

Environmental Statement Volume 6 Appendix 16.1: Phase 1 Preliminary Risk Assessment

Date: January 2020

Environmental Impact Assessment

Environmental Statement

Volume 6

Appendix 16.1

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Thurrock Power Ltd

1st Floor

145 Kensington Church Street

London W8 7LP

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Prepared by: Jo Osmond and Liz Holland

Contributor: Liz Williams

Checked by: Jim Lightbown





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Summary

The purpose of this Phase 1 Preliminary Risk Assessment is to determine the potential for significant contamination to be present which could impact future site occupants and the wider environment, significantly constrain the proposed use of the site or affect the development process. It forms the technical basis for the baseline conditions section of Volume 3, Chapter 16: Geology, Hydrogeology and Ground Conditions.

Qualifications

This document has been prepared by Liz Holland, a Fellow of the Geological Society, who has nine years' experience working in the environmental sector, specialising in contaminated land assessments.

It has been checked by Jim Lightbown, a Chartered Environmentalist and Scientist of CIWEM, who has 15 years' experience working in the contaminated land sector, within consultancies and within a regulatory body.





1. Introduction

1.1 Preamble

1.1.1 This Phase 1 Preliminary Risk Assessment provides the technical basis for the Geology, Hydrogeology and Ground Conditions chapter, which is included at Volume 3, Chapter 16. It draws from desktop study data and information in the Phase 2 Site Investigation Report (Volume 6, Appendix 16.2).

1.2 Objectives

- 1.2.1 The principal objectives of this assessment were as follows:
 - To assess potential sources of contamination at the site, associated with historical and current land uses both on site and in the surrounding area;
 - To review the environmental setting to assess the sensitivity of the surrounding area to contamination/pollution;
 - To produce an outline Conceptual Site Model (CSM) detailing how any contamination may impact the identified receptors via pollutant linkages; and
 - To make recommendations for further investigation of potential pollutant linkages, where considered necessary.

1.3 Legislation and Guidance

- 1.3.1 This report has been produced in general accordance with:
 - Contaminated Land (England) Regulations 2006 (as amended);
 - DEFRA Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (2012):
 - DEFRA and Environment Agency (2004) Contaminated Land Report 11 (CLR 11):
 Model Procedures for the Management of Land Contamination;
 - National Planning Policy Framework (2019);
 - CIRIA Document C665: Assessing Risks Posed by Hazardous Ground Gases to Buildings;
 - British Standard requirements for the 'Investigation of potentially contaminated sites – Code of practice' (ref. BS10175:2011+A2:2017);
 - British Standard requirements for the 'Code of practice for ground investigations' (ref. BS5930:2015); and

- British Standard requirements for the 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings' (ref BS8485:2015).
- 1.3.2 Where appropriate, consideration has also been given to the following:
 - the potential for environmental liabilities to occur under other associated regimes, for example the Water Resources Act (1991) and the Environmental Damage Regulations (2009); and
 - key constraints on site redevelopment.
- 1.3.3 Details of the limitations of this type of assessment are described in Annex A.





2. Site Reconnaissance and Desk Study

2.1 Site Reconnaissance

- 2.1.1 This section of the report is based upon observations made during a site visit carried out on 13 September 2018 and web based aerial photography. The location and order limits are shown in Figure 1.2 in Volume 2, Chapter 2: Project Description.
- 2.1.2 The proposed development is located on land to the south west of Station Road near Tilbury, Essex, centred at National Grid Reference TQ662766. Land within the proposed order limits has been divided into zones (namely Zone A to Zone J). The main development site comprises Zone A.

The Site

- 2.1.3 Land within the order limits comprises primarily a number of agricultural fields with some brownfield land and Thames foreshore, divided into the following zones for ease of description.
- 2.1.4 In the following sections of this appendix, all references to "the site" or to distances from the site are to the Thurrock Flexible Generation Plant Order Limits, unless otherwise specified in the text.

Zone A and F4

- 2.1.5 This zone partially occupied irregularly shaped agricultural fields, located approximately 970m to the south of West Tilbury village and south of a railway line (London, Tilbury and Southend Railway known as the Tilbury Loop). The field in the north was cultivated and bordered by drainage ditches to the east, south and west. This field was generally flat with two electricity pylons located in the centre. The field located in the south of the site appeared to have been left fallow, vegetated with long grass. Zone F4 occupied part of a more roughly vegetated area in the southeast with a number of electricity pylons.
- 2.1.6 The topography of the southern fields was slightly undulating with two further electricity pylons, located in the centre. Drainage ditches were located to the east, south, west and north of the southern field with another drainage ditch cutting through the northeast corner. The drainage ditches were approximately 1.00m deep and heavily vegetated with shrubs and some small trees. The vegetation formed an approximately 1.50m wide border to either side of the drainage ditches. A grass track was located on the western edge of Zone A, providing vehicular access to the southern field, drainage ditches were located on either side of the track.

2.1.7 A photograph of the main development site at the time of the site walkover, is shown in Figure 2.1.



Figure 2.1: Main Development Site

Zone B

2.1.8 This zone comprised part of an existing National Grid Substation. Due to the operational nature of this area, Zone B was not accessed as part of the site walkover. Zone B was located to the southwest of Zone A beyond a drainage ditch.

Zone C

Zone C comprised a corridor of land located adjacent to the south of the railway line and to the north of Zone A. The corridor comprised a gravel track in the north with a metal fence separating the site from the railway line. The gravel track was raised approximately 0.50m above the adjacent cultivated agricultural field (located in the centre to south of the zone) which formed the majority of the Zone C area. Five electricity pylons were located within Zone C.





Zone C was bisected by two drainage ditches in the east and centre running north to south across the site. The drainage ditches were culverted below the track and open within the field area. The ditches were heavily vegetated with weeds and shrubs. A mound of soil and a drain/manhole cover were noted adjacent to the eastern drainage ditch. The track extended along the entire length of Zone C providing access from Station Road. Two railway crossings were also located at the north edge of Zone C in the centre and west of the area. The western railway crossing was for vehicles and livestock with the central crossing for pedestrians only. A locked metal gate was located at the end of the track, at Station Road. A photograph of Zone C is shown in Figure 2.2.



Figure 2.2: General View of Zone C.

Zones D1, D2 and D3

Zone D1 and D2 comprised part of primarily agricultural fields accessed from Station Road, located approximately 1.25km southwest of West Tilbury. The borders of the fields adjacent to Station Road comprised trees and shrubs. The irregularly shaped northern field appeared to have been recently ploughed and sloped slightly up from north to south. The smaller eastern field south of Station Road not in agricultural use was not accessed, however it appeared to be used for the storage of HDV trailers. Part of this zone also crosses through the southern corner of a larger field north of Station Road which lies adjacent to an industrial estate.

- 2.1.12 A photograph of Zone D2 is shown in Figure 2.3.
- 2.1.13 Zone D3 is located adjacent to the eastern field of Zone D2 and comprised a fallow agricultural field (vegetated with grass) with a generally flat topography. The area was accessed from Station Road to the northwest. The northern and western boundary of the area was demarcated by shrubs and trees.



Figure 2.3: General view of Zone D2.

Zones E, F1 and F3

Zones E, F1 and F3 were located to the north of the railway line, extending from the edge of Grays town to the north of Zone C. Zone E comprised a roughly rectangular field and Zones F1 and F3 comprised part of separate fields, both of which were located along the northern edge of the railway line. The railway line was raised approximately 0.50m above the fields. A drainage ditch was located along the western, northern and eastern edge of the field with a vegetated border comprising weeds, shrubs and reeds. The vegetated border was also raised slightly above the field level. The field comprised short grass (potentially recently cut) with a number of telegraph poles spanning its centre. A photograph of Zone E is shown in Figure 2.4.







Figure 2.4: General View of Zone E.

Zone F2

2.1.15 Zone F2 comprised the western part of a field located to the north of the railway with electricity pylons traversing its southern portion.

Zone G

- 2.1.16 Zone G comprised four main parts, from south to north: Thames foreshore; the site of Tilbury B Power Station (largely demolished); mature ash fields and extraction and land-raising operations; and an agricultural field.
- 2.1.17 Other apparatus associated with the former Tilbury B Power Station primarily comprising electricity substation compounds and pylons were adjacent to the zone. A number of unnamed land drains were located predominantly on the periphery of the zone with one of these diverting across the centre of the area before discharging to, what appeared to be, a settlement pond beyond the eastern boundary of the zone. The south of the zone was occupied by the shoreline of the northern bank of the River Thames.
- 2.1.18 A photograph showing the foreshore is shown in Figure 2.5.



Figure 2.5: Foreshore

Zones H, I and J

2.1.19 These zones are existing and under-construction public and private roads, which are within the Order Limits for Thurrock Flexible Generation Plant for purposes of access and temporary right of way diversion but would not be subject to physical changes from construction of the proposed development and therefore have not been surveyed.

Summary

2.1.20 At the time of the site visit, the majority of the site was in agricultural use predominantly as cultivated fields. Zone G part of Tilbury B Power Station but also includes parts of former ash fields (more recently used for deposit of Crossrail and Thames Tideway Tunnel spoil) and an area of the Thames foreshore. Zone B was part of an active substation.





2.1.21 No waste storage was noted on-site, nor was any chemical or oil storage observed. A minor amount of fly tipping was observed to be present adjacent to the road on land located between Zones F1 and F2. Access was not available to the HDV trailers stored in in the field containing Zone D2. No buildings were noted on the accessed areas of the site. No visual evidence of contamination was identified during the site walkover.

Surrounding area

2.1.22 The site was located within a predominantly agricultural area to the north, east and west but with the former Tilbury B Power Station and site of Tilbury2 port expansion to the south. East Tilbury village was located beyond the agricultural fields to the east of the site. East Tilbury included the Thames Industrial Park with industrial units visible from Zone D. A metal recycling works was located to the northwest of Zone D1. Tilbury Sewage Treatment Works was located to the west of Zone G. Grays town was located to the west of the site with West Tilbury village located to the north.

2.2 Site History

Historical Map Review

2.2.1 The following review is based on past editions of readily available Ordnance Survey (OS) maps. These include scales of 1:1,250, 1:2,500 and 1:10,000 dated 1865 to 2014. Historical mapping is provided as Annex C. The imagery included within Annex C contains Ordnance Survey data (license 100035207) under © Crown copyright and database right (2018) and is replicated from the Groundsure Report (Ref: RPS-5426520).

Table 2.1: Historical Site Uses.

On-site Land Use and Features	Dates First Shown
The majority of the site comprised undeveloped rural (likely agricultural) land traversed by a number of land drains. Walton Common West Tilbury Marshes is indicated to be present in Zone A and marshland in the south of Zone G (annotated as 'Saltings' from 1888).	c.1865
Then electricity transmission lines with poles and pylons were shown within Zone A and Zone C.	c.1955
Electricity transmission lines with pylons are shown extending into Zone G.	c.1966
Then the electricity transmission lines running through Zone A and Zone C and the surrounding area were marked as ending in Zone B.	c.1971

Table 2.2: Historical Neighbouring Site Uses.

Commence discrete and these (OFOre realises)	Oniontation	Dates		
Surrounding Land Uses (250m radius)	Orientation	From	То	
Railway line	South, north	1865	Present	
Gravel pit (annotated as disused from 1973) and old gravel pit (annotated old kiln from 1921, works from 1973 and then industrial estate)	Adjacent Zone C	1895	c.1991 to present	
Gravel pit Then potentially infilled	North of Zone I	1923 1967	c.1967	
Works – expansion east with chimney and tanks and annotated Tilbury Power Station from 1966	West of Zone G	1955	Recent	
Works Then electricity substation	South of Zone A	1966 1991	c.1991 c.2010	
Old gravel pit (outline shown 1865) Then potentially infilled	Northeast of Zone F2	1895 1955	c.1955	
Old chalk pit (outline shown 1865) Then potentially infilled	South of Zone D2	1895 1923	c.1923	

2.3 Environmental Setting

Geology

2.3.1 Based on British Geological Survey (BGS) mapping (1:50,000-scale) and the Environment Agency (EA) Groundwater Vulnerability mapping (1:100,000-scale), the stratigraphic sequence and aquifer classifications beneath the site are indicated to be as follows:

Table 2.3: Description of Geological Strata.

Strata	Strata Description & approximate thickness	
Artificial ground	Made Ground may be present beneath Zone B and is known to be present as a result of ash disposal within and adjacent to Zone G.	N/A
Head deposits (Zones D, I & J)	Head deposits are indicated to be present from ground level across parts of Zones D, I & J. This stratum generally comprises clay, silt, sand and gravel. Likely to be a few metres in thickness.	Secondary Undifferentiated Aquifer





Strata	Description & approximate thickness	Aquifer Classification
Alluvium (Zones A, B, C, E, F, G & H)	Alluvium is indicated to be present from ground level across Zones A, B, C, E, F, G & H. This stratum generally comprises clay, silt, sand and peat. Likely to be approximately 10 m to 15 m in thickness.	Secondary Undifferentiated Aquifer
Taplow Gravel Member (Zones A, B, C, E, F, G & H)	Secondary A Aquifer	
Lynch Hill Gravel Member (Zones D, I & J)	This stratum is indicated to be present from ground level beneath parts of Zone D and Zone I. This stratum generally comprises sand and gravel likely to be a few metres in thickness beneath the site.	Secondary A Aquifer
Thanet Formation (Zones D & I & J)	This stratum generally comprises fine grained sand likely to be up to 30m in thickness beneath the site.	Secondary A Aquifer
White Chalk Subgroup (all zones)	This stratum generally comprises white chalk. Likely to be of significant thickness beneath the site.	Principal Aquifer

- 2.3.2 A BGS record of an historical borehole log (ref: TQ67NE285, located directly south of Zone A) indicates underlying ground conditions comprised topsoil to approximately 0.20m below ground level (bgl) with silty clay below to approximately 1.30m bgl. Alternating layers of organic silty clay with decaying vegetation and peat were encountered to a depth of approximately 16.80m bgl (*interpreted by RPS as Alluvium*). Layers of sand and gravel were identified below the clay to a depth of approximately 19.40m bgl (*interpreted by RPS as the Taplow Gravel Member*). Chalk was noted to be present from approximately 19.40m bgl to the base of the borehole at approximately 20.10m bgl. Groundwater was encountered within a peat band at the base of the Alluvium with a resting water level recorded of approx. 1.80m bgl.
- 2.3.3 A number of boreholes were advanced for the construction of Tilbury Power Station located in a north-south alignment on the western flank of Zone G. These encountered approximately 16.00m of alternating clays/silts and peat (*interpreted by RPS as Alluvium*). Peat bands indicated to be up to 2.40m thickness. Below the Alluvium approximately 5.50m of gravels were identified (*interpreted by RPS as the Taplow Gravel Member*). Chalk was noted to be present beneath the gravels.

As indicated in Table 2.3, Made Ground may be present across parts of the site, in particular Zone B and known to be present in parts of Zone G. Four inspection pits excavated directly south of the southernmost ash disposal area as part of Tilbury Ground Investigations (Fugro report, 2019, presented in Volume 6, Appendix 16.3: Team2100 Tilbury Ground Investigations), encountered up to 1.2 m of Made Ground (base unproven). The Made Ground comprised granular material with pockets of ashy sand noted. Horizons of PFA were identified up to 0.3 m thickness terminating on a concrete base.

Hydrogeology

- 2.3.5 The majority of the site is indicated to be located above a Secondary Undifferentiated Aquifer relating to the Head and Alluvium deposits. These formations have varying characteristics in different locations.
- 2.3.6 Secondary A Aquifers relating to the Taplow Gravel Member, Lynch Hill Gravel Member and Thanet Formation are indicated to be located below Zones D, Zone I and Zone J. These formations are formed of permeable layers capable of supporting water supplies at a local scale, in some cases forming an important source of base flow to rivers. The Taplow Gravel Member is indicated to be present beneath the Alluvium in Zones A, B, C, E, F, G & H.
- 2.3.7 A Principal Aquifer relating to the White Chalk Subgroup is indicated to be located below the superficial deposits (and Thanet Formation in Zone D, Zone I and Zone J) across the entire site. These formations provide a high level of water storage and may support water supply and / or river base flow on a strategic scale.
- 2.3.8 According to EA data, the majority of site, including the main development site (Zone A), is not located in a groundwater Source Protection Zone (SPZ). The northern parts of Zone C, Zone D and Zone I are located within a groundwater SPZ 3 (Total Catchment). The total catchment is the total area needed to support removal of water from the borehole, and to support any discharge from the borehole.
- 2.3.9 Under the Water Framework Directive, the EA's local River Basin Management Plan classifies groundwater chemical quality within the Essex Gravel beneath Zone D, Zone I and Zone J of the site as 'poor' quality (as of 2016). Groundwater chemical quality (as of 2016) within the South Essex Thurrock Chalk located below Zones A, B, C, E, F,G and H was classified as having 'good' chemical quality, as was the South Essex Lower London Tertiaries located below part of Zone C, Zone F (excluding Zone F4) and D1. However, as part of the EA's response (ref: EA/2018/123138/01-L01, dated 5 September 2018) to the EIA Scoping Report, reference was made to the South Essex Thurrock Chalk groundwater body currently being at 'poor' status.





2.3.10 Information provided by the EA indicates that there are records of five active licensed groundwater abstractions within 2 km of the site. These are detailed in Table 2.4 below.

Table 2.4: Licensed Groundwater Abstractions.

License Holder	Approx. Distance and Direction*	Source	Use
C H Cole & Sons	85m north west	Well West Tilbury	General farming & domestic use (includes potable water supply) and spray irrigation
RWE Generation UK Plc	160m west	Borehole East Tilbury	Potable Water
C H Cole & Sons	225m north	Well West Tilbury	General farming and domestic use including spray irrigation
S Walsh & Son Ltd	575m northeast	Gravel pit at East Tilbury	Mineral Washing
Northumbrian Water Ltd	1,360m north	Well at Linford	Potable Water

^{*} from nearest point on Order Limits

Surface Water

- 2.3.11 Numerous drainage ditches are located on site and within the surrounding area. However, no watercourses which are classified within a River Basin Management Plan published by the EA under the European Water Framework Directive (2000) have been identified within 1km of the site.
- 2.3.12 Information provided by the EA indicates that there is a record of one active licensed surface water abstraction within 2km of the site. The license holder for the abstraction is C. H. Cole & Sons, for an abstraction recorded approximately 1,770m northwest of the site, from a ditch tributary of the River Thames for spray irrigation (storage) uses.

Ecologically Sensitive Sites

2.3.13 Natural England data indicates that there is one ecologically sensitive site, which constitutes an environmental receptor as defined within Table 1 of the Defra Environmental Protection Act 1990: Part 2A - Contaminated Land Statutory Guidance (2012), located within a 1km radius of the site. This relates to Mucking Flats and Marshes Site of Special Scientific Interest (SSSI) located approximately 770m to the east of Zone D3.

Radon

2.3.14 According to the Indicative Atlas of Radon in England and Wales published by the Health Protection Agency (part of Public Health England) and the British Geological Survey, the site is located in an area where between 1% and 3% of properties are above the Action Level. However, no radon protection measures as described in publication BR211 by the Building Research Establishment are considered necessary.

Coal Authority

2.3.15 The Interactive Map Viewer on the Coal Authority website indicates that the site is not located in a coal mining reporting area.

Non-Coal Mining

- 2.3.16 The BGS has provided information regarding non-coal mining activities in the vicinity of the site. These include:
 - Chalk: Small scale underground mining may have occurred; mine adits, shafts and tunnels may be present. The potential for localised difficult ground conditions are at a level where they should be considered.
 - Sand: Sporadic underground mining of restricted extent may have occurred. The
 potential for difficult ground conditions are unlikely and localised and are at a level
 where they need not be considered.

2.4 Ground Investigation (Zone A)

- 2.4.1 A Phase 2 Site Investigation was undertaken in September 2019 in Zone A and its findings are reported in Volume 6, Appendix 16.2. The investigation comprised:
 - seven cable percussive boreholes to depths of up to 25 mbgl;
 - nine dynamic samples boreholes to depths of up to 5.45 mbgl;
 - ten Cone Penetration Tests;
 - piezometer installations within the Chalk aquifer in seven boreholes and subsequent groundwater monitoring; and
 - six standpipe installations within the Made Ground/Alluvium with subsequent groundwater and ground gas monitoring.

Encountered Ground Conditions

2.4.2 Topsoil was encountered within the majority of locations to depths of between 0.1 mbgl and 0.95 mbgl.





- 2.4.3 Made Ground was encountered within five locations to depths of between 0.5 mbgl and 1.82 mbgl. This comprised gravelly clay with gravel of brick and chalk.
- 2.4.4 Alluvium was encountered underlying the topsoil and Made Ground to depths of between 18.1 mbgl and 20.3 mbgl. It comprised predominantly very soft, silty clay, frequently peaty and an occasional layer of peat typically 1.5 m thick encountered at approximately 5.5 mbgl and 6 mbgl. Thinner shallower bands of peat were identified in five locations around 1 mbgl. Coarse sand and flint gravel were commonly encountered at depths of between 11.2 mbgl and 16.1 mbgl (RPS interpreted as the Taplow Gravel Member).
- 2.4.5 Chalk was encountered underlying the Alluvium recovered as chalk gravel and putty chalk, occasionally with pockets of flint gravel.
- 2.4.6 During the site investigation, groundwater was encountered in five cable percussive boreholes at depths of between 11.2 mbgl and 15 mbgl where the top of the sand and gravel was encountered, and rose to depths of between 2.4 mbgl and 6.2 mbgl over a period of 20 minutes.

Groundwater Monitoring

2.4.7 Groundwater was monitored at depths of approximately 1 mbgl within the piezometers installed within the Chalk aquifer and at between 1.62 mbgl and 2.67 mbgl within shallower boreholes installed within the Made Ground/Alluvium.

Ground Gas Monitoring

2.4.8 Recorded methane, carbon dioxide and hydrogen sulphide concentrations were below detection levels on all monitoring occasions. Carbon dioxide concentrations ranged between 0.3 and 2.7 %.

Screening Assessment

- 2.4.9 Analysis of selected soil samples did not indicate any elevated concentrations of contaminants when compared with criteria for commercial end use.
- 2.4.10 Asbestos was not detected in any of the analysed soil samples.
- 2.4.11 Analysis of groundwater samples from the shallower boreholes did not indicate any elevated concentrations of contaminants when compared to the UK Drinking Water Standards.

2.5 Sediment Sampling (Zone G)

- 2.5.1 Phase 2 sediment sampling was undertaken to characterise the sediment composition including sediment bound contaminants, within the footprint of the causeway and dredging area.
- 2.5.2 Chemical analysis of three sediment core samples indicated that the levels of contaminants in the sediments were typical of a busy estuary such as the Thames. Metals and PAHs were elevated above Cefas Action Level 1 and the Canadian Threshold Effects Levels (TEL), but well below Cefas Action Level 2 and the Canadian Probable Effect Level (PEL) (where relevant).
- 2.5.3 Further details are provided in Volume 6, Appendix 17.1: Phase 1 Intertidal Survey Report and Appendix 17.4: Third Party Survey Reports.

2.6 Authorised Processes and Pollution Incidents

Landfills and Waste Sites

2.6.1 Information provided by a number of sources (EA, BGS, Local Authority) shows that there are six recorded licensed or known historical landfill sites and four waste treatment / transfer sites recorded within 250m of the site. These are described within Table 2.5 below.

Table 2.5: Landfills and Waste Sites.

Approx. Distance and Direction	License Details	Waste Type and Details	
Landfill Sites			
On site – Zone G	Tilbury Power Station 1963 to present day. Known as the Tilbury ash disposal site.	Industrial waste (factory curtilage) – pulverised fuel ash.	
On site – Zone G	RWE Npower Plc, Tilbury B Power Station – issued 2001	Industrial waste (factory curtilage) – pulverised fuel ash.	
On site – Zone G	National Power Plc - issued 1978	Inert	





Approx. Distance and Direction	License Details	Waste Type and Details			
50m north Zone D1	Leemans and Readman (known as Low Street Brickworks) – 1956 to 1977	Industrial, commercial (brickworks) Thurrock Council has record of a pit inspection from 28 July 1956 which notes that the filling of a pong had been done using waste foundry sand from the Readymetal Company. Condition 1 of THU/442/75 stated that no refuse other than refuse of the descriptions specified below shall be deposited on the site without the further consent of the Council and Thurrock Borough Council being first sought and obtained – clay, excavated materials, building site clearance materials and waste concrete blocks excluding liquid, toxic, putrescible and water soluble materials			
50m north Zone D1	Low Street – 1969 to 1976	Non-hazardous industrial and commercial			
Adjacent to Zone I Aylett Gravel Limited (known as Princess Margaret Road landfill (Love Lane)) – 1934 to 1988		Inert, industrial, commercial			
10m north Zone I	Bata Gravel Pit	Not provided			
Within the south of Zone J					
185m southwest Zone D2	East Tilbury Marshes (William Cory and Son Limited) – 1932 to 1991	Industrial, commercial, household, liquid sludge Thurrock Council has a record of this site being operated from 1979 until the mid-1990s. Waste types included household hazardous solids and liquids.			
Scrap Yards & Waste Transfer / Treatment Sites					
On site – Zone G	RWE Npower Plc, Tilbury B Power Station – issued 2001	Industrial waste landfill (factory curtilage) – pulverised fuel ash			
50m north Zone D1 Lester Reclaim Spares Ltd, Unit 9 Road – issued 2004		End of life vehicle facility			

Approx. Distance and Direction	License Details	Waste Type and Details
50m north Zone D1	J S Trucks Ltd, Low Street Brickworks, Station Road – issued 1998, effective 2004	Metal recycling site (vehicle dismantler)
100m north Zone D1	Mayer Parry Recycling Ltd, Station Road – issued 1994, modified 2009	Metal recycling site

Environmental Permits

2.6.2 EA and Local Authority data indicates that there are six active processes regulated by an Environmental Permit (under the Environmental Permitting Regulations 2010) within 500m of the site. These are outlined in Table 2.6 below:

Table 2.6: Environmental Permits.

License Holder	Approx. Distance and Direction	Permitted Activity	
Mayer Parry Recycling Limited	90m northwest	Recovery and disposal of non-hazardous waste – metal waste	
Stobart Biomass Products	365m southeast	Recovery and disposal of non-hazardous waste – pre- treatment of waste for incineration	
RWE Generation UK Plc 420m south Loading, unloading, storing of pulverise bulk prior to transportation		Loading, unloading, storing of pulverised fuel ash in bulk prior to transportation	
RWE Generation UK Plc	420m south	Combustion of any fuel.	
RWE Generation UK Plc 420m south Was		Waste landfilling excluding inert waste	
RWE Generation UK Plc 420m south		Recovery and disposal of non-hazardous waste involving treatment of slags and ashes.	

COMAH Sites

- 2.6.3 According to the Groundsure report there are no records of any active operations under the Control of Major Accident Hazards (COMAH) Regulations 1999, located within 500 m of the site. Correspondence from the Health and Safety Executive (HSE) dated November 2018 however identifies one major accident hazard site and three major accident hazard pipelines within the development boundary as follows:
 - HSE ref H1277; operated by British Beta Shoe Company
 - HSE ref 8189; operated by National Grid Plc; 5 feeder Hordon / Tilbury Thomas North





- HSE ref 8191; operated by National Grid Plc; 18 feeder Stapleford / Tilbury Thomas North
- HSE ref 8149; operated by cadent gas ltd; Orsett / Chadwell St. Mary (21)
- 2.6.4 It is however indicated that the British Beta Shoe Company factory closed in 2005.

Pollution Incidents

2.6.5 Environment Agency data indicates that there are no records of 'major' or 'significant' pollution incidents within 500 m of the site.

Regulatory Consultations

- 2.6.6 The Contaminated Land Officer at Thurrock Council was consulted regarding any known contamination issues at the site. The Council advised the following:
 - Thurrock Council has implemented its Inspection Strategy for Contaminated Land, as required by Part 2A of the Environmental Protection Act 1990. At this time, they have had no cause to inspect any land within 250m of the site for contamination, applying this strategy.
 - No land within 250 m of the site has been declared as 'contaminated land' as defined by Part 2A of the Environmental Protection Act 1990. The zones have been assessed as Category 3 or 4 sites in their current use.
 - Thurrock Council Environmental Health has no records of pollution incidents at the site or in the surrounding area.
- 2.6.7 RPS notes that the Contaminated Land Statutory Guidance (2012) states that:

"Categories 1 and 2 would encompass land which is capable of being determined as contaminated land on grounds of significant possibility of significant harm to human health. Categories 3 and 4 would encompass land which is not capable of being determined on such grounds." In addition, "Categories 1 and 2 would comprise cases where the authority considers that a significant possibility of significant pollution of controlled waters exists. Categories 3 and 4 would comprise cases where the authority considers that a significant possibility of such pollution does not exist."





3. Outline Conceptual Site Model

3.1 Background

- 3.1.1 An outline conceptual site model (CSM) consists of an appraisal of the source-pathway-receptor 'contaminant linkages' which is central to the approach used to determine the existence of 'contaminated land' according to the definition set out under Part 2A of the Environmental Protection Act 1990. For a risk to exist (under Part 2A), all three of the following components must be present to facilitate a potential 'pollutant linkage'.
 - Source referring to the source of contamination (Hazard).
 - Pathway for the contaminant to move/migrate to receptor(s).
 - Receptor (Target) that could be affected by the contaminant(s).
- 3.1.2 Receptors include human beings, other living organisms, crops, controlled waters and buildings / structures. The National Planning Policy Framework, used to address contaminated land through the planning process, follows the same principles as those set out under Part 2A. Further details on the Part 2A regime are presented in Annex B.

3.2 Potential Pollutant Linkages

3.2.1 Each stage of the potential pollutant linkage sequence has been assessed individually on the basis of information obtained during the site reconnaissance and desk study exercise and are discussed in the following section.

Potential Contaminant Sources

On Site - Current

- 3.2.2 The majority of the site currently comprises agricultural land, which is not considered to represent a potentially significant source of contaminants of concern. However, agricultural land uses could represent a potential source of pesticides and herbicides.
- 3.2.3 The former Tilbury Power Station is crossed by part of Zone G and the zone itself cuts through an associated ash disposal site.
- 3.2.4 The use of Zone B as part of a National Grid substation represents a potential source of contamination.
- 3.2.5 BGS mapping indicates that Made Ground may be present across Zone B. Where present this could represent a potential source of contaminants of concern and / or ground gas.

- 3.2.6 The presence of peat within the underlying Alluvium could represent a potential source of ground gas. No elevated ground gas concentrations were identified within the Phase 2 2019 investigation of Zone A; however, standpipe installations were not located within the thicker peat layers and only one round of monitoring was undertaken during worst case conditions.
- 3.2.7 Access was not available to the HDV trailers stored in Zone D2.

On Site – Historical

- 3.2.8 Historical maps indicate the majority of the site comprised undeveloped rural land (likely agricultural), which is not considered to represent a potential source of contamination.
- 3.2.9 The historical use of Zone B as a works (likely associated with Tilbury Power Station) from c.1967 could represent a potential source of contaminants of concern.

Off-site - Current

- 3.2.10 Current off-site potential sources of contaminants of concern include Tilbury Sewage Treatment Works located to the west of Zone G. A metal recycling site and associated industrial units located to the north of Zone D and East Tilbury Industrial Estate located approximately 470m northeast of Zone D1. Two metal recycling / end of life vehicle waste sites are also recorded from 110m north of Zone D1.
- 3.2.11 Zone G cuts through the marked boundary of a licensed landfill, as well as historical landfills accepting industrial waste (pulverised fuel ash), representing a potential source of mobile contamination. There is potential for the disposal of any putrescible, non-ash material in these landfills to represent a potential source of contamination and ground gas.
- 3.2.12 At the time of the site walkover, a minor amount of fly tipping was observed to be present adjacent to the road on land located between Zones F1 and F2. Given its small scale and the nature of the materials, this is not considered to represent a potentially significant source of contaminants of concern.

Off-Site - Historical

- 3.2.13 Potentially infilled gravel pits are located to the north of the site. These could represent potential sources of contaminants of concern and / or ground gas.
- 3.2.14 A number of historical landfills accepting industrial and commercial waste were recorded in the site vicinity (north of Zone D1 and north of Zone D3) which could represent a potential source of contaminants of concern and ground gas.





Potential Pathways

- 3.2.15 The main development site will largely be covered by buildings, structures and apparatus comprising the gas engines, substations, battery storage, gas compound and runoff attenuation area. In these areas, the risks to future on site human health receptors via the pathways of dermal contact and ingestion will be mitigated. However, in any areas of proposed soft landscaping, the pathways of dermal contact and ingestion could still be active. In addition, there would be potential for the airborne migration of soil derived dust from these areas.
- 3.2.16 There is the potential for ground gas and volatile contaminants of concern in soil and/or groundwater (if present) beneath the site to impact future site users via the inhalation pathway in indoor areas. However, it is noted that the facility is not expected to have a full-time workforce on site during operation.
- 3.2.17 There is the potential for contaminants of concern (if present) beneath the site to migrate on or off-site via granular horizons of the Made Ground (if present) and the Head, Alluvium and Taplow Gravel Member deposits. These may impact off-site human heath receptors via the dermal contact, ingestion and vapour inhalation pathways.
- 3.2.18 The service corridors and/or subterranean infrastructure corridors could act as preferential pathways for the migration of any potential contaminants of concern.
- 3.2.19 There is potential for any mobile contaminants of concern (if present) within shallow soils to leach into the underlying Thanet Formation and White Chalk Subgroup. However, the likely significant thickness of Alluvium beneath the majority of the site will inhibit the potential for the vertical and/or lateral migration of any contaminants of concern.
- 3.2.20 Any contaminants of concern present within the Taplow Gravels beneath the main development site has potential to migrate downwards along piles. No chemical testing of this aquifer was undertaken within the Phase 2 2019 investigation of Zone A.

Potential Receptors

- 3.2.21 Potential human receptors include future site users and off-site human receptors including residents, workers and general public users on land adjacent to the scheme.
- 3.2.22 Head deposits and Alluvium are indicated to be present from ground surface across the majority of the application site, including the main development site. These strata are classified as Secondary Undifferentiated Aquifers. Given this classification, they are not considered to represent potential controlled waters receptors.

- 3.2.23 Parts of Zone D, Zone I and Zone J are directly underlain by the Taplow Gravel Member or Lynch Hill Gravel Member. These strata are classified as Secondary A Aquifers.
- 3.2.24 The main development site (Zone A) is indicated to be underlain by the White Chalk Subgroup (a Principal Aquifer). The relatively thick, likely low permeability overlying Alluvium will provide a high level of protection to the underlying groundwater within this aquifer. However, service corridors, subterranean infrastructure corridors or piling activities could act as preferential pathways for the migration of any potential contaminants of concern which could impact the White Chalk Subgroup. Therefore, this aquifer is considered to be a sensitive receptor.
- 3.2.25 Two groundwater abstraction licences for potable water supply are located within the vicinity of the site.
- 3.2.26 Numerous drainage ditches are located on site and within the surrounding area.
- 3.2.27 Mucking Flats and Marshes Site of SSSI is located approximately 770m east of Zone D3. However, given that this feature is over 2.5km from the main development site (Zone A), it is not considered to represent a potential receptor.

3.3 Outline Conceptual Site Model

- 3.3.1 An outline CSM has been developed on the basis of the site reconnaissance and desk study prepared for the site and ground investigation relating to Zone G. The CSM is used to identify potential sources, pathways and receptors (i.e. potential pollutant linkages) on site and is summarised in Table 3.1 overleaf.
- 3.3.2 The risk assessment is based upon the available information relating to the site. A further ground investigation is proposed to confirm ground conditions and the data will be used to refine the conceptual model and design of any remediation required.





Table 3.1: Outline Conceptual Site Model.

Potential Source	Contaminants of Concern	Via	Potential Pathways	Linkage Potentially Active?	Receptors		
			Direct contact/ingestion	✓	Construction workers Future site users		
		Soil	Inhalation of volatiles	✓	Construction workers Future site users		
		S	Airborne migration of soil derived dust	✓	Off-site users		
On site – current: Agricultural land and part of National Grid substation (Zone B)	Metals, hydrocarbons, polychlorinate		Leaching of mobile contaminants	✓ ✓	Taplow Gravel Member Secondary A Aquifer Lynch Hill Gravel Member Secondary A Aquifer		
On site – historical: Works (Zone B)	d biphenyls (PCBs), pesticides, herbicides and asbestos		Direct contact/ingestion	✓ ✓	Construction workers Future site users Off-site users		
		Groundwater	Inhalation of volatiles	✓ ✓ ✓	Construction workers Future site users Off-site users		
		Gre	Downward vertical and lateral migration in permeable strata	✓ ✓ ✓	Taplow Gravel Member Secondary A Aquifer Lynch Hill Gravel Member Secondary A Aquifer Potable groundwater abstractions Land drains		
Off-site – current:			Direct contact/ingestion	✓	Construction workers		
Tilbury Sewage Treatment Works (located west of Zone G); a metal recycling site and associated industrial units located adjacent to the north of Zone D; East Tilbury Industrial Estate (north west of Zone D); two metal recycling / end of life vehicle waste sites north west of Zone D licensed active and historical landfill (including ash fields), extending onto Zone F4 and Zone G) Off site – historical: Potentially infilled gravel pits; active and historical landfills; and brick works, a scrap yard and an industrial estate	Metals and hydrocarbons			Groundwater	Lateral migration and subsequent inhalation of volatiles	✓ ✓	Construction workers Future site users
On and off-site:	Carbon	Ground Gas	Vertical and lateral migration and subsequent inhalation of ground gas	✓ ✓	Construction workers Future site users Off-site users		
Landfills, potentially infilled gravel pits, Made Ground / natural strata (including peat deposits) or bio-degradation of contamination	dioxide and methane		Explosive risks	✓ ✓ ✓	Construction workers Future site users Off-site users		





4. Conclusions and Recommendations

- 4.1.1 The outline CSM produced upon completion of the desk study assessment has identified a limited number of potential pollutant linkages that may be active upon the redevelopment of the site, particularly in consideration of the main application site.
- 4.1.2 It is recommended that further confirmatory ground investigation be undertaken of the main development site specifically targeting the Taplow Gravels Secondary A aquifer and thicker peat horizons within the Alluvium.
- 4.1.3 The BGS has provided information regarding non-coal mining and extraction associated with localised areas within the application site boundary. This relates to chalk mining and risk of dissolution, and therefore an Interpretative Cavity Occurrence Assessment Report is recommended for the main development site.





5. References

British Standards Institution (2013) BS 10175 :2011+A2:2017 Investigation of Potentially Contaminated Sites. London, BSI.

British Standards Institution (2015) BS 5930 Code of practice for ground investigations. London, BSI.

British Standards Institution (2015) BS 8485 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings. London, BSI.

Construction Industry Research and Information Association (CIRIA) (2007) Assessing Risks Posed by Hazardous Ground Gases to Buildings (C665). London, CIRIA.

Department for Environment, Food & Rural Affairs (DEFRA) and Environment Agency (EA) (2004) Contaminated Land Report 11 (CLR 11): Model Procedures for the Management of Land Contamination. [Online] Available at:

https://webarchive.nationalarchives.gov.uk/20140328160926/http:/cdn.environmentagency.gov.uk/scho0804bibr-e-e.pdf [Accessed 04 October 2019]

Department for Environment, Food & Rural Affairs (DEFRA) (2012) Environmental Protection Act 1990: Part 2A - Contaminated Land Statutory Guidance. [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/223705/pb13735cont-land-guidance.pdf [Accessed 04 October 2019]

Fugro (2019) Team2100 Tilbury Ground Investigation. Project Ref: G180029U, v.02.

Ministry of Housing, Communities and Local Government (2019) National Planning Policy Framework. UK, APS Group.





Annex A General Notes

- A.1.1.1 This report provides available factual data for the site obtained only from the sources described in the text and related to the site on the basis of the location information provided by the Client.
- A.1.1.2 The desk study information is not necessarily exhaustive and further information relevant to the site may be available from other sources.
- A.1.1.3 The accuracy of maps cannot be guaranteed and it should be recognised that different conditions on site may have existed between and subsequent to the various map surveys.
- A.1.1.4 No sampling or analysis has been undertaken in relation to this desk study.
- A.1.1.5 Any borehole data from British Geological Survey sources is included on the basis that:

 "The British Geological Survey accept no responsibility for omissions or
 misinterpretation of the data from their Data Bank as this may be old or obtained from
 non-BGS sources and may not represent current interpretation".
- A.1.1.6 Where any data supplied by the Client or from other sources, including that from previous site investigations, have been used it has been assumed that the information is correct. No responsibility can be accepted by RPS for inaccuracies in the data supplied by any other party.
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Annex B Part 2A (The Contaminated Land Regime)

B.1 Contaminated Land Definition

- B.1.1.1 Under Section 57 of the Environmental Act 1995, Part 2A was inserted into the Environmental Protection Act 1990 to include provisions for the management of contaminated land.
- B.1.1.2 Subsequent regulations were first implemented in England in April 2000, Scotland in July 2000 and Wales in July 2001¹, providing a definition of 'contaminated land' and setting out the nature of liabilities that can be incurred by owners of contaminated land and groundwater.
- B.1.1.3 According to the Act, contaminated land is defined as 'any land which appears to the local authority in whose area the land is situated to be in such a condition, by reason of substances in, on or under the land that:
 - a) significant harm is being caused or there is a significant possibility of such harm being caused; or
 - b) significant pollution of controlled waters² is being caused or there is a significant possibility of such pollution being caused³
- B.1.1.4 The guidance on determining whether a particular possibility is significant is based on the principles of risk assessment and in particular on considerations of the magnitude or consequences of the different types of significant harm caused. The term 'possibility of significant harm being caused' should be taken, as referring to a measure of the probability, or frequency, of the occurrence of circumstances that could lead to significant harm being caused.
- B.1.1.5 The following situations are defined where harm is to be regarded as significant:
 - i. Chronic or acute toxic effect, serious injury or death to humans
 - ii. Irreversible or other adverse harm to the ecological system
 - iii. Substantial damage to, or failure of, buildings

- iv. Disease, other physical damage or death of livestock or crops
- v. The pollution of controlled waters⁴.
- B.1.1.6 With regard to radioactivity, contaminated land is defined as 'any land which appears to be in such a condition, by reason of substances in, on or under the land that harm is being caused, or there is a *significant possibility of such harm being caused*⁵'.

B.2 The Risk Assessment Methodology

B.2.1.1 Risk assessment is the process of collating known information on a hazard or set of hazards in order to estimate actual or potential risks to receptors. The receptor may be humans, a water resource, a sensitive local ecosystem or future construction materials. Receptors can be connected with the hazard via one or several exposure pathways (e.g. the pathway of direct contact). Risks are generally managed by isolating or removing the hazard, isolating the receptor, or by intercepting the exposure pathway. Without the three essential components of a source (hazard), pathway and receptor, there can be no risk. Thus, the mere presence of a hazard at a site does not mean that there will necessarily be attendant risks.

B.3 The Risk Assessment

- B.3.1.1 By considering where a viable pathway exists which connects a source with a receptor, this assessment will identify where pollutant linkages may exist. A pollutant linkage is the term used by the DEFRA in their standard procedure on risk assessment. If there is no pollutant linkage, then there is no risk. Therefore, only where a viable pollutant linkage is established does this assessment go on to consider the level of risk. Risk should be based on a consideration of both:
 - The likelihood of an event (probability) takes into account both the presence of the hazard and receptor and the integrity of the pathway.
 - The severity of the potential consequence takes into account both the potential severity of the hazard and the sensitivity of the receptor.
- B.3.1.2 For further information please see the Contaminated Land section on the DEFRA website (www.defra.gov.uk).





¹ In England by The Contaminated Land (England) Regulations 2000, updated by The Contaminated Land (England) (Amendment) Regulations 2012; in Scotland by The Contaminated Land (Scotland) Regulations 2000, updated by the Contaminated Land (Scotland) Regulations 2005; and in Wales by The Contaminated Land (Wales) Regulations 2001, updated by the Contaminated Land (Wales) Regulations 2006.

² In Scotland the term "controlled water" has been updated to "water environment" under the Contaminated Land (Scotland) Regulations 2005 in line with the Water Environment and Water Services (Scotland) Act 2003.

³ The definition was amended in 2012 by implementation of the Water Act 2003.

⁴ Groundwater in this context does not include waters within underground strata but above the saturated zone.

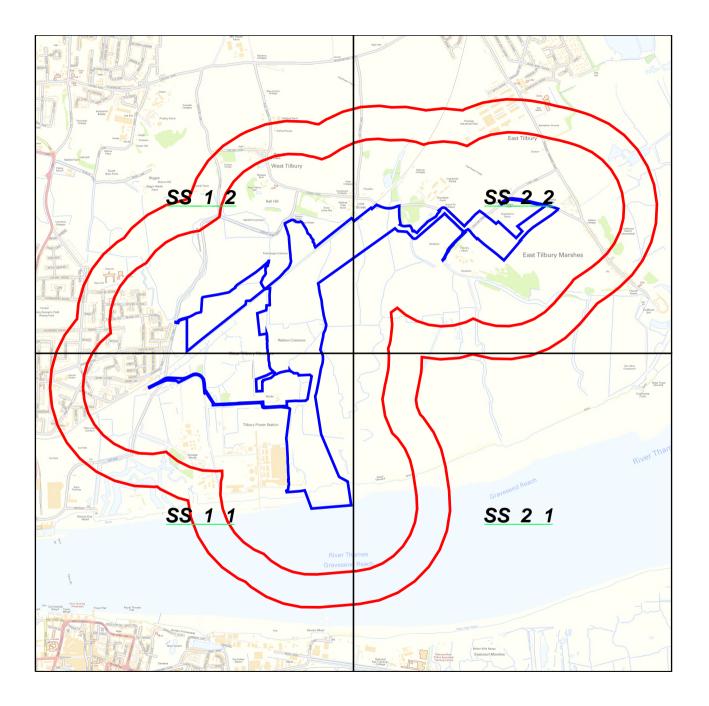
⁵ The Radioactive Contaminated Land (Modification of Enactments) (England) Regulations 2006 and Contaminated Land (Wales) Regulations 2006.

Annex C Historical Mapping

Note: the development marked on the historical maps does not precisely represent the proposed development Order Limits, as the mapping was purchased at an earlier stage of design. However, the historical mapping extent does fully encompass the Order Limits and study area for the Volume 6, Appendix 16.1: Phase 1 Preliminary Risk Assessment.



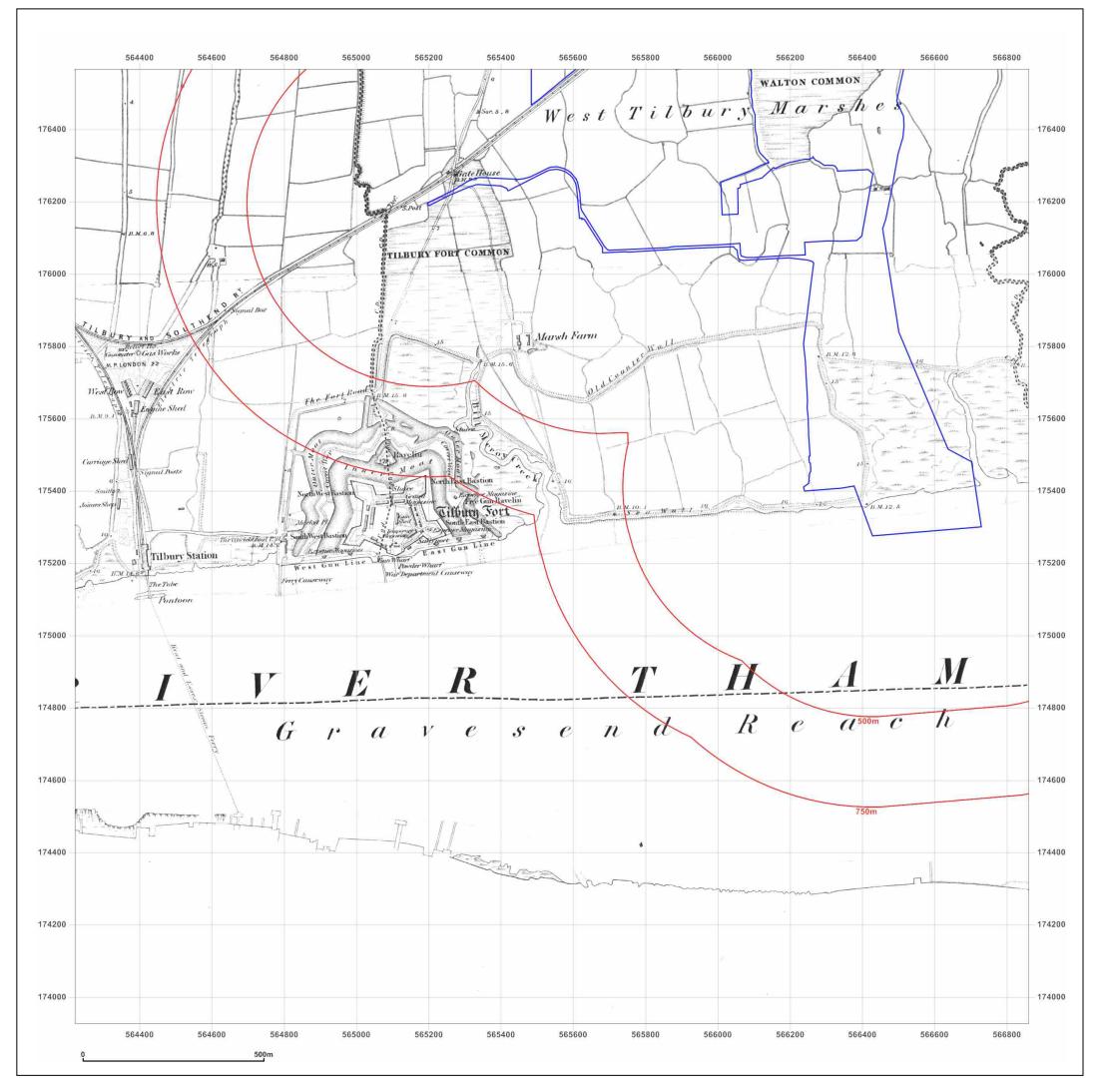




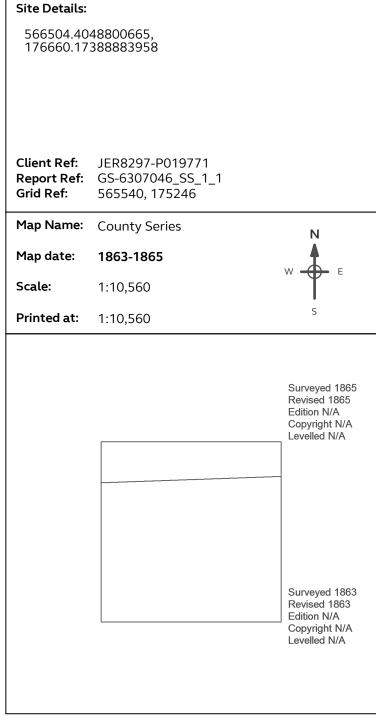




Small Scale Grid Index





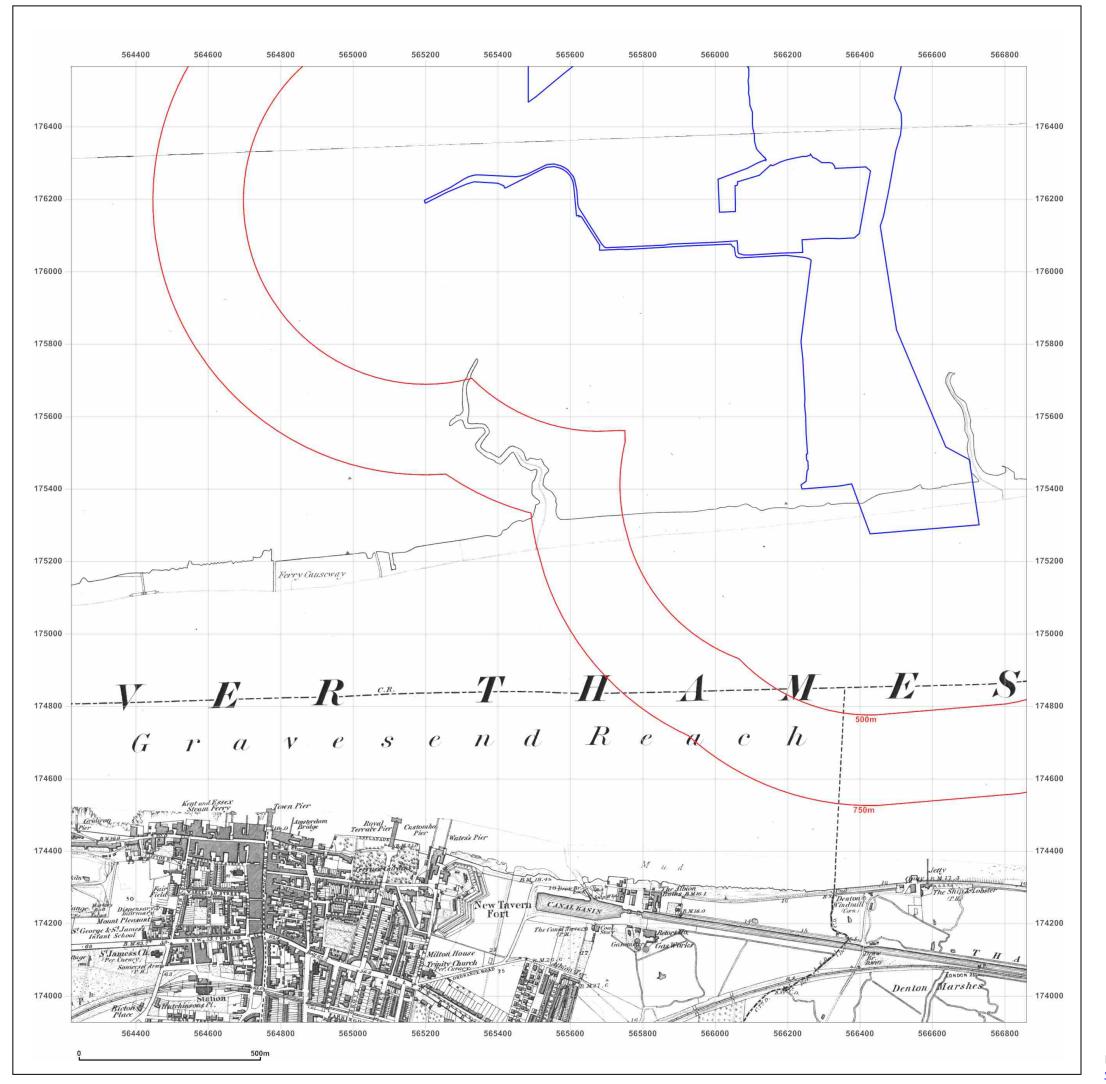




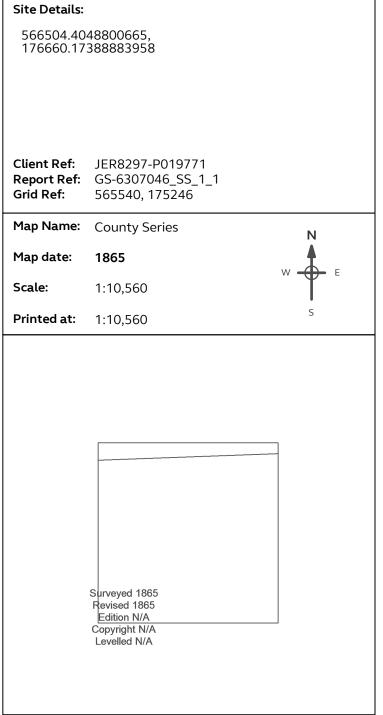
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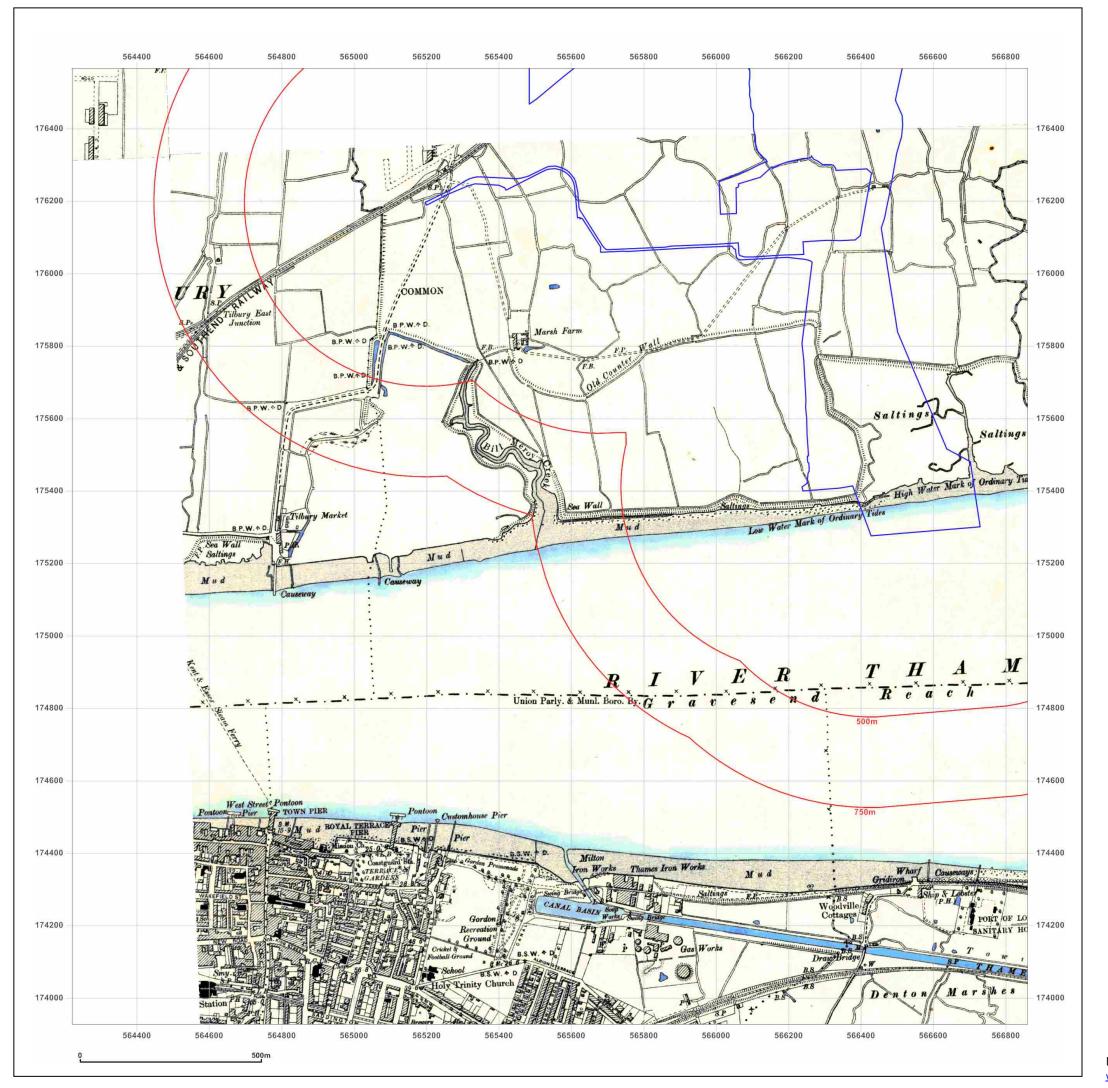




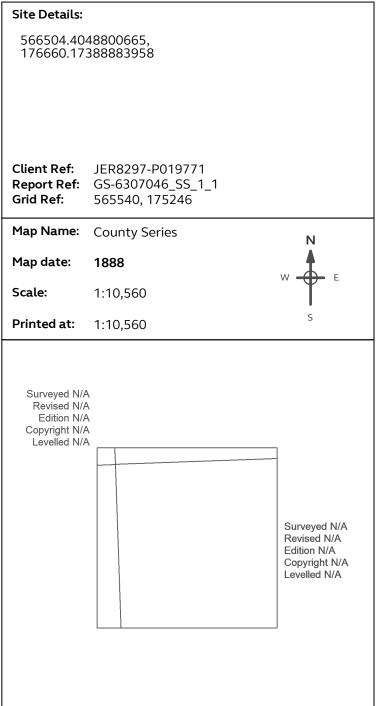
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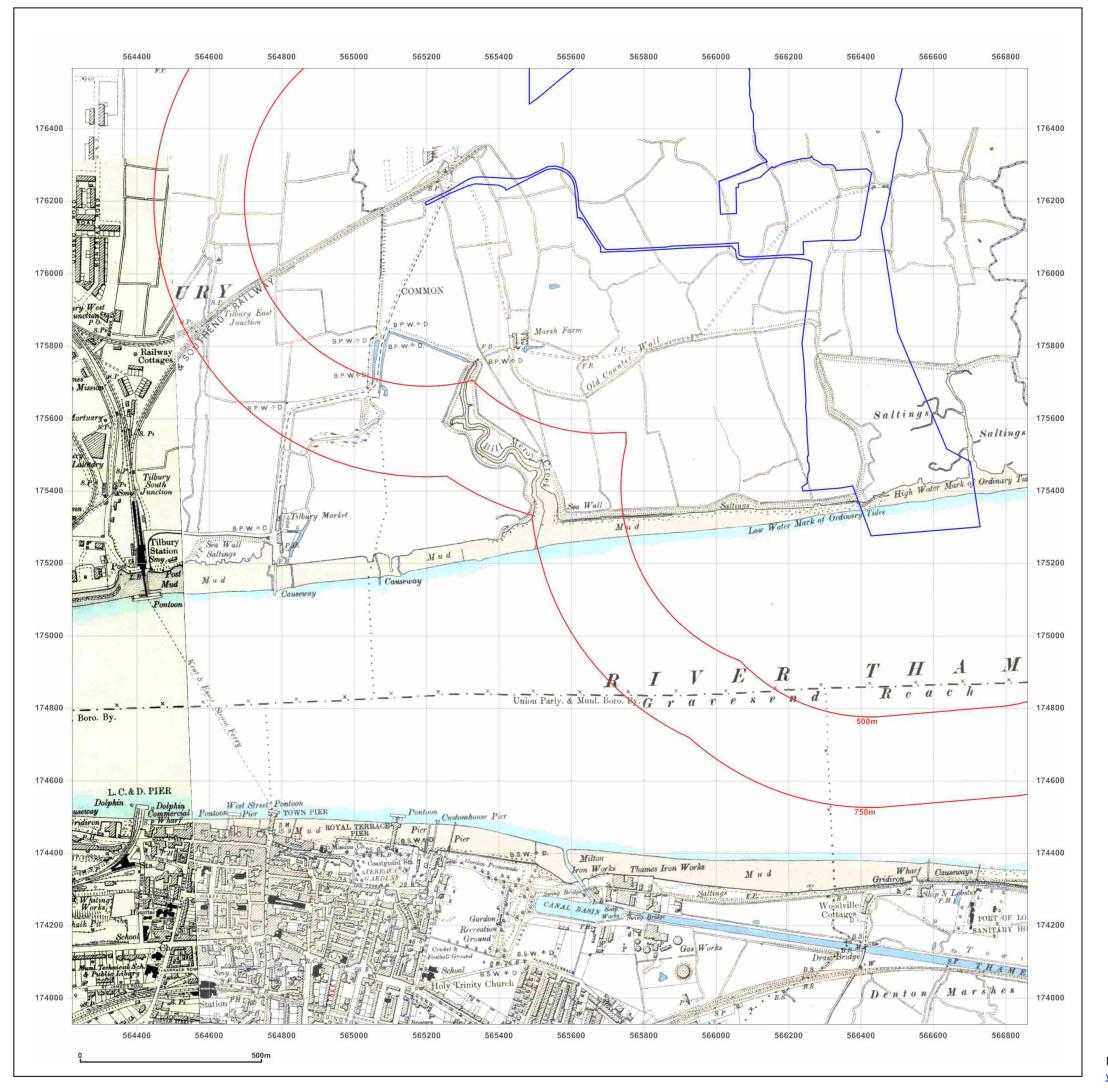




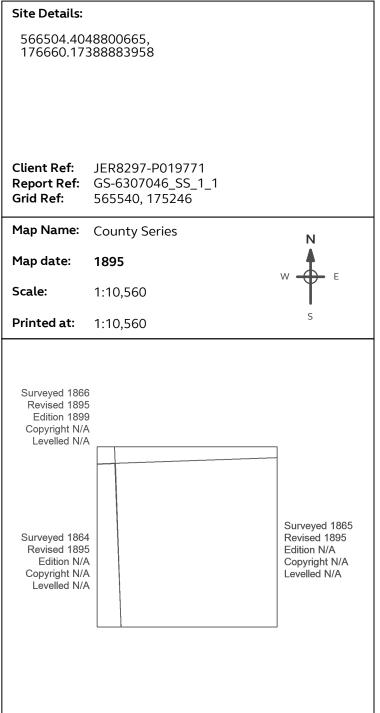
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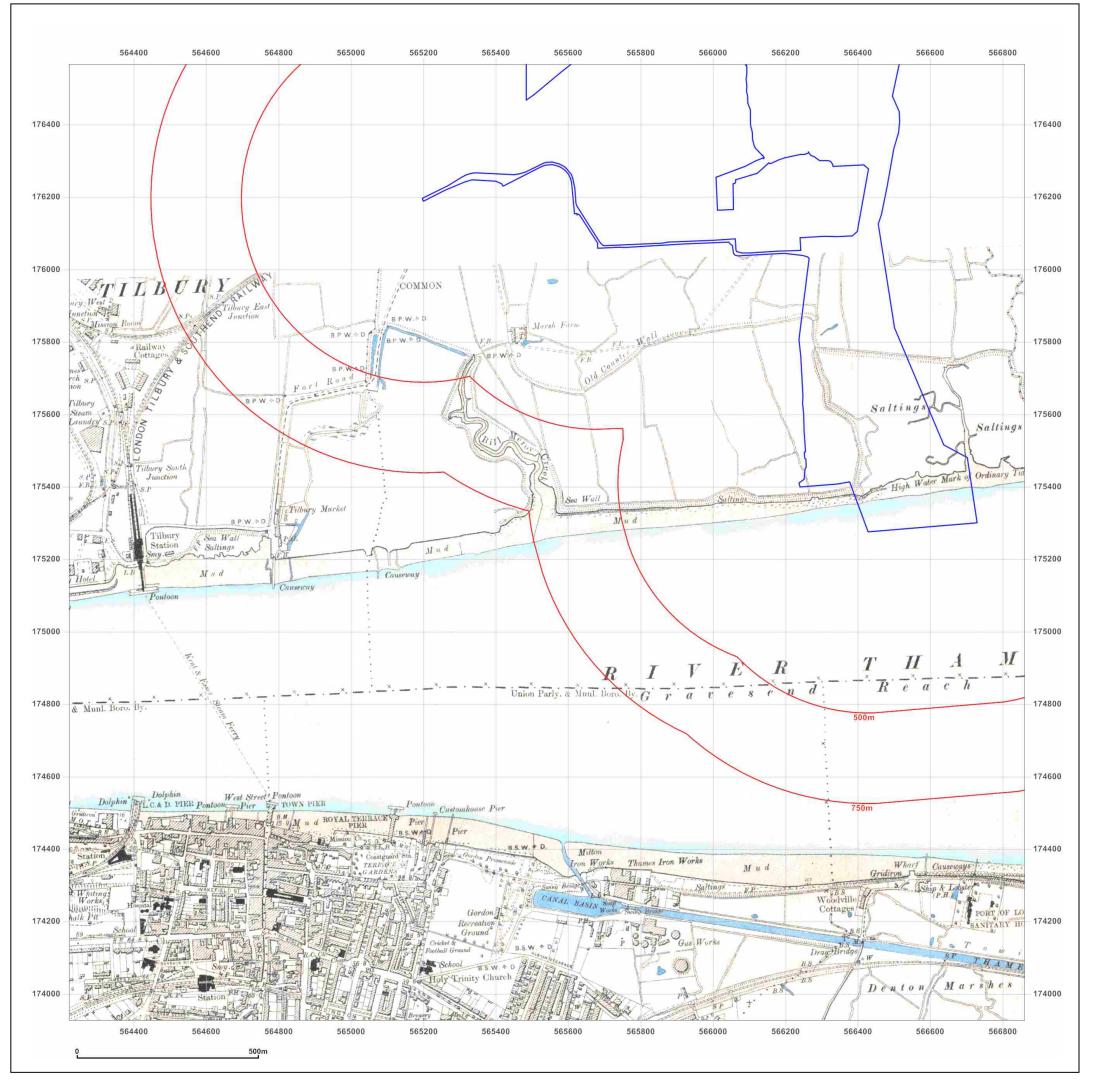




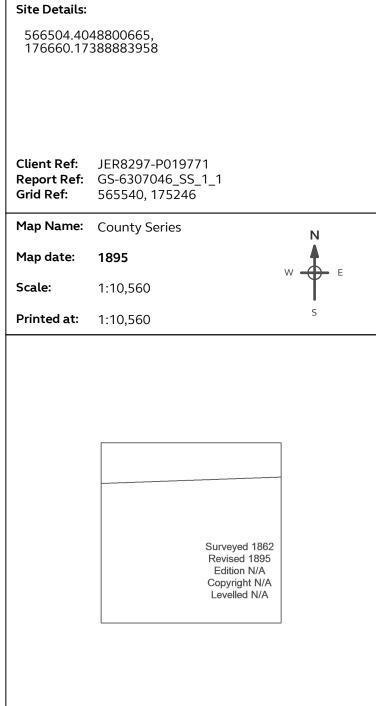
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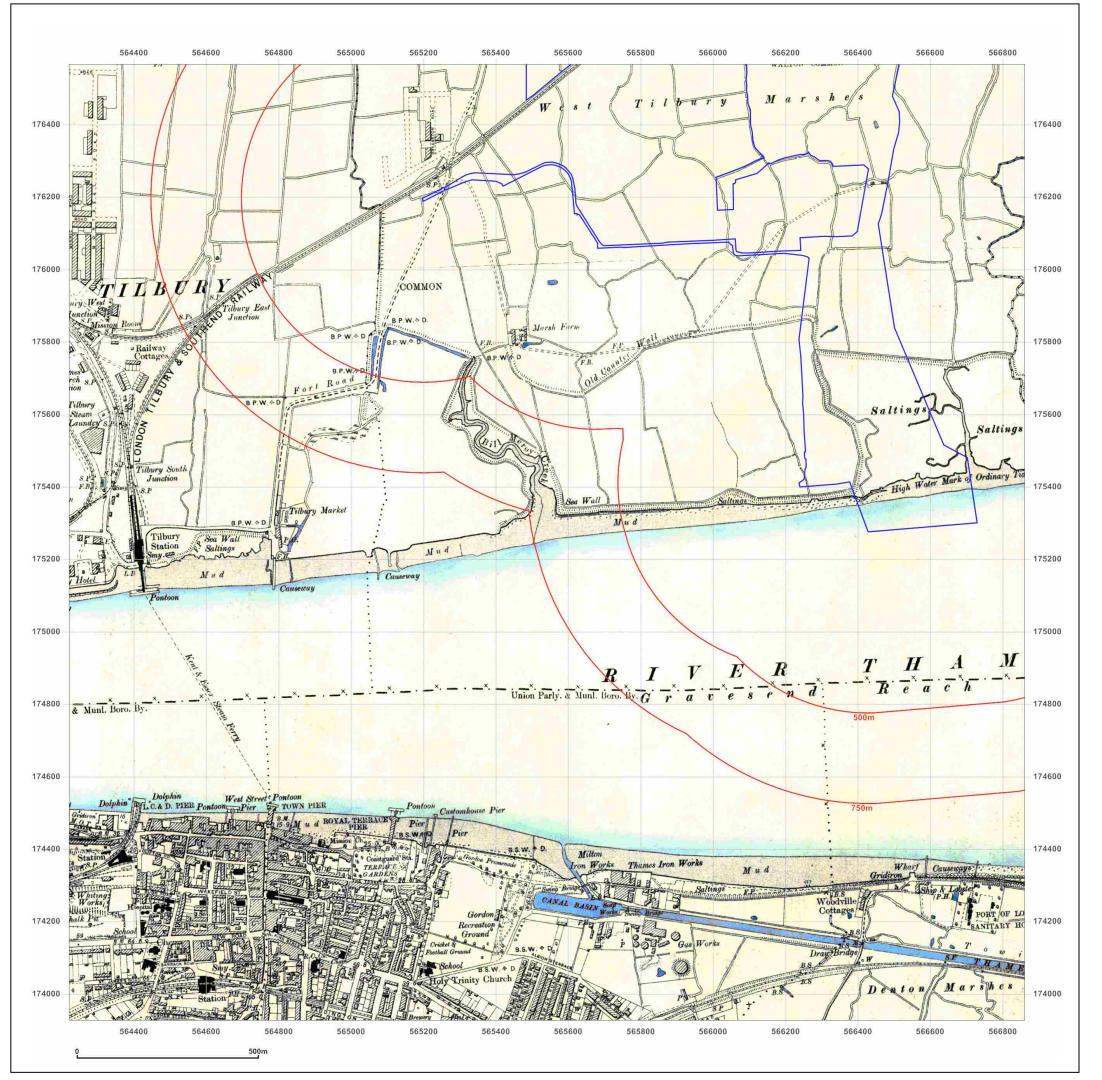




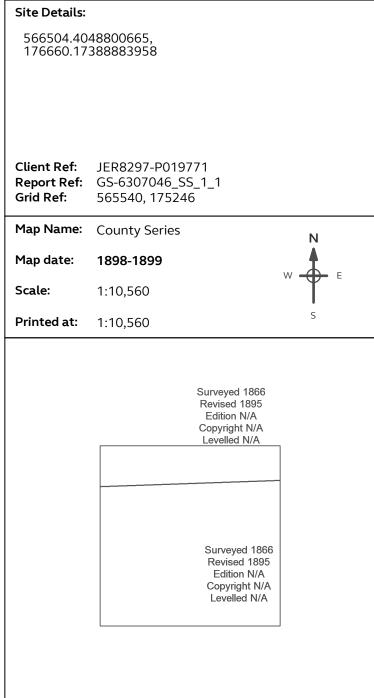
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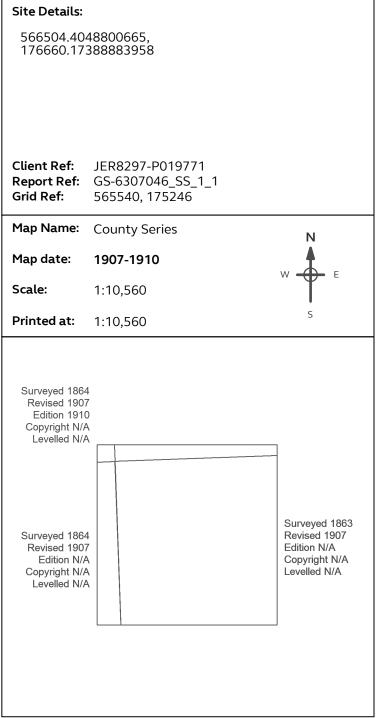
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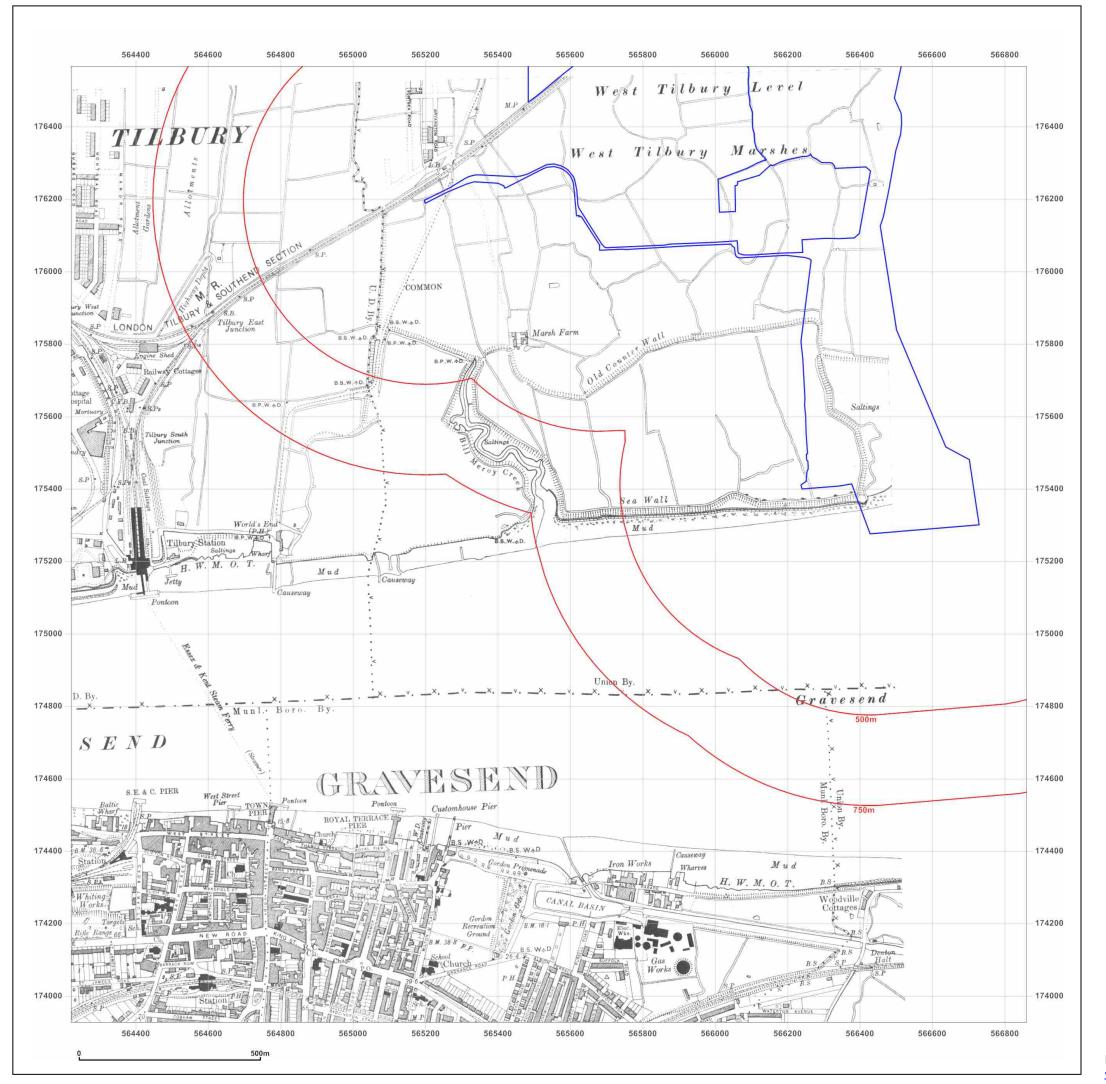




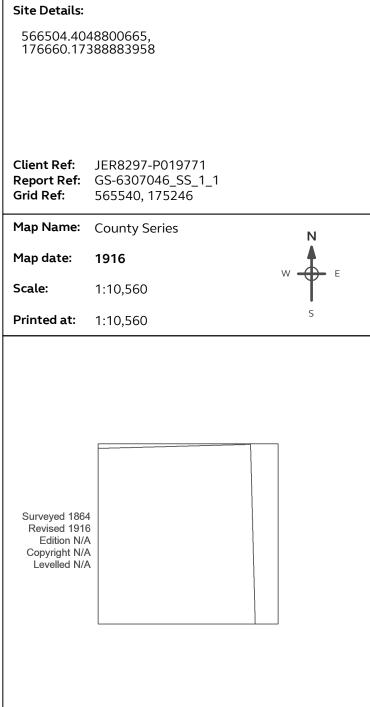
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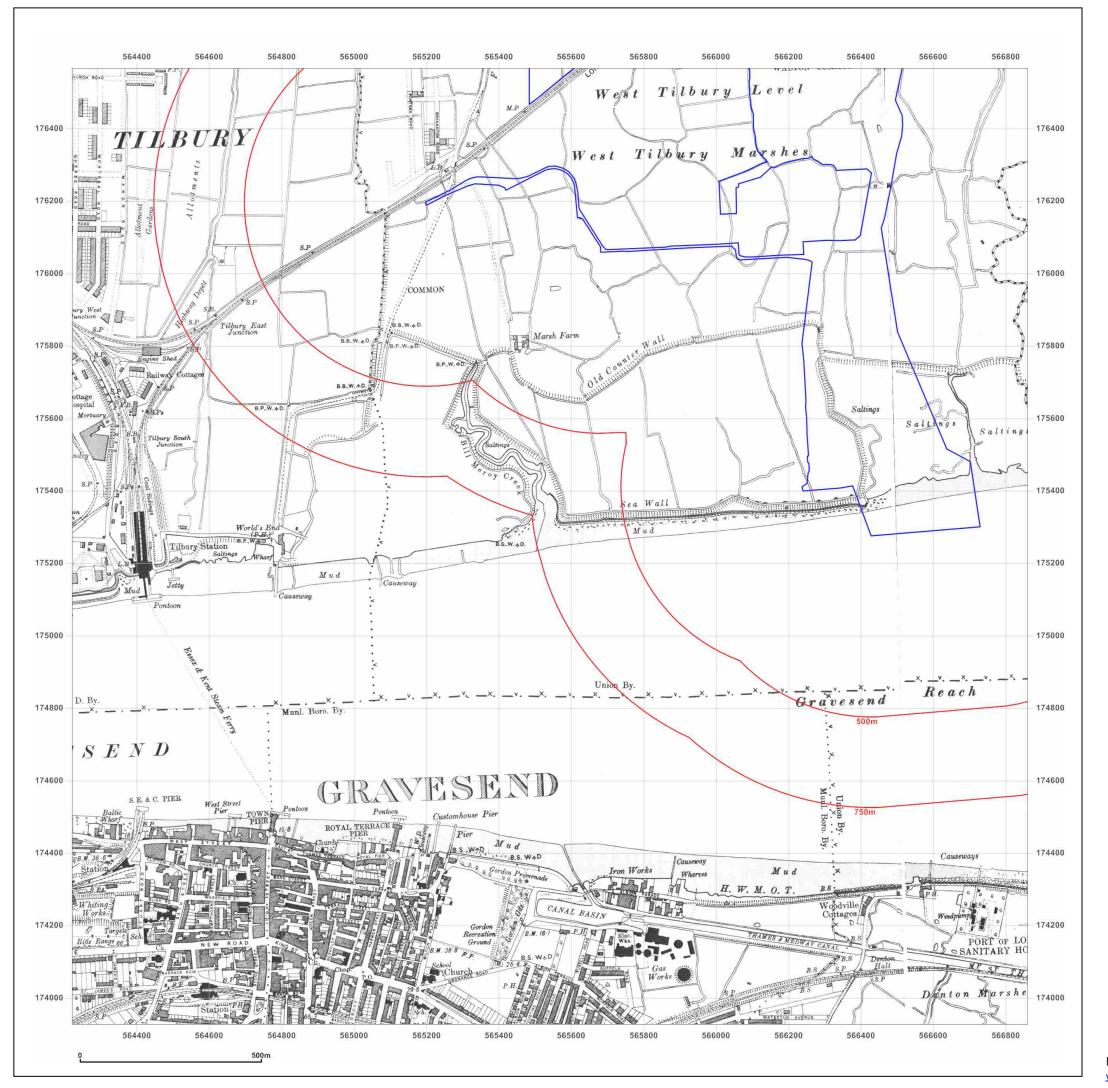




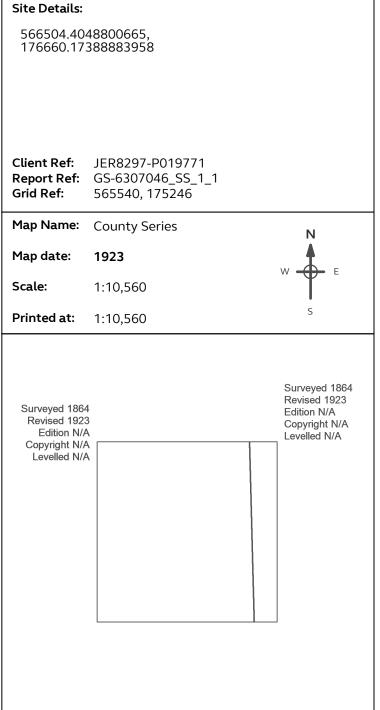
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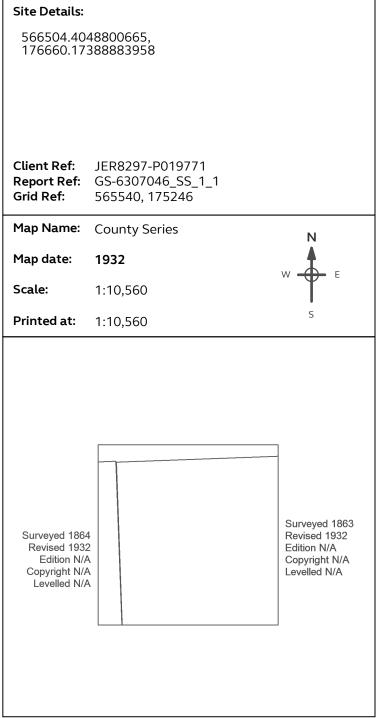
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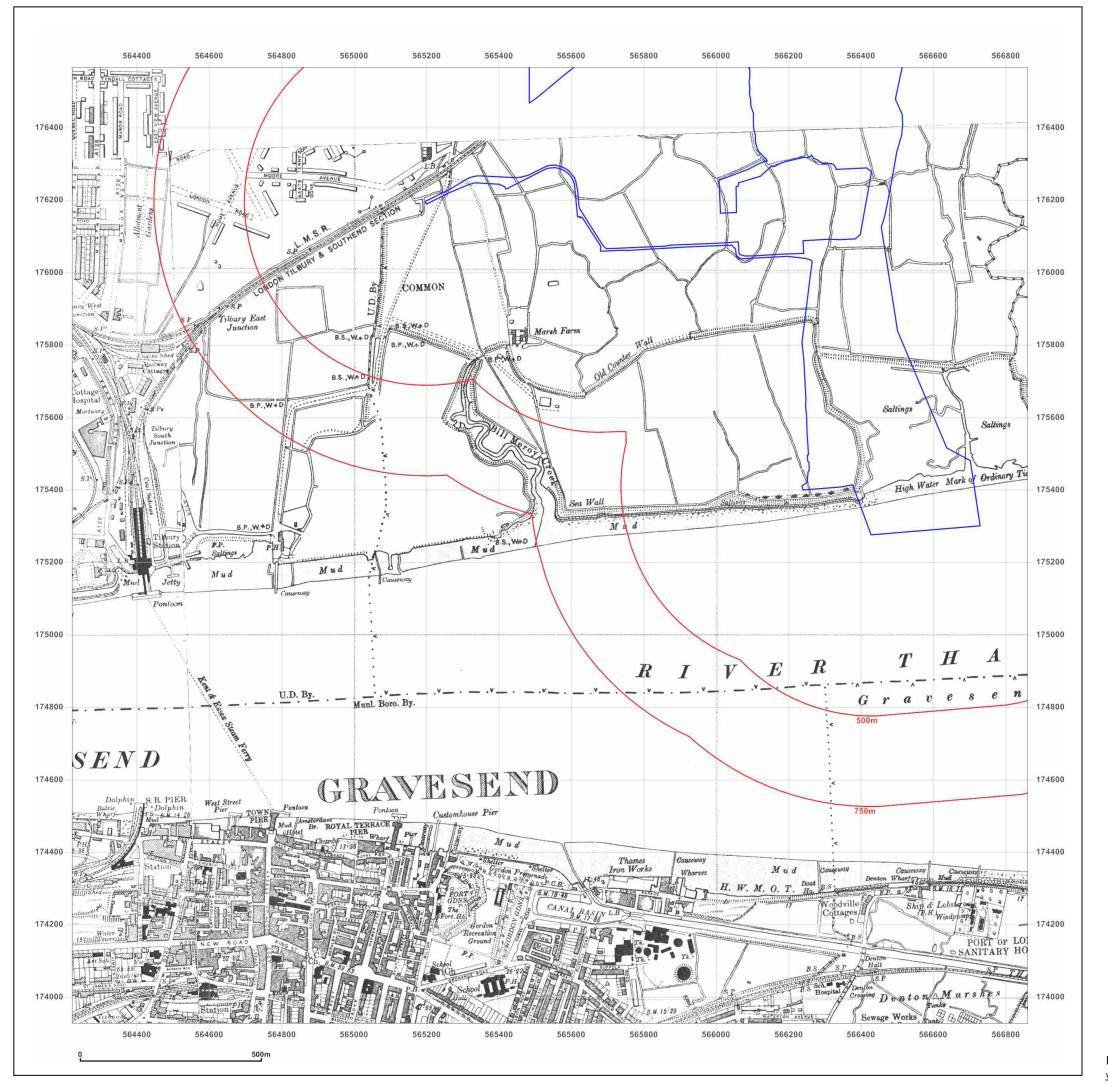




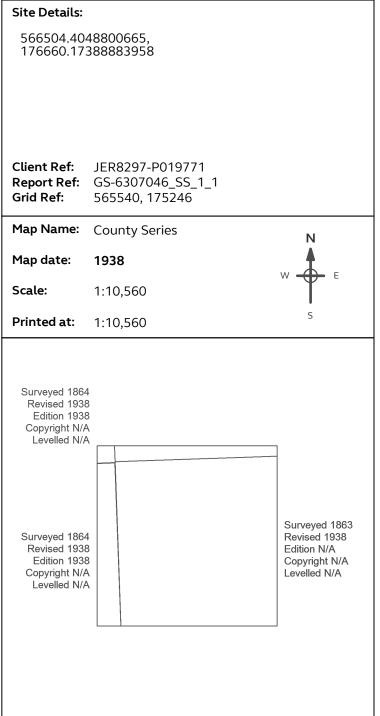
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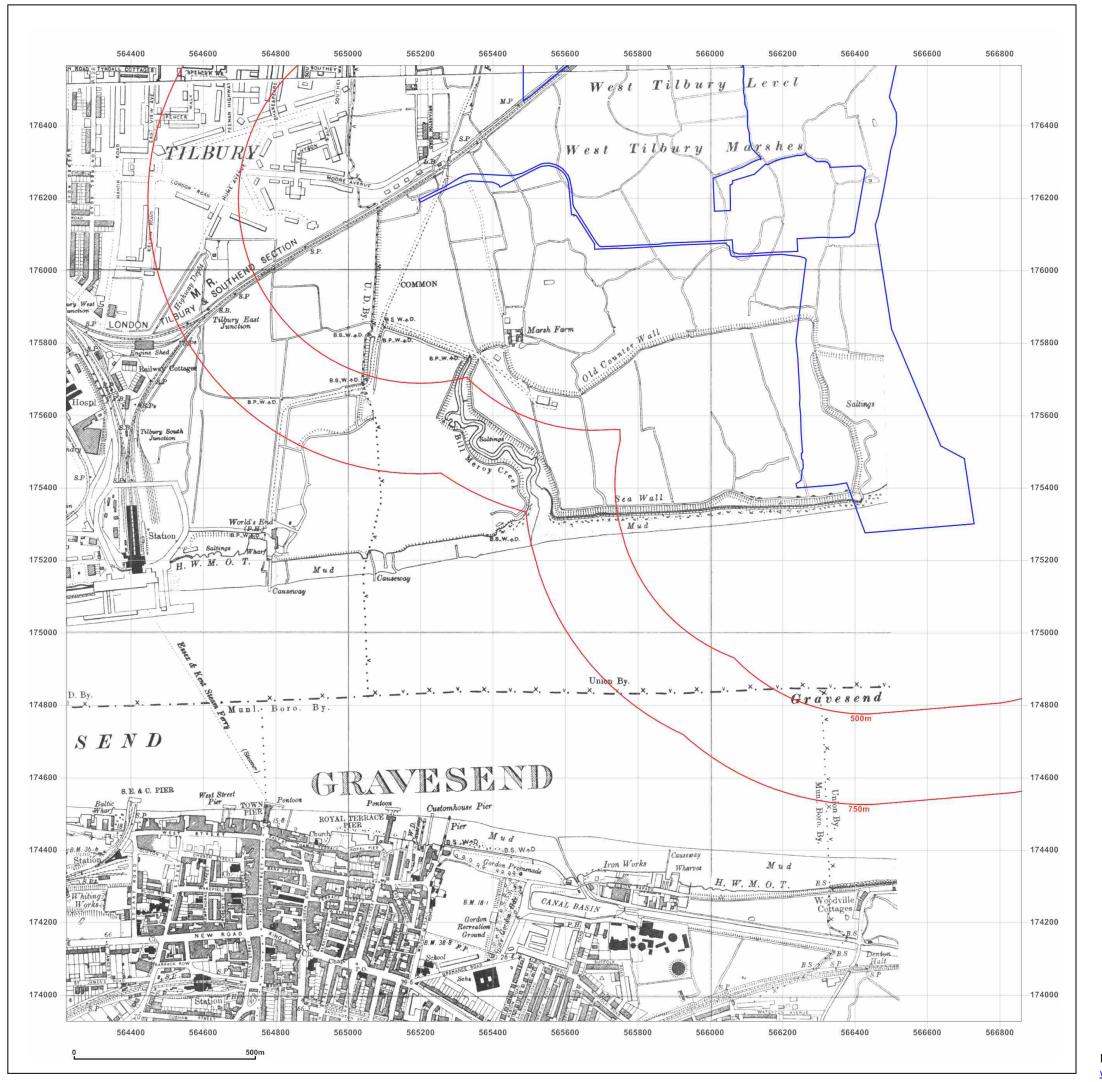




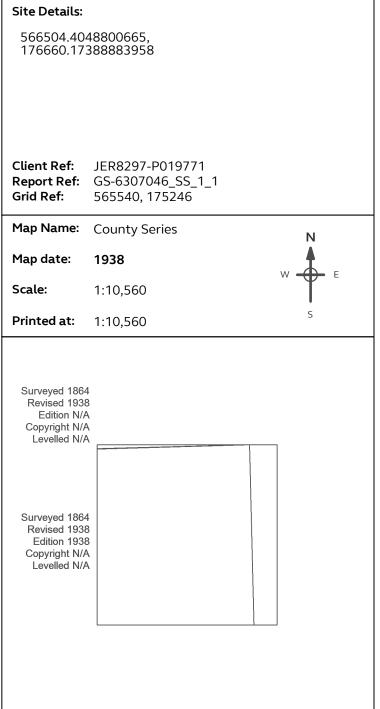
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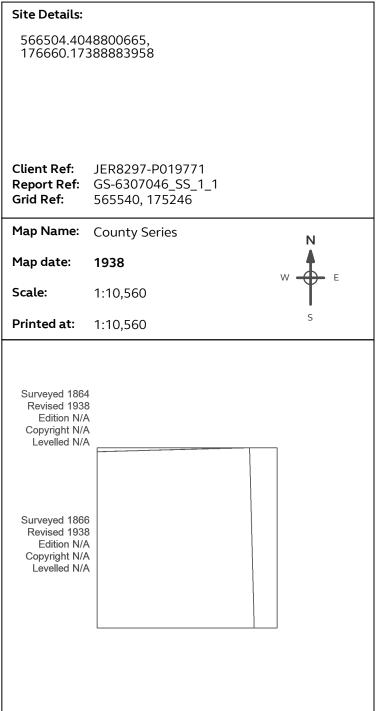
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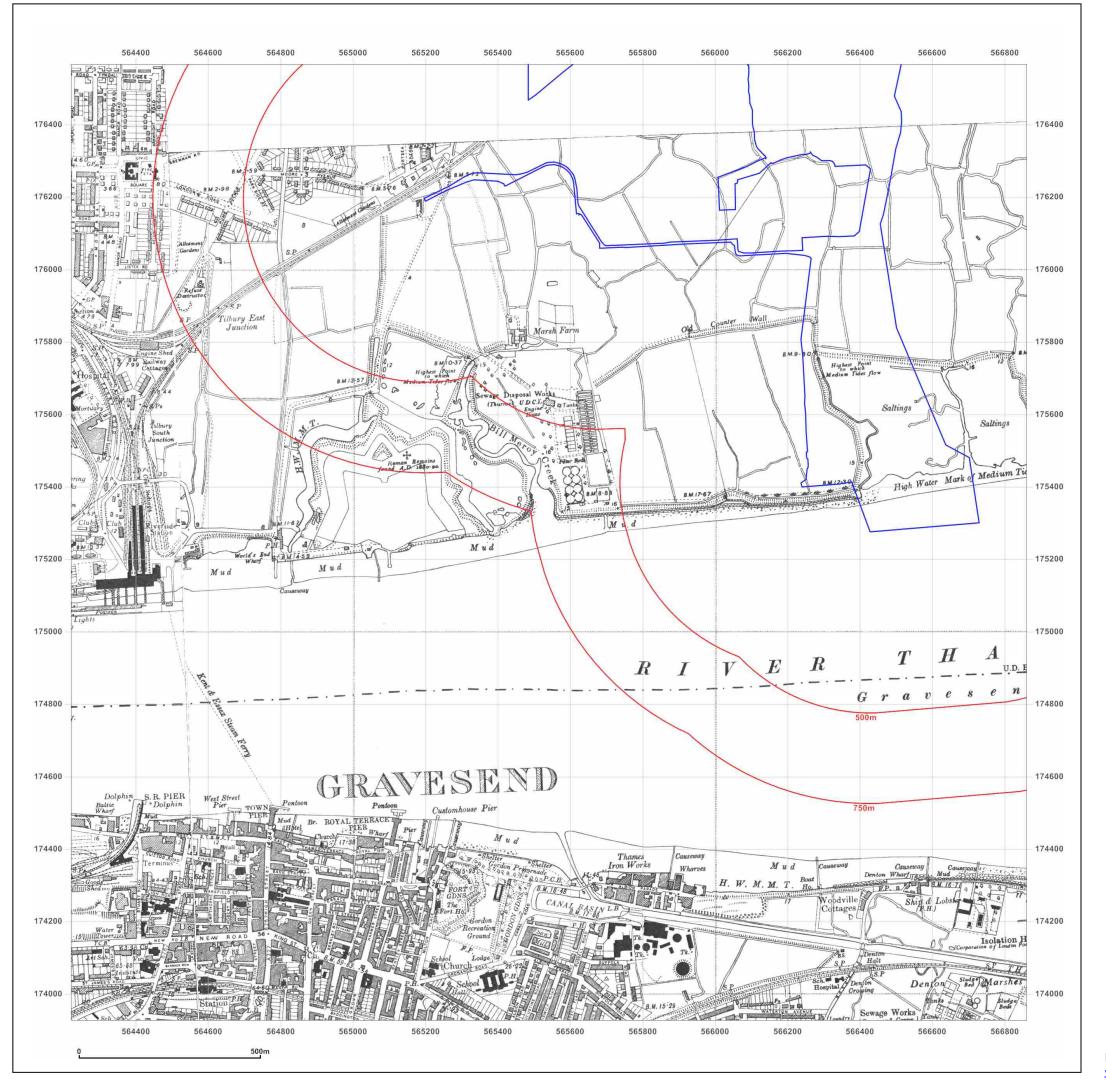




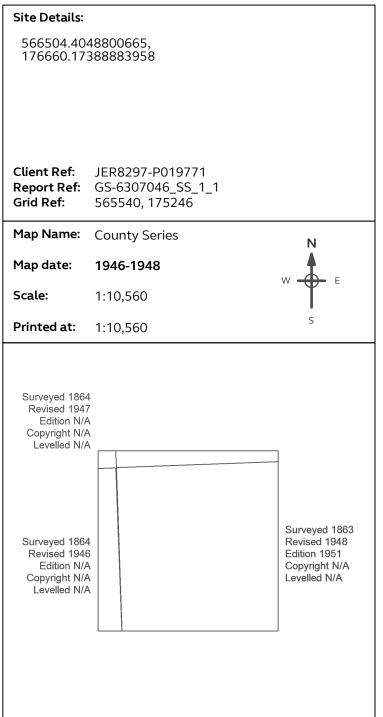
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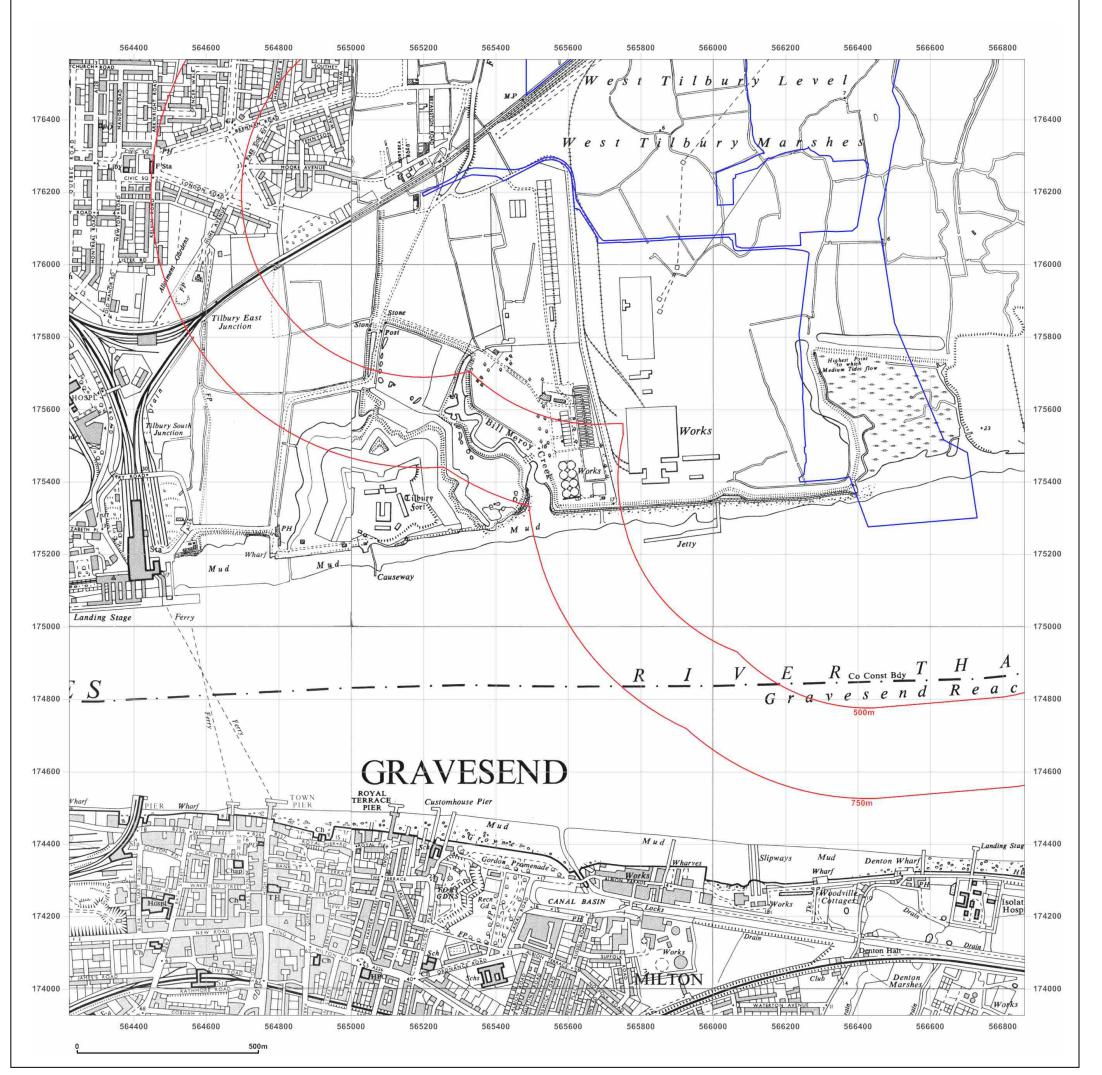




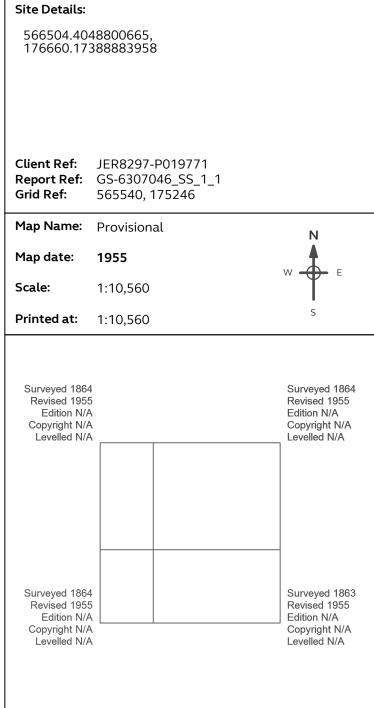
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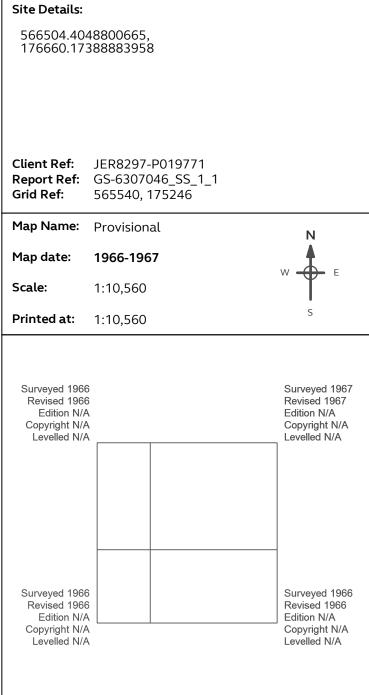
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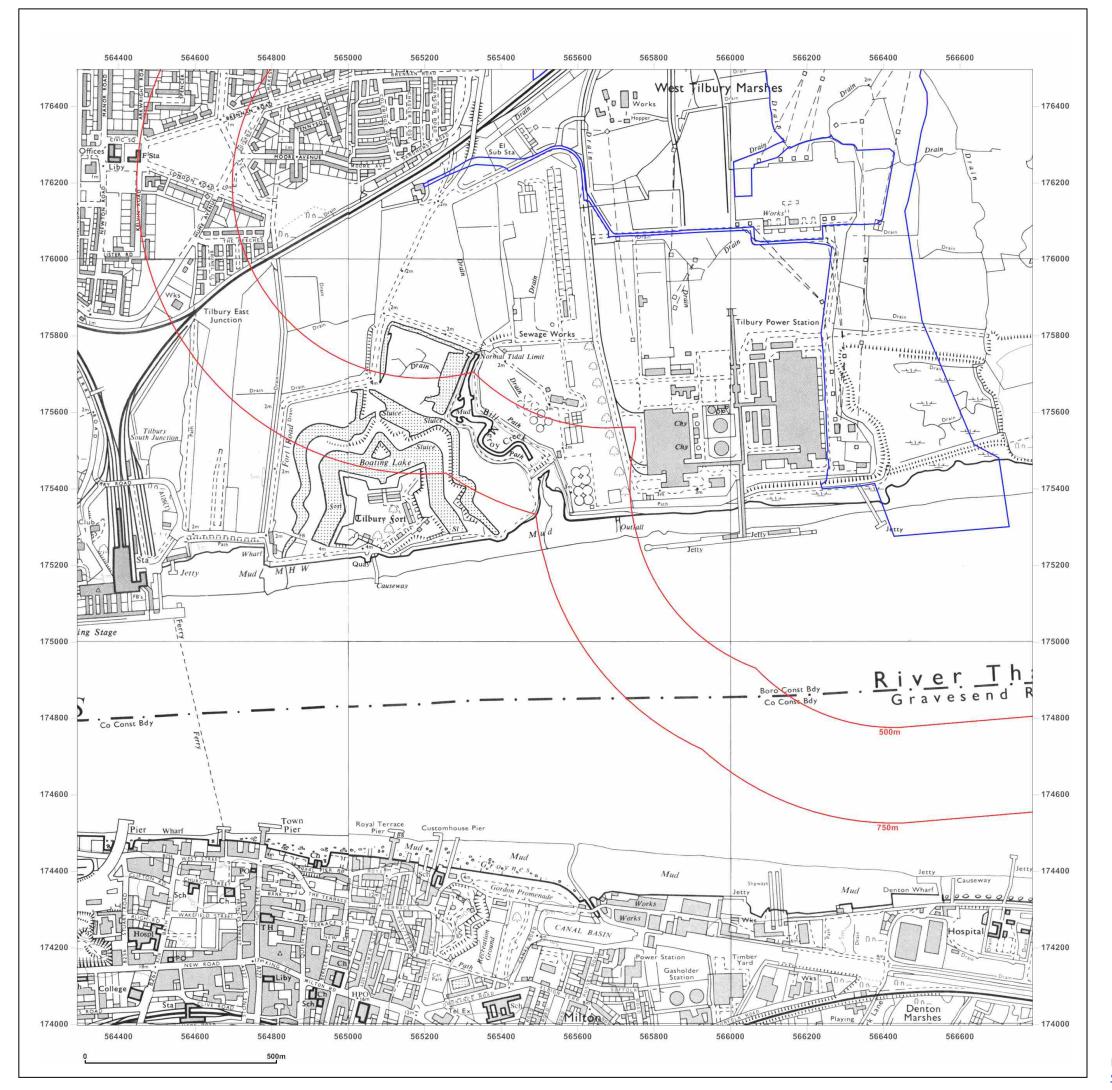




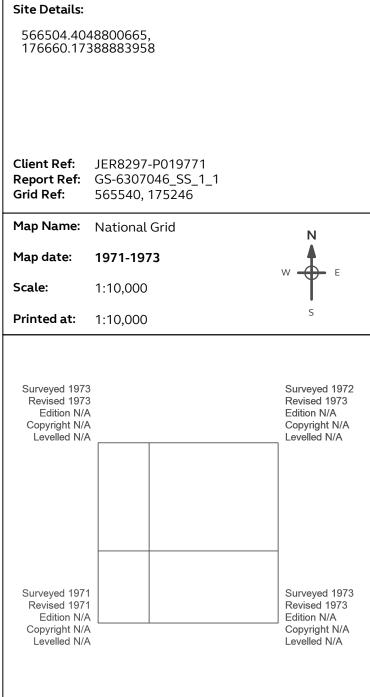
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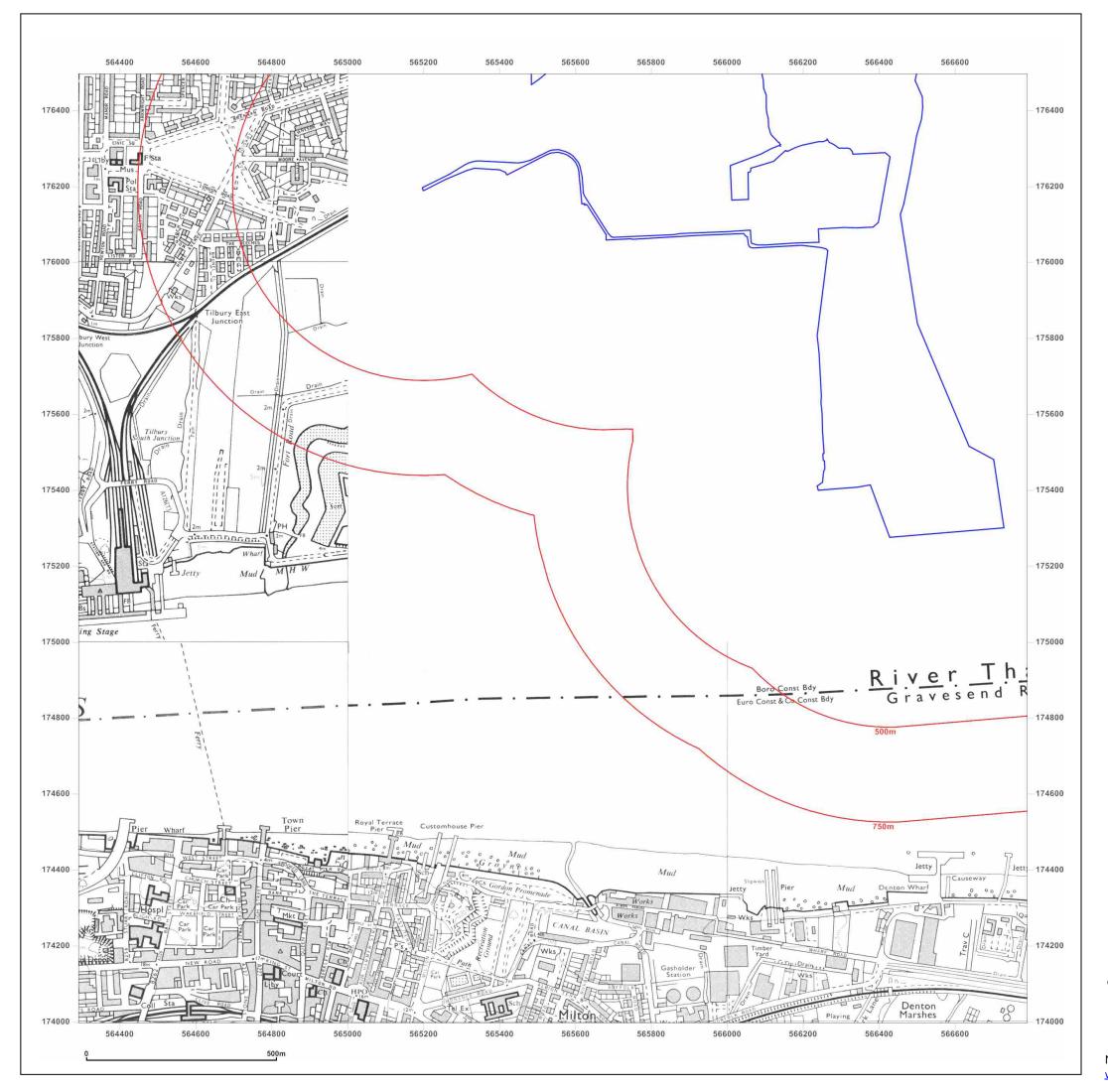




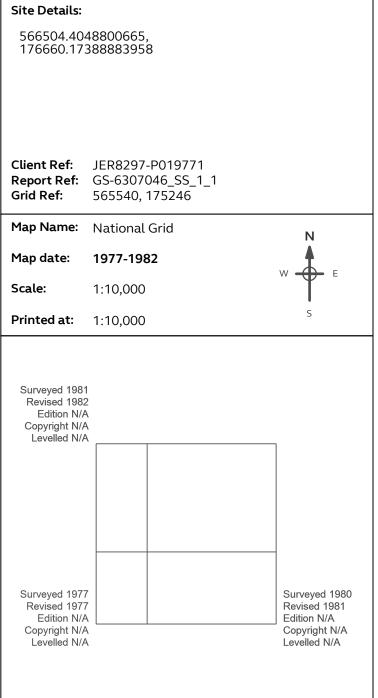
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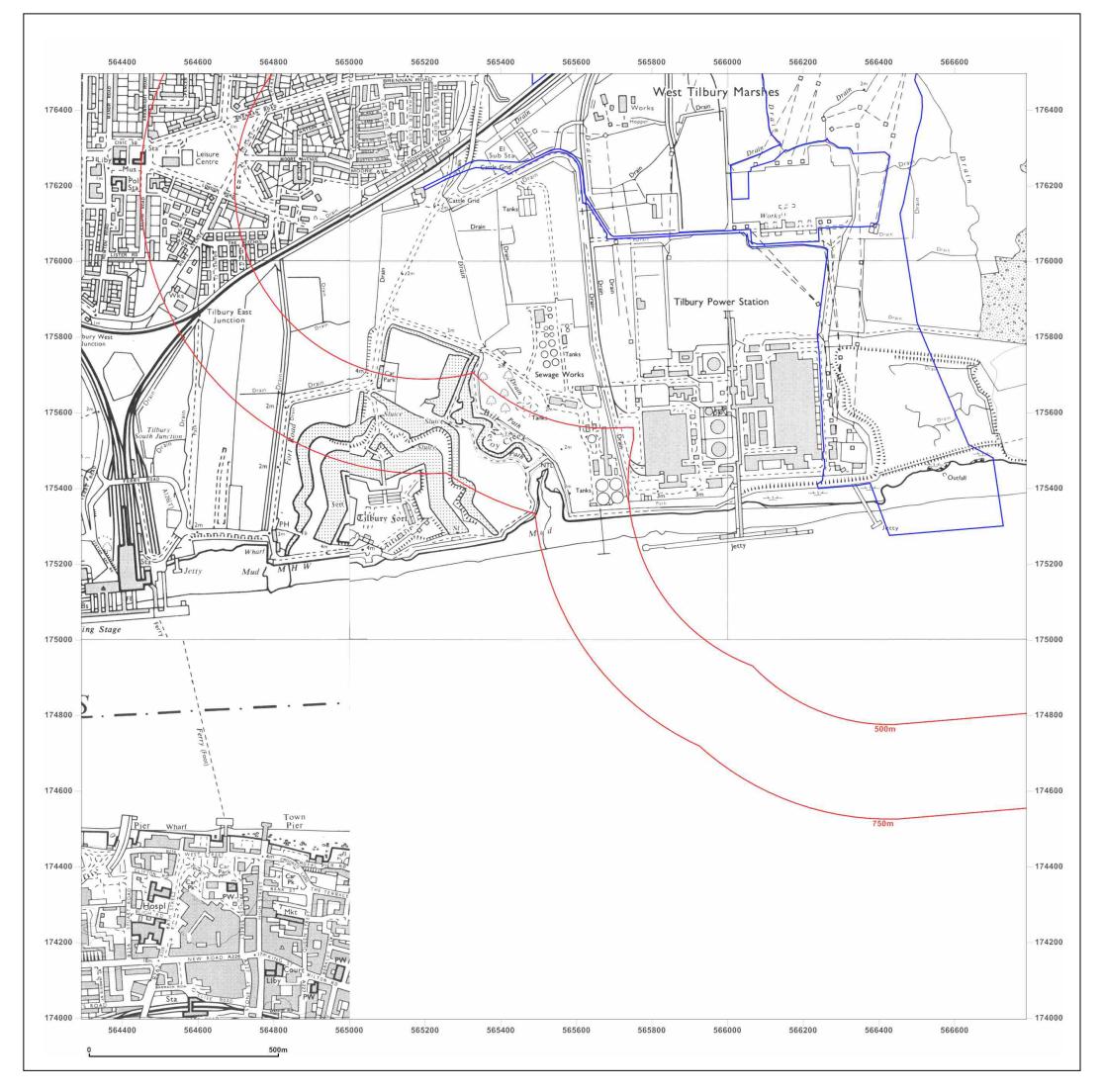




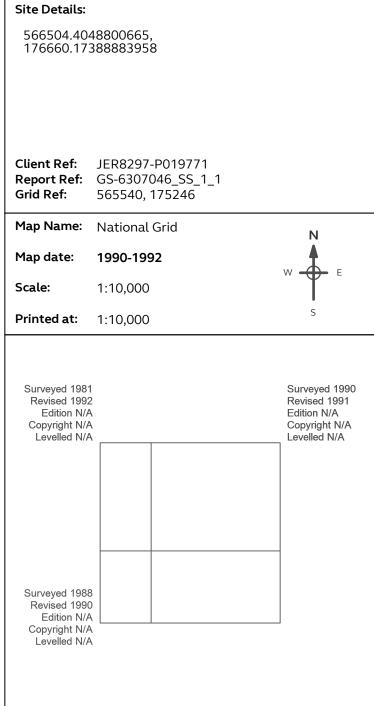
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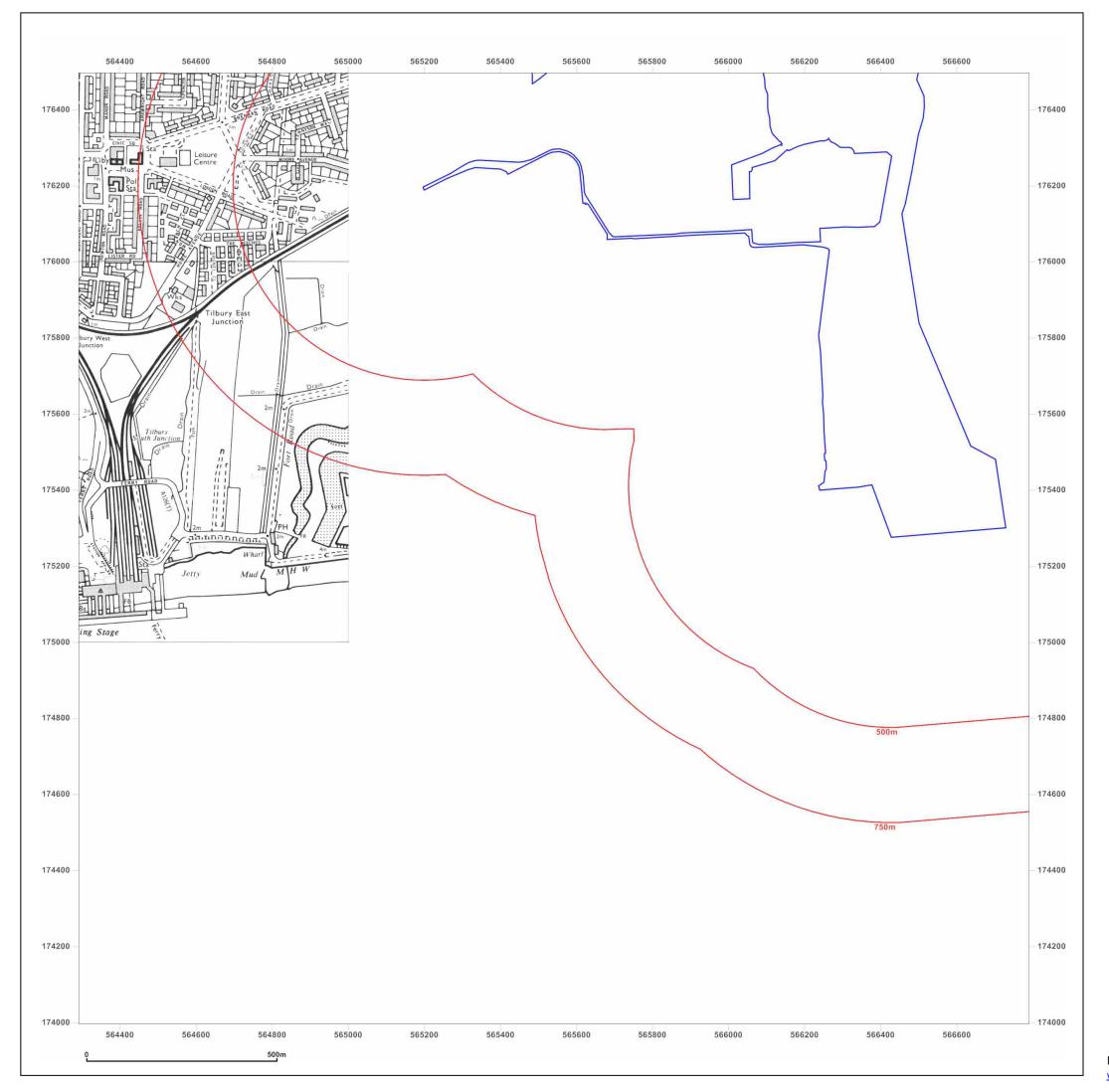




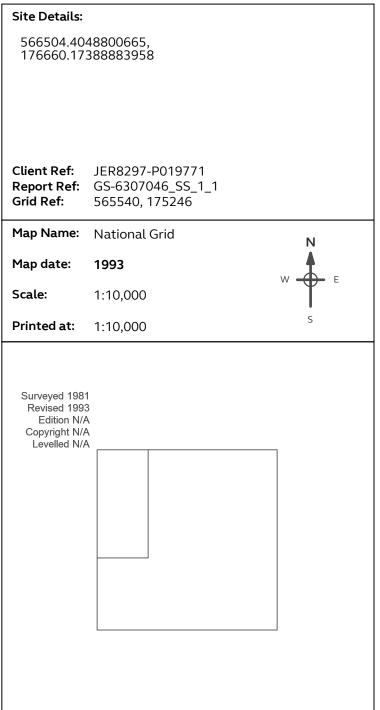
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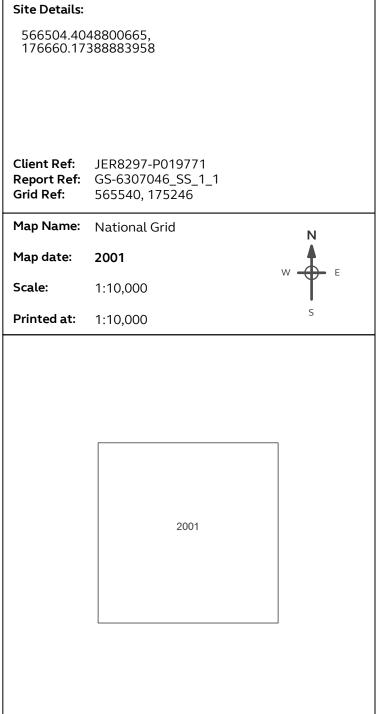
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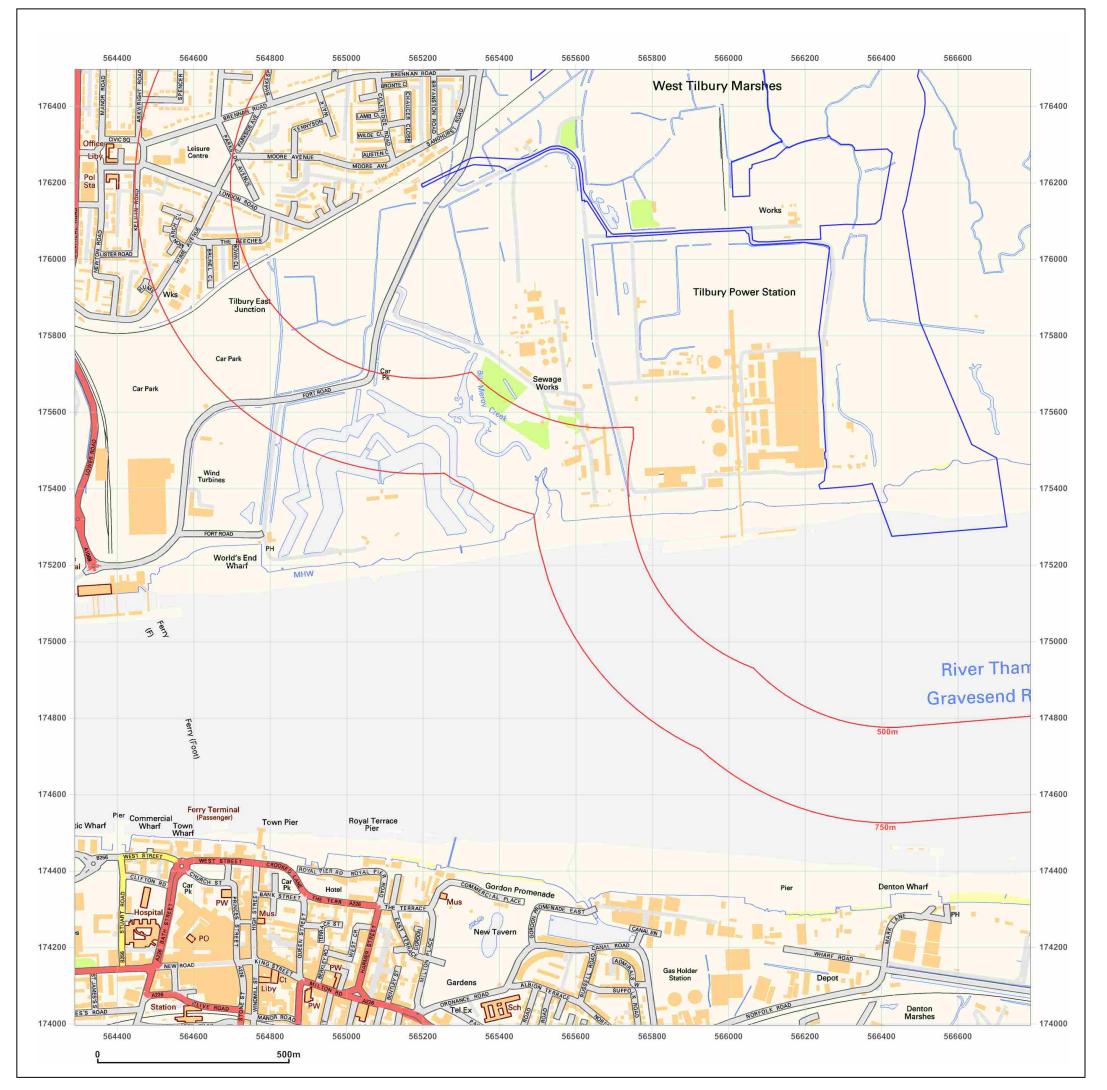




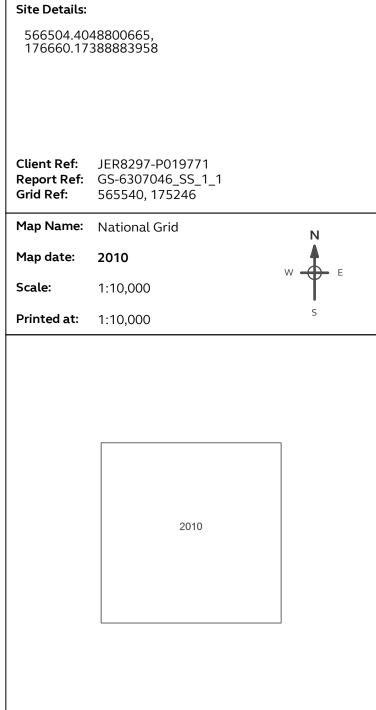
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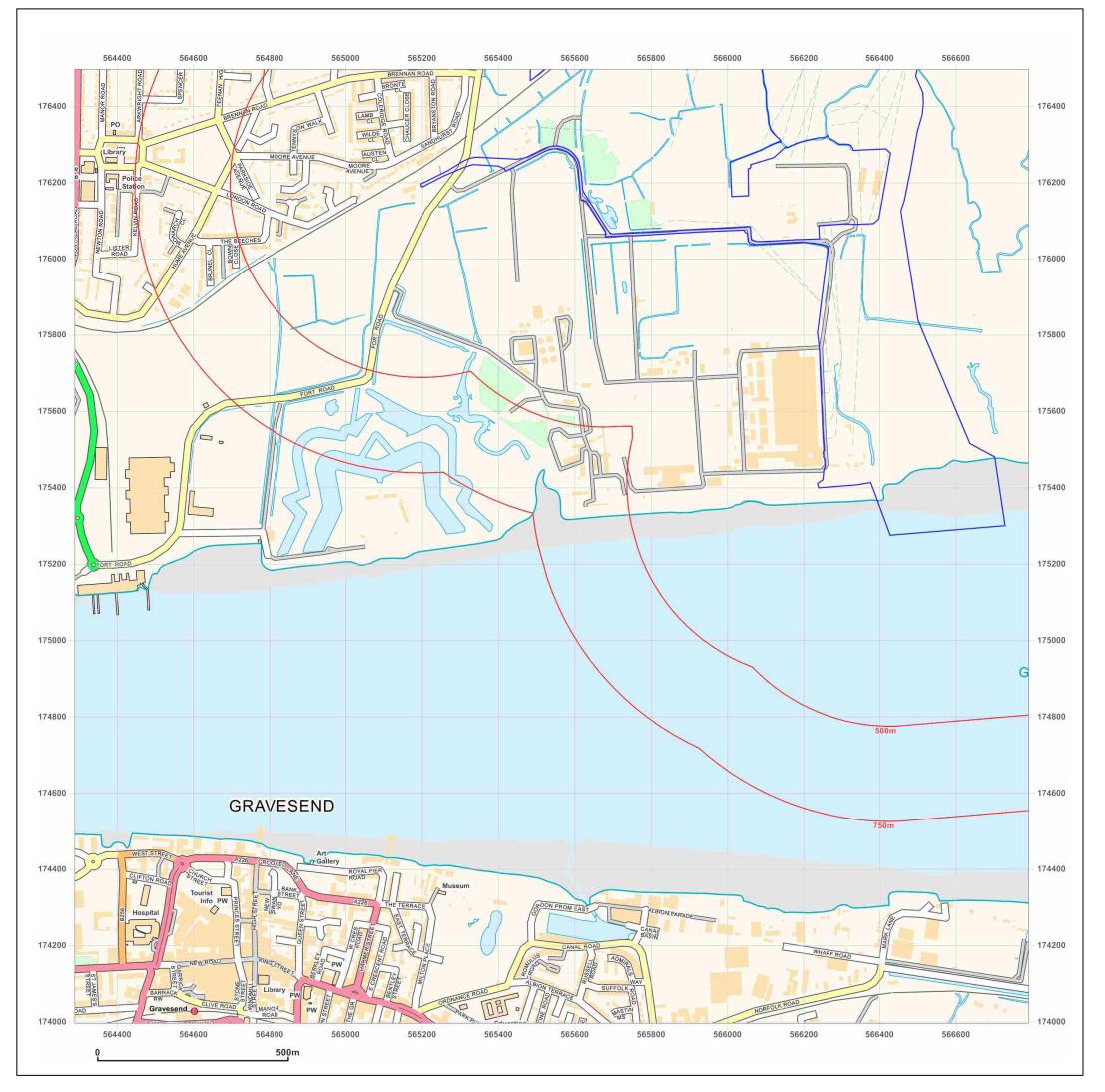




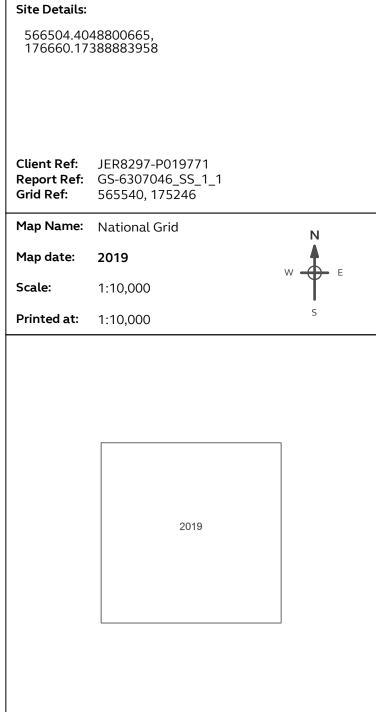
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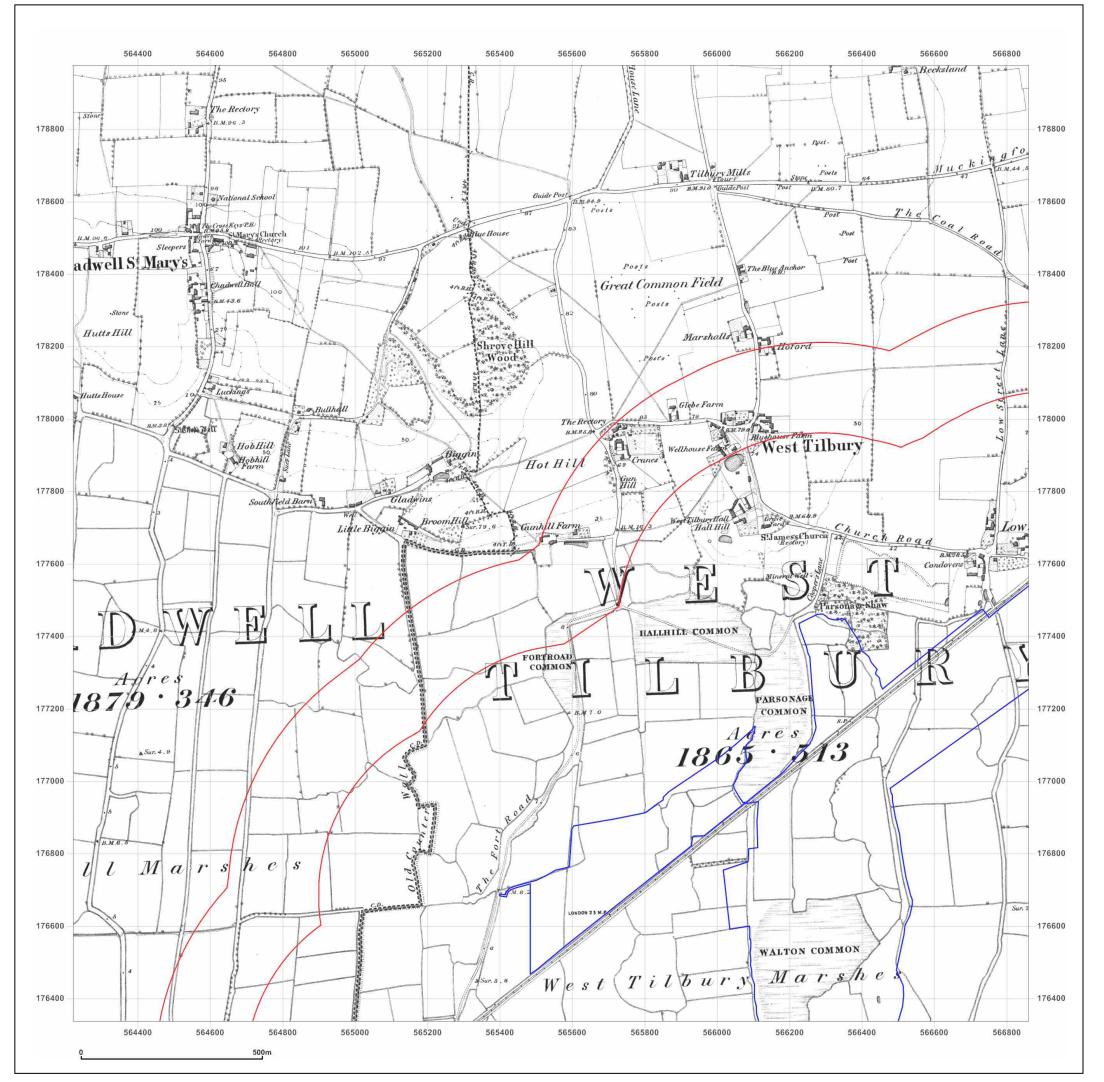




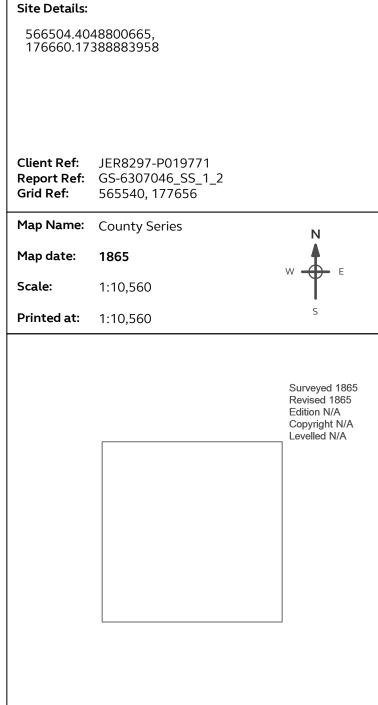
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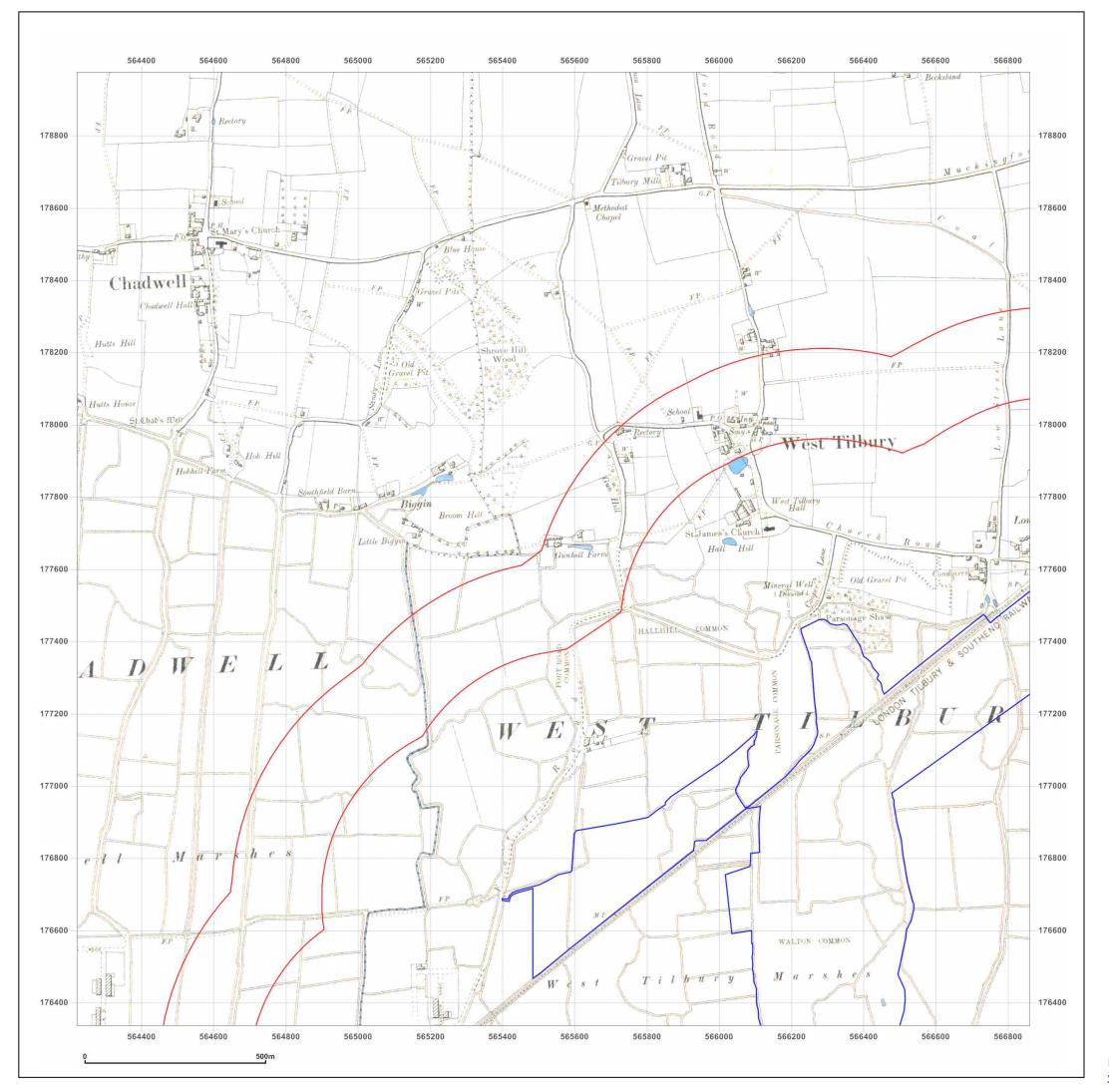




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Map date: 1895

Scale: 1:10,560

Printed at: 1:10,560

Surveyed 1866 Revised 1895 Edition N/A Copyright N/A Levelled N/A

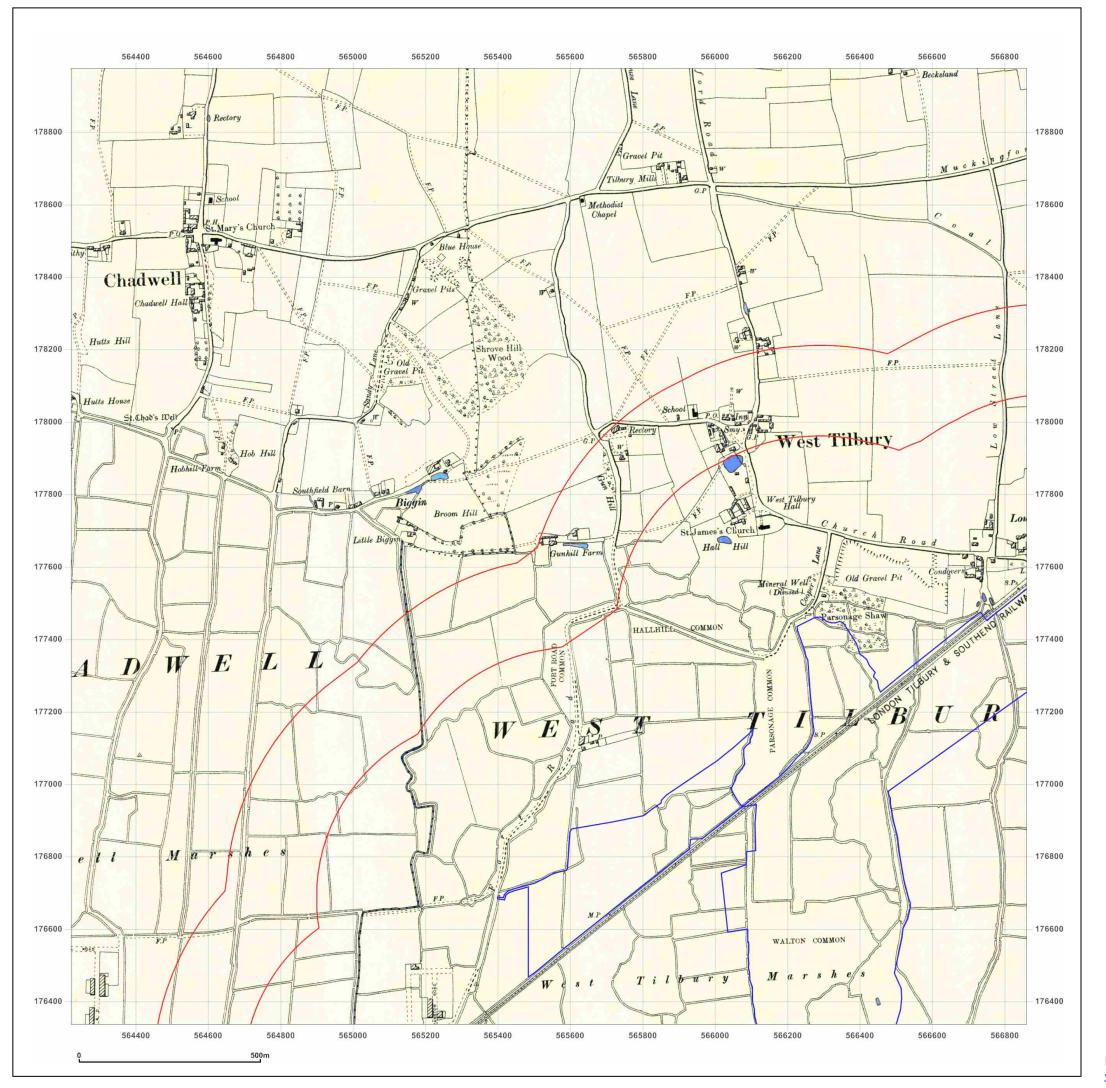


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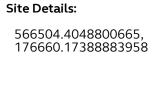
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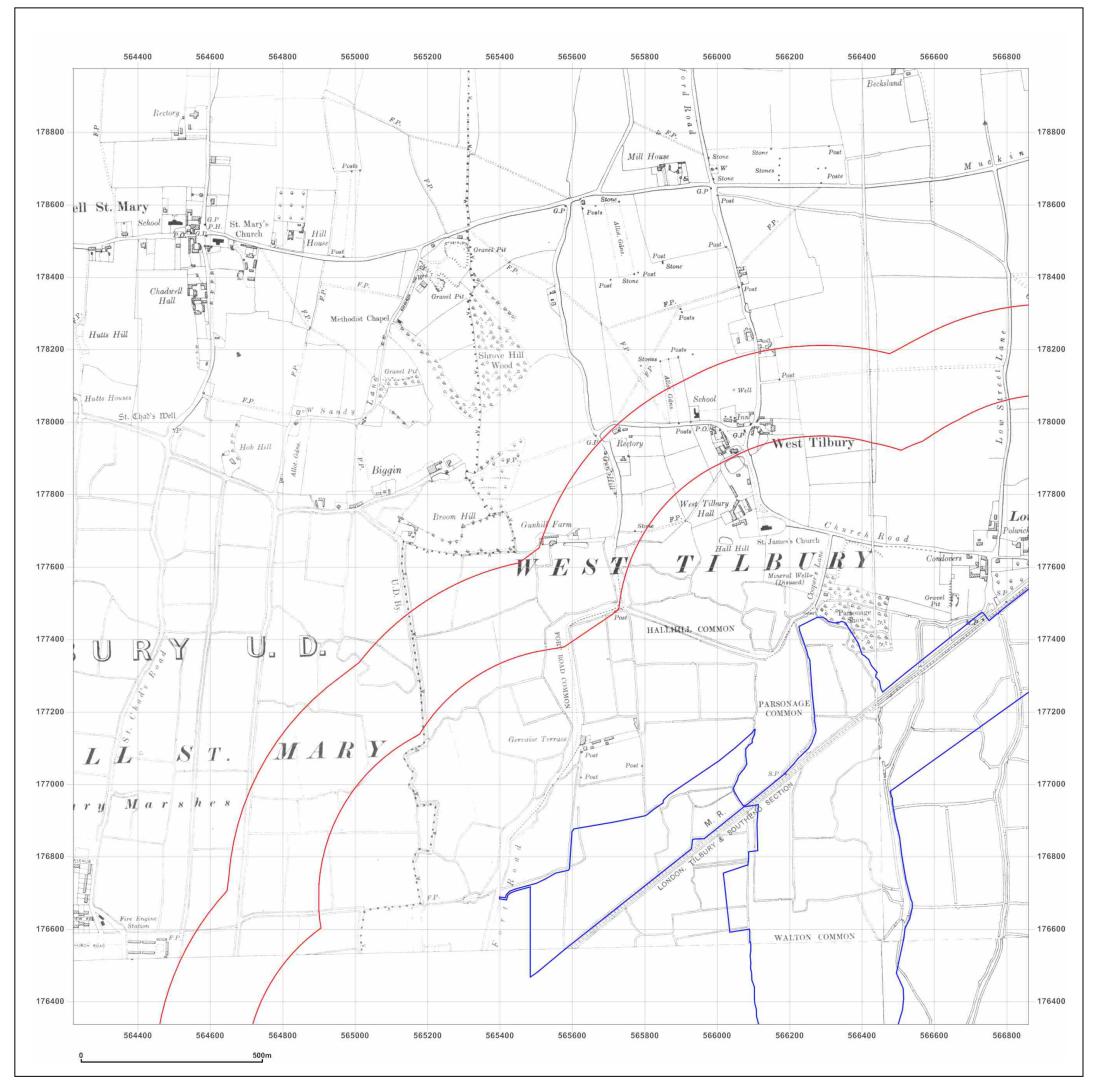


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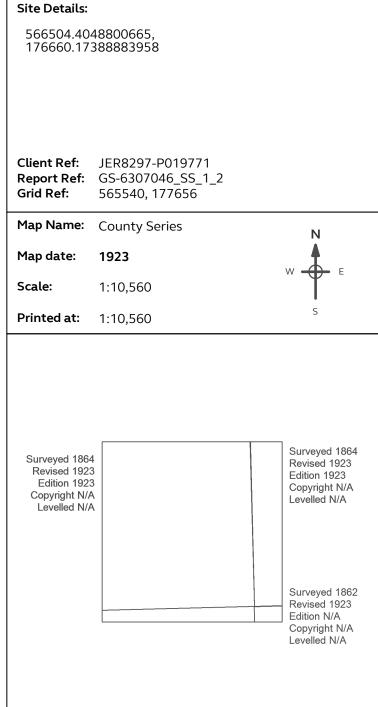
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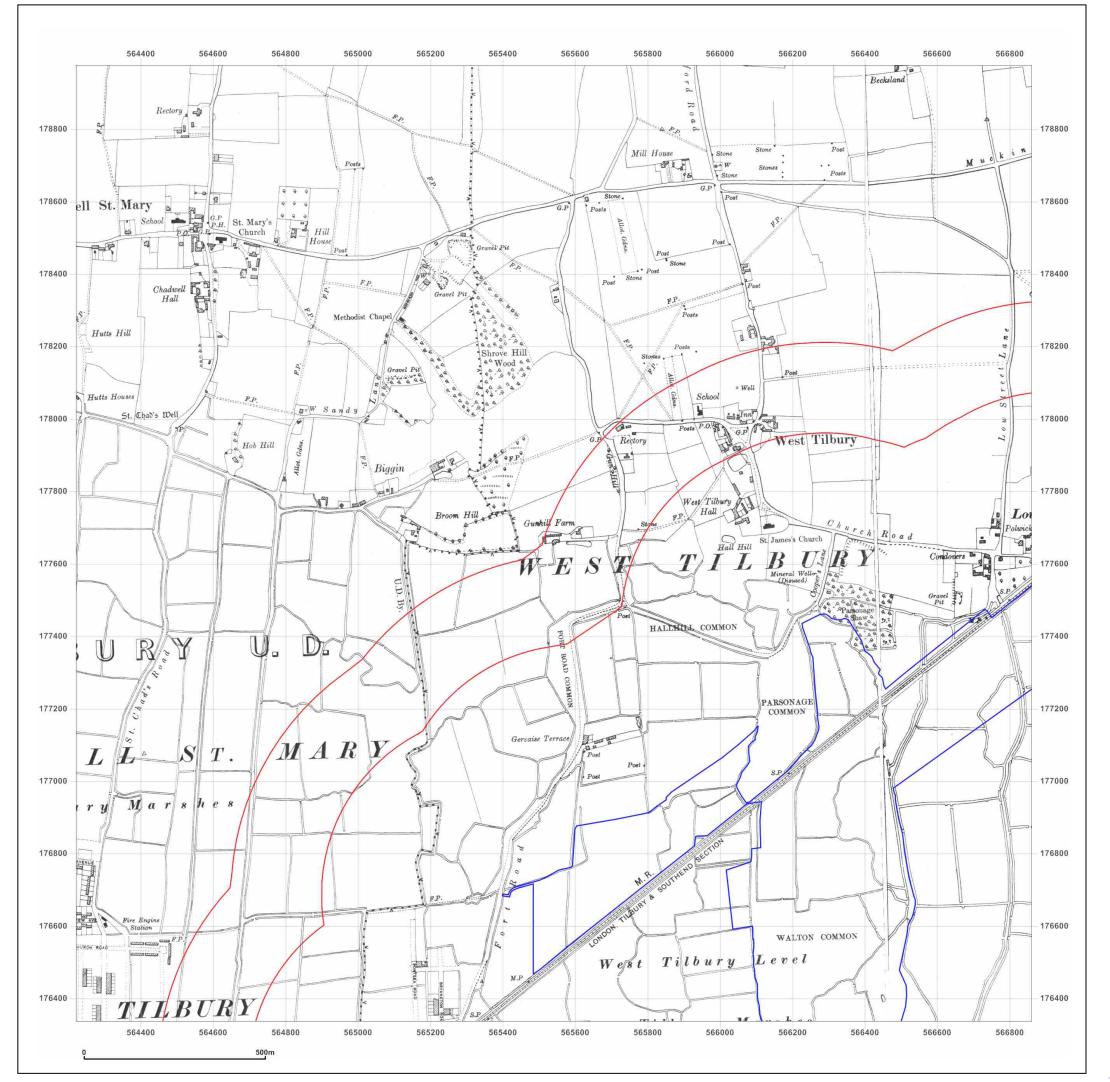




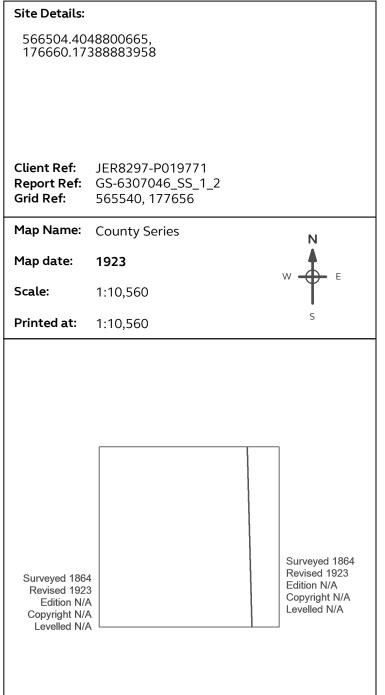
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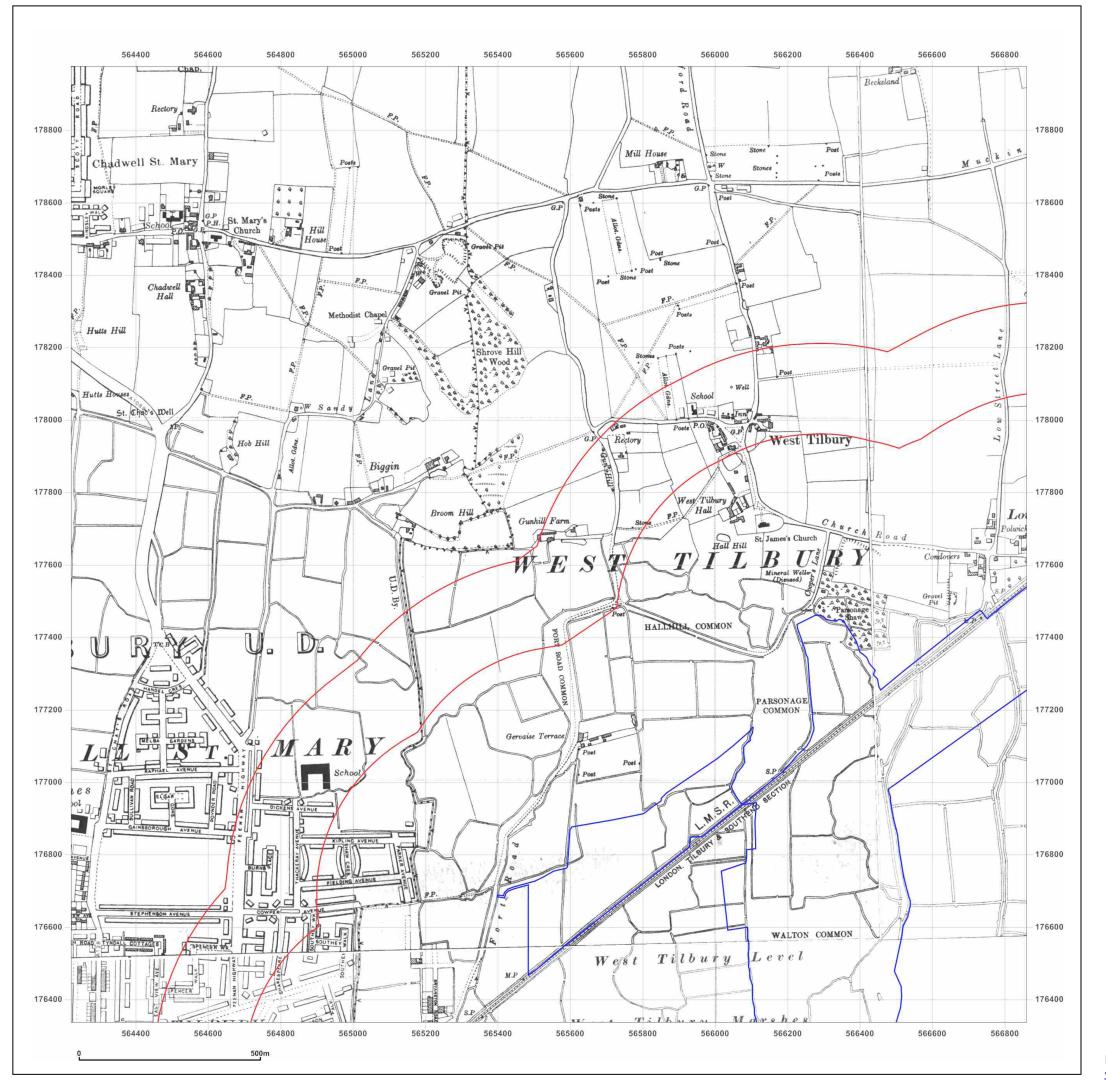




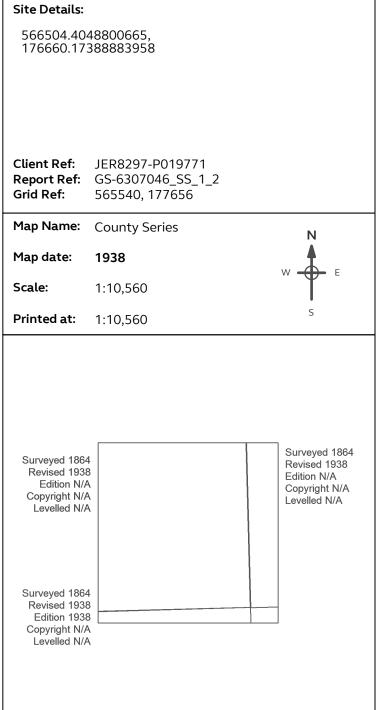
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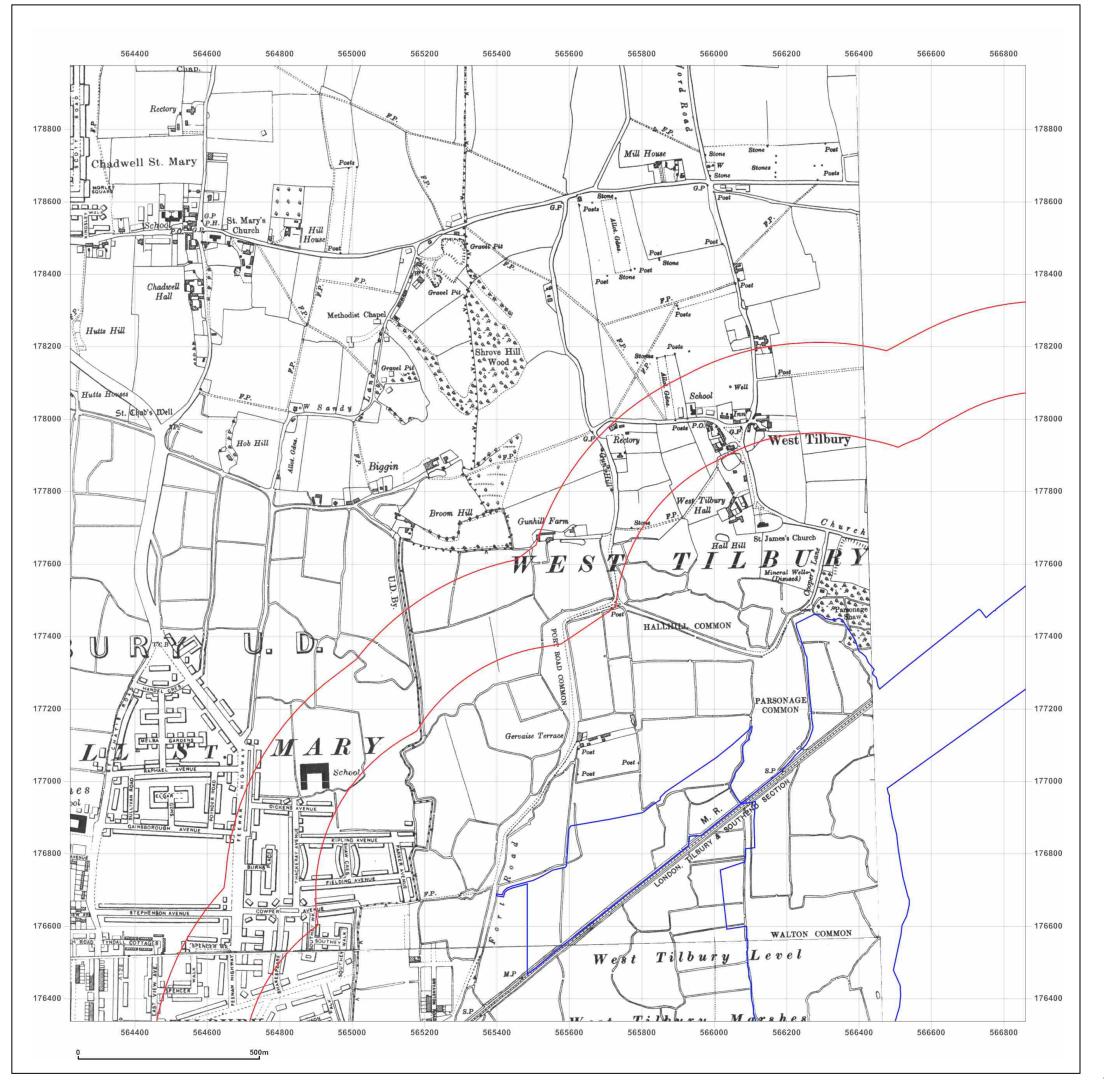




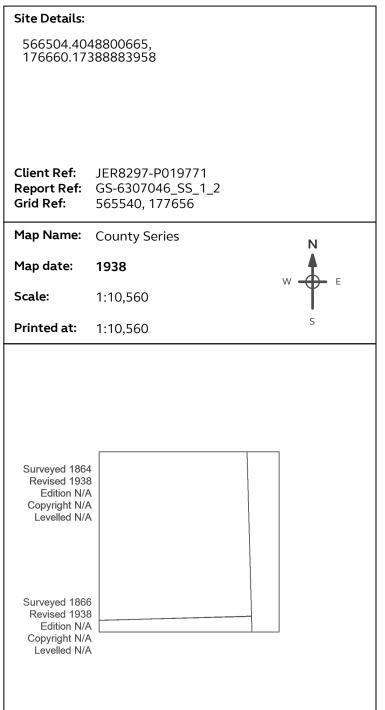
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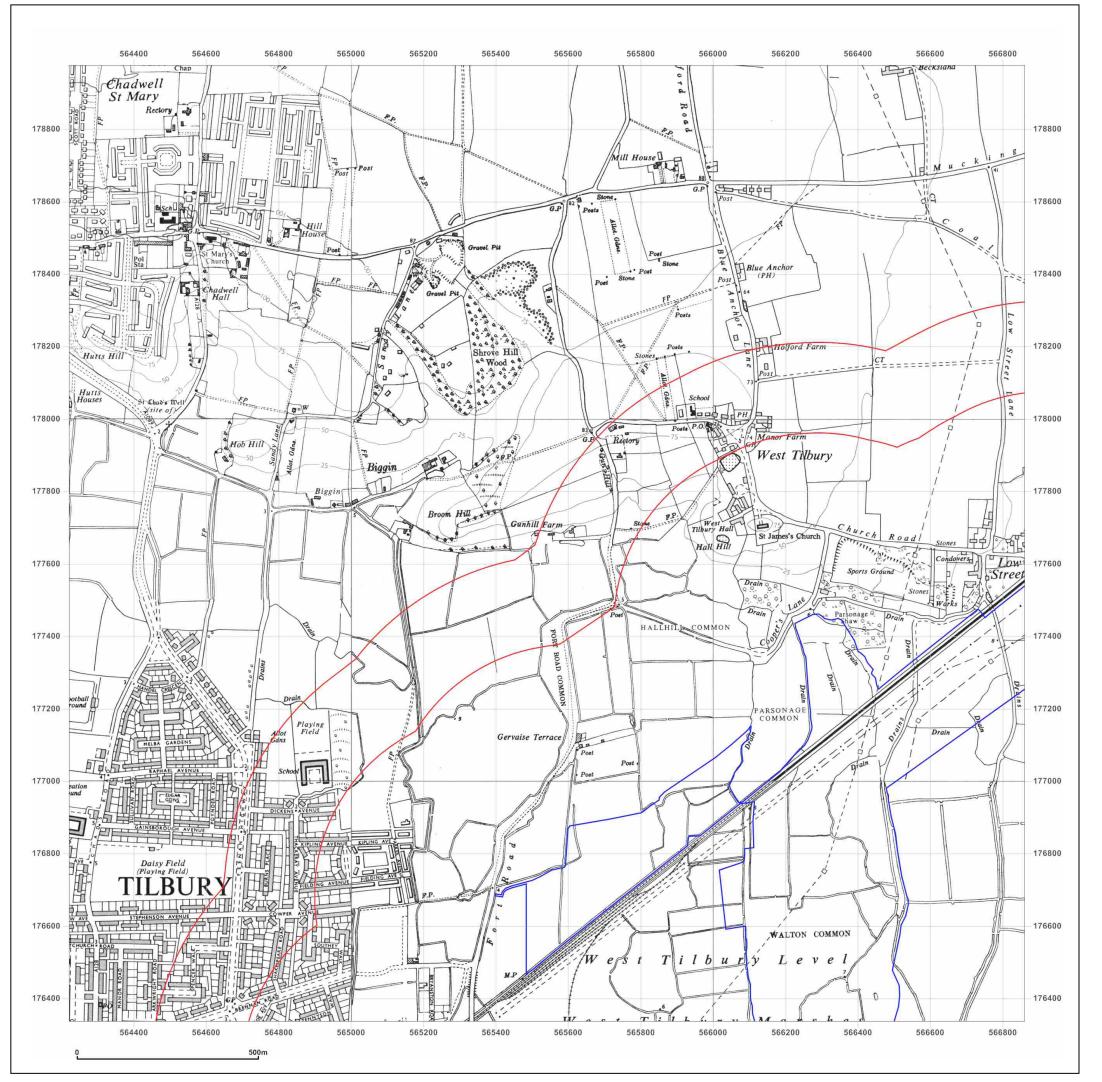




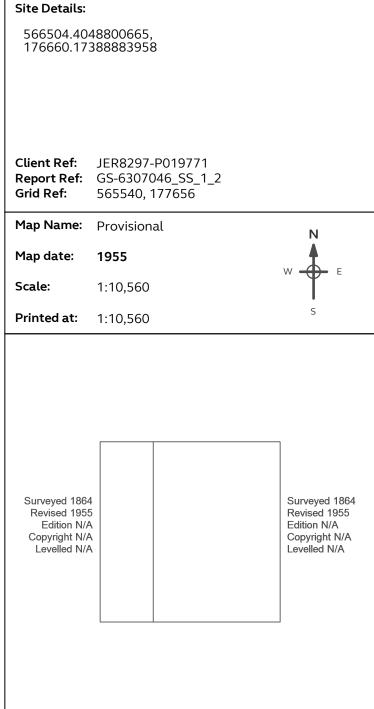
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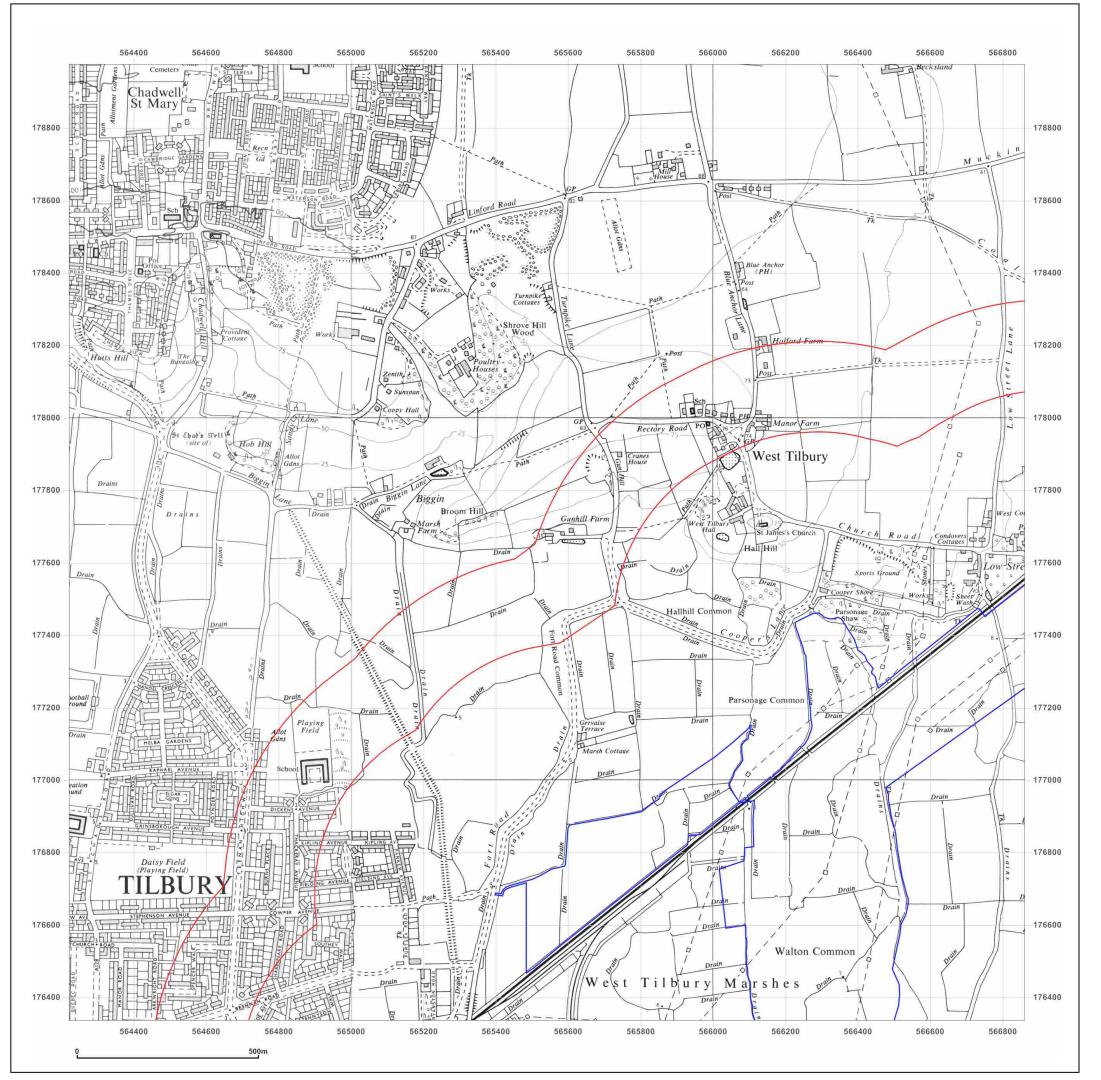




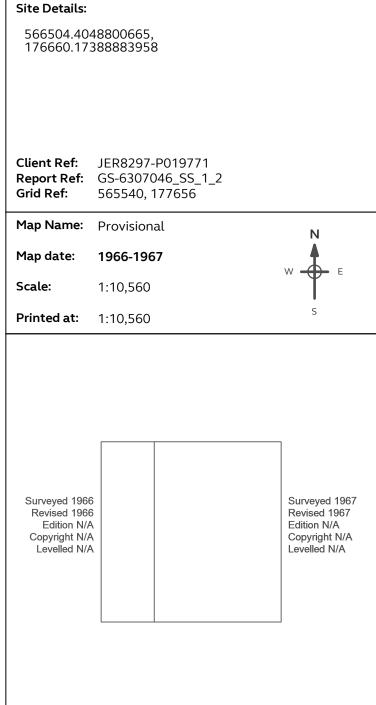
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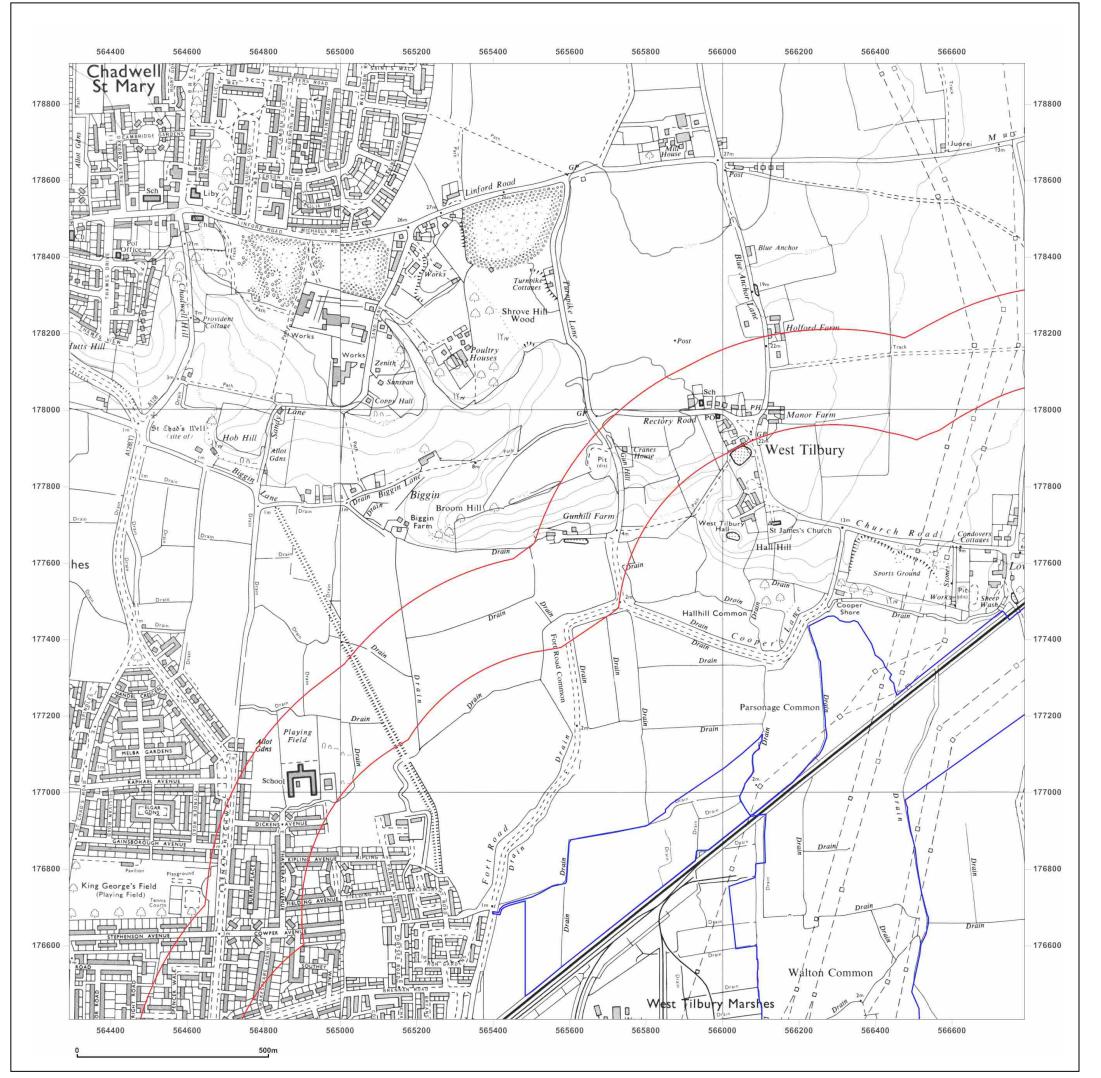




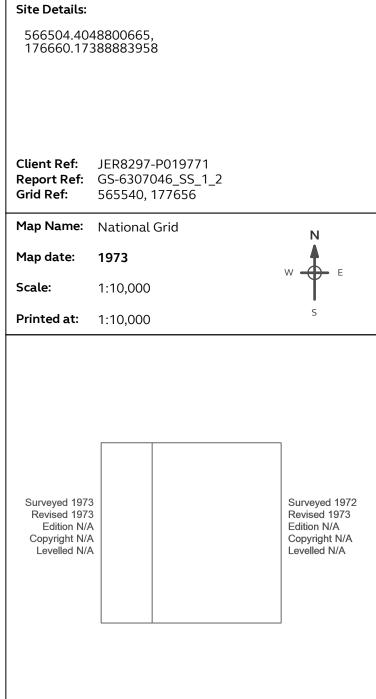
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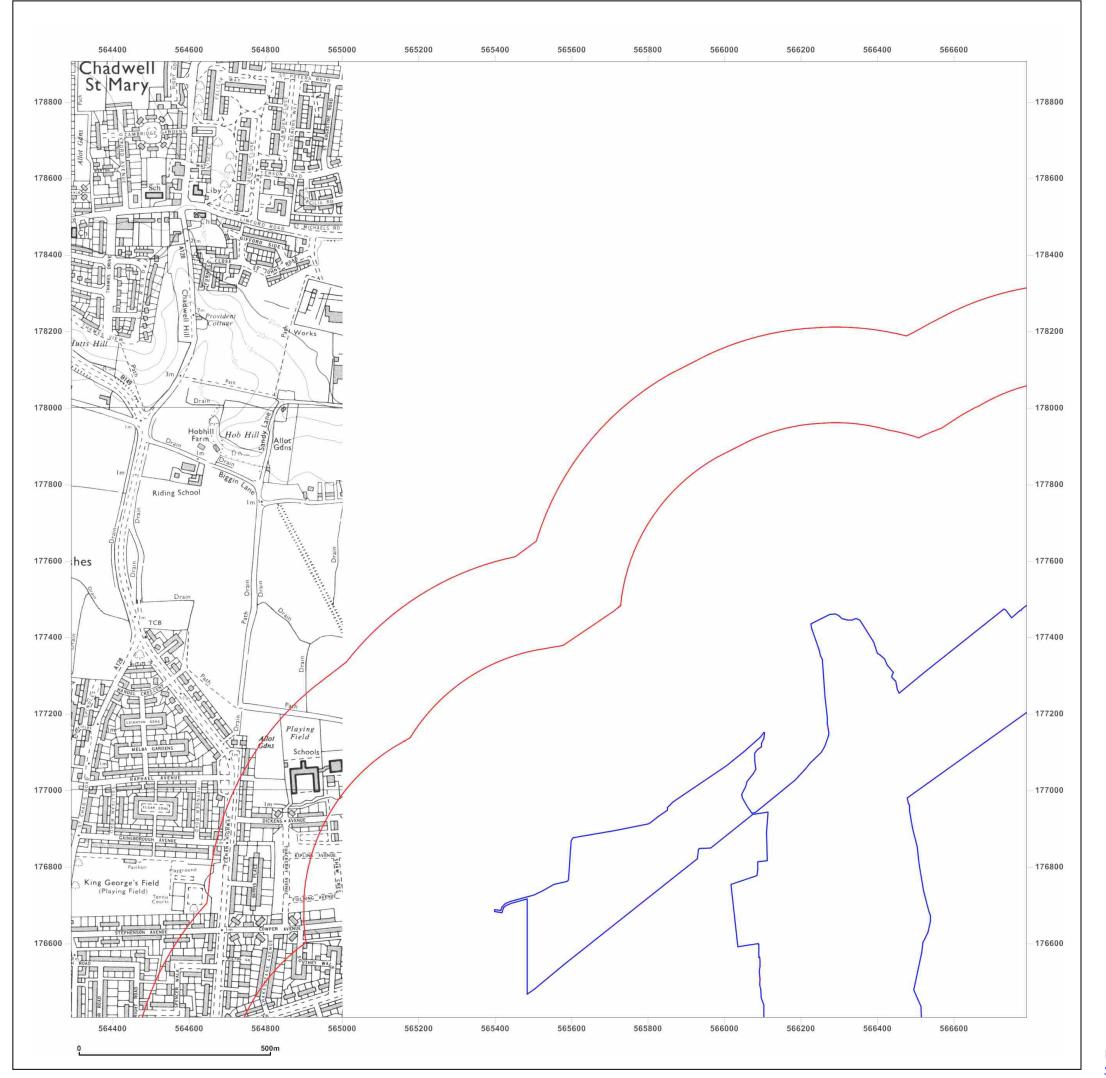




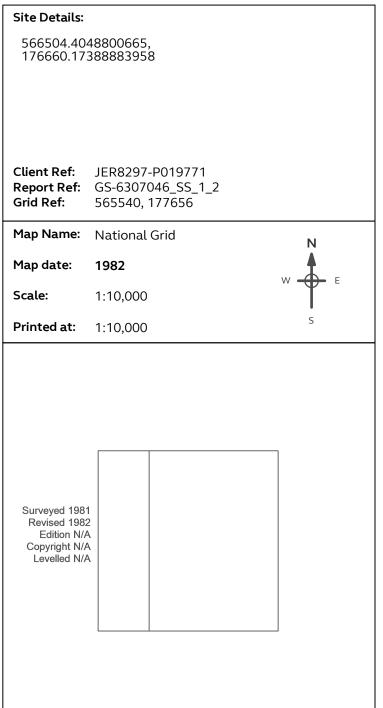
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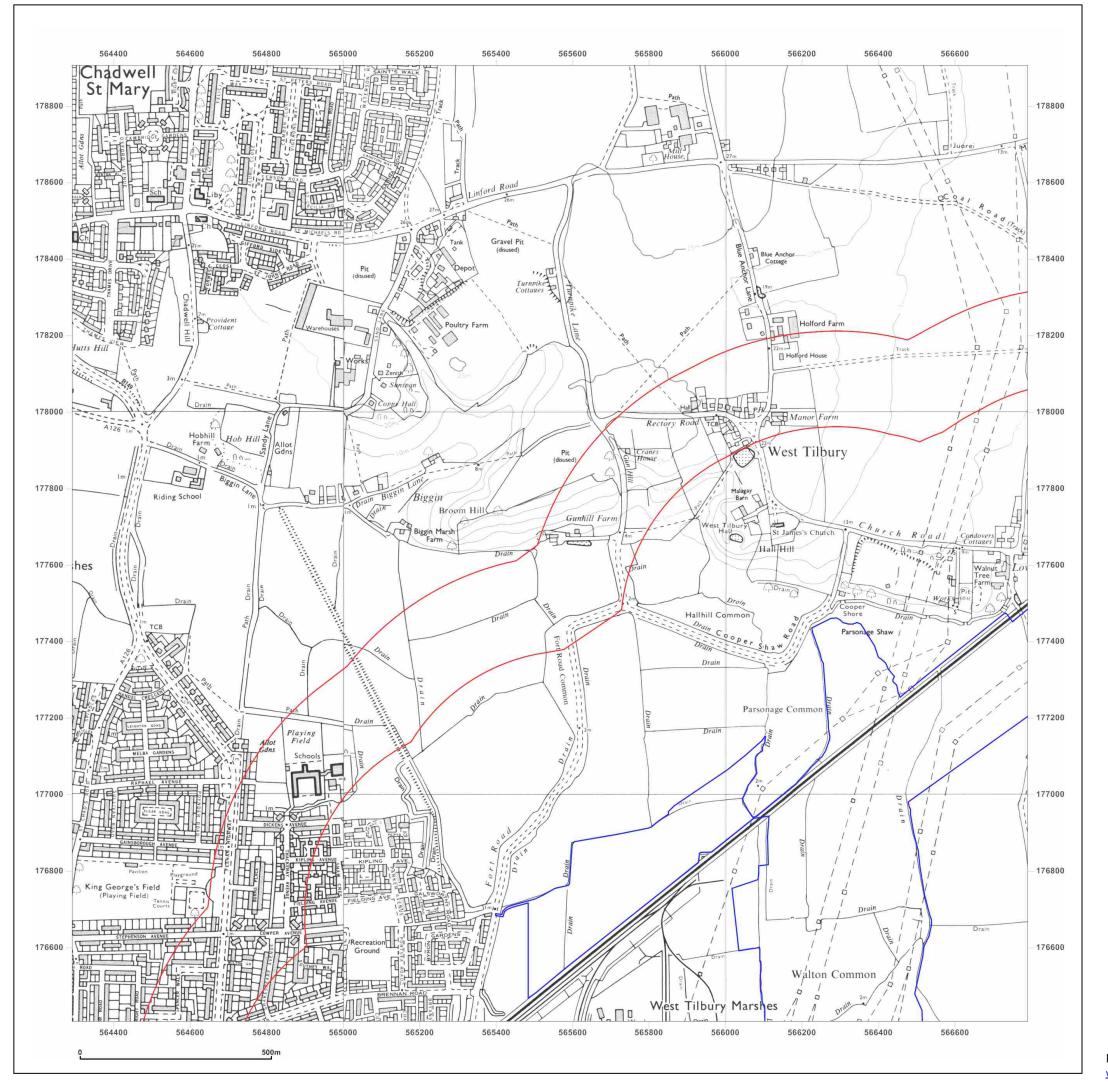




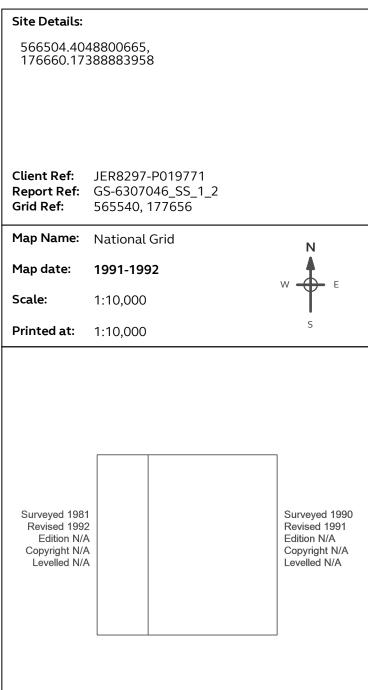
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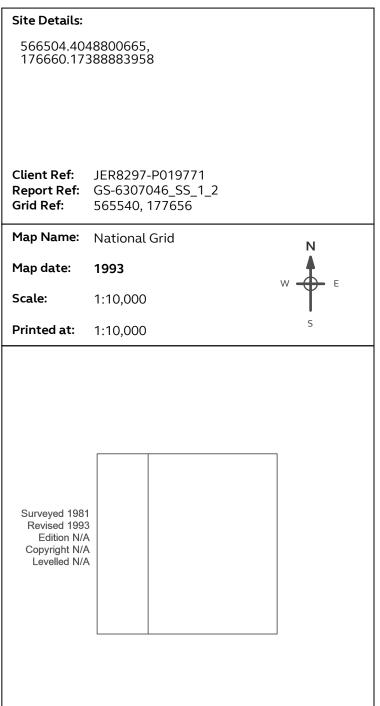
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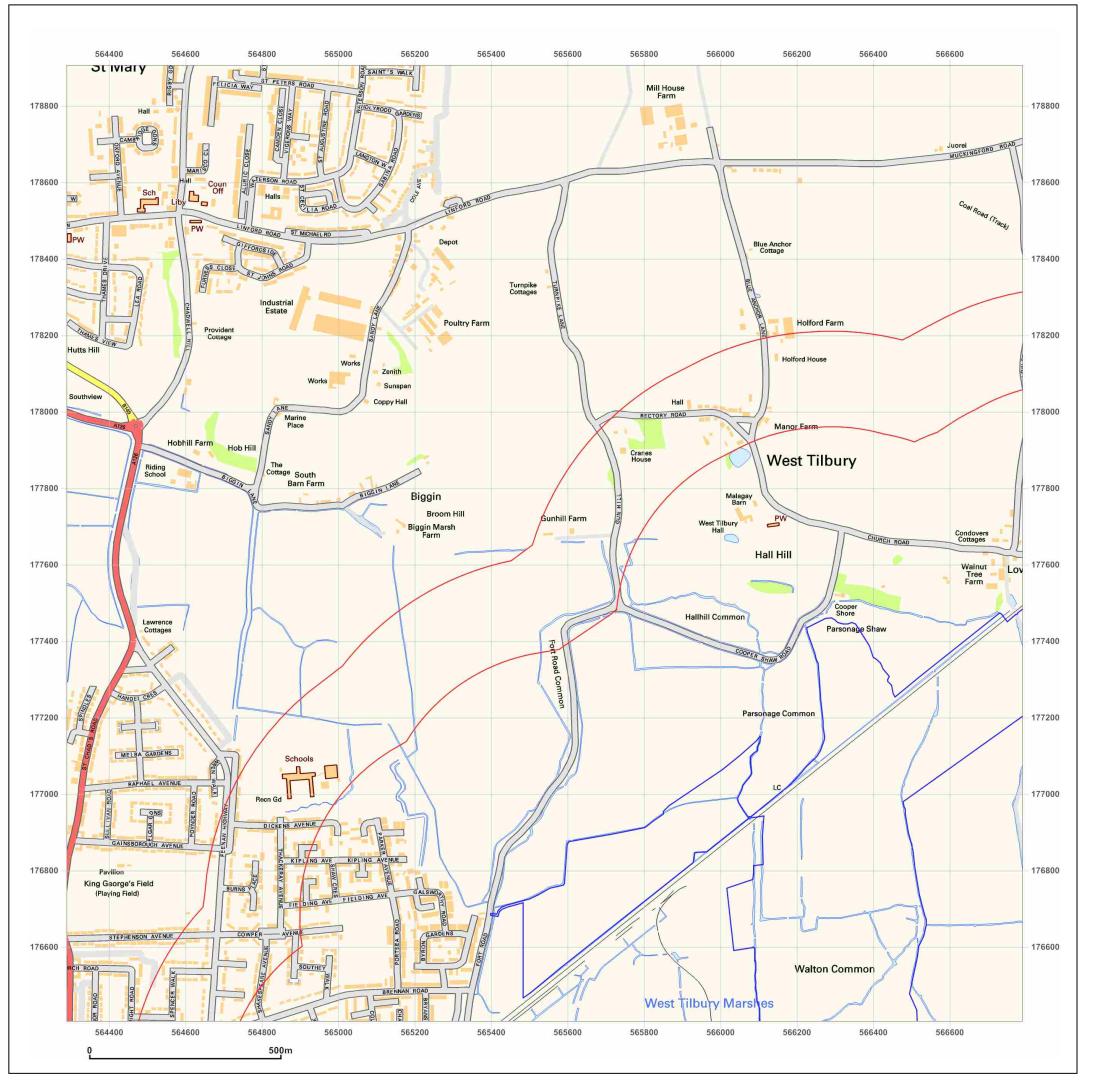




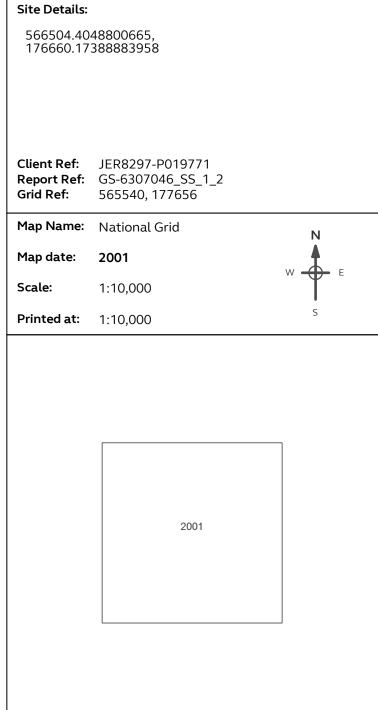
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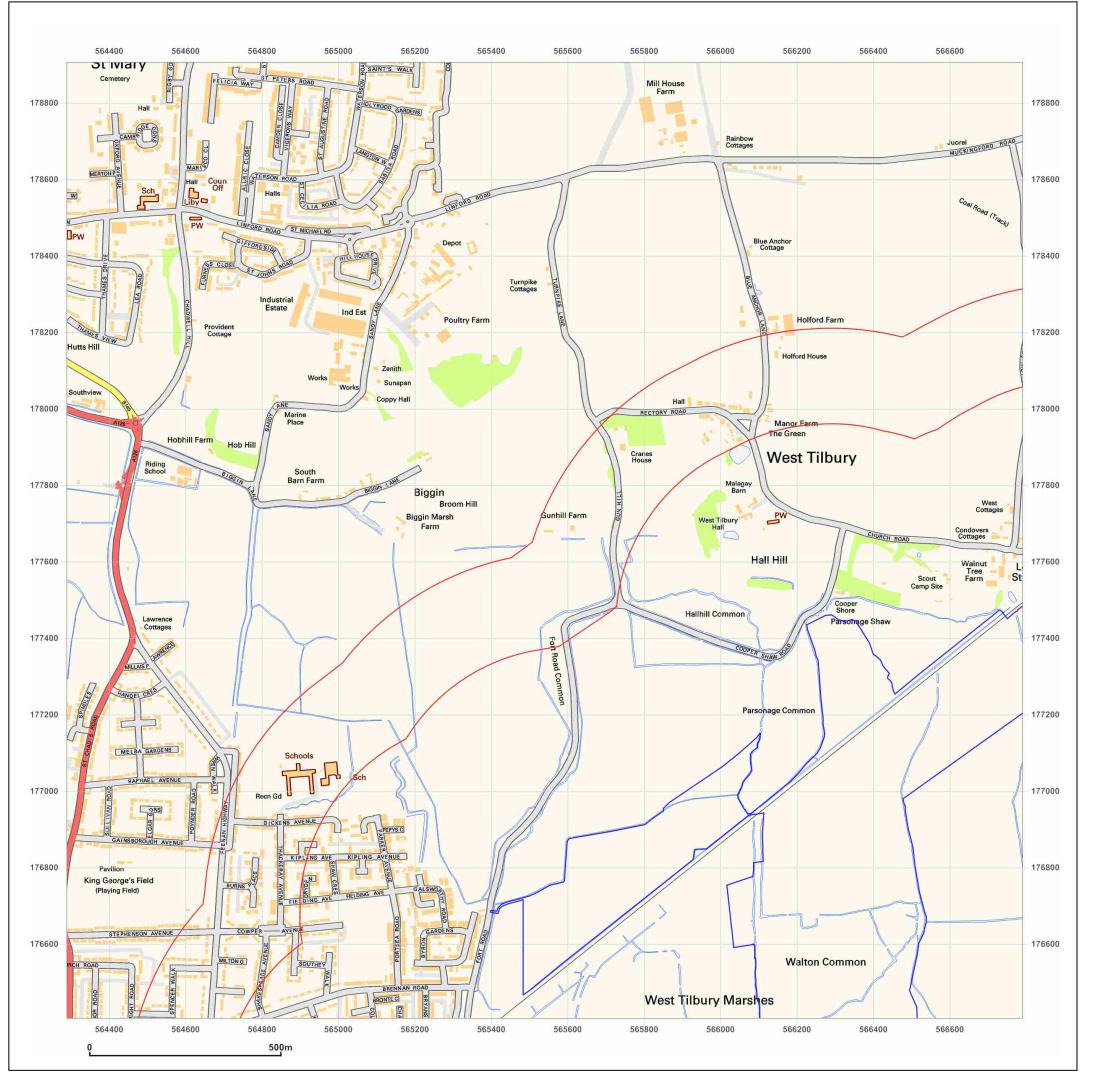




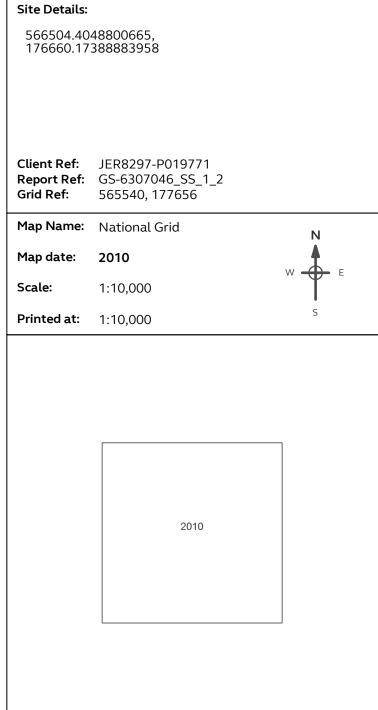
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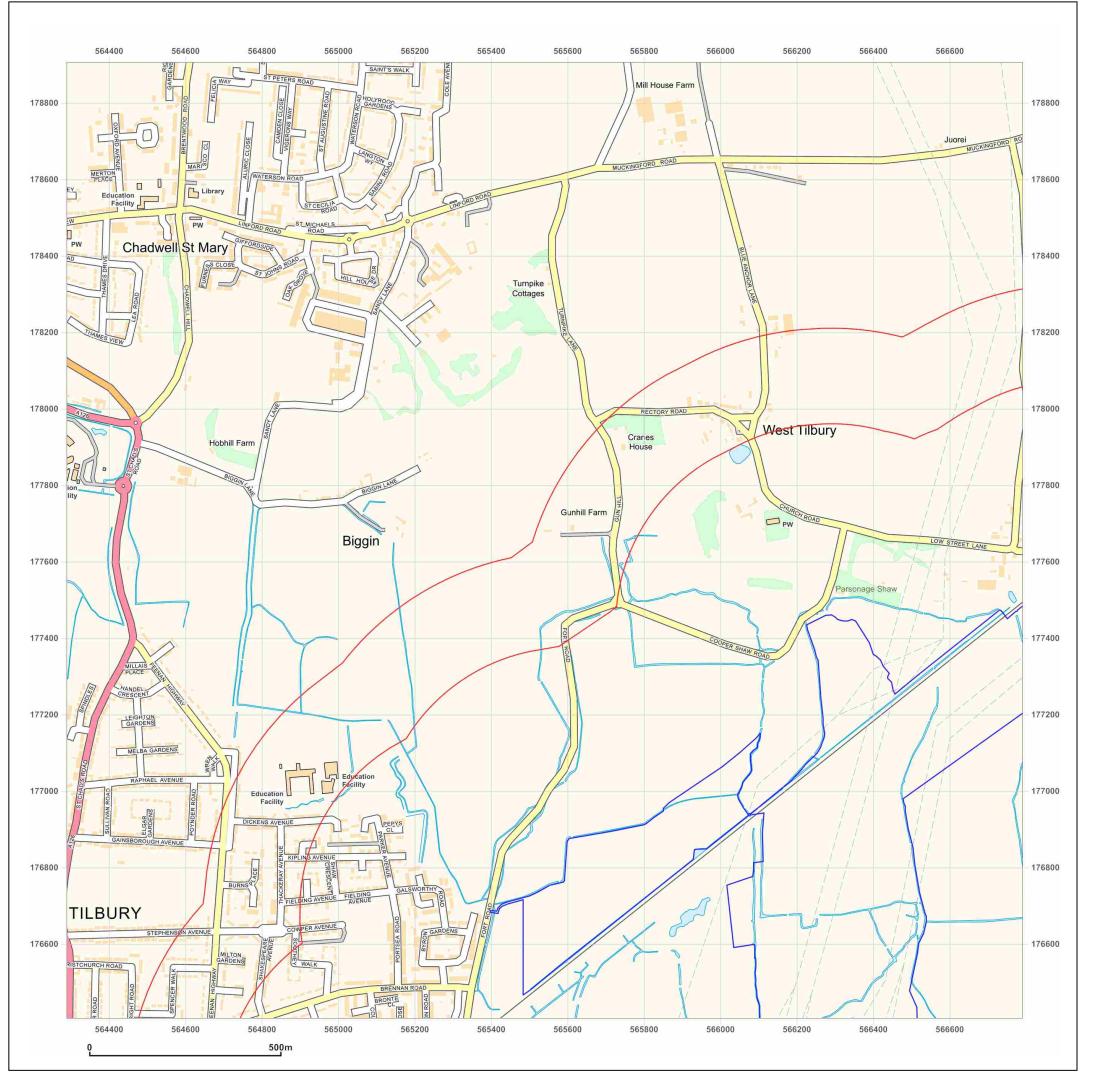




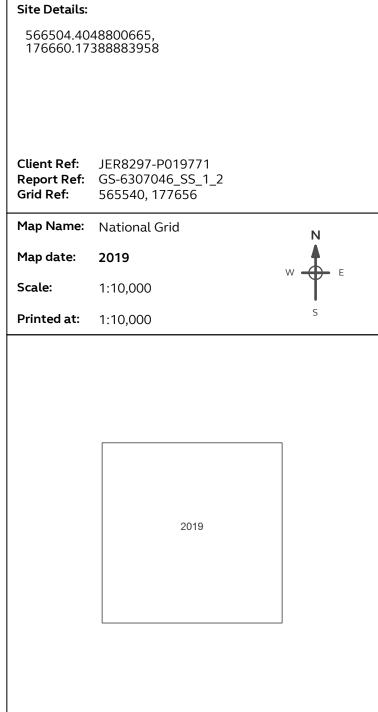
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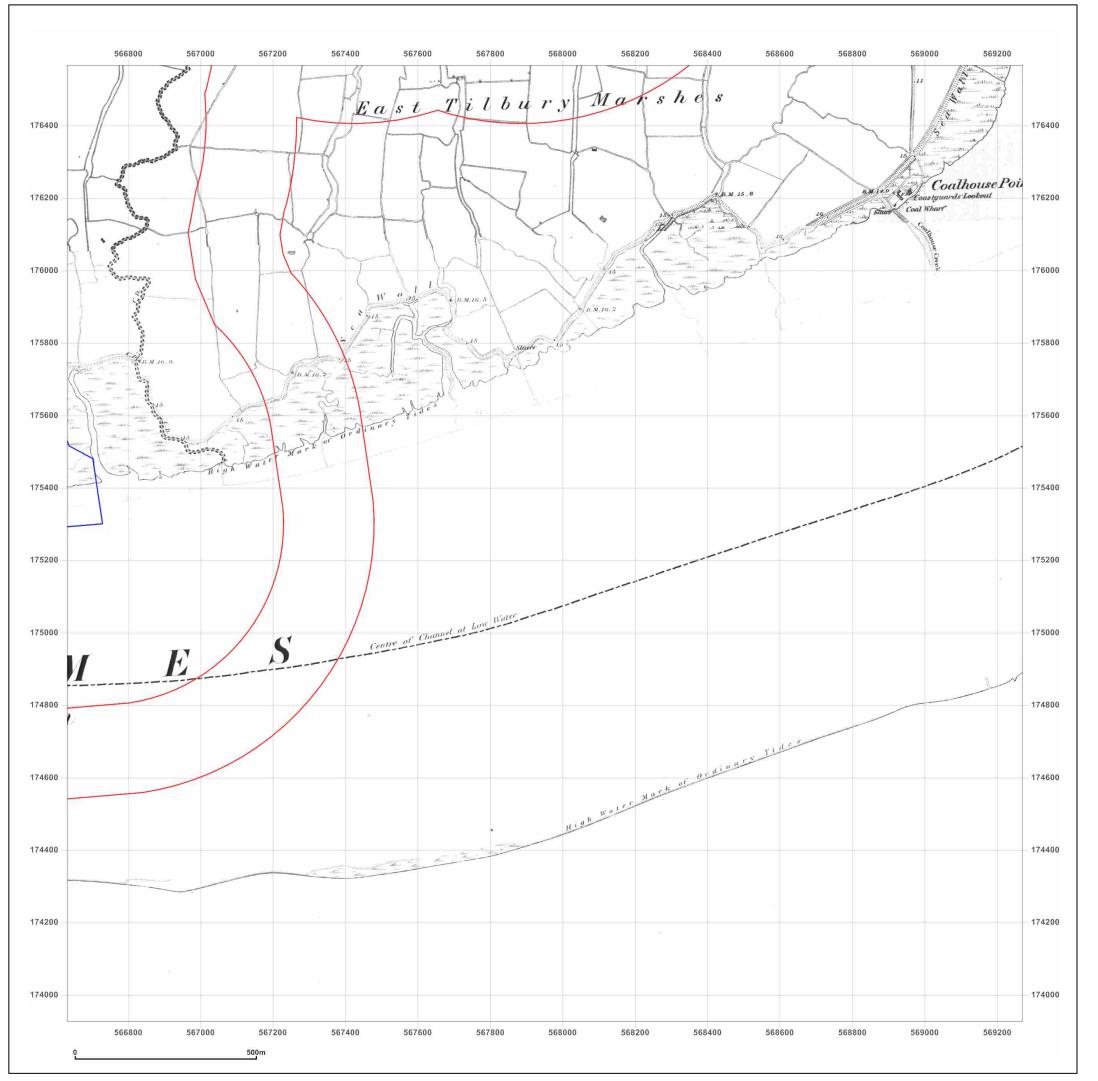




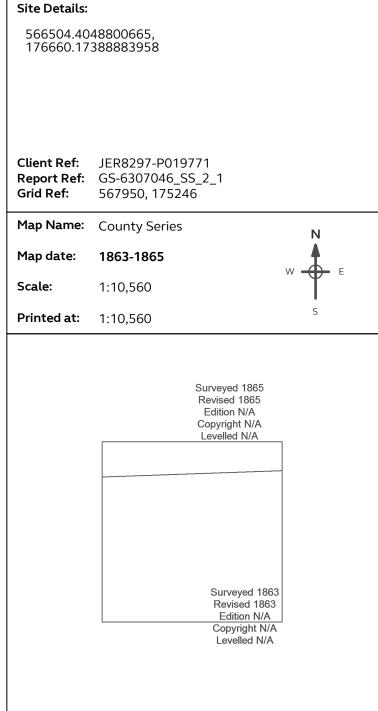
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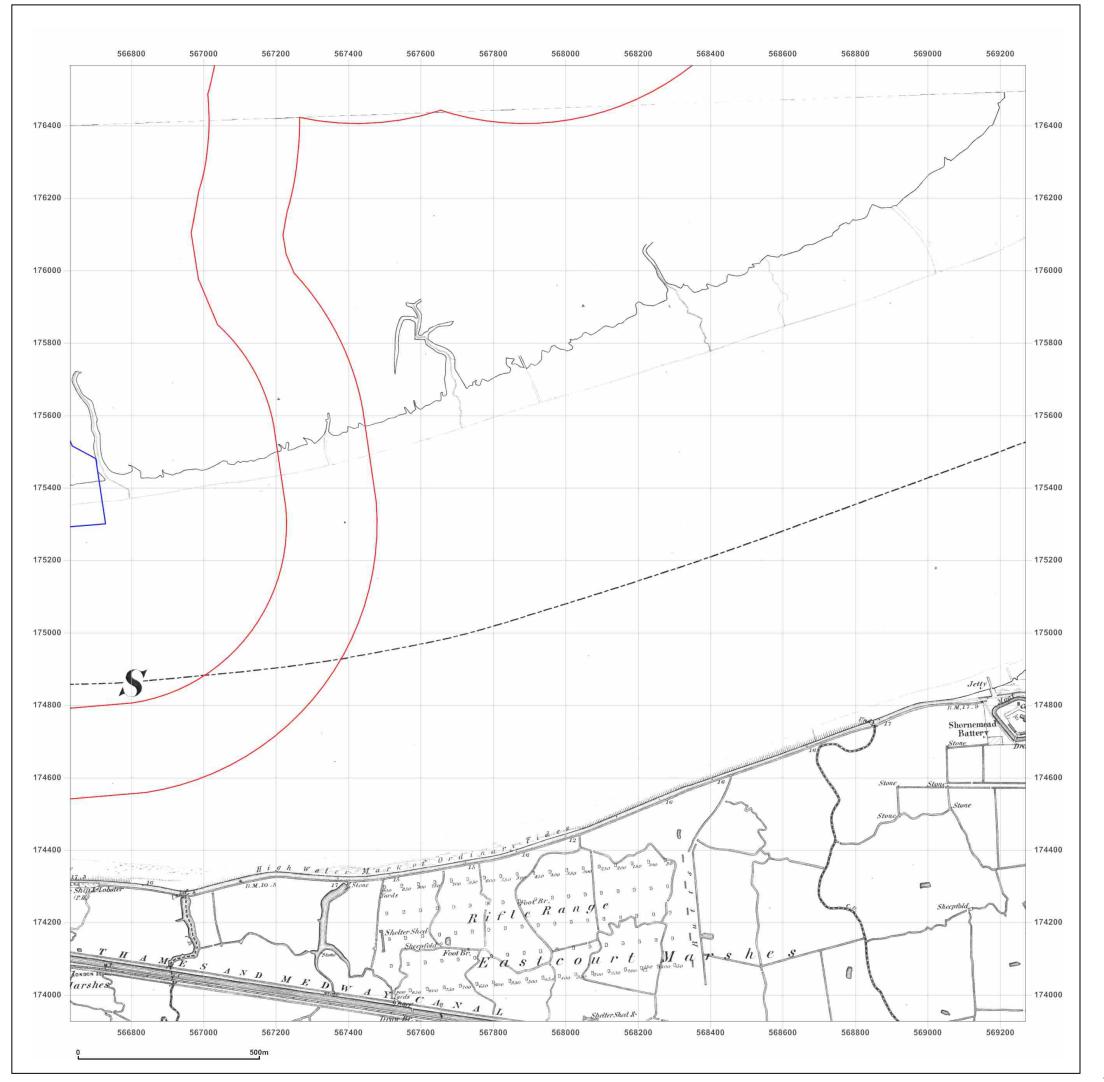




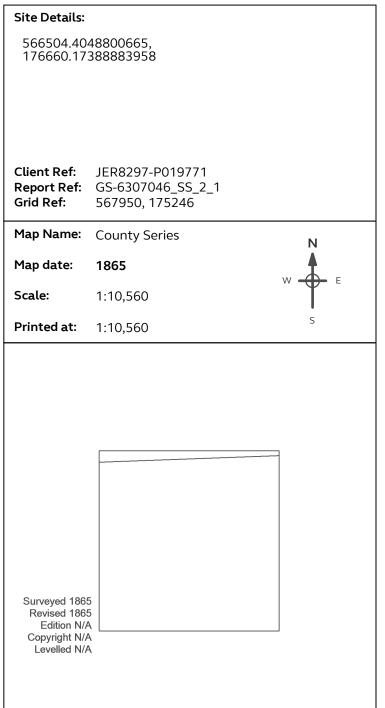
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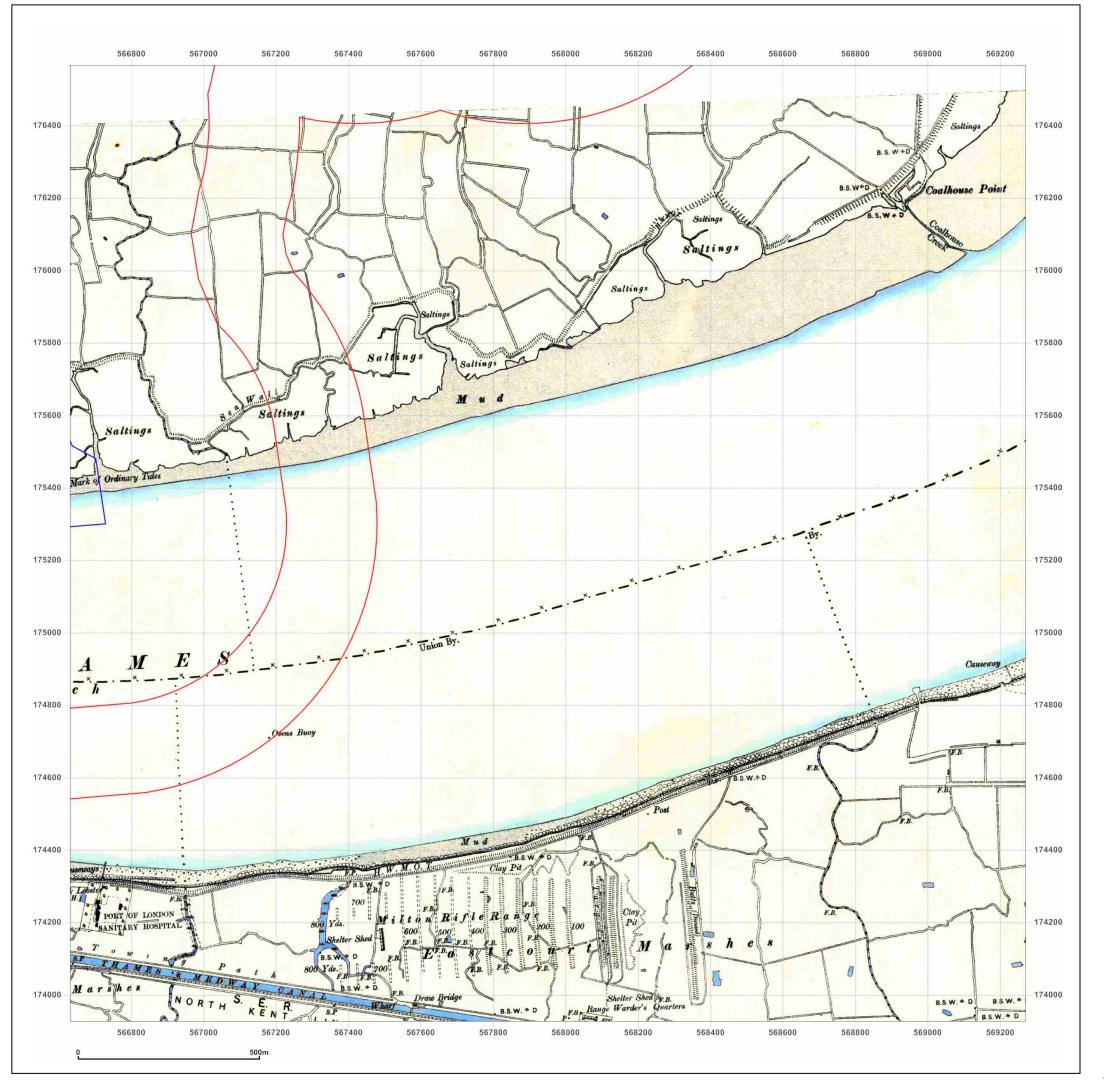




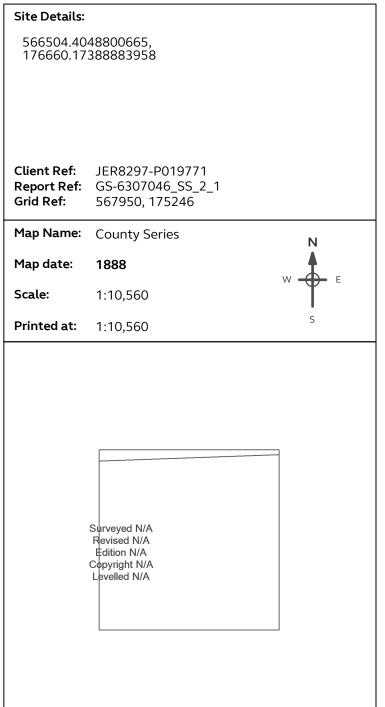
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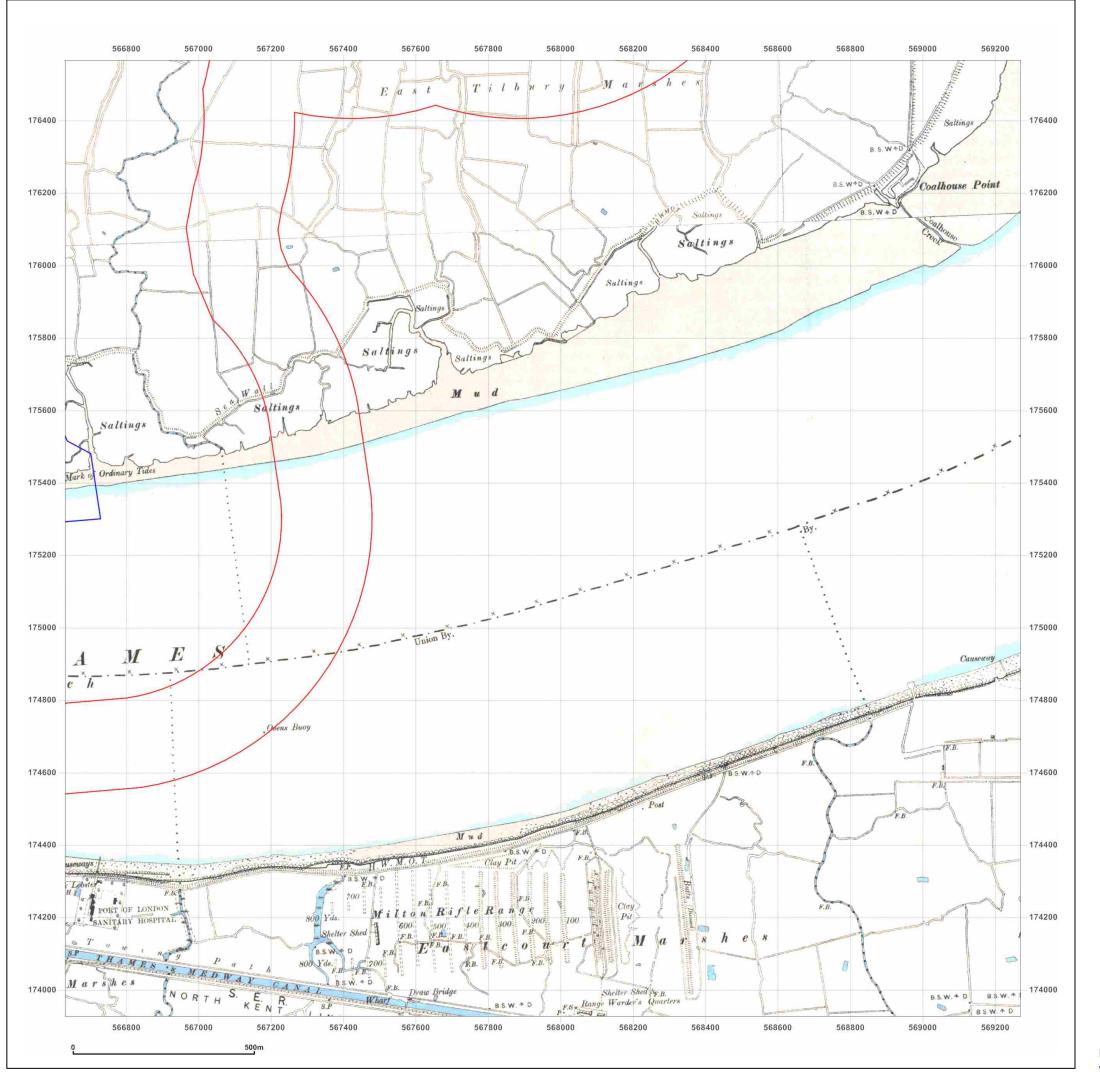




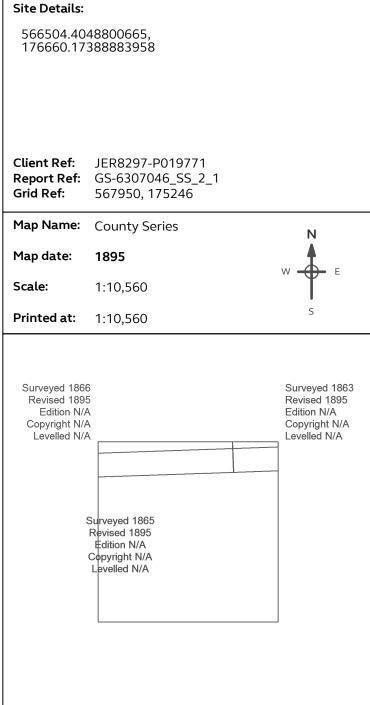
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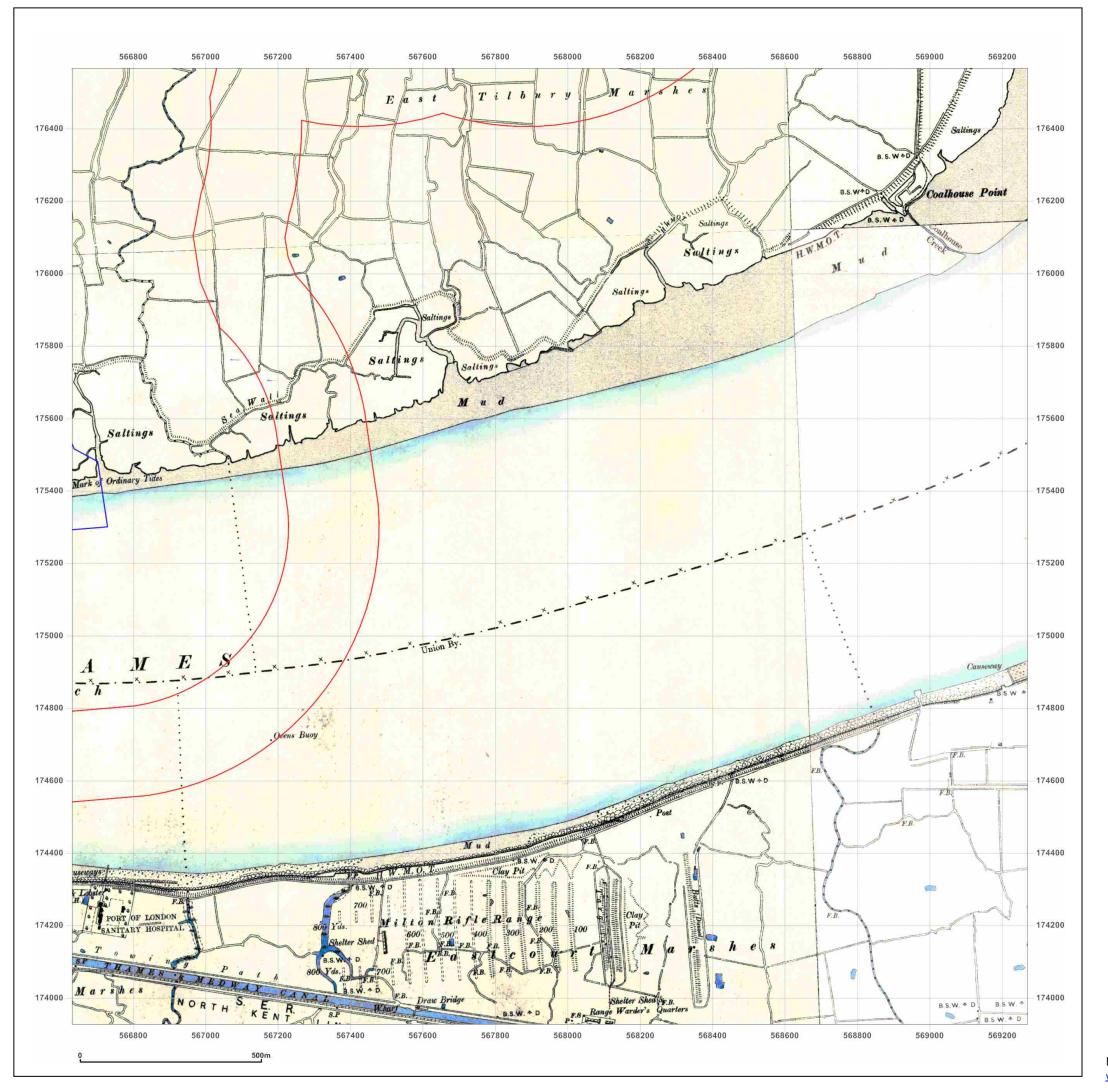




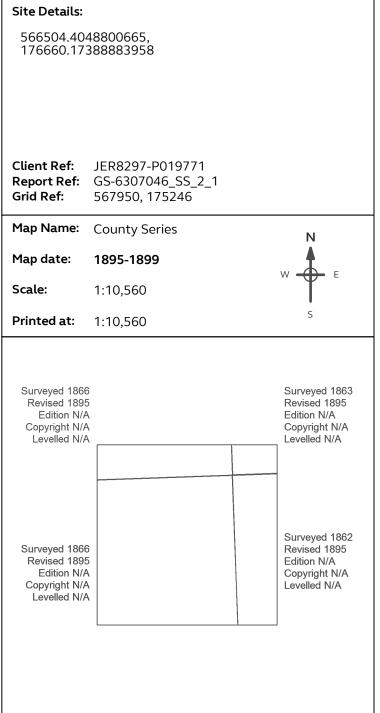
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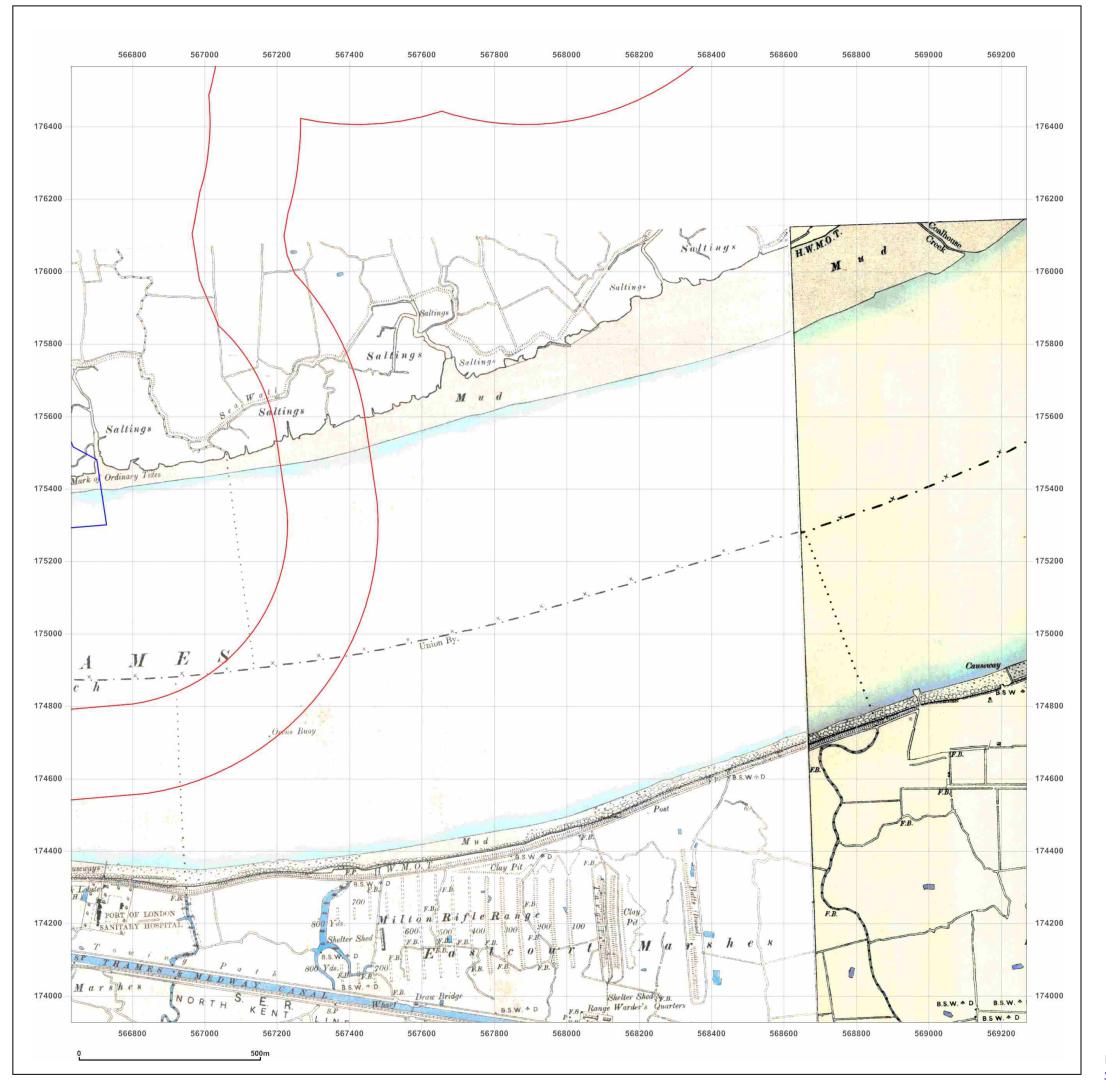




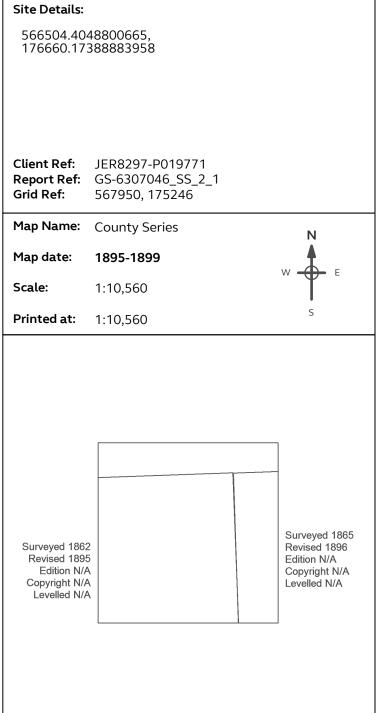
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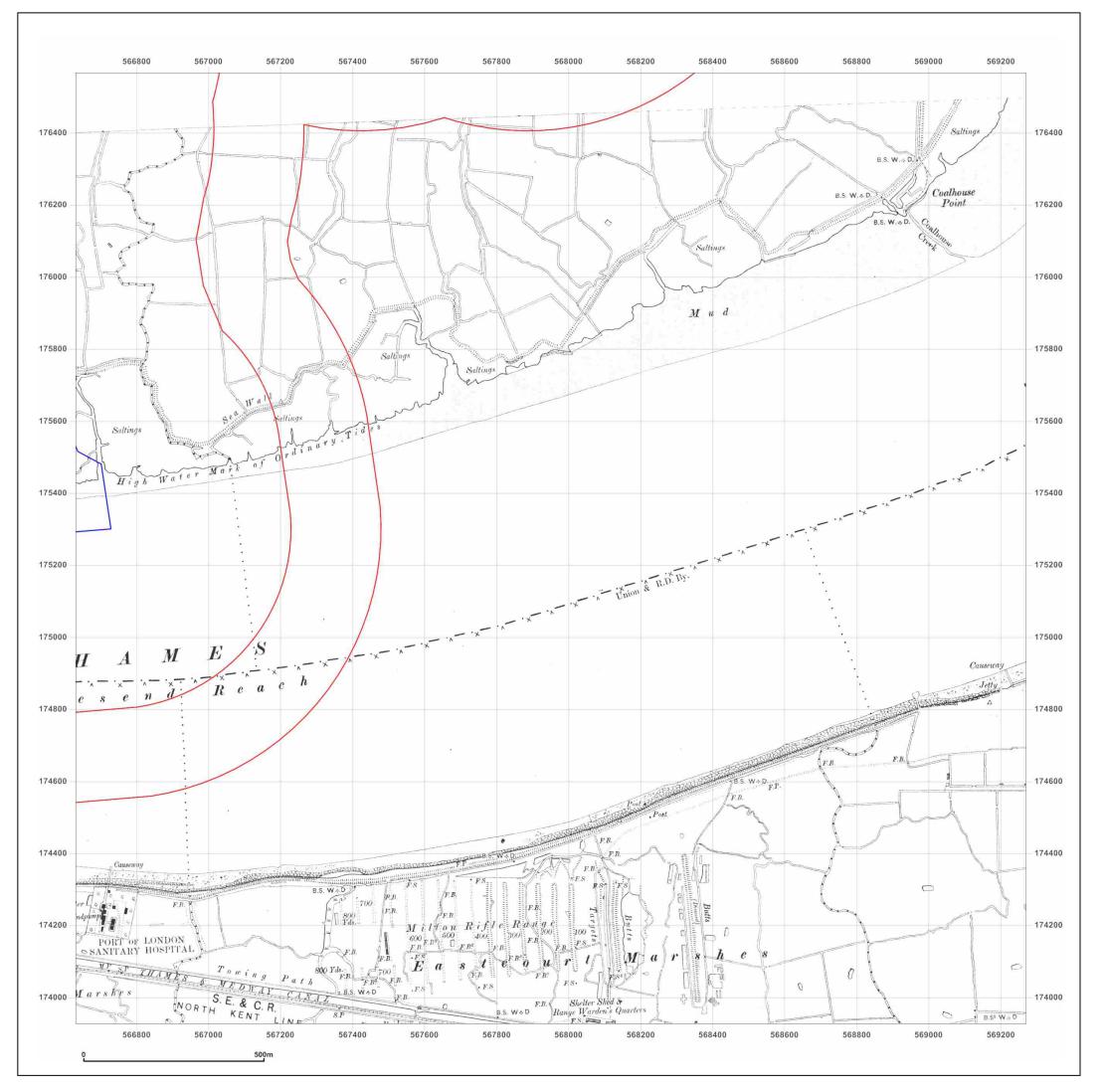




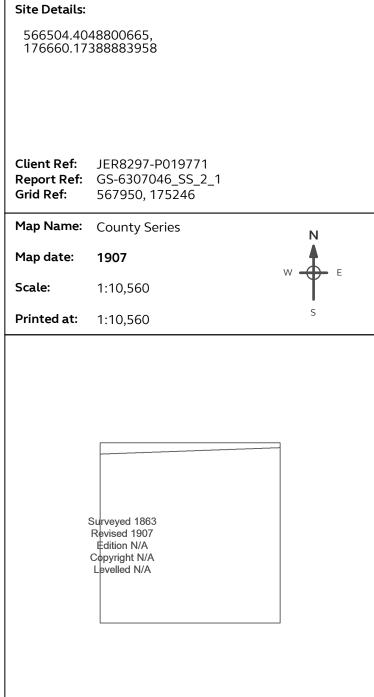
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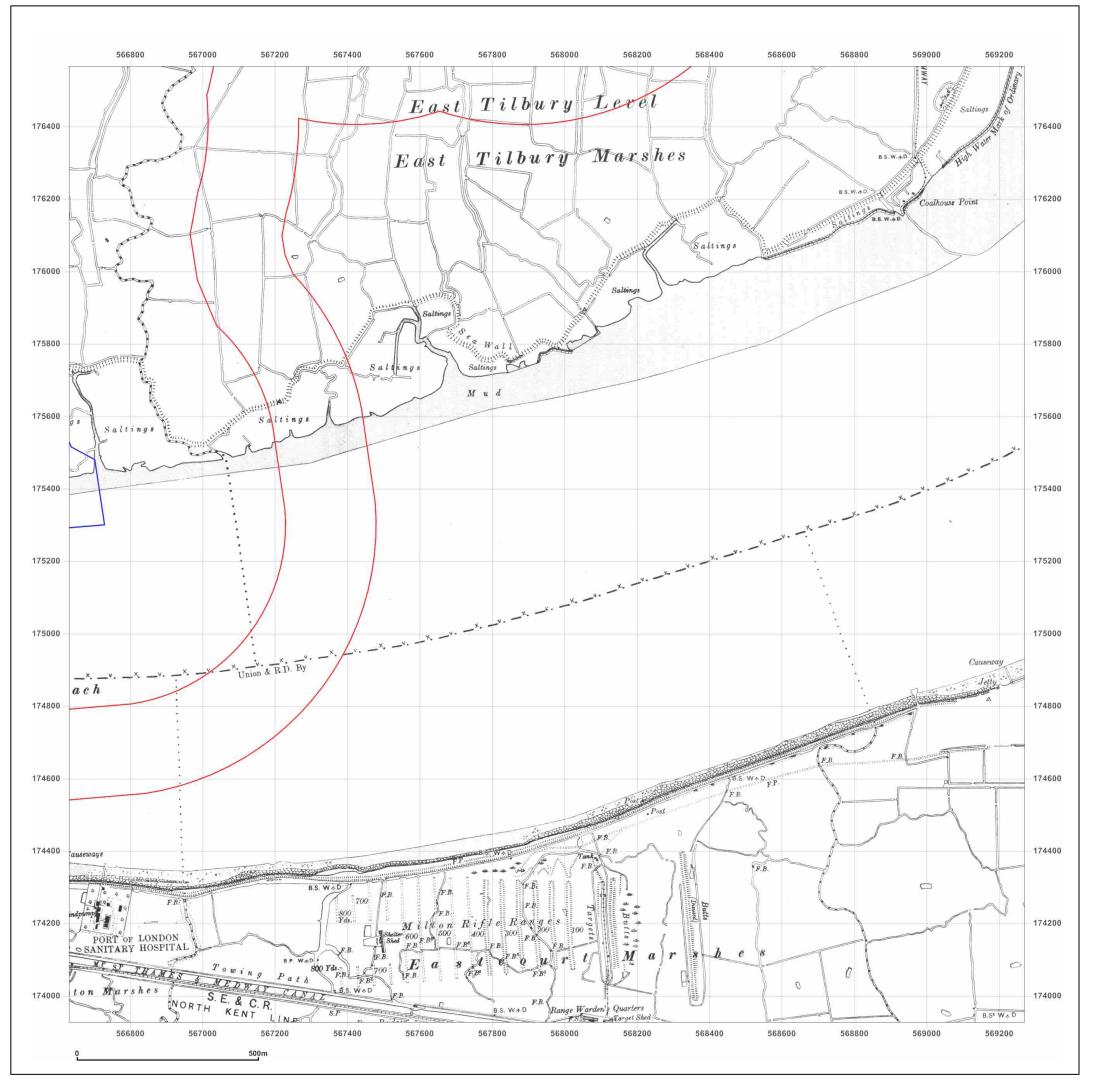




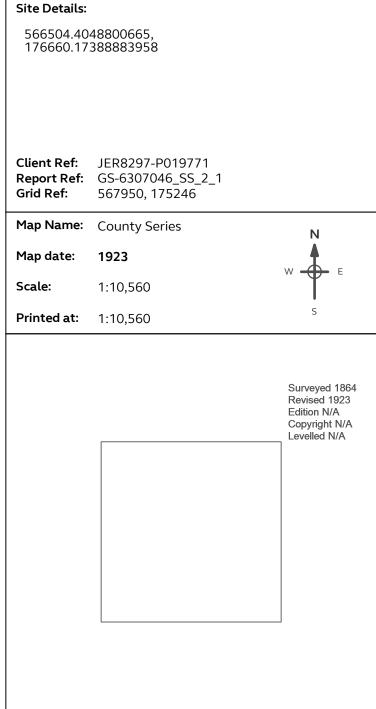
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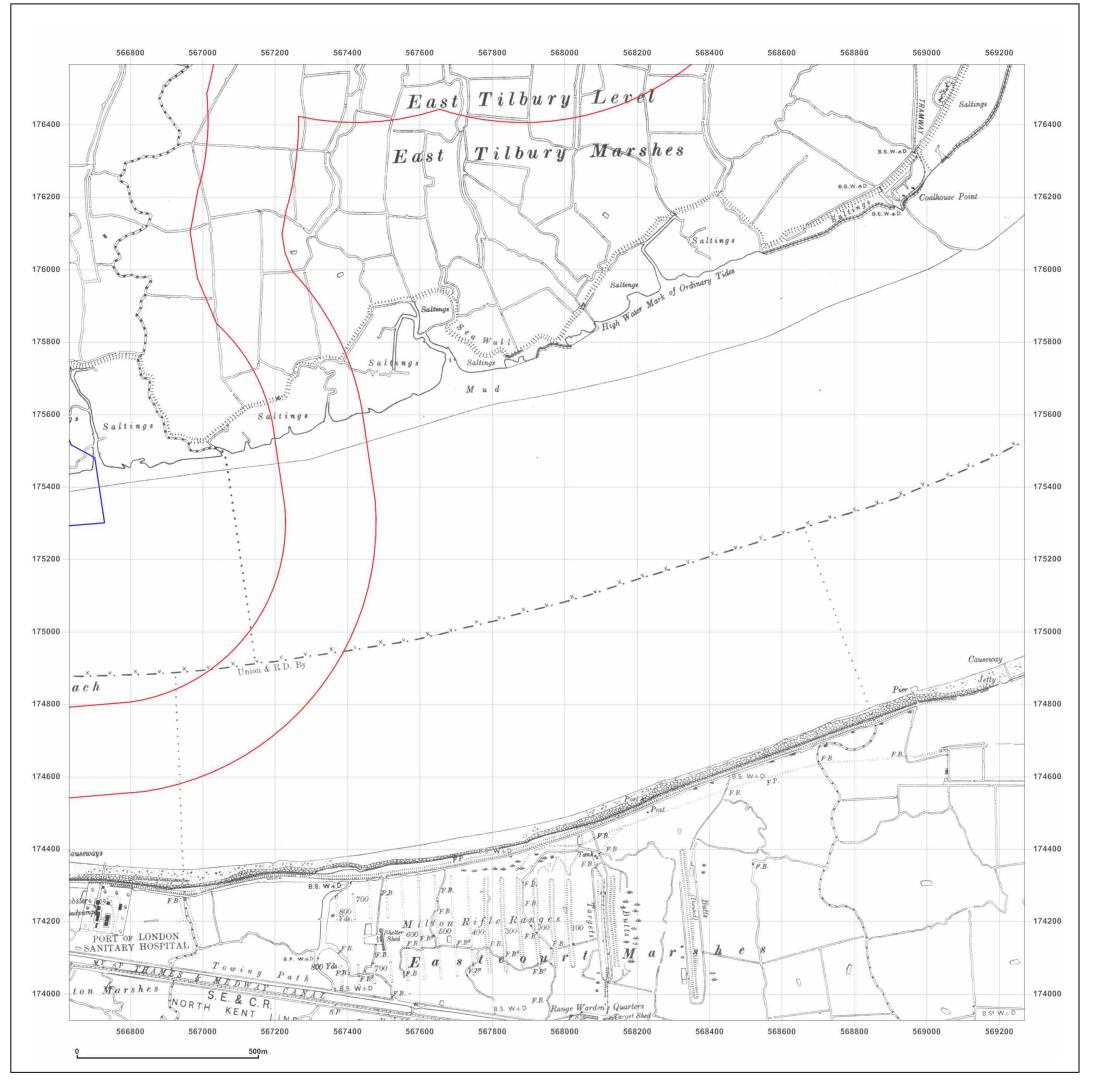




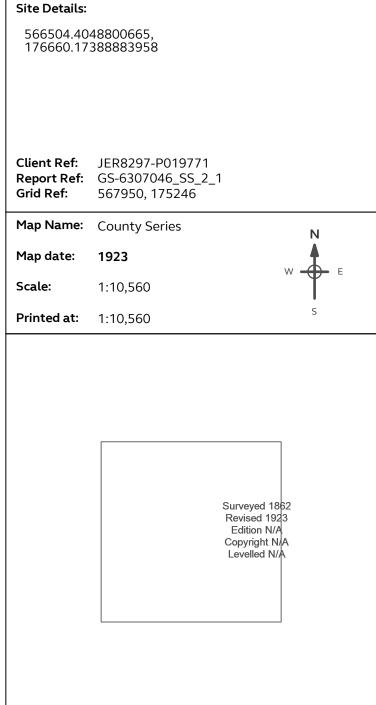
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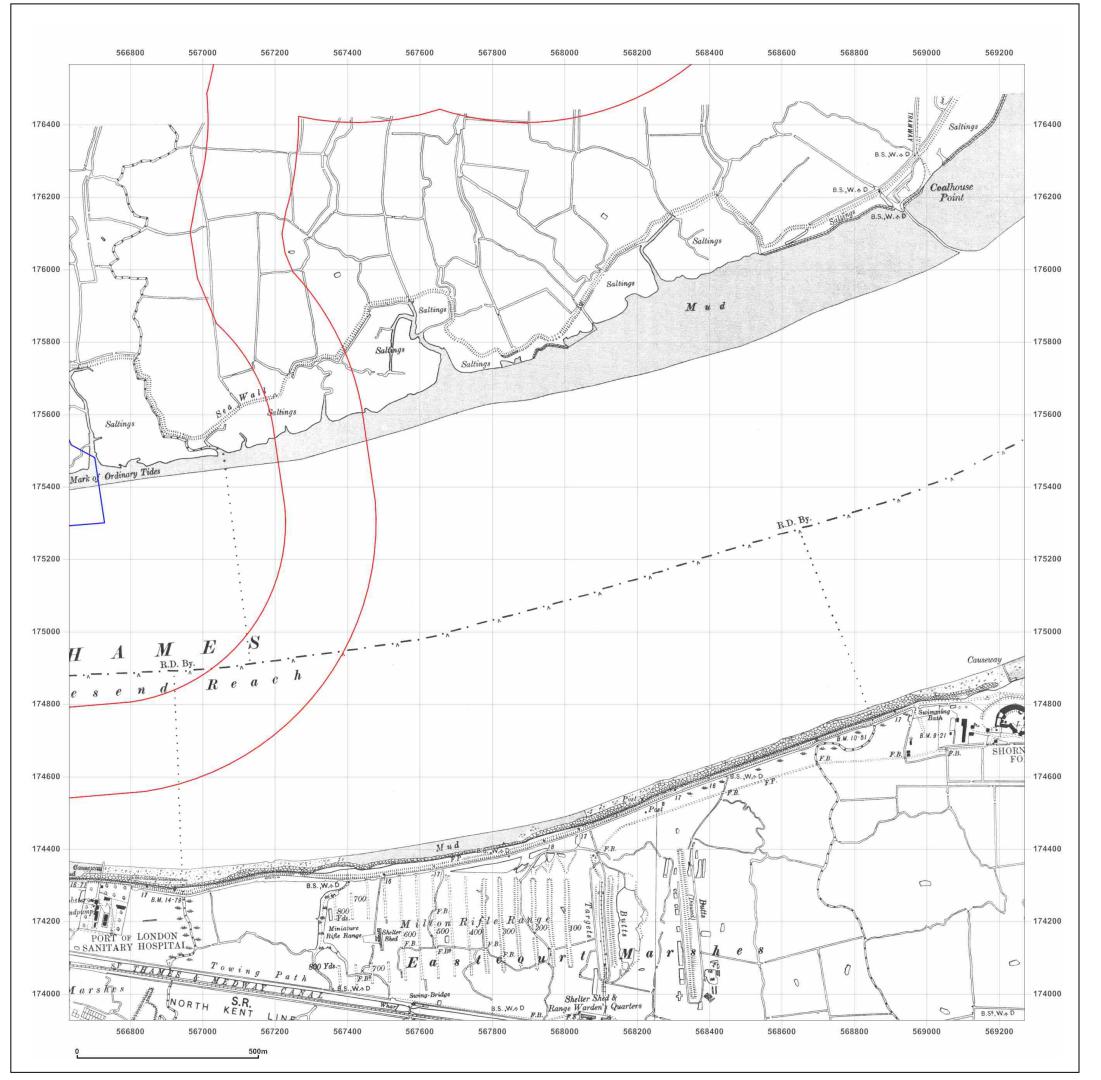




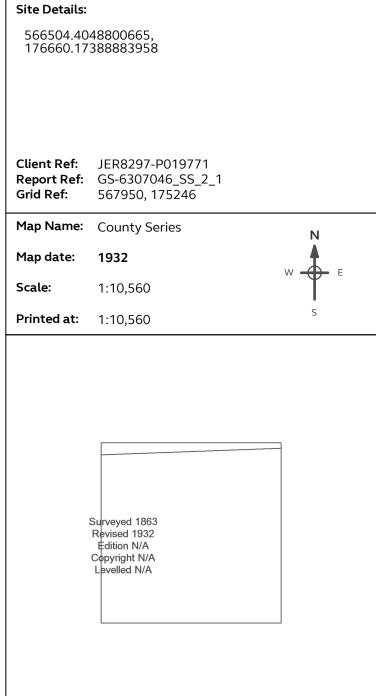
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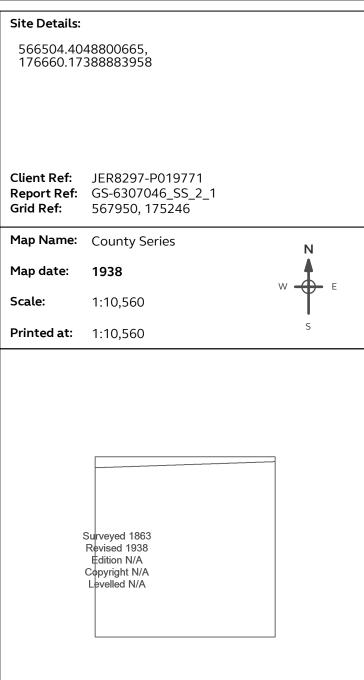
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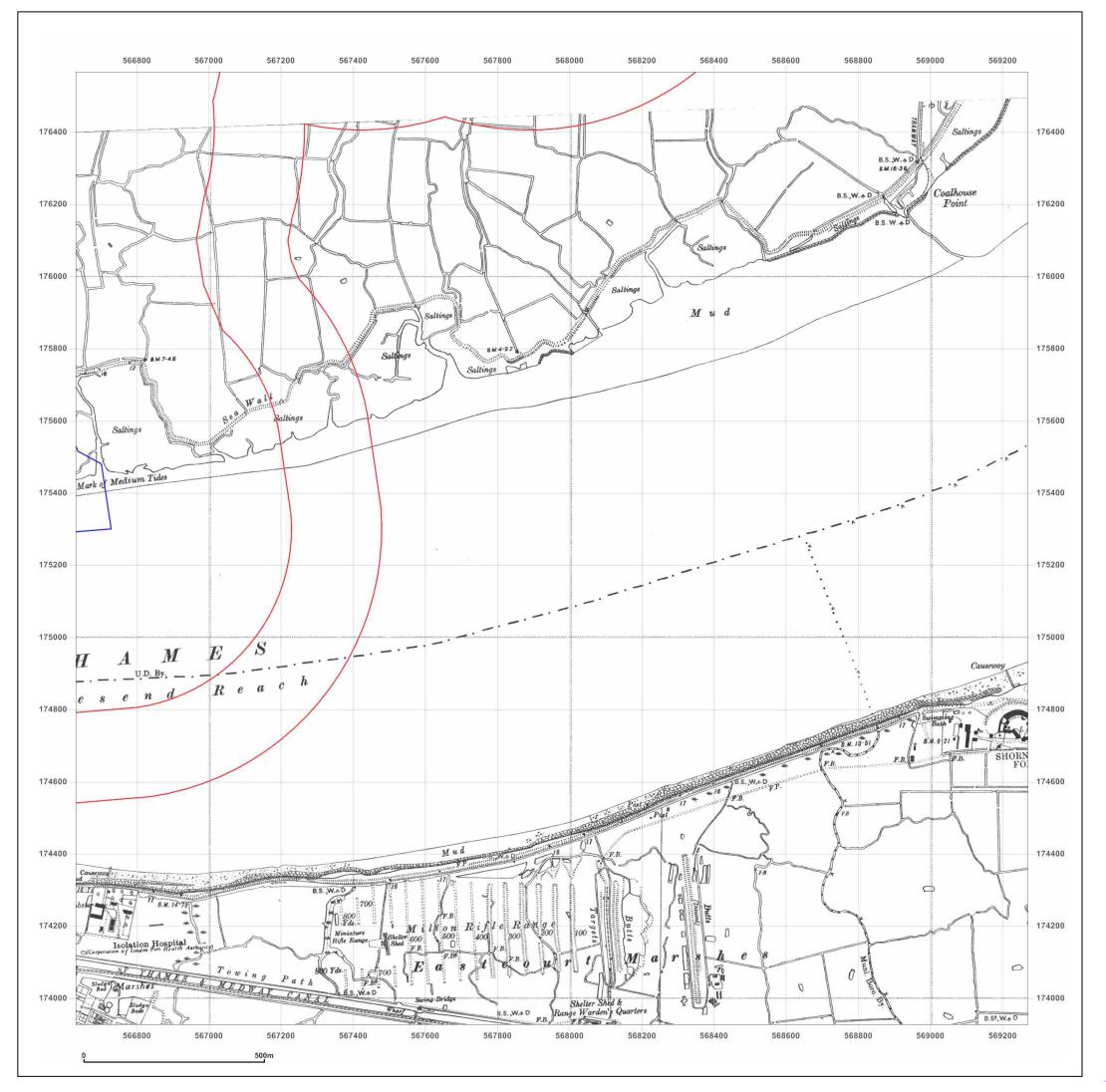




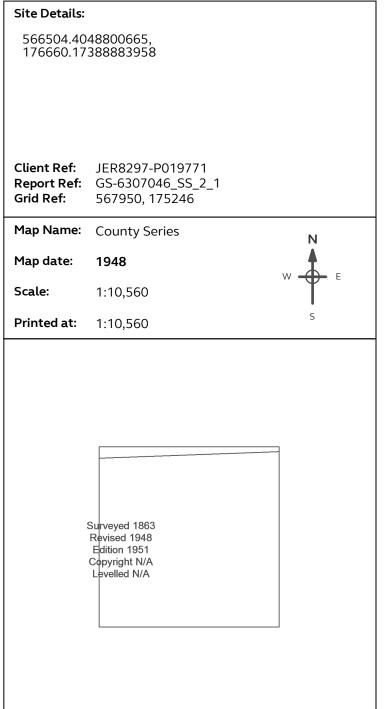
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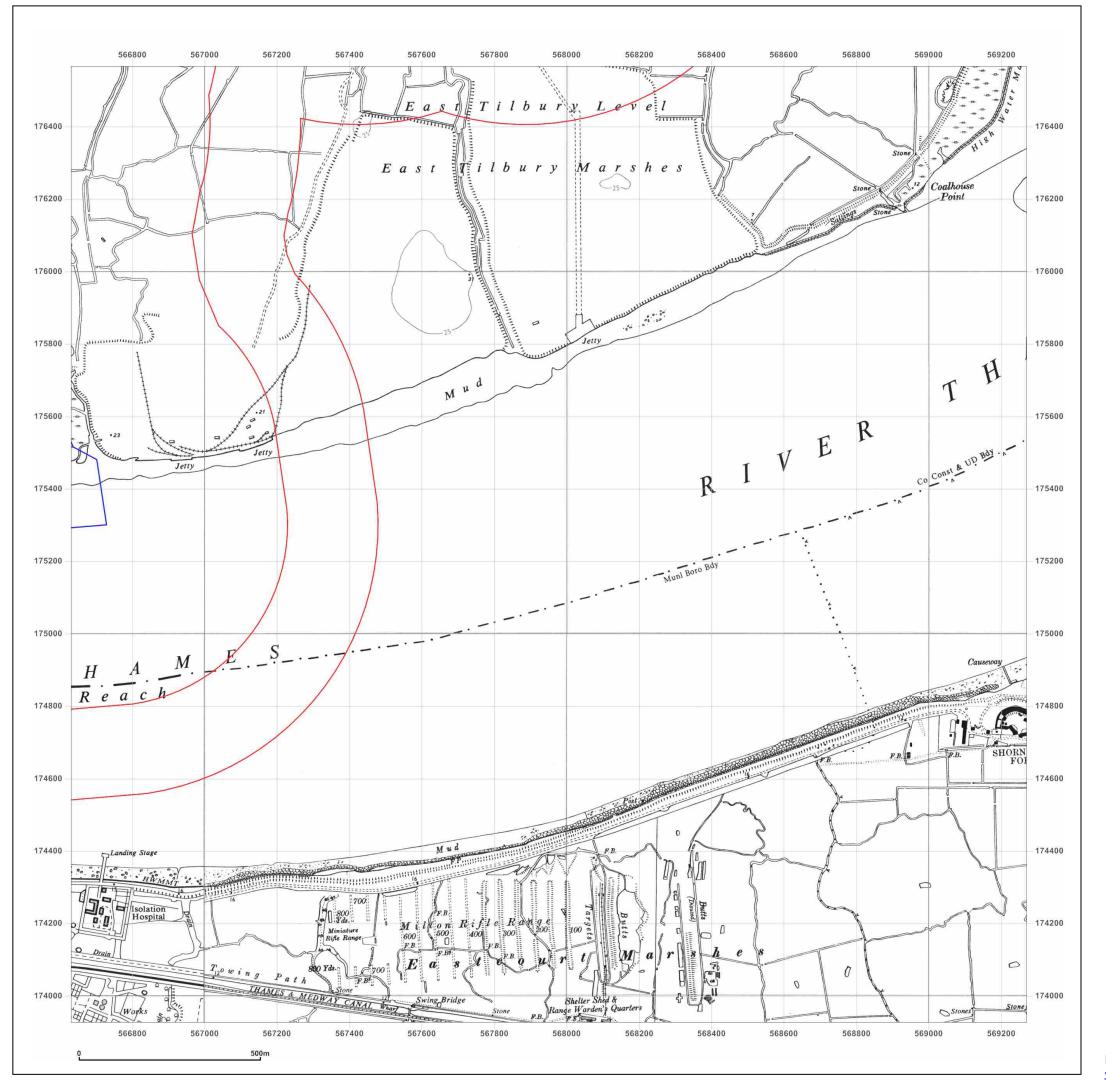




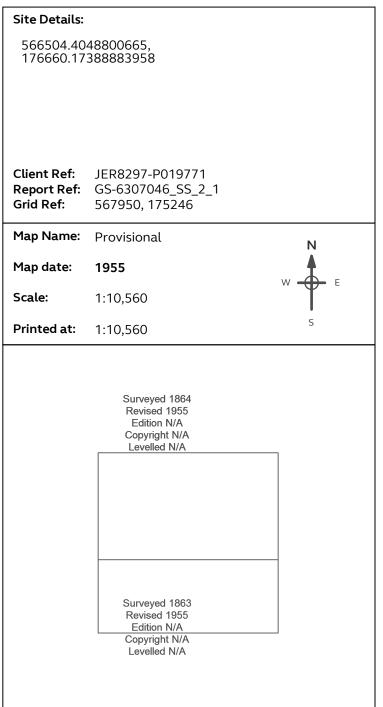
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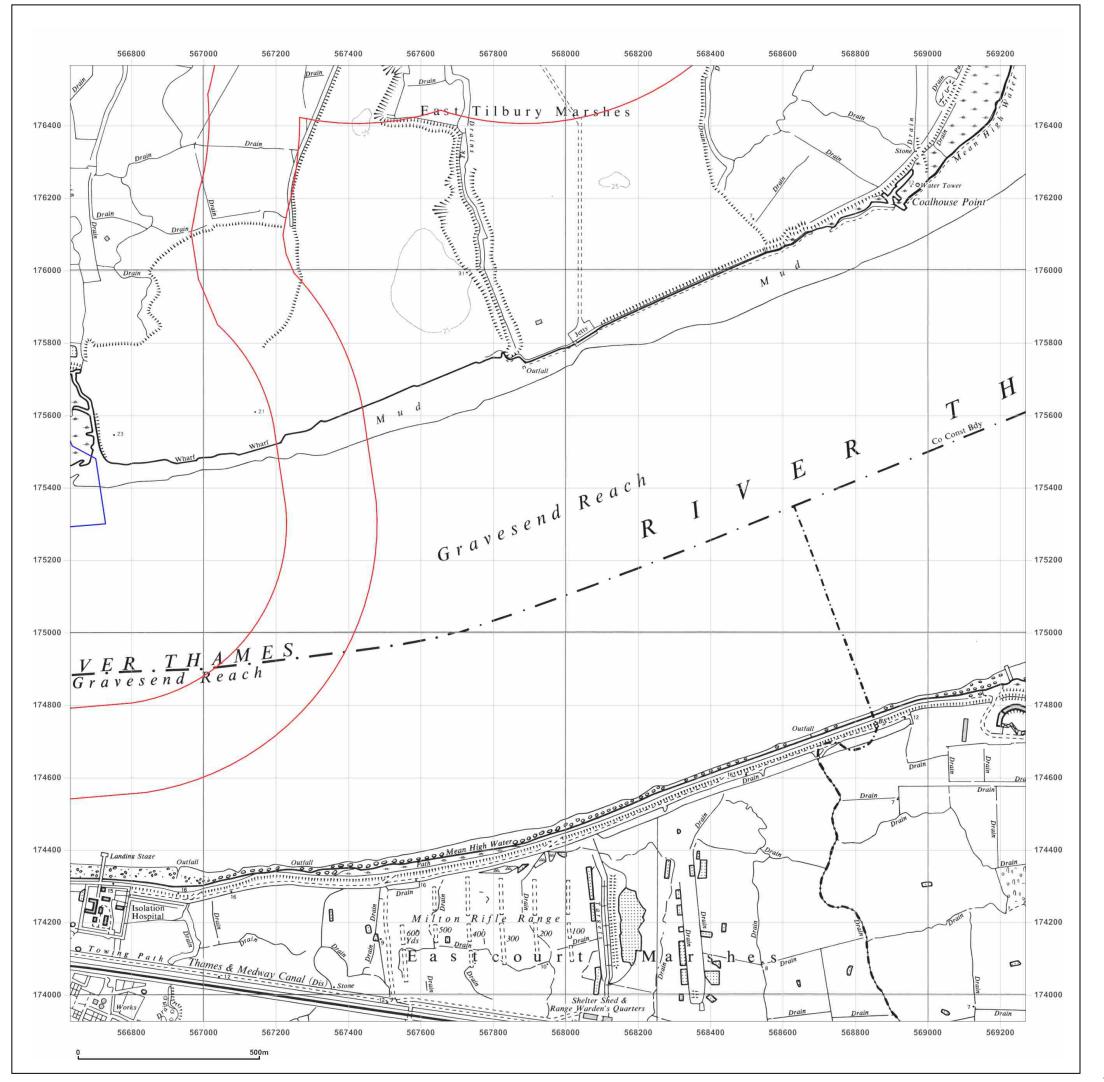




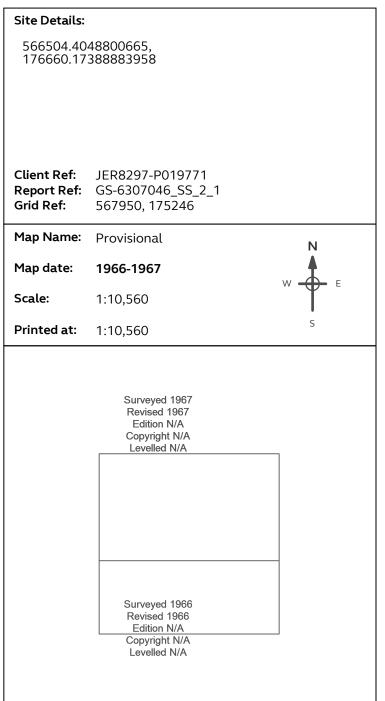
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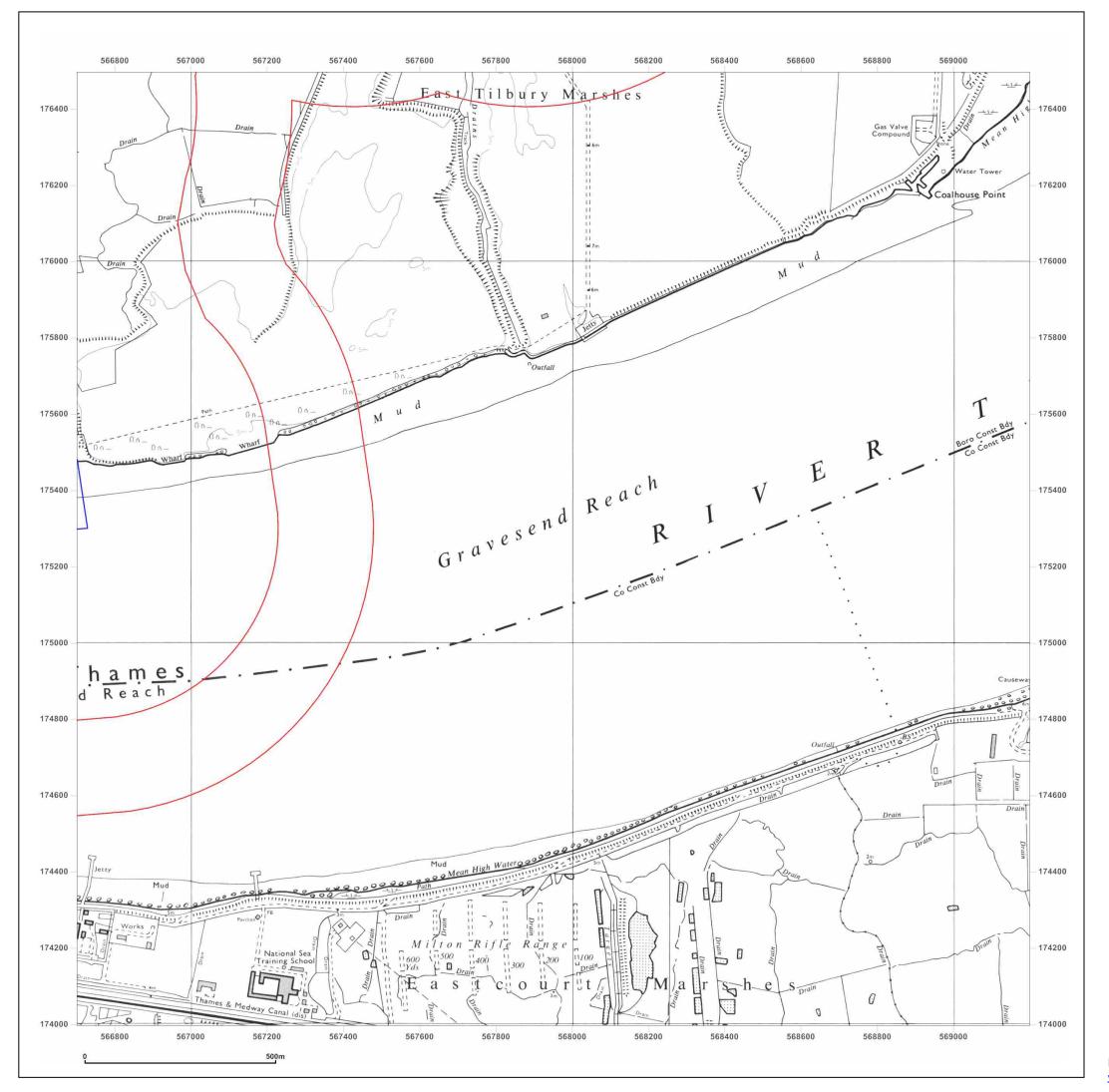




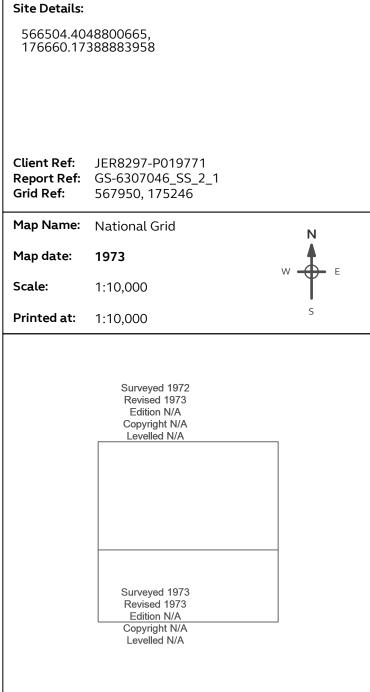
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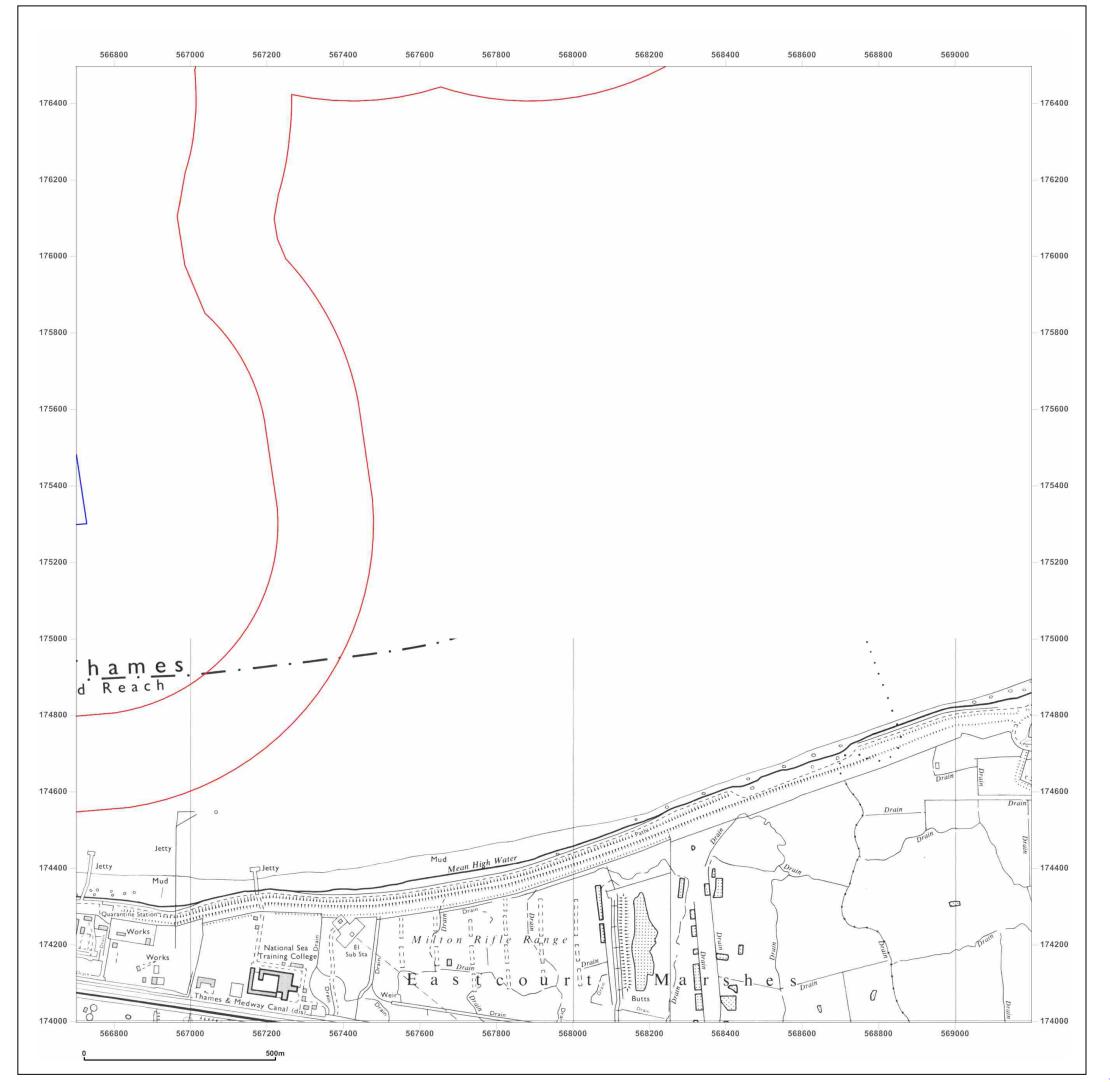




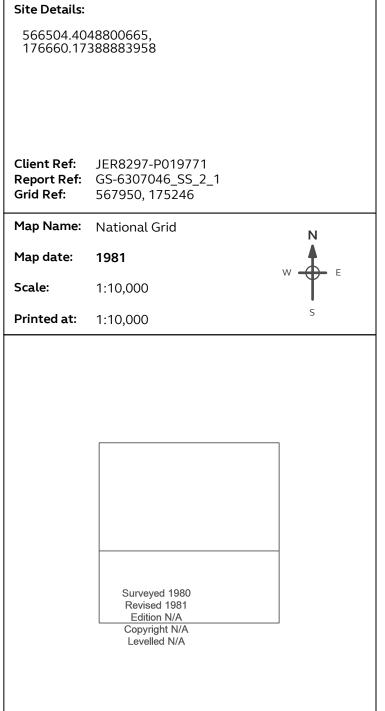
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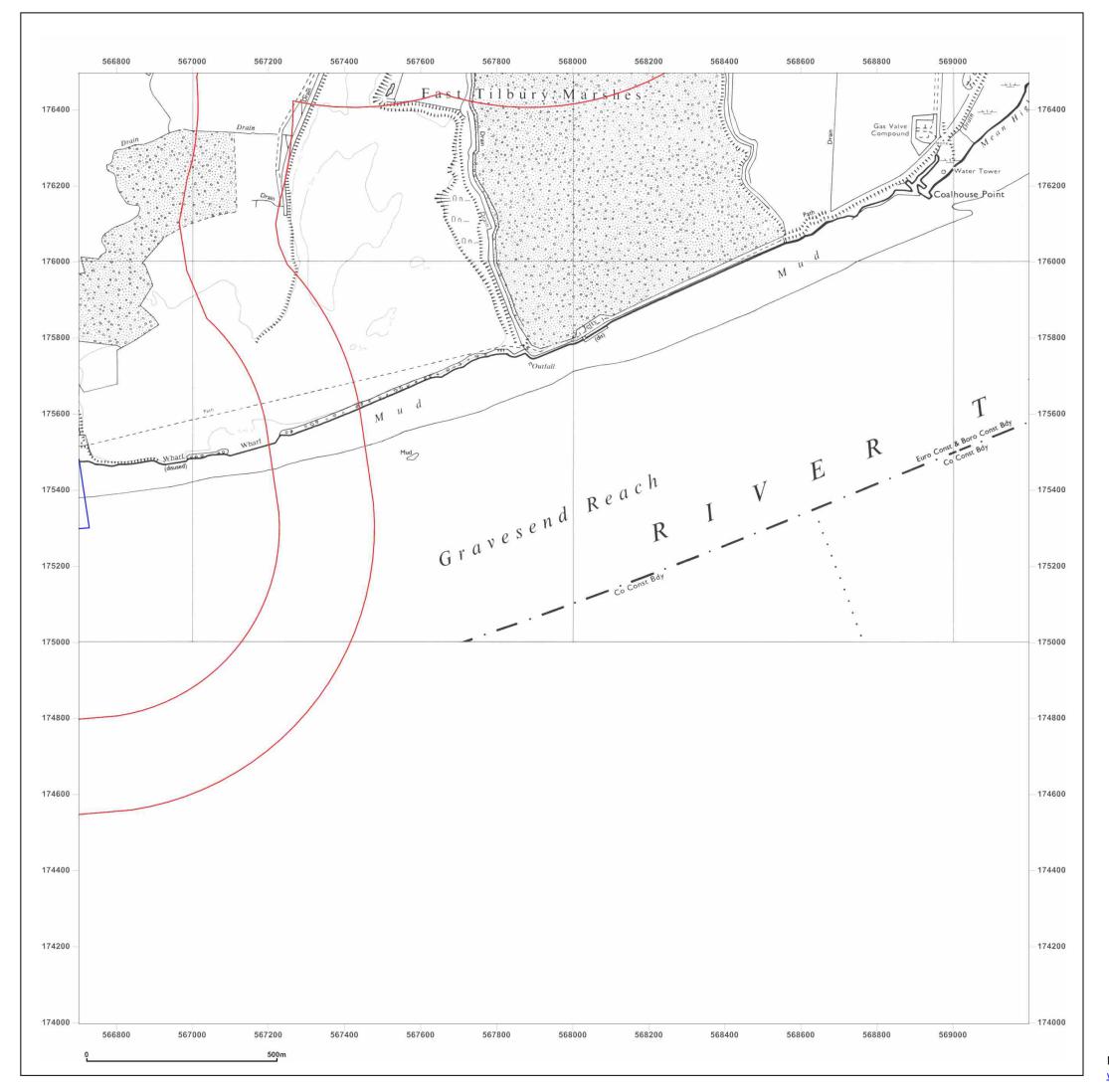




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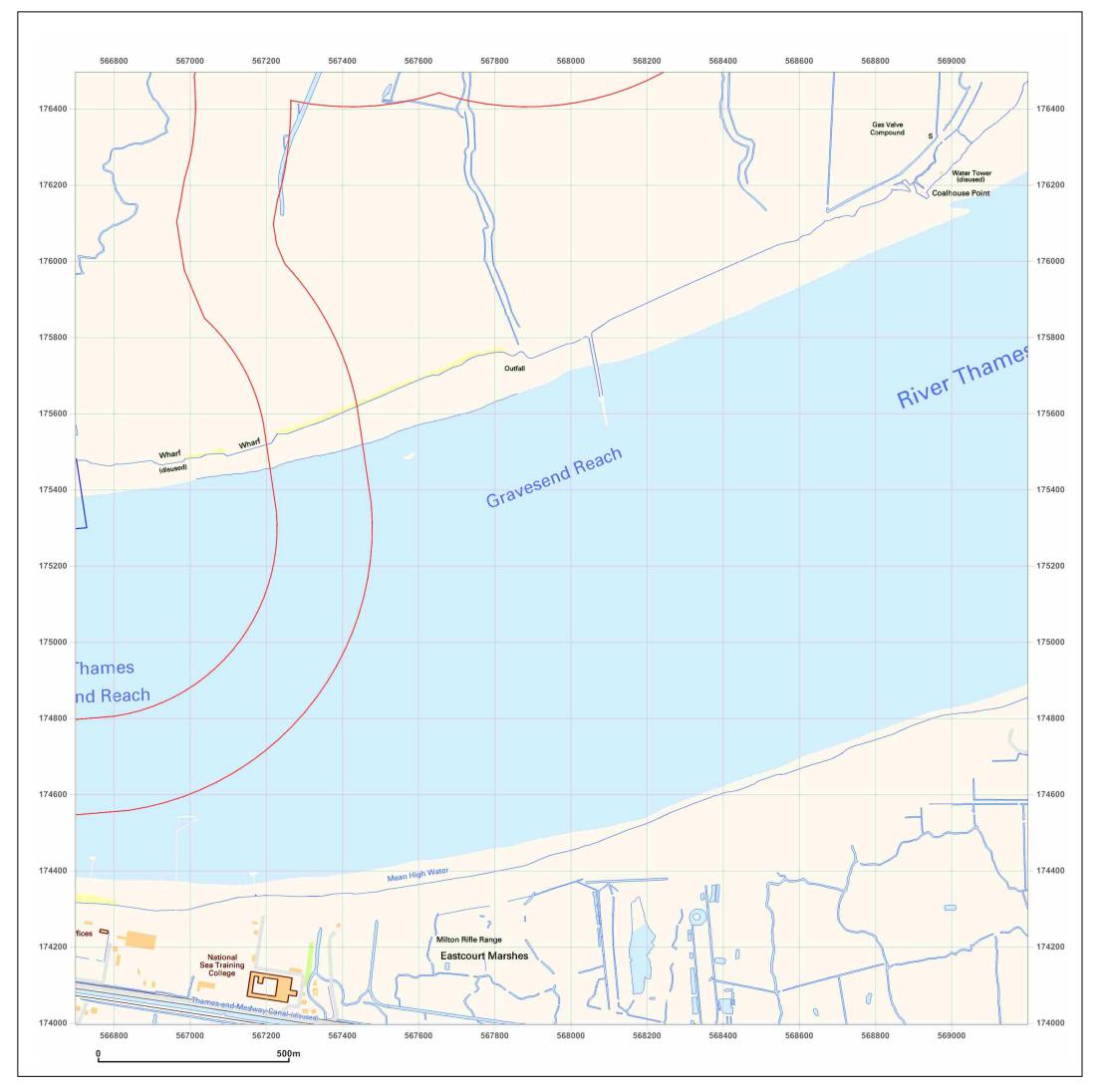
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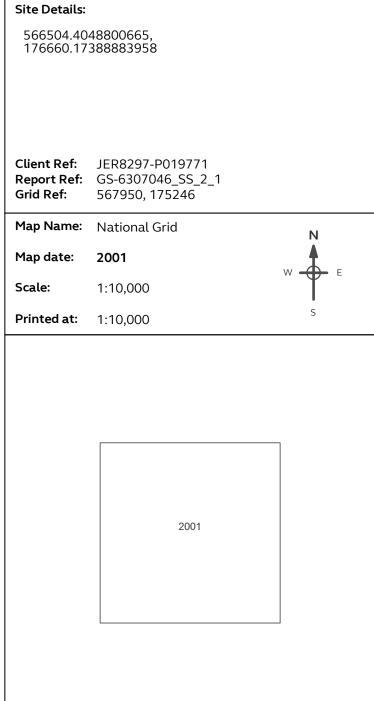
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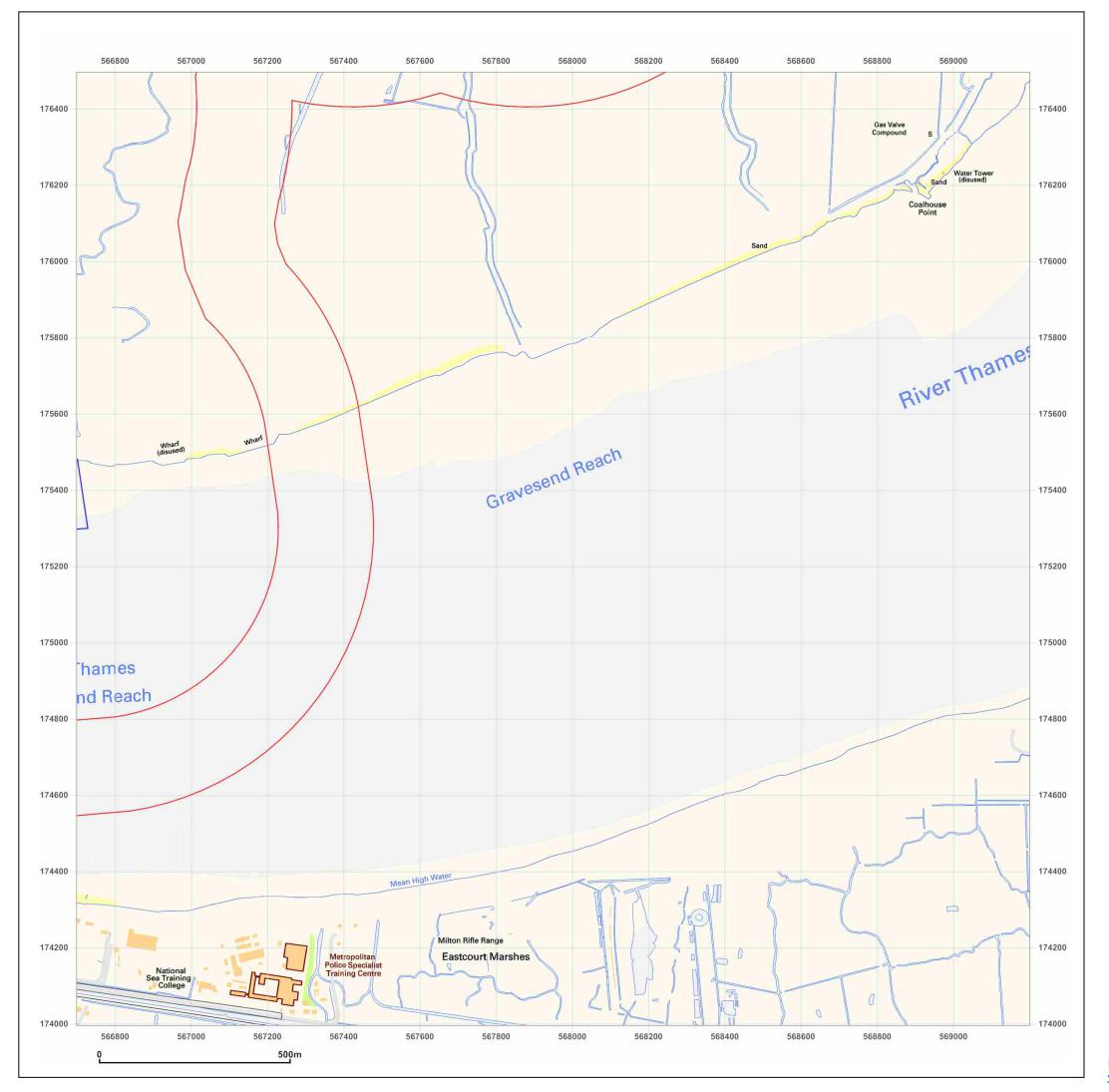




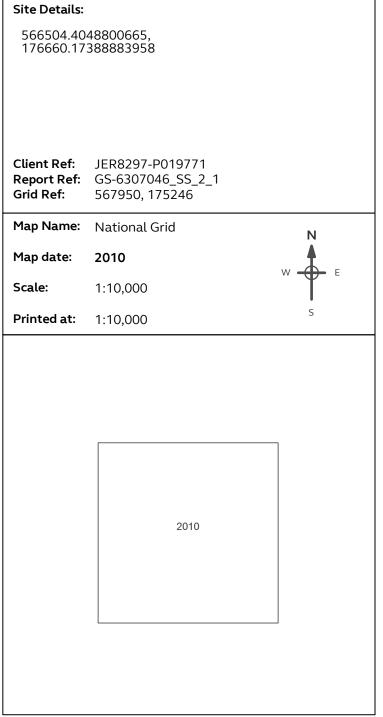
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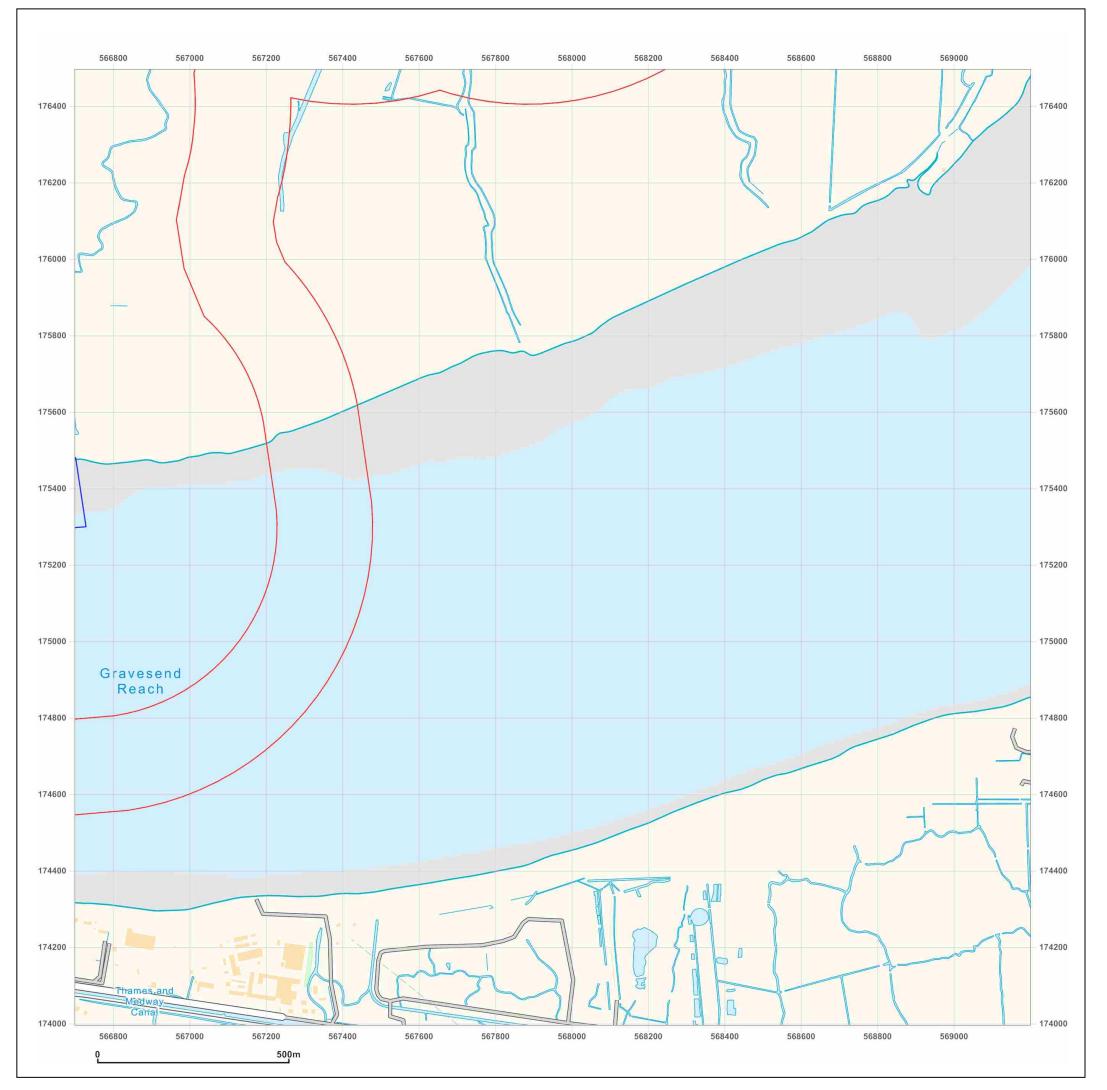




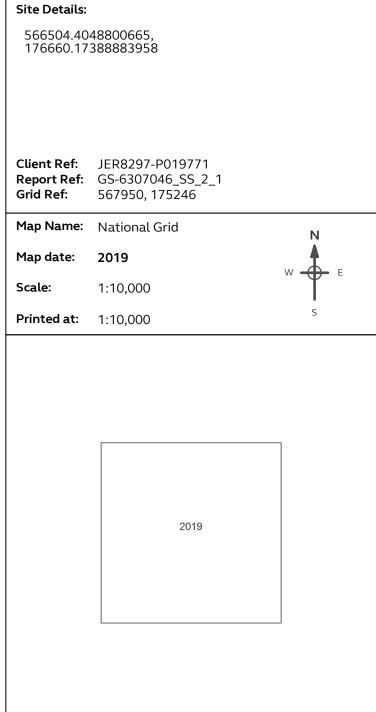
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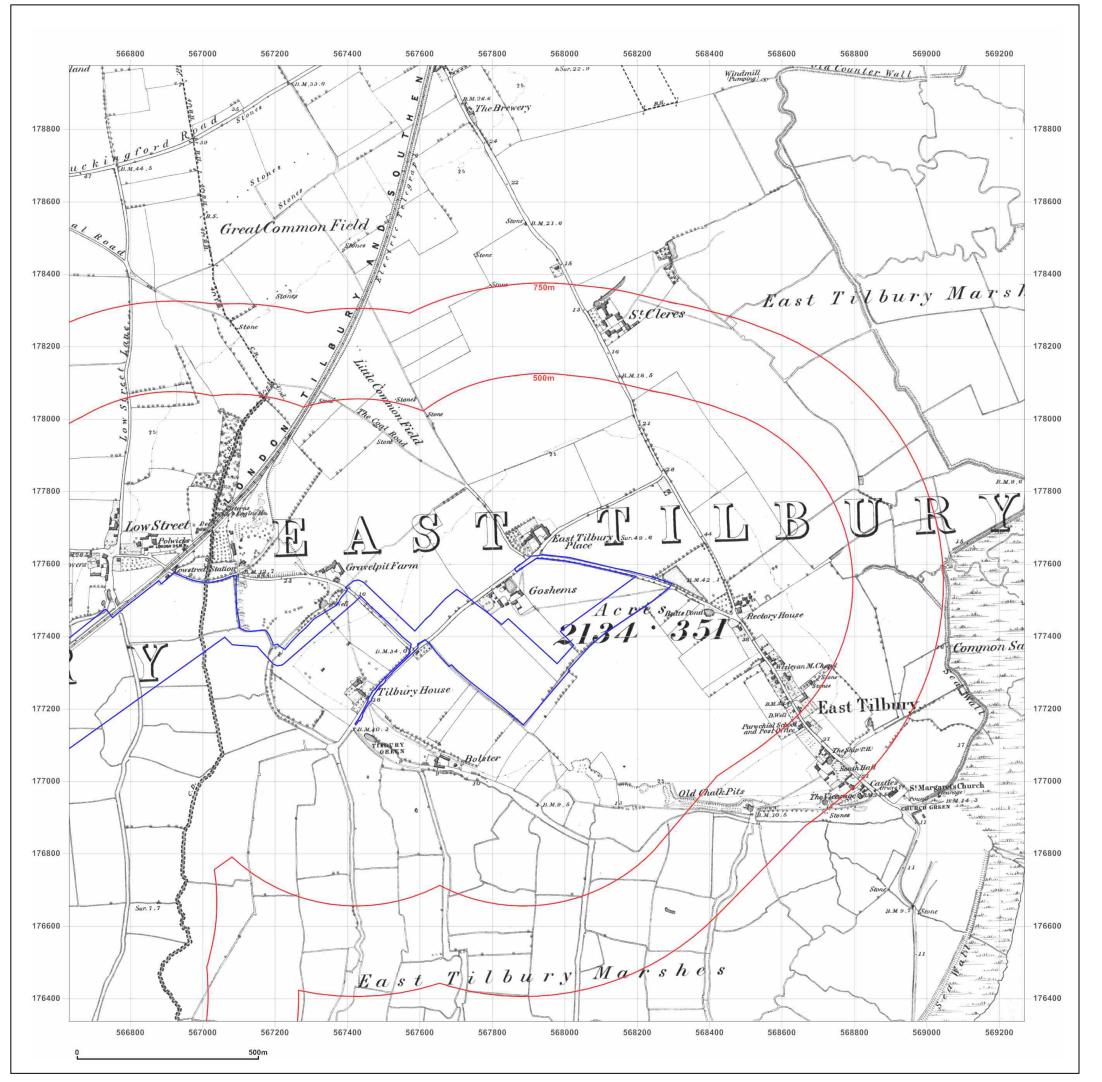




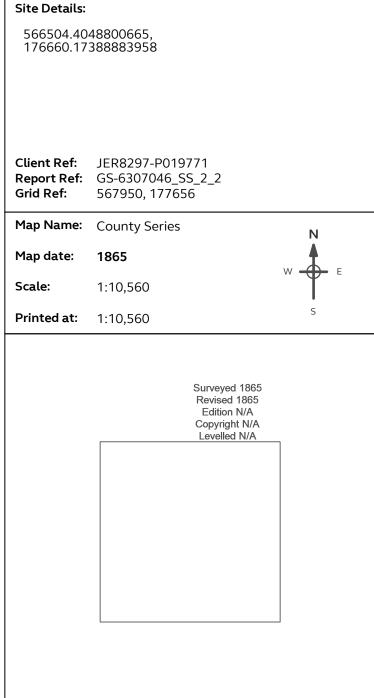
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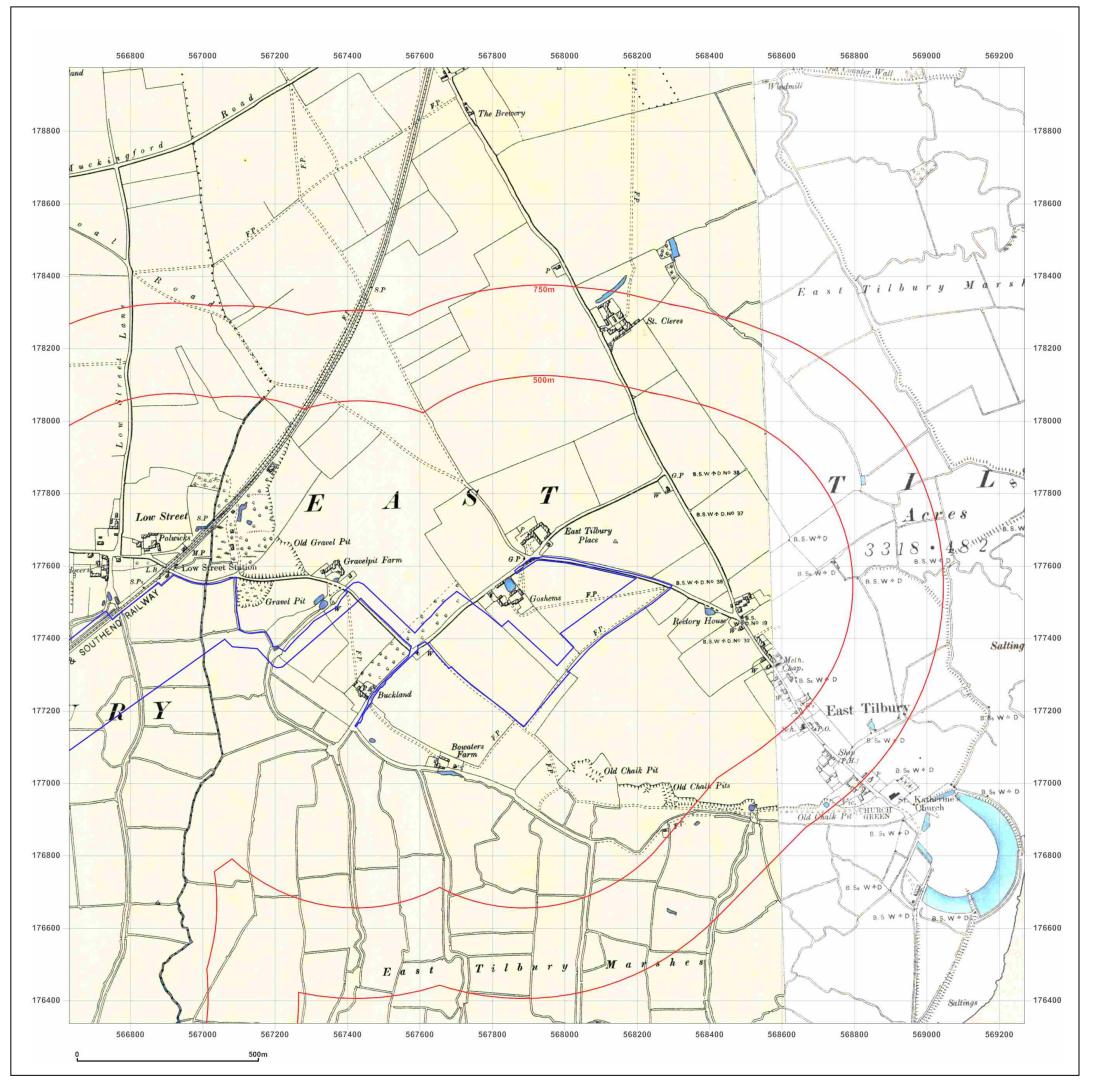




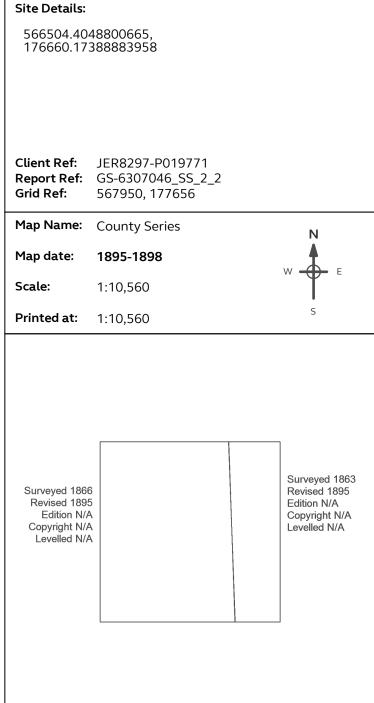
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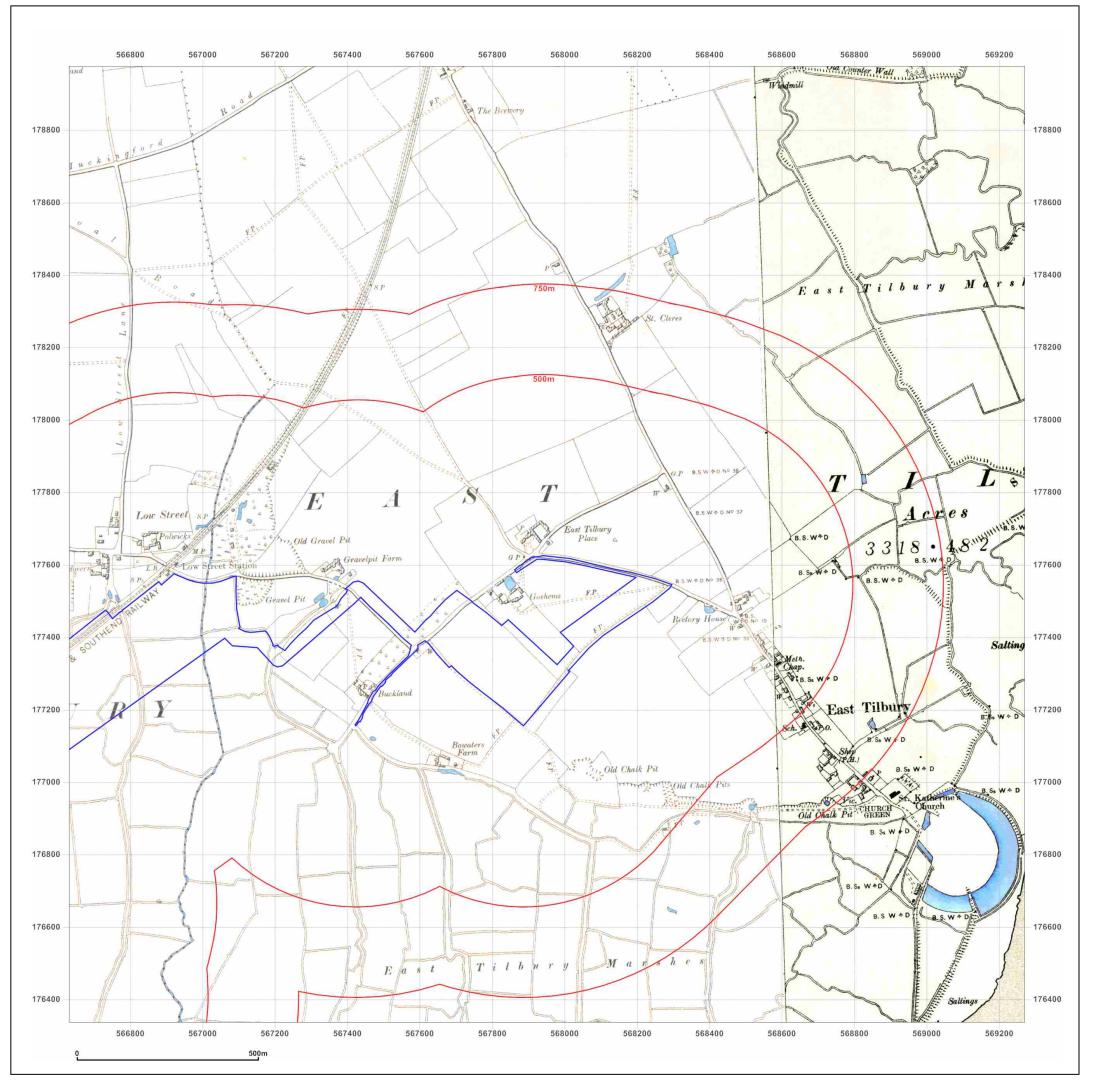




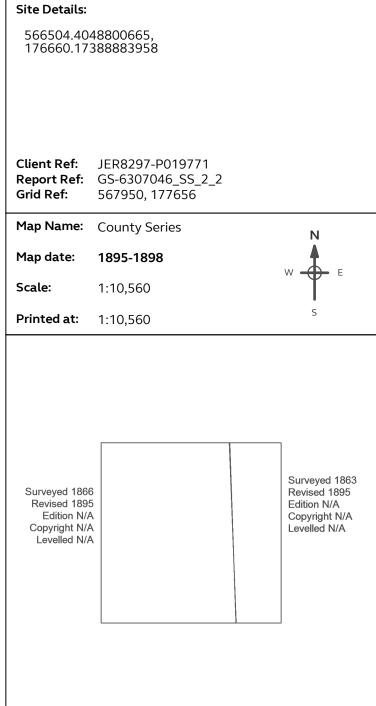
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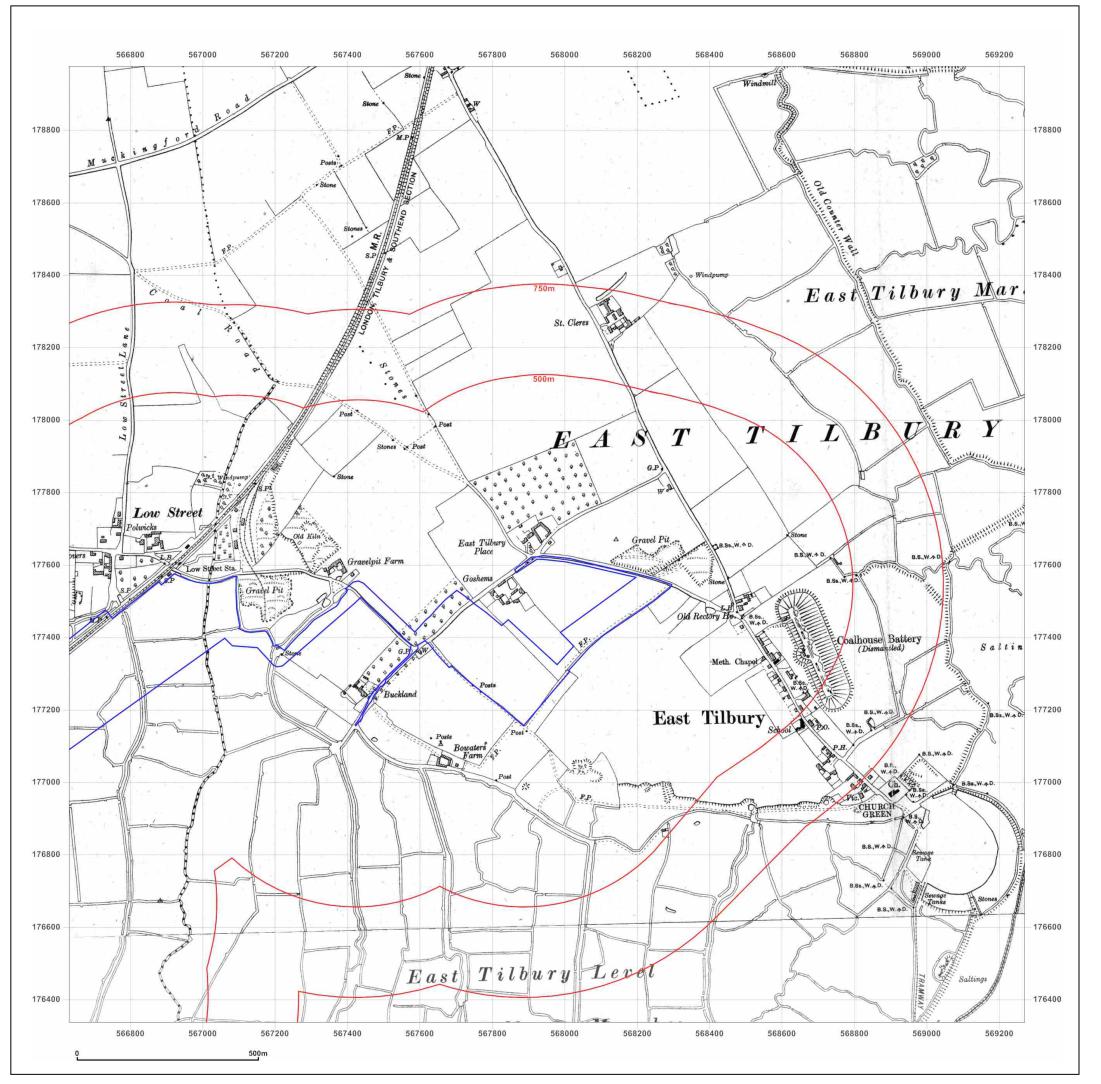




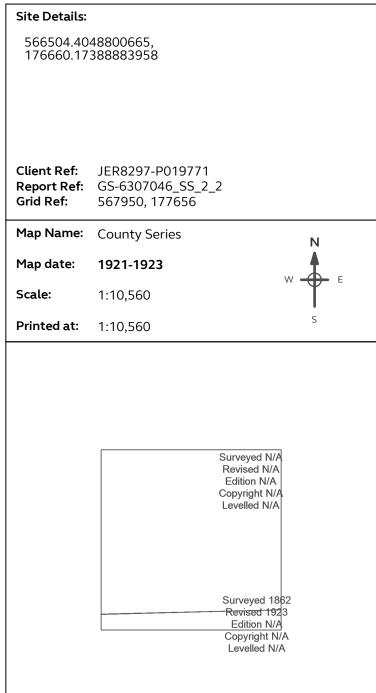
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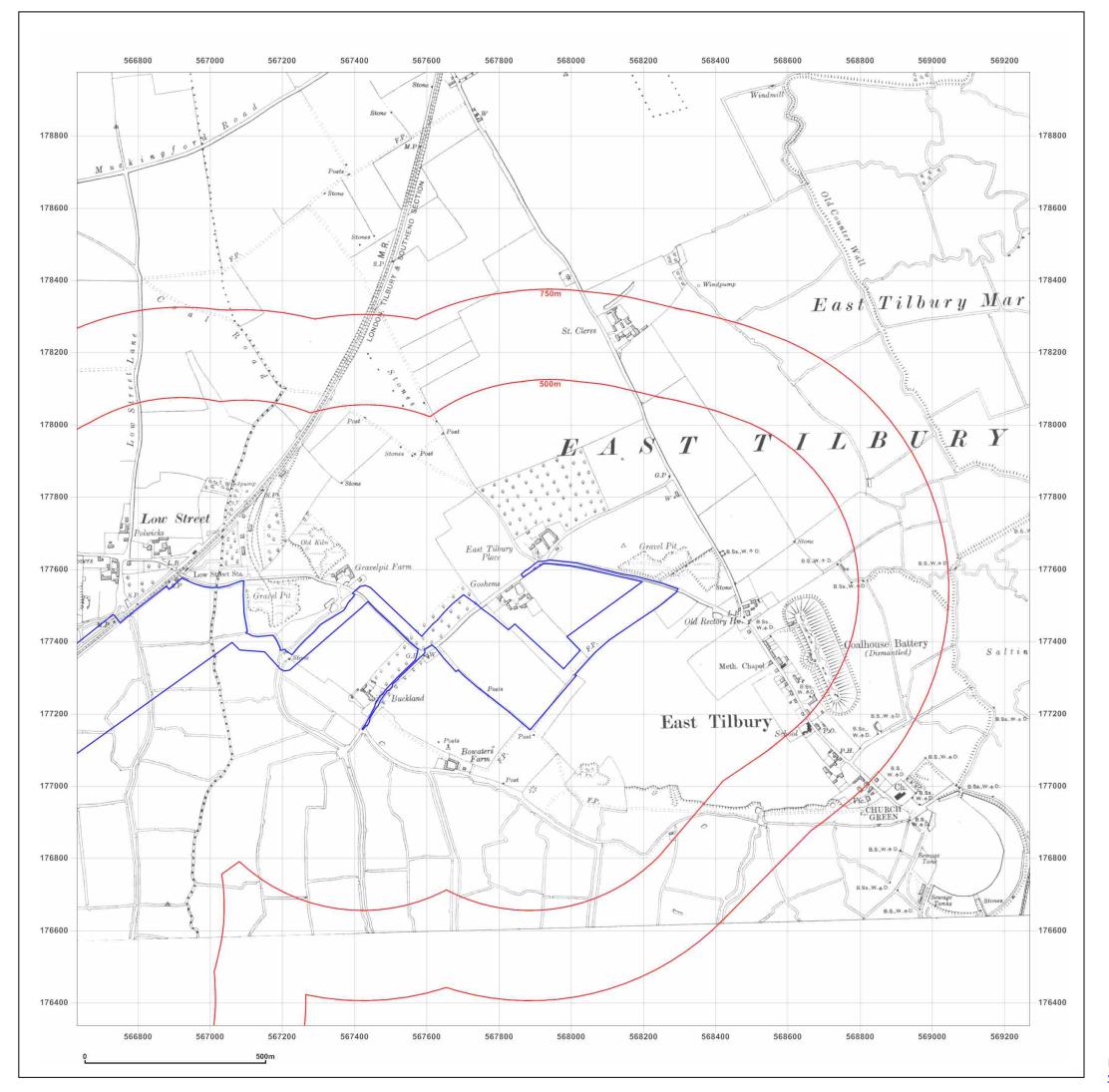




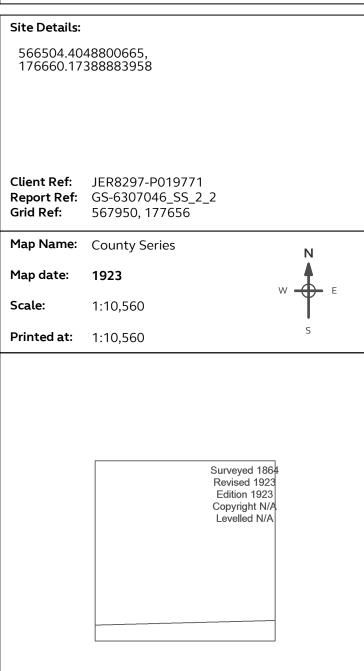
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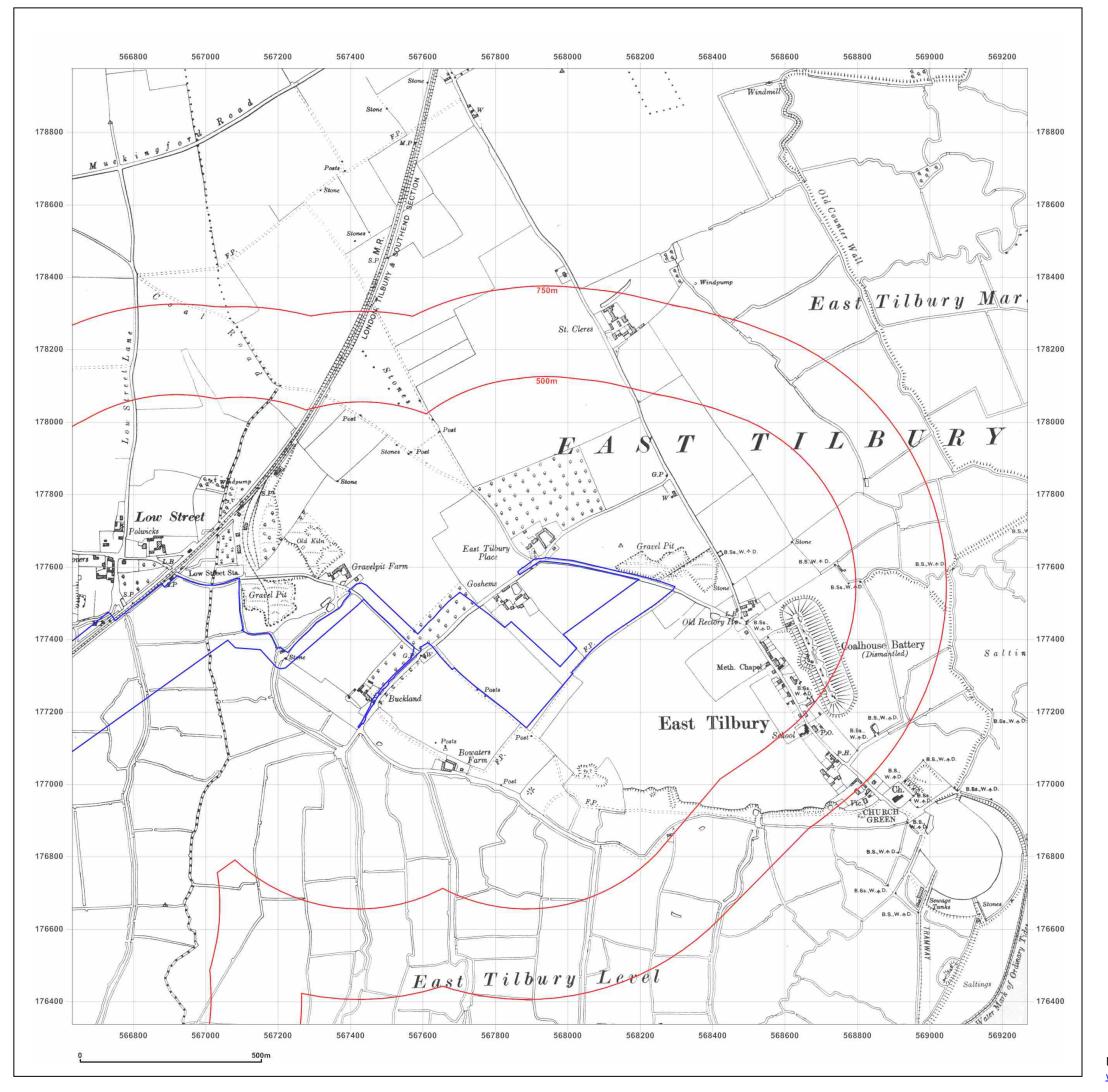




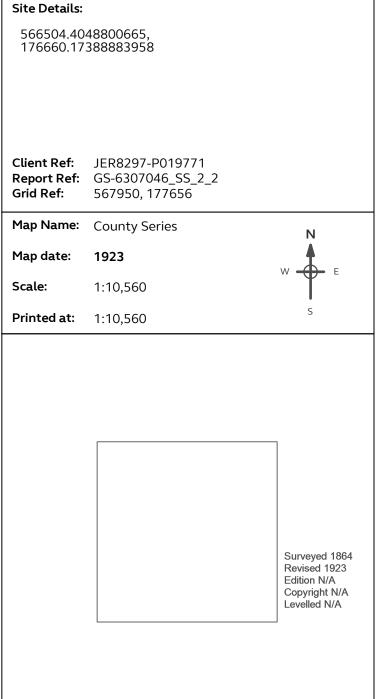
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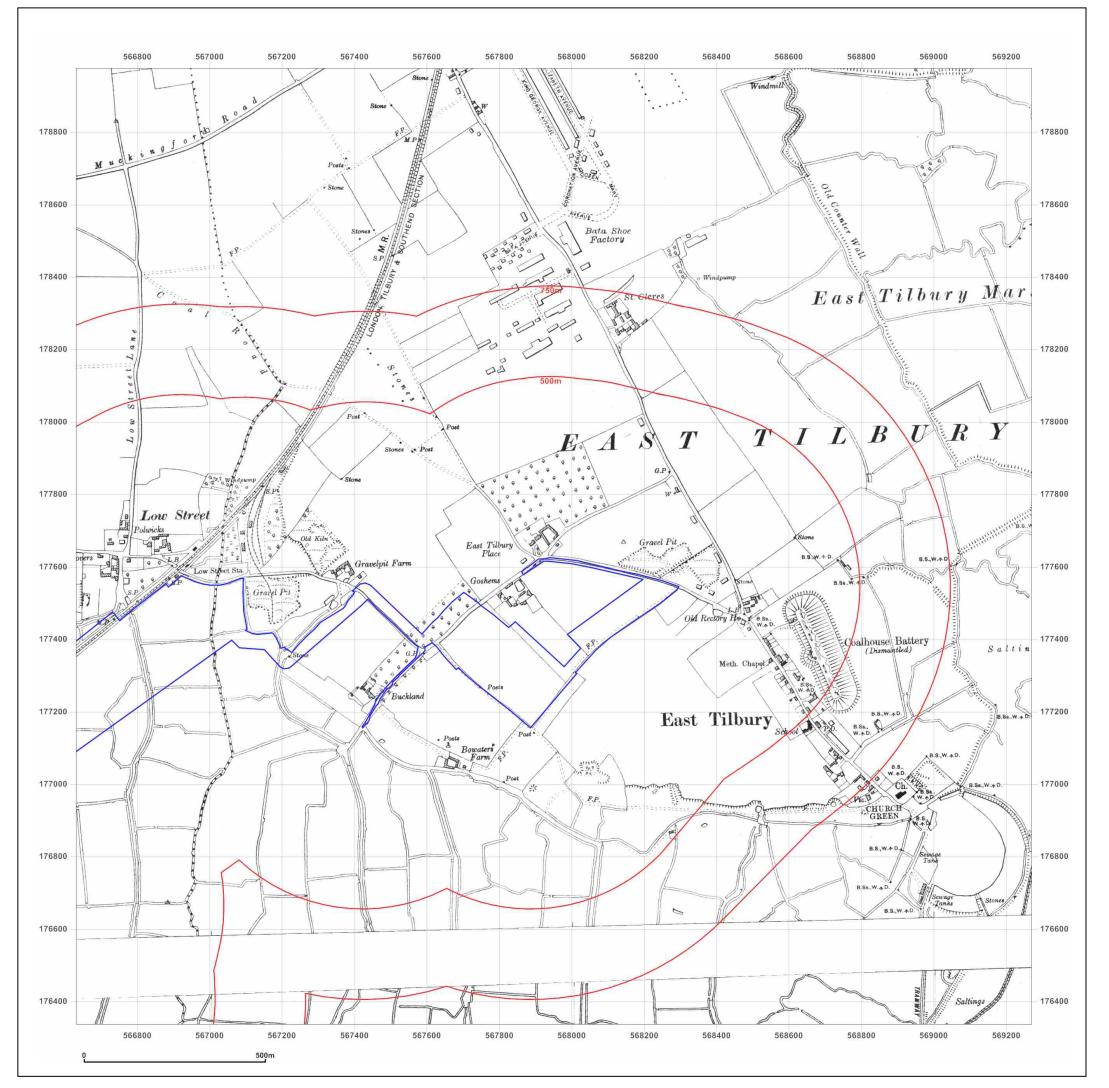




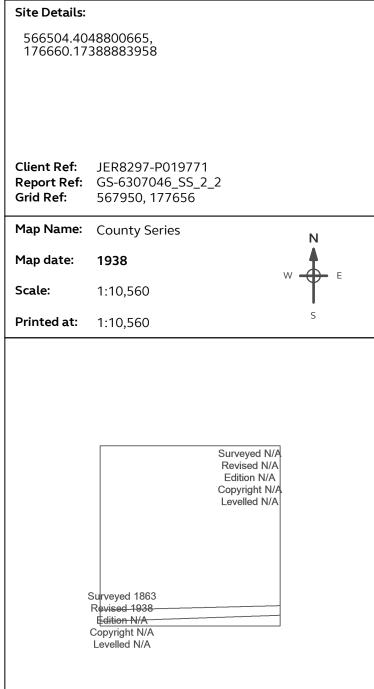
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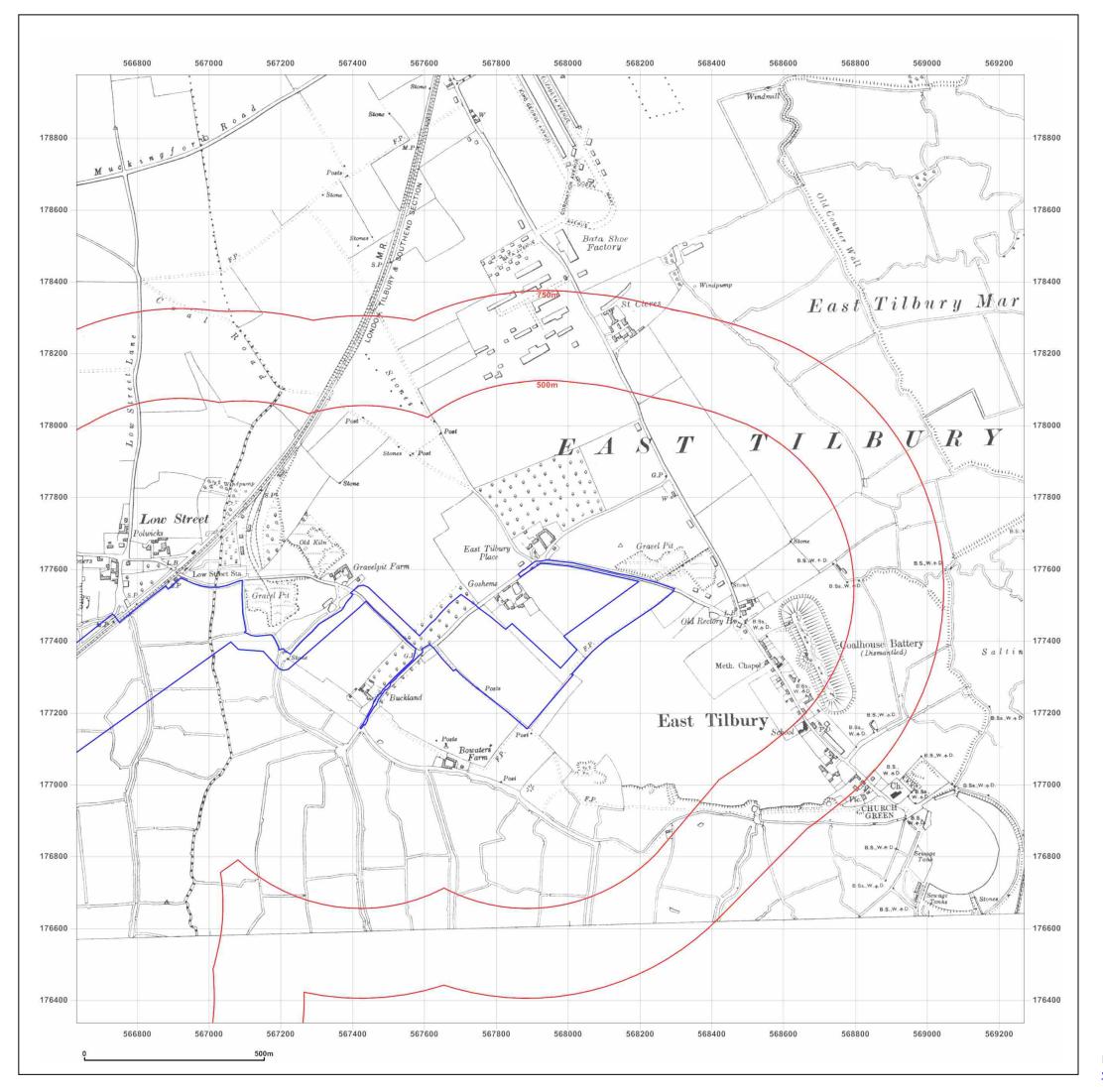




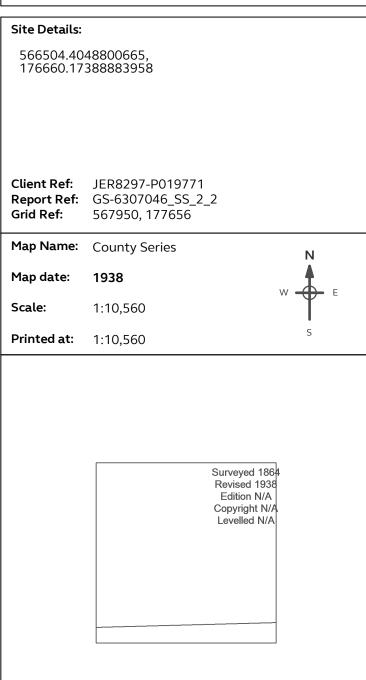
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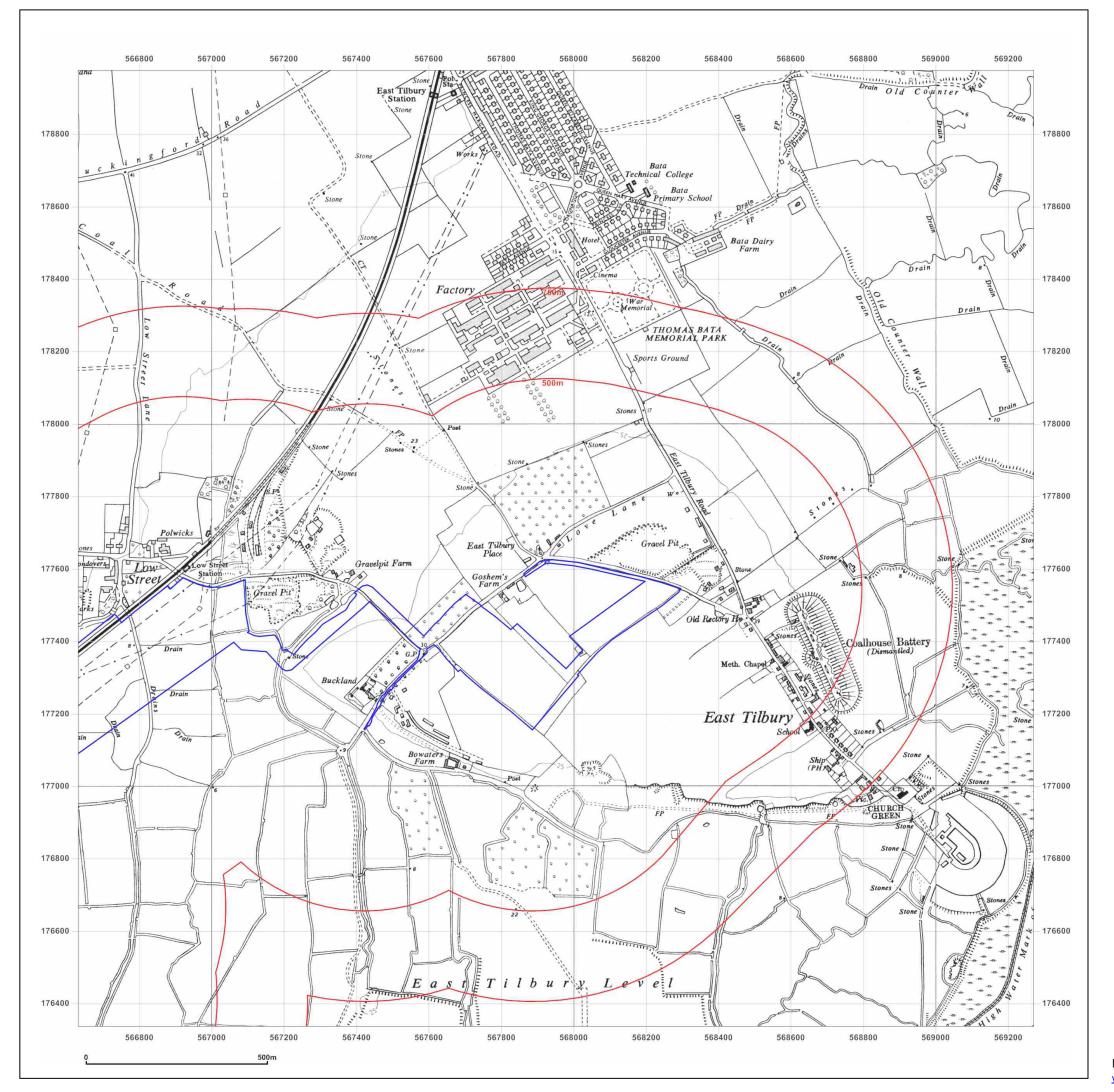




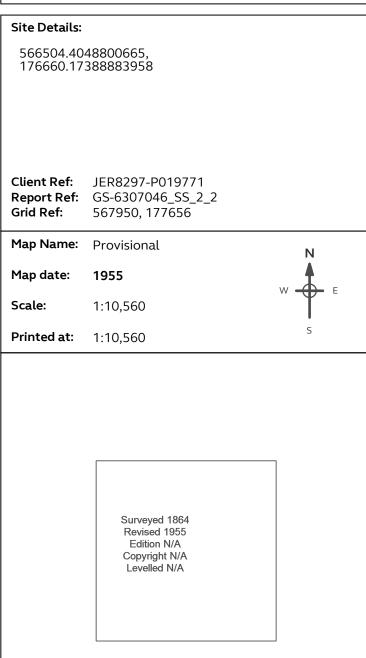
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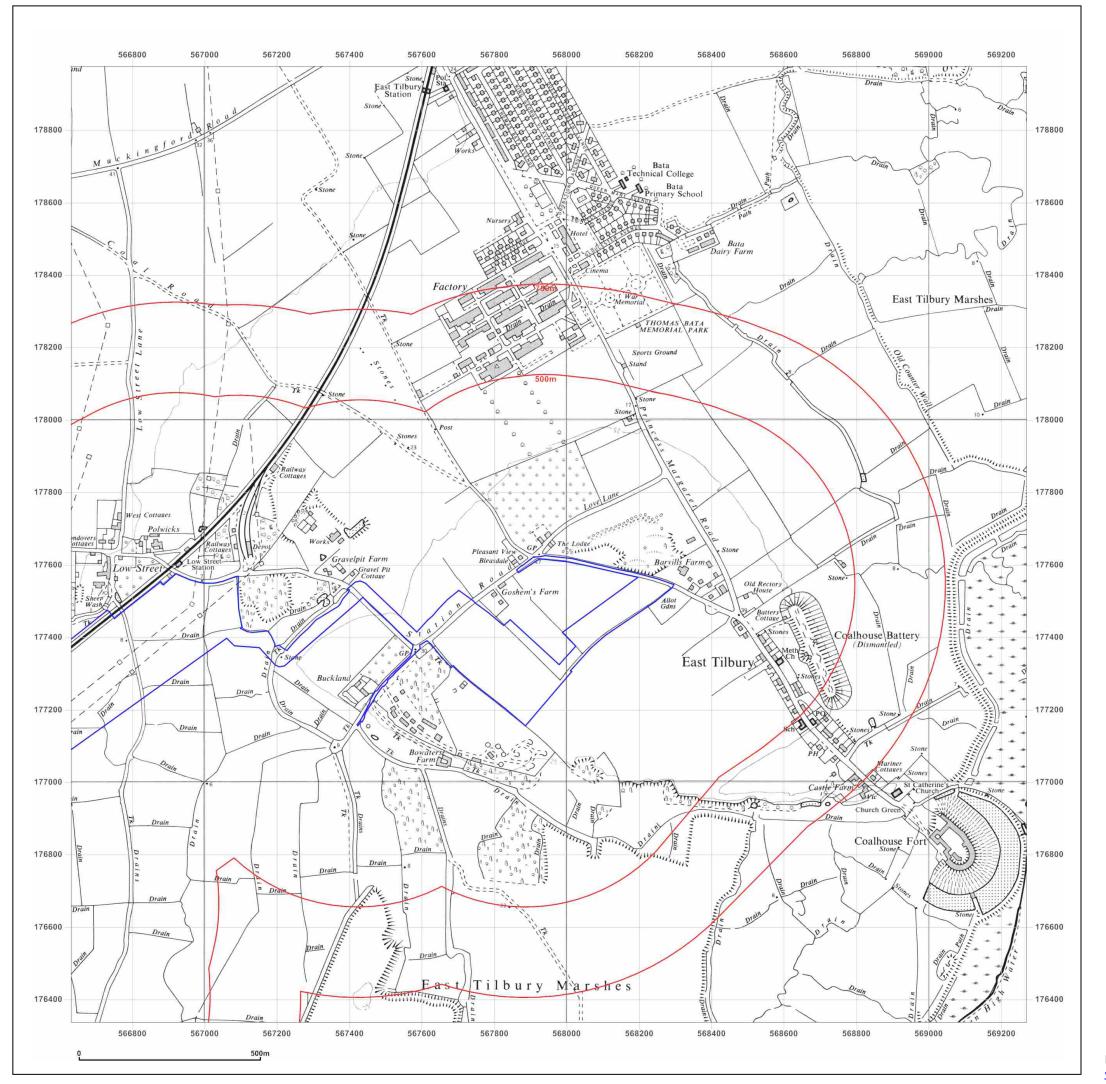




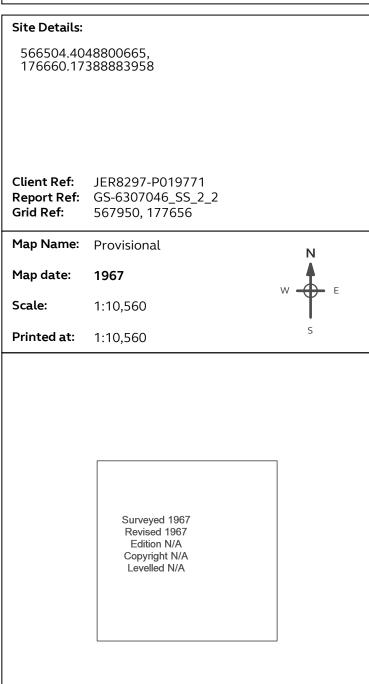
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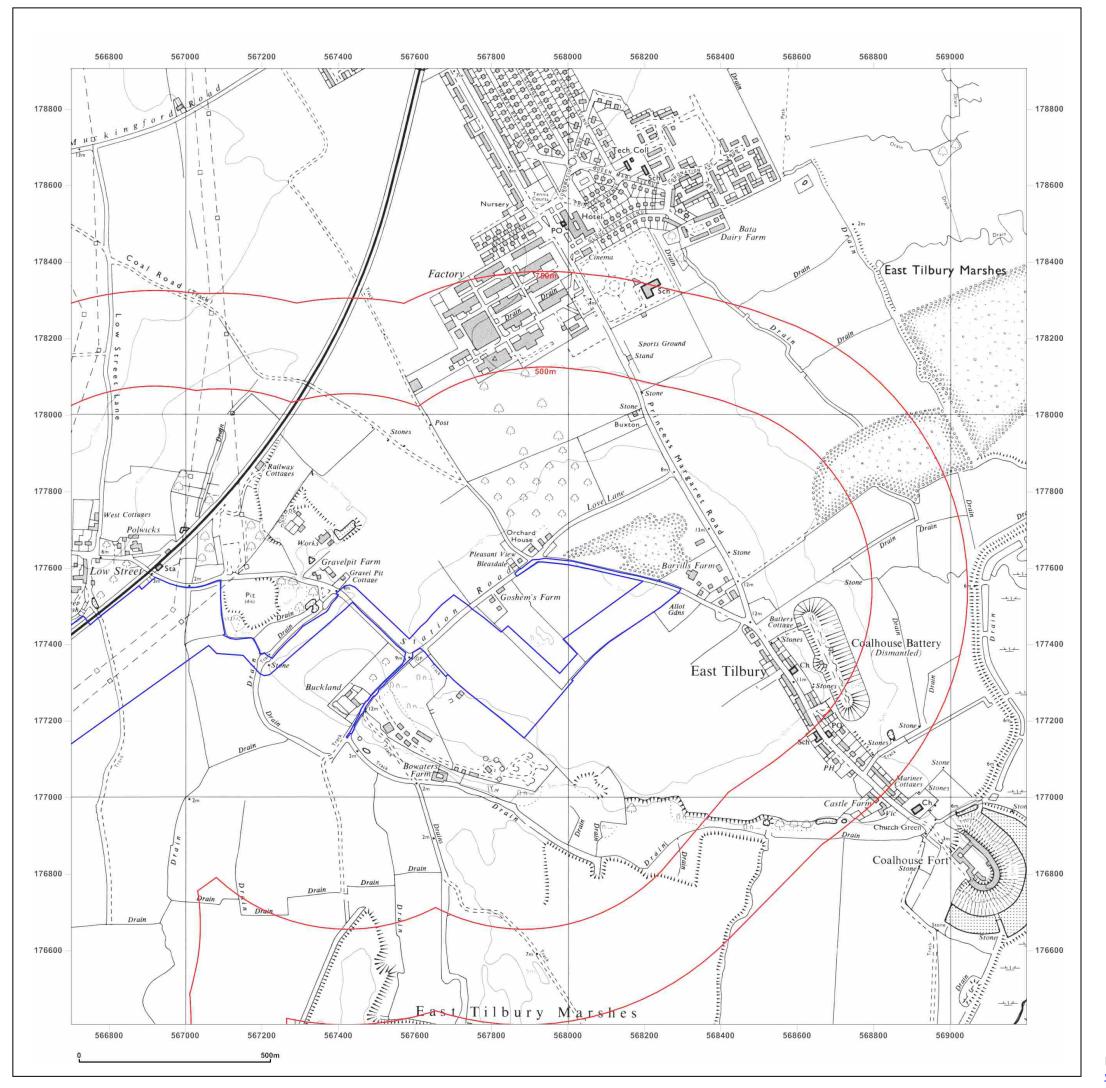




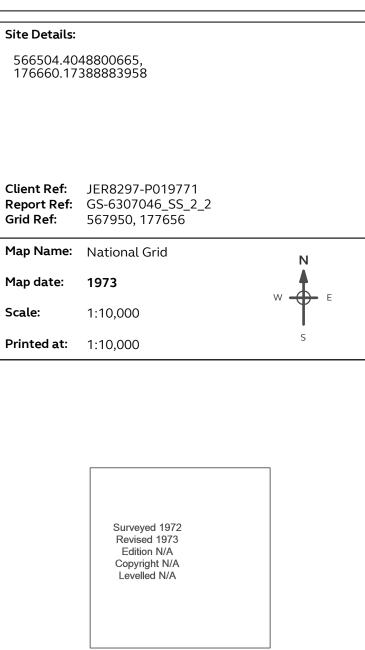
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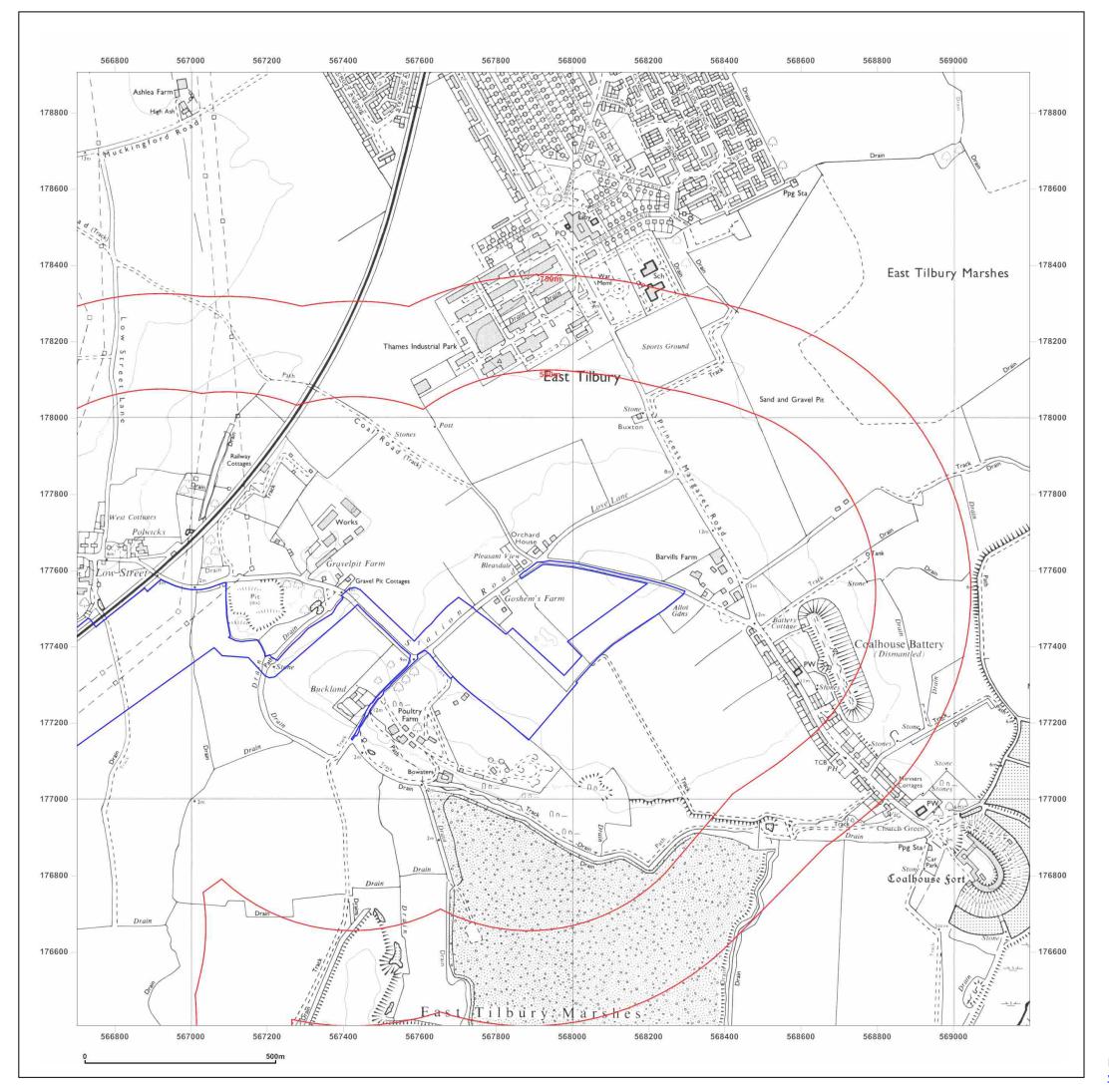




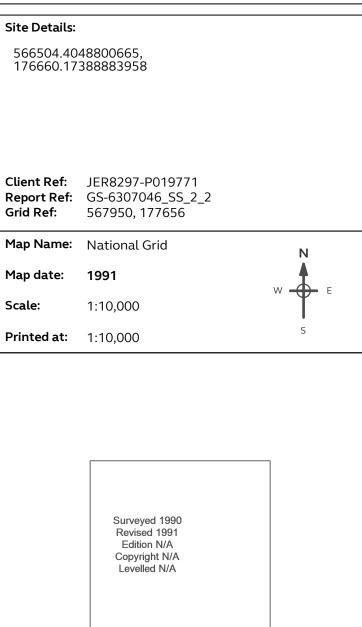
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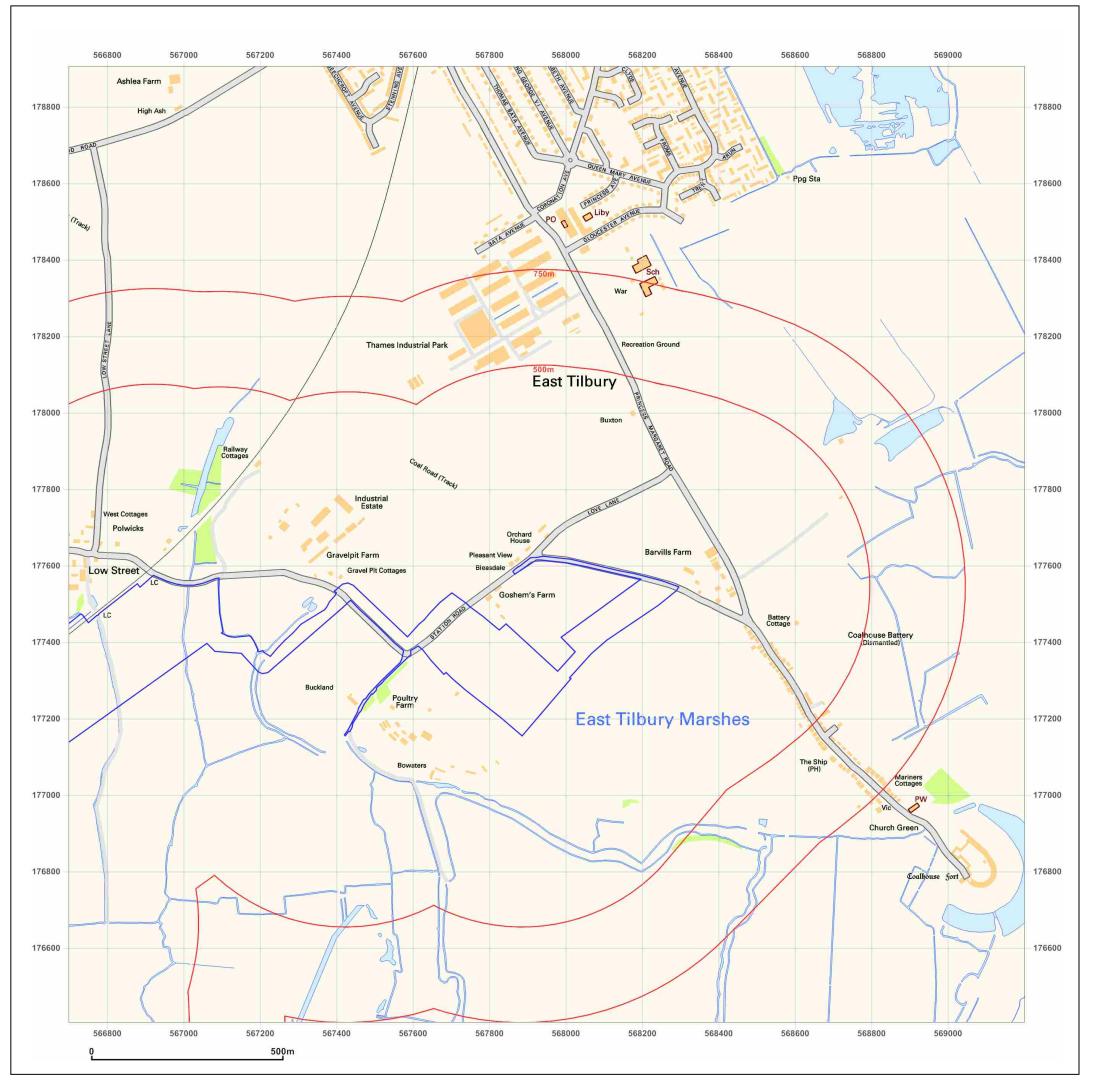




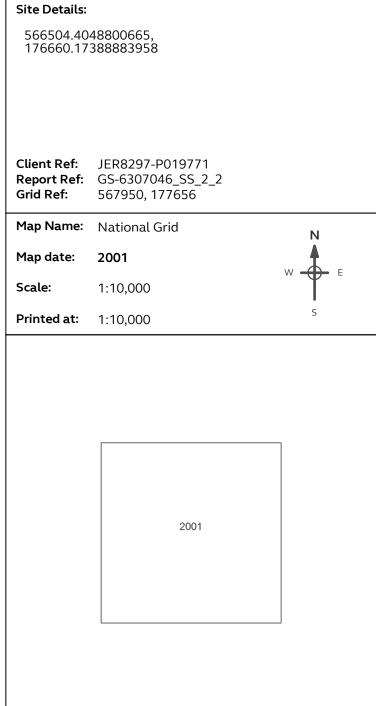
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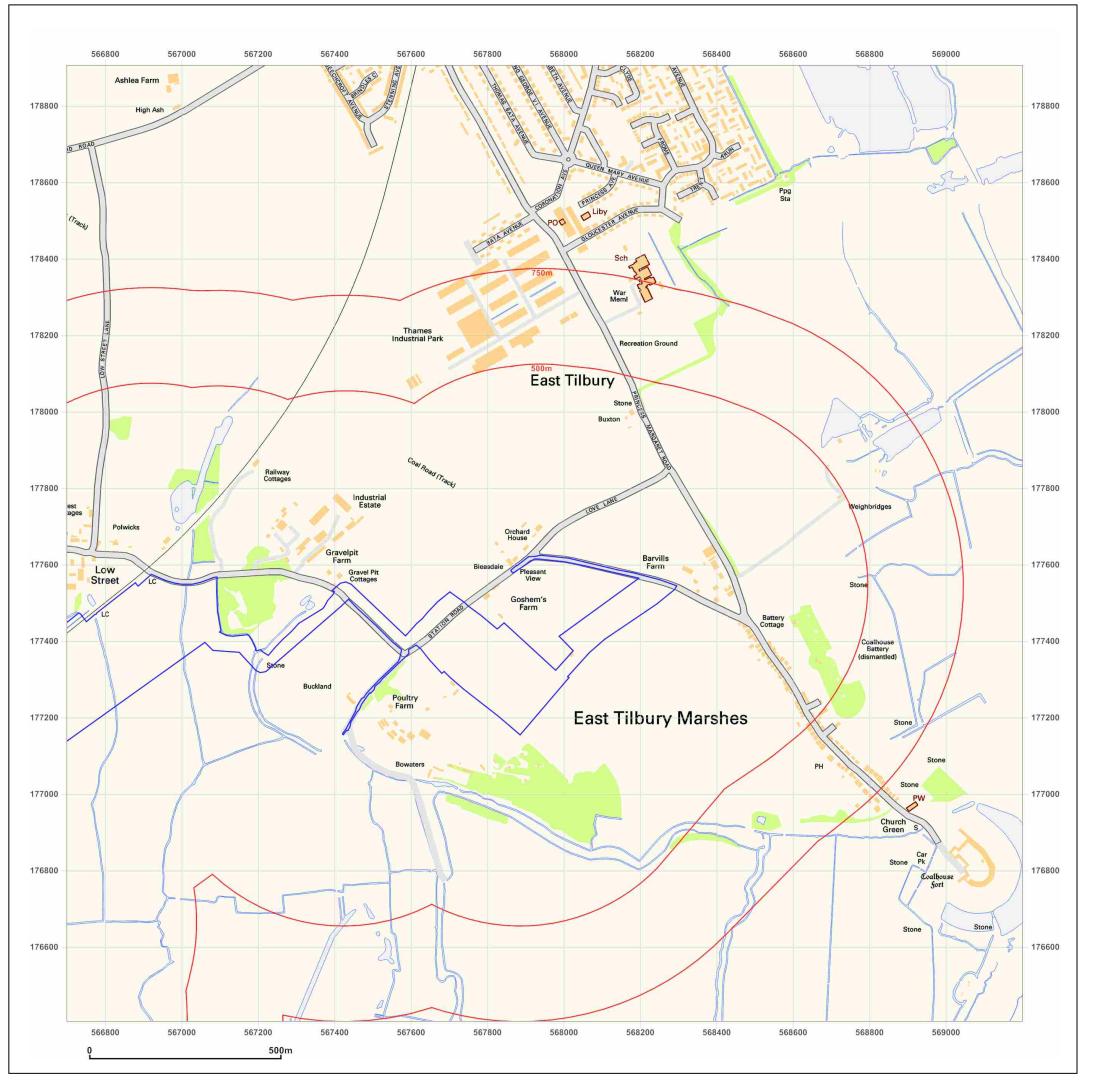




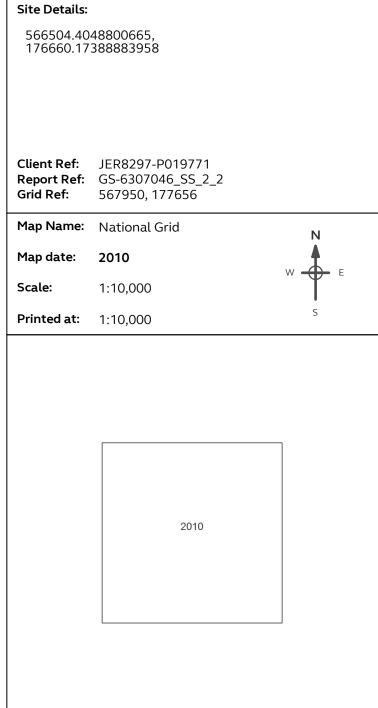
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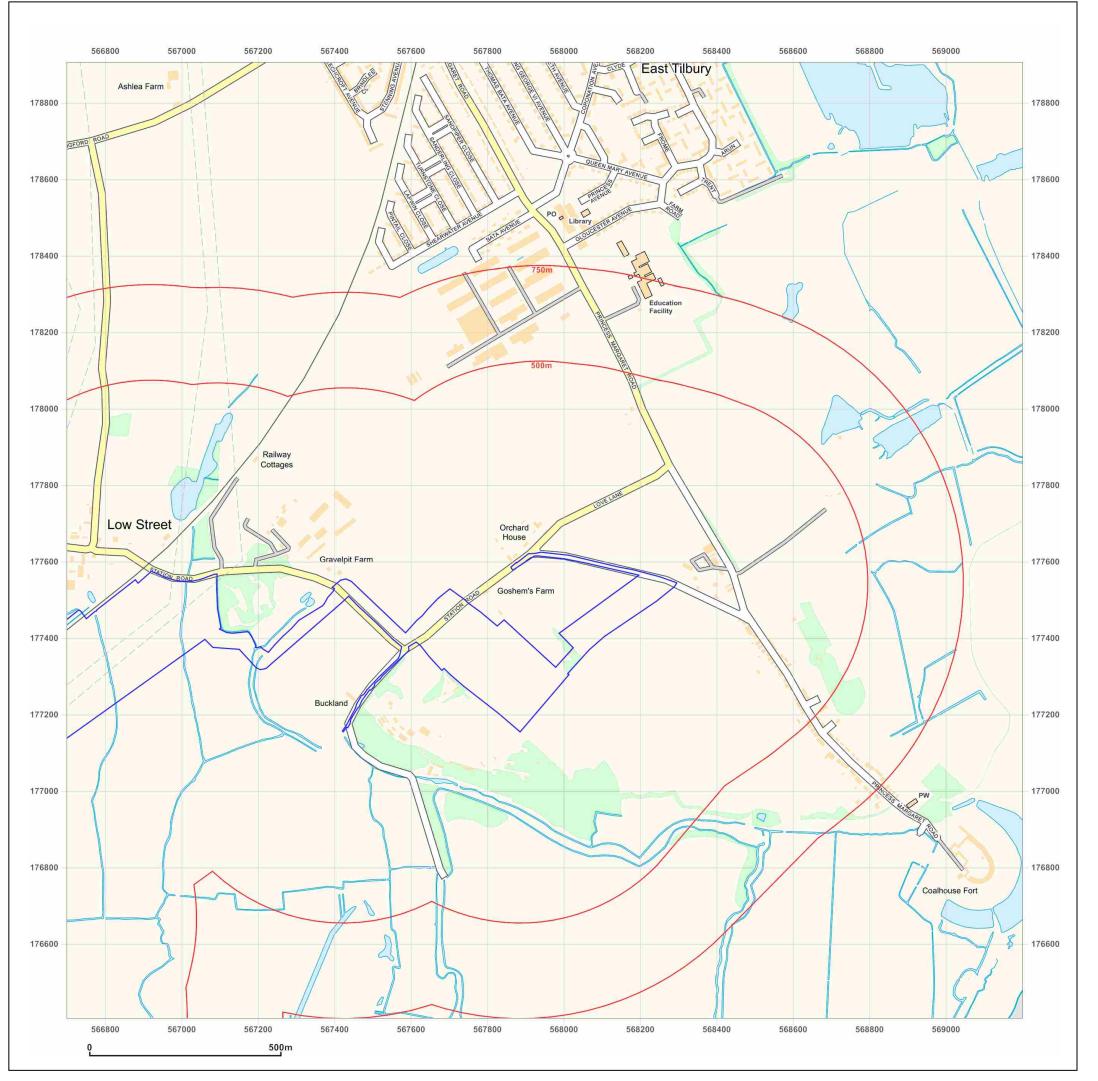




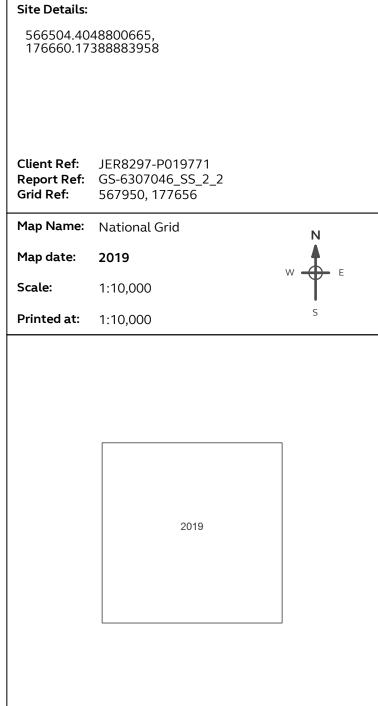
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