

Preliminary Geo-Environmental Risk Assessment

Westgate, Dartford

Presented to **Muse Development Ltd**

Issued: March 2020

Delta-Simons Project No. 18-0704.01



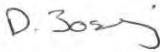
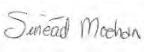

Delta-Simons Environmental Consultants Limited
Head Office: 3 Henley Office Park, Doddington Road, Lincoln, LN6 3QR
Tel: 01522 882555 | www.deltasimons.com



Report Details

Client	Muse Developments Ltd
Report Title	Preliminary Geo-Environmental Risk Assessment
Site Address	Westgate, Dartford, DA1 2DF
Project No.	18-0704.01
Delta-Simons Contact	Simon Brown (simon.brown@deltasimons.com)

Quality Assurance

Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
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				David Josling Principal	Sinéad Meehan Principal	Simon Brown Executive Director

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Executive Summary

Brief	Delta-Simons Environmental Consultants Limited (“Delta-Simons”) was instructed by TPS on behalf of Muse Developments Ltd (the “Client”) to prepare a Preliminary Geo-Environmental Risk Assessment for land known as Westgate, Dartford, DA1 2DF (the “Site”).
Site Use & Surrounding Area	The Site currently comprises an irregularly shaped plot of land comprising a carpark, Orchard Street and a presently undeveloped area of crushed fill/Made Ground. The Site is located within Dartford’s central business district.
Environmental Setting	<p>A limited thickness of Made Ground across the Site is anticipated to be underlain by a sequence of Alluvium and Thames River Terrace Gravel superficial deposits overlying bedrock classified as the Lewes Nodular Chalk Formation.</p> <p>The superficial deposits are classified as Secondary Aquifers (A/Undifferentiated), and the bedrock as a Principal Aquifer. The Site is located within a designated groundwater Source Protection Zone (SPZ) Inner Zone (Zone 1).</p> <p>The nearest major surface water feature is the River Darent approximately 265 m to the east.</p>
Contamination Potential Sources	Limited potential sources of contamination have been identified associated with historical industrial activity (including a brewery), electrical substations on-Site and Made Ground deposits related to historical demolition works. Off-Site industrial activity has also been identified as a potential source of contamination.
Development Considerations	<p>Widespread contamination is considered unlikely and the preliminary risk assessment has identified a Low to Moderate risk of soil/groundwater contamination and hazardous ground gas at the Site. Asbestos may be present within the Made Ground.</p> <p>Potentially significant geohazards at the Site relate to ground instability due to dissolution features in the underlying chalk and potential for weak compressible deposits (Made Ground and Alluvium).</p>
Recommendations	<p>It is recommended that an intrusive ground investigation is undertaken to assess the potential for contamination and ground gases to impact on the proposed development, and to determine the geotechnical conditions across the Site, allowing the Site-specific ground and groundwater model to be refined and enable an assessment of foundation and engineering solutions to be made. Further desk-based assessment of the potential for ground instability associated with dissolution features in the chalk bedrock should be undertaken.</p> <p>Furthermore, it is recommended that a Remediation and Verification Plan is produced in advance of the building phase of works to set out procedures to be followed during the development works in the context of contaminated land; and</p> <p>A Site Verification Report should be produced on completion of the redevelopment works for full compliance with published planning conditions.</p>
<p>This is intended as a summary only. Further detail and the limitations of the assessment is provided within the main body of the Report.</p>	

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1.0 Introduction

1.1 Appointment

Delta-Simons Environmental Consultants Limited (“Delta-Simons”) was instructed by TPS on behalf of Muse Developments Ltd (the “Client”) to prepare a Preliminary Geo-Environmental Risk Assessment for land known as Westgate, Dartford, DA1 2DF (the “Site”).

A Site location is presented in Figure 1.

1.2 Context & Purpose

The aim of this report is to identify likely environmental and geotechnical issues associated with soil and groundwater conditions that may affect the proposed development of the site.

This report is designed in general accordance with guidance on Land Contamination: Risk Management pages of the [GOV.UK](https://www.gov.uk) web pages, the relevant requirements of the National Planning Policy Framework 2019 (NPPF) (paragraphs 170 & 178-180)¹ and the Planning Practice Guidance (Land Affected by Contamination)².

This Preliminary Geo-Environmental Risk Assessment is to support a planning submission for the redevelopment of the Site. It is understood that the development will comprise the demolition of existing structures to make way for the construction of a mixed use commercial (A1, A2, A3, A4, D1, D2 and B1), cinema (D2), hotel (C1), residential (C3) and health/wellbeing (D1) with associated parking, infrastructure, public realm and landscaping. It is understood that a sublevel will be constructed below the car park to house a sprinkler tank.

1.3 Scope of Works

To complete this preliminary risk assessment, the following works were undertaken:

- ▲ Review of the environmental setting of the Site, including the current use/status of the Site and surrounding area, and review of the geology, hydrogeology and hydrology;
- ▲ Review of the historical activities of the Site and surrounding area;
- ▲ Review of regulatory information relating to the Site;
- ▲ Review of the online planning records for the Site;
- ▲ Consultation and review of information from the Local Authority in relation to Part 2A of the 1990 Environmental Protection Act;
- ▲ Completion of a Site reconnaissance by undertaking a visual inspection of readily accessible areas of the Site;
- ▲ Development of an outline Conceptual Site Model and undertake a Preliminary Risk Assessment with respect to potential contamination focussed on the proposed land use;
- ▲ Identification of potential contamination risks and/or liabilities associated with the proposed acquisition of the Site;
- ▲ Provision of commentary on potential land contamination and geotechnical constraints in the context of the proposed development; and
- ▲ Summary of readily available data on the flood risk associated with the Site.

In completing this Assessment, Delta-Simons has utilised the following data sources and third party information:

- ▲ Current (OS) maps and online mapping including aerial photos;
- ▲ British Geological Survey (BGS) data;

¹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779764/NPPF_Feb_2019_web.pdf

² <https://www.gov.uk/guidance/land-affected-by-contamination>

- ▲ Local Authority Contaminated Land Officer information;
- ▲ A Landmark Envirocheck Report for the Site (Ref. 168151210_1_1), dated May 2018; and
- ▲ Historical Maps included as part of the Envirocheck® Report.

1.4 Limitations

The standard limitations associated with this assessment are presented in Appendix A. In addition, there are the following specific limitations that apply to this assessment:

- ▲ The Consultant undertaking the Site inspection completed a visual check for invasive species, particularly Japanese Knotweed. It should be noted however that the Consultant is not a trained ecologist and a separate survey undertaken by an experienced Ecologist should be completed to provide a robust assessment; and
- ▲ The report includes a preliminary assessment for the potential for radon gas hazards. A detailed radon assessment falls outside of the scope of this report, and the requirement for radon mitigation measures in the proposed development should be identified separately to the satisfaction of Dartford Borough Council Building Control.

2.0 Site Context & Data Review

2.1 Site Information

Co-ordinates	Centred approximately at National Grid Reference 54070, 174170.	Elevation	c. 5 m AOD
		Area	1.22 Ha
Site Location	The Site occupies an irregularly shaped plot located near the centre of Dartford. The Site is loosely defined within Westgate Road to the north, Spital Street to the south, Kent Road to the west and Hythe Street to the east.		
Current Site Use	The Site can be considered as occupying three parts: the western area currently comprises a car park and the eastern area comprises crushed concrete/demolition rubble (surrounded by security fencing); the two areas are separated by Orchard Street (and pavements). Electricity substations are located towards the northern end of Orchard Street and in the south-west corner of the carpark.		
Proposed Development Description	It is understood that the development will comprise the demolition of existing structures to make way for the construction of a mixed use commercial (A1, A2, A3, A4, D1, D2 and B1), cinema (D2), hotel (C1), residential (C3) and life hub (D1) with associated parking, infrastructure, public realm and landscaping. It is understood that a sublevel will be constructed below the car park to house a sprinkler tank.		
Site Reconnaissance	<p>Delta-Simons conducted a Site visit on 8th June 2018. A series of Site photographs are presented as Appendix C, and pertinent information that was observed or reported on-Site is summarised as follows:</p> <ul style="list-style-type: none"> ▲ The Site area to the east of Orchard Street is largely defined by steel fencing surrounding an area of generally level, crushed stone fill at surface with occasional vegetation. Adjacent to the boundaries, the vegetation is locally thicker. No Japanese Knotweed was identified visually however the Site visit was not a detailed ecological survey; ▲ An electricity substation is located off Orchard Street within the eastern Site area; ▲ To the south, the Site area was bounded by the facia of the former Spital Street development, the rear of the public house and the rear of the Copperfields development. In the northeast, Kent Curry house forms part of the Site boundary; ▲ The Site area to the west of Orchard Street is currently a car park. The area generally slopes gently downwards to the east and west from a line running north to south through the centre; ▲ An electricity substation is located in the southwest of the car park; ▲ At the time of the survey the southern boundary of the car park was defined by on-going residential development and the northern boundary by steel fencing. Access onto Orchard Street and Kent Road to the west is open to pedestrians; ▲ The car park contained three electric car charging points and associated infrastructure; and ▲ The surrounding area is largely commercial with some residential property. No obvious sources of contamination were identified. <p>It has been assumed that no further significant changes have occurred at the site since the date of the site walkover.</p> <p><i>The electricity substations represent a potential source of contamination. No other sources were identified during the Site visit.</i></p>		

Current Surrounding Area	North	Commercial and residential property on Orchard Street, Kent Road and Hythe Street.
	East	Commercial and residential property on Hythe Street.
	South	Commercial and residential property on Spital Street, Orchard Street and Kent Road.
	West	Commercial property on Kent Road. A Kwik-Fit garage is located approximately 20 m to the north-west of the Site.
	<i>The Kwik-Fit garage represents a potential source of significant contamination identified in the area surrounding the Site.</i>	

2.2 Environmental Setting

Published Geology	From published British Geological Survey (BGS) mapping (1:50,000 Sheet Number 271, Dartford), the Site is indicated as being underlain by superficial deposits of Alluvium (mainly silt and clay, locally peaty) overlying Thames River Terrace Gravel deposits (gravel, sandy and clayey in part). The underlying bedrock is classified as the Lewes Nodular Chalk Formation. Given the current Site status, Made Ground is likely to be present overlying the Alluvium at the Site.
Specific Ground Conditions	Historical BGS borehole coverage in the vicinity of the Site is limited. TQ57SW175, located approximately 50 m east of Site recorded 0.5 m of Made Ground overlying brown gravel and sand (river terrace deposits) to 5.0 m bgl. TQ57SW13/B, located approximately 50 m south-west of the Site recorded approximately 17 m of gravel overlying chalk to 75 m bgl. Groundwater level was recorded at c.2.9 m bgl. No other BGS borehole scans are available within 100 m of the Site.
Hydrogeology	According to the Envirocheck® Report, the superficial deposits are classified as a Secondary A Aquifer in the south and Secondary Undifferentiated in the north. The bedrock (Lewes Chalk) is classified as a Principal Aquifer. The Envirocheck® Report also indicates that the Site is located within a designated groundwater Source Protection Zone (SPZ) Inner Zone (Zone 1), and that there are three licensed abstraction records from groundwater located within 500 m of the Site, the nearest located approximately 300 m to the east and relating to a potable public water supply.
Hydrology	The nearest surface water feature is the River Darent, located approximately 266 m to the north-east of the Site. According to the Envirocheck Report, one record of licensed abstraction from surface water is located within 500 m of the Site, relating to non-evaporative cooling approximately 310 m to the north-east.
Flooding	A detailed Flood Risk Assessment has been completed by a third party and further information relating to the status of the site is covered within this report. According to the Envirocheck® Report identified the potential for Groundwater Flooding of Property situated below ground level.
Coal Mining	According to the Envirocheck® Report, the Site does not lie within an area affected by coal mining activity.

Quarrying	“Old Chalk Pits” are recorded within 500 m of the Site on historical plans. Unmarked pits predating the mapping may exist closer to or within the Site boundary.
Radon Gas	The Site lies within an area where less than 1% of homes are above the National Radiological Protection Board (NRPB) recommended “action level” for radon. BRE211 (2007) indicates that no radon protective measures are necessary in the construction of new buildings at the Site.
Ecological Receptors	It is understood from information provided within the Envirocheck® Report, there are no statutory ecological receptors located within 1 km of the Site.
Heritage Interest	According to Historic England, a Grade II public house (listed as The Coach and Horses but apparently now called Industry) is located adjacent to the south-east of the Site, and a Grade II listed chapel is recorded approximately 40 m south-west of the Site. Other listed sites are recorded in the vicinity along Spital Street and Kent Road.
Unexploded Ordnance (UXO)	The project management team has obtained an Explosive Ordnance Desktop Threat Assessment (presented in Appendix F). The report identified a Medium Risk of German High Explosive Bombs being present.
Environmental Sensitivity	<p>The following receptors are considered to have a moderate to high environmental sensitivity, however when they are considered in the context of the surrounding developed/commercial area and absence ecological receptors, the overall sensitivity of the Site is considered to be reduced:</p> <ul style="list-style-type: none"> ▲ Principal Aquifer underlying the superficial strata (themselves Secondary Aquifers); and ▲ the Site’s location within a SPZ Zone 1 and the public potable water supply borehole located approximately 300 m from the Site.

2.3 Historical Use of the Site & Surrounding Area

Approach	The historical development of the Site and surrounding area has been assessed through a review of available historical OS maps dating to 1860 and Google Earth historical satellite imagery. A summary of the key historical Site uses and developments in the surrounding area is presented below. Copies of pertinent historical maps are included as Appendix D.
Historical Features On-Site	<p>The earliest historical map recorded the Site as being predominantly occupied by a brewery, with an orchard garden occupying the northern and western areas, and terraced residential property on Hythe Street and Spital Street occupying parts of the eastern and southern boundary respectively.</p> <p>Development of the Site took place between 1883 and 1897. The brewery was extended across the centre and south-east of the Site, and terraced housing associated with Orchard Street was constructed in the centre and west of the Site.</p> <p>By 1909 the western reaches of the Site were also occupied by terraced housing associated with Kent Road.</p> <p>Before 1938, the houses on Spital Road forming part of the Site’s southern boundary had been demolished.</p> <p>An aerial photo dated 1947 appears to show the demolition of the brewery and some of the houses abutting Kent Road; these are interpreted as bomb strikes in WWII.</p> <p>By 1961, the majority of the former Brewery site, occupying the eastern Site area, had been redeveloped into an un-named building. The building was extended to occupy the entire eastern Site area before 1975. During that time, the houses to the west of</p>

	<p>Orchard Street were demolished. An unlabelled structure, located where the present electricity substation is found, was recorded from c.1961 until mapping dated 2006.</p> <p>A multi-storey carpark had been constructed on the Site area to the west of Orchard Street before 1982. An electricity substation was recorded to the southwest of the carpark on mapping dated 1993.</p> <p>No significant changes were recorded on any plans until mapping dated 2018, which detailed the demolition of the multi-storey carpark to the west and the development to the east of Orchard Street, leaving the Site in its present condition.</p> <p><i>Given the former industrial uses and the dual phases of demolition (possibly including bomb damage), buried structures, locally deep Made Ground and potentially contaminated ground are anticipated.</i></p>
<p>Potentially Contaminative Historical Features Off-Site</p>	<p>Potential sources of contamination within 250 m of the Site include:</p> <ul style="list-style-type: none"> ▲ Dartford Print Works, 250 m east, c.1860-c.1961, and c.1961-c.1982 as a Works; ▲ Goods Depot and railway sidings, c.110 m north-east, c.1860-c.1975; From c.1897, the sidings were listed as a coal depot; ▲ Cattle market, 100 m south, c.1860-c.1982; ▲ Iron Foundry, 100 m north, c.1860-c.1909; between c.1909 and c.1931, the foundry was repurposed as an Engineering Works and later (until c.1982) simply a Works. Tanks associated with the Works were recorded c.90 m north (1982 mapping); ▲ Baltic Saw Mills (later, simply, Mill), c.125 m east, c.1897-c.1967; ▲ Coach and Motor Works (later, simply, Garage), 100 m south, c.1909-c.2000; ▲ Works, c.20 m northwest, c.1961-c.2006; ▲ Works, c.200 m south, c.1966-c.2000; ▲ Works, c.120 m east, c.1961-c.1982; and ▲ Works, c.10 m west, c.1970-c.1983.

2.4 Environmental Database Review

<p>Approach</p>	<p>The Landmark Envirocheck® Report provides a database of environmental information held by various statutory bodies including the EA, Local Authority (LA), Health & Safety Executive (HSE) and HPA amongst others. A full copy of the Envirocheck® Report is provided in Appendix E and the most relevant information is summarised below.</p>
<p>Features On-Site</p>	<p>The Landmark Envirocheck® Report does not list any pertinent entries within the boundaries of the Site.</p>
<p>Potentially Contaminative Features Off-Site</p>	<p>Pertinent entries included within the Landmark Envirocheck® Report located within 250 m from the Site include the following:</p> <ul style="list-style-type: none"> ▲ One Discharge Consent (effective from April 1991 until it was revoked February 2003) operated by A.P.V. Baker Ltd for Trade Effluent Into Land was located c.160 m to the north. (Another discharge consent, effective between 1967 and 1991, was operated by Wellcome Chemical Works for Trade Discharges – Cooling Water to Freshwater Stream/River c. 250 m to the northeast); ▲ Three Local Authority Pollution Prevention and Controls, all currently permitted, relating to respraying of road vehicles (c.40 m south-west since 1994), and dry cleaning (c.40 m north-east since 2007 and c. 20 m north-east since 2010); and ▲ Two Pollution incidents to Controlled Waters: a Category 3 – Minor Incident relating to a white substance (chemicals – paints/dyes) in watercourse dated May 1998 (c.

	<p>200 m north-east) and a Category 3 – Minor Incident relating to sewage in the River Darent dated July 1994 (c.225 m south-east).</p> <p>There are no BGS, LA and EA registered landfill sites on or within 250 m of the Site. No landfill data was available from relevant Local Authorities.</p> <p>Seven active Contemporary Trade Directory Entries are located within 100 m of the Site associated with dry cleaning, tyre dealing, domestic cleaning services, freight forwarding, car dealing and electric goods.</p> <p>A Fuel Station Entry, Westgate House Service Station, was recorded approximately 125 m to the west. It's status is recorded as Obsolete.</p>
Implications for Land Contamination Risk	<p><i>No potential sources of contamination have been identified at the Site from the regulatory information. Potential off-Site sources of contamination have been identified that will be considered in the preliminary risk assessment.</i></p>

2.5 Planning Review/Regulatory Enquiries

On-line Planning Portal	Dartford Borough Council	Date Accessed	05/06/2018
Findings	<p>The Site and surrounding in area have been subject to hundreds of planning applications dating back to 1888. The most relevant applications to the present development project are recorded below:</p> <p><u>12/01094/CON – September 2012</u></p> <p>Demolition of part of 19-33 Spital Street within Dartford Conservation Area with retention of Spital Street and Orchard Street façade (former Co-op 20 - 54 Hythe Street and 19-33 Spital Street). Relates to the most southerly extent of the eastern half of the current Site.</p> <p>Decision: Conservation Area Consent</p> <p><u>07/00687/FUL – September 2008</u></p> <p>Demolition of existing building, with the retention of Spital Street facade and redevelopment of site to provide 2 detached buildings. Building 1: (fronting Hythe Street) erection of building up to 6 storeys in height comprising 61 x 1 bedroom flats and 65 x 2 bedroom flats (126 units) with 6 retail units at ground floor level and communal garden at first floor level (Orchard Street elevation). Building 2: (fronting Spital Street) Erection of part 3/part 5 storey building comprising 12 x 1 bedroom flats, 32 x 2 bedroom flats and 6 x 3 bedroom flats (50 units) with retail unit and communal garden at ground floor level together with 88 car parking spaces at basement and ground floor level and a pedestrian link walkway from Hythe Street to Orchard Street.</p> <p>Decision: Application Permitted</p> <p>No additional potentially contaminative activities or other information pertinent to this assessment was identified from the historical planning records.</p>		
Part 2A of the Environmental Protection Act (EPA) 1990	<p>The Contaminated Land Officer (CLO) was contacted on 5th June 2018. The CLO confirmed that “The site is not listed on the Part 2a Public Register for Dartford Borough Council and has therefore not been prioritised in that context”.</p>		

3.0 Conceptual Site Model

3.1 Introduction

A Conceptual Site Model (CSM) represents the relationships between contaminant sources, pathways and receptors, to support the identification and assessment of Possible Pollutant Linkages (PPL).

Where PPL are identified, a preliminary risk assessment is undertaken to assess the likelihood that each possible linkage exists and to determine whether these pose potentially unacceptable risks to identified receptors and require further assessment. Where this linkage is of a form that subsequently leads to the potential for land being identified as 'contaminated land' under the terms of Part 2A of the Environmental Protection Act 1990, the linkage is termed a significant pollutant linkage.

At the preliminary risk assessment stage, which is typically based upon desk study information, the decision on whether a PPL poses a potentially unacceptable risk is based upon professional judgement. The significance of the PPL will also be determined dependant on the context of the land use and the purpose of the assessment.

Assessing risks from land contamination underpins the "suitable for use" approach adopted for Part 2A of the EPA 1990 regulatory regime and the National Planning Policy Framework (NPPF), March 2012.

3.2 Potential Contamination Sources

Potential contamination sources identified in Section 2.2 as relevant to the Site are presented in the following table:

Source	Location	Dates Present	Potential Associated Contaminants of Concern
Brewery	Eastern Site area	c.1883 to c. 1945	Heavy metals, asbestos, TPH, PAH, VOC, hazardous ground gases.
Made Ground - Potential demolition and historic sources	Site-wide	c.1938 to present	Asbestos, heavy metals, PAH, TPH, hazardous ground gases.
Electricity substations	Southwest and central	c.1961 and 1993 to present	PAH, PCB.
Surrounding industrial uses including railway lines	Off-Site	c.1860 to present	Heavy metals, asbestos, TPH, PAH, VOC, SVOC, PCB, hazardous ground gases.

3.3 Potential Pathways

The potential pathways are considered to be as follows:

- ▲ P1 - Direct contact, ingestion or inhalation of soil bound contaminants/dust during or following redevelopment.
- ▲ P2 - Inhalation of organic vapours associated with contamination.
- ▲ P3 - Migration of ground gas/vapours into on-site buildings causing asphyxiation or risk of explosion.
- ▲ P4 - Leaching of contamination into groundwater followed by migration of groundwater to the wider groundwater environment or discharge to surface waters.
- ▲ P5 - Direct contact between aggressive ground conditions and new infrastructure.

3.4 Potential Receptors

Relevant potential receptors are considered to include:

- ▲ R1 - Construction workers.
- ▲ R2 - Third parties during construction (adjacent Site users and adjacent residents).
- ▲ R3 - Future Site users and maintenance workers.
- ▲ R4 - The underlying aquifer(s).
- ▲ R5 - The Built Environment (new buildings and infrastructure/utilities).

Pollutant Linkage Assessment					
Source(s)	Pathway(s)	Receptor(s)	Risk Rating	Justification & Mitigation (if required)	Requires Investigation
Brewery, potential Demolition Made Ground	P1, P2, P3, P4, P5	R1, R2, R3, R4, R5	Moderate Risk	<p>Given the industrial Site history and the demolition of on-Site buildings, it is considered likely that there are Made Ground Deposits on-site which could be potentially contaminated. There is considered to be a possible pollutant linkage between the deposits anticipated on Site and identified receptors, including the underlying aquifers.</p> <p>The presence and matrix of the Made Ground can be confirmed and the potential risk to receptors assessed through a ground investigation and subsequent Geo-Environmental Assessment at the Site.</p>	Y
Electricity Substations	P1, P2, P3, P4	R1, R2, R3, R4	Low to Moderate Risk	<p>Substations represent a potential source of hydrocarbon contamination, particularly PAH and PCB. However, given the two substations identified on-Site are currently operational, maintenance is anticipated to be good and therefore the risk reduced.</p> <p>The presence of historical or ongoing contamination can be confirmed through a ground investigation at the Site.</p>	Y
Surrounding Historical Land Uses	P2, P3	R1, R3	Low to Moderate Risk	<p>It is considered that the adjacent historical land uses may represent sources of contamination. There is the potential for vapours and hazardous ground gases to migrate on to Site from the surrounding ground through the superficial and Made Ground strata. Furthermore, vapour generating contamination has the potential to migrate on to Site mobilised by groundwater.</p> <p>The presence of contamination migrating on to Site can be confirmed through a ground investigation.</p>	Y

4.0 Preliminary Ground Engineering Appraisal

4.1 Preliminary Ground Model

Based on the available information, it is anticipated that the Site is likely underlain by a sequence of Made Ground underlain by Alluvium and River Terrace Gravels, with Chalk bedrock beneath. Groundwater is anticipated to be present beneath the Site in the chalk, with perched groundwater possible in the overlying gravels.

4.2 Plausible Geohazards

The geohazards listed below have been identified by following guidance presented in the HA document HD22/08 'Managing Geotechnical Risk' (2008) which aims to identify and manage the geotechnical risks associated with a scheme throughout its lifespan, from planning to construction to maintenance.

The following geohazards are considered to be substantial ground related risks associated with the proposed development. A substantial risk is defined by Delta-Simons in Appendix B.

- ▲ The Envirocheck® Report identifies a Moderate Potential for Compressible Ground Stability Hazards on Site. Other Ground Stability Hazards are recorded as No Hazard to Low Risk;
- ▲ Given the presence of the underlying Chalk bedrock and the vicinity of the River Darent, chalk dissolution features are considered to be a potential hazard across the Site;
- ▲ Given the anticipated presence of Alluvium, soft and/or compressible ground is likely with potentially low bearing capacity and unacceptable levels of total/differential settlement may occur;
- ▲ The history of demolition at the Site indicates that Made Ground will be present at the Site. Made Ground is typically variable in nature and strength with a potentially low bearing capacity and unacceptable levels of total/differential settlement may occur; and
- ▲ As a result of previous demolition, relict structures may be present that could act as obstructions.

Potential solutions and further steps to address the aforementioned issues are discussed in Section 5.

5.0 Development Considerations

5.1 Potential Remediation Requirements & Solutions

Soils	<p>The risk of the Site requiring widespread remediation to protect end users is considered to be low to moderate, although localised remedial measures, for example removal of contamination hotspots and provision of a clean soil cover for proposed soft landscaping, may be required in areas of Made Ground.</p> <p>If contamination and/or Asbestos Containing Materials (ACMs) are identified, then this may have an impact on waste disposal costs.</p>
Groundwater	<p>Significant widespread groundwater contamination resulting from on-Site activity is not anticipated.</p>
Ground Gas	<p>The risk of significant ground gas being present is considered to be moderate, and it would be prudent to allow for basic ground gas protection measures until monitoring data is available for interpretation.</p>
Building Fabric & Services	<p>Widespread contamination at the Site is considered unlikely. However, services are recommended to be placed in clean corridors. A drinking water pipeline assessment may be required following soils chemical results. Aggressive ground chemistry may attack buried concrete and therefore there may be a requirement for protection measures to be put in place at the Site.</p>

5.2 Geotechnical Considerations

Foundations & Floor Slabs	<p>The shallow ground conditions are anticipated to comprise Made Ground (associated with current uses and demolition of former structures) underlain by a sequence of Alluvium and Thames River Terrace Gravels over bedrock of the Lewes Nodular Chalk Formation.</p> <p>The underlying Alluvium deposits at the Site may pose a risk for shallow foundations due to compressibility and unacceptable levels of total/differential settlement and the underlying granular deposits at the Site may be a more suitable founding medium however this depends on final design parameters. If required, a piled foundation solution transferring loads to the chalk may be suitable for the proposed development.</p> <p>However, the potential for dissolution features associated with underlying chalk needs to be investigated and may require upgraded foundation and floor slab solutions (e.g. reinforced rafts, pre-pile probing, grouting).</p>
Groundworks	<p>A hydraulic breaker or floor-saw will be required to break up the widespread hardstanding across the western section of Site.</p> <p>Relict structures from housing, former multi-storey carpark, the brewery and the subsequent development on the eastern Site area may be present.</p> <p>The potential for shallow groundwater may also present problems for excavations.</p>
External Works	<p>California Bearing Ratio testing will be required to determine road construction thickness. Consideration will need to be given for the potential for differential settlement to affect road surfaces and services and appropriately mitigated within the design.</p>
Ground Instability	<p>The potential of chalk dissolution features beneath the Site and surrounding area increases the risk of ground instability.</p>

	Should this not be investigated and assessed properly to determine whether remedial stabilisation measures are required, it will have significant cost implications with regards to the construction of any development.
--	--

6.0 Conclusions & Recommendations

6.1 Land Contamination

<p>Conceptual Site Model</p>	<p>The outline Conceptual Site Model has identified several potential sources of contamination associated with the Site's former user as a brewery, Made Ground and electricity substations. Contaminants of concern are likely to comprise heavy metals, hydrocarbon fractions, PAHs, PCBs, SVOCs, VOCs, asbestos and ground gas. When these are considered in the context of existing/future receptors (future residential occupants, Principal Aquifer, SPZ3) several potential pollutant linkages have been identified and the development is considered to pose a Low to Moderate risk to human health and controlled waters.</p>
<p>Recommendations</p>	<p>It is recommended an intrusive ground investigation to be undertaken to investigate:</p> <ul style="list-style-type: none"> ▲ The presence, thickness and nature of any Made Ground and superficial deposits; ▲ The potential for chalk dissolution features; ▲ The presence, concentrations and leachability of substances of concern in shallow soils (including Made Ground) on-Site; ▲ The presence of substances of concern in any perched water/soil pore water or deep groundwater beneath Site; and ▲ Likelihood of significant ground gas and/or soil vapour intrusion into future on-Site and off-Site buildings. <p>Furthermore, it is recommended that a Remediation and Verification Plan is produced in advance of the building phase of works to set out procedures to be followed during the development works in the context of contaminated land; and</p> <p>A Site Verification Report should be produced on completion of the redevelopment works for full compliance with published planning conditions.</p> <p>The following costs are anticipated to be incurred during any future development:</p> <ul style="list-style-type: none"> ▲ Undertaking a Natural & Mining Cavities Database Searches and Cavities Occurrence Assessment; ▲ All shallow intrusive works on Site must be undertaken with the support of an Explosive Ordnance Disposal (EOD) Engineer, including intrusive magnetometer surveys to the maximum bomb penetration depth (10m); ▲ Completing a ground investigation with and subsequent Geo-Environmental Assessment; ▲ Undertaking further assessments, for example a Detailed Quantitative Risk Assessment (DQRA), liaison with relevant Regulatory Authorities, and, if required, subsequent soil and groundwater remediation; ▲ Completing a waste classification exercise and the disposal of soils for engineering purposes (e.g. foundation and service trench arisings, engineering cut, excavations etc) or remediation; ▲ Use of clean inert material in service runs across the Site; and ▲ Use of upgraded water supply pipes, even where low concentrations of hydrocarbons are present.

Figure 1 – Site Location Map

Appendix A – Limitations

Limitations

The recommendations contained in this Report represent Delta-Simons professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Delta-Simons obtained, reviewed and evaluated information in preparing this Report from the Client and others. Delta-Simons conclusions, opinions and recommendations has been determined using this information. Delta-Simons does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

This Report was prepared by Delta-Simons for the sole and exclusive use of the Client and for the specific purpose for which Delta-Simons was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Delta-Simons, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. In particular, Delta-Simons does not intend, without its written consent, for this Report to be disseminated to anyone other than the Client or to be used or relied upon by anyone other than the Client. Use of the Report by any other person is unauthorised and such use is at the sole risk of the user. Anyone using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Delta-Simons from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by the Consultant.

Appendix B – Risk Definitions

Contaminated Land Risk Definitions

The following methodology is based on the methodology presented in CIRIA C552 Contaminated Land Risk Assessment: A Guide to Good Practice 2001. It requires the classification of the:

- ▲ Magnitude of the potential consequence (severity) of the Risk occurring: and
- ▲ Magnitude of the Probability (likelihood) of the Risk occurring.

The classifications are then compared to indicate the risk presented by each pollutant linkage.

Consequence to Receptor Definition Matrix

	Human Health	Controlled Waters	Buildings/Services
Severe Consequence	Acute or chronic permanent impact on human health.	Sensitive controlled water pollution ongoing, or just about to occur.	Catastrophic collapse
Medium Consequence	Chronic permanent impact on human health	Gradual pollution of sensitive controlled water	Degradation of materials
Mild Consequence	Chronic temporary impact on human health	Gradual pollution of non-sensitive controlled water	Damage to building rendering it unsafe to occupy (eg foundation damage resulting in instability).
Minor Consequence	Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc).	Slight discoloration of water	Easily repairable effects of damage to buildings, structures and services, i.e discoloration of concrete

Probability Definitions

Probability	Definition in Context
Higher	There is a pollution linkage 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. Positive evidence of source, pathway and receptor.
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. Suspect source, pathway, and receptor
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 No evidence of hazard, pathway, and receptor

Standard Risk Matrix

		Consequence/Magnitude of impact			
		Severe	Medium	Mild	Minor
Probability	High	Very High	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/low	Low
	Low Likelihood	Moderate	Moderate/low	Low	Very Low
	Unlikely	Moderate/low	Low	Very Low	Very Low

Classified risks and likely action

Significance Level	Definition/Comments
Very High Risk	<p>There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening.</p> <p>This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.</p> <p>Demonstrable contaminated land situation, highest threat & liability level, urgent action recommended.</p>
High Risk	<p>Harm is likely to arise to a designated receptor from an identified hazard.</p> <p>Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.</p> <p>Likely contaminated land situation, risk assessment and action recommended.</p>
Moderate	<p>It is possible that harm could arise to a designated receptor from an identified hazard. However, if is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild</p> <p>Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.</p> <p>Plausible contaminated land situation, risk assessment and possible action recommended.</p>
Low Risk	<p>It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.</p> <p>Unlikely contaminated land situation, possible risk assessment and possible action.</p>
Very Low Risk	<p>There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.</p> <p>Negligible risk, no action recommended except vigilance for changes in conditions.</p>

Geotechnical Risk Classification

The geohazards listed in the report within Section 4 follow guidance presented in Clayton, C.R.I. (2001) *Managing Geotechnical Risk*, Thomas Telford and the Highways Agency document HD22/08 '*Managing Geotechnical Risk*' (2008) which aims to identify and manage the geotechnical risks associated with a scheme throughout its lifespan, from planning to construction to maintenance.

For each geohazard the probability of the hazard occurring (P) has been considered together with the impact it would have (I) if it were to happen to calculate the risk rating between 1 and 25.

Risks that fall within Moderate, Significant and Severe categories below are considered to be **substantial** and are therefore listed within the report.

Probability	(P)	X	Impact	(I)	=	(R)	Risk
Very Likely (VLk)	5		Very High (VH)	5		20 – 25	Severe
Likely (Lk)	4		High (H)	4		15 – 19	Substantial
Plausible (P)	3		Medium (M)	3		10 – 14	Moderate
Unlikely (U)	2		Low (L)	2		5 – 9	Minor
Very Unlikely (VU)	1		Very Low (VL)	1		1 – 4	Negligible

Appendix C – Site Photographs

Site Photographs



Photograph 1: Northern extent of eastern Site area



Photograph 2: Southern extent of eastern Site area



Photograph 3: Protection of retained facia on Spital Street



Photograph 4: The carpark occupying the western Site area



Photograph 5: The electricity substation located in the southwest corner of the carpark



Photograph 6: The western Site boundary with Kent Road



Photograph 7: Electric-car charging infrastructure



Photograph 8: Orchard Street from the north

Appendix D – Historical Maps

Historical Mapping Legends

Ordnance Survey County Series 1:10,560

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

Ordnance Survey Plan 1:10,000

	Chalk Pit, Clay Pit or Quarry		Gravel Pit
	Sand Pit		Disused Pit or Quarry
	Refuse or Slag Heap		Lake, Loch or Pond
	Dunes		Boulders
	Coniferous Trees		Non-Coniferous Trees
	Orchard		Scrub
	Coppice		
	Bracken		Heath
	Rough Grassland		
	Marsh		Reeds
	Saltings		
	Building		Glasshouse
	Sloping Masonry		Pylon
	Electricity Transmission Line		Pole
	Cutting		Embankment
	Standard Gauge Multiple Track		
	Standard Gauge Single Track		
	Siding, Tramway or Mineral Line		
	Narrow Gauge		
	Geographical County		
	Administrative County, County Borough or County of City		
	Municipal Borough, Urban or Rural District, Burgh or District Council		
	Borough, Burgh or County Constituency Shown only when not coincident with other boundaries		
	Civil Parish Shown alternately when coincidence of boundaries occurs		
	BP, BS Boundary Post or Stone		Pol Sta Police Station
	Ch Church		PO Post Office
	CH Club House		PC Public Convenience
	F E Sta Fire Engine Station		PH Public House
	FB Foot Bridge		SB Signal Box
	Fn Fountain		Spr Spring
	GP Guide Post		TCB Telephone Call Box
	MP Mile Post		TCP Telephone Call Post
	MS Mile Stone		W Well

1:10,000 Raster Mapping

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

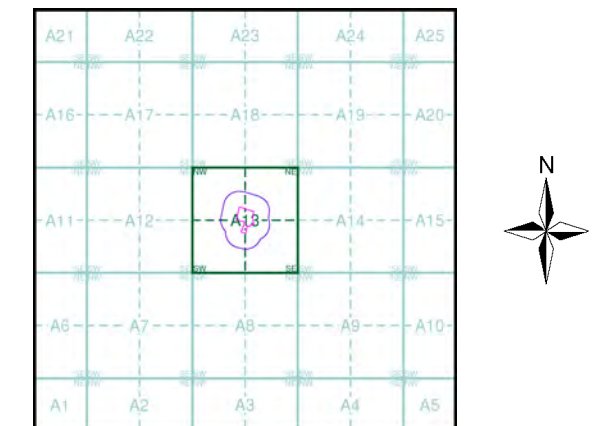
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Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Kent	1:10,560	1869	3
Essex	1:10,560	1872	4
Kent	1:10,560	1898	5
Kent	1:10,560	1910	6
London	1:10,560	1920	7
Essex	1:10,560	1921	8
Kent	1:10,560	1931	9
Kent	1:10,560	1938	10
London	1:10,560	1938	11
Essex	1:10,560	1938	12
Kent	1:10,560	1939 - 1950	13
Historical Aerial Photography	1:10,560	1947 - 1948	14
Historical Aerial Photography	1:10,560	1947	15
Ordnance Survey Plan	1:10,000	1961	16
Ordnance Survey Plan	1:10,000	1966 - 1967	17
Ordnance Survey Plan	1:10,000	1974 - 1977	18
Gravesend	1:10,000	1977	19
Ordnance Survey Plan	1:10,000	1983 - 1987	20
London	1:25,000	1985	21
Ordnance Survey Plan	1:10,000	1988	22
Ordnance Survey Plan	1:10,000	1992 - 1996	23
Ordnance Survey Plan	1:10,000	1996	24
10K Raster Mapping	1:10,000	1999	25
10K Raster Mapping	1:10,000	2006	26
VectorMap Local	1:10,000	2018	27

Historical Map - Slice A



Order Details

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 Customer Ref: 18-0704.01
 National Grid Reference: 554070, 174170
 Slice: A
 Site Area (Ha): 1.07
 Search Buffer (m): 1000

Site Details

Westgate, DARTFORD, DA1 2DF

Landmark
 INFORMATION GROUP

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

Russian Military Mapping Legends

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

a. Not drawn to scale b. Drawn to scale

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

243,8 Values for prominent elevations
186.0 Numbers for spot elevations, depth soundings, contour lines, etc.
0,2 Velocity of the current, width of river bed, depth of river
180/12 Fractional terms: length and capacity of bridges; depth of fords and condition of the river bottom; height of forest and the diameter of trees

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

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

1:25,000 mapping

a. Not drawn to scale b. Drawn to scale

	Government and Administrative Buildings		Military and Industrial Buildings
	Military and Communication Areas		Subway Entrance
	Partly Demolished Buildings		Demolished Buildings
	Built-Up Area with Fireproof Buildings Predominant		Built-Up Area with Non-Fireproof Buildings Predominant
	Individual Fireproof Building		Prominent Industrial Building
	Individual Dwelling, Fireproof		Ruins of an Individual Dwelling
	Factory or Mill Chimney		Factory or Mill with Chimney
	Factory or Mill without Chimney		Mine or Open Pit Mine
	Operating Shaft or Mine		Non-Operating Shaft or Mine
	Salt Mine		Tailings Pile
	Pit		Stone Quarry
	Gas Pump or Service Station		Fuel Storage or Natural Gas Tank
	Oil or Natural Gas Derrick		Small Hydroelectric Power Station
	Power Station		Transformer Station
	Cemetery		Burial Mound (height in metres)
	Triangulation Point on Burial Mound		Triangulation Point
	Bench Mark		Telegraph Office
	Telephone Station		Radio Station
	Radio Tower		Airfield or Seaplane Base
	Landing Strip		Cut
	Fill		Km Post
	Plantings		Width of Road
	Steep Grade		Highway under Construction
	Improved Dirt Road (former truck road)		Small Bridge
	Pipe (Culvert)		Tunnel
	Dismantled Railroad		Double-track Railroad with First Class Station
	Railroad Under Construction		Shore Embankment
	River or Ditch with Embankment		Water Gauge
	Direction and velocity of current		Water Level Mark
	Well		Water Reservoir or Rain Water Pit
	Spring		Isobath with value
	Heavy (Index) Contour Line		Contour Line and Value
	Half Contour Line		Spot Elevation Value
	Coniferous		Deciduous
	Mixed		Scrub

Key to Numbers on Mapping

TQ57_London

No.	Description
114	Factories (Chemicals And Machinery)

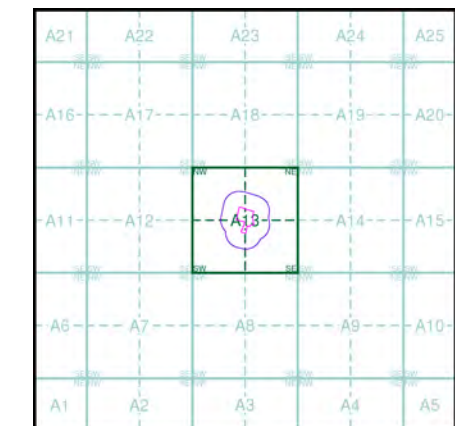
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10K Raster Mapping	1:10,000	1999	25
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VectorMap Local	1:10,000	2018	27

Russian Map - Slice A



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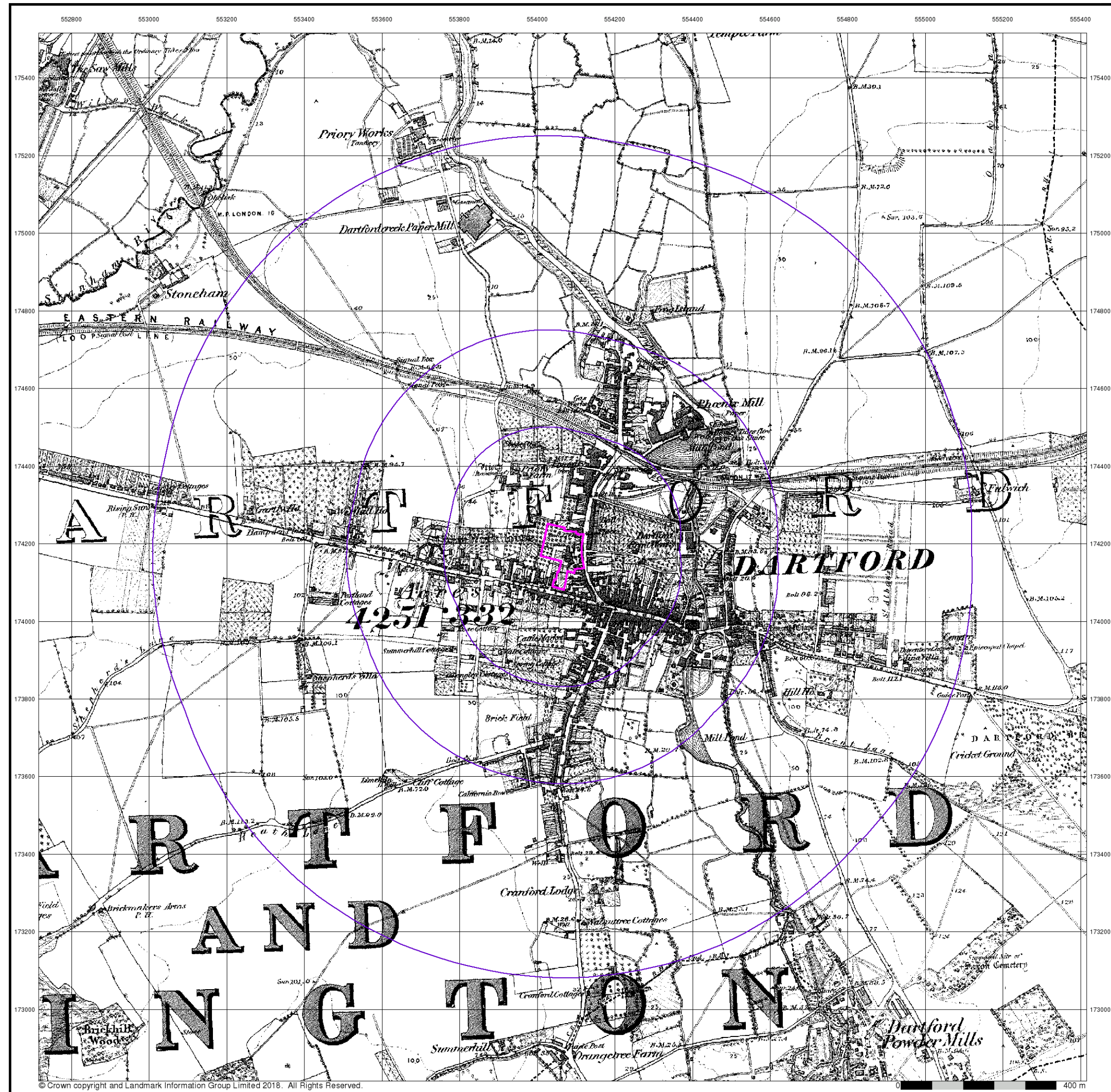
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Site Details

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Landmark
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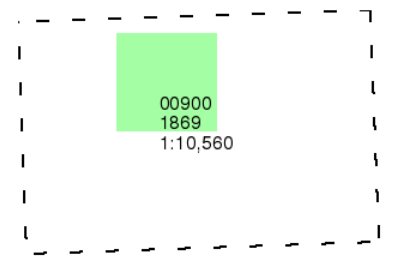
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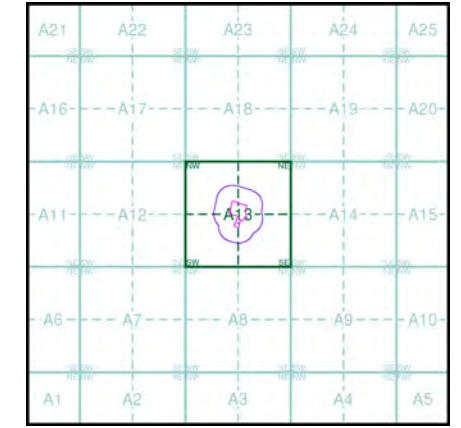
Kent
Published 1869
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A



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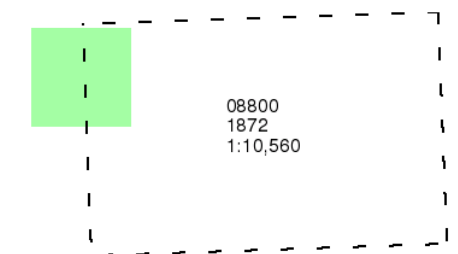
Essex

Published 1872

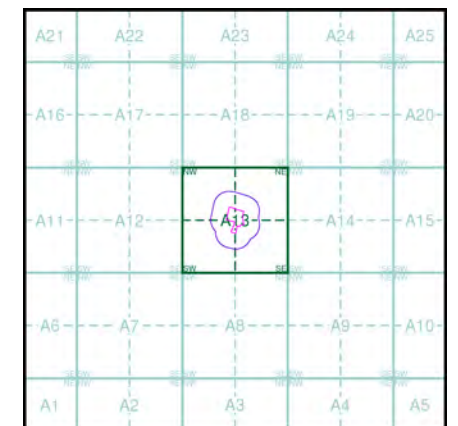
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Map Name(s) and Date(s)



Historical Map - Slice A

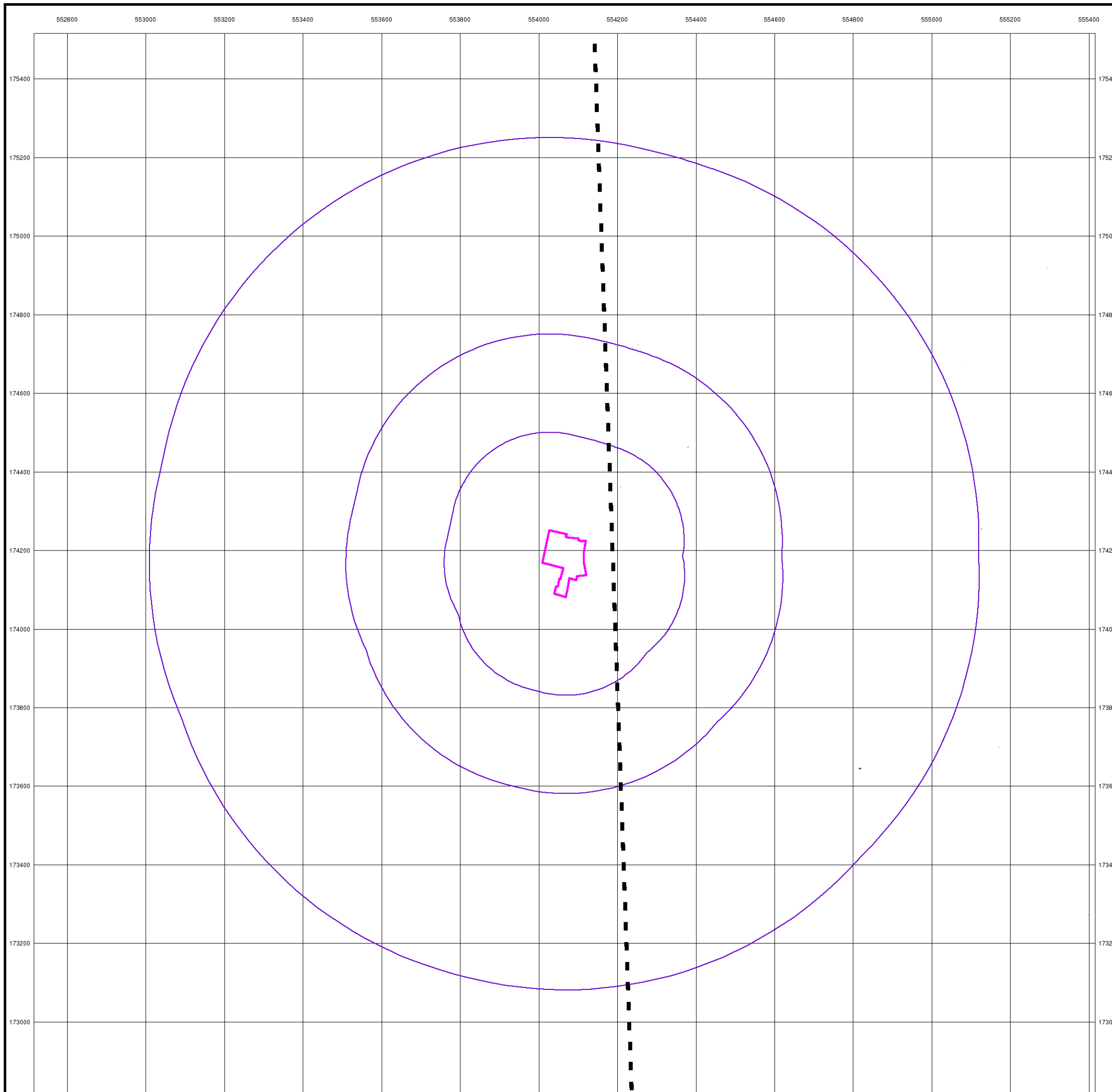


Order Details

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Slice: A
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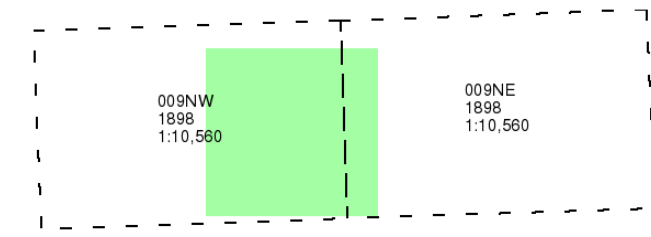




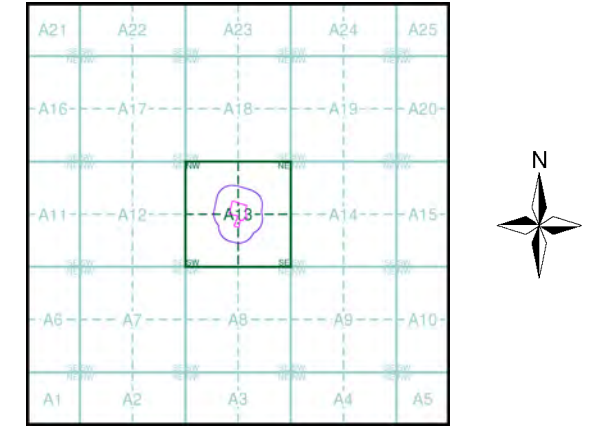
Kent
Published 1898
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A

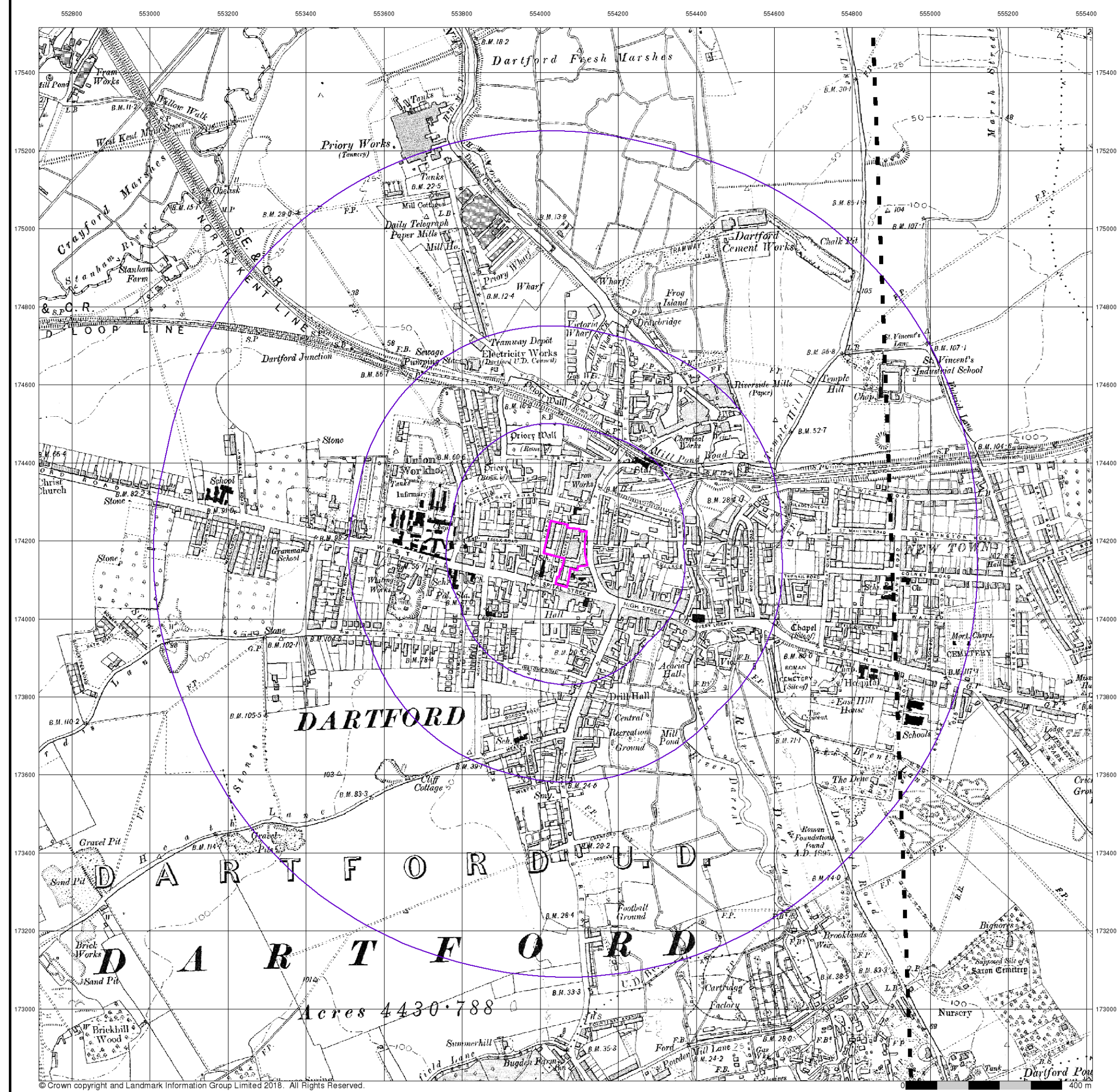


Order Details

Order Number: 168151210_1_1
 Customer Ref: 18-0704.01
 National Grid Reference: 554070, 174170
 Slice: A
 Site Area (Ha): 1.07
 Search Buffer (m): 1000

Site Details

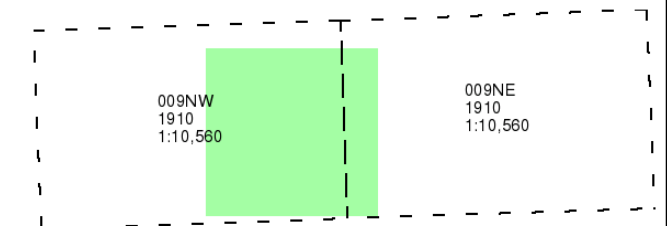
Westgate, DARTFORD, DA1 2DF



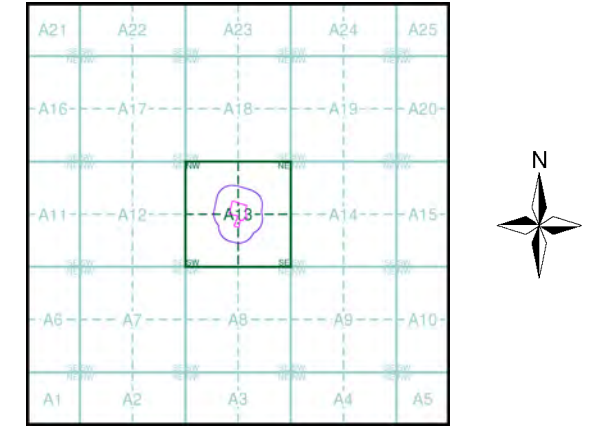
Kent
Published 1910
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 168151210_1_1
 Customer Ref: 18-0704.01
 National Grid Reference: 554070, 174170
 Slice: A
 Site Area (Ha): 1.07
 Search Buffer (m): 1000

Site Details

Westgate, DARTFORD, DA1 2DF

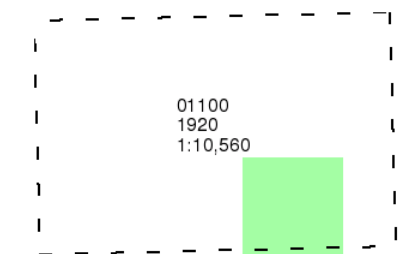
London

Published 1920

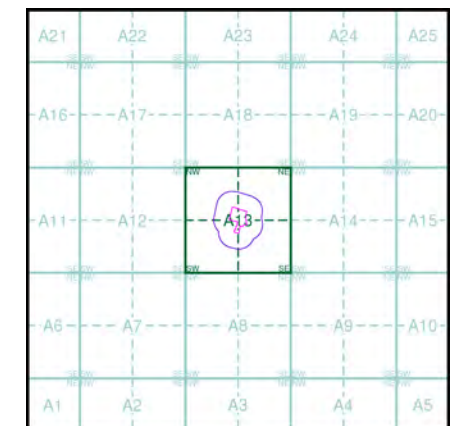
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A

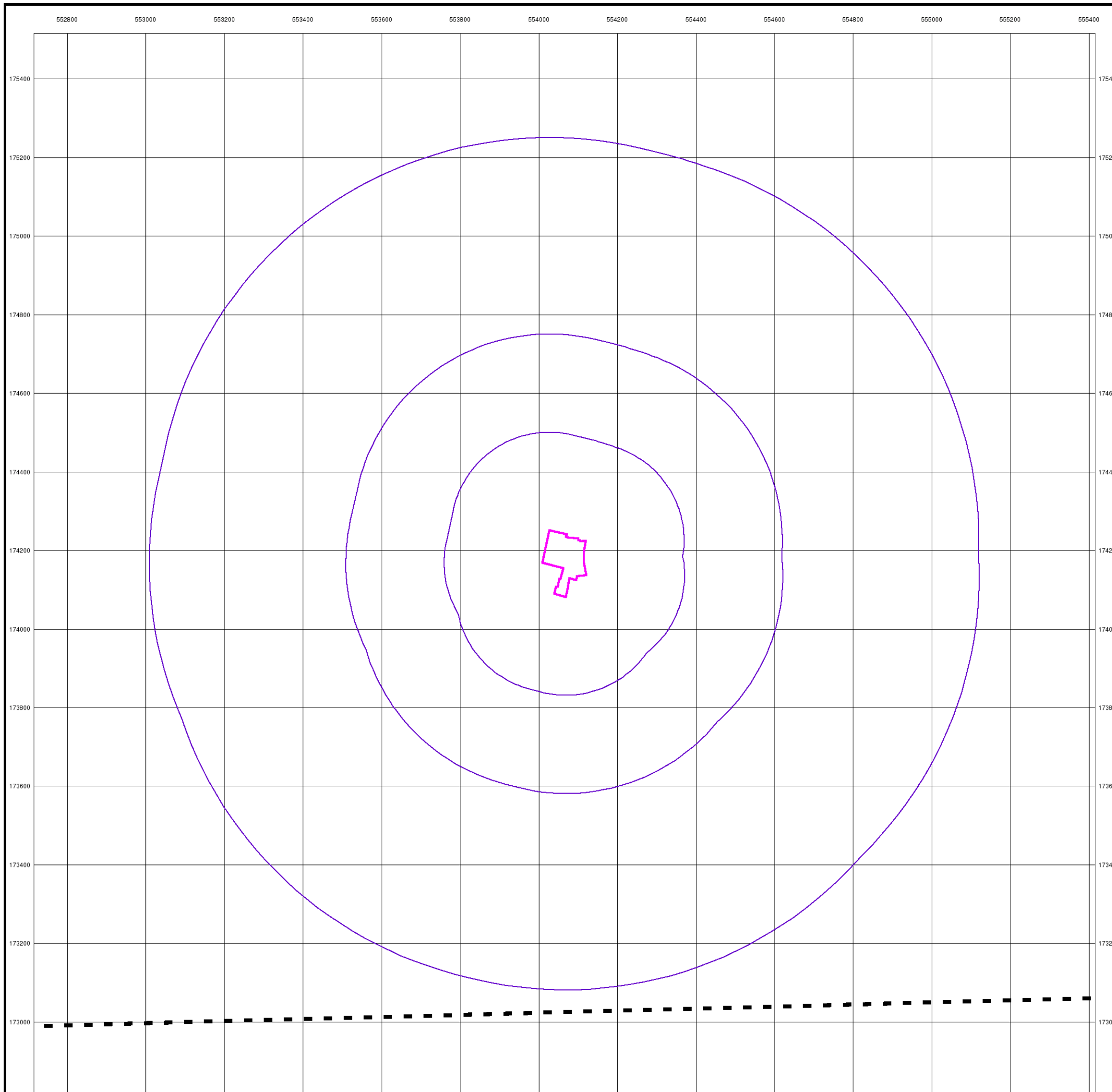


Order Details

Order Number: 168151210_1_1
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Site Details

Westgate, DARTFORD, DA1 2DF

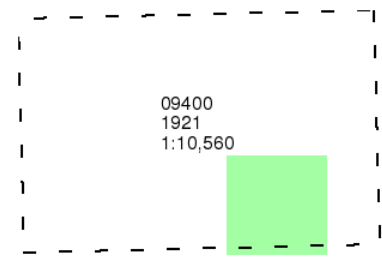




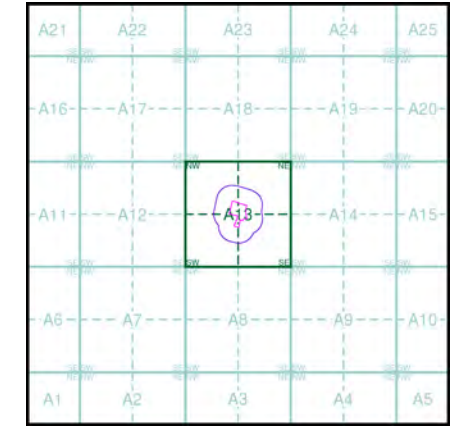
Essex
Published 1921
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A

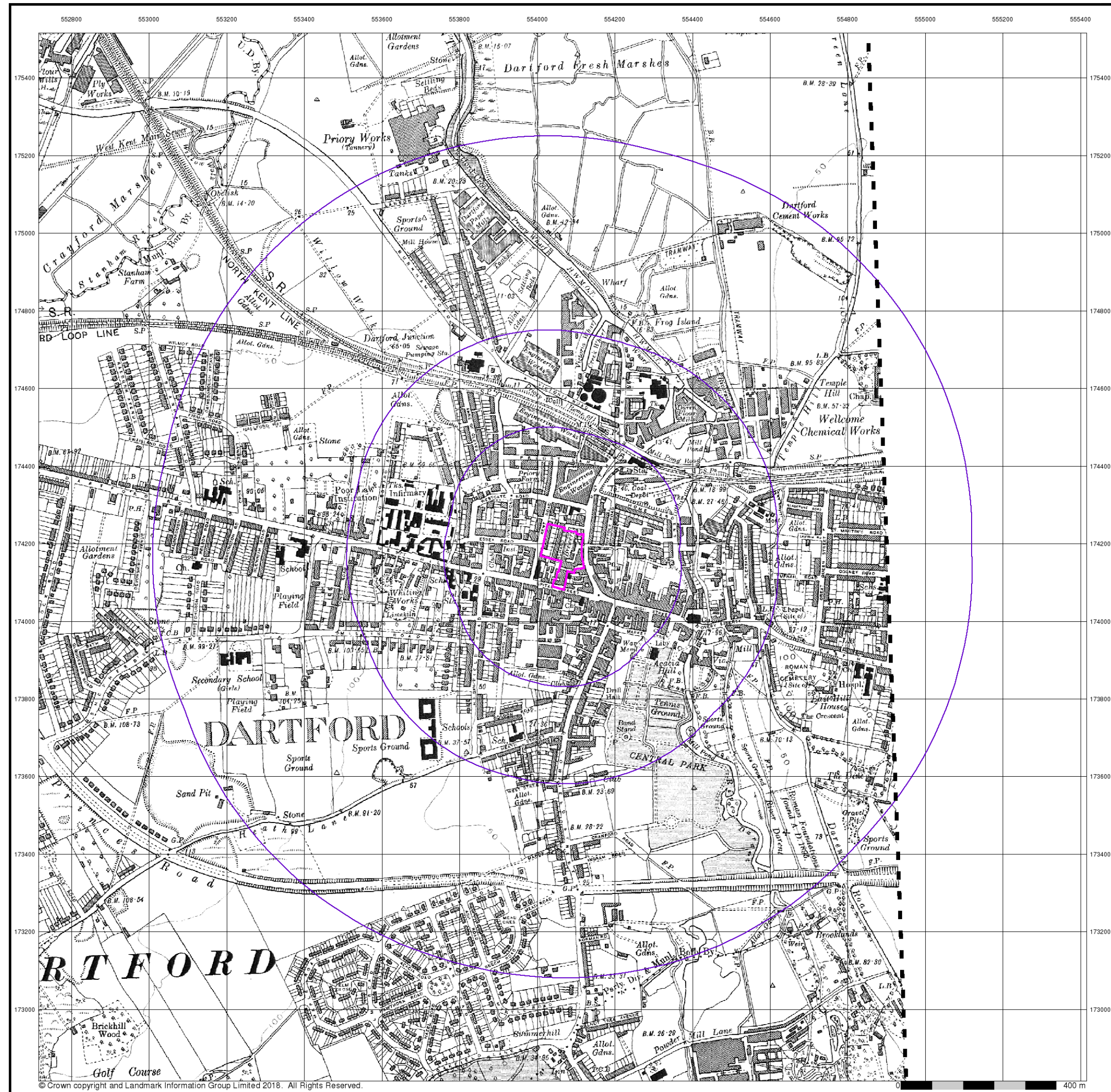


Order Details

Order Number: 168151210_1_1
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 National Grid Reference: 554070, 174170
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Site Details

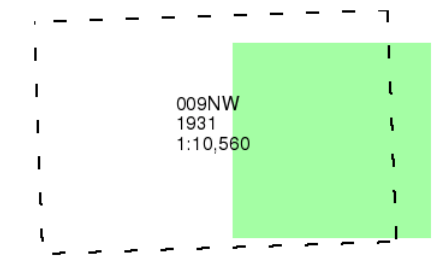
Westgate, DARTFORD, DA1 2DF



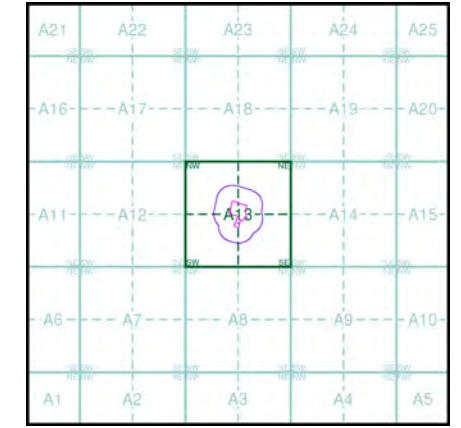
Kent
Published 1931
Source map scale - 1:10,560

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

Map Name(s) and Date(s)

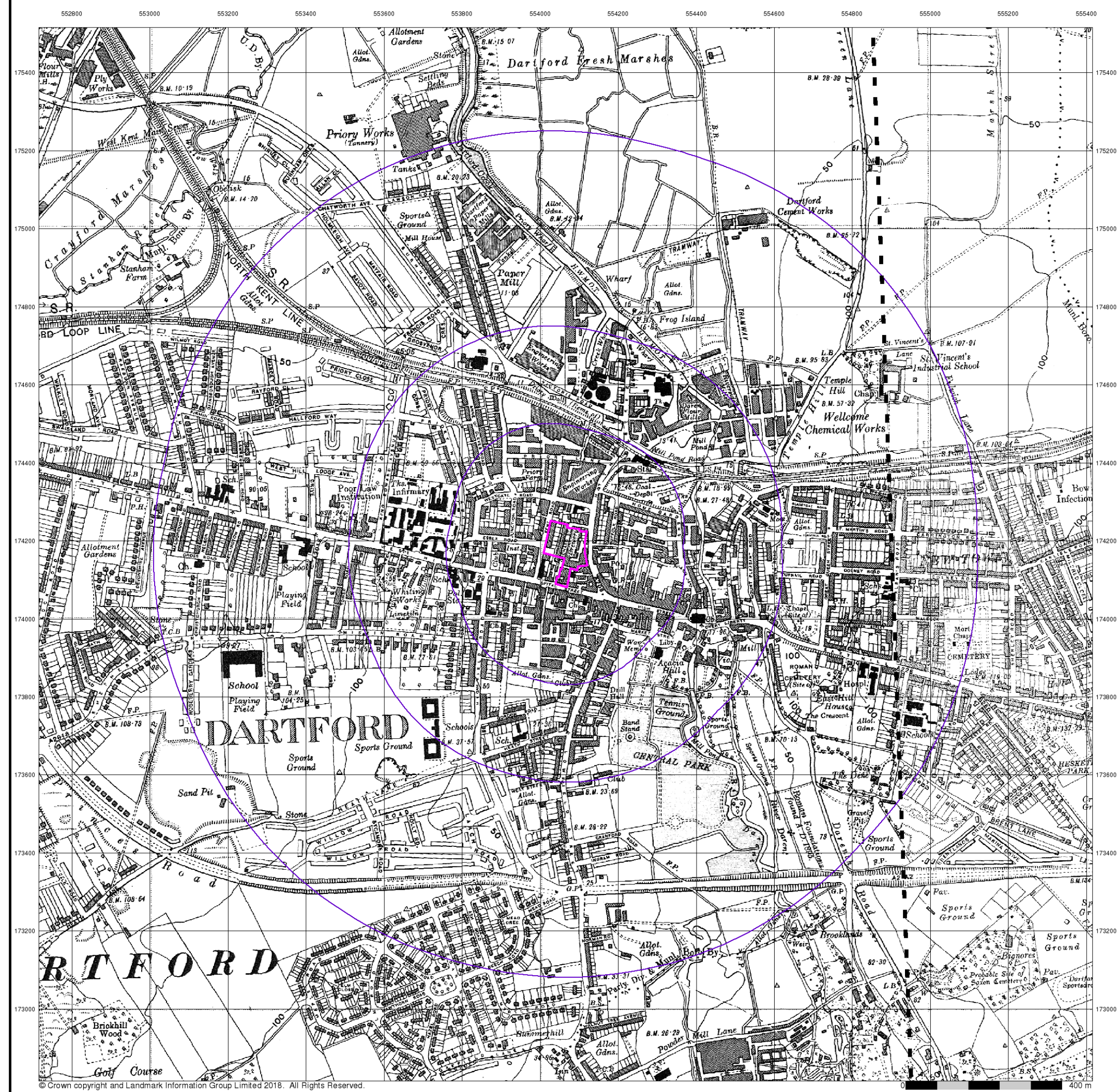


Historical Map - Slice A



Order Details
 Order Number: 168151210_1_1
 Customer Ref: 18-0704.01
 National Grid Reference: 554070, 174170
 Slice: A
 Site Area (Ha): 1.07
 Search Buffer (m): 1000

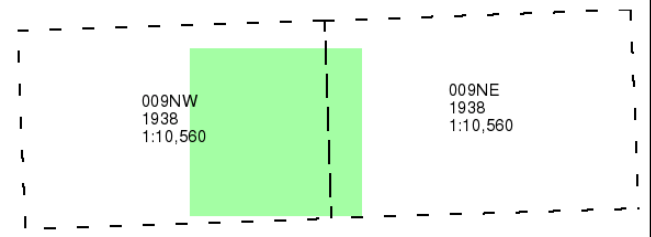
Site Details
 Westgate, DARTFORD, DA1 2DF



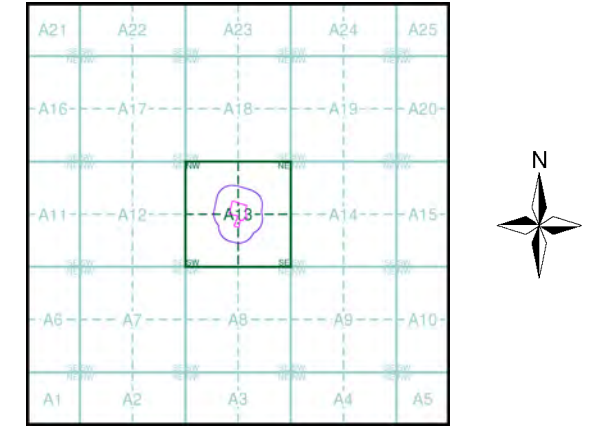
Kent
Published 1938
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 168151210_1_1
 Customer Ref: 18-0704.01
 National Grid Reference: 554070, 174170
 Slice: A
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Site Details

Westgate, DARTFORD, DA1 2DF

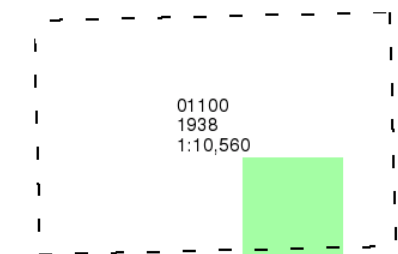
London

Published 1938

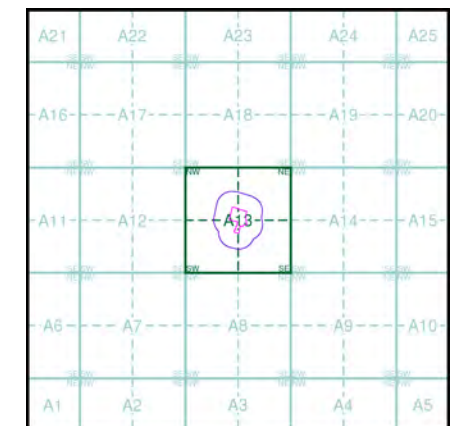
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A

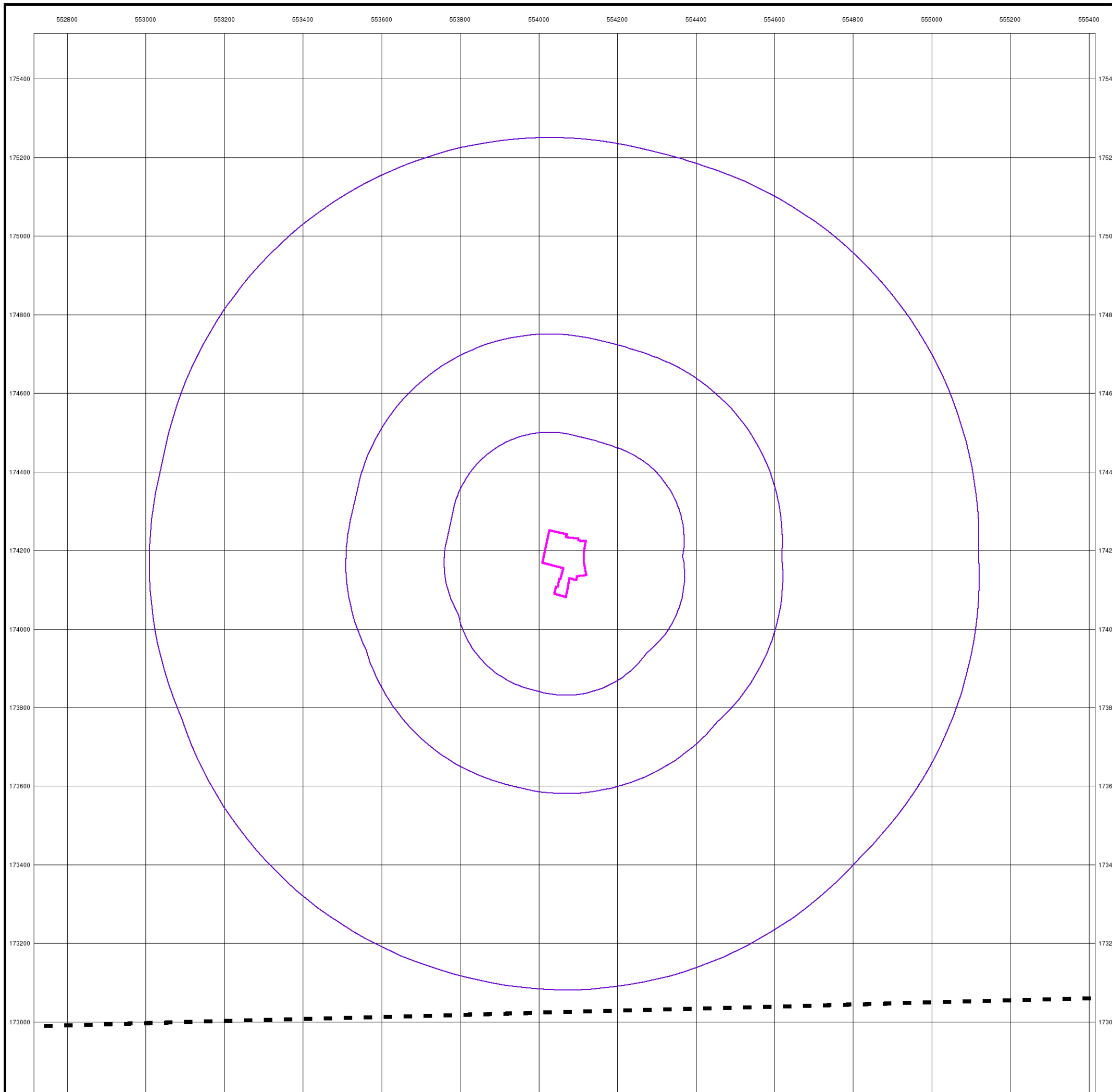


Order Details

Order Number: 168151210_1_1
Customer Ref: 18-0704.01
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Slice: A
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Site Details

Westgate, DARTFORD, DA1 2DF

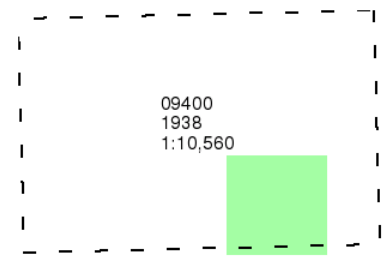




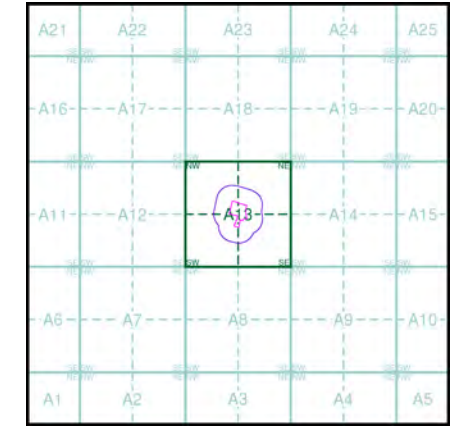
Essex
Published 1938
Source map scale - 1:10,560

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

Map Name(s) and Date(s)

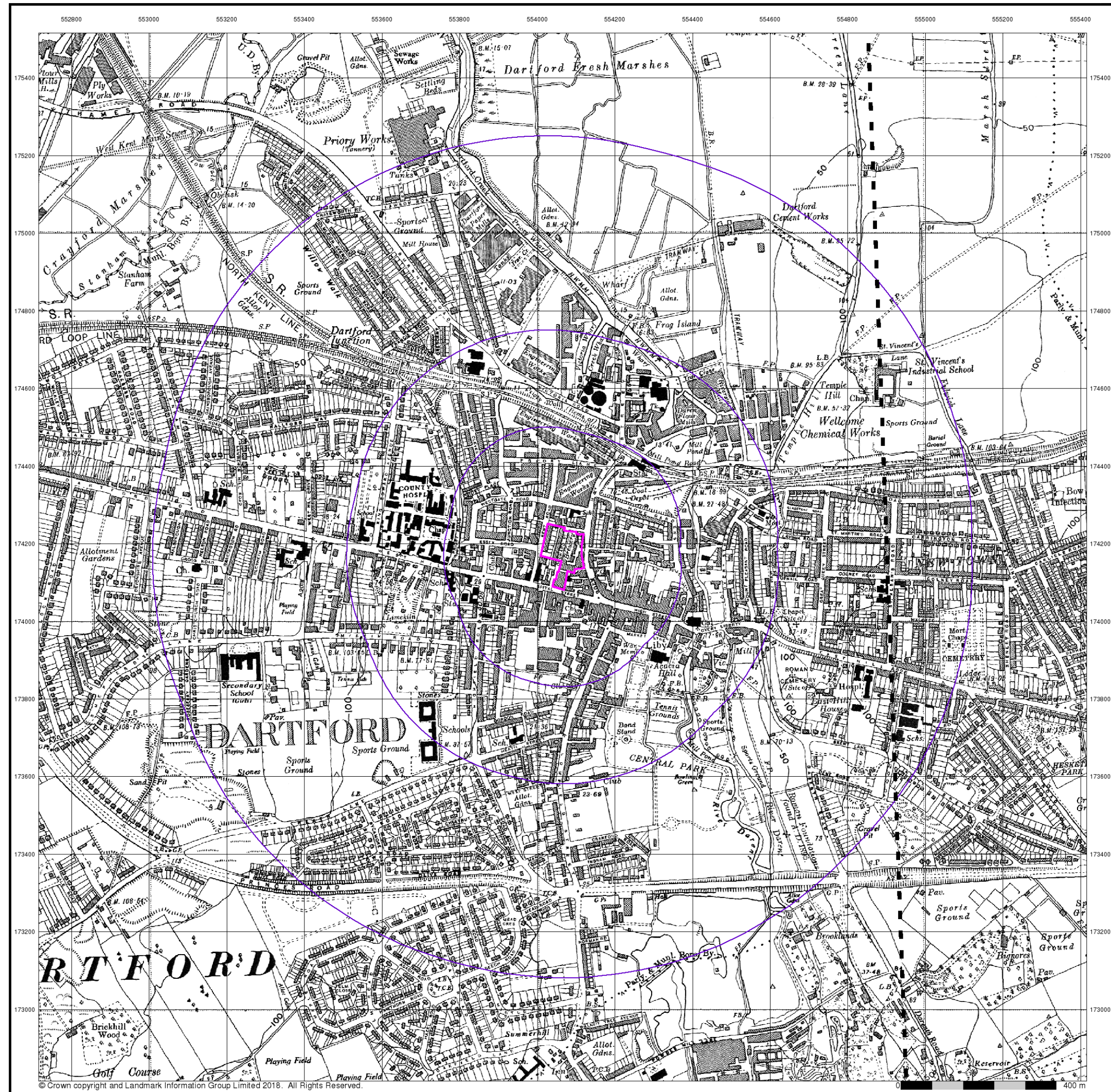


Historical Map - Slice A



Order Details
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 National Grid Reference: 554070, 174170
 Slice: A
 Site Area (Ha): 1.07
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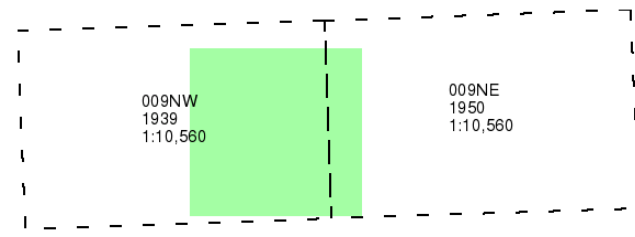
Site Details
 Westgate, DARTFORD, DA1 2DF



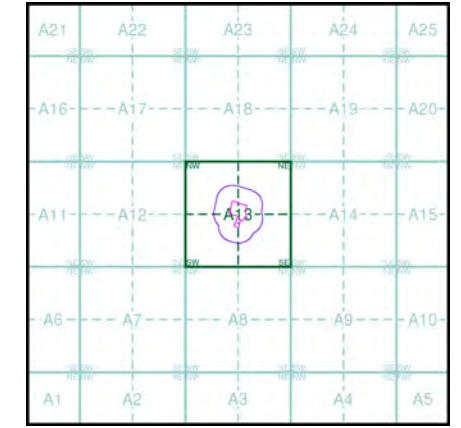
Kent
Published 1939 - 1950
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 168151210_1_1
 Customer Ref: 18-0704.01
 National Grid Reference: 554070, 174170
 Slice: A
 Site Area (Ha): 1.07
 Search Buffer (m): 1000

Site Details

Westgate, DARTFORD, DA1 2DF

Historical Aerial Photography

Published 1947 - 1948

Source map scale - 1:10,560

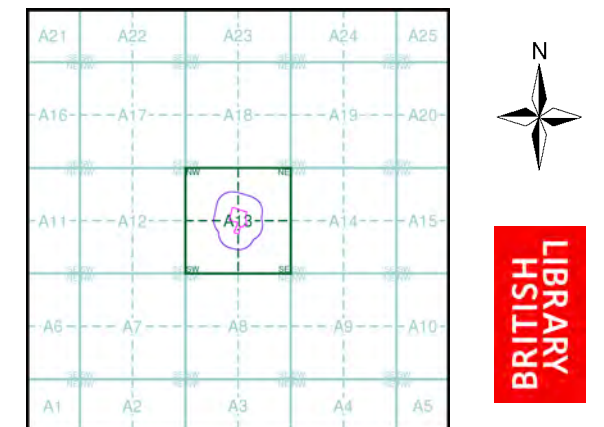
The Historical Aerial Photos were produced by the Ordnance Survey at a scale of 1:1,250 and 1:10,560 from Air Force photography. They were produced between 1944 and 1951 as an interim measure, pending preparation of conventional mapping, due to post war resource shortages. New security measures in the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

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Map Name(s) and Date(s)

TQ57NW 1948 1:10,560	TQ57NE 1947 1:10,560
TQ57SW 1947 1:10,560	TQ57SE 1947 1:10,560

Historical Aerial Photography - Slice A



Order Details

Order Number: 168151210_1_1
 Customer Ref: 18-0704.01
 National Grid Reference: 554070, 174170
 Slice: A
 Site Area (Ha): 1.07
 Search Buffer (m): 1000

Site Details

Westgate, DARTFORD, DA1 2DF



Historical Aerial Photography

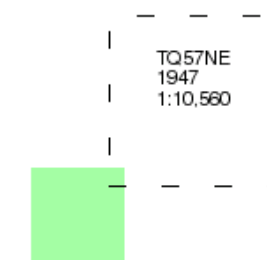
Published 1947

Source map scale - 1:10,560

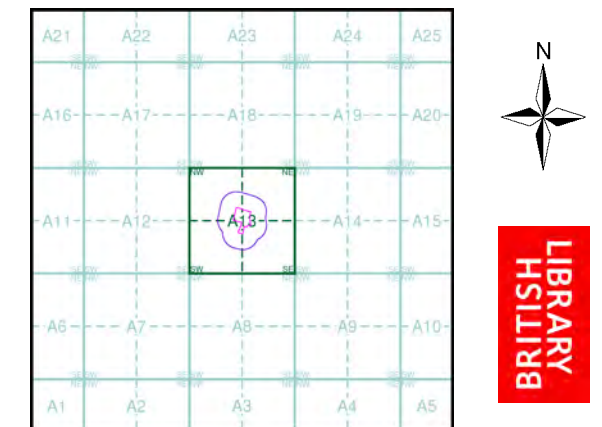
The Historical Aerial Photos were produced by the Ordnance Survey at a scale of 1:1,250 and 1:10,560 from Air Force photography. They were produced between 1944 and 1951 as an interim measure, pending preparation of conventional mapping, due to post war resource shortages. New security measures in the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

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Map Name(s) and Date(s)



Historical Aerial Photography - Slice A



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