Gladman Developments Ltd

Land of Dover Road, Deal

Preliminary risk assessment

28927 R01 (03)

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RSK GENERAL NOTES

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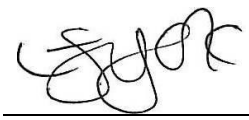
Signature		Signature	
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1 INTRODUCTION

1.1 Background

RSK Environment Limited (RSK) was commissioned by Gladman Developments Limited to carry out a geo-environmental assessment of the land off Dover Road, Deal. It is understood the site is being considered for development with the construction of approximately 85 no. residential dwellings.

This report is subject to the RSK service constraints given in Appendix A.

1.2 Aim

The aim of the work is to complete a Preliminary Risk Assessment (PRA) of the proposed development area to inform geo-environmental design constraints and to support a planning application for development at the site. The PRA will obtain information regarding anticipated ground conditions and potential contaminant sources from which risks to end-users, the environment and structures can be assessed.

In addition, the assessment was undertaken to determine the possible ground related geotechnical hazards and provide an outline of recommendations for intrusive investigations.

1.3 Scope

The scope of the investigation and layout of this report has been designed with consideration of CLR11 (Environment Agency, 2014) and BS 10175: 2013 (BSI, 2013) and guidance on land contamination reports issued by the Environment Agency (EA) (2010a).

The project was carried out to an agreed brief as set out in RSK's proposal (ref. 28927-T01(00)/rs, dated 28th October 2016) The scope of works for the assessment included:

- a preliminary risk assessment (PRA) to include a review of geological, hydrogeological and hydrological information, a commercially available environmental database, and historical plans; correspondence with regulatory authorities;
- a site walkover – this information is used to develop an initial conceptual site model to consider any potentially complete pollutant linkages
- consideration of the potential risk from UXO
- recommendations for intrusive investigation

1.4 Existing reports

RSK are unaware of any previous reports pertaining to the site

1.5 Limitations

The comments given in this report and the opinions expressed are based on information gathered during the site walkover and through relevant searches. However, there may be conditions pertaining to the site that have not been disclosed and therefore could not be taken into account.

2 THE SITE

2.1 Site location and description

The site is located off Dover Road, Deal at National Grid reference 636710, 149570 as shown on Figure 1. The nearest postcode is CT14 7PG.

The area around the site mainly comprises of residential dwellings and arable land as detailed in Table 1.

Table 1: Site setting

To the north:	Residential dwellings, caravan park (north west)
To the east:	Agricultural land
To the south:	Farm/ Reservoir/Agricultural land
To the west:	Dover Road with residential dwellings beyond

The site covers approximately 4.06 hectares at an elevation of approximately 40-45m above Ordnance Datum (AOD) and slopes gently to the east. Based on publically available Ordnance Survey maps, the land slopes downwards from south west to north east and there appears to be no prevailing gradient of 1 in 12 or steeper at the site. A full topographic survey would be recommended to confirm this.

The site comprises of the following main attributes (some of which are shown on Figure 2):

- Dwellings on the northwest corner of the site.
- Grassland extending through the proximity of the site.
- Trees extending from the north to southwest portion of the site.

2.2 Proposed development

It is understood that the site is under consideration for redevelopment with approximately 85 residential dwellings. RSK is unaware of any further details regarding the proposed development layout or associated infrastructure.

3 PRELIMINARY RISK ASSESSMENT (PRA)

3.1 Site walkover

The site was visited on Tuesday 8th November to undertake a site walkover. Photographs and the site walkover checklist are provided in Appendix C. The site is currently used for horse riding with grass cover. Woodland is present within the eastern and southern portion of the site. No potentially significant ground contamination or geotechnical issues were identified during the site reconnaissance survey.

Japanese knotweed was not identified during the site visit. However, Japanese knotweed is difficult to identify outside the growing season (March to September/October). As the site visit was conducted in November, it is unlikely that any Japanese knotweed present could be identified accurately and, as such, we recommend that the site be resurveyed during the growing season.

3.2 Ground condition

3.2.1 Geology

Published records (British Geological Survey, Geoindex: available online at www.bgs.ac.uk) for the area indicated the geology of the site to be characterised by the succession recorded in Table 2.

Table 2: Geology at the site

Geological unit	Description	Estimated thickness (m)
Superficial		
Head (Silt and Clay)	Head - Polymict deposit: comprises gravel, sand and clay depending on upslope source and distance from source. Poorly sorted and poorly stratified deposits formed mostly by solifluction and/or hillwash and soil creep. Essentially comprises sand and gravel, locally with lenses of silt, clay or peat and organic material.	3.5-5.0
Bedrock		
Seaford Chalk Formation	Firm white chalk with conspicuous semi-continuous nodular and tabular flint seams. Hardgrounds and thin marls are known from the lowest beds. Some flint nodules are large to very large.	69.0
Source: BGS Geoindex		

The history of development at the site indicates that there is a potential for made ground to be encountered within the sites northwestern corner. The historical borehole record (TR3 4NE22) from the BGS website immediately southwest of the site highlights 0.40m of Made Ground, with 0.20m of concrete and 0.20m of chalk and brick fill.

3.2.1.1 Chalk Cavity Risk Assessment

In view of the prevailing ground conditions, with chalk at shallow depth beneath the site, it is normal practice to consider the potential risk of ground subsidence related to the presence of swallow holes and other natural chalk solution features or man-made cavities.

With reference to Edmund's database of recorded cavities, there are no recorded natural solution features within 500 m of the site. The nearest feature is a solution pipe located approximately 2.4 km south-east of the site

With reference to natural chalk solution features, based on the Edmund's risk assessment model for the prediction of natural dissolution features referred to in CIRIA Report C574 (Lord et al. 2002), the site falls into the 'low anticipated subsidence risk' category.

This inference is supported by the environmental database report (Envirocheck, November 2016; Appendix E) which, based on information provided by the British Geological Survey; identifies the potential for ground dissolution stability hazards at the site as 'low' to 'very low'.

With regard to anthropogenic features, the environmental database report (Appendix E) identifies a series of chalk pits within 1km of the site, the closest of which is listed as the Ringwould Chalk Pit located 630m south of the site. In addition, the environmental database report indicates that a brick-lined shaft has been identified within the chalk some 209m north of the site, however further details of this feature were not available at the time of writing.

It is noted, however, that based on the historical maps there is at least one other historic chalk pit within the immediate vicinity of the site; which does not appear to be listed within the Envirocheck Datasheet. The feature is shown on the historic map dated 1872, labelled as 'Old Chalk Pit', and is located some 120m south east of the site boundary.

Review of the historical maps obtained as part of the environmental database report indicates that a covered reservoir also was constructed adjacent south of the site c.1898, associated with Deal Water Works, and a second open reservoir was constructed adjacent south of the site in the 1980's. Details of the construction and purpose of these features were not available at the time of writing.

Although the risk generally remains low, given the presence of surface features within the vicinity of the site, it would be prudent to allow for an increased density of investigation at the site in order to confirm the ground conditions and identify any previously unrecorded shallow workings or areas of instability.

3.2.2 Radon

The environmental database report (Envirocheck, November 2016; Appendix E) indicates that site is located within an area where 1 – 3% of homes are above the Action Level as defined by the Documents of the National Radiological Protection Board (Radon Atlas of England and Wales, NRPB-W26-2002).

The environmental database report notes that no radon protection measures are necessary in the construction of new buildings.

3.2.3 Mining and quarrying

Evidence has been sought to identify any mining and quarrying operations, past and present, which have taken place within 250m of the site. The sources of information referenced in this element of the desk study include:

- an environmental database report (Envirocheck report, November 2016, Appendix E)
- Old Ordnance Survey maps and plans contained within the Envirocheck report
- Geological maps

With reference to the above data, there are no recorded *mines or quarries* within a *250m* radius of the site. However, there is one record of a man-made cavity within 250m of the site, which is 209m north of the site described as a brick-lined shaft, uncovered-exact detail unknown. Furthermore, there are nine records of BGS recorded mineral sites between 250m and 1000m from the site, all of which are ceased. The closest of these records is 268m south-east and is recorded as a gravel pit.

The environmental database report (Envirocheck, November 2016; Appendix E) indicates that the site is situated within a coal mining affected area, which is described as an area which may be affected by coal mining activities. This is due to the presence of the Kent Coalfield, which underlies the site at significant depth. A CON29M non-residential mining report (Ref. 51001314431001; dated 6 December 2016; Appendix F) confirms that:

- Past underground coal mining - The property is not within a surface area that could be affected by past underground mining.
- Present underground coal mining - The property is not within a surface area that could be affected by present underground mining.
- Future underground coal mining - The property is not in an area where the Coal Authority has plans to grant a licence to remove coal using underground methods. The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods. The property is not in an area likely to be affected from any planned future underground coal mining. However, reserves of coal exist in the local area which could be worked at some time in the

future. No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

- Mine entries - There are no known coal mine entries within, or within 20 metres of, the boundary of the property.
- Coal mining geology - The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining.
- Past opencast coal mining - The property is not within the boundary of an opencast site from which coal has been removed by opencast methods

3.2.4 Landfilling and land reclamation

Evidence has been sought to identify any landfilling or land reclamation operations, past and present, which have taken place within 250m of the site. The sources of information referenced in this element of the desk study include:

- environmental database report (Envirocheck November 2016, Appendix E)
- EA What's in your backyard online viewer

There are no records of landfill sites (former or current) within 250m of the site. The nearest landfill is located approximately 990m south, (Ringwould Road, Kingsdown, Kent) dated from 1969 and associated with deposited waste inclusive of inert waste.

A search of the EA 'What's in your backyard' interactive viewer shows the former landfill site at Ringwould Road.

3.3 Hydrogeology

3.3.1 Aquifer characteristics

The bedrock geology underlying the site have been classified as a Principal Aquifer, with the superficial/ drift deposits recorded as being unproductive strata.

The anticipated depth to the groundwater table is in the order of 40m below ground level. Shallow groundwater in the site area is anticipated to flow in an easterly direction.

Groundwater beneath the site may be affected by saline intrusion. Groundwater levels in the Seaford Chalk (bedrock geology) at the site may be affected by tidal variations.

It is also possible that localised perched water may be present within the Head Deposits or within isolated made ground.

3.3.2 Vulnerability of groundwater resources

The site has been classified by the EA website to overlie a:

- Principal Aquifer within the Seaford Chalk Formation (bedrock geology): layers of rock or drift deposit that have high intergranular and/or fracture permeability (usually providing a high level of water storage). They may support water supply and/or river base flow on a strategic scale. The online BGS geoindex describes the aquifer as being up to 450m thick and yielding 50 to 100 l/s from large diameter boreholes and up to 300 L/s from addited systems, providing hard to very hard, good quality water.
- 'Unproductive' strata within the head deposits (superficial/drift deposits): low permeability with negligible significance for water supply or river base flow.

The soils beneath the site are classified as having INTERMEDIATE (I) leaching potential I -soils that have a moderate ability to attenuate diffuse source pollutants or where some non-adsorbed diffuse source pollutants and liquid discharges could penetrate the soil layer. The site is immediately adjacent to an area of HIGH (H) leaching potential.

3.3.3 Licensed groundwater abstraction

The environmental database (Envirocheck report, November 2016, Appendix E) report indicates that there are eight current licensed groundwater abstractions (five of which are public water supply boreholes) within a 2km radius of the site summarised in Table 3.

The nearest is located approximately 60m to the southwest of the site and is operated by Kingsdown Water for water bottling purposes.

Table 3: Groundwater abstractions

Reference	Distance and orientation from site	Comment
So/040/0014/003	60m southwest	Food and Drink: Water bottling Operated by: Kingsdown Water
14/032	61m southwest	Food and Drink: Water bottling Operated by: Mr W Bomer
9/40/04/0497/G	1163m south	Potable water supply Operated by: Affinity Water Ltd,
9/0/04/0497/G	1173m south	Potable water supply Operated by Affinity Water Ltd
4/0279/GR	1185m north	Public water supply Operated by Southern Water Services Ltd
9/40/04/0279/Gr	1316m north	Potable water supply Operated by Southern Water Services Ltd

Reference	Distance and orientation from site	Comment
9/40/04/0150/Gr	1579m west	Horticulture and Nurseries: General use Operated by Mr and Mrs B & R Liversidge

Review of historical borehole logs and the extraction license indicates that the Kingsdown water abstraction well currently extracts water from the aquifer between 49m and 70m with an annual abstraction rate of 43800 litres.

In terms of aquifer protection, the EA generally adopts a three-fold classification of source protection zones (SPZ) for public supply abstraction wells.

- zone 1 or 'inner protection zone' is located immediately adjacent to the groundwater source and is based on a 50-day travel time from any point below the water table to the source. It is designed to protect against the effects of human activity and biological/chemical contaminants that may have an immediate effect on the source
- zone 2 or 'outer protection zone' is defined by a 400-day travel time from a point below the water table to the source. The travel time is designed to provide delay and attenuation of slowly degrading pollutants.
- zone 3 or 'total catchment' is the area around the source within which all groundwater recharge is presumed to be discharged at the source.

Information available on the EA website indicates that the site does not lie within a currently designated groundwater Source Protection Zone. Although, the site lies 1000m south and 500m north of a zone 1, 2 and 3 groundwater source protection zone.

3.4 Hydrology

3.4.1 Surface watercourses

There are no ponds, streams or drainage ditches on or adjacent to the site, however two reservoirs are situated directly south of the site. Information from the land owner indicates that both reservoirs are redundant. The western reservoir was sold by the local water authority and subsequently received planning permission for conversion to a domestic dwelling. The reservoir to the east is owned by the land owner and is no longer in use.

There is one record of a pollution incident to controlled waters within 1km of the site, which is 880m west dated from 1997 and associated with a minor incident (category 3) involving the release of organic waste (cattle manure).

3.4.2 Surface water abstractions

The environmental database report (Envirocheck report, November 2016, Appendix E) indicates that there no currently licensed surface water abstractions within a 1km radius of the site.

3.4.3 Site drainage

From the site walkover there was no evidence of site drainage. However, there may be land drains present at the site.

3.4.4 Preliminary flood risk assessment

The indicative floodplain map for the area, published by the EA, shows that the site does not lie within 100m of a zone 2 or zone 3 flood zone.

This report is not intended to replace a full hydrological study.

3.5 History of site and surrounding area

The history of the land-use and development of the site and surrounding area has been assessed based on the following sources:

- historical maps within the environmental database from 1872 to 2016;
- An internet search
- Aerial photography.

Copies of OS and County Series maps are included in the environmental database report in Appendix E Other details of the development history of the site are also included in Appendix E Reference to historical maps provides invaluable information regarding the land use history of the site, but historical evidence may be incomplete for the period pre-dating the first edition and between successive maps.

The development history of the site and surrounding area from the above sources is detailed in Table 4 and demonstrates that the site has remained undeveloped since the earliest recorded maps, with the exception of Kings Farm, which is within the northwest boundary of the site and is shown to be present on 1898- 1993(1:10000) map editions.

The historical maps show the surrounding environs to be largely arable in nature, with a growing residential nature with time. Residential dwellings extend north and southeast of the site from 1907 onwards. Possible contaminative land uses from the historical maps include; chalk and gravel pits, brick works, brewery and petrol filling station.

Table 4: Summary of historical development

Date	Land use/features on site	Land use/features in vicinity of site (of relevance to the assessment)
1872	The site is undeveloped with the exception of Kings Farm which was situated in the north-western portion of the site.	A brewery is situated approximately 200m north and an old chalk pit is labelled 110m southeast.
1877	No significant change	Brick pits located 370m south-west
1898	No significant change	A windmill is situated 500m southwest and a reservoir immediately south and a railway line is situated 600m southwest running in a northeast to southwest orientation.
1907	No significant change	Brick works are situated northwest of the site and a gravel pit 220m east.
1938	No significant change	Reservoir immediately southwest of site
1957	No significant change	Reservoir immediately south of the site
1960	No significant change	The brewery is now labelled as unspecified works and the old reservoir is now a covered reservoir with a new reservoir immediately south of the site.
1973	No significant change	Windmill is marked as disused.
1981	No significant change	No significant change
1986	No significant change	Petrol filling station situated 200m southwest.
1987	Kings Farm is no longer shown on the maps and appears to have been demolished	No significant change
1990	No significant change	No significant change
1993	No significant change	Tank is labelled 200m south
1999	No significant change	No significant change
2016	No significant change	No significant change

3.6 Sensitive land uses

No national or internationally designated sensitive land uses such as sites of special scientific interest (SSSI) were identified in the vicinity of the site. The site lies within a nitrate vulnerable zone.

A comprehensive evaluation of ecological receptors is outside the scope of this report.

3.7 Licenses and permissions

There are two records relating to local authority environmental permits within a 1km radius of the site. Both of which are associated with the Mill Service Station situated approximately 205m southwest of the site for the operation of a petrol filing station. Both of these have been revoked.

3.8 Local authority environmental health department information

RSK Environment Ltd submitted an enquiry to Dover District Council on 16th November 2016 and which was replied to via email on the 21st November 2016. The council have indicated that there are no known contaminated land issues associated with the site. The response from the council is presented within Appendix F

3.9 Unexploded ordnance

Publically available online maps (www.zetica.com) were consulted as an initial assessment of the potential for unexploded ordnance to be present at the site. The regional report for Kent identifies the area around Deal and Walmer as potentially high bomb risk. A preliminary UXO risk assessment report for the site is recommended.

4 INITIAL CONCEPTUAL MODEL

The information presented in Sections 2 and 3.1 to 3.9, has been used to compile an initial conceptual model. The identified potential sources of contamination, associated contaminants and receptors have been considered with plausible pathways that may link them. The resulting potential pollutant linkages are considered in Section 4.5. The risk classification has been estimated in accordance with information in Appendix D

4.1 Summary of potential contaminant sources

Potential sources and contaminants of concern are summarised in Table 5.

Table 5: Potential sources and types of contamination

Potential sources	Contaminants of concern
On-site historical	
Potential made ground associated with the construction of Kings Farm (north-west corner)	Unknown fill material, but potentially including heavy metals, ash, clinker, sulphates, polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons, asbestos etc
On-site present day	
Potential made ground associated with the demolition of Kings Farm/ Barn Agricultural use of the land.	Made Ground in northwest corner- unknown fill material, but potentially including heavy metals, ash, clinker, sulphates, polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons, asbestos etc Agricultural use – pesticides and herbicides
Off-site	
Petrol filling station and associated storage tanks, 205m southwest	Hydrocarbons, petroleum spirit, ethylene glycol, methyl tertiary butyl ether (MTBE), oil and waste oil, chlorinated and non-chlorinated solvents, asbestos, sulphuric acid, metal and metal compounds
Various industrial land uses including: brickworks (600m northwest), brewery (200m north), unspecified works (200m north) and windmill (500m southeast) and railway land (300m northeast).	Fuel oils, lubricating oils, heavy metals, polychlorinated biphenyls (PCBs), PAHs, solvents and other common industrial contaminants
Adjacent and nearby former and current industrial activities	Fuels, oils, solvents, heavy metals and ubiquitous industrial chemicals
Potentially infilled former chalk pit (110m southeast -1872map) and	Ground gases/ leachates from infill materials

Potential sources	Contaminants of concern
gravel pit 220m east	
Gas **sources and gas generation potential in line with BS8576**	
Made Ground in the northwest corner	Methane and carbon dioxide
Natural soils with high carbonate content - Chalk (very low gas generation potential)	Carbon dioxide
Infilled chalk pit – 60m southeast, infilled gravel pit 220m east	Methane and carbon dioxide

Potential sources of contamination on-site are anticipated to be largely restricted to any discrete areas of made ground associated with Kings Farm situated within the northwest portion of the site or potentially associated with the use of pesticides / herbicides on the agricultural land

The immediate surrounding environs comprise of residential dwellings and agricultural land. The old petrol filling station situated 205m southwest could be a potential source of contamination as could the infilled chalk pit represent a potential source of ground gas. It is deemed that other potential contaminative activities are located at a great enough distance from the site to not be a potential cause of concern.

4.2 Sensitive receptors

Sensitive receptors at this site include:

- future site occupants
- adjacent site users
- vegetation
- potable water supply pipes
- groundwater beneath the site
- groundwater in wider aquifer body (including abstractions)

It is noted that there are no nearby surface water abstractions other than the two reservoirs noted to the south of the site. Both of the reservoirs are noted to be redundant and as such they are not considered as relevant receptors

4.3 Summary of plausible pathways

The plausible pathways are summarised below:

- direct contact (soil, dust and vegetable ingestion, dermal contact, dust and fibre inhalation)

- ground gas and soil gas inhalation
- vertical and lateral migration including leaching
- root uptake
- chemical attack of infrastructure (including water supply pipes) and buildings.

4.4 Data gaps and uncertainties

At this stage the presence and constituents of made ground in the north-western part of the site is not known.

4.5 Potentially complete pollutant linkages

An estimate of the risk associated with each linkage is summarised in Table 6

The risk classification has been undertaken in accordance with CIRIA C552 (Rudland et al., 2001), a summary of which is included in Appendix D.

Linkages with a risk classification of moderate/low or above are 1, 5, 6, 12 and 13. These relate to potential made ground at the site and on-site and off-site gas generation.

- Linkage 1: Chemicals associated with possible made ground on-site related to the development of Kings farm and barn through the site, affecting future site users by direct contact
- Linkage 5: Ground gas from on-site sources affecting future site users by inhalation
- Linkage 6: Ground gas from off-site sources affecting future site users by inhalation
- Linkage 12: Ground gas from off-site sources affecting on-site buildings and infrastructure by gas migration
- Linkage 13: Ground gas from on-site sources (made ground) affecting on-site buildings and infrastructure by gas migration

It should be noted that the risk of ground gases is somewhat biased by the severe risk associated with acute inhalation risks and explosion. Overall the risk for the site is considered to be low.

Table 6: Risk estimation for potentially complete pollutant linkages

Pollutant Linkage	Potential Contaminant	Possible pathway	Potential receptor	Likelihood	Severity	Risk and justification
Human Health						
1	Potential made ground associated with the former Kings Barn and Farm in the sites north-west corner	Direct contact (soil, dust and vegetable ingestion, dermal contact, dust and vapour inhalation)	Future site users	Low	Medium	**Moderate/low risk.** Areas subject to potential contamination are anticipated to be restricted to a discrete area within the north-western portion of the site, which represents a very small proportion of the site. However direct contact in these areas could lead to chronic damage to human health.
2		Inhalation of vapours from impacted groundwater or dust	Adjacent site users	Unlikely	Medium	**Low risk.** Areas subject to potential contamination are anticipated to be isolated to a discrete area in the north-western part of the site. It is considered unlikely that significant contamination will be present that could impact off-site end users via groundwater/vapour inhalation or dust inhalation pathways
3	Pesticides / herbicides associated with the agricultural use of the land	Direct contact (soil, dust and vegetable ingestion, dermal contact, dust and vapour inhalation)	Future site users	Unlikely	Medium	**Low risk**. Recent or current use will have been subject to existing controls and residual contamination associated with this possible use is not considered to be of concern for future receptors at the site.
4			Adjacent site users	Unlikely	Medium	**Low risk**. Recent or current use will have been subject to existing controls and residual contamination associated with this possible use is not considered to be of concern for adjacent site users.

Pollutant Linkage	Potential Contaminant	Possible pathway	Potential receptor	Likelihood	Severity	Risk and justification
5	On-site ground gas generation (Chalk and/or made ground)	Inhalation	Future site users	Unlikely	Severe	**Moderate/low risk.** Anticipated areas of potential made ground are thought to be small and localised, and unlikely to contain large volumes of organic material. Chalk is a natural sources of ground gas (CO_2), although generation potential is typically low. Risks from ground gas are acute and therefore a severity rating of severe has been determined.
6	Off-site ground gas generation from infilled chalk and gravel pits	Inhalation	On-site buildings and infrastructure	Unlikely	Severe	**Moderate/low risk.** Potential off-site sources of ground gas (methane or carbon dioxide) are associated with the infilled chalk and gravel pits
Controlled waters						
7	Potential made ground associated with the construction of Kings Barn and Farm in the sites north-west corner	Vertical and lateral migration via leaching	Groundwater in Principal Aquifer	Unlikely	Medium	**Low risk.** Areas subject to chemical contamination anticipated to be isolated to possible discrete areas of made ground associated with the north-western portion of the site.
8	Pesticides / herbicides associated with the agricultural use of the land	Vertical and lateral migration via leaching	Groundwater in Principal Aquifer	Unlikely	Medium	**Low risk**. Recent or current use will have been subject to existing controls and residual contamination associated with this possible use is unlikely to be present in significant concentrations to impact groundwater.
Building Infrastructure						
9	Potential made ground associated with the construction of Kings barn/ farm.	Chemical attack	On-site buildings and infrastructure	Low	Mild	**Low risk.** Potential for chemical attack of foundations in areas impacted by chemicals (possibly associated with discrete areas of made ground).

Pollutant Linkage	Potential Contaminant	Possible pathway	Potential receptor	Likelihood	Severity	Risk and justification
10		Permeation	On-site potable water supply	Unlikely	Medium	**Low risk.** Considered that there is a low potential for significant concentrations of hydrocarbons to be present that would permeate into potable water supply pipes and pose a health risk.
11	Pesticides / herbicides associated with the agricultural use of the land	Permeation	On-site potable water supply	Unlikely	Medium	**Low risk**. Recent or current use will have been subject to existing controls and residual contamination associated with this possible use is not considered to be of concern for potable water supply pipes at the site.
12	Off-site ground gas generation from infilled chalk and gravel pits	Explosion	On-site buildings and infrastructure	Unlikely	Severe	**Moderate/low risk.** Potential off-site sources of ground gas (methane or carbon dioxide) are associated with the nearby chalk and gravel pits that have been infilled. However due to size and distance it is considered unlikely that they represent a significant risk.
13	On-site ground gas generation (made ground)	Explosion	Future site users	Unlikely	Severe	**Moderate/low risk.** Anticipated areas of potential made ground are thought to be small and localised, and unlikely to contain large volumes of organic material. Risks from ground gas are acute and therefore a severity rating of severe has been determined

5 CONCLUSIONS AND RECOMMENDATIONS

Generally the Conceptual Site Model (CSM) for the site has indicated that overall the risk for the site is low with potentially higher risks of low/moderate associated with direct contact of contaminants associated with made ground in the sites north-western corner and in relation to ground gases associated with the made ground, chalk and off-site sources.

Based on the potential pollutant linkages with a risk of moderate or above, site investigation works should, in addition to providing general coverage of the site, be targeted to ground in proximity within the north-western portion of the site where Kings barn and farm was previously present.

Chalk is present across the site and is considered as a natural ground gas source (carbon dioxide) with a low gas generation potential. In addition the made ground present in the northwest corner may represent a potential ground gas source with a low gas generation potential.

The CSM also identified that infilled pits located offsite may also represent a potential source of ground gas, likely with a low to moderate gas generation potential. It should be noted that monitoring wells with a response zone within chalk can produce elevated carbon dioxide concentrations, albeit with low flow rates.

Further investigation into potential ground gases should be undertaken to confirm the low generation potential of these identified sources.

There are no specific geotechnical recommendations relating to the presence of chalk beneath the site due to a low risk classification. However during the site investigation works a watching brief should be maintained for any unrecorded anthropogenic features relating to the presence of chalk such as pits or shafts.

A preliminary UXO risk assessment report is recommended for the site.

The environmental database report notes that no radon protection measures are necessary in the construction of new buildings.

5.1 Foundations

Based on the published geological records, the Seaford Chalk Formation is likely to be present at relatively shallow depth. In addition, the chalk is likely to be overlain a veneer of Head deposits across the majority of the site; although superficial cover deposits are shown to be absent within the south-western corner.

Subject to site investigation to confirm the condition of the shallow chalk and the degree of near surface weathering, the ground conditions may be suitable for the design

and construction of relatively shallow spread foundations for the proposed residential development. In addition, there is the potential that shallow foundations may be constructed within the Head Deposits, subject to intrusive investigation to confirm the bearing capacity characteristics.

As discussed within Section 3.2.1.1 above, the risk associated with natural dissolution features beneath the site is generally considered low. It is considered, however, that given the presence of anthropogenic surface features within the vicinity of the site, it would be prudent to allow for an increased density of investigation at the site in order to confirm the ground conditions and identify any previously unrecorded shallow workings or areas of instability.

It is recommended that site investigation works are carried out in order to inspect the competency of the shallow chalk, confirm the absence of any unrecorded shallow features, and enable the estimation of the allowable bearing pressure for design purposes.

Standard Penetration Tests (SPTs) should be undertaken within boreholes to assess the in-situ strength/density of the materials encountered.

In addition, given the likely variable thickness of superficial cover deposits across the site, the additional coverage is recommended in order to better understand the spatial distribution and bearing capacity characteristics of the shallow Head Deposits.

In the event that the investigation identifies the presence of possible solution features or abnormalities beneath the site, further targeted investigation is likely to be required, in the form of geophysical surveys, dynamic probing, or a combination of the above.

Should such features be encountered, the design mitigation options include stabilising the ground beneath spread foundations by a technique such as grouting, designing spread foundations to span over any future subsidence features, or piling down into stable chalk strata.

5.2 Drainage

The adoption of soakaway drainage or some other form of Sustainable Urban Drainage Systems (SUDS) into the Chalk should be assessed by a drainage engineer, together with consultation with the Environment Agency.

The infiltration characteristics associated with the shallow chalk may be suitable for the adoption of soakaways to discharge surface run off, subject to confirmation via in-situ testing. There is, however, the potential for future soakaways to exacerbate any existing unrecorded solution features, or initiate a new phase of solution feature formation, particularly in low-density chalk. For this reason, any soakaways should be sited well away from foundations for structures or roads, with general guidance indicated below:

- In areas where dissolution features are known to be prevalent, soakaways should be avoided if at all possible but, if unavoidable, should be sited at least 20m away from any foundations
- Where the chalk is of low density, or its density is not known, soakaways should be sited at least 10m away from any foundations
- Where the chalk is of medium density (or higher), the closest part of the soakaway should be at least 5m away from any foundations.

For the drainage systems, flexible jointed pipes should be used wherever possible; particular care should be taken for the avoidance of leaks in both water supply and drainage pipework in order to negate the potential for leaking infrastructure to channel water from a point source into the underlying chalk.

In addition, as the chalk is an important aquifer, the Environment Agency and local authority must be consulted when planning soakaway installations where chalk lies below the site.

5.3 Recommendations for further work

The following investigation works should be undertaken at the site as part of a Phase II intrusive ground investigation to address the potential contaminant linkages identified within the desk study and to provide further geotechnical information;

- A programme of shallow exploratory holes providing general coverage across the site to allow for sample collection and in-situ geotechnical testing. Additionally exploratory holes should be targeted to the north-west corner of the site, where made ground is possible from the construction and demolition of kings farm/ barn, to allow for targeted environmental sampling.
- An appropriate suite of geotechnical and chemical soil analysis, including speciated petroleum hydrocarbons in the vicinity of the site.
- Installation of ground gas monitoring wells across the site. Monitoring wells should be designed to target any made ground at the site and potential pathways

Infiltration rate tests to confirm the suitability of the underlying geology for drainage design and a preliminary unexploded ordnance risk assessment have been completed and issued under a separate cover.

6 BIBLIOGRAPHY

British Geological Survey, Onshore Geoindex (online). Available at; http://mapapps2.bgs.ac.uk /geoindex/home.html (accessed November 2016).

British Standards Institution (BSI) (1990), 'BS 1377:1990. Methods of test for soils for civil engineering purposes'.

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

British Standards Institution (2013), BS8576:2013. Guidance on investigations for ground gas – permanent gases and volatile organic compounds (VOCs).

Coal Authority, Interactive Map Viewer (online). Available at; http://mapapps2.bgs.ac.uk/coal authority/home.html (accessed November 2016).

Coal Authority (2016). CON29M Non-residential mining report. Ref 51001314431001, dated 6th December 2016.

Environment Agency (2004), *Model Procedures for the Management of Contaminated Land. Contaminated Land Report Number 11 (CLR11),* September (Bristol: Environment Agency).

Environment Agency, What's in Your Backyard (online). Available at; http://apps.environment-agency.gov.uk/wiyby/ (accessed November 2016).

Landmark Information Group (2016), 'Envirocheck report reference 103544487_1_1, dated 04 November 2016.

Zetica. UXO risk assessment online resource. http://zeticauxo.com/downloads-and-resources/risk-maps/

FIGURES

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Client: GLADMAN DEVELOPMENT

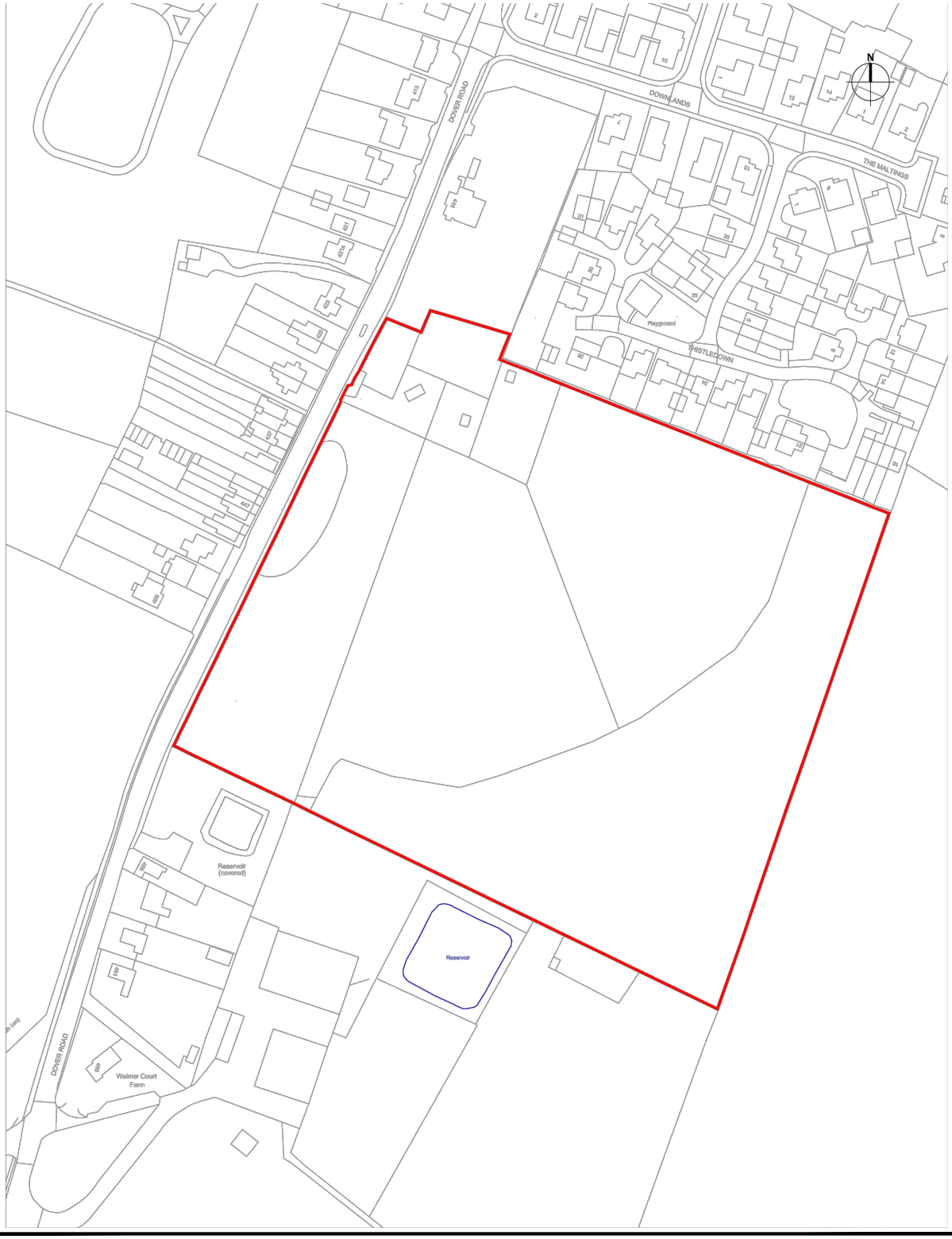
Project Title: DOVER ROAD, DEAL

Drawing Title: SITE LOCATION PLAN

Rev	Drawn	Date	Checked	Date	Approved	Date
01	AP	29.11.16	SF	29.11.16	ARJ	29.11.16

Dimensions	Scale	Original Size
m	nts	A4

Project Number	Drawing File	Drawing Number
28927 - R01 (01)	28927 - R01(00) Fig 1.dwg	FIGURE 1



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Client: GLADMAN DEVELOPMENT

Project Title: DOVER ROAD, DEAL

Drawing Title: EXISTING SITE LAYOUT PLAN

Rev	Drawn	Date	Checked	Date	Approved	Date
01	AP	29.11.16	SF	29.11.16	ARJ	29.11.16

Dimensions	Scale	Original Size
m	nts	A4

Project Number	Drawing File	Drawing Number
28927 - R01 (01)	28927 - R01(00) Fig 2.dwg	FIGURE 2

APPENDIX A
SERVICE CONSTRAINTS

1. This report and the site investigation carried out in connection with the report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) for Gladman Developments ltd (the "client") in accordance with the terms of a contract between RSK and the "client", dated 25th October 2016. The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.

2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.

3. Unless otherwise agreed in writing the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. **Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.**

4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK 's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date of this report, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.

5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.

6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.

7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.

8. The intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and RSK] [based on an understanding of the available operational and historical information,] and it should not be inferred that other chemical species are not present.

9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (boreholes, trial pits etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for setting out and should be considered indicative only.

APPENDIX B
SUMMARY OF LEGISLATION AND POLICY RELATING TO CONTAMINATED LAND

Part IIA of the Environmental Protection Act 1990 (EPA) and its associated Contaminated Land Regulations 2000 (SI 2000/227), which came into force in England on 1 April 2000, formed the basis for the current regulatory framework and the statutory regime for the identification and remediation of contaminated land. Part IIA of the EPA 1990 defines contaminated land as 'any land which appears to the Local Authority in whose area it is situated to be in such a condition by reason of substances in, on or under the land, that significant harm is being caused, or that there is significant possibility of significant harm being caused, or that pollution of controlled waters is being or is likely to be caused'. Controlled waters are considered to include all groundwater, inland waters and estuaries.

In August 2006, the Contaminated Land (England) Regulations 2006 (SI 2006/1380) were implemented, which extended the statutory regime to include Part IIA of the EPA as originally introduced on 1 April 2000, together with changes intended chiefly to address land that is contaminated by virtue of radioactivity. These have been replaced subsequently by the Contaminated Land (England) (Amendment) Regulations 2012, which now exclude land that is contaminated by virtue of radioactivity.

The intention of Part IIA of the EPA is to deal with contaminated land issues that are considered to cause significant harm on land that is not undergoing development (see Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance, April 2012). This document replaces Annex III of Defra Circular 01/2006, published in September 2006 (the remainder of this document is now obsolete).

Water Framework Directive (WFD)

The Water Framework Directive 2000/60/EC is designed to:

- enhance the status and prevent further deterioration of aquatic ecosystems and associated wetlands that depend on the aquatic ecosystems
- promote the sustainable use of water
- reduce pollution of water, especially by 'priority' and 'priority hazardous' substances
- ensure progressive reduction of groundwater pollution.

The WFD requires a management plan for each river basin be developed every six years.

Groundwater Directive (GWD)

The 1980 Groundwater Directive 80/68/EEC and the 2006 Groundwater Daughter Directive 2006/118/EC of the WFD are the main European legislation in place to protect groundwater. The 1980 Directive is due to be repealed in December 2013. The European legislation has been transposed into national legislation by regulations and directions to the Environment Agency.

Environmental Permitting Regulations (EPR)

The Environmental Permitting (England and Wales) Regulations 2010 provide a single regulatory framework that streamlines and integrates waste management licensing, pollution prevention and control, water discharge consenting, groundwater authorisations, and radioactive substances regulation. Schedule 22, paragraph 6 of EPR 2010 states: 'the regulator must, in exercising its relevant functions, take all necessary measures - (a) to prevent the input of any hazardous substance to groundwater; and (b) to limit the input of non-hazardous pollutants to groundwater so as to ensure that such inputs do not cause pollution of groundwater.'

Water Resources Act (WRA)

The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 updated the Water Resources Act 1991, which introduced the offence of causing or knowingly permitting pollution of controlled waters. The Act provides the Environment Agency with powers to implement remediation necessary to protect controlled waters and recover all reasonable costs of doing so.

Priority Substances Directive (PSD)

The Priority Substances Directive 2008/105/EC is a 'Daughter' Directive of the WFD, which sets out a priority list of substances posing a threat to or via the aquatic environment. The PSD establishes environmental quality standards for priority substances, which have been set at concentrations that are safe for the aquatic environment and for human health. In addition, there is a further aim of reducing (or eliminating) pollution of surface water (rivers, lakes, estuaries and coastal waters) by pollutants on the list. The WFD requires that countries establish a list of dangerous substances that are being discharged and EQS for them. In England and Wales, this list is provided in the River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2010. In order to achieve the objectives of the WFD, classification schemes are used to describe where the water environment is of good quality and where it may require improvement.

Planning Policy

Contaminated land is often dealt with through planning because of land redevelopment. This approach was documented in Planning Policy Statement: Planning and Pollution Control PPS23, which states that it remains the responsibility of the landowner and developer to identify land

affected by contamination and carry out sufficient remediation to render the land suitable for use. PPS23 was withdrawn early in 2012 and has been replaced by much reduced guidance within the National Planning Policy Framework (NPPF).

The new framework has only limited guidance on contaminated land, as follows:

- *"planning policies and decisions should also ensure that:*
    - *the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;*
    - *after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and*
    - *adequate site investigation information, prepared by a competent person, is presented".*

APPENDIX C
SITE PHOTOGRAPHS AND WALKOVER CHECKLIST

PHOTOGRAPHIC LOG		
Photo no. **1**	**Date:** 7/11/16	
Direction photo taken: North		
Description: Boundary of woodland and grassland on site.		

Photo No. 2	**Date:** 7/11/16	
Direction photo taken: South		
Description: Current land use		

Photo No.	Date:	
3	7/11/16	
Direction Photo Taken: North		
Description: Current land use		

Photo No.	Date:	
4	7/11/16	
Direction Photo Taken: Looking East		
Description: Site entrance from Dover Road Deal		

WALKOVER SURVEY CHECKLIST: GEOSCIENCES

SITE NAME Dover Road, Deal, CT14 7PG
SITE REFERENCE 28927
NGR: 636710, 149570

These inspections can provide useful information on:

- Potential geotechnical hazards
- Suitable and appropriate locations for investigation
- The groundwater and surface water environments
- Potentially sensitive receptors (targets) including issues that require further investigation, e.g. ecology surveys
- Potential sources of contaminants
- Nature of contamination
- Potential migration routes (pathways)

Mark locations of features described on a map and give them a reference number.

Describe features in as much detail as possible. Continue on the back of the checklist if necessary, using the feature letter for reference. Take photos of site and relevant features in immediate surrounding area.

The walkover survey can also provide information for the environmental consultant in planning the site investigation.

Points that should be addressed in a walkover survey are as follows:

Features	Description	Photo no.	Map ref.
a) Describe materials exposed in nearby road or railway cuttings, in pits and quarries and natural exposures of soils and rocks near to the site. *This will give an indication of the geology beneath the site*	None observed within the vicinity of the site.		
b) Describe surrounding properties/land use and name occupiers. Type of boundary demarcation (if any) on each side. *This will identify any potential sources of contamination from adjacent sites and any sensitive receptors*	The surrounding environs are largely farm/ arable land to the east and south of the site. Former petrol filling station is situated southwest and is now used as a car garage. Residential dwellings are situated northeast and west of the site. A reservoir is situated south of the site.		
c) Describe present land use. Are there areas of hardstanding (if yes describe location, types and condition)? *Especially crops, for consideration of appropriate timing for further investigation, compensation and reinstatement. Also note hardstanding, obstructions etc. Note any old buildings/ivy covered trees as these may be used by owls or bats*	Green fields no hardstanding area is noted.		

WALKOVER SURVEY CHECKLIST Continued

Features	Description	Photo no.	Map ref.
d) Describe the site in terms of ground slopes and changes in slope. Is there any evidence of subsidence or landslip/slope erosion? *Old scarps or hummocky ground may be evidence of previous landslips that could be reactivated. A terraced appearance may be indicative of superficial solifluction movement or cambering. Trees that are leaning may indicate instability or general slope movement.*	The ground was gently sloping to the north with no evidence of subsidence or slope erosion.		
e) Describe the types and condition of surface vegetation. *Nettles may indicate an old cesspit for example or unhealthy vegetation may indicate the presence of phytotoxic fill or landfill gas. Note invasive weeds, e.g. Japanese knotweed.*	The eastern and south-western portion of the site is covered in deciduous woodland including mature trees. The remaining portion of the site is covered by grass cover.		
f) Note the number, location, height and species of trees and hedges. *This is important in terms of shrinking and swelling ground. Trees and hedgerows may be protected; their condition should be noted along with any restrictions they will impose for site access.* *It is important to note any areas with the potential for nesting birds, roosting bats, water voles and badger setts.*	Deciduous trees including mature trees are present within the eastern and southwestern portion of the site.		
g) Describe any evidence of animal activity. *For example obvious animal paths or areas of excavations and burrows.*	None observed		
h) Describe any damage to existing structures on site or adjacent to the site *For example, cracks in buildings both on the site and in the neighbourhood, and other evidence of settlement or differential settlement.* *Note presence of any suspected asbestos-containing materials (ACM)*	No damage to existing structures on site. Existing structures are situated within the north eastern portion of the site, in the form of three residential dwellings.		
i) Note the remains of structures that have been demolished. Look for evidence of remnants of any historical structures. *This will provide valuable information on the location of previous foundations, processes etc.* *Note presence of any suspected asbestos-containing materials (ACM)*	N/A		

WALKOVER SURVEY CHECKLIST Continued

Features	Description	Photo no.	Map ref.
j) Note any abrupt changes in ground level. Is there evidence of Made Ground/fill on site *May indicate that minerals have been worked in surface excavations. May indicate cut and fill.*	The field shows a slight gradient to the north. There was no evidence of fill/ Made Ground on site.		
k) Note any surface hollows. *Which may indicate the presence of solution features or swallow holes in rocks such as chalk limestone, gypsum and salt, or collapsed underground workings in these materials. May also indicate badger setts or other wildlife activity.*	No surface hollows observed on site.		
l) In areas of country underlain by coal or other minerals note any hummocky ground. *Which may be the remnants of spoil tips and surface depressions that may indicate collapsed shallow workings. Areas of general unevenness may be evidence of waste disposal activities.*	No remnants of spoil tips or surface depressions observed on site.		
m) Note any evidence of gas from nearby landfill sites *Can be indicated for example by poor vegetation or gas bubbles in water-filled trenches.*	No evidence for gas or nearby landfill sites within close proximity of the site.		
n) Are there any evidence of gas protection measures (gas membrane, gravel filled trenches, venting pipes, cowls etc)	No evidence of gas protection measures on site.		
o) Note the location of streams, culverts, ponds, seepages and sinks and signs of previous flooding. Note direction of flow. Note where the stream is accessible for sampling. May need to take dimensions of stream. *If ponds are present on site they may contain great crested newts. Ditches, streams and rivers that border or run through a site may contain water voles, otters or white-clawed crayfish. Presence of water features on site may prompt the need for a survey during a site investigation.*	No surface water features noted on or surrounding the site, with the exception of the reservoir which is situated directly south of the site.		
p) All surface waters should be examined for evidence of contamination. *For example, oil sheen, silt, solid matter, discoloured sediment.*	No signs of contamination noted.		

Features	Description	Photo no.	Map ref.
q) Note site drainage. Are there any drain covers/soakaways (if yes describe locations). Are there any outfalls to surface watercourses? Are there any interceptors/lagoons/effluent treatment plants?	No site drainage observed during the walkover.		
r) Describe storage of fuels and chemicals. Are there any drums/containers (if yes, describe quantity, full/empty, stored on hardstanding/softstanding, bunded)? *Is there evidence of underground fuel tanks (if yes, describe locations, how many, volumes, bunding, used/disused, condition)?*	N/a		
s) Note any discoloured ground. *This may provide evidence of contamination.*	N/a		
t) Accidents: In the event of a large spillage would runoff affect any vulnerable watercourses/culverts? *Are emergency procedures/equipment in place?*	No vulnerable watercourses are seen within the vicinity of the site.		
u) Waste: Are there any waste skips on site? Are waste storage facilities adequate? Is there any litter/fly-tipped material?	None noted.		
v) Are there any electricity substations on or adjacent to site?	None observed.		
w) Identify any old structures, pipework etc. wherever possible and, if safe, inspect for evidence of stored waste. *Old tanks may contain oil. Old electricity transformers should be noted. Asbestos risk should be assessed together with the need for a specialist hazardous materials survey.*	N/A		
x) Examine surrounding areas for evidence of contamination which could migrate onto the site. *For example a leaking oil tank on an adjacent site.*	Potential groundwater contamination from ancient underground storage tanks within the former petrol filling station.		
y) Note the presence of any underground structures, services, mine workings, tunnels etc *From a safety point of view for development of the site and also as they may provide contaminant migration routes.*	None observed		
z) Note any anecdotal information in past uses of the site. *Local street names etc. can provide indicators of past industry or ground problems*	None observed		

WALKOVER SURVEY CHECKLIST Continued

Features	Description	Photo no.	Map ref
aa) Description of buildings on site. Is there any evidence of asbestos construction materials, e.g. roofing, insulation materials. Do any of the buildings have basements? Do any of the buildings have a boiler room? (if yes describe fuel type and storage arrangements)	None observed		
bb) Identify potential access routes to the site for plant for the site investigation *Excavators and drilling rigs may be required for the next stage of the investigation, or if the access is limited window sampling techniques may need to be specified. Note any specific obstructions such as unsafe/unstable ground, protected trees or hedgerows, or protected buildings.*	Access to the site can be gained via Walmer Park Farm.		
cc) Evidence of buried services (water, gas, electricity, telephone, cable, television, pipelines) *Both for safety considerations and in the case of water as supply for further investigation. As well as danger, there is the question of considerable expense, which can arise from an inadequate knowledge of the location of buried services. The locations and heights of overhead cables may be important when considering the movement of site equipment.*	No evidence of buried services on site.		

Walkover survey completed	Approved: _____	Signature
	Name: Sophia Foschini	
	Date: 7/11/2016	

APPENDIX D
RISK ASSESSMENT METHODOLOGY

CLR11 outlines the framework to be followed for risk assessment in the UK. The framework is designed to be consistent with UK legislation and policies including planning. Under CLR11, three stages of risk assessment exist: preliminary, generic quantitative and detailed quantitative. An outline conceptual model should be formed at the preliminary risk assessment stage that collates all the existing information pertaining to a site in text, tabular or diagrammatic form. The outline conceptual model identifies potentially complete (termed possible) pollutant linkages (contaminant–pathway–receptor) and is used as the basis for the design of the site investigation. The outline conceptual model is updated as further information becomes available, for example as a result of the site investigation.

Production of a conceptual model requires an assessment of risk to be made. Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, both the likelihood and the consequences of an event must be taken into account when assessing risk. RSK has adopted guidance provided in CIRIA C552 for use in the production of conceptual models.

The likelihood of an event can be classified on a four-point system using the following terms and definitions based on CIRIA C552:

- highly likely: the event appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution
- likely: it is probable that an event will occur or circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term
- low likelihood: circumstances are possible under which an event could occur, but it is not certain even in the long term that an event would occur and it is less likely in the short term
- unlikely: circumstances are such that it is improbable the event would occur even in the long term.

The severity can be classified using a similar system also based on CIRIA C552. The terms and definitions relating to severity are:

- severe: short term (acute) risk to human health likely to result in ‘significant harm’ as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. Short-term risk to an ecosystem or organism forming part of that ecosystem (note definition of ecosystem in ‘Draft Circular on Contaminated Land’, DETR 2000)
- medium: chronic damage to human health (‘significant harm’ as defined in ‘Draft Circular on Contaminated Land’, DETR 2000), pollution of sensitive water resources, significant change in an ecosystem or organism forming part of that ecosystem

- mild: pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures or the environment
- minor: harm, not necessarily significant, but that could result in financial loss or expenditure to resolve. Non-permanent human health effects easily prevented by use of personal protective clothing. Easily repairable damage to buildings, structures and services.

Once the probability of an event occurring and its consequences have been classified, a risk category can be assigned according to the table below.

		Consequences			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**Highly likely**	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

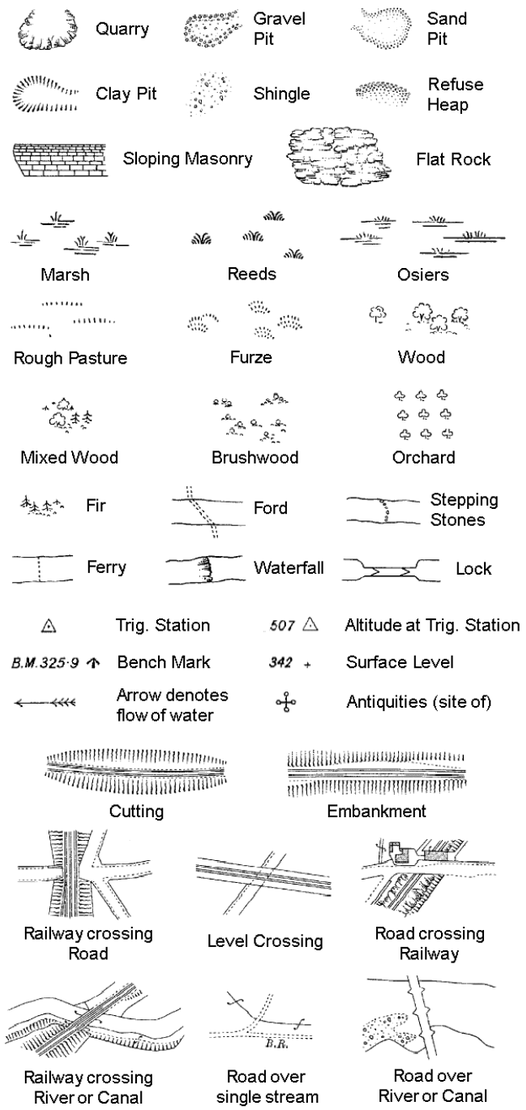
Definitions of these risk categories are as follows together with an assessment of the further work that may be required:

- Very high: there is a high probability that severe harm could occur or there is evidence that severe harm is currently happening. This risk, if realised, could result in substantial liability; urgent investigation and remediation are likely to be required.
- High: harm is likely to occur. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required. Remedial works may be necessary in the short term and are likely over the long term.
- Moderate: it is possible that harm could arise, but it is unlikely that the harm would be severe and it is more likely that the harm would be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term.
- Low: it is possible that harm could occur, but it is likely that if realised this harm would at worst normally be mild.
- Very low: there is a low possibility that harm could occur and if realised the harm is unlikely to be severe.

APPENDIX E
ENVIROCHECK REPORT

Historical Mapping Legends

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



County Boundary (Geographical)

County & Civil Parish Boundary

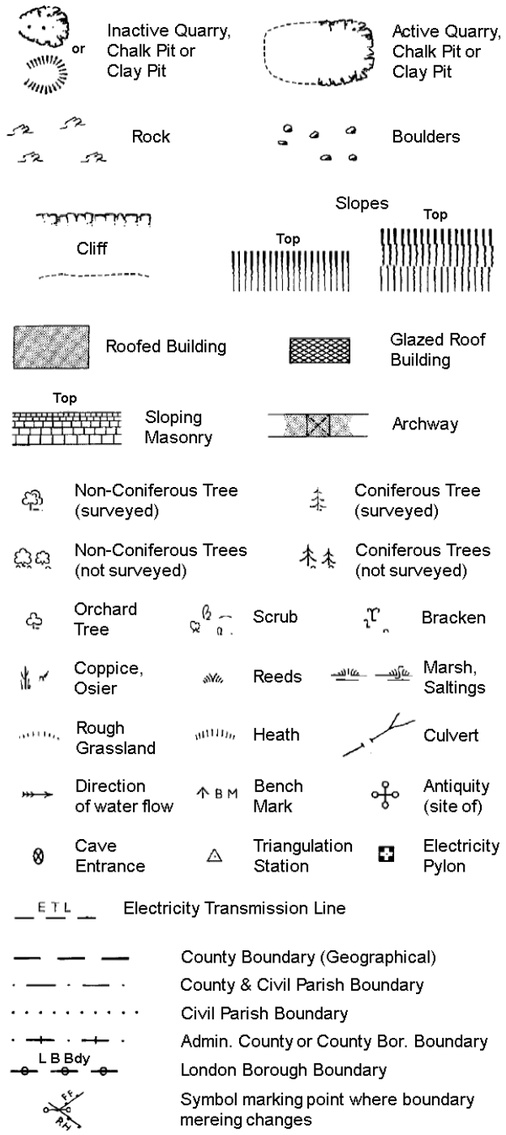
Administrative County & Civil Parish Boundary

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

Co. Burgh Bdy. County Burgh Boundary (Scotland)

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

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



County Boundary (Geographical)

County & Civil Parish Boundary

Civil Parish Boundary

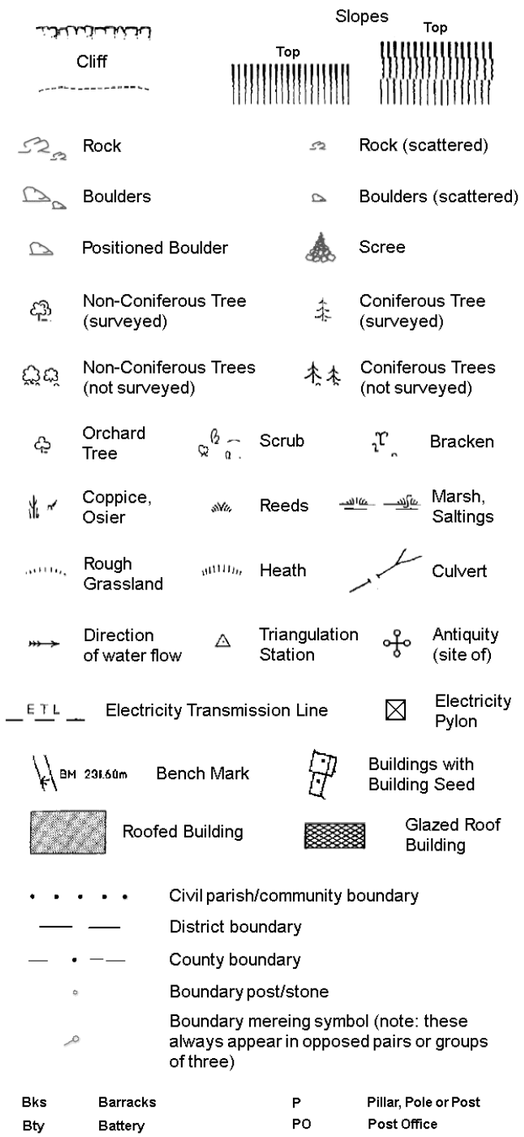
Admin. County or County Bor. Boundary

L B Bdy London Borough Boundary

Symbol marking point where boundary mereing changes

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

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



Civil parish/community boundary

District boundary

County boundary

Boundary post/stone

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

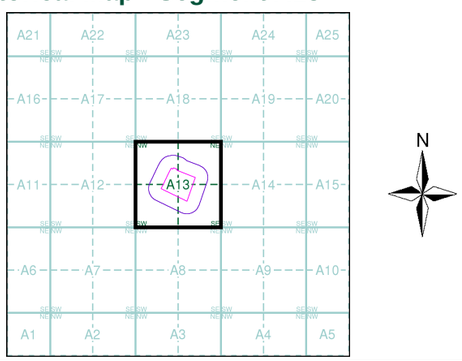
Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity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

RSK

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Kent	1:2,500	1872	2
Kent	1:2,500	1898	3
Kent	1:2,500	1906	4
Kent	1:2,500	1938	5
Ordnance Survey Plan	1:1,250	1957	6
Ordnance Survey Plan	1:2,500	1958 - 1959	7
Ordnance Survey Plan	1:1,250	1973 - 1974	8
Ordnance Survey Plan	1:2,500	1981	9
Additional SIMs	1:2,500	1986	10
Additional SIMs	1:1,250	1987 - 1990	11
Additional SIMs	1:1,250	1990	12
Large-Scale National Grid Data	1:1,250	1993	13
Large-Scale National Grid Data	1:1,250	1995	14

Historical Map - Segment A13



Order Details

Order Number:	103544487_1_1
Customer Ref:	28927
National Grid Reference:	636710, 149570
Slice:	A
Site Area (Ha):	4.08
Search Buffer (m):	100

Site Details

459 Dover Road, Walmer, DEAL, Kent, CT14 7PG

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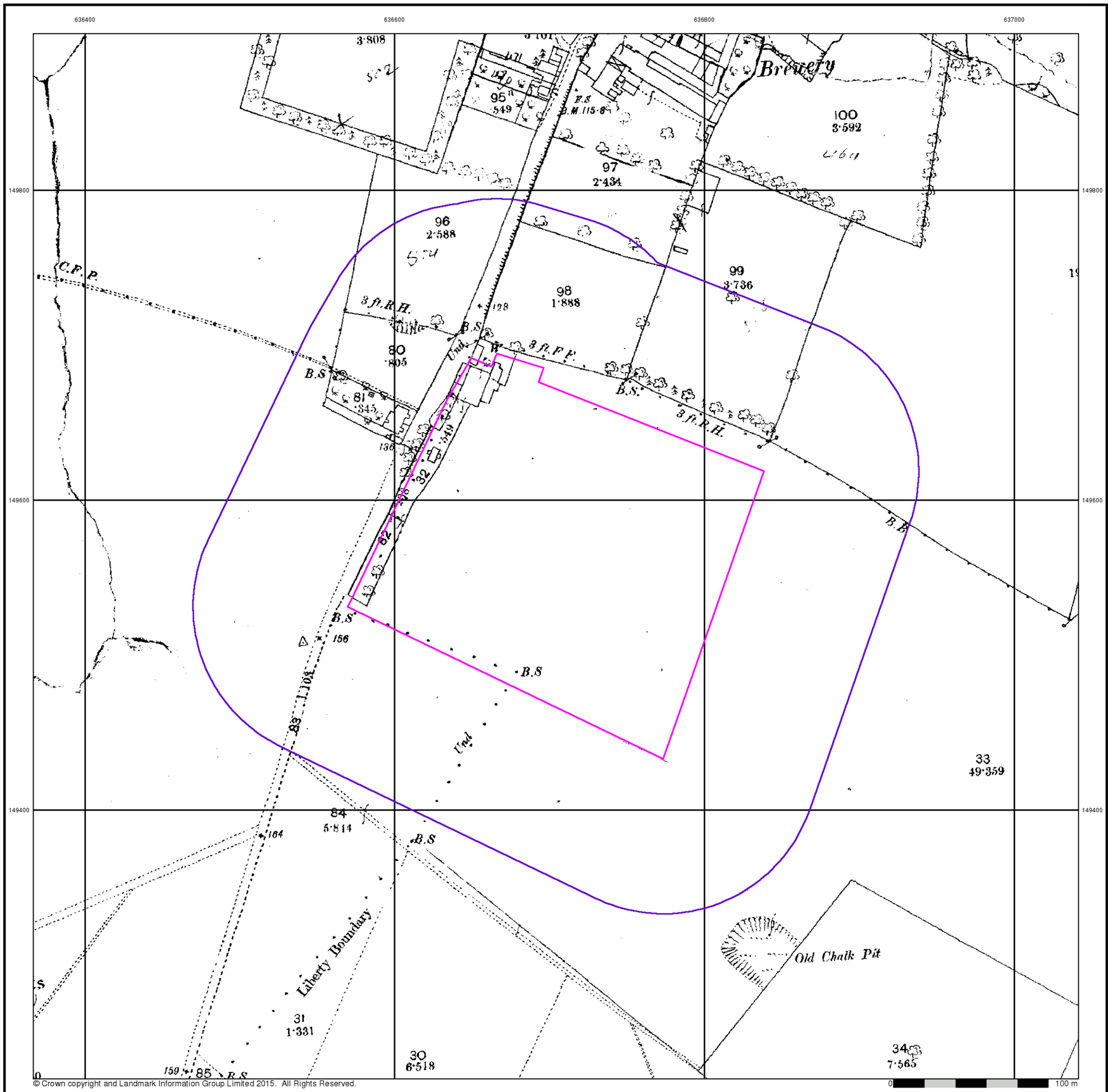


RSK

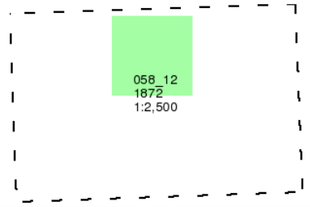
Kent

Published 1872

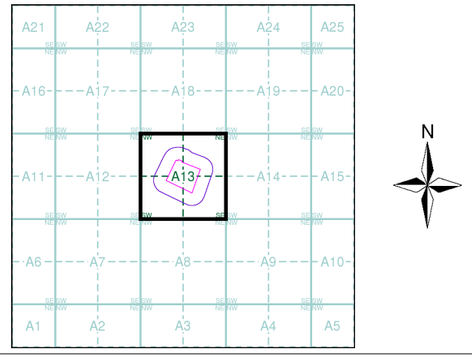
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A13



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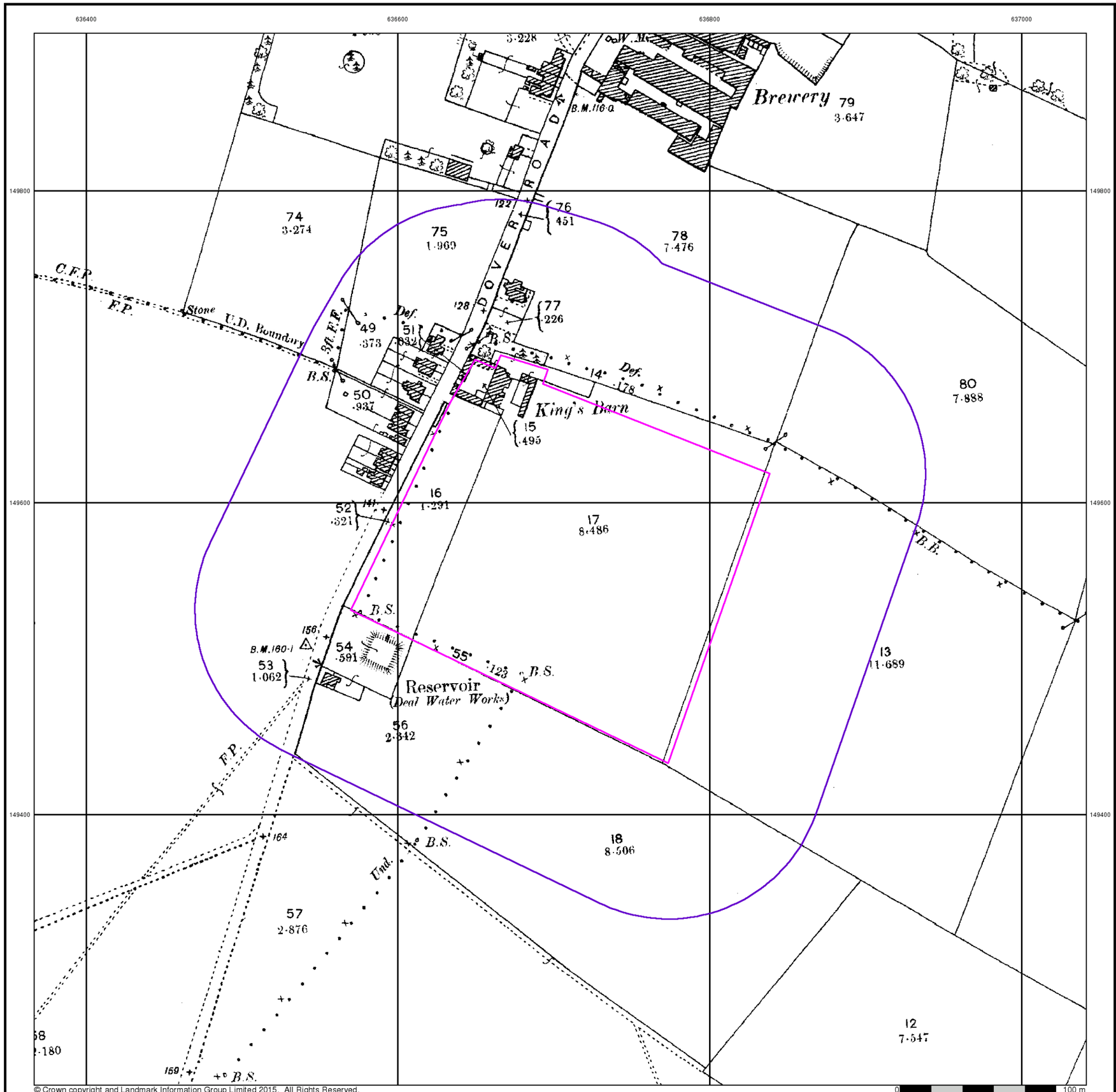

RSK

Kent

Published 1898

Source map scale - 1:2,500

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

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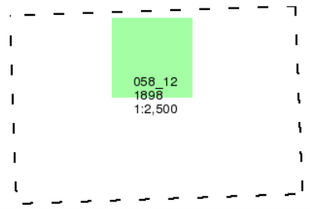
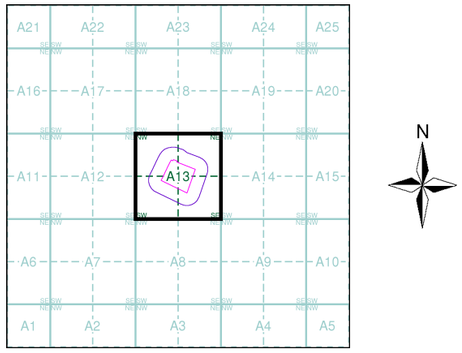


Historical Map - Segment A13



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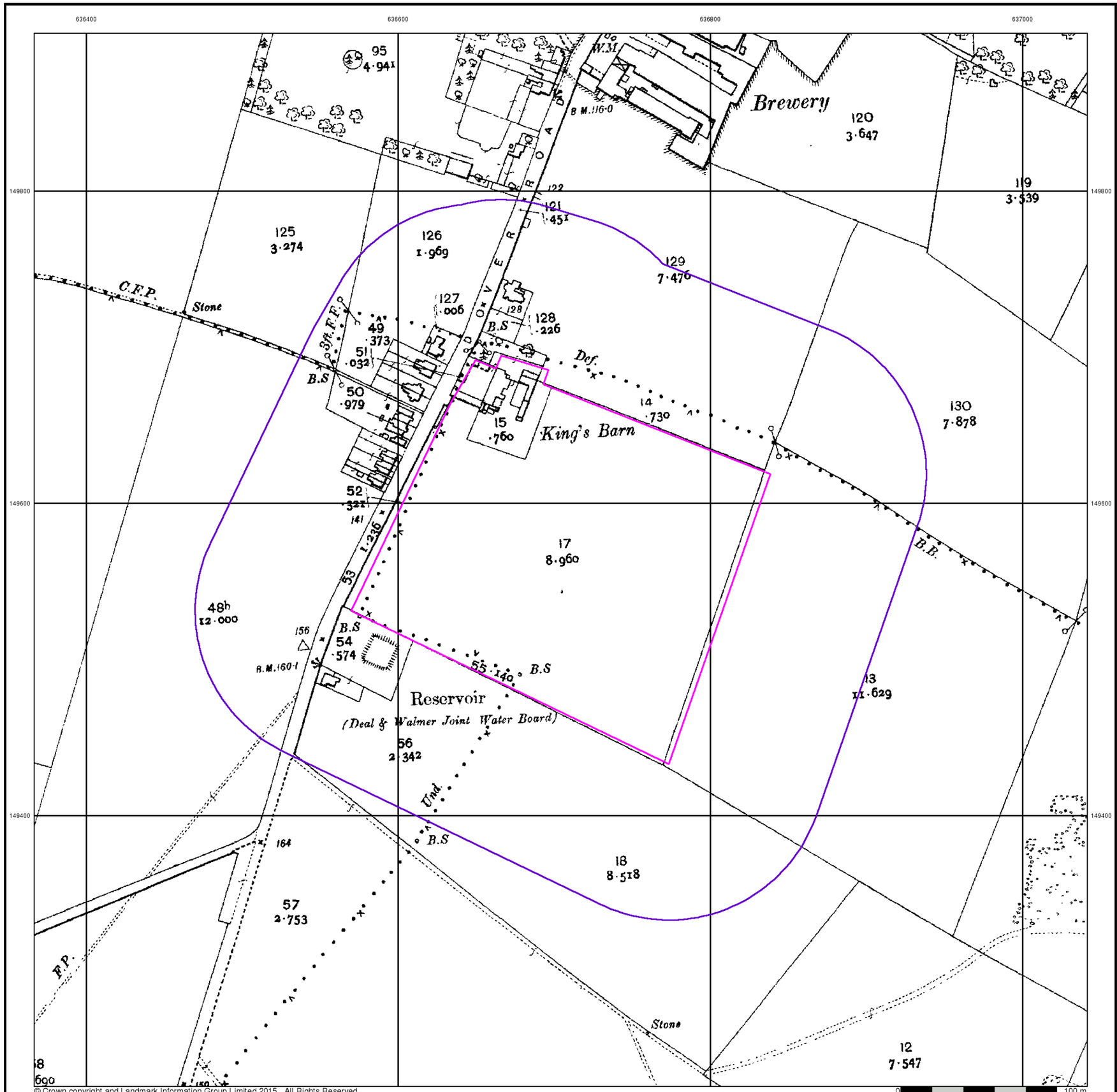


RSK

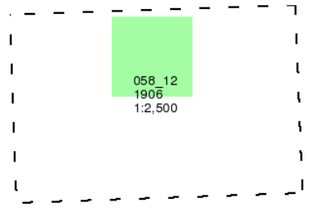
Kent

Published 1906

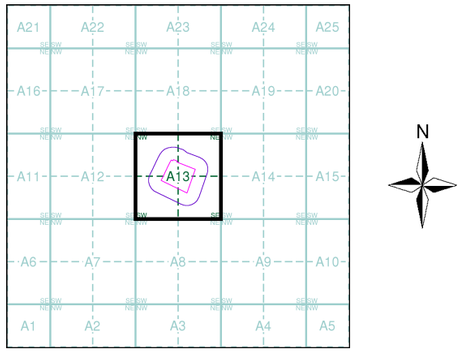
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A13



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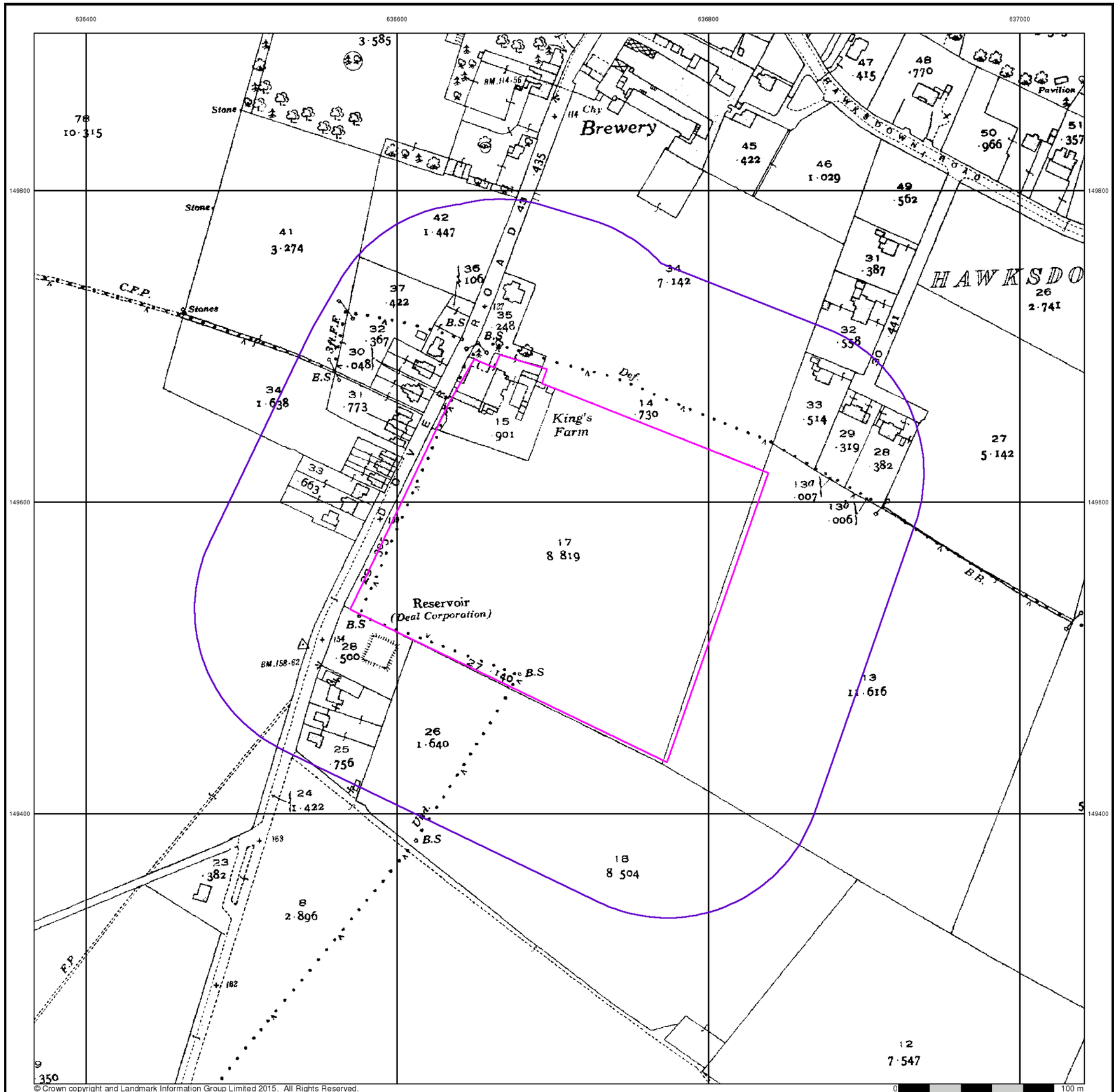

0 100 m

RSK

Kent

Published 1938

Source map scale - 1:2,500

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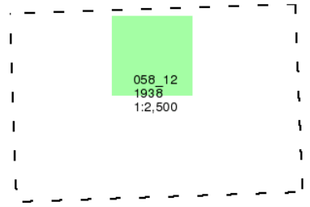
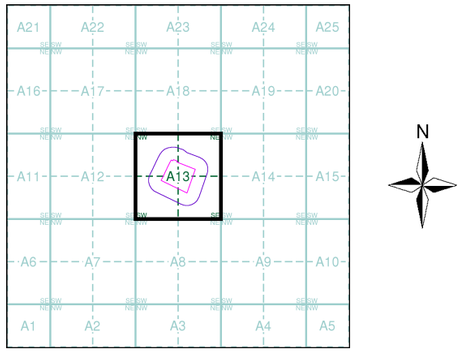


Historical Map - Segment A13



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RSK

Ordnance Survey Plan

Published 1957

Source map scale - 1:1,250

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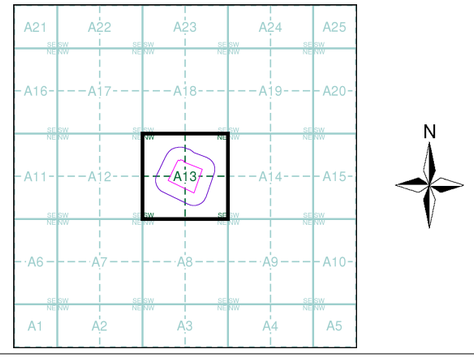
Map Name(s) and Date(s)

TR3649NE 1957 1:1,250

TR3749NW 1957 1:1,250

Historical Map - Segment A13



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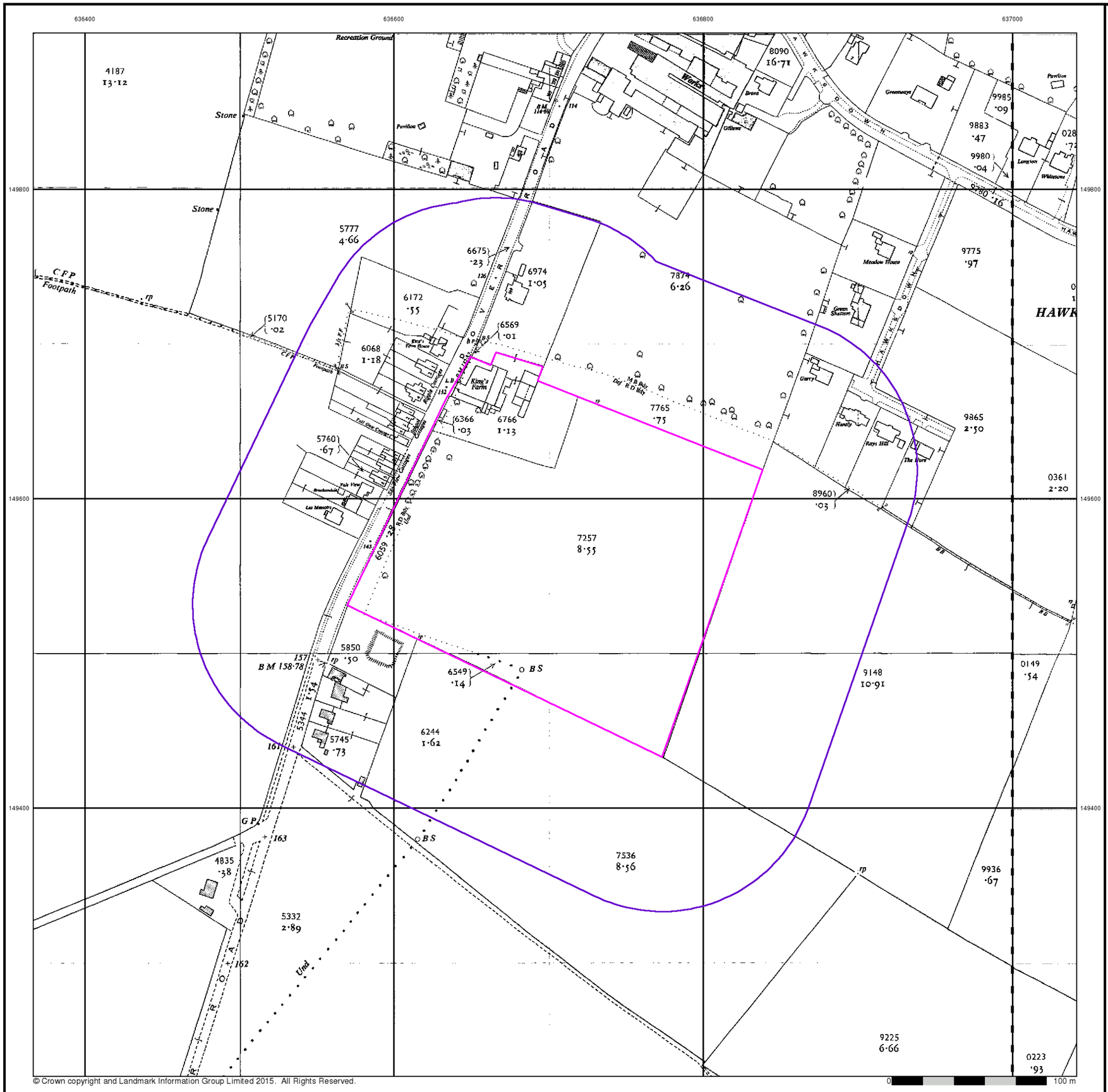


RSK

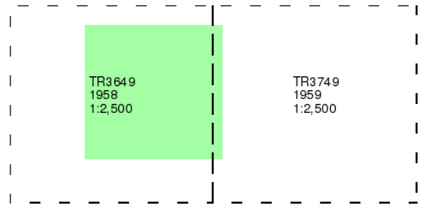
Ordnance Survey Plan

Published 1958 - 1959

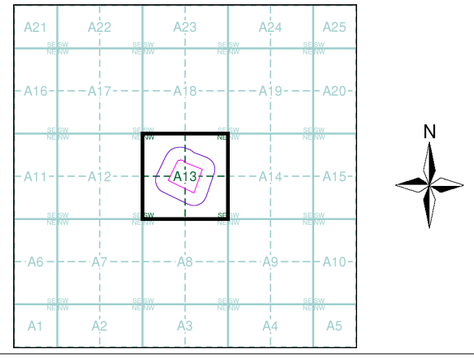
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A13



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