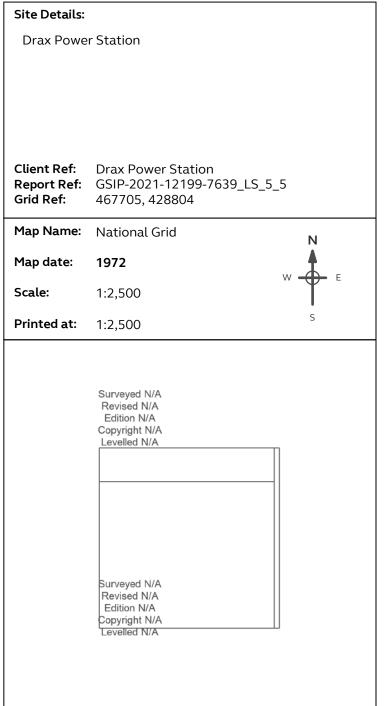


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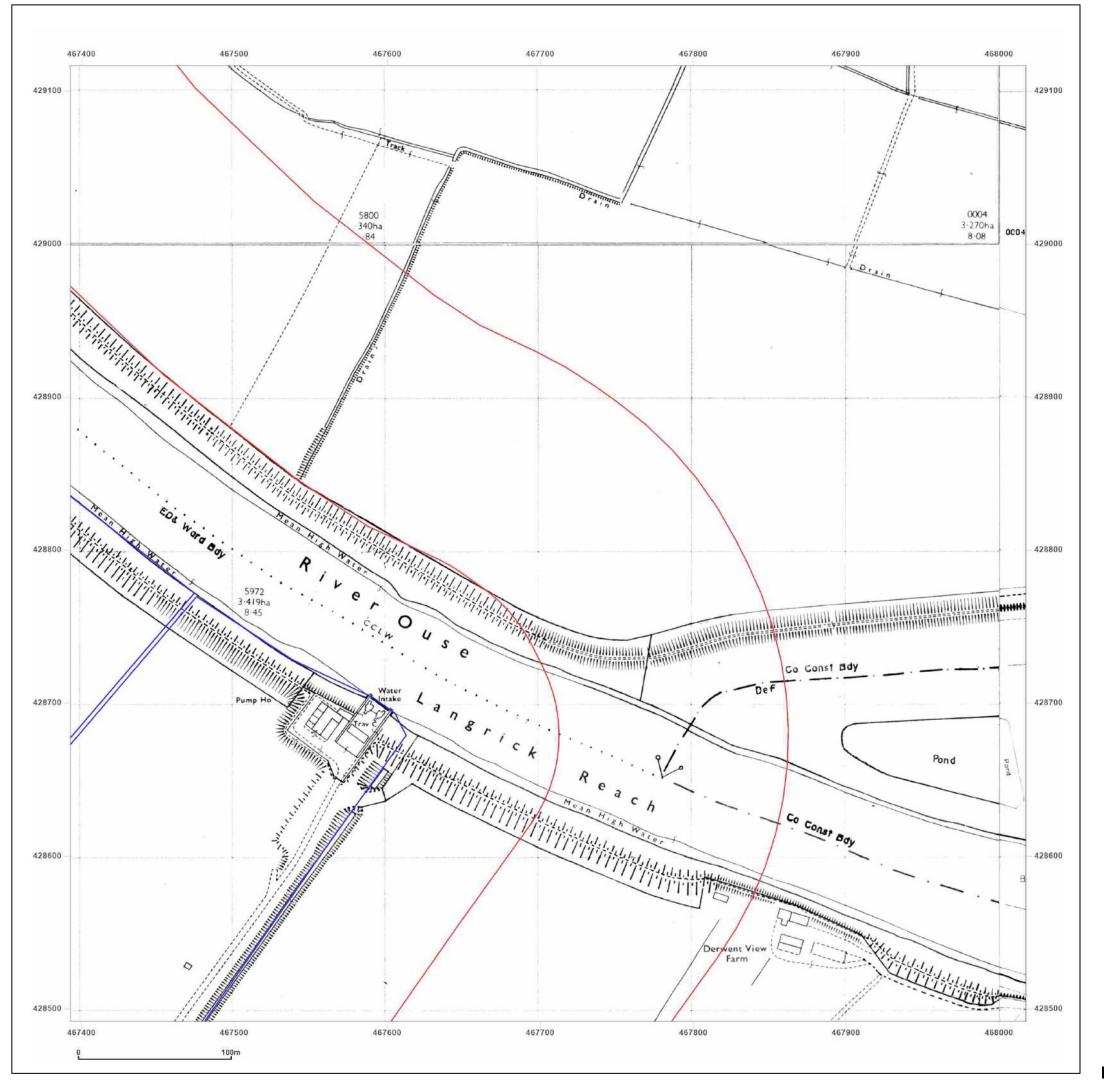




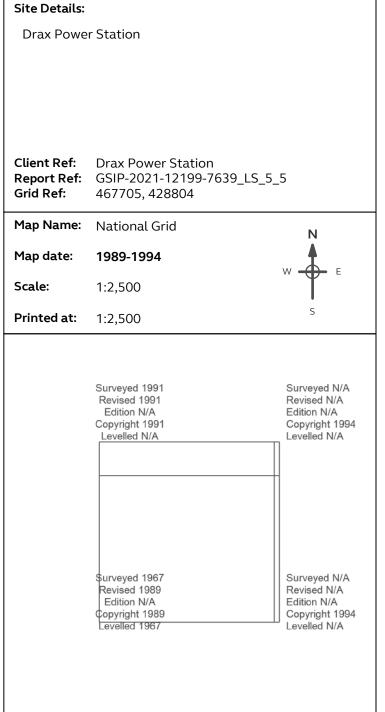


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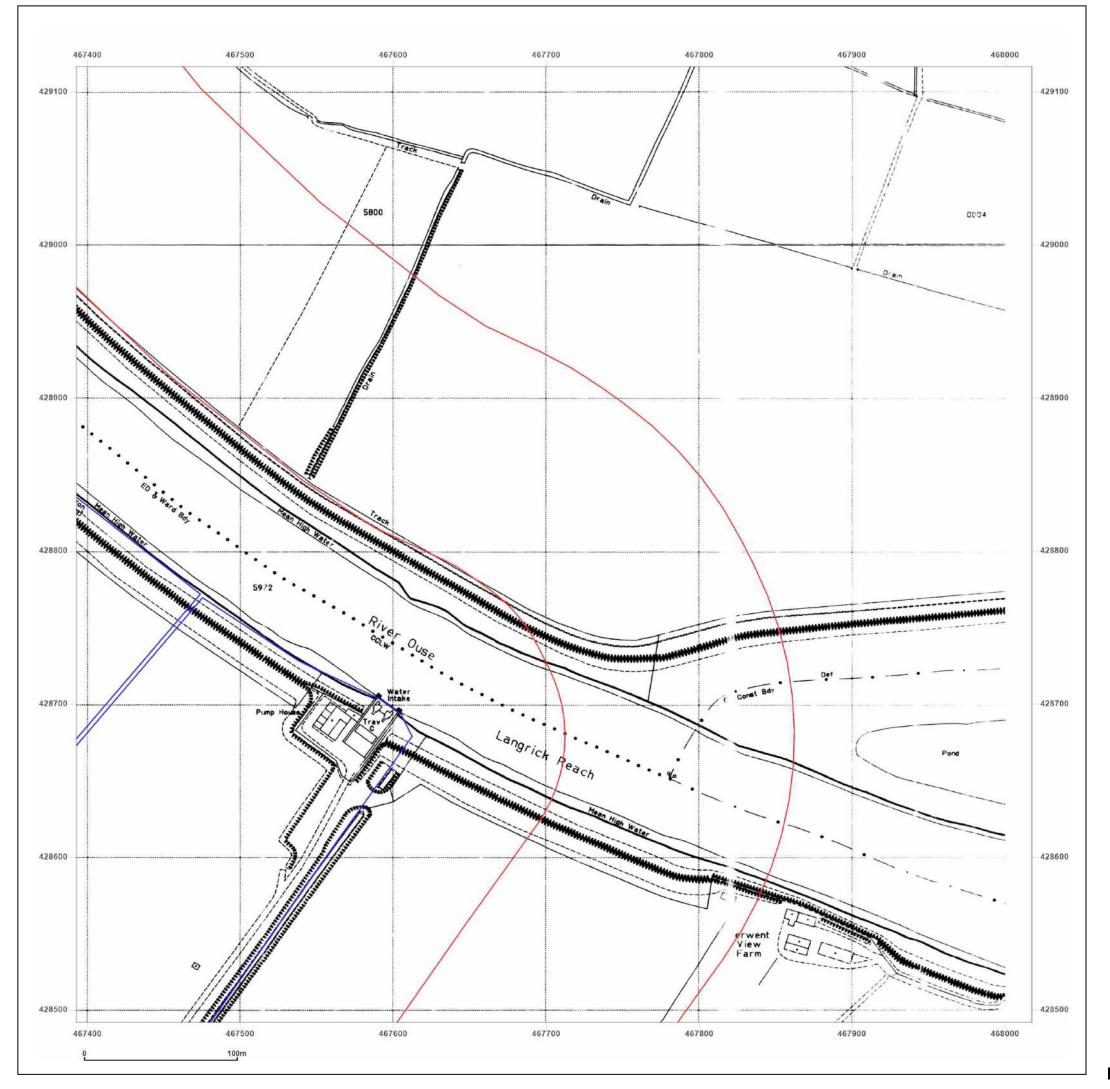




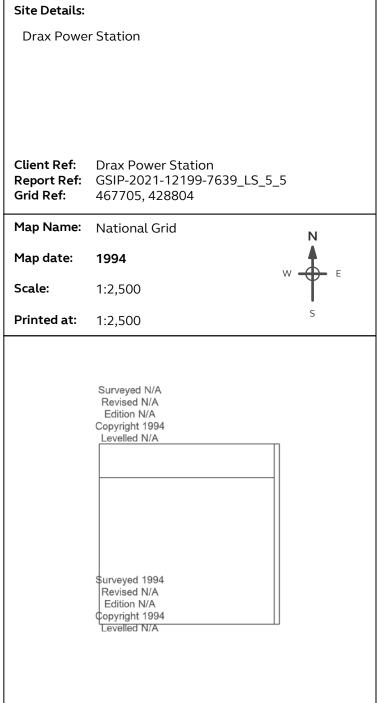


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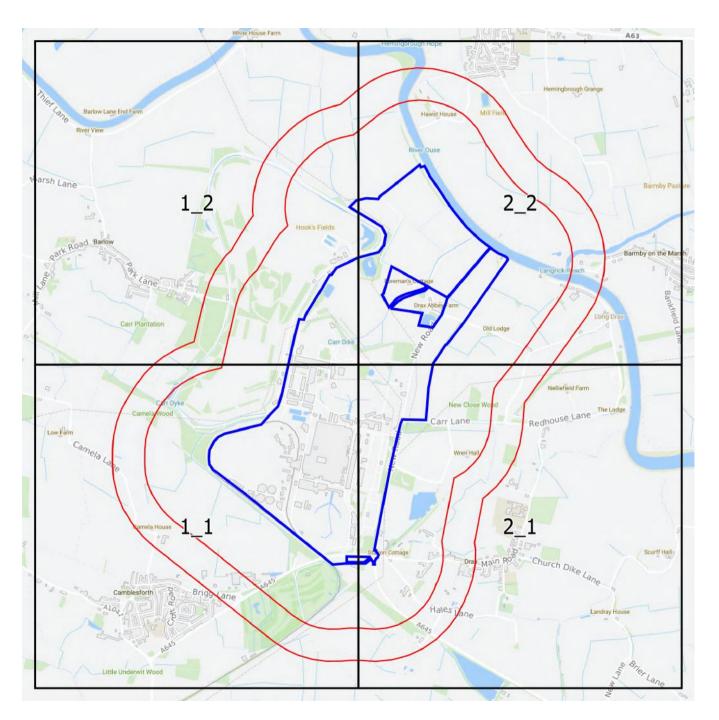






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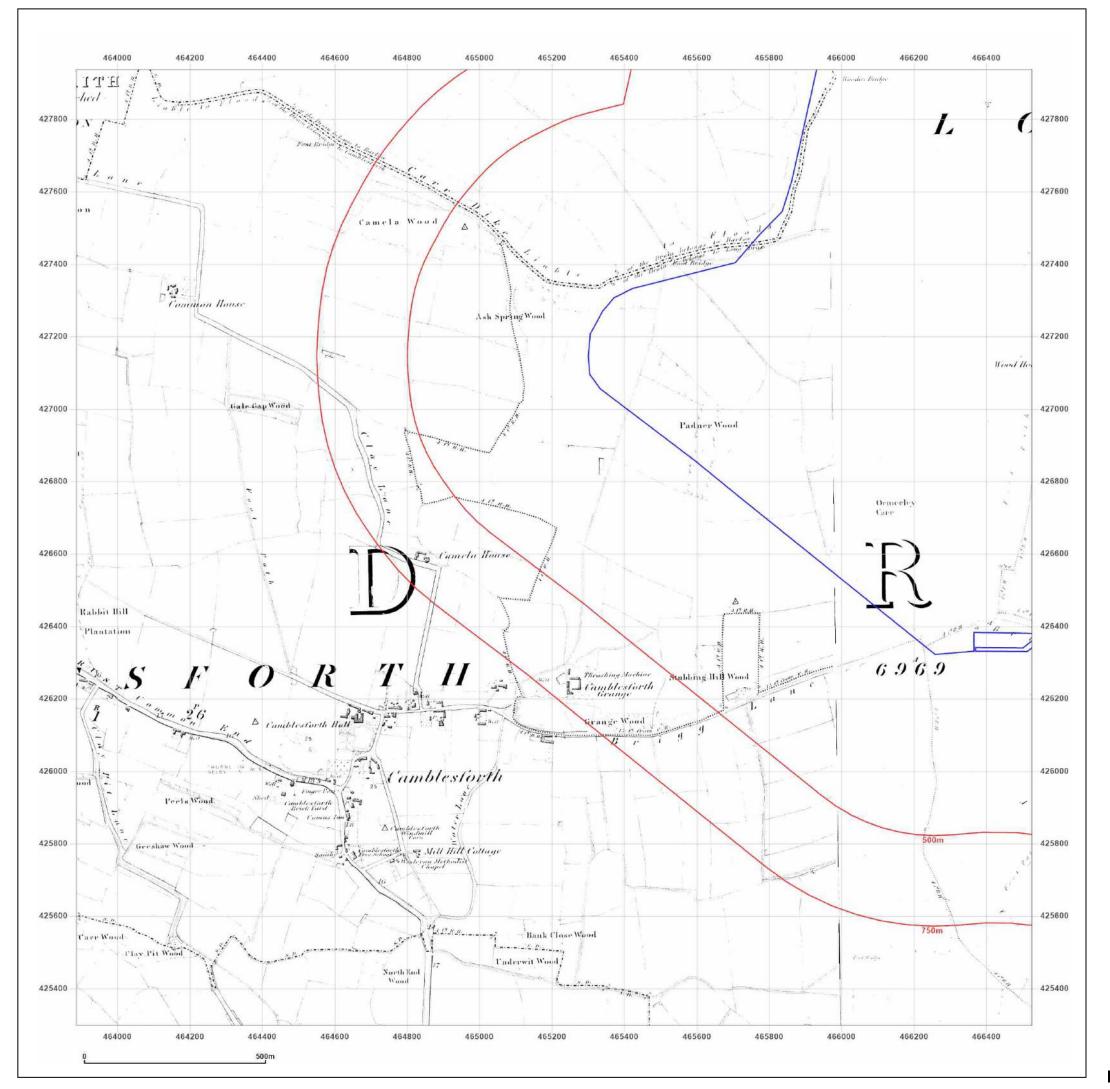
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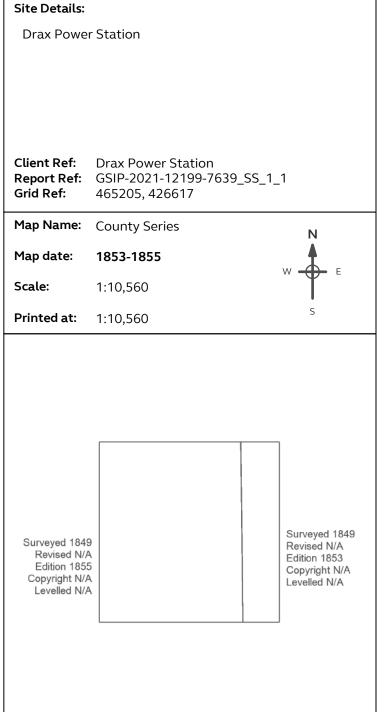


Small Scale Grid Index





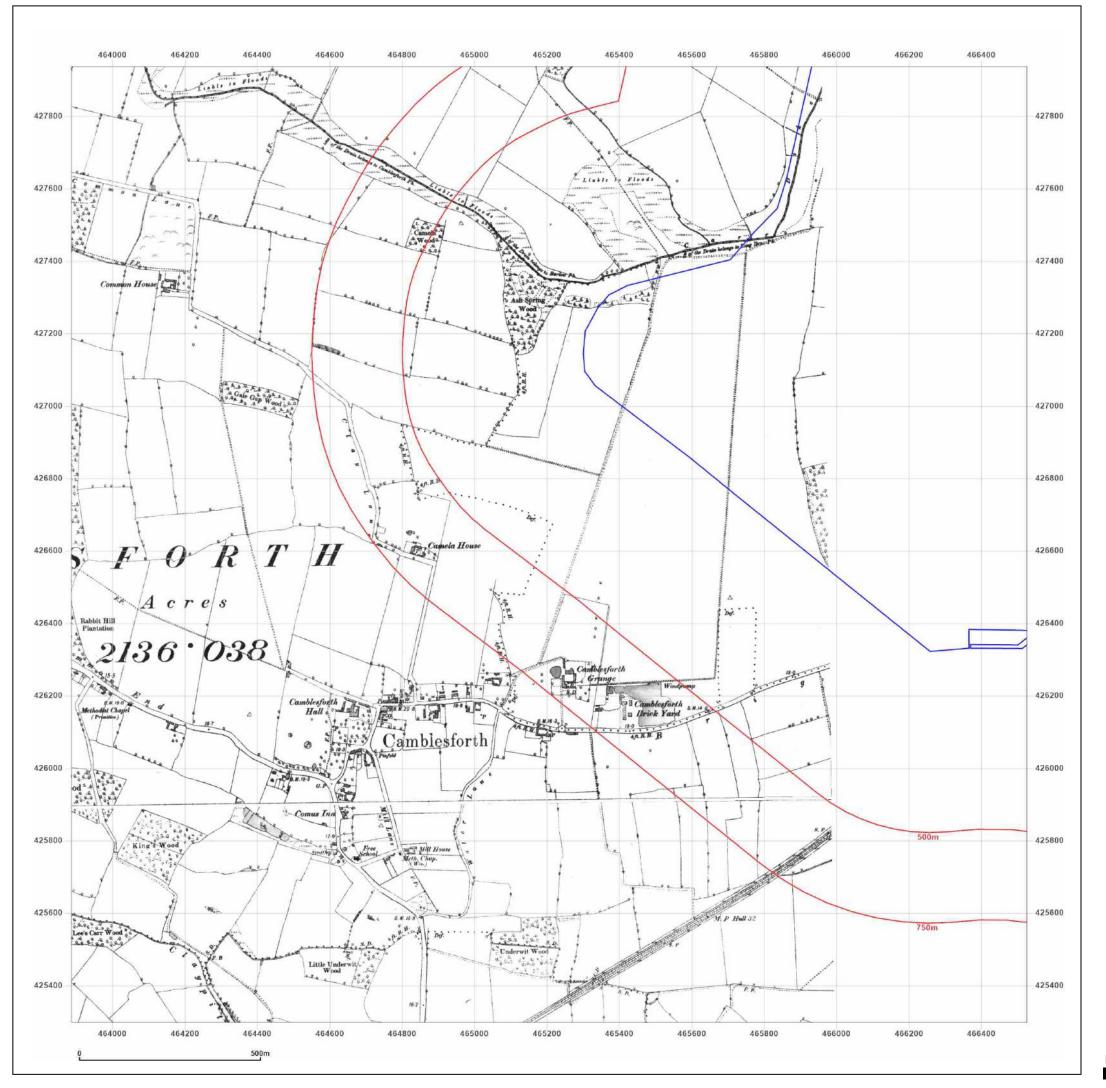






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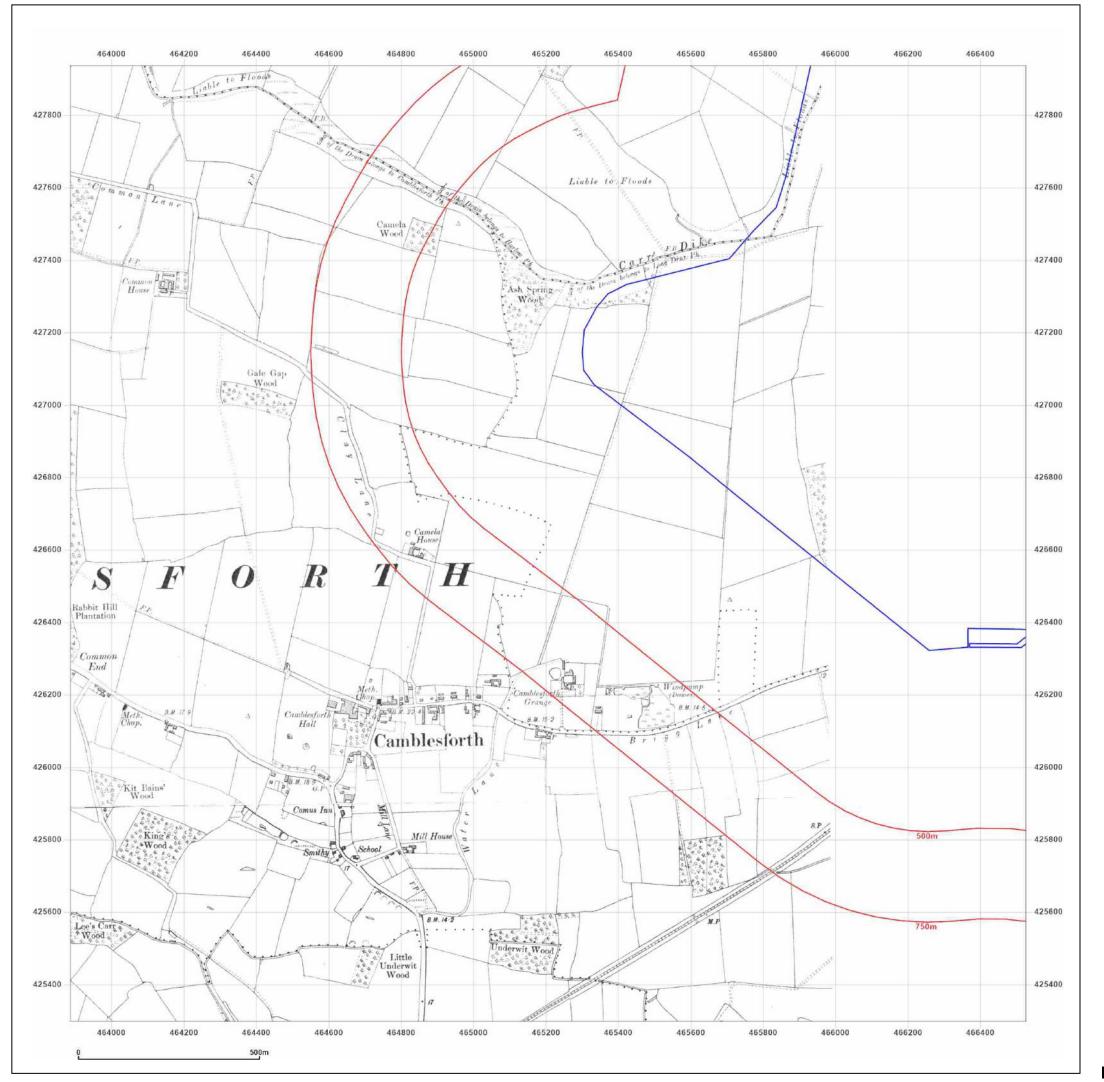


Site Details:		
Drax Power Station		
Client Ref: Report Ref: Grid Ref:	Drax Power Station GSIP-2021-12199-7639_SS_1_1 465205, 426617	
Map Name:	County Series N	
Map date:	1891	
Scale:	1:10,560	
Printed at:	1:10,560 S	
Surveyed 1889 Revised N/A Edition 1891 Copyright N/A Levelled N/A		
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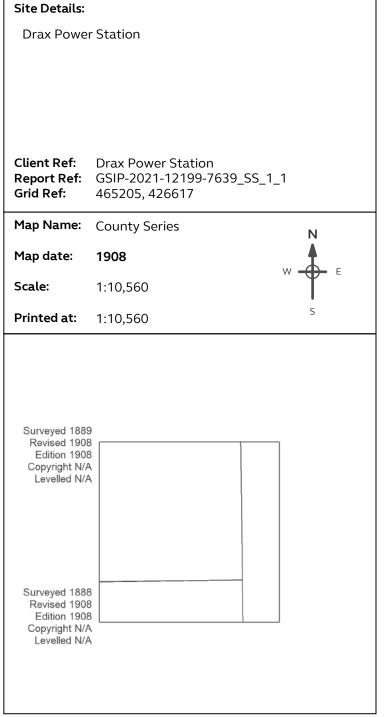


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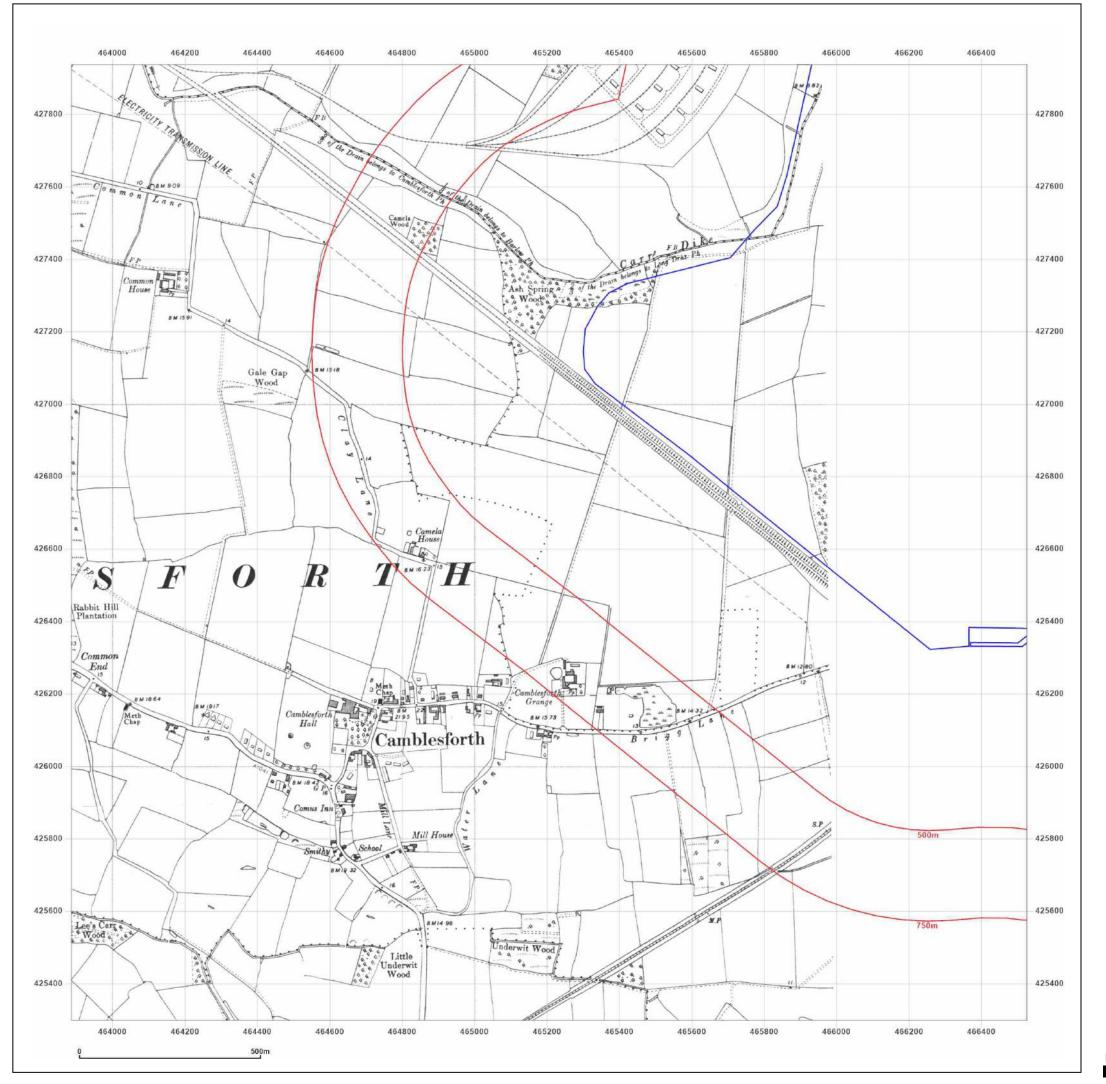




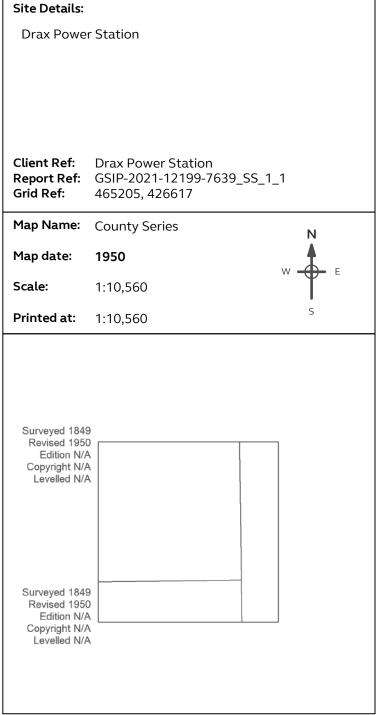


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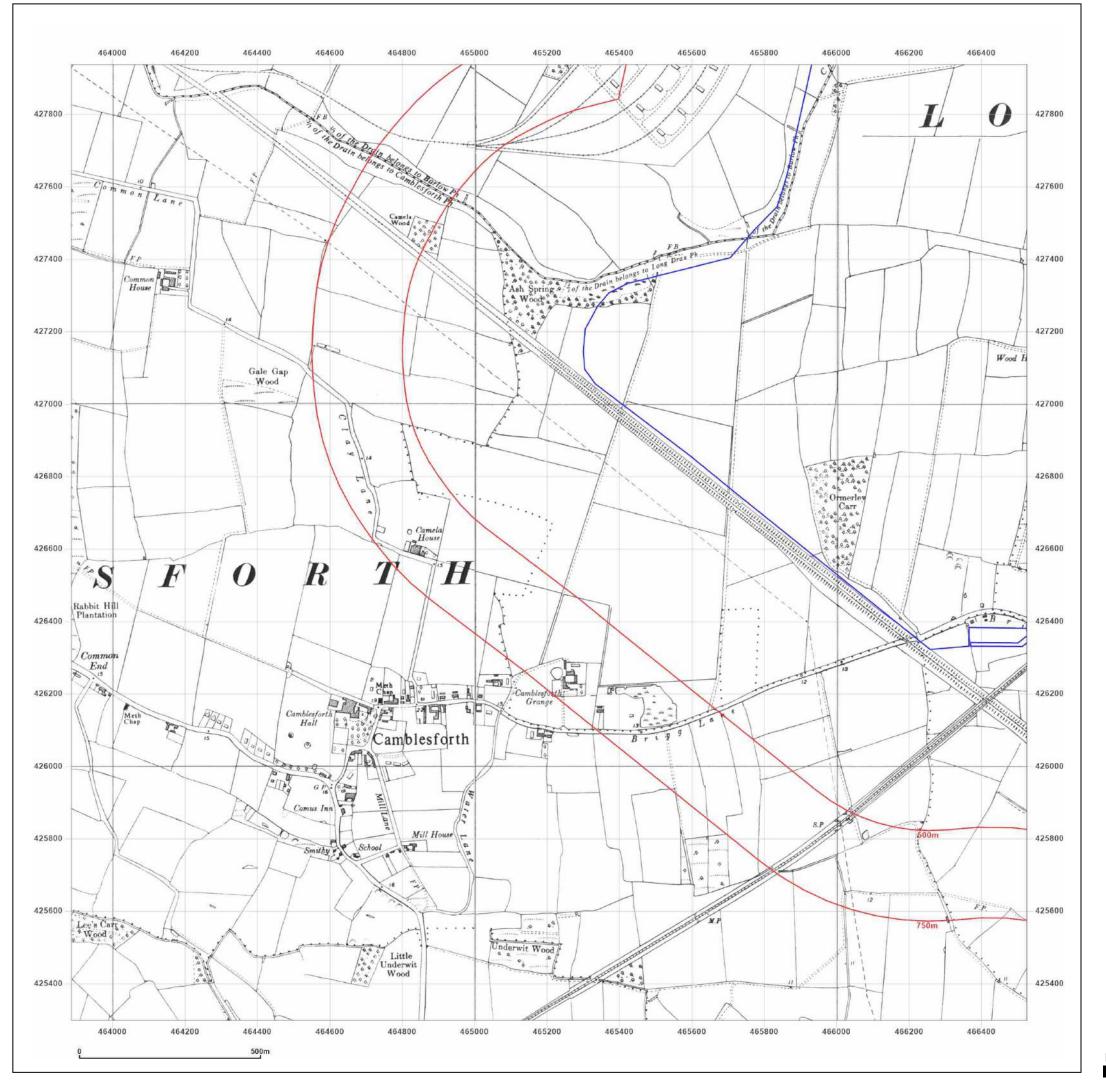






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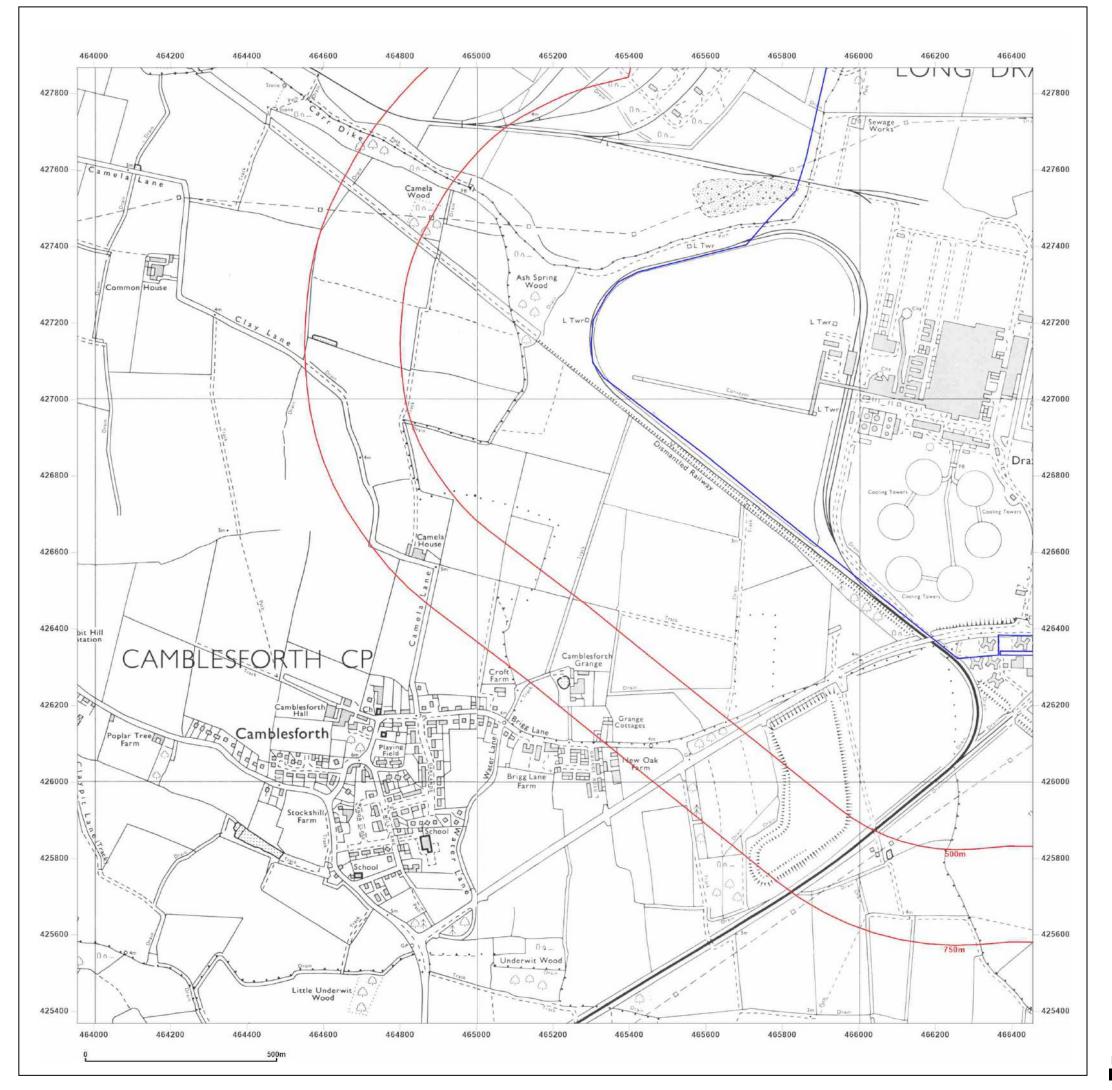


Site Details:				
Drax Powe	Station			
Client Ref: Report Ref: Grid Ref:	465205, 426617		1	
Map Name:	Provisional		N	
Map date:	1958		W E	
Scale:	1:10,560		" T '	
Printed at:	1:10,560		S	
Surveyed N/A Revised 1957 Edition N/A Copyright 1958 Levelled N/A			Surveyed N/A Revised 1957 Edition N/A Copyright 1958 Levelled N/A	



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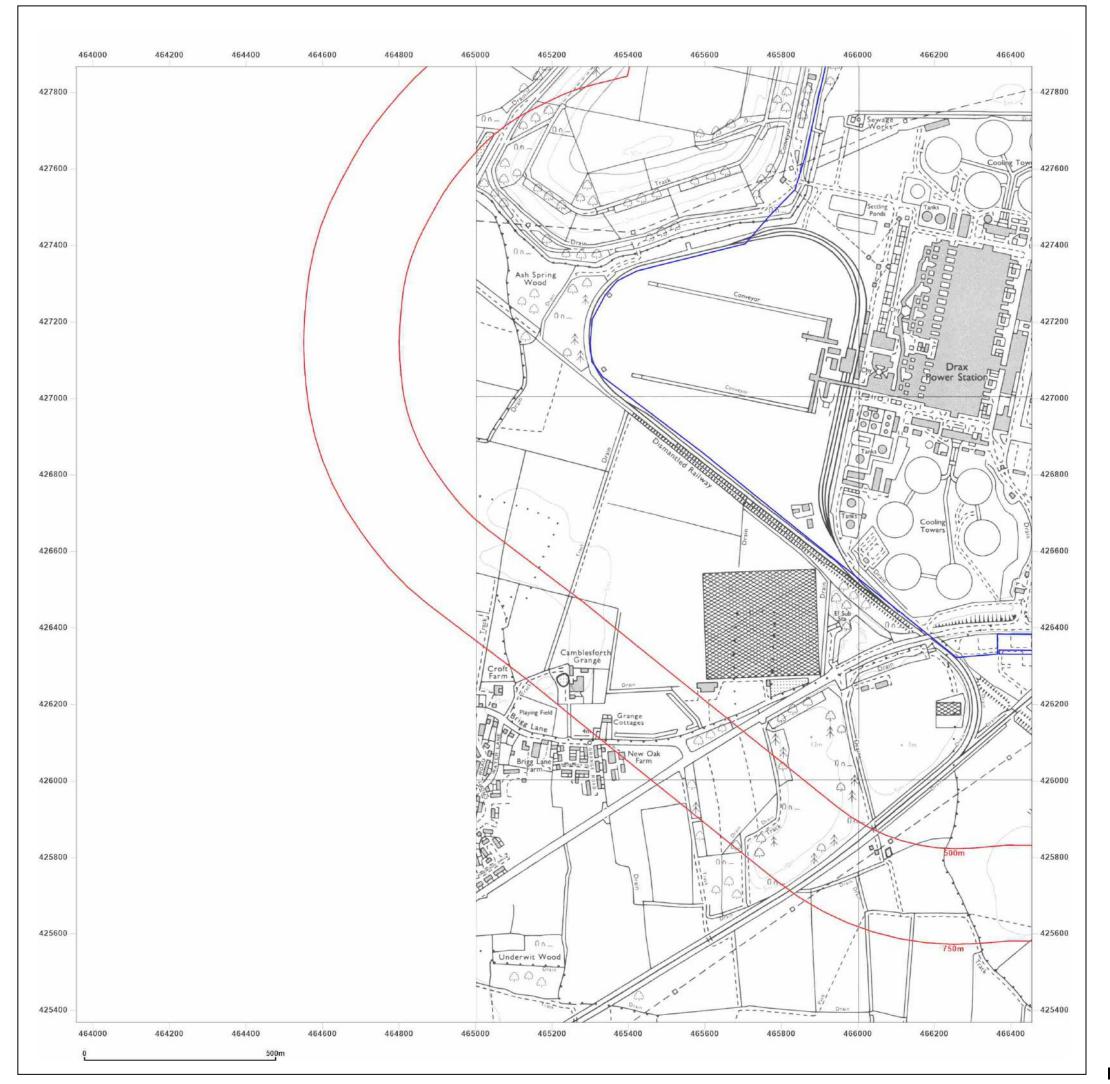


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Map date:	1973-1974	W - 6		
Scale:	1:10,000	W F		
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Surveyed 1971 Revised 1973 Edition N/A Copyright N/A Levelled N/A	3	Surveyed 1974 Revised 1974 Edition N/A Copyright N/A Levelled N/A		

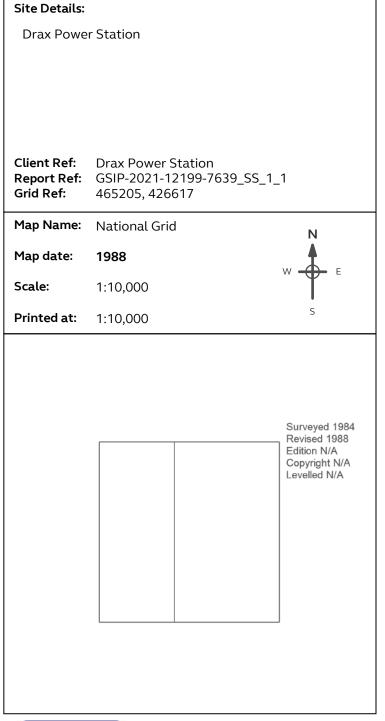


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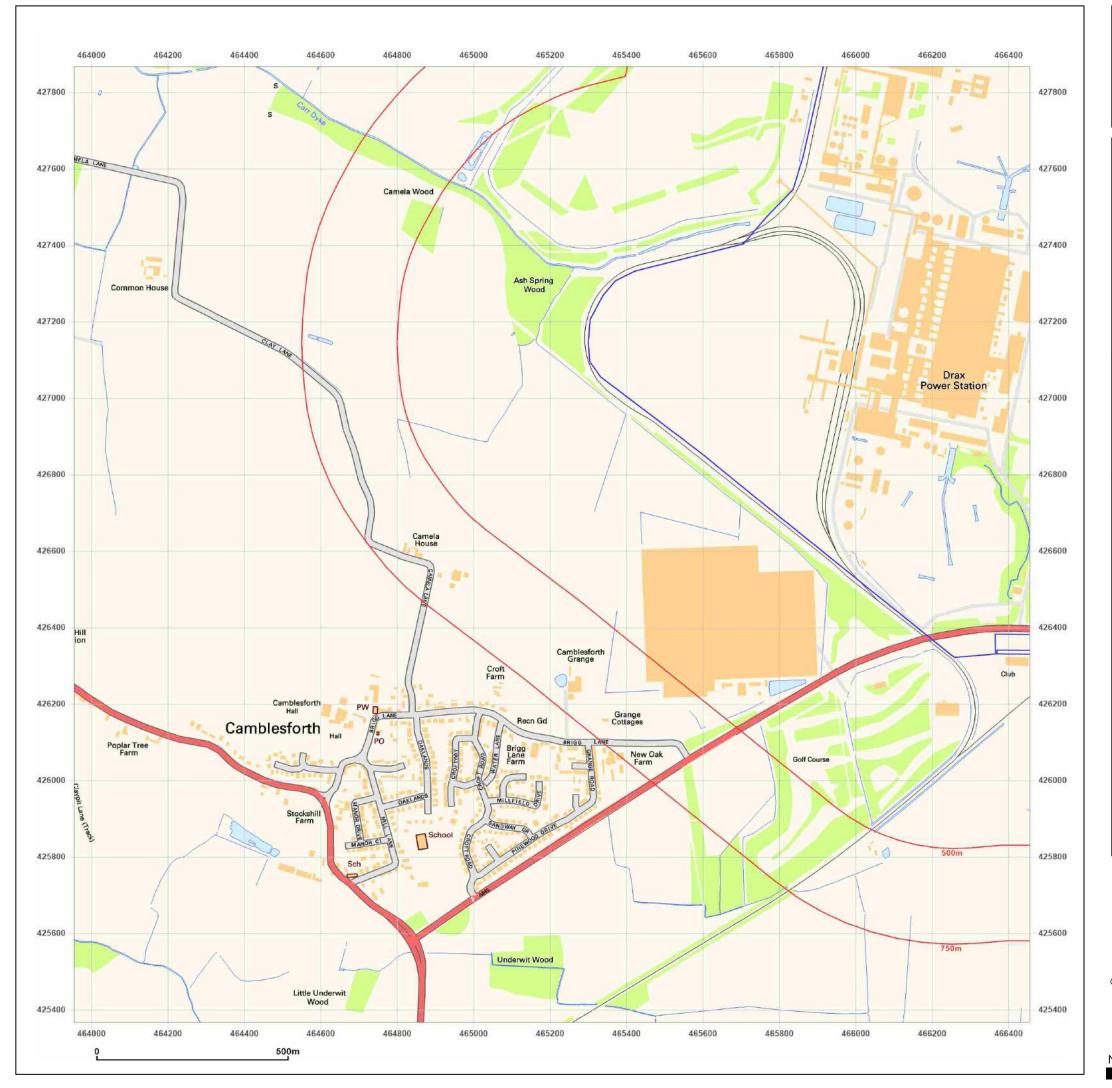




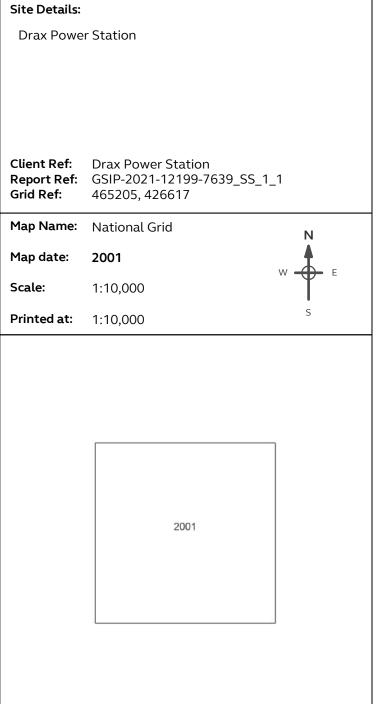


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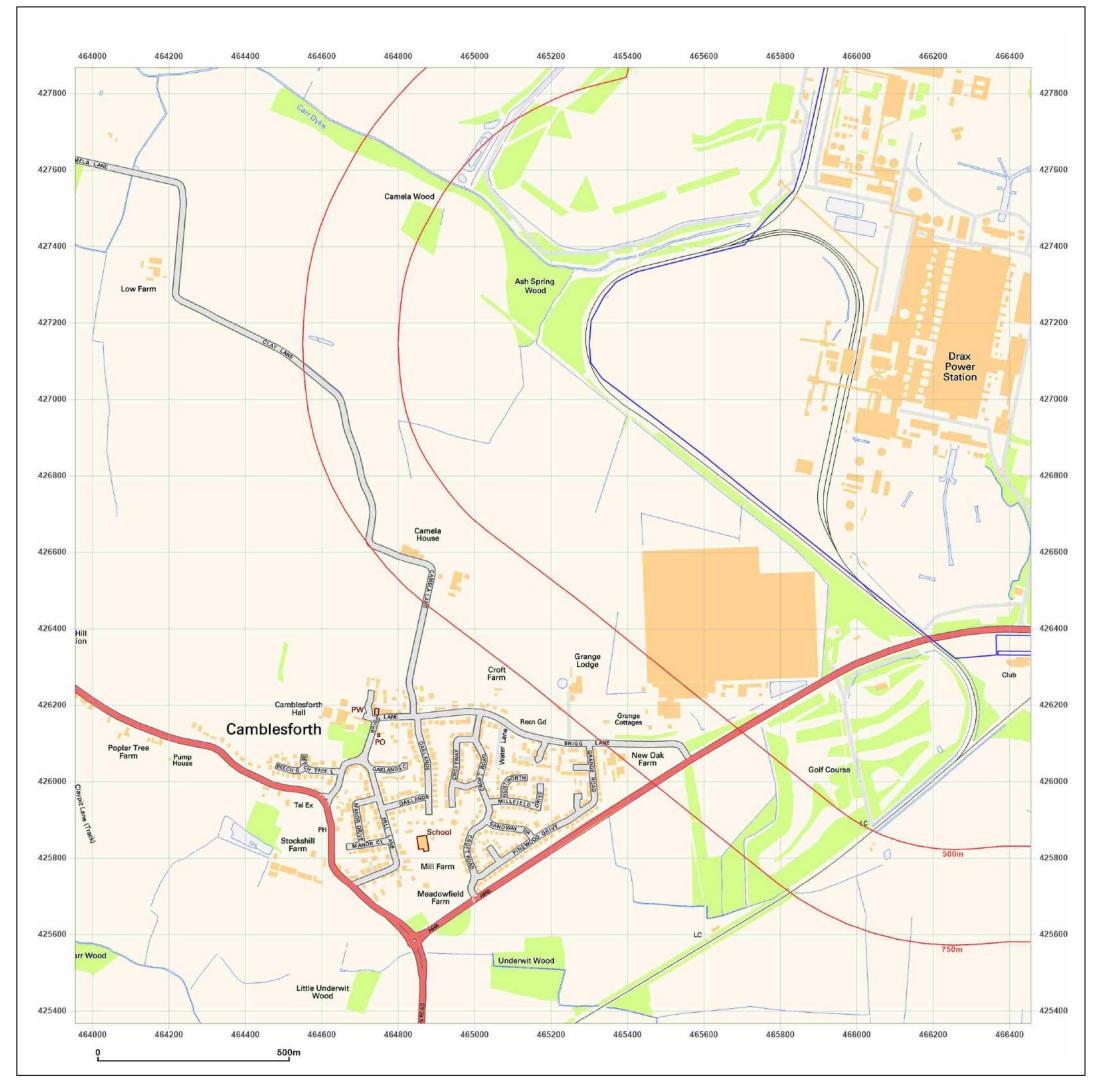




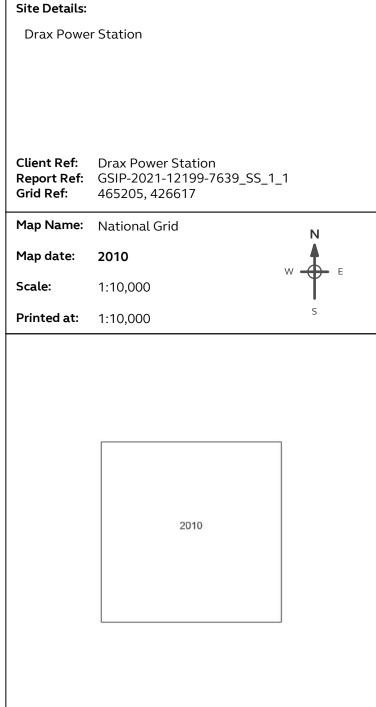


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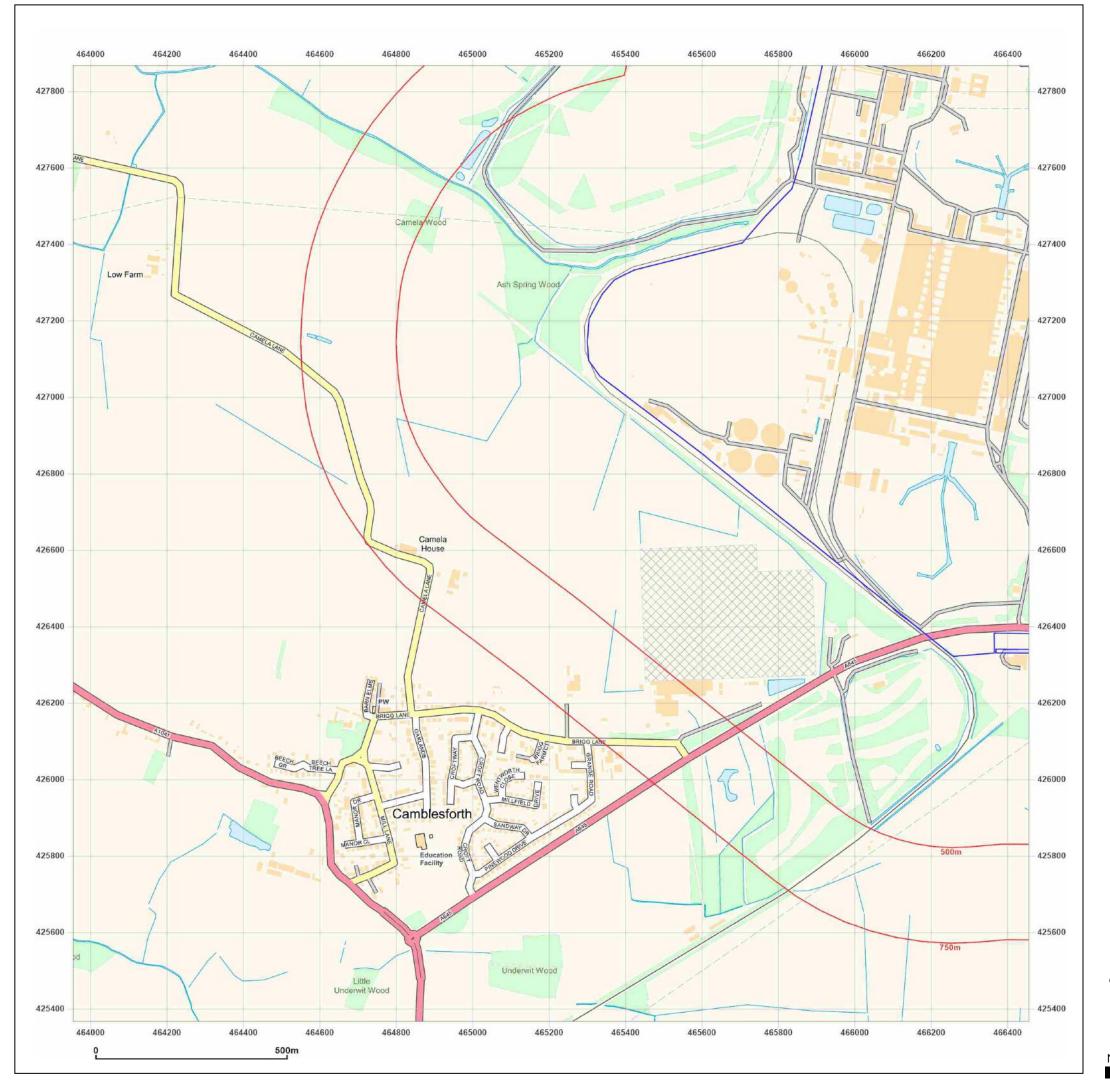




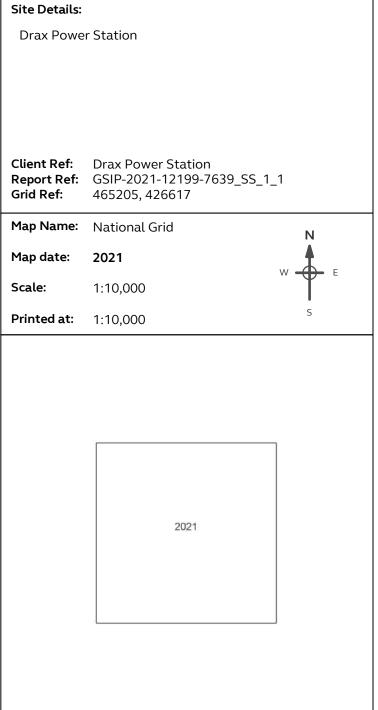


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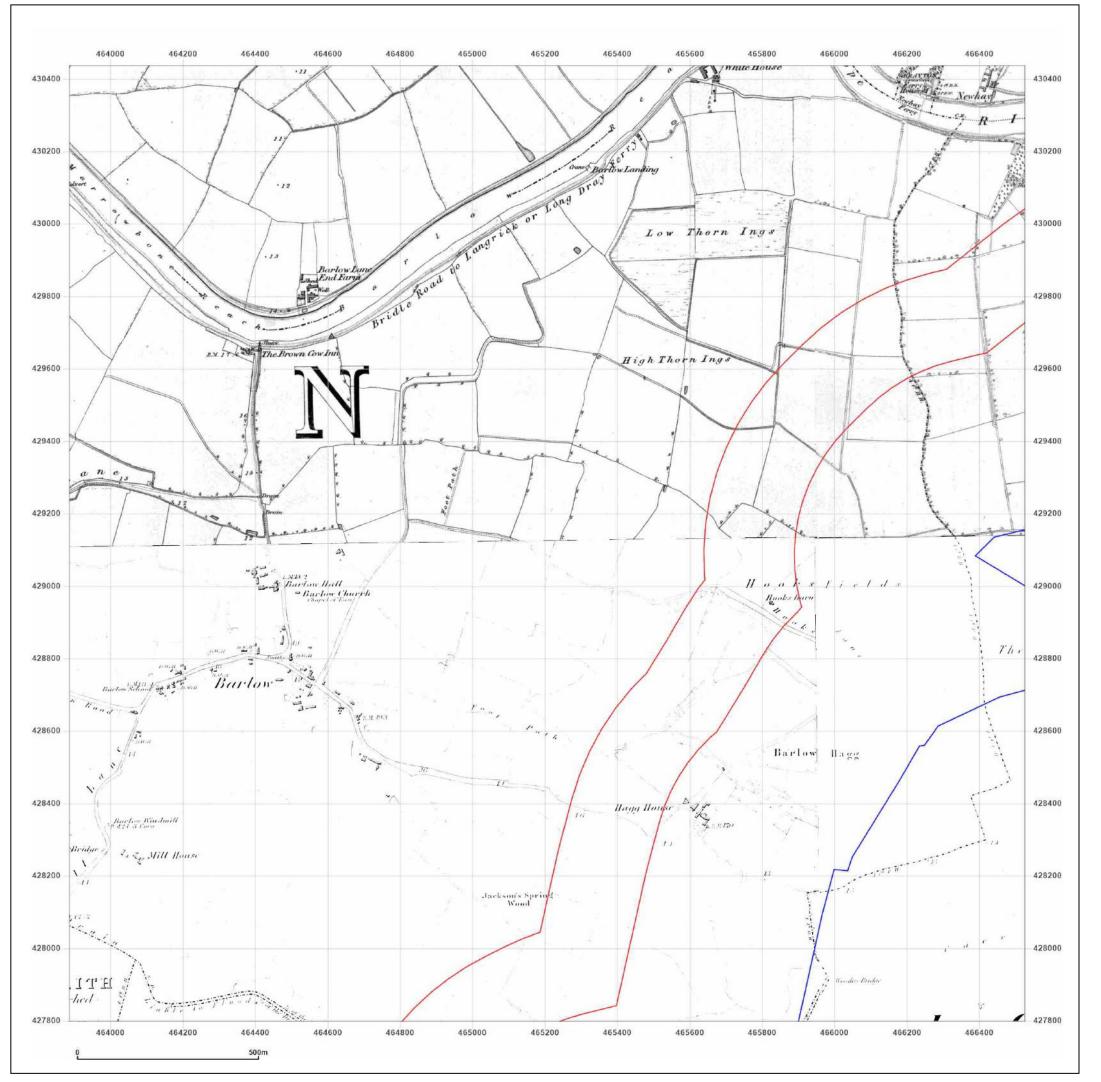




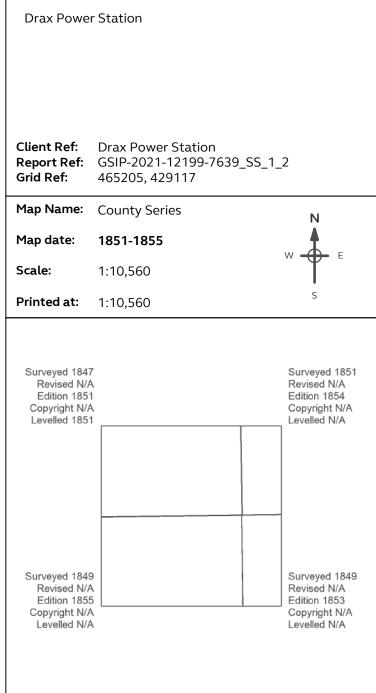


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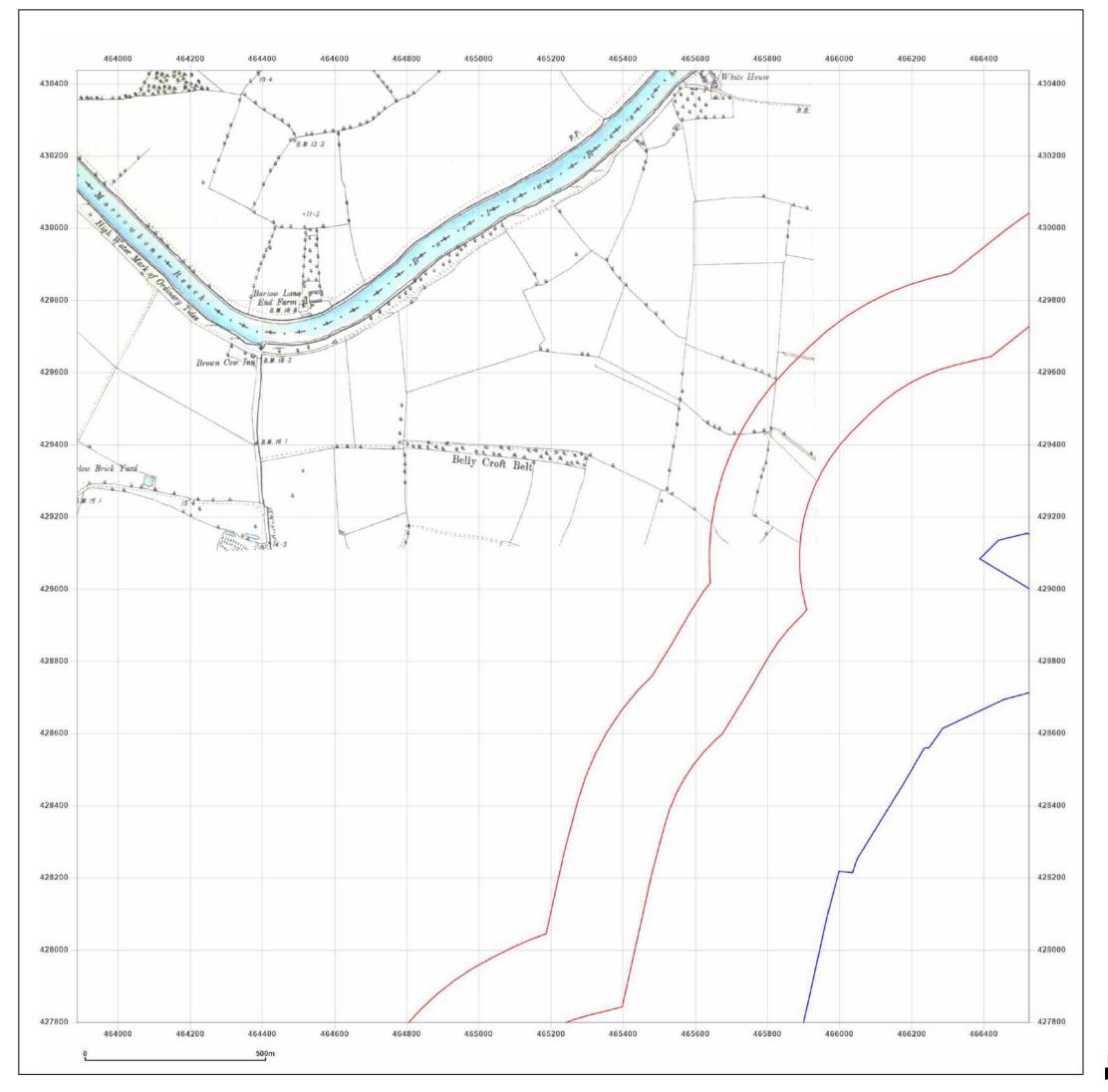




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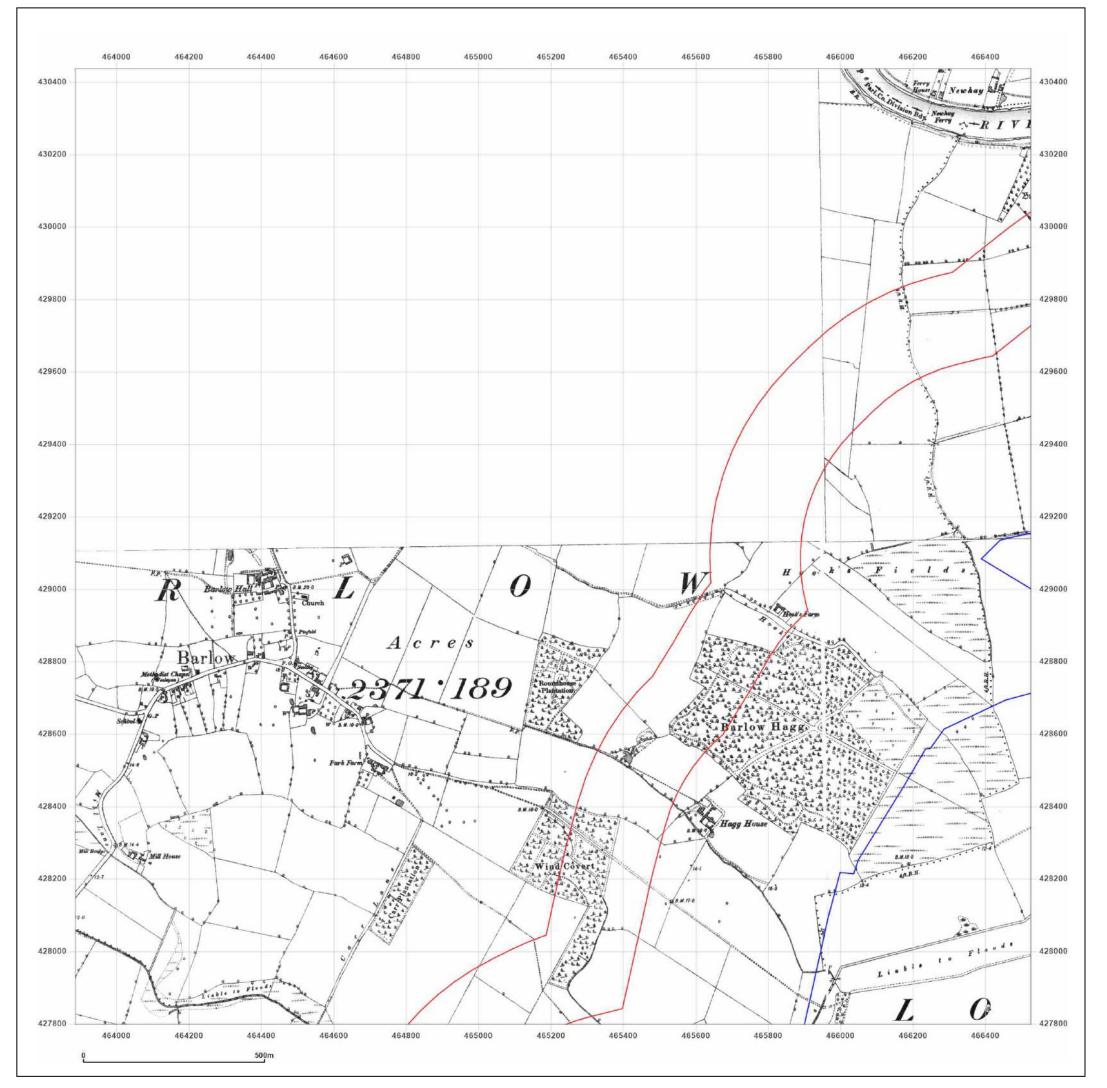


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Map date:	1890			
Scale:	1:10,560			
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Surveyed 1890 Revised 1890 Edition N/A Copyright N/A Levelled N/A) \ \			

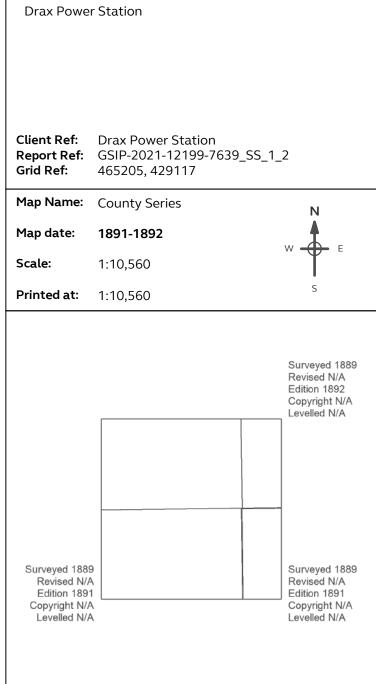


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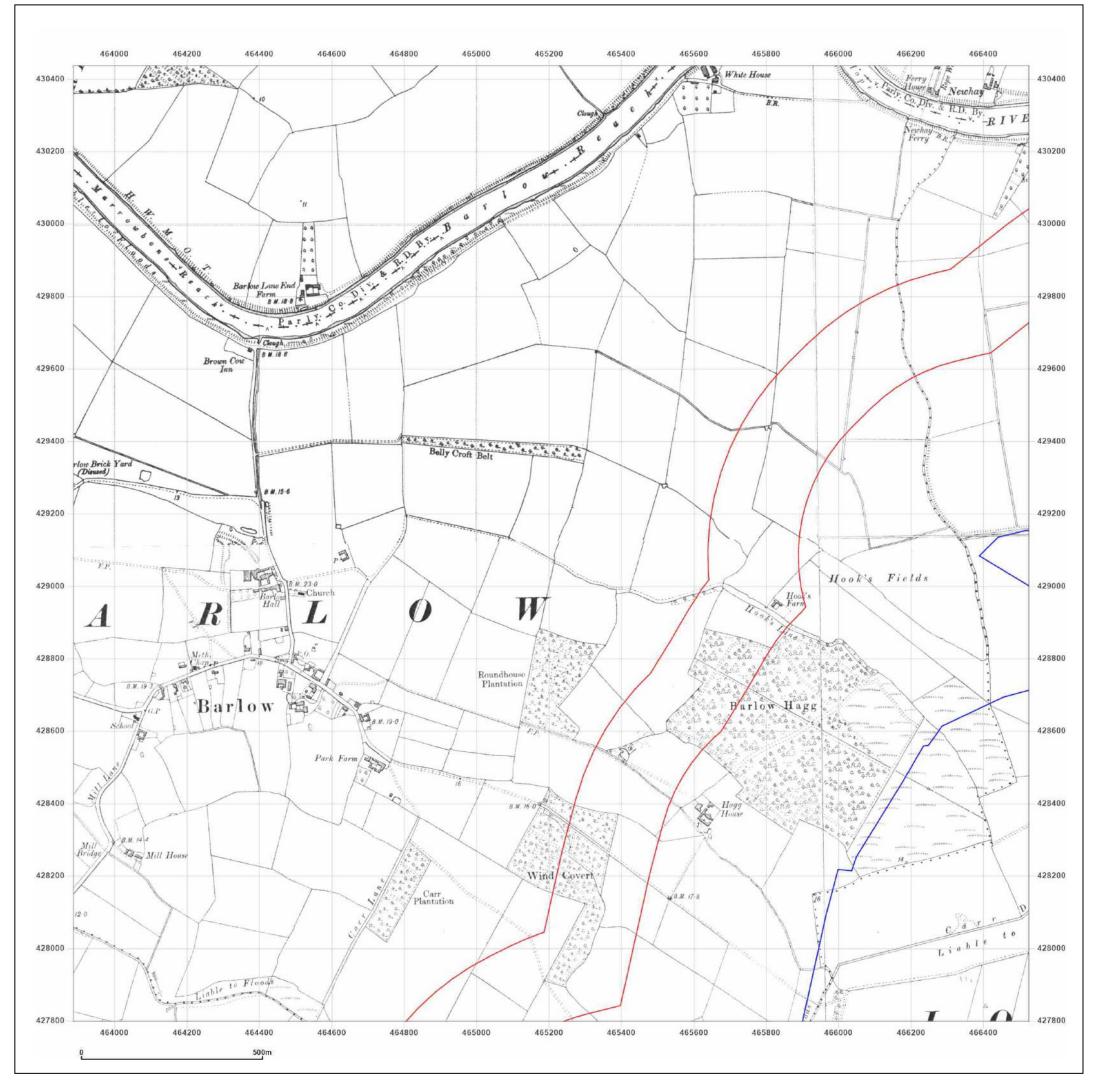




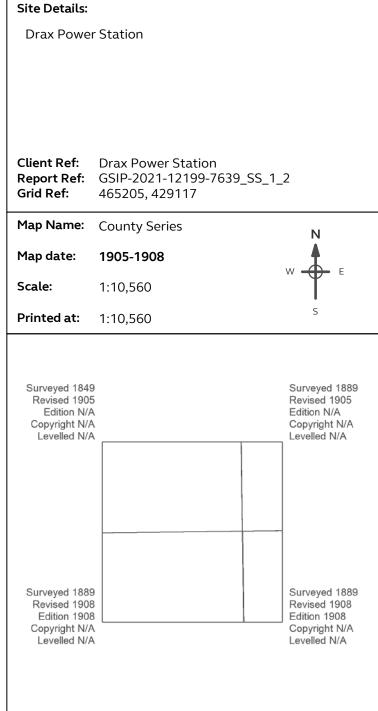
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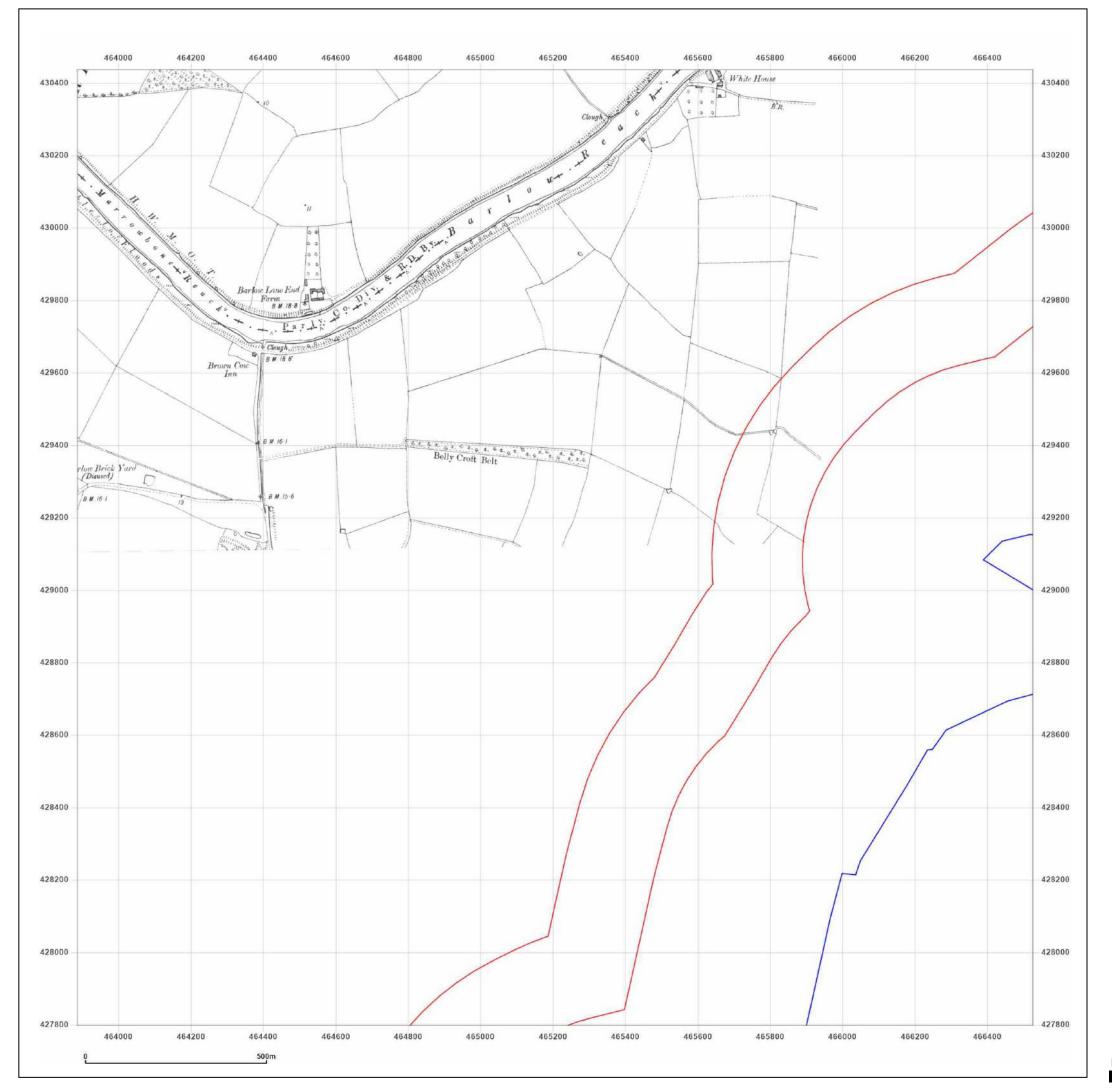




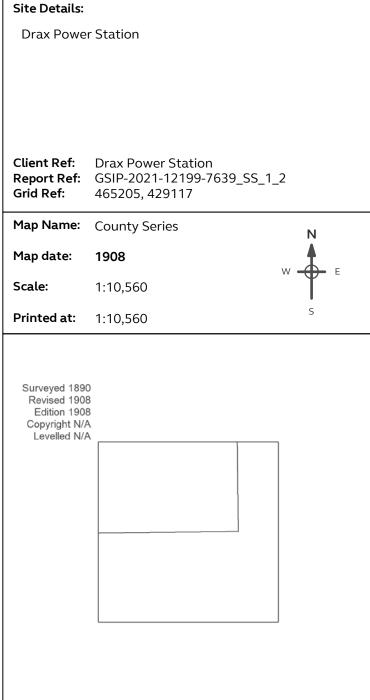


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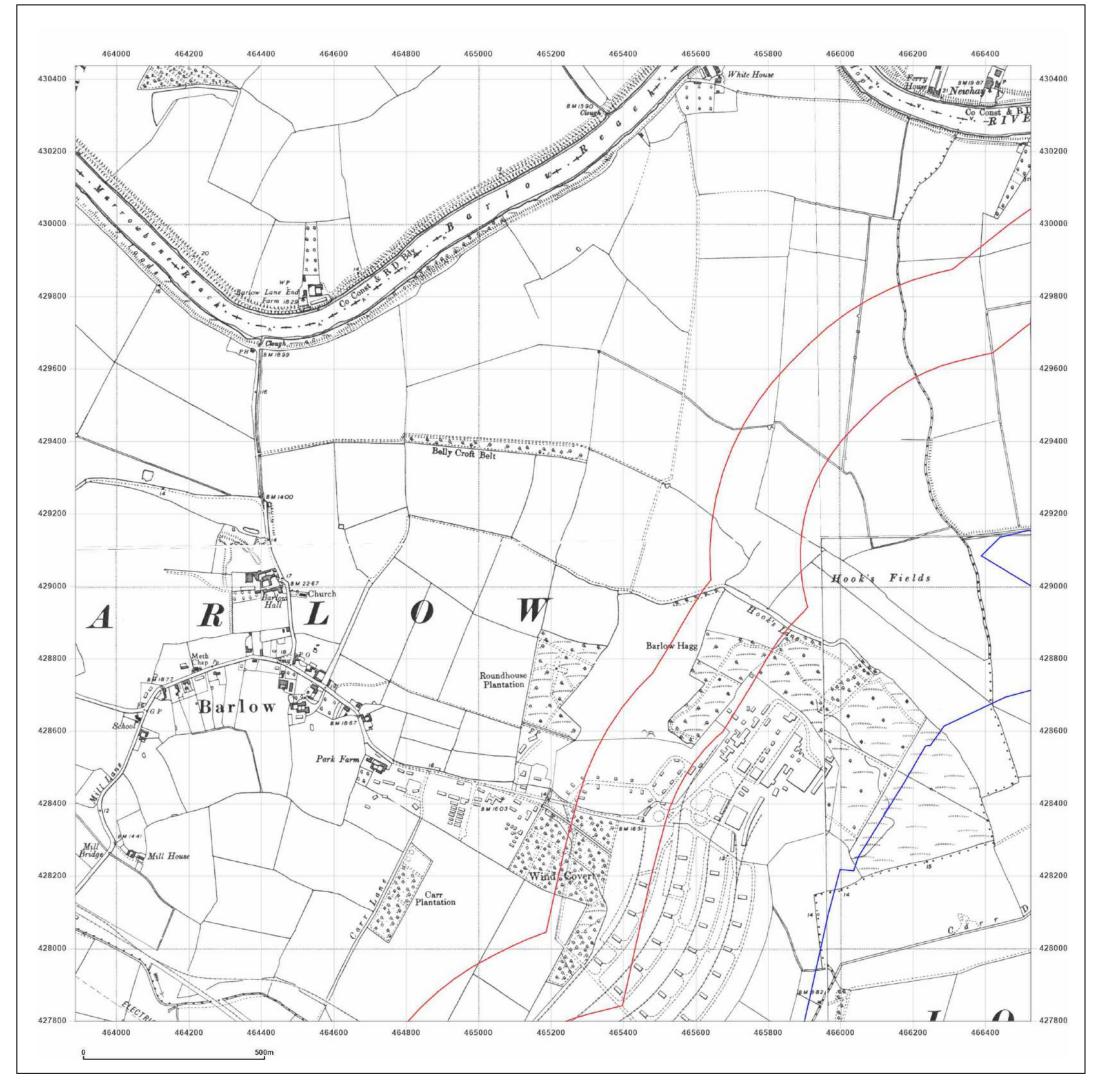




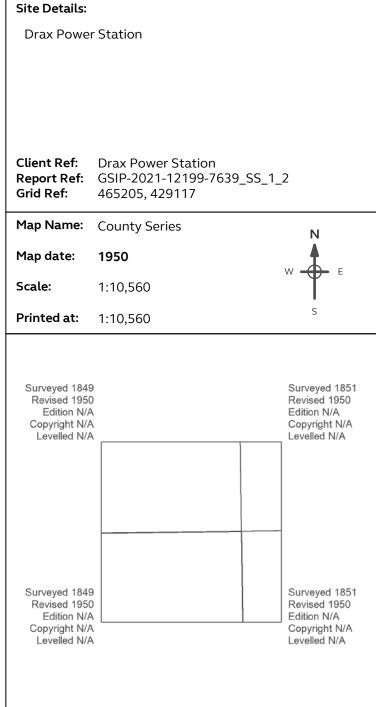


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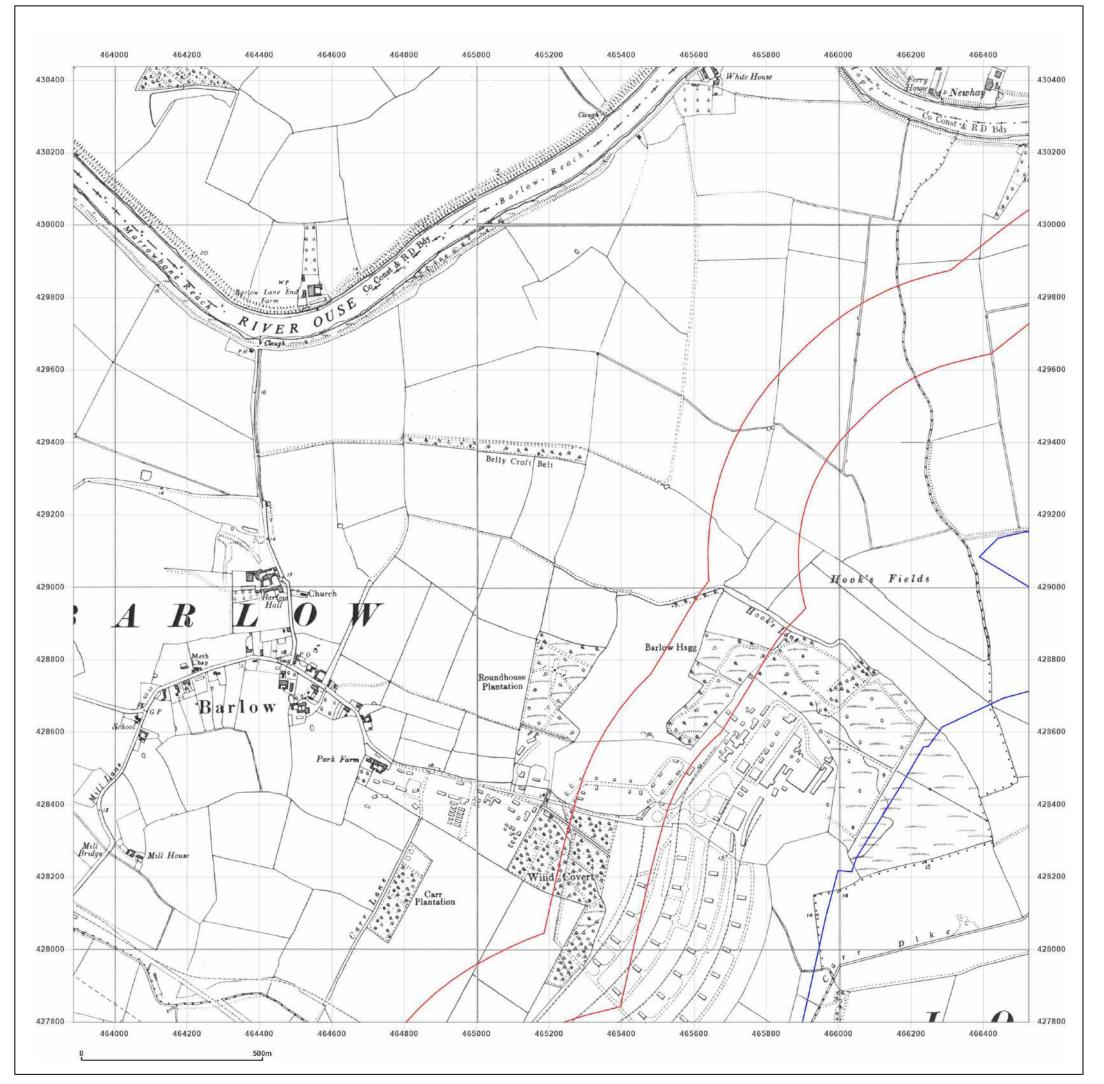






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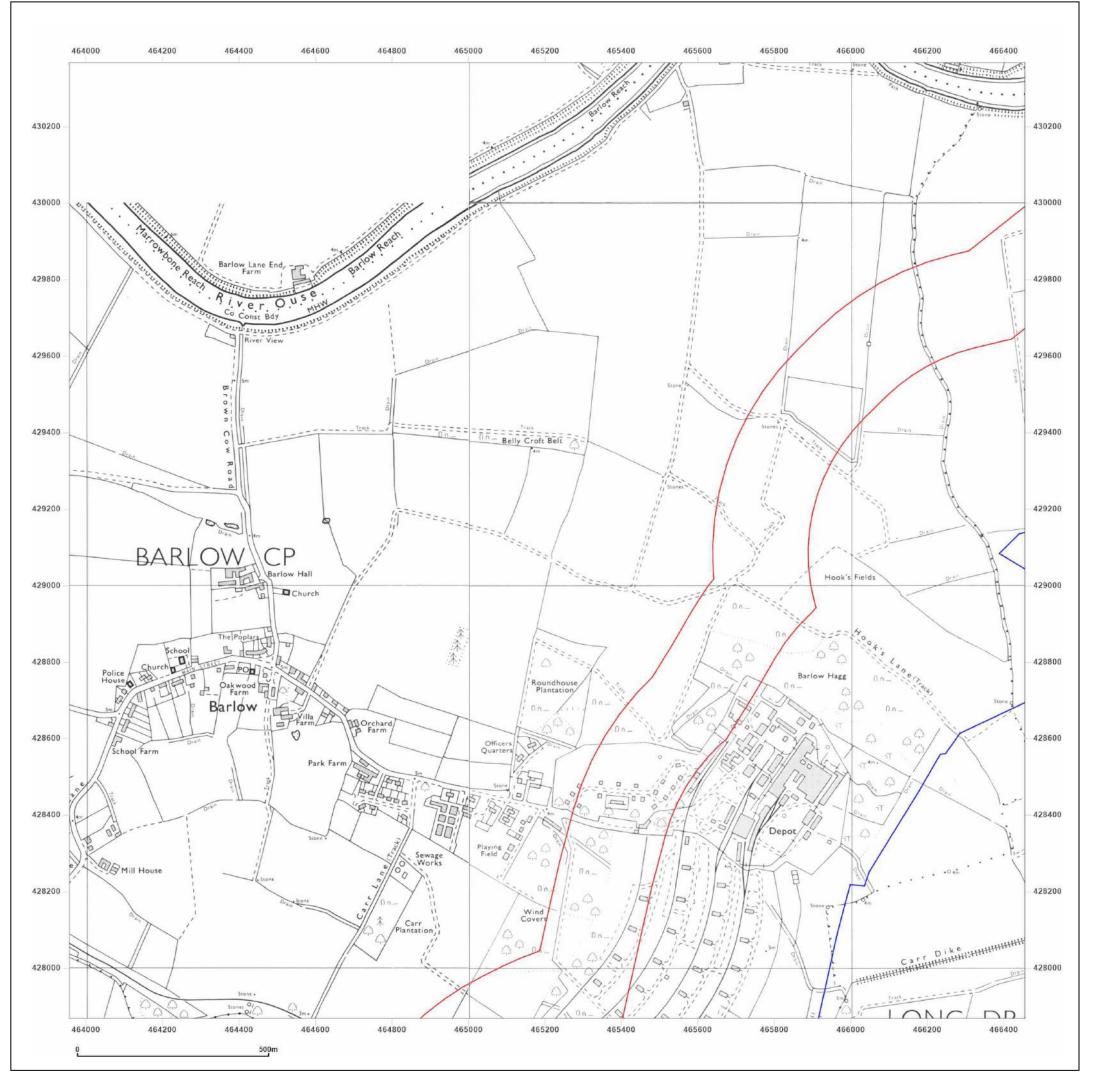
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Map date:	1958	W F	
Scale:	1:10,560		
Printed at:	1:10,560	S	
Surveyed N/A Revised 1957 Edition N/A Copyright 1958 Levelled N/A	7 A 3	Surveyed N/A Revised 1957 Edition N/A Copyright 1958 Levelled N/A	
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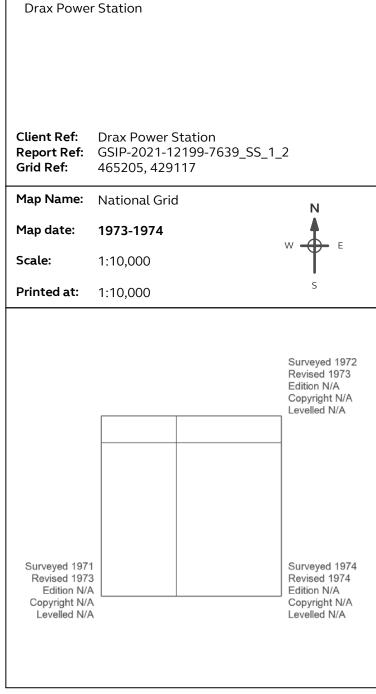
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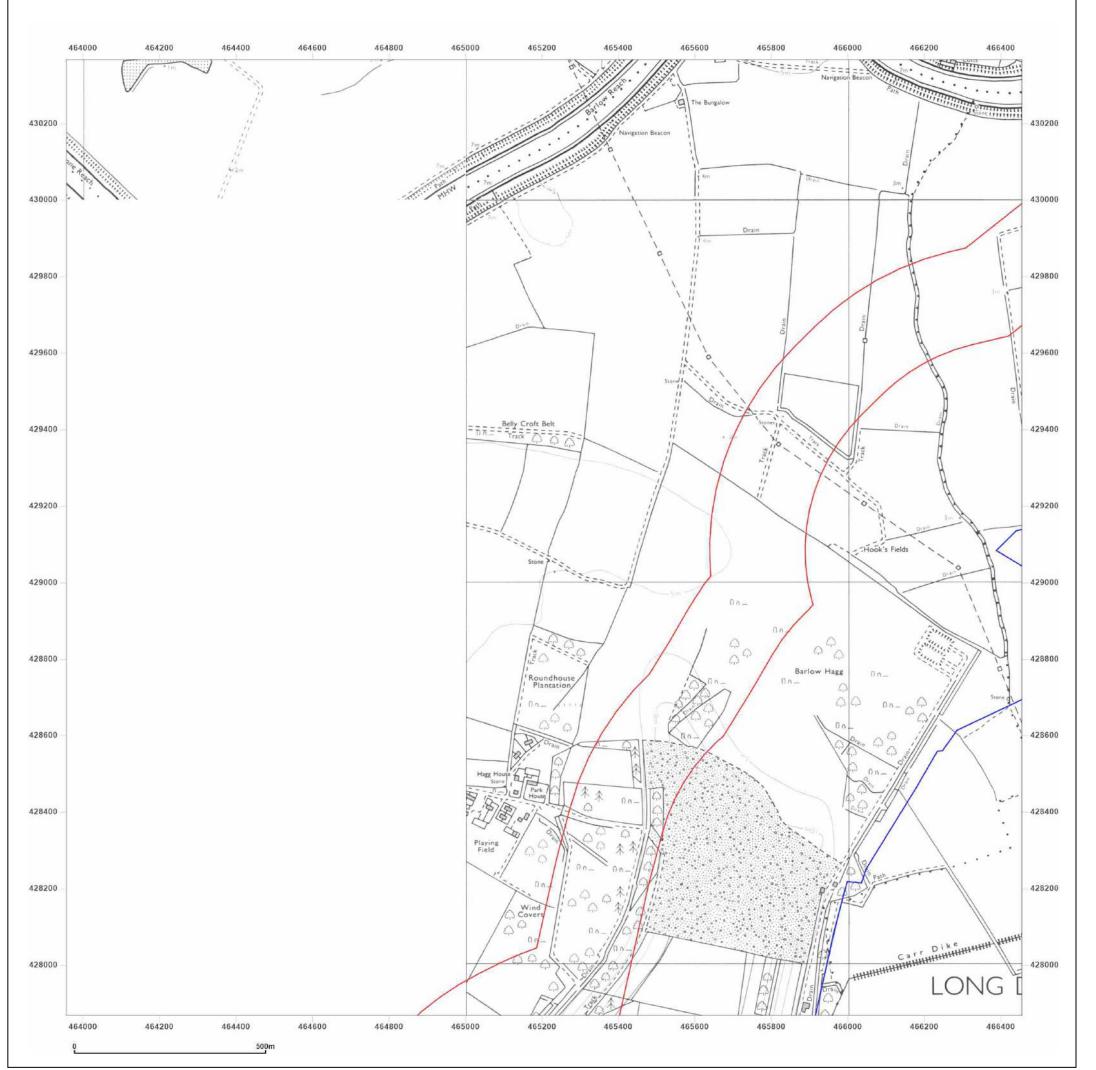




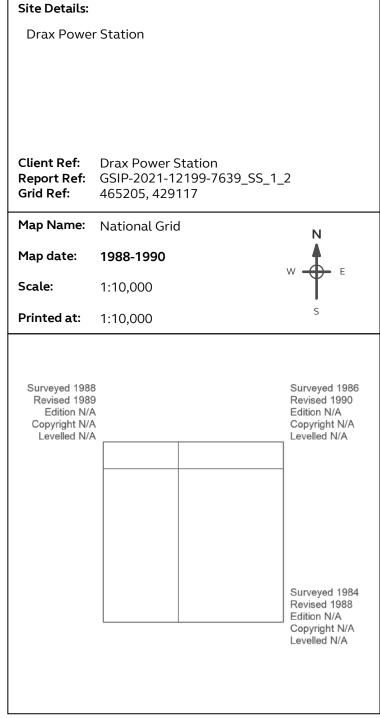
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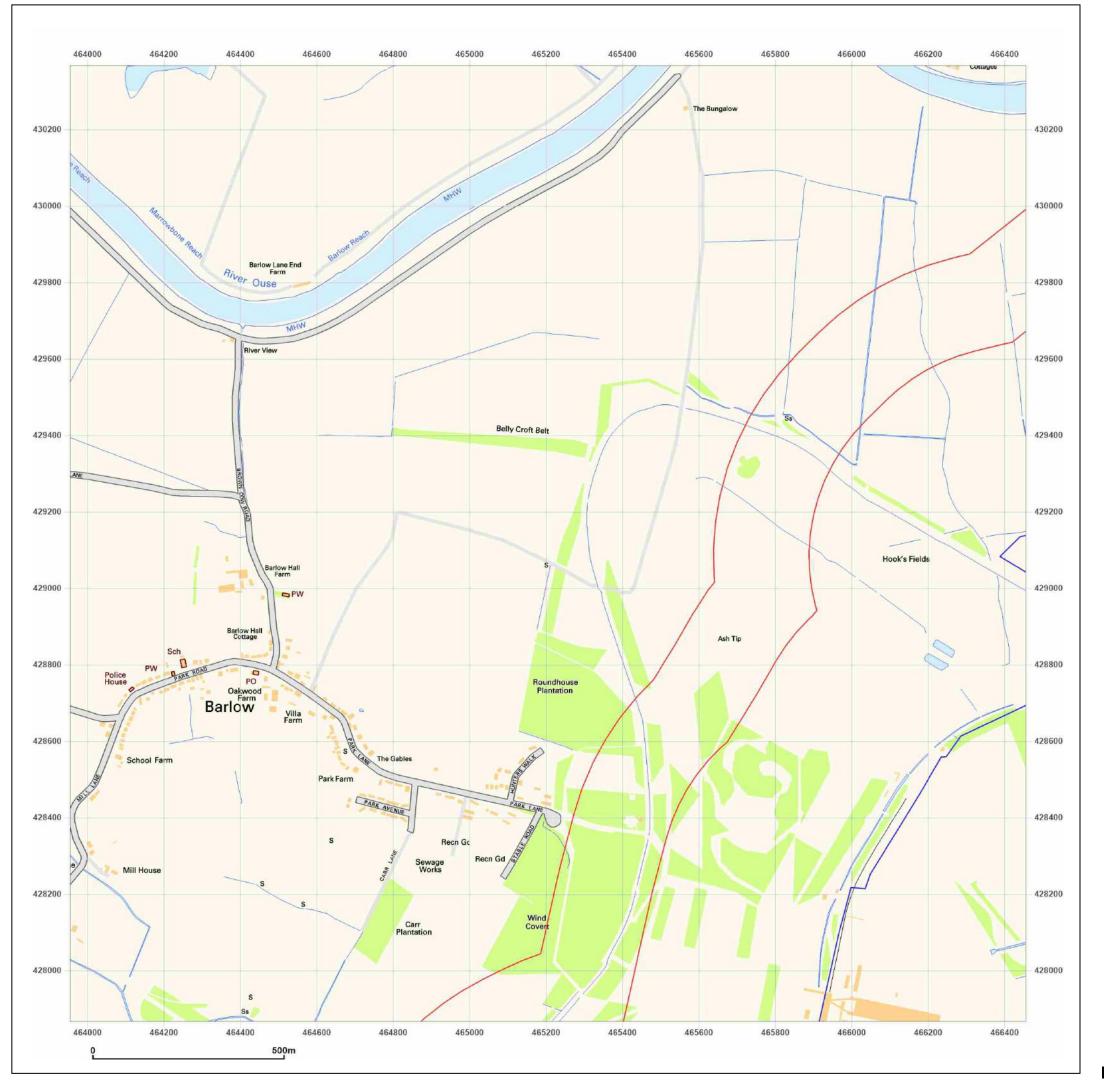




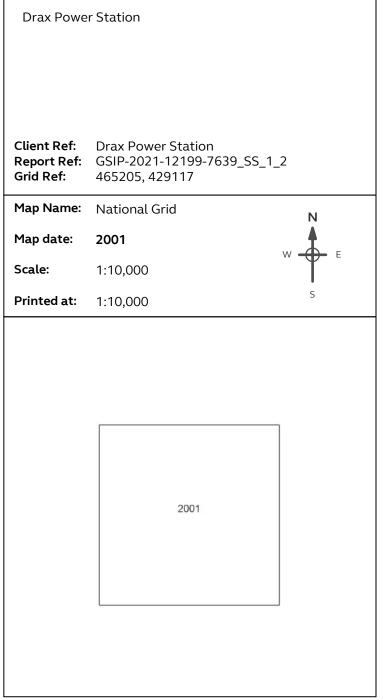


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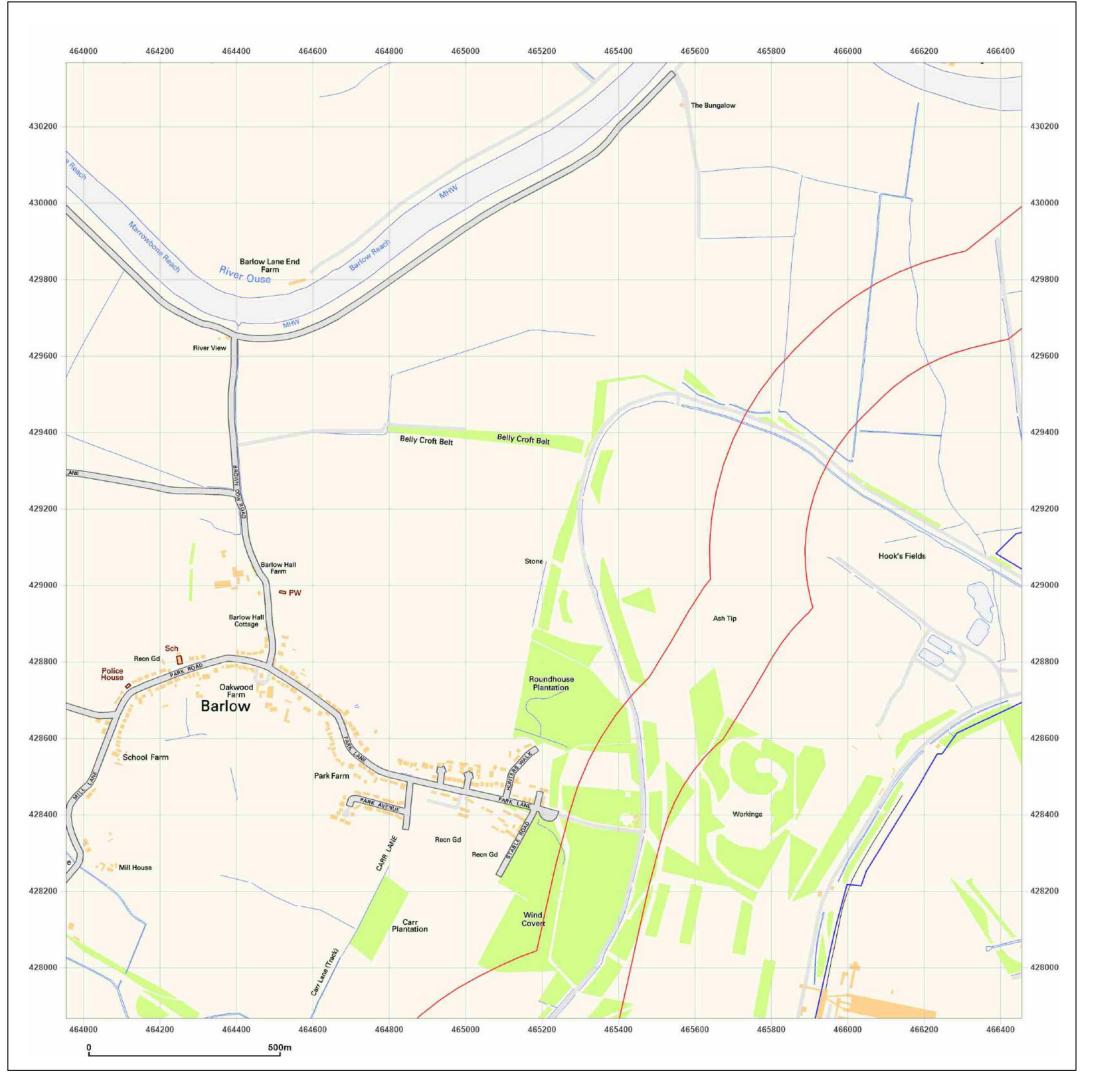




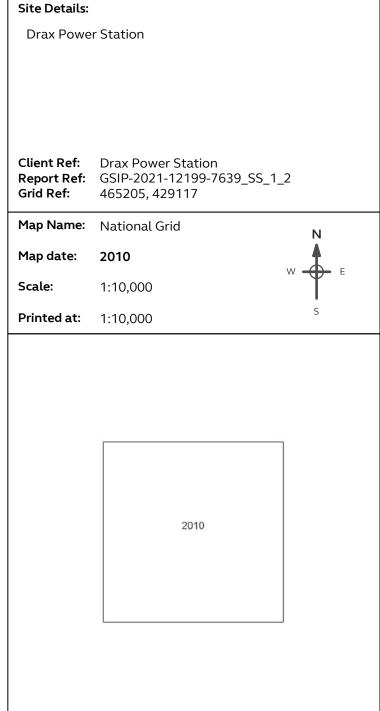
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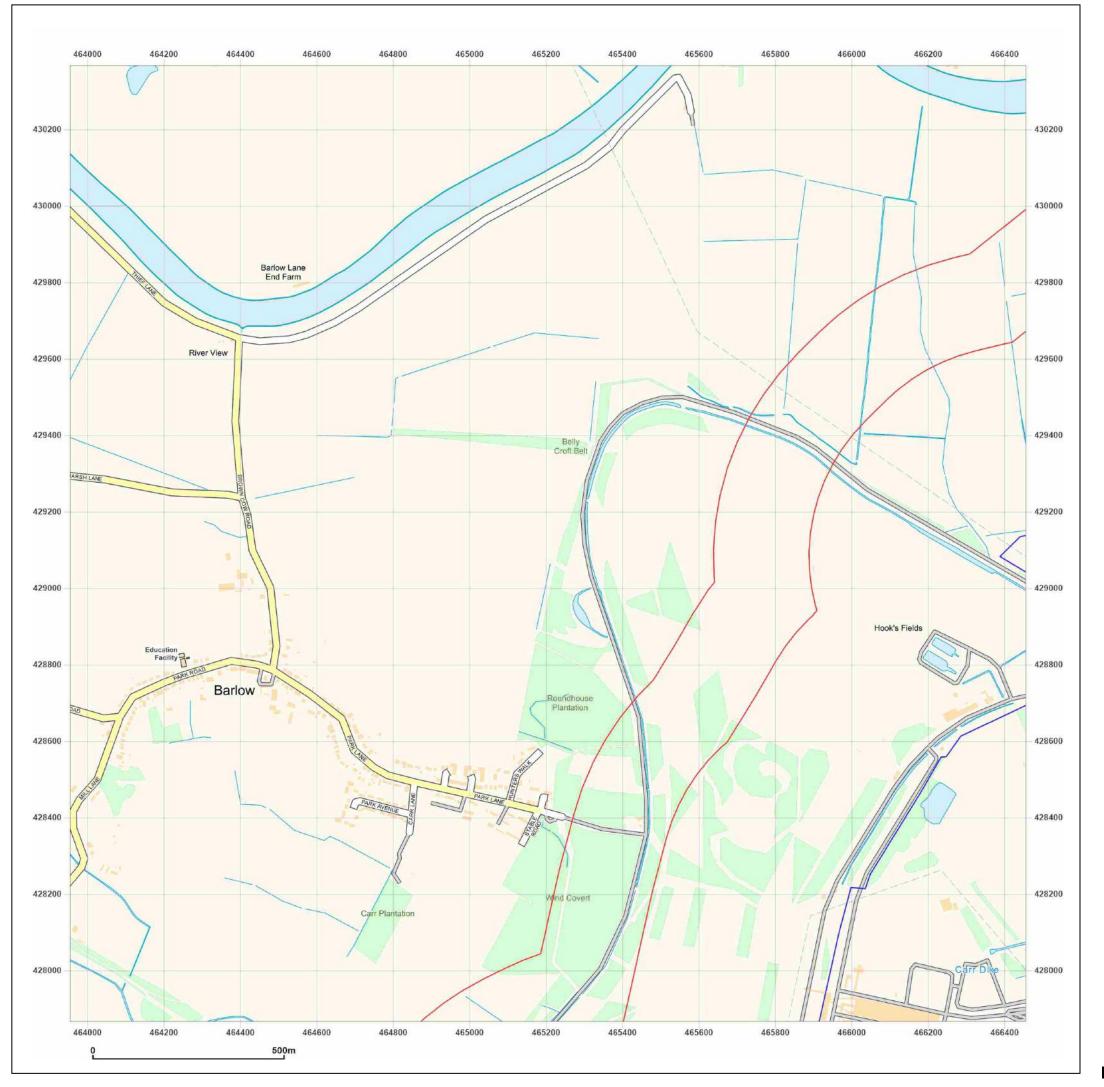




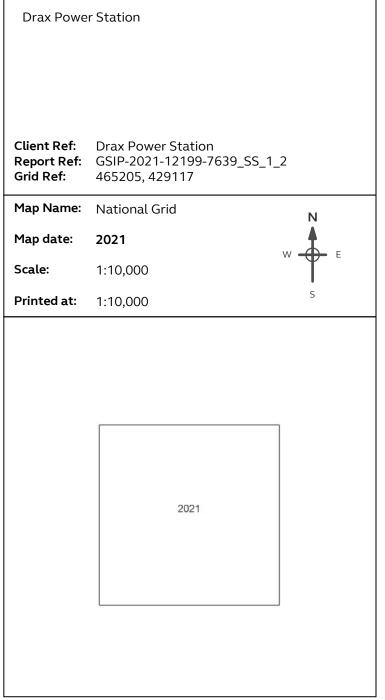


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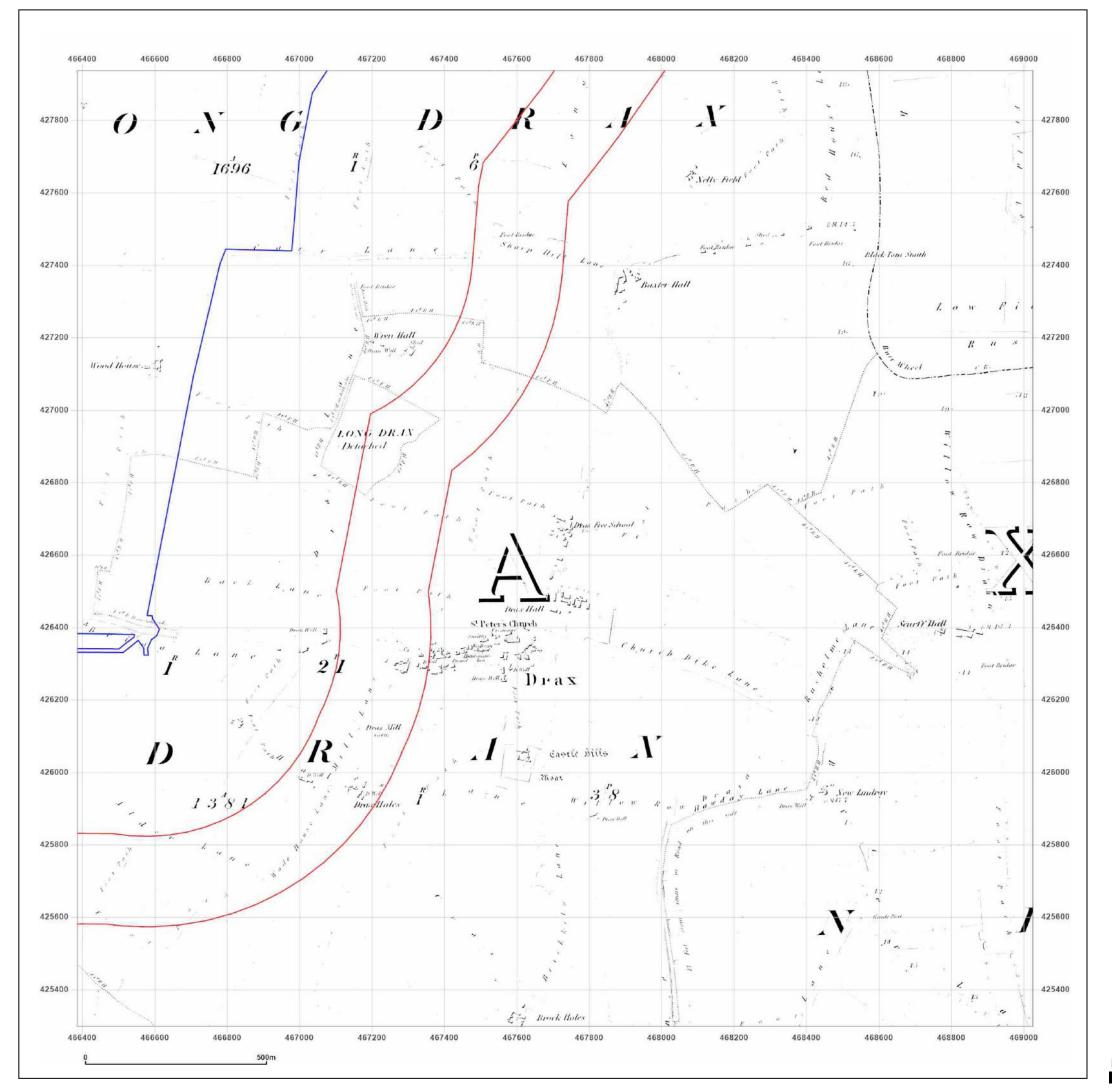




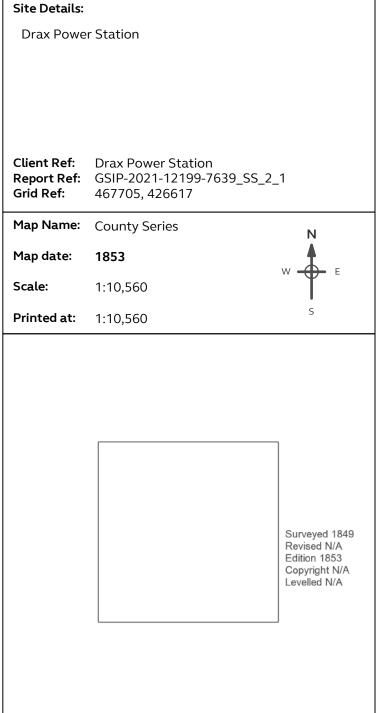
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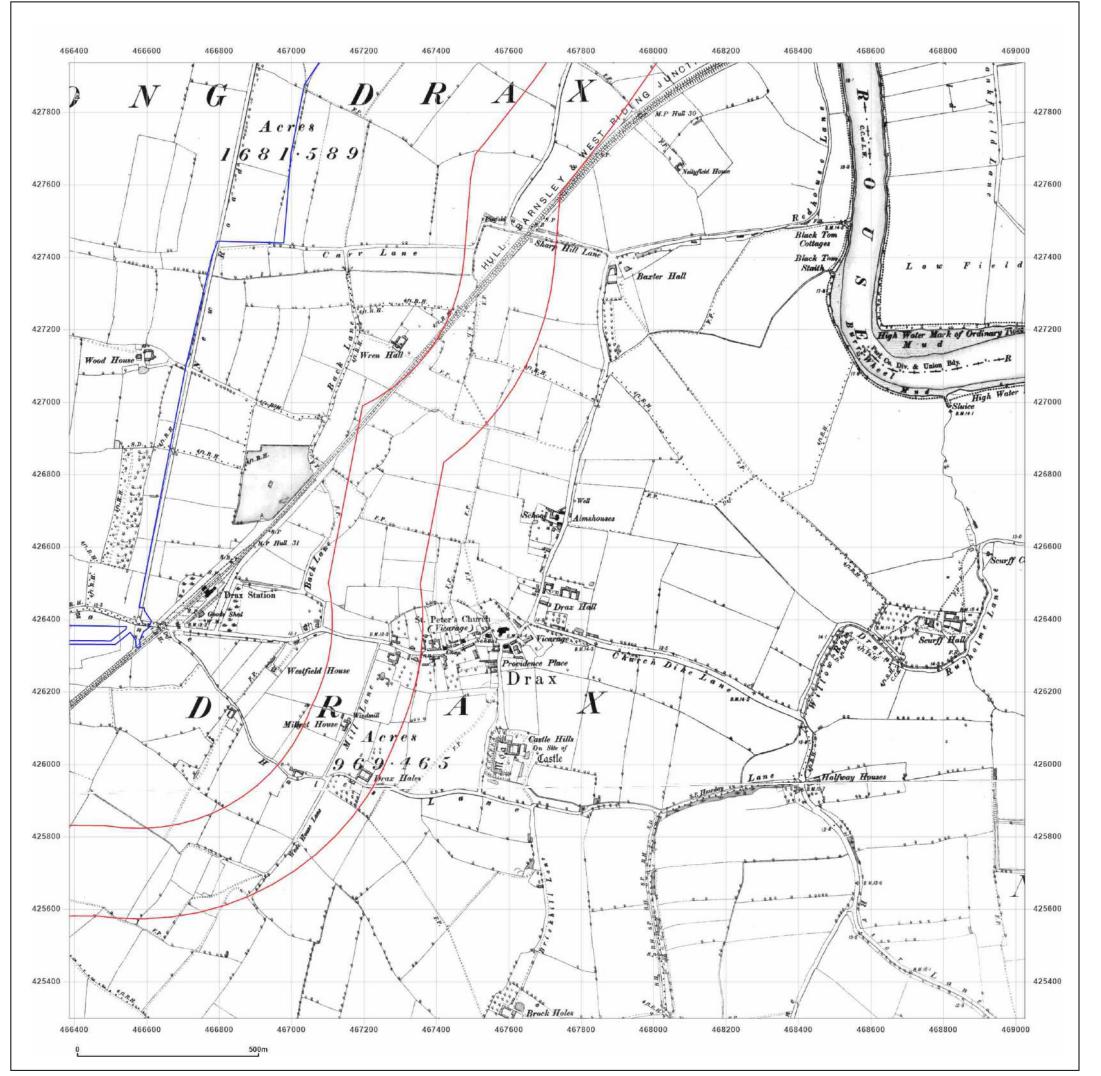




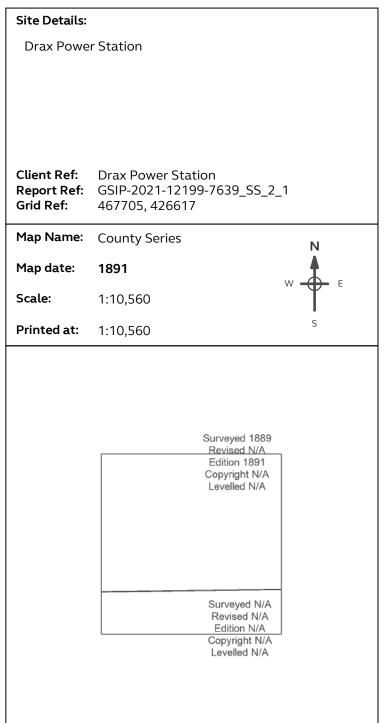


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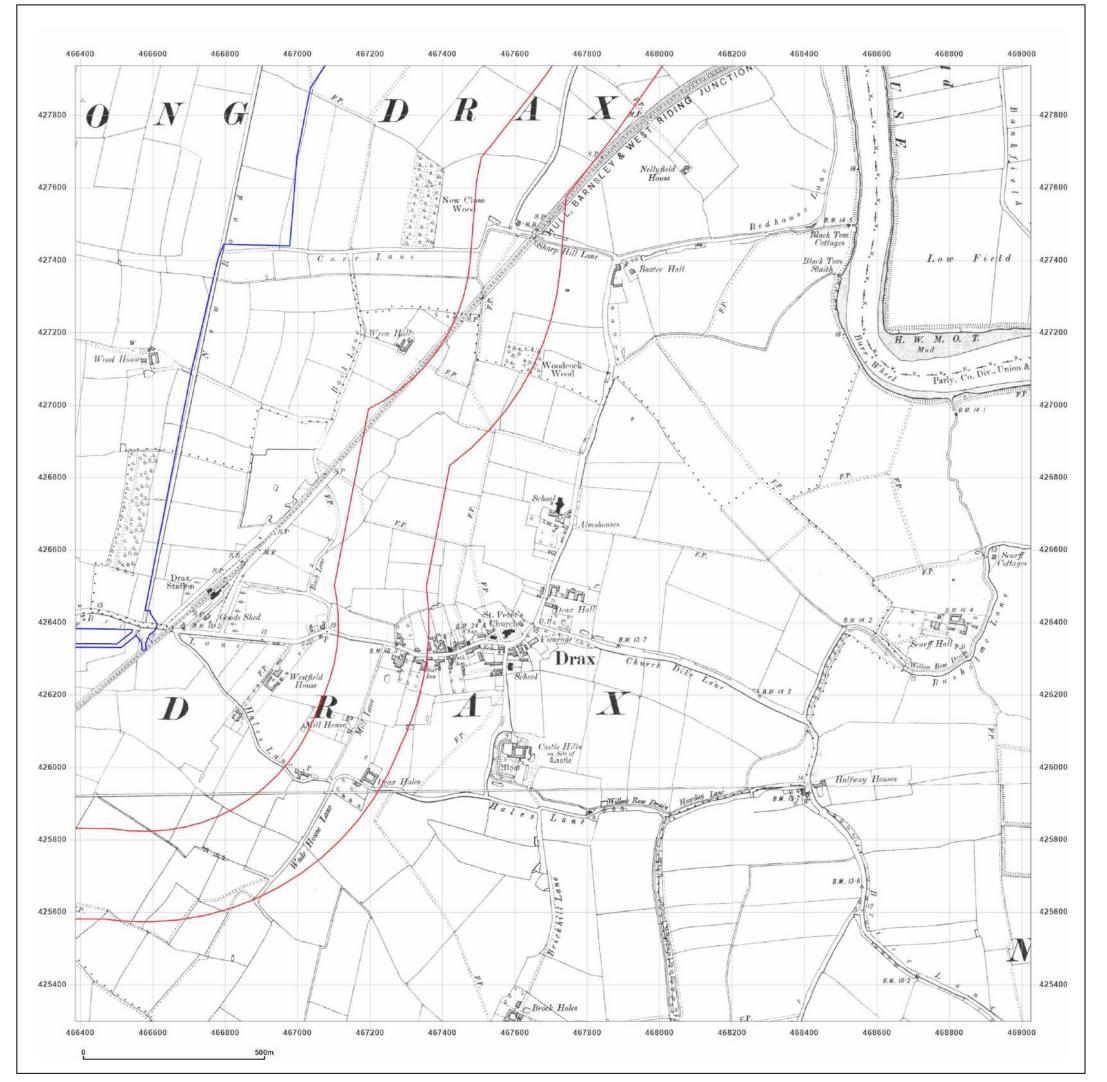




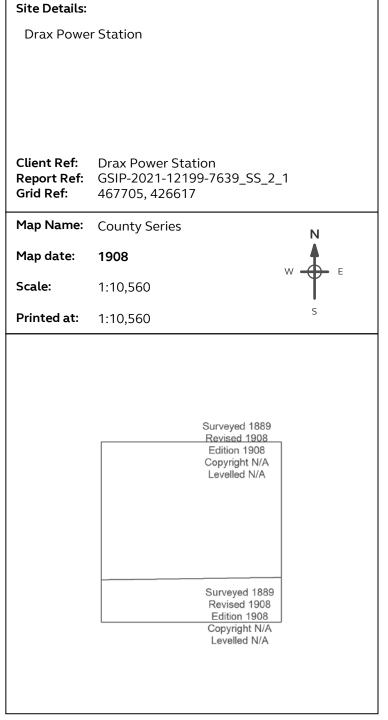


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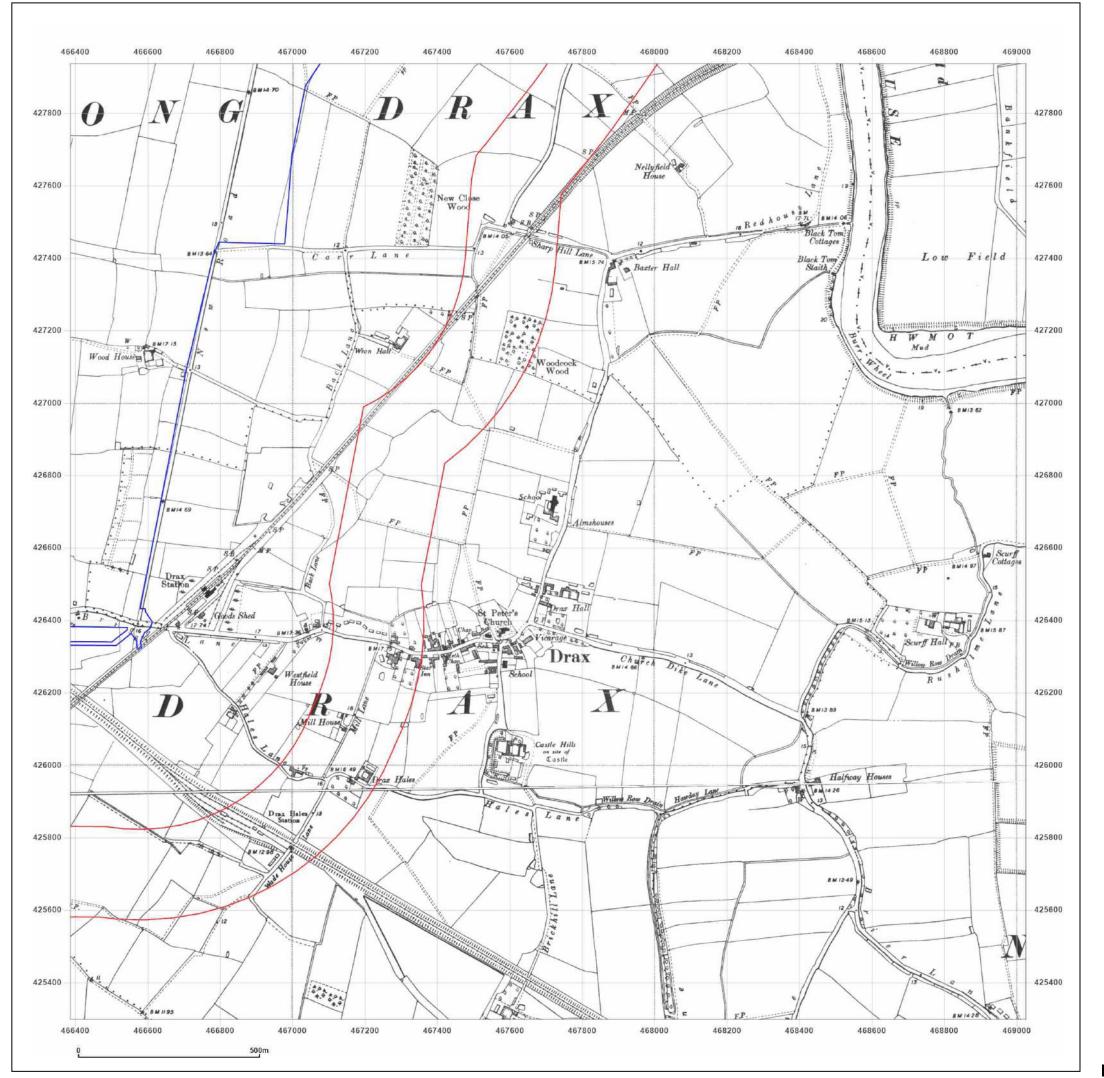




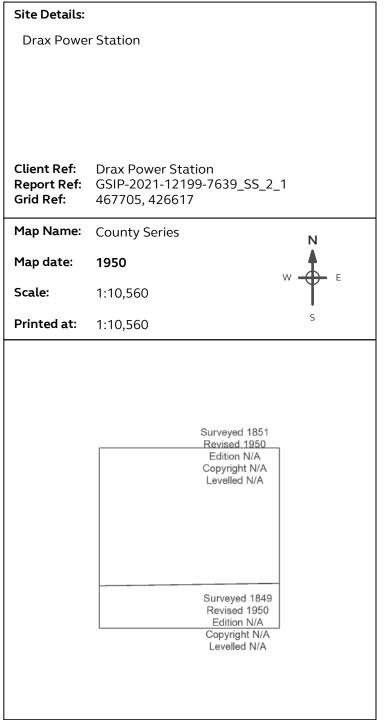


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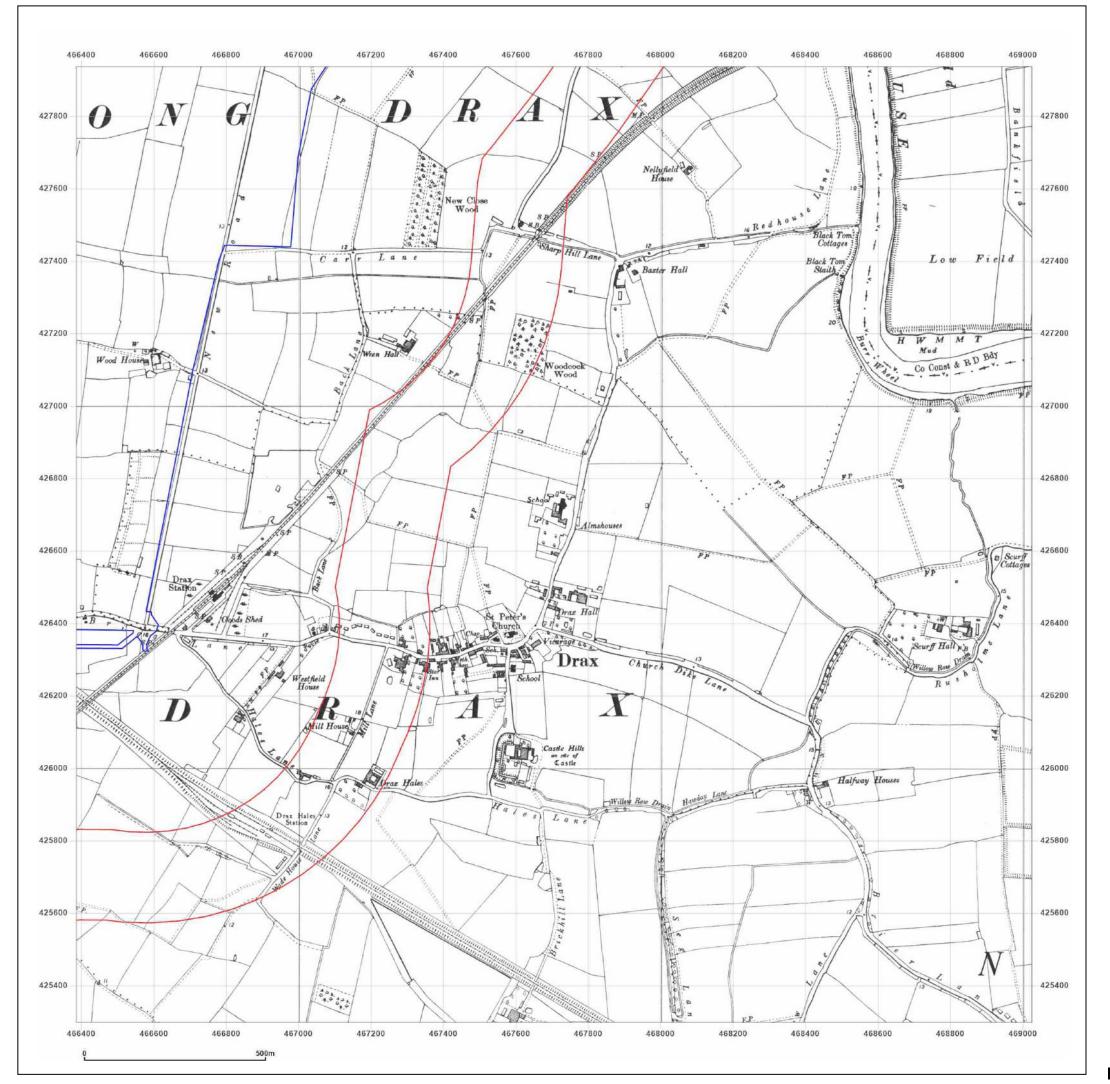




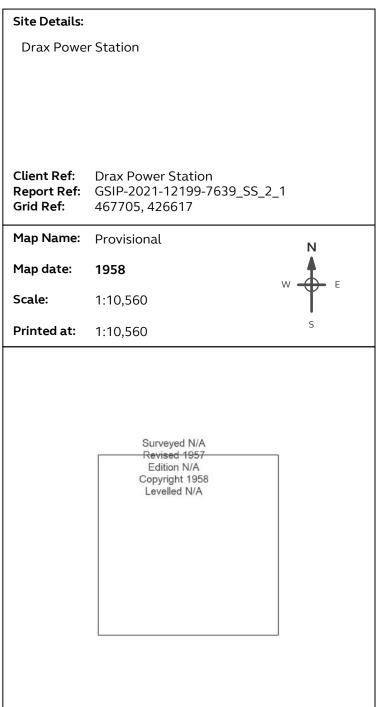


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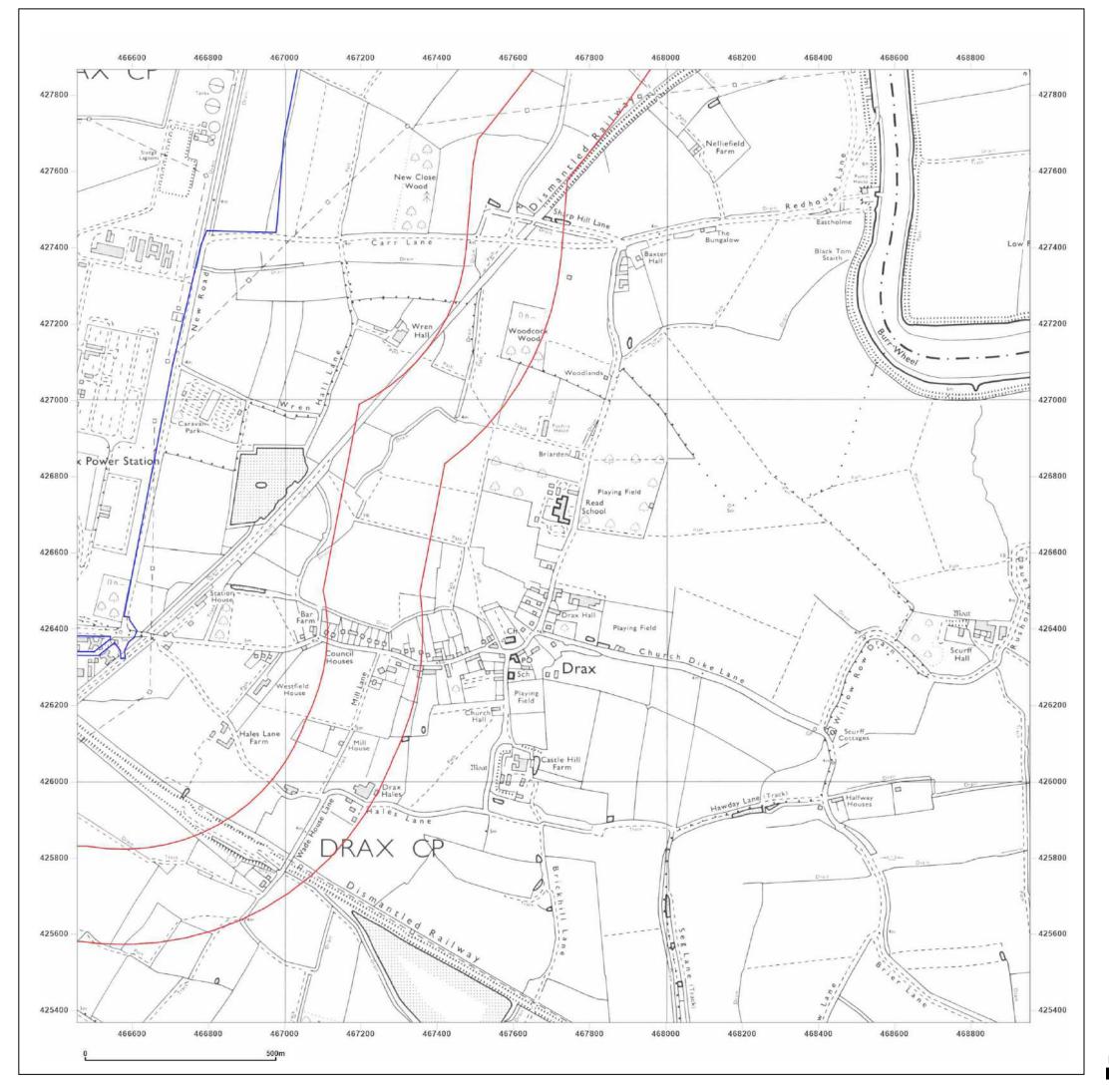




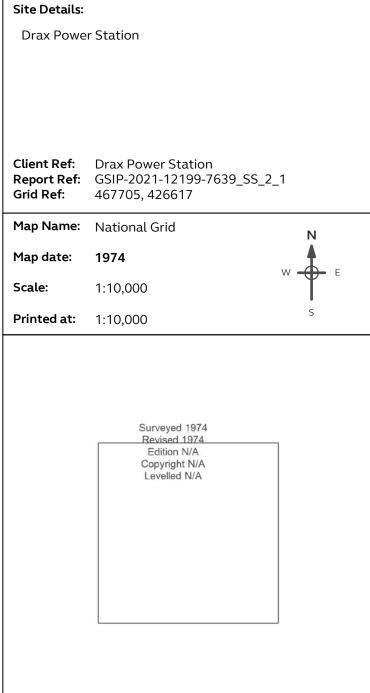


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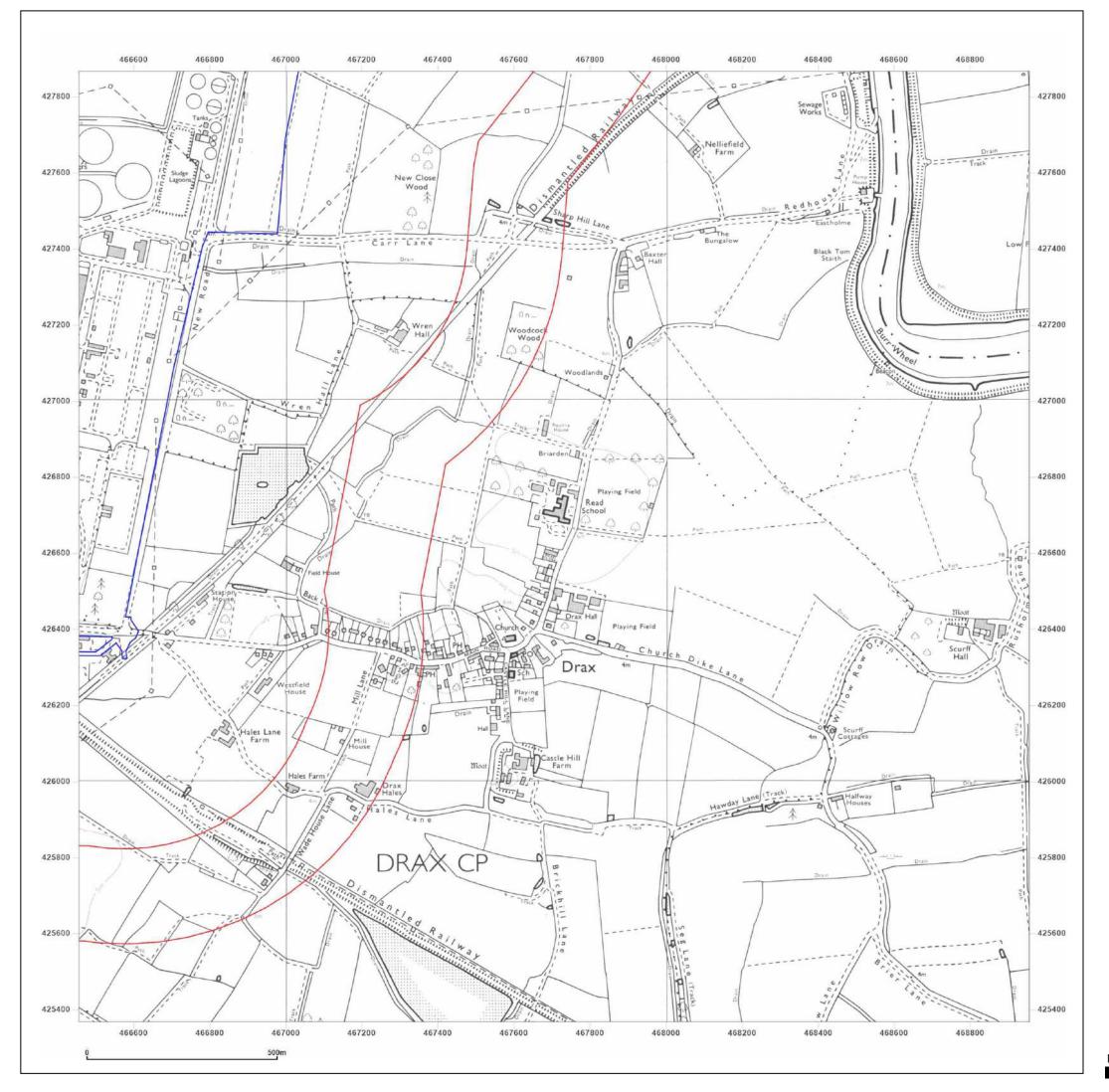




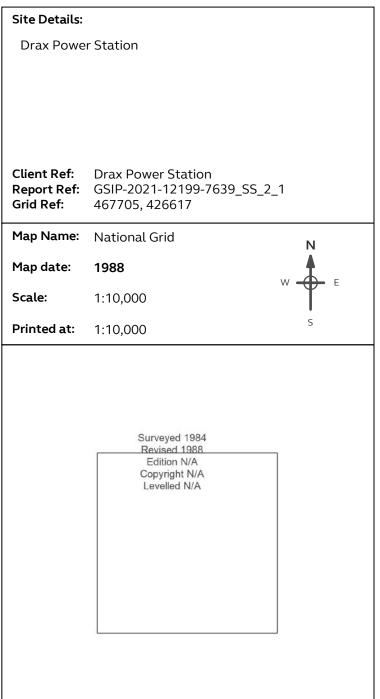


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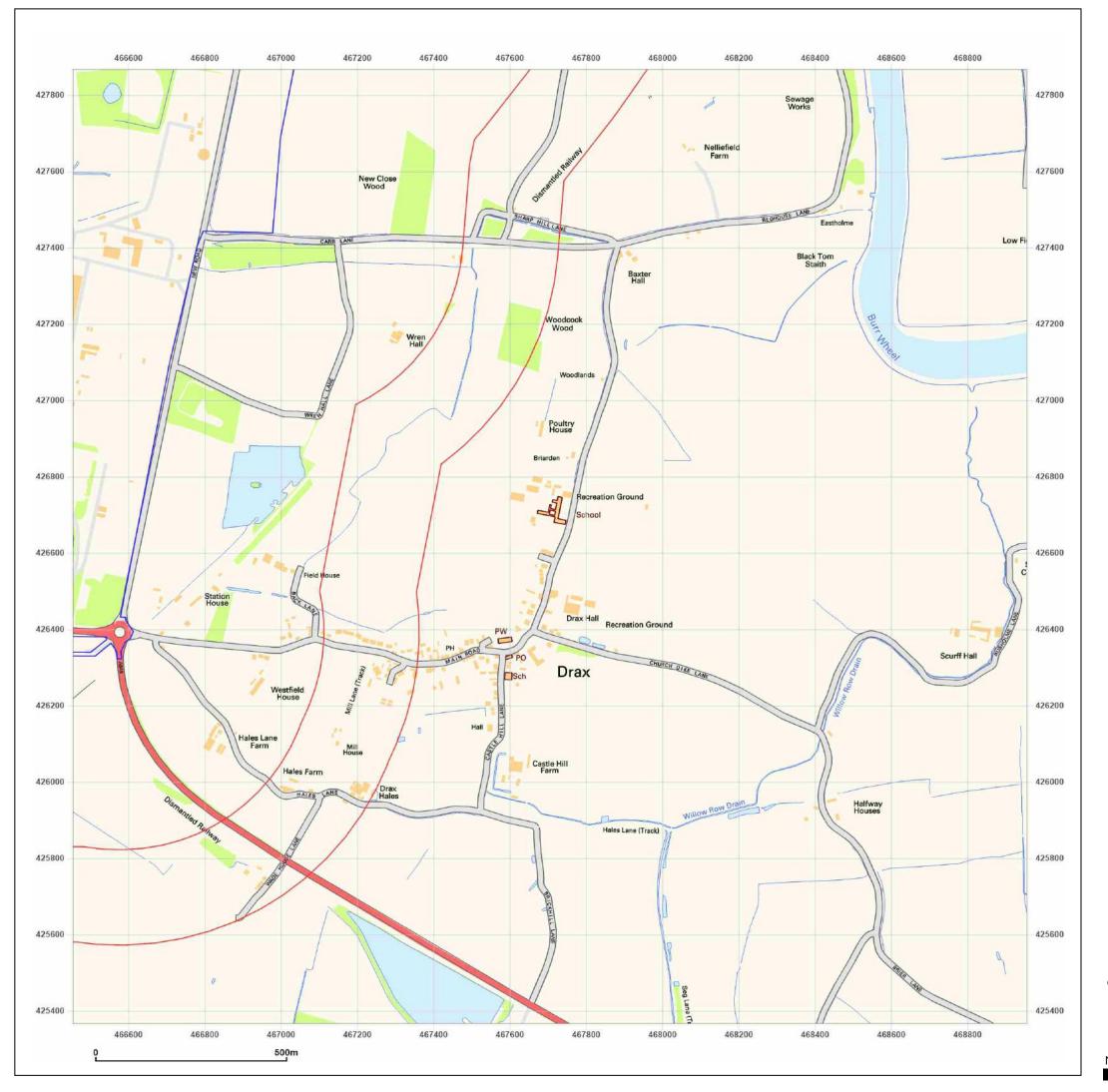




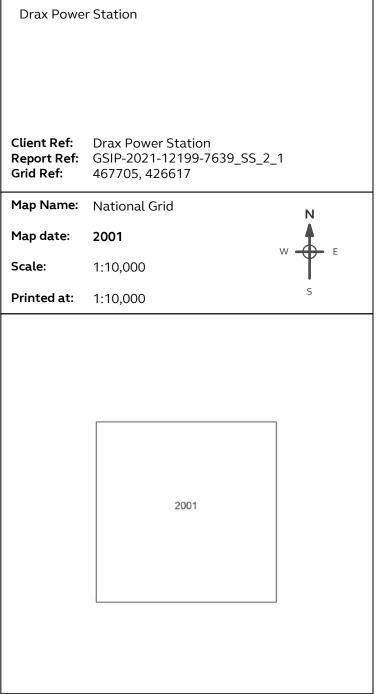


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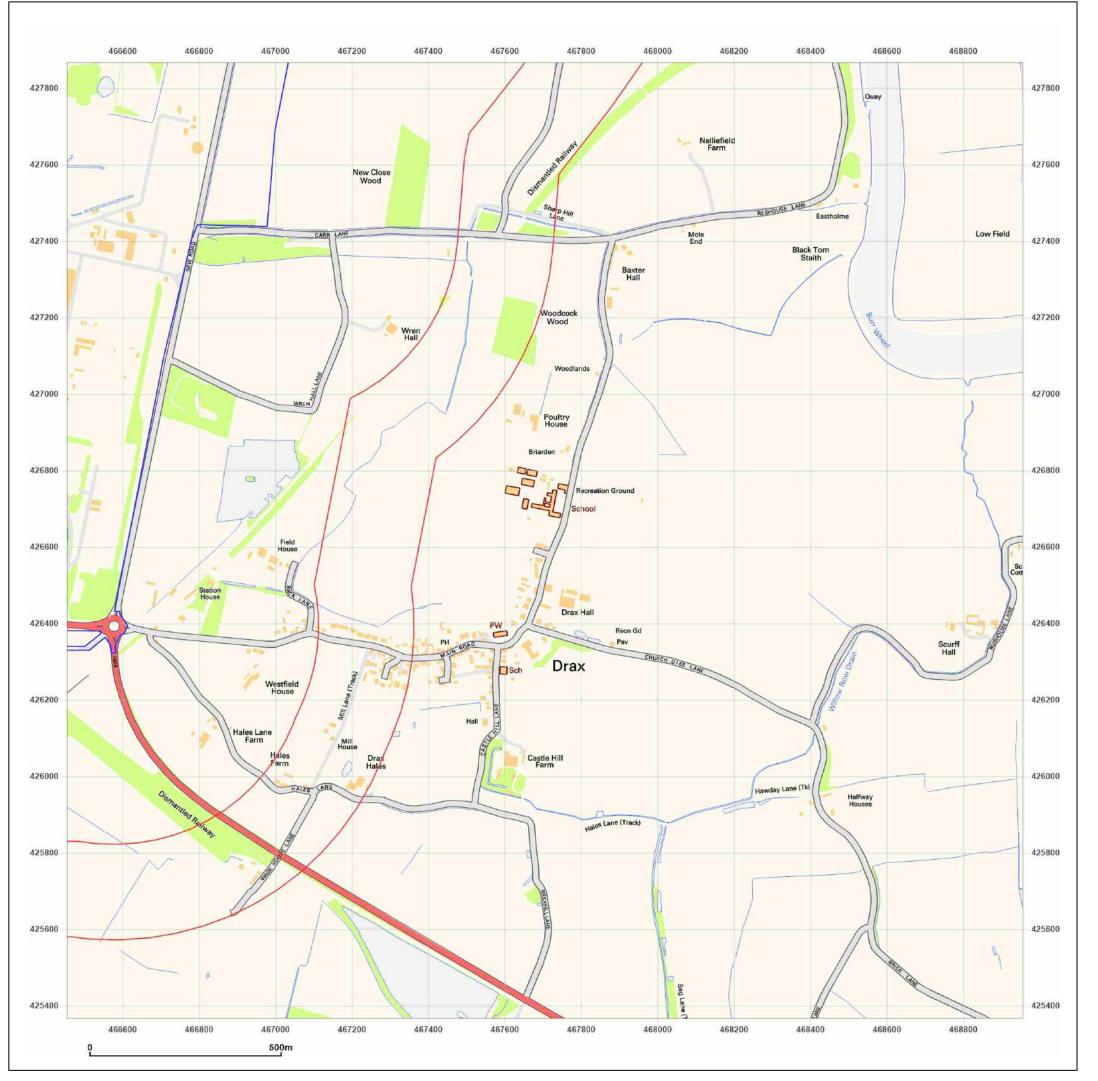




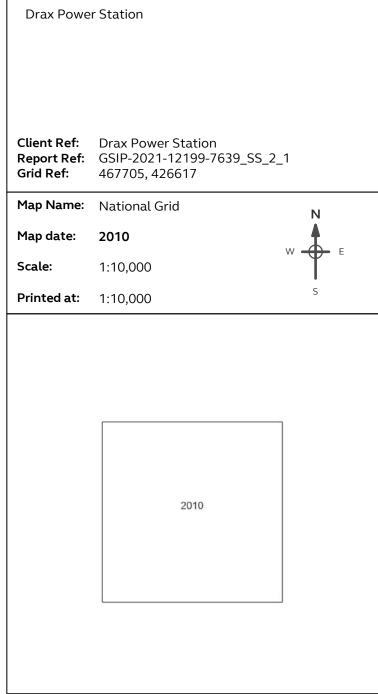
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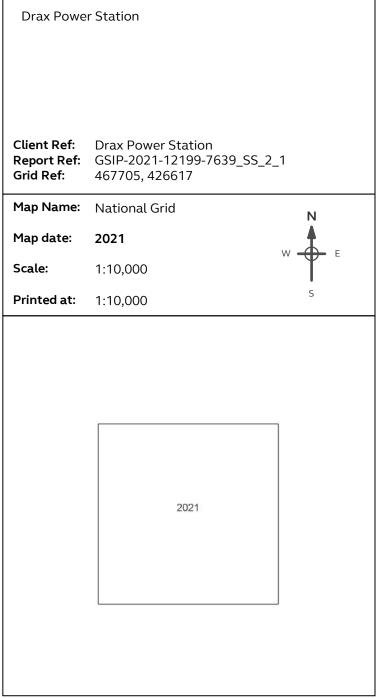
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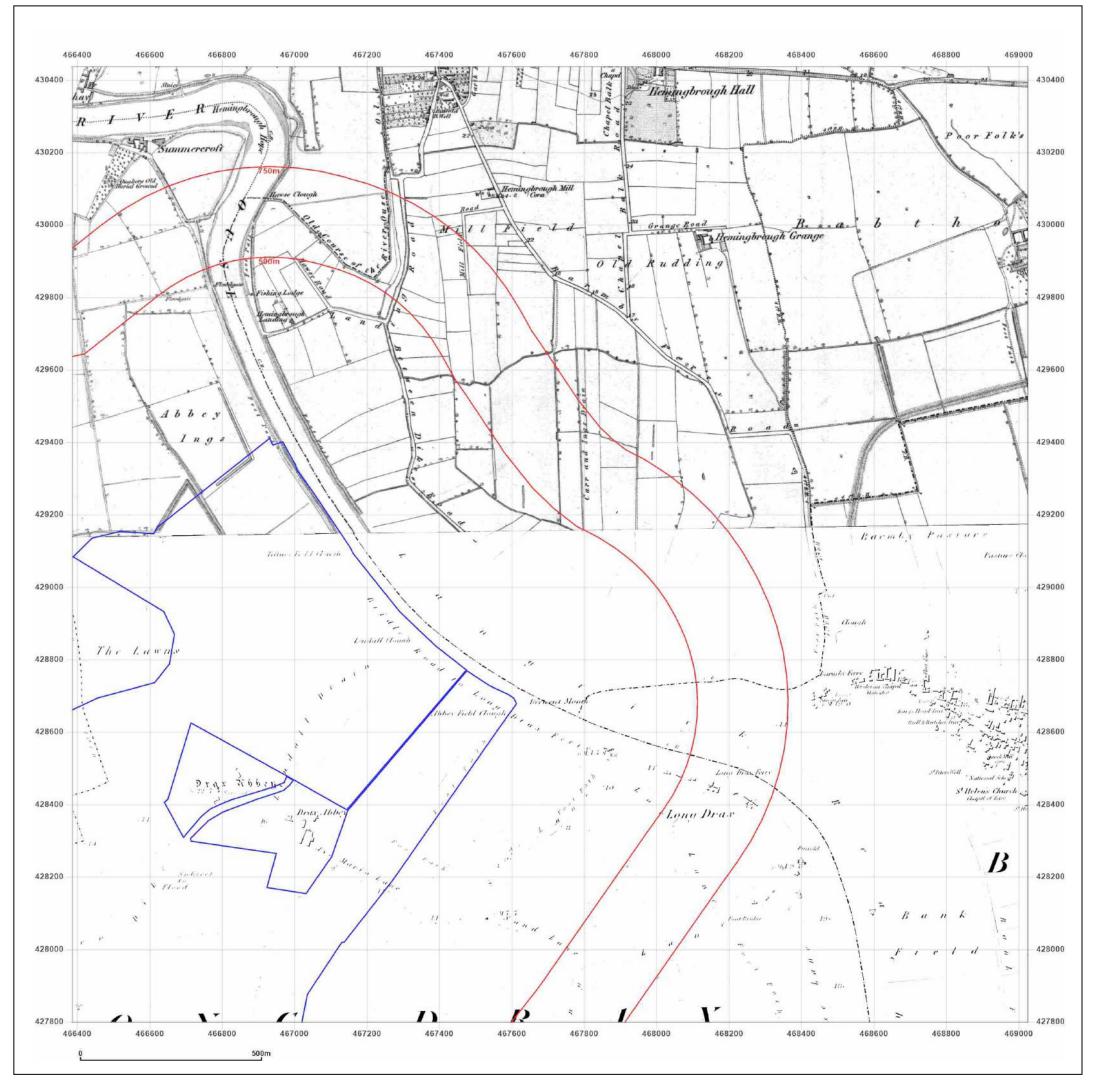




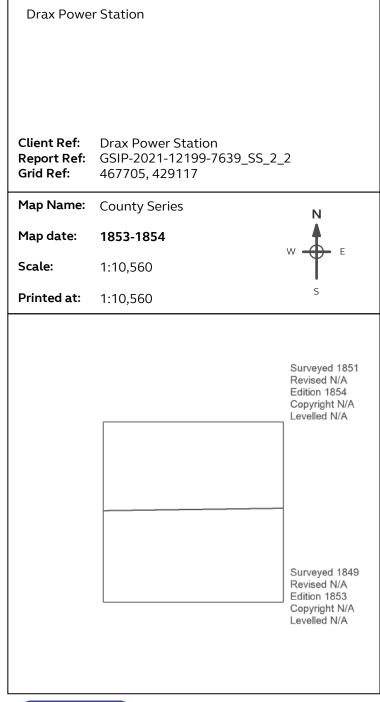
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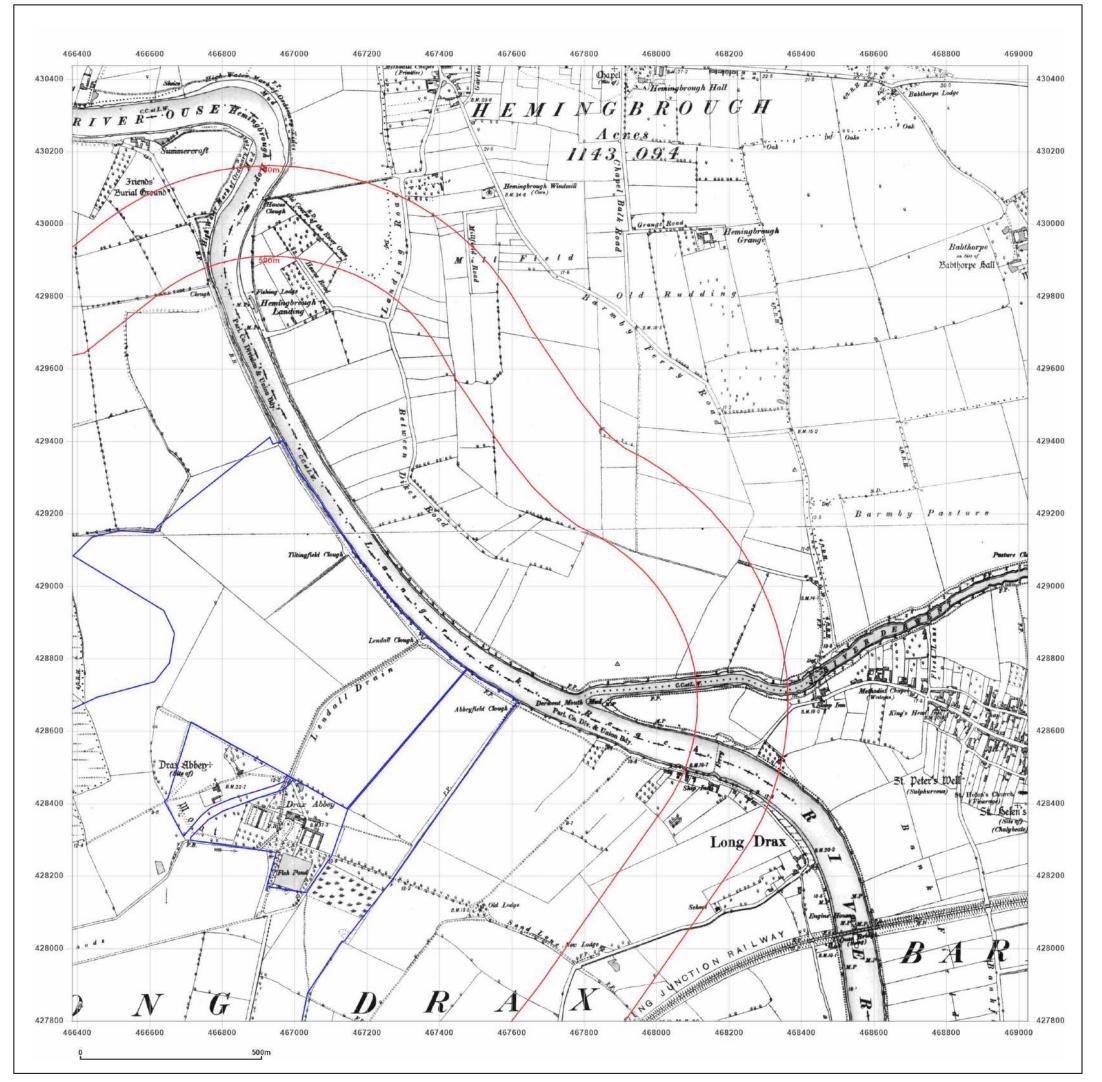




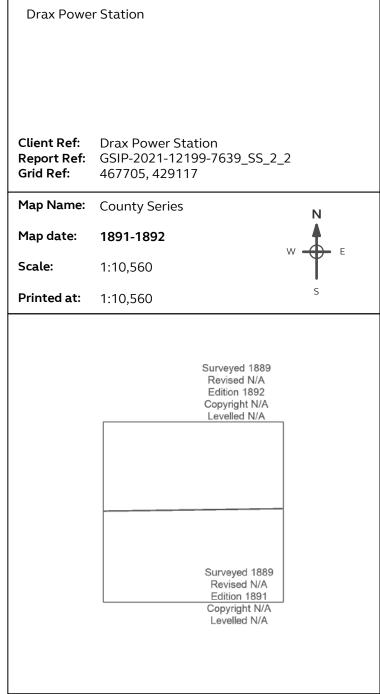
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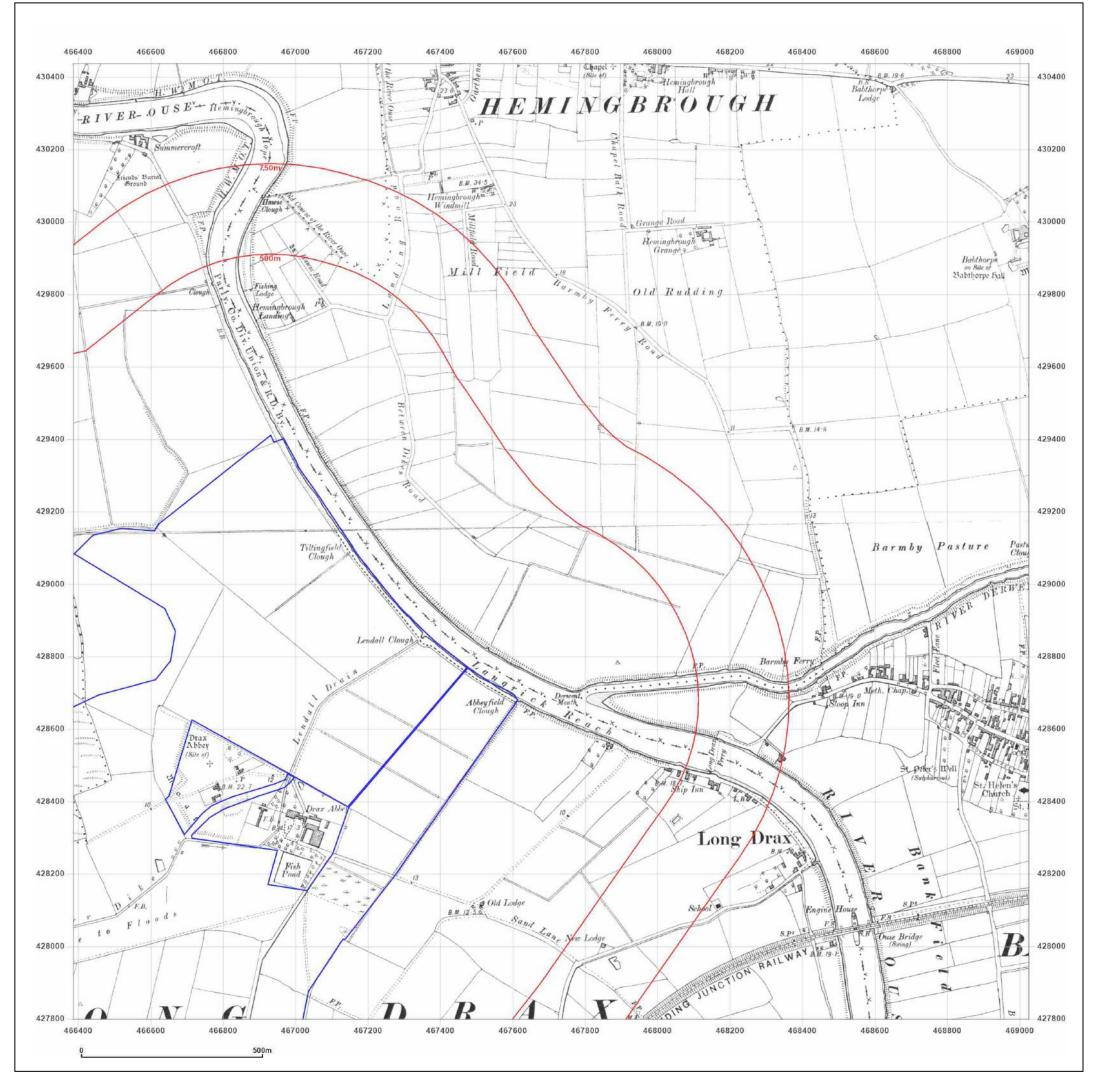




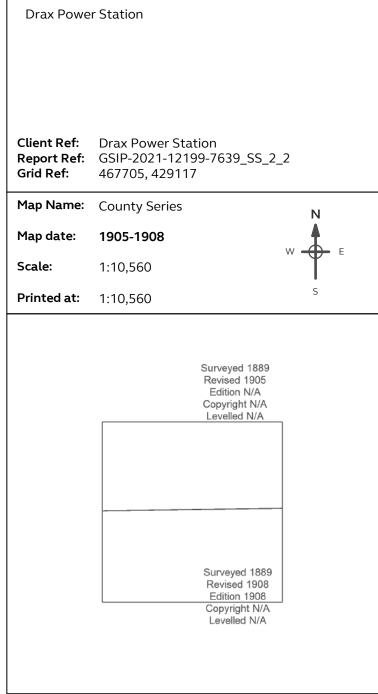
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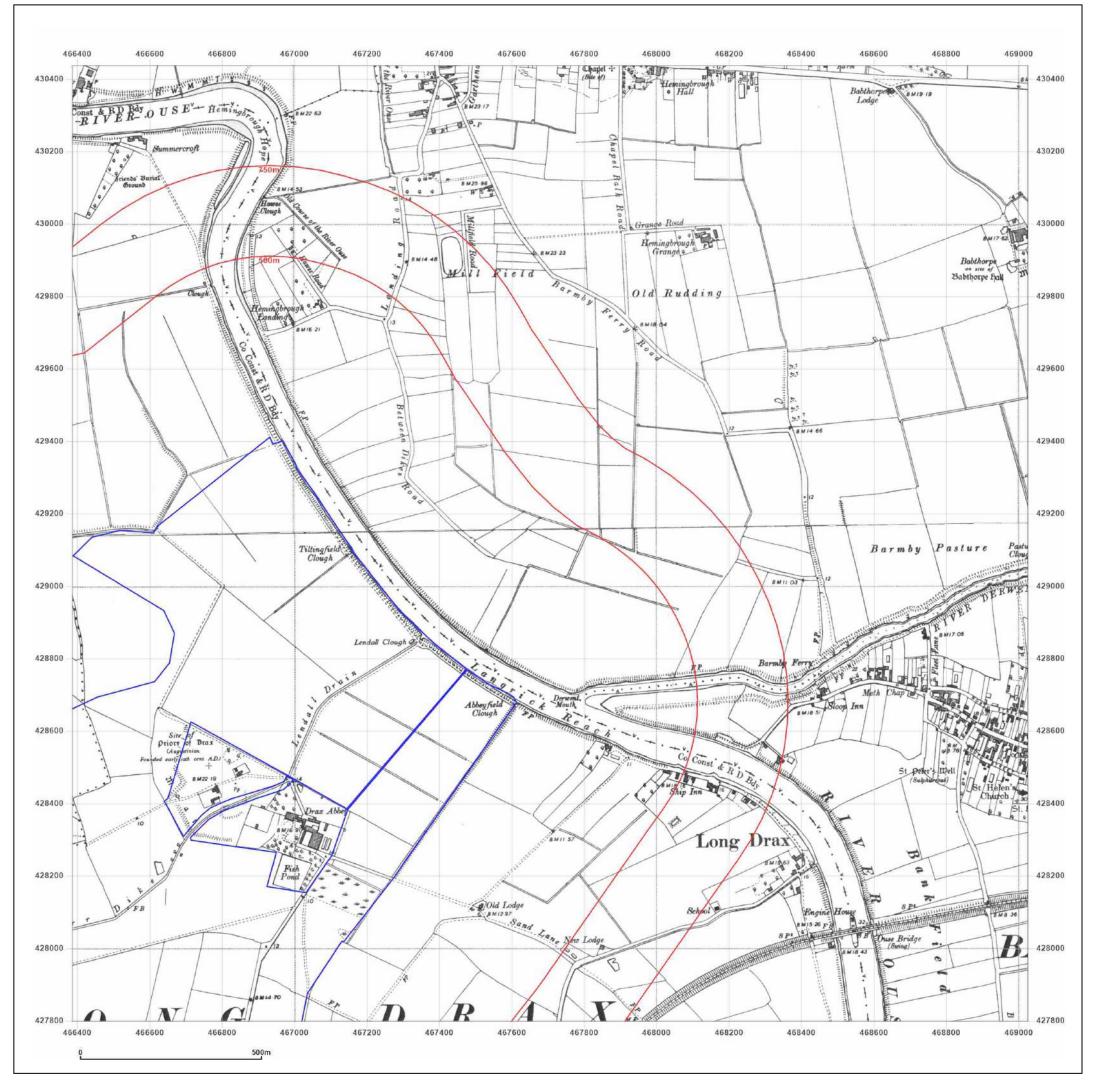


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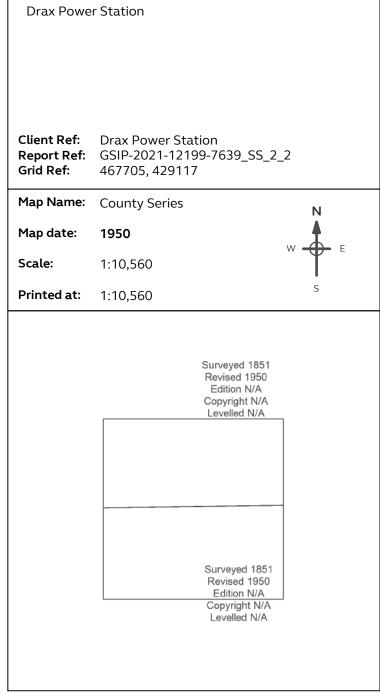
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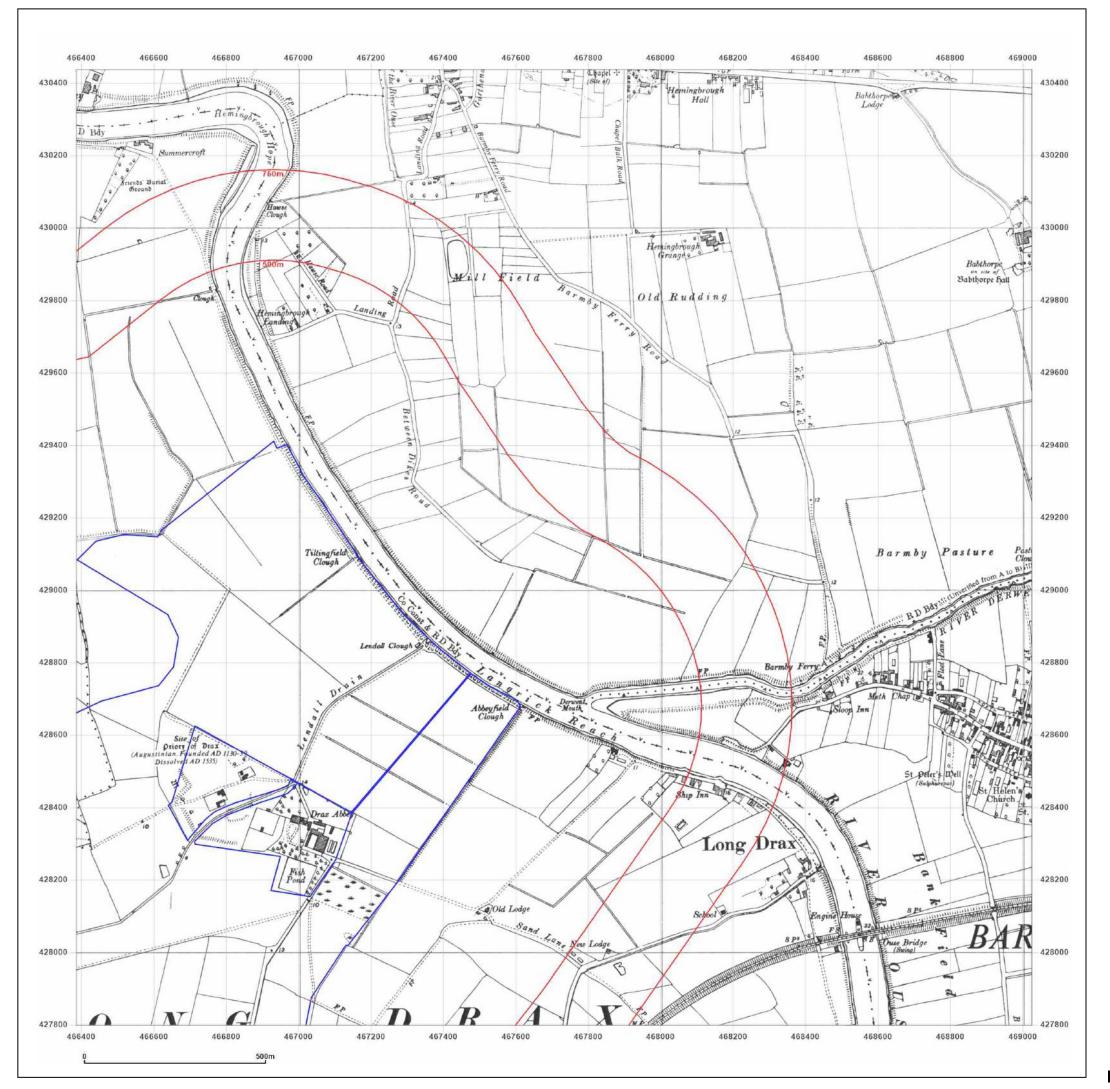




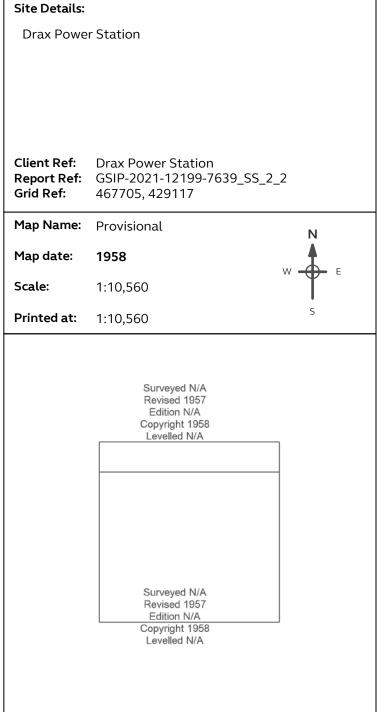
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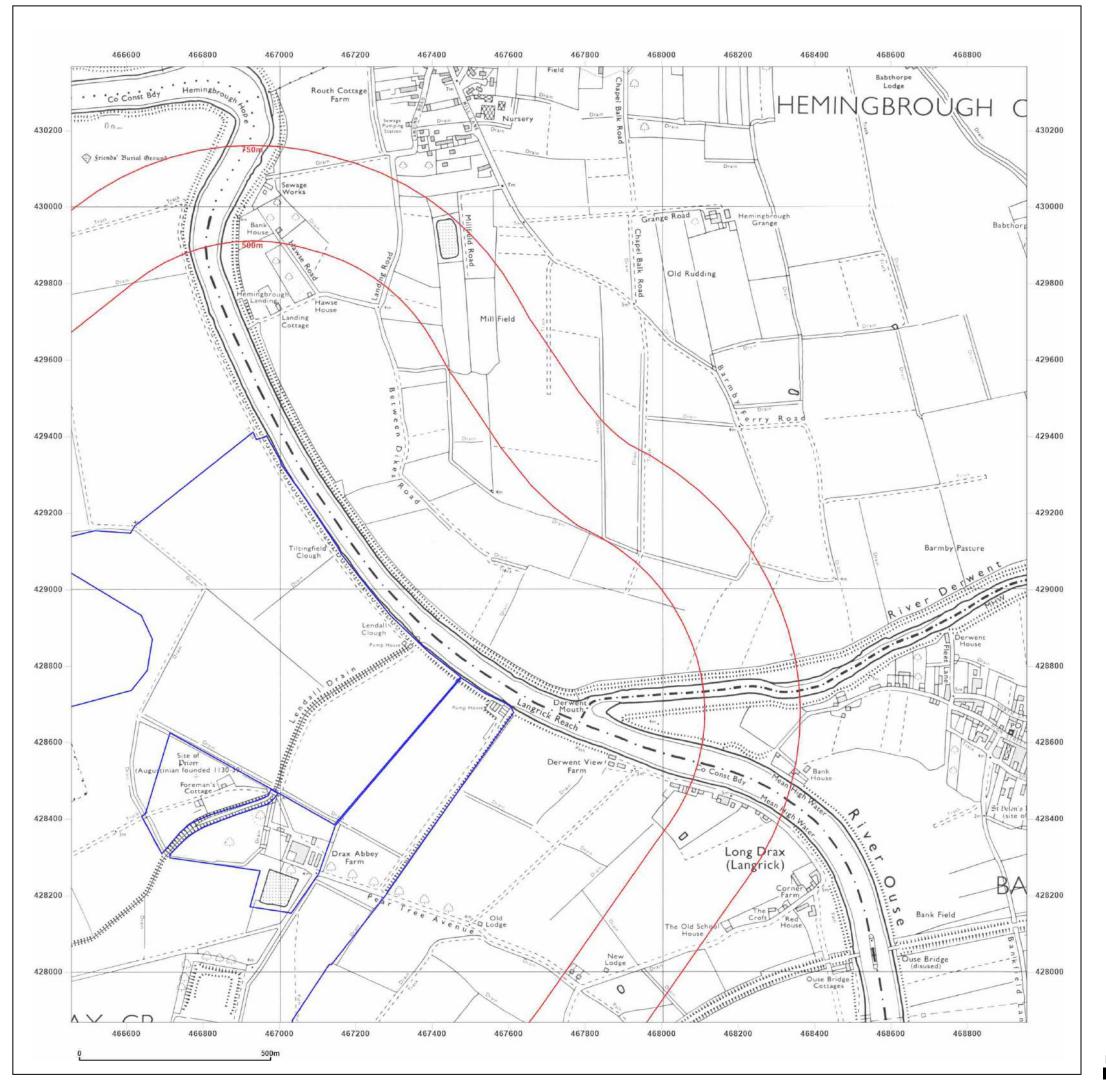




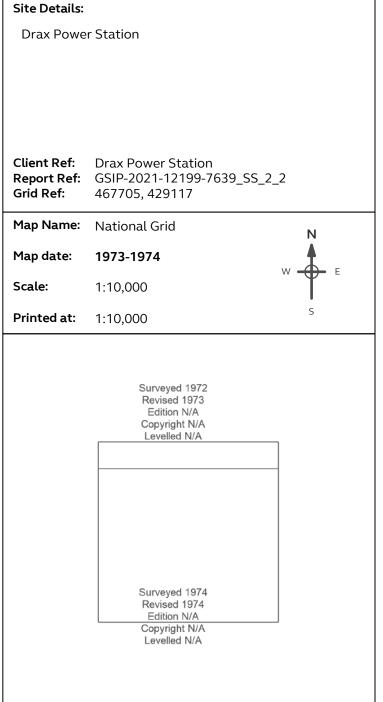


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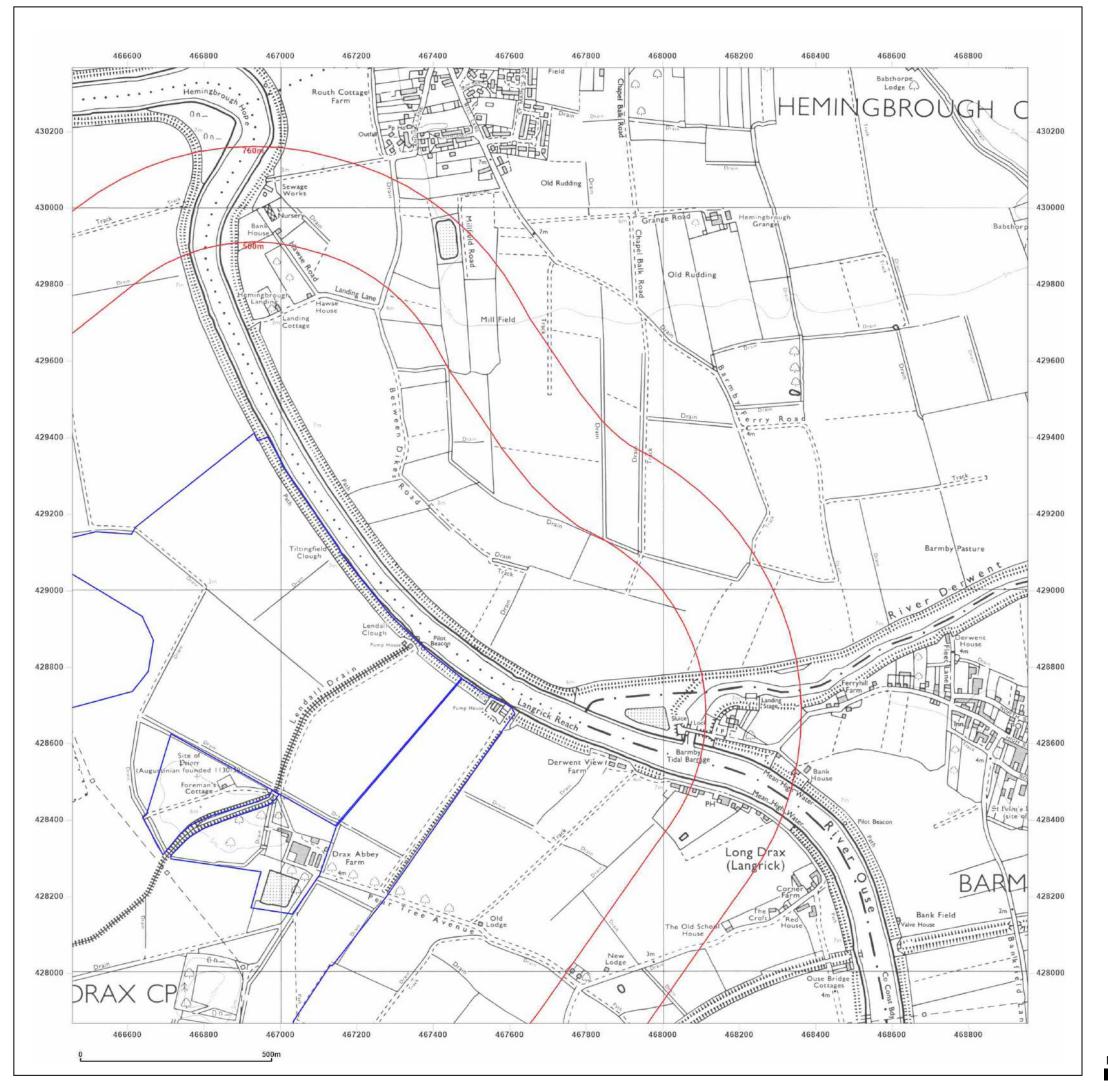




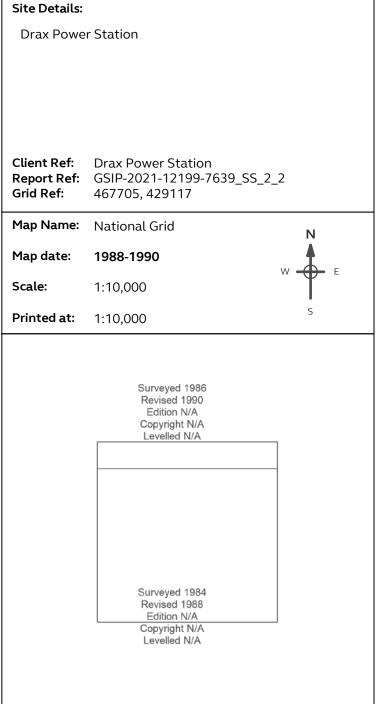


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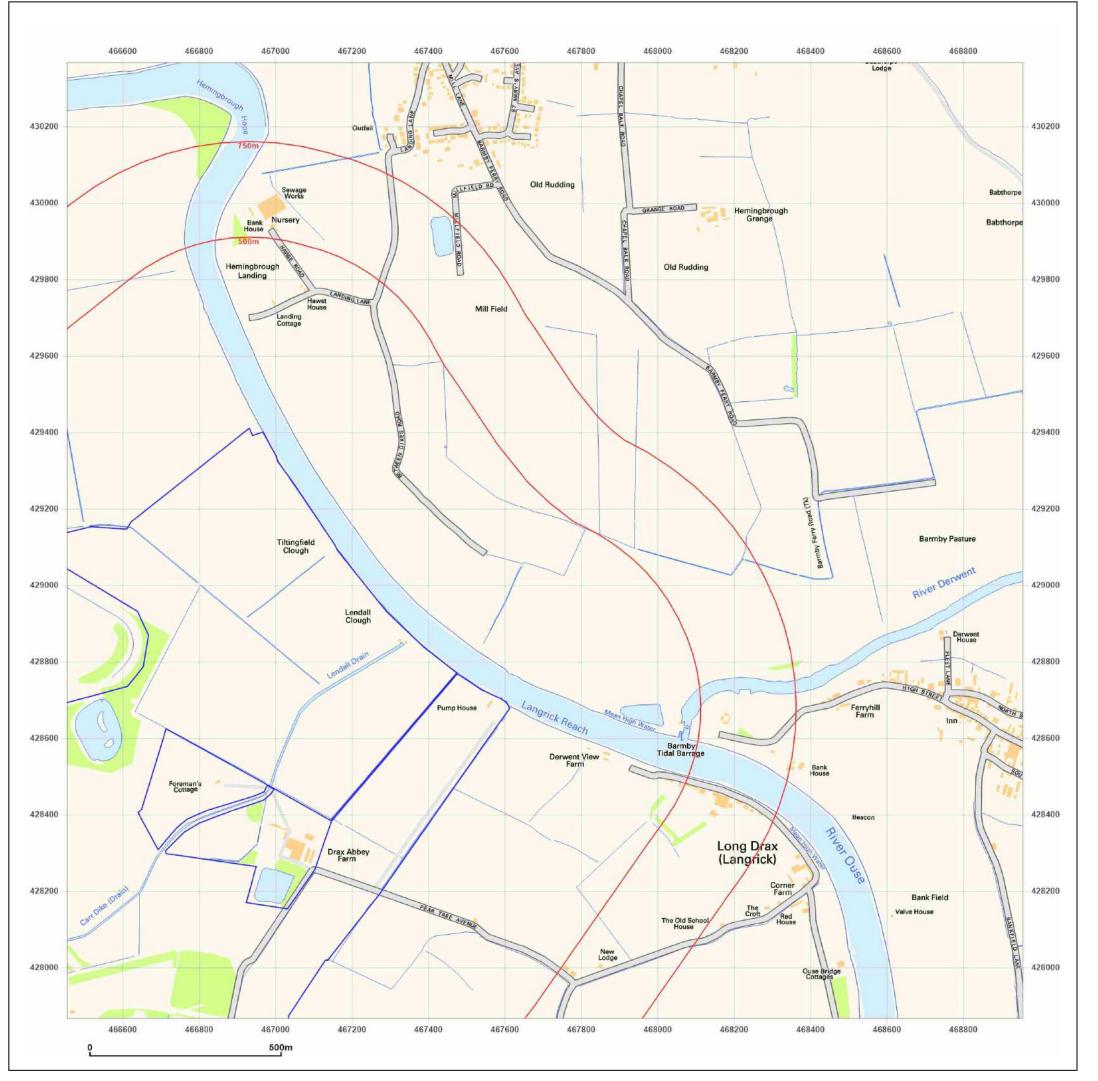




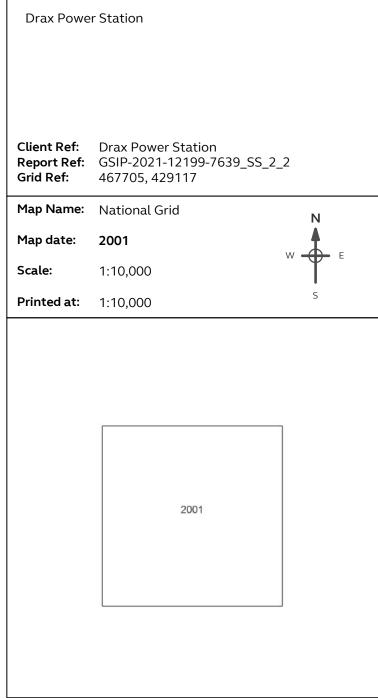


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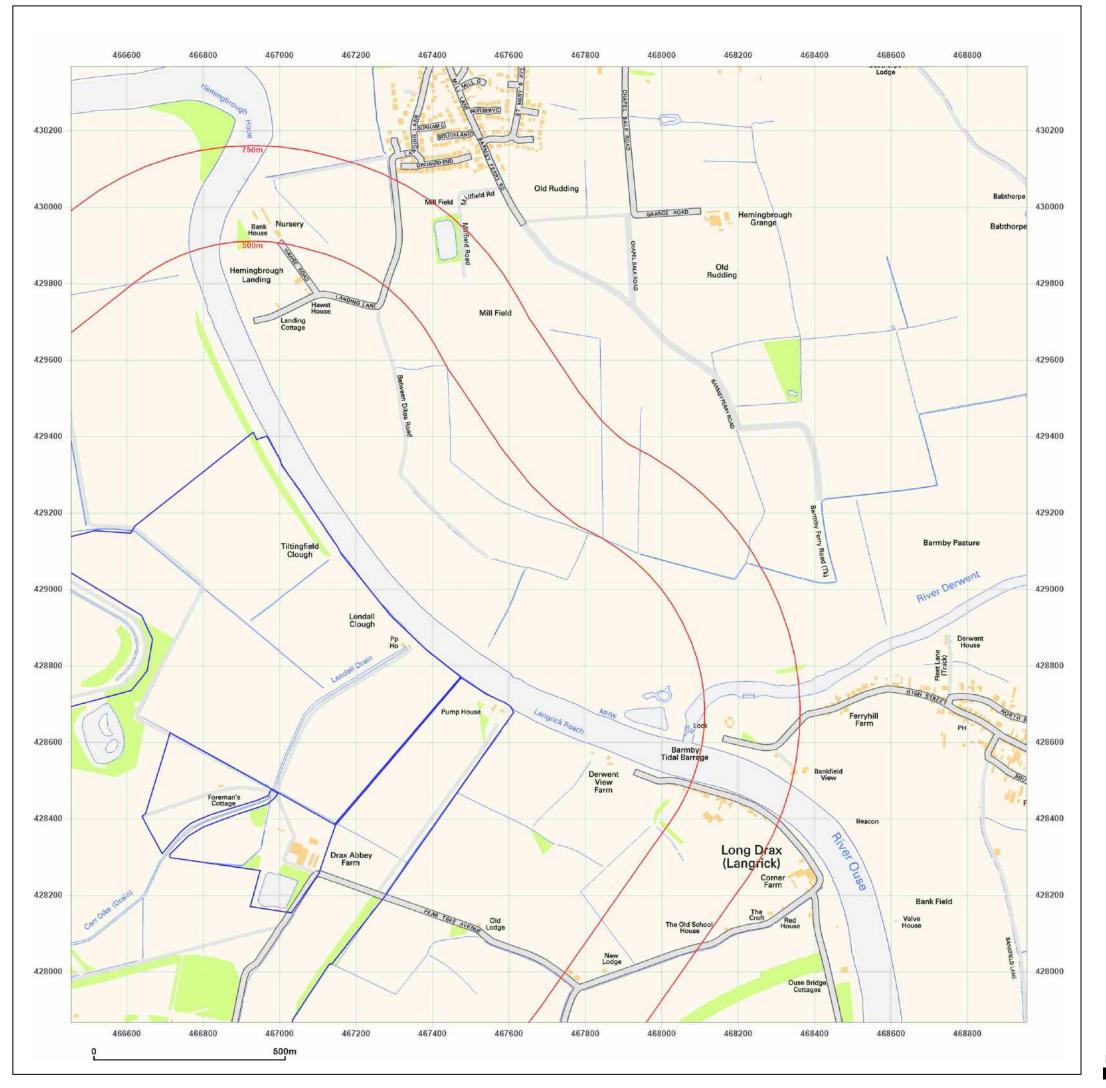




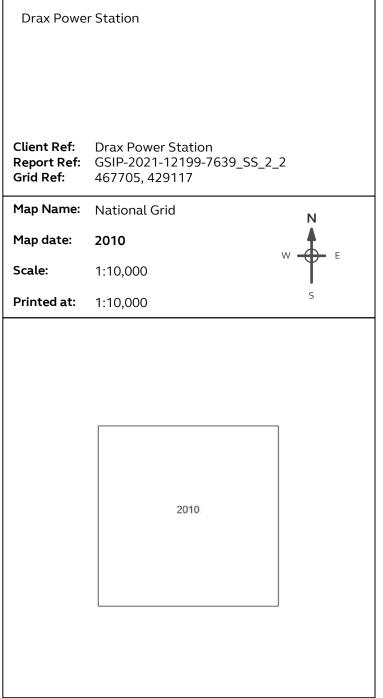
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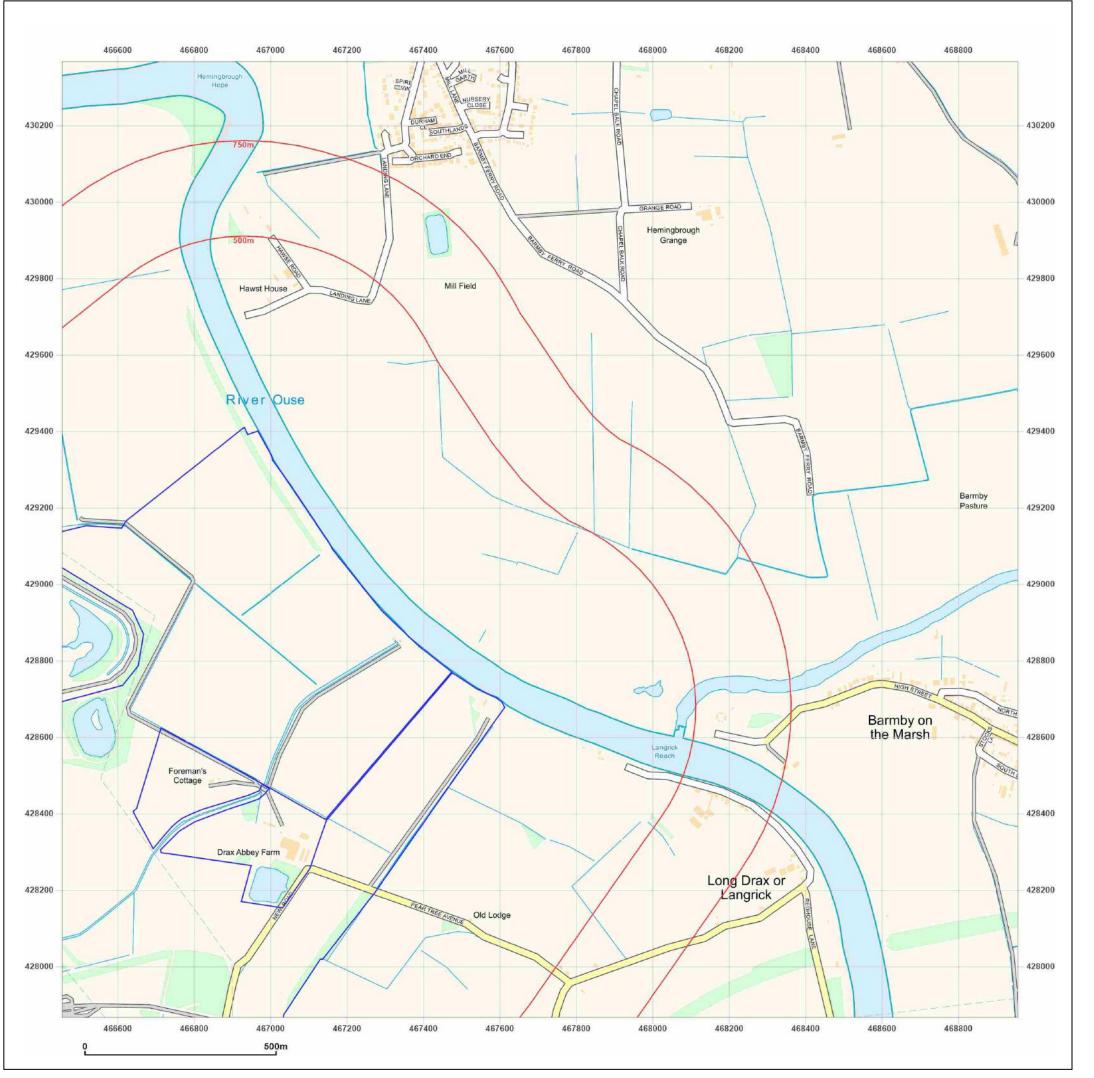




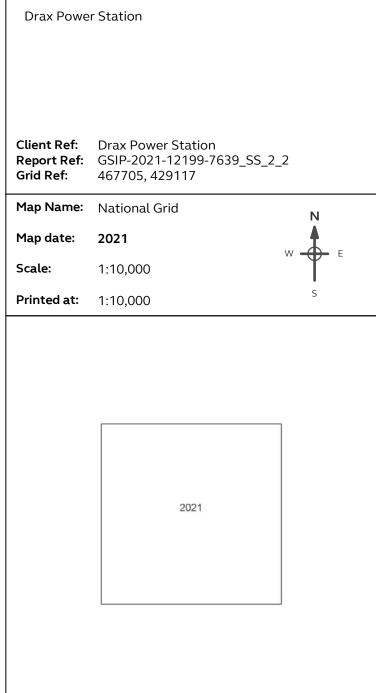
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