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GlaxoSmithKline Research & Development Limited

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Project Number
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GSK
DAVID JACK RESEARCH CENTRE
APPLICATION SITE CONDITION REPORT

RAMBOLL

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APPENDICES

1. INTRODUCTION

1.1 Overview

Ramboll Environment and Health UK Limited (Ramboll) was commissioned by GlaxoSmithKline Research & Development Limited (GSK or the 'Client') to prepare an Application Site Condition Report (SCR) for its Combustion Plant located at the David Jack Research Centre in Ware, Hertfordshire, SG12 0DP (the 'Facility' or the 'site').

Following a review of the facility's energy provision plant for the purposes of the Medium Combustion Plant Directive, GSK's advisors identified that the total capacity of the combustion plant exceeds the 50MW thermal input (MWth) threshold set out in Schedule 1, Part 2, Section 1.1 A(1) of the Environmental Permitting Regulations 2016 (as amended); as such an environmental permit is required. This SCR supports the application for the environmental permit.

1.2 General Limitations and Reliance

This report has been prepared by Ramboll UK Limited ("Ramboll") exclusively for the intended use by GlaxoSmithKline Research & Development Limited (the "client") in accordance with the agreement (proposal reference number Q1700003159), dated 31st October 2018 between Ramboll and the client defining, among others, the purpose, the scope and the terms and conditions for the services. No other warranty, expressed or implied, is made as to the professional advice included in this report or in respect of any matters outside the agreed scope of the services or the purpose for which the report and the associated agreed scope were intended or any other services provided by Ramboll.

In preparation of the report and performance of any other services, Ramboll has relied upon publicly available information, information provided by the client and information provided by third parties. Accordingly, the conclusions in this report are valid only to the extent that the information provided to Ramboll was accurate, complete and available to Ramboll within the reporting schedule.

Unless otherwise stated in this report, the scope of services, assessment and conclusions made assume that the site will continue to be used for its current purpose and end-use without significant changes either on-site or off-site.

Ramboll's scope of services for this assignment did not include collecting samples of any environmental media. Ramboll cannot rule out the existence of conditions, including, but not limited to, contamination not identified and defined by the data and information available to and/or obtained by Ramboll. Specifically, this assessment must not be considered as an asbestos survey (whether in built structures, waste, soils, etc.), even though the subject of asbestos-containing materials may have been discussed in the report.

Unless stated otherwise, the geological information provided is for general environmental interpretation and should not be used for geotechnical and/or design purposes.

1.3 Scope of Works

The objective of the SCR is to document the condition of the land and groundwater at the time at which the permit is applied for. This will be based upon previous site condition and site baseline reports, a site inspection, a review of publicly available information, review of historical maps, reference to the environmental risk assessment and the undertaking of an installation wide soil and groundwater investigation. This SCR has been produced in accordance with the Environment

Agency's H5 Guidance (Site Condition Report) and the European Commission's Baseline Reporting guidance.

In line with current guidance, the SCR is structured as follows:

- Sections 1 to 3 provide the information required for an Application SCR (submitted with the Permit application);
- Sections 4 to 7 relate to the operational phase of the installation and will be updated/supplemented throughout the lifetime of the Permit; and
- Sections 8 to 10 relate to the EP surrender stage and will be provided at the end of the permit including evidence to show that the installation has been left in a 'satisfactory condition' at surrender.

Given that the EP is at application stage, this SCR presents Sections 1 to 3 only. Sections 4 to 10 of this SCR will be updated in the future, as required.

1.4 Previous Reports

Ramboll Environment and Health UK Limited (formerly "Ramboll Environ" and "ENVIRON") have undertaken previous localised investigations relating to the site as detailed below:

- ENVIRON UK Ltd. Phase I Environmental Review, GlaxoSmithKline Research and Development Site Ware, Ref C5323, October 2003.
- ENVIRON UK Ltd. Groundwater Sampling – Effluent Release Investigations, Ref. SMG/UK11-143340-03, October 2009.
- ENVIRON UK Ltd. Phase I Environmental Review – Proposed Stability Room Project, Ref. UK11-16240, November 2010.
- ENVIRON UK Ltd. R&D Site, Soil Investigation of Foul Drain Leak, Ref. UK11-18595, May 2013.

The following third-party site investigation reports have also been undertaken for localised developments within the facility.

- ERM EnviroClean, Soil Contamination Investigation: Proposed Amenity and Recreation Building Ware, Ref. 2700, June 1994.
- Laing Technology Group Consultants, Geotechnical Report (Ware) Project 96010 Proposed Sports Hall and Bowling Clubhouse (Building 50), February 1996.
- Ground Engineering – Ground Investigation Stability Building GSR&D Ware, June 2010, Ref. SJF/C12161.

These reports have been referenced to gain an understanding of the general geological and hydrogeological setting of the site. Given the age and localised nature of the soil and groundwater data (where available), this is not being put forward as baseline information. Instead, a strategy for investigation within the boundary of the installation has been presented in Section 3.5.

2. SITE DETAILS

Table 2-1: Site Details	
Name of Applicant	GlaxoSmithKline Research & Development Limited
Activity Address	David Jack Research Centre, SG12 0DP
National Grid Reference	534890, 214440
Permit Application Number	EPR/AP3631QN/A001

Table 2-2	
Appendix 1	Figures
Appendix 2	Site Photographic Log
Appendix 3	Historical Maps

2.1 Site Location and Description

GlaxoSmithKline Research & Development Limited owns and operates the David Jack Research Centre, a pharmaceutical research and development facility located at Park Road, Ware, SG12 0DP (the "site" or the "facility"). The site is located approximately 500m west of Ware town centre in Hertfordshire (Figure 1, Appendix 1). The site lies at an elevation ranging between 39 m above ordnance datum (AOD) at the northern site boundary, falling to approximately 36m AOD at the southern site boundary, common with the River Lea Navigation.

The Facility consists of a number of buildings that are used for the purposes of R&D including seven laboratory buildings. Four buildings are given over to engineering uses (including one in which the energy centre is contained) and other ancillary areas including stores areas, loading bays, office buildings, solvent stores, electrical substations and welfare facilities such as the sports pavilion and sports and social club. The sports pavilion and sports and social club are located outside of the proposed permit installation boundary.

The David Jack Research Centre is located in the south west of the town of Ware and is bound to the east by Harris's Lane beyond which the GSK manufacturing plant is located. The River Lea Navigation bounds the wider facility to the south and flows in a west to east direction.

The western site boundary is formed by sports facilities comprising, for the most part, a cark park, with tennis courts and sports pitches. The northern site boundary is formed by Park Road with a school, a sports gym and swimming pool and a residential development of apartments and houses beyond.

2.2 Installation Areas and Activities

The Installation area that is the subject of the SCR is shown on Figure 2, Appendix 1. The eastern boundary of the installation area runs to the immediate west of the Amenities Building and in the far north-east, by offices, laboratories and a stores building of the David Jack Research Centre. The southern boundary of the installation area is formed essentially by a southern access road with soft landscaping and mature trees beyond and the River Lea Navigation beyond. The western boundary of the permit installation is common with the David Jack Research Centre's western boundary, formed by the neighbouring sports car park and pitches.

The site is used for research and development of pharmaceutical and associated support services. Information provided by GSK stated that these services include the following:

- a wide variety of laboratories providing for pharmaceutical development, toxicology, chemical, biological and radiological research;
- animal holding facilities;
- an energy centre including maintenance and engineering;
- an effluent holding plant;
- a waste (solvent) and chemical storage facility; and
- office and administration functions.

In addition to the operation of the energy centre and CHP, the site has a number of oil fired, back-up generators which fall within the scope of the permit activities. The back-up generators are provided with day tanks for oil top-up and the day tanks are all connected to the main bulk fuel storage tank by way of an oil distribution pipeline that runs principally north-south and west-east within the installation boundary.

The specific building, generators and their associated activities located within the installation area, which fall within the remit of the permit are summarised in Table 2.3.

Table 2-3: Site Activities Relevant to Permit

Building Reference	Building Use	Equipment Relevant to Permit	Associated Fuel Storage Capacity, Contents and Description	Containment
Building 1	Office Building	One generator	One single-skinned 1,200 litre steel day tank containing light fuel oil.	Located in a 1.45m^3 capacity steel bund
Building 2	Laboratories	Three generators	Three single-skinned steel 1,300 litre day tanks.	Each tank located in a 1.45m^3 capacity steel bund
Building 5	Laboratories	Two generators	Two single-skinned steel 1,900 litre day tanks containing light fuel oil. One steel generator oil dump tank (capacity unconfirmed but in the region of 5000 litres based on tank dimensions), located on south-western corner of Building 5.	Both day tanks are located above the generators, at some 2m elevation and each generator is located in a shallow brick bund. The tanks are connected to the fuel distribution line from the bulk fuel tank in Building 7, but top-up is managed manually by an operative present at the day tank in communication with an operative at the pump set in Building 7. The dump tank is kept empty for use in the event of a building fire.
Building 7	Engineering/ Main Boiler House	Four boilers Two generators	196,000 litre single-skinned oil tank, containing Light Fuel oil. Fitted with a high-level alarm and overfill protection. The level of the tank can be seen from the remote filling point. The tank is connected to a pumped distribution pipeline that supplies oil to the generators located around the installation. Two single-skinned steel 1,480 litre steel day tanks containing light fuel oil.	Located within >110% capacity, unroofed, sunken containment bund (brick/concrete) shared with boiler blowdown vessel. The entire bund is constructed of brick from ground level up, and concrete below the surrounding ground level. A manually operated electrically driven stormwater pump is present in a sump within the bund which discharges to the foul drainage network.
Building 9	Laboratories	Two generators	Two single-skinned steel 1,280 litre day tanks integral to generators.	Both located each in a 5m^3 capacity steel container. The steel containers are provided with alarmed leak detection and inspected daily. The tanks are connected to the fuel distribution line from the bulk fuel tank in Building 7 and top-up is managed automatically via a level detection system.

Table 2-3: Site Activities Relevant to Permit				
Building 27	Laboratories	One generator	8,600 litre single-skinned day tank in brick constructed containment bund – located in the basement of the building. A second steel day tank of 1000 litre is located in the basement generator room.	The tank is located internally and is positioned within a bund of brick construction with a capacity of 12,900 litres. There is also a tanker connection point, which can be used to fill the tank. The level of the tank cannot be seen from the fill point. The tanks are otherwise connected to the fuel distribution line from the bulk fuel tank in Building 7, but top-up is managed manually by an operative present at the day tank in communication with an operative at the pump set in Building 7. The smaller day tank is elevated on steel supports some 2m above floor level, with a concrete kerb at floor level.
Building 64	Generator Unit located adjacent to the northern site boundary	One generator	One single-skinned steel integral 1,200 litre day tank	The day tank is integral to the generator unit, all of which is housed within a steel container, providing secondary containment. The steel container is provided with alarmed leak detection system.
Building 29	Firewater Pumphouse	Pump equipment	One single skinned, 1,500 litre light fuel oil tank.	No secondary containment but located within building. Contains borehole abstraction for firewater
CHP Plant	Located in the south-west of the site	Two Engines	None. Gas fired-engines, however two aboveground oil storage tanks containing 'clean' and waste lubrication oil (3,500 litres and 2,000 litres) within the area of the CHP refer to Section 2.3.3.	Both contained within a partially sunken a $7m^3$ concrete bund. Rainwater is removed from the secondary containment structure via vacuum tanker.

2.3 Oil Storage and Distribution

2.3.1 Bulk Oil Tank

The site is served by a central oil storage tank located in the north of Building 7. The tank is of steel construction and 196,000 litre capacity, located within a concrete and brick bund that forms part of Building 7, but which is absent of a roof over the oil storage section of the building. The tank bund is sunken such that the tank sits at a level lower than the surrounding ground level. The lower section of the bund is constructed of concrete block work and concrete flooring, although a slotted drainage gulley is present through the middle of the bund and along its southern edge. Accumulated rainwater is discharged via the drainage gullies to a concrete lined sump constructed in the south-west corner of the bund and then pumped manually to the foul drainage system.

The concrete flooring appeared visually to be in reasonable condition but with evidence of cracks and degradation at joint work particularly in the vicinity of the drainage gulley.

A daily dip is taken of the tank contents and an integrity test is undertaken on the tank bund every 5 years by filling it with water. The bund is emptied again using the sump arrangement. No issues have been reported by site representatives in relation to bund integrity. The last integrity check was undertaken approximately 3 to 4 years ago. A daily inspection is undertaken of the tank, containment bund and sump.

The tank filling point is located externally, on the eastern side of Building 7. The fill point is provided with secondary containment by way of a brick bund and metal grill work. When the tank is filled, a penstock valve installed on the final interceptor at the discharge point into the The Cut is closed as a matter of procedure.

CBRE has an EHS Work Instruction (operating procedure) in place for 'Fuel Oil Storage and Offloading'. The procedure requires that a designated responsible person is required to be fully conversant with the location of site drainage, including the gullies, interceptors and penstock valves. They are also required to maintain spills kits, maintain oil storage tanks and ancillary equipment and identify training requirements in relation to oil storage. The procedure provides for measures to be taken during oil offloading which include environmental protection measures such as closing the penstock valve on the drainage, that surface water gullies are covered and mats/drip trays are present beneath the coupling between hose connections. At Ware this is provided by the grilled containment bund. The procedure also includes requirements in the event of a spillage.

2.3.2 Back Up Generators and Oil Distribution Pipeline

The back-up generators and their respective day tanks (typically 1,300 litres) are all located within buildings (some at ground floor level) but most are located on the roofs of the buildings. A photographic log is provided as Appendix 2. The day tanks are connected to the main bulk fuel storage tank in Building 7 by a subsurface oil distribution pipeline but which is understood to run through a subsurface concrete lined trench/boxed concrete utilities corridor. The route of the oil distribution pipeline is illustrated on Figure 3, Appendix 1.

GSK has advised that the concrete corridor was subject to a third party inspection in 2017 although the report has not been available for review. The corridor is inspected as part of a maintenance programme and is periodically but automatically emptied of groundwater ingress, which accumulates in a dedicated sump on the corridor. The collected groundwater is discharged to foul sewer. The pipeline does not have leak detection.

2.3.3 Other Bulk Fuel Storage

Aside from the day tanks and the bulk fuel oil tank in Building 7, other bulk storage within the installation area includes an aboveground, steel waste lubrication oil tank (of 2000 litre capacity) and an aboveground, steel construction 'clean' lubrication oil tank (of 3600 litre capacity) that are sited to the immediate south-east and used in relation to the CHP plant. The tanks are located in a partially sunken concrete bund, which was observed at the time of the site inspection to contain some rainwater, leaf and litter debris. The bund is not roofed. The bund is periodically inspected and accumulated rainwater reported by site staff to be emptied by vacuum tanker.

A summary of the oil storage facilities has been included in Table 2.3.

CBRE has an EHS Work Instruction (operating procedure) in place for 'Fuel Oil Storage and Offloading'. The procedure requires that a designated responsible person is required to be fully conversant with the location of site drainage, including the gullies, interceptors and penstock valves. They are also required to maintain spills kits, maintain oil storage tanks and ancillary equipment and identify training requirements in relation to oil storage. The procedure provides for measures to be taken during oil offloading which include environmental protection measures such as closing the penstock valve on the drainage, that surface water gullies are covered and mats/drip trays are present beneath the coupling between hose connections. At Ware this is provided by the grilled containment bund. The procedure also includes requirements in the event of a spillage.

2.4 Chemical Storage

The materials set out Table 2.4 are associated with the operation and maintenance of the combustion units at the David Jack Research Centre. Safety Data Sheets for the relevant chemicals are provided in Appendix 3.

Table 2-4: Chemicals Relevant to Permit

Chemical/Material	Reason for use	State (Solid/ Liquid / Gas)	Volume stored	Containment
Lubricant Oil	Lubrication on CHP engines	Liquid	2,000 litres 3,600 litres	Concrete containment bund, as per Table 2.1
Sodium Bisulphite	Boiler feed treatment	Liquid	1,500 litres	Polypropylene tank located inside boiler house, Building 7
Polymer and Phosphonate Mixture	Boiler feed treatment	Liquid	1,500 litres	Polypropylene tank located inside boiler house, Building 7
Sodium hydroxide	Boiler feed treatment	Liquid	1,500 litres	Polypropylene tank inside boiler house

2.5 Wastes

There are no wastes arising from the combustion activities.

2.6 Relevant Hazardous Substances

Based upon the materials identified in Sections 2.3 to 2.5, the relevant hazardous substances identified for the permitted David Jack Research Centre include light fuel oil, lubricant oil, sodium bisulphate, polymer/phosphonate mixtures and sodium hydroxide. The oils are considered to have the greater potential environmental affects given that the remaining boiler water treatment chemicals are contained within a building and any release to the environment would not be

expected to be persistent and instead buffered by groundwater conditions. Notably also, the volumes of boiler treatment chemicals are relatively small in comparison to volumes of oil stored and the boiler feed treatment chemicals are stored internal to buildings.

2.7 Site Drainage

2.7.1 Process and Foul Waste Water Drainage System

Foul and trade water, including grey water from laboratory sinks are discharged to a combined foul and trade waste water drainage network, which discharges to the municipal drainage system on either Park Road to the north of the installation or Harris's Lane to the east of the wider R&D Ware facility. Given the topographical falls of the site towards the south, the foul drainage system in the north and west of the David Jack Research Centre is served by a number of pumps, forwarding foul drainage to Park Road; this system serves the vast majority of the installation area. The foul drainage system that discharges to the Harris's Lane serves Building 8 (amenities building, broadly central to the R&D site but excluded from the installation boundary) and the north-eastern most group of buildings within the installation boundary. GSK holds a consent from sewerage undertaker to discharge to the municipal sewer.

2.7.2 Surface Water Drainage System

A comprehensive surface water drainage system is present across the site which discharges via an area known as 'The Cut' at the southern site boundary, into the River Lea Navigation. The discharge to The Cut occurs via two interceptors which serve two branches of the drainage network located within the installation boundary. The interceptors are fitted with penstock valves that can be closed in the event of a spill or loss to the drainage system. The penstock valve on the final interceptor receiving surface run-off from the refilling area drainage network is routinely closed during the building 7 bulk storage tank refilling events. Site representatives have advised that the interceptor serving the filling point drainage network has a storage capacity of 20,000 litres.

Another interceptor is also present on the surface water drainage system to the north-east corner of Building 5, which is down topographical gradient from Building 7.

Six soakaways are present within the surface water drainage serving the installation area. The soakways are located as follow:

- two are located to the north of building 1;
- one is located to the east of building 34 and therefore the eastern extent of the permit installation area;
- three are located to the south of building 2 and building 6; and
- one is located between building 9 and the CHP.

None of the soakaways are located near or adjacent to bulk fuel storage facilities.

Site representatives have indicated that the surface water drainage system in some areas has been subject to ingress from groundwater, further assessment is being considered by GSK in this regard.

2.8 Inspection and Maintenance

Facilities management is undertaken by a contractor, which operates a planned preventative maintenance (PPM) programme including a periodic inspection programme for the drainage arrangements. The PPM is managed through a Computerised Maintenance Management System (CMMS) which generates, schedules and records maintenance events.

The bulk fuel oil tank bund integrity test, undertaken every 5 years, is included as an item on the CMMS. The boiler house and tank containment arrangements in Building 7 are otherwise inspected daily.

The drainage system serving the facility handles surface water run-off and as a consequence presents a low risk of chronic pollution in the event of drainage failure. The last CCTV survey of the drainage was undertaken in 2017.

2.9 Site Surfacing

An estimated 80% of the installation area has either building or hard stand covering. External areas include concrete hardcovered roadways, parking areas and footpaths (amounting to approximately 40% of the Installation area); and approximately 40% of the David Jack Research Centre is occupied by building cover.

Soft landscaping is provided by small grassed areas with mature trees, largely on the boundaries of car park areas and along the northern and southern boundary of the David Jack Research Centre. Where these are present, they are protected by step-up kerbing and are not adjacent to higher-risk storage locations.

3. CONDITION OF THE LAND AT PERMIT ISSUE

Table 3-1 provides a description of the site's environmental setting from a review of publicly available information, previous third-party reports and Ramboll's previous investigations.

Table 3-1: Environmental Setting

Conditions	Source	Description
Geology		
Geological Conditions	Landmark Envirocheck Database (November 2018) British Geological Survey (BGS) published maps (Sheet 239) and website (accessed 26/11/18) ENVIRON Phase I Environmental Review – Stability Room Project (2010) Ground Engineering Ltd Ground Investigation (2010)	The published geology indicates that the northern extent of the site is underlain by the Kesgrave Catchment Subgroup (sand and gravel), and the southern extent of the site is underlain by the Kempton Park Gravel Member (sand and gravel). The entire site is further underlain by the Lewes Nodular Chalk Formation and Seaford Chalk Formation (chalk) at depth. Based on the borehole logs from the previous site investigations, the ground conditions are expected to comprise concrete, asphalt or topsoil overlying Made Ground to a depth between 1.6m and 2.0 m below ground level (bgl). The Made Ground is expected to generally comprise gravelly sands with clay and silt. The Kempton Park Gravel member underlies the Made Ground, comprising of light brown gravel with silty sand, to depths between 4.0 and 7.3 m bgl, with an average thickness of 2.6 to 4.7 m. The superficial deposits are underlain by Chalk which was encountered at depths of between 4.0 and 7.3 m bgl (depth unproven). Alluvium is noted in the southern extent of the site towards the River Lea at a depth of between 2.4 and 4.0 m bgl according to the Ground Engineering Ltd report. It was concluded that the Alluvium was associated with the inlet on the northern bank of the River Lea. Alluvial deposits and deeper made ground could be expected to be present in a corridor trending north-south from beneath Building 2, passing through the car park adjacent to Building 7 and crossing the north-east corner of Building 5 following the previous route of the full section of 'The Cut' before it was infilled and reclaimed for the development of the R&D site.
Hydrogeology		
Groundwater Aquifer Quality	ENVIRON Phase I Environmental Review – Stability Room Project (2010)	The site is situated a Secondary A Aquifer relating to the superficial deposits (sand and gravel); underlain by a Principal Aquifer relating to the bedrock (chalk).

Table 3-1: Environmental Setting		
	Landmark Envirocheck Database (November 2018)	According to EA, the site is situated within an Outer Zone (Zone 2) Source Protection Zone (SPZ) whereby the site comprises either a 25% of source area or a 500 day travel time to groundwater source. The Inner Protection Zone (Zone 1) is located approximately 14m south of the site whereby the area experiences a travel time of 50 days or less to the groundwater source.
Groundwater Levels and Presumed Groundwater Flow Direction	ENVIRON Phase I Environmental Review – Ware (NPS Building) ENVIRON Phase 1 Environmental Review – Stability Room Project (2010) Ground Engineering Ltd Ground Investigation (2010)	Groundwater was encountered in the Laing Technology Group (LTG) Consultants (1996) investigation at depths of between 3 and 4m bgl. More recently, groundwater was encountered in the Ground Engineering Ltd investigation to depths between 2.3 and 2.76 m bgl in a layer of silty sand and gravel. ENVIRON noted that the shallow groundwater in the Kempton Park Gravel member was likely to be in continuity with the Chalk recorded at depths of approximately 5 m bgl. According to hydrogeological maps, the regional direction of groundwater flow is expected to be in a southerly direction towards the River Lea, but is also expected to be influenced by numerous groundwater abstractions across the site area. The groundwater flow noted in the LTG 1996 site investigation was found to flow towards the River Lea, and ENVIRON concluded that groundwater beneath the site was likely to be in hydraulic continuity with the River Lea. Local groundwater flow directions within the site boundary, whilst generally flowing south or south-east might also be locally influenced by depths of more permeable made ground/alluvium in the vicinity of the former full length of 'The Cut'.
Groundwater Supply Wells and Licensed Groundwater Abstractions	Landmark Envirocheck Database (November 2018)	There are two groundwater abstraction wells listed on-site which are located along the southern site boundary and in the centre of the site respectively. The source of the abstractions are not stated, however, are likely to be abstracted from the Upper Chalk at depth. According to the EA, the boreholes are currently in use for the following processes: • research non-university/college: evaporative cooling; • research non-university/college: process water;

Table 3-1: Environmental Setting		
		• research non-university/college: drinking, cooking, sanitary, washing, (small garden); and • research non-university/college: evaporative cooling. • According to previous reports, only one abstraction is active and the second is not actively abstracting but held in reserve for emergency fire fighting. According to the EA there is one water abstraction located 13m west of the site which is currently in use for the following processes: • research non-university/college: drinking, cooking, sanitary, washing, (small garden); • research non-university/college: evaporative cooling; and • research non-university/college: process water.
Surface Water		
Surface Water Features	Landmark Envirocheck database (November 2018) EA: catchment data explorer (accessed 26/11/18) ENVIRON Phase 1 Environmental Review – Stability Room Project (2010)	The nearest water course is a short section of inland river, 'The Cut', which is orientated north-south and flows into the River Lea. The Cut and the River Lea are currently classified as being part of the Lee Navigation from Hertford to Fieldes Weir and being of 'moderate' ecological quality and 'good' chemical quality under the Water Framework Directive classification scheme. ENVIRON stated that a previous ground investigation undertaken by ERM (this report was not available for review) stated that the River Lea is substantially different to groundwater depth. The River Lea lies at approximately 1 m bgl compared to 3-4 m bgl for groundwater depth, suggesting that the River Lea is "perched" above natural groundwater. The banks of the River Lea are noted to be heavily engineered at certain sections and its banks are in some places sheet piled, which may influence the water levels on either side of the barrier.
Surface Water Abstractions	Landmark Envirocheck database (July 2018)	There are two licensed surface water abstractions located within 1km of the site: one is for abstraction from Glaxo Operations (UK) Ltd for production of energy: hydroelectric power generation, located approximately 262m east; and one is for abstraction from Thames Water Utilities Ltd for public water supply for potable water, located approximately 899m south-west.

Table 3-1: Environmental Setting		
		There are six licensed surface water abstractions located between 1-2km of the site.
Flood Plain	Landmark Envirocheck database (November 2018)	The far southern extent of the site is located in an area classified by the EA as Flood Risk Zone 2 (medium probability of flooding) and the northern extent of the site is located in an area classified by the EA as Flood Risk Zone 1 (low probability of flooding). Site representatives have reported no known flooding and advised that the River Lea weir system is managed by the Environment Agency to prevent flooding to the benefit of the site. Flooding can occur at the locations of the soakaways but affects an area local to the soakaways.
Ecology and Protected Sites		
Designated Ecological Sites	Landmark Envirocheck database (November 2018) ENVIRON Phase 1 Environmental Review – Stability Room Project (2010)	The site is located in an area of Unadopted Green Belt and in a Nitrate Vulnerable Zone, relating to the Lee surface water navigation. Additionally, an Area of adopted Green Belt is located approximately 2m south of the site. According to ENVIRON, an ecological assessment was undertaken across the entire GSK site in December 2009 by Adonis Ecology Ltd. This report stated that there was a potential for some trees on the site and adjacent bankside areas to represent potential bat roosts and breeding habitats for birds.

3.1 Pollution History

3.1.1 Historical Land Uses

According to the first available historical record dated 1880 the site was occupied by a brick field and a surface water course, 'The Cut', orientated north-south, bisecting the site. Two 'Engine Houses' were located in the south-western corner and in the centre north of the site; and several adjoined rectangular features (each measuring approximately 50m x 20m) labelled as 'backs'[i] were located along the northern site boundary. Hertfordshire Council Environmental Department (Archaeology Section) was consulted in 2003 regarding the purpose of these features. In the opinion of the council, the features were connected with the brick making industry. The 'backs' may have represented a system for stacking and loading fired bricks onto barges, which operated on the adjacent River Lea and The Cut.

The surrounding area was largely undeveloped, assumed to be for agricultural use and the town of Ware had been developed approximately 500m east of the site.

The historical map dated 1899 showed several gravel pits located approximately 100m north to 500m north-west of the site, and the nearest pit 100m north had been infilled by 1925.

By 1923 the two engine houses in the centre north and south-western corner of the site had been demolished and the presumed brick storage area to the north-east, the 'backs' had been demolished and redeveloped into allotment gardens.

The site remained unchanged between 1923 and 1963. By 1963 a sports field and tennis courts had been developed in the central portion of the site and allotment gardens remained to the north of these. The north-western extent of the site had been redeveloped to a row of terrace buildings, assumed to be for residential use, together with a sports track.

By 1977 the site had been redeveloped for commercial uses comprising buildings and associated car parking in the western extent and a biological research laboratory and associated car parking in the north-eastern extent of the site. The sports fields and tennis courts in the south-eastern extent remained in place. 'The Cut' watercourse had been infilled across the entire site with the exception of a short section that remained feeding the River Lea Navigation. By 1980 the surrounds to the east of the site had been developed into works; and residential housing and schools were located to the north.

Between 1980 and the most recent historical map dated 2006 the site remained unchanged. Reference to publicly available satellite imagery, shows the development of Building 9 and the CHP plant within the western area of the installation boundary, after 2006 but by 2013.

An extract of historical maps is provided in Appendix 4.

3.1.2 Historical Pollution Incidents

According to the Landmark Database, the following information in relation to historical pollution incidents on and in the vicinity of the site is available:

- there are no publicly recorded historic pollution incidents to controlled waters on the GSK Ware R&D site;
- there were eight recorded pollution incidents to controlled waters within 250m of the site, the closest of which was recorded approximately 13m west of the site. All the events were classified as a 'Category 3 – Minor Incident' by the Environment Agency and occurred between 1989 and 1997. Two events were classified as a pollution of miscellaneous – unknown event; two events were classified as pollution of oils – unknown; two events were classified as pollution of chemicals – unknown; one event was classified as storm sewage pollutant; and one event was classified as pollution of unknown material;
- there were five recorded pollution incidents to controlled waters within 500m of the site between 1992 and 1997. One event was classified as a 'category 2 – Significant Incident' which related to a spillage of oils – unknown, approximately 288m east of the site. Four were classified as 'Category 3 – Minor Incidents' which related to a spillage of oils - unknown, chemicals - unknown, storm sewage and unknown sewage;
- there are no prosecutions relating to controlled waters and no enforcement and prohibition notices within 2km of the site; and
- there have been no publicly recorded pollution incidents within 2km of the site since 1997.

GSK has confirmed that there have been no notable spill, leak or loss incidents at the site that had the potential to contaminate ground. The caustic soda tank was reported to have lost contents and overwhelmed the integral bund on one occasion, but given that this was located within the boiler house is not expected to have had significant impact to soil and groundwater. Spilled caustic soda was lost to the drainage system via a drainage gulley in the corner of the room, but since this incident the drain has been decommissioned.

3.2 Potential Historic Contamination

The GSK Ware R&D site has been in use predominantly as a laboratory research and development for approximately 40 years and therefore a range of industrial contaminants and solvents have been in use at the site, albeit predominately at laboratory, bench top scale.

ENVIRON conducted an audit of the site operations in 2003 which did not identify significant potential for chemical contamination due to operational activities. A review of the 2003 audit by ENVIRON in 2010 stated that that there should be no reason that significant changes to site operations could have caused contamination since that time.

ENVIRON (2010) identified potential sources of contamination in the form of:

- potential historical in-filling of parts of the site with materials of unknown origin – in the area of the former full section of 'The Cut';
- the historical use of entire site for research and development for greater than 30 years including solvent storage and oil storage, although this would not necessarily imply widespread ground contamination; and
- existing and ongoing site activities for research and development purposes, although operating procedures are such that materials handling is carefully managed.

ENVIRON (2010) provided a summary of the potential contamination sources and these are discussed in Section 3.3.1 and 3.3.2 below.

3.3 Previous Site Investigations

A number of ground investigations have been undertaken at the GSK Ware R&D site, as detailed in Section 1.3 above however these have been typically localised and related to specific objectives, development schemes or investigation needs.

The most recent, a geotechnical ground investigation, was carried out at the site by Ground Engineering Limited in June 2010 in association with designing the foundation design for the construction of a Stability Building as part of GSK's redevelopment of the Ware R&D site. The stability building is located in the south-west of the Ware R&D site but out with the proposed permit installation boundary.

In short, there has been no site-wide investigation coverage to date, that would serve as a suitable baseline for soil and groundwater reference data at the start of the permit. It is therefore proposed that a site investigation will be undertaken and the strategy for the investigation is set out herein.

3.4 Baseline Soil and Groundwater Reference Data Strategy

Due to the use and presence of relevant hazardous substances (specifically diesel) at the installation, and the close proximity of sensitive receptors in the form of the River Lea and a Source Protection Zone, the collection of a soil and groundwater baseline is considered appropriate.

3.4.1 Sample Location Rationale

The bulk oils storage and oil distribution pipeline are activities of the permit that are considered to represent the most significant risk of soil and groundwater contamination. Management procedures and containment infrastructure are in place to minimise those potential risks, but a site investigation is proposed to provide a baseline assessment of current soil and groundwater conditions at the advent of the permit.

Up to ten soil investigation locations to depths of between 5m bgl and 10m bgl are proposed which will be used for soil and groundwater sample collection. The depth of the borehole will be determined by the depth to groundwater at each location (specifically the first groundwater strike which is expected in either the gravels or alluvial aquifers) and the boreholes will be terminated at approximately 2m depth beyond the resting groundwater level. The boreholes will not be drilled into the deeper chalk so as to avoid creating a preferential pathway to the chalk aquifer.

At this stage the plotted exploratory locations (as shown on Figure 3, Appendix 1) are indicative and their final location will be determined by access for drilling equipment (and later from a health and safety perspective for monitoring visits) and the presence or absence of buried utilities. The proposed locations will also require prior agreement with GSK and its facilities management team. The proposed borehole locations and their rationale are broadly set out below:

- BH01, BH02 and BH03 – up hydraulic gradient of the main permit installation, parallel with the northern site and installation boundary;
- BH05 and BH09 – located in the centre of the permit installation area, but down hydraulic gradient of a number of buildings in which generators are located but also down hydraulic gradient of the oil distribution pipeline;
- BH04 and BH06 – located as close as access permits to Building 7 containing the bulk fuel storage tank and offset filling point. The position of BH6 (as currently referenced on Figure 3, Appendix 1) is intended to be slightly down hydraulic gradient of Building 7 but must acknowledge the access constraints imposed by the roadway and narrow area between Building 7 and Building 5. BH6 is plotted on the north-eastern corner of Building 5 but may be relocated further west wards if possible.
- BH8 - located down hydraulic gradient of the oil distribution pipeline and in the vicinity of the CHP plant.
- BH7 and BH10– located along the permit installation area's down hydraulic gradient boundary. The final location would potentially be further west than shown but will be dependant on access to the rear of buildings 29 and 81.

The boreholes are anticipated to be drilled by continuous flight auger (or hollow stem techniques depending on drilling conditions) and completed with monitoring well installations that would have a design specification protective of the aquifer in respect of well response zone, annulus backfill and well headworks design. Robust trafficable covers are likely to be required if the boreholes are drilled in car park areas but these will also be used site wide to provide aquifer protection in the event of a spill, leak or loss of stored oils or chemicals during the life of the permit.

3.4.2 Sample Acquisition and Analysis

Soil arisings from boreholes will be examined visually and logged broadly in accordance with BS 5930:1999 and the European/British Standards BS EN ISO 14688 (for soils).

Soil samples will be screened on-site using a Photo Ionisation Detector (PID) for the field monitoring of volatile organic compounds (VOCs) and the readings noted for inclusion on the borehole logs.

Selected samples will be placed into containers appropriate to the type of analysis being undertaken and stored in cool boxes maintained at a low temperature (to avoid the loss of volatile compounds) prior to collection by a courier. An independent UKAS and MCERTS accredited laboratory will be contracted for all analysis. Chain of custody documentation will be maintained to track samples to and receipt at the laboratory and to fulfil QA/QC requirements.

3.4.3 Analytical Strategy

Soil Sample Analysis

The proposed analytical suite will include:

- principally total petroleum hydrocarbons (TPH) working group methodology which will include the aromatic and aliphatic carbon banding split, methyl tert butyl ether (MTBE) and benzene,

toluene, ethylbenzene and xylene (BTEX) compounds; but data will also be collected to include

- volatile organic compounds (VOCs) and semi volatile organic compounds (SVOCs);
- heavy metals; and
- asbestos.

Up to 18 soil samples will be scheduled for TPH analysis given that this is the principal contaminant of concern. A maximum of nine soil samples will be scheduled for VOC and SVOC analysis, but these will be collected from a depth beyond 1m. Heavy metals and asbestos analysis will be scheduled for one sample from each location, collected from made ground. The boiler treatment chemicals are such that any loses would likely result only in a short term change in pH and would otherwise be buffered by the groundwater geochemistry; in short, they are not considered to behave as persistent pollutants that would lead to longer term degradation of the groundwater aquifer. No laboratory analysis is therefore proposed for the boiler treatment chemicals except insofar as including pH on the suite of analysis.

Groundwater Analysis

A similar suite of analysis is proposed for groundwater analysis and will include TPH, VOCs and SVOCs, heavy metals and pH. It is proposed that the groundwater wells are sampled on three separate occasions, over two months, following installation of the monitoring wells, to provide a good characterisation of groundwater quality at the site.

Thereafter, groundwater monitoring would be undertaken once every five years (based upon the requirements of the Industrial Emissions Directive), or more frequently in the event of a spill, leak or loss.

3.5 Outcome of Reference Data Collection

The findings of the site investigation will be used to prepare a baseline report for inclusion in this Site Condition Report when they become available.

4. PERMITTED ACTIVITIES

4.1 Permitted Activities

The activities for which a permit is being sought comprise the operation of >50MWth of combustion plant, comprising of gas -fired boiler and CHP units, together with back-up diesel-fired generators. This includes the storage and handling of diesels, lubrication oils and water treatment chemicals. A discussion of oil and chemical storage arrangements is provided in Section 2.3.

4.2 Non-Permitted Activities

Non-permitted activities relate laboratory and R&D functions at the site, involving small quantities of solvents and other laboratory chemicals. These are excluded from the scope of the Environmental Permit and the Site Condition Report.

4.3 Environmental Risk Assessment

The Environmental Risk Assessment in accordance with the EPR H1 Guidance is provided under separate cover. By way of summary, in relation to ground conditions the EPR has identified:

- Potential for plant or equipment failure and for issues during materials handling to give risk to potential release of oils and chemicals at the site; namely this relates to the bulk storage of oils in Building 7 and the oil distribution pipeline in the west and north of the installation area. The bulk storage of oils in day tanks associated with the generators are not considered to represent a risk given their locations within or on the roofs of buildings.
- Much of the bulk storage of oils is provided with secondary containment however the condition of the concrete lined utility corridor containing the oil distribution pipeline is less well known. Inspections are undertaken but a report documenting the condition of the corridor have not been available for review. Nevertheless, the oil pipeline is contained within a concrete corridor and not laid direct to ground. In the event of a loss from the pipe, significant containment could be expected to be provided by the concrete corridor and the integral sump.
- Overall the risk of potential contamination release at source is managed through:
    - infrastructure (i.e. engineered containment bunds);
    - materials handling and management procedures (including specific oil delivery procedures); and
    - planned preventative maintenance (regular inspection programmes and corrective action).
- The site is served by a comprehensive network of surface water drainage that discharges ultimately to 'The Cut' and River Lea Navigation. None of the soakaways are considered to be susceptible to oil ingress given their remote positioning relative to oil storage facilities. In the event of a major loss to the drainage system, a penstock valve can be operated at 'The Cut' to prevent discharge of oils/chemicals to the River Lea Navigation and the drainage system, particularly the final interceptor has a capacity of some 20,0000 litres for containment.
- The site is largely hard surfaced such that an aboveground loss of oil/chemicals would be encouraged towards the engineered drainage system. Topographically the site falls in gradient towards the River Lea Navigation and some very localised areas of soft landscaping are present. There is some limited potential for oil/chemicals to permeate through soft landscaped areas in the event of a major uncontrolled loss, however soft landscaped areas

are kerbed such that a large spill/loss would be expected to be contained to roadways and car parks and directed towards the drainage network.

The oil distribution pipe network runs through a series of covered, concreted culverts. In the event that a failure of the oil distribution pipeline occurred the concrete corridor could be expected to provide some containment and reduce the potential for uncontrolled loss to the surrounding soils and groundwater. There is considered to be a low overall risk of impact to groundwater.

5. CHANGES TO THE ACTIVITY

This section is currently not applicable and will be updated during the life of the Environmental Permit.

6. MEASURES TAKEN TO PROTECT LAND

This section is currently not applicable and will be updated during the life of the Environmental Permit.

7. SOIL, GAS AND WATER QUALITY MONITORING

This section is currently not applicable and will be updated during the life of the Environmental Permit.

8. DECOMISSIONING AND REMOVAL OF POLLUTION RISK

This section will be completed when the site is decommissioned.

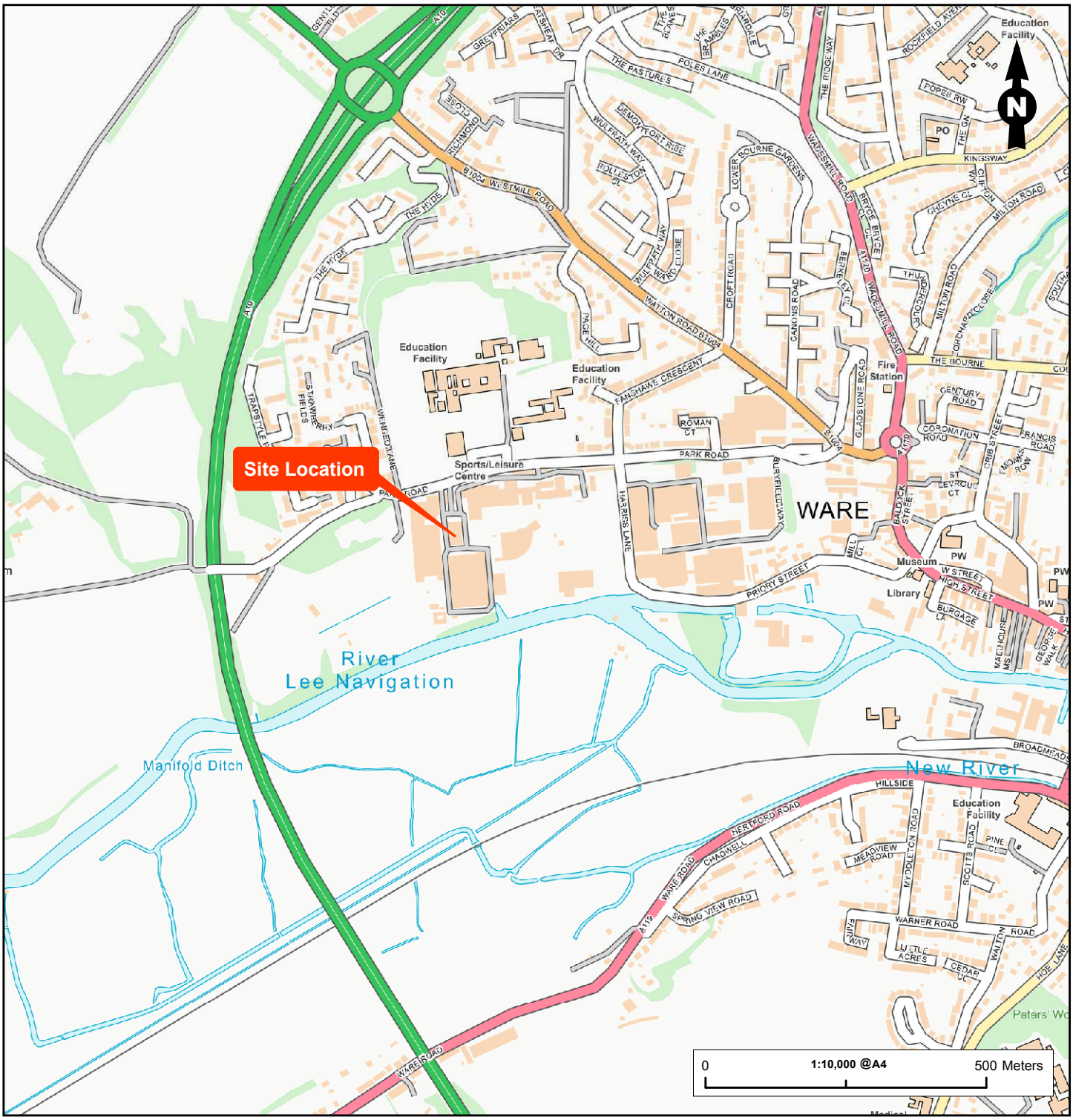
9. REFERENCE DATA AND REMEDIATION

This section will be completed when the site is decommissioned.

10. STATEMENT OF SITE CONDITION

This section will be completed when the site is decommissioned

APPENDIX 1
FIGURES



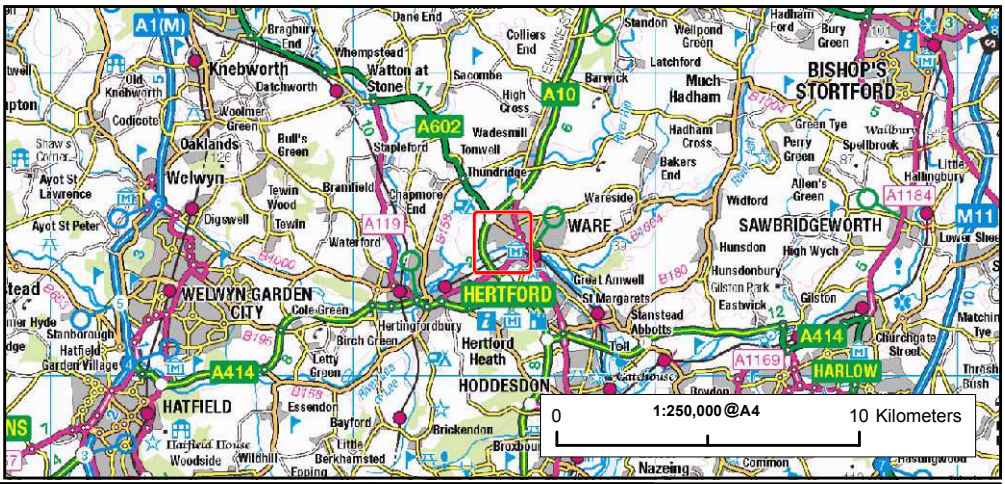
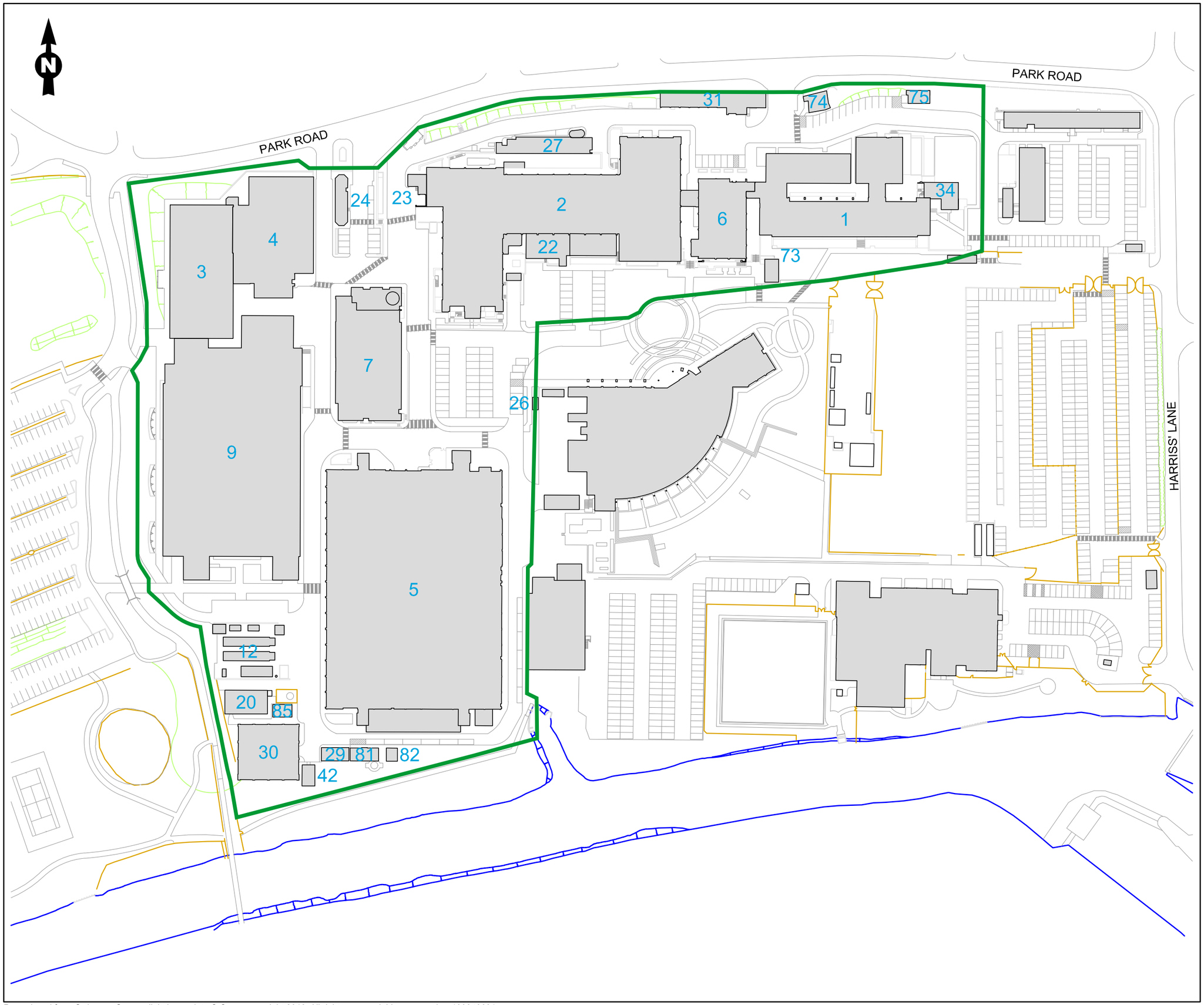


Figure Title: Figure 1: Site Location	Project Name: Development Facility, Ware, Hertfordshire, SG12 0DP	Date: April 2019	
		Scale: As shown	
Project Number: 1700003159	Client: GlaxoSmithKline Services Limited	Issue: 2	Prepared By: BVK

Coordinate System: British National Grid. Projection: Transverse Mercator. Datum: OSGB 1936.



Legend

Permit Installation Boundary

BUILDING NO:	DESCRIPTION:
01	OFFICE BUILDING
02	LABORATORIES
03	LABORATORIES
04	LABORATORIES
05	LABORATORIES
06	COMPUTER CENTRE
07	ENGINEERING
09	BUILDING 9
12	CHP
20	SOLVENT STORE
22	LABORATORIES
23	LOADING BAY
24	SITE RECEPTION
26	ENGINEERING
27	LABORATORIES
29	ENGINEERING PUMPHOUSE
30	SUB-STATION
31	SECURITY
34	ENGINEERING
42	SUB-STATION
53	TENNIS PAVILION
55	SPORTS PAVILION
62	PORTACABINS
73	COMPUTER ARCHIVE STORE
74	CYCLE PARKING
75	CYCLE PARKING
81	STORE
82	STORE
85	STORE

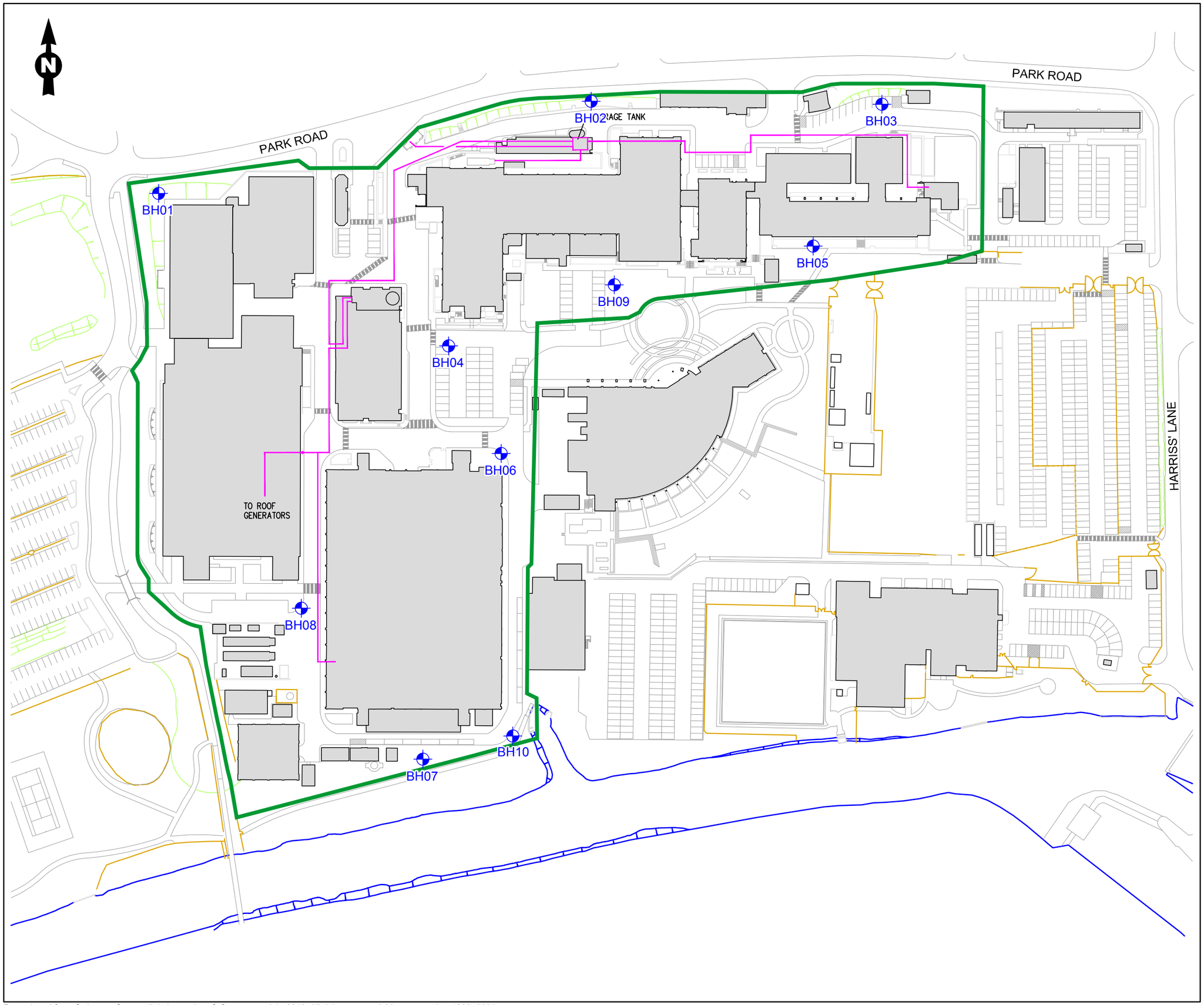
Figure Title
Figure 2: Site Layout

Project Name
Development Facility, Ware, Hertfordshire, SG12 0DP

Project Number	Figure No.
1700003159	2
Date	Prepared By
April 2019	BVK
Scale	Issue
Not to scale	2

Client
GlaxoSmithKline Services Limited

RAMBOLL



Legend

- Permit Installation Boundary
- Pipeline
- Proposed Borehole Location

Figure Title
Figure 3: Proposed Borehole Location Plan

Project Name
Development Facility, Ware, Hertfordshire, SG12 0DP

Project Number	Figure No.
1700003159	3
Date	**Prepared By**
April 2019	BVK
Scale	**Issue**
Not to scale	2

Client
GlaxoSmithKline Services Limited

RAMBOLL

APPENDIX 2
SITE PHOTOGRAPHIC LOG

Photo 1. Bulk fuel storage tank, Building 7

Photo 2. Containment and drainage for bulk fuel tank, Building 7

Title: Photographic Log	**Client:** GSK
Site: David Jack Research Centre	**Date:** April 2019

Photo 3. Containment and drainage for bulk fuel tank, Building 7. Day tank for generator in rear of view

Photo 4. Sump for draining containment bund to bulk fuel storage tank

Title: Photographic Log	**Client:** GSK
Site: David Jack Research Centre	**Date:** April 2019

Photo 5. Bulk tank offset refilling point with containment

Photo 6. Roadway and surface falls adjacent to offset fill point to bulk fuel tank

Title:	Photographic Log	**Client:**	GSK
Site:	David Jack Research Centre	**Date:**	April 2019

Photo 7. Boiler treatment chemical storage, internal to Building 7

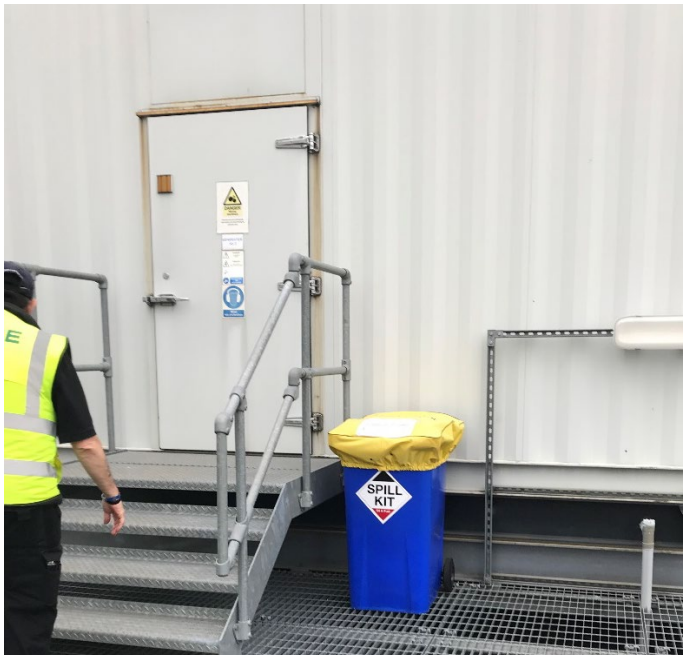


Photo 8. Building 9, roof top generator container with spill kit

Title: Photographic Log	**Client:** GSK
Site: David Jack Research Centre	**Date:** April 2019

Photo 9. Building 9, generator with integral day tank

Photo 10. Building 5, ground floor generator with separate (elevated) day tank and brick bunding

Title:	Photographic Log	**Client:**	GSK
Site:	David Jack Research Centre	**Date:**	April 2019

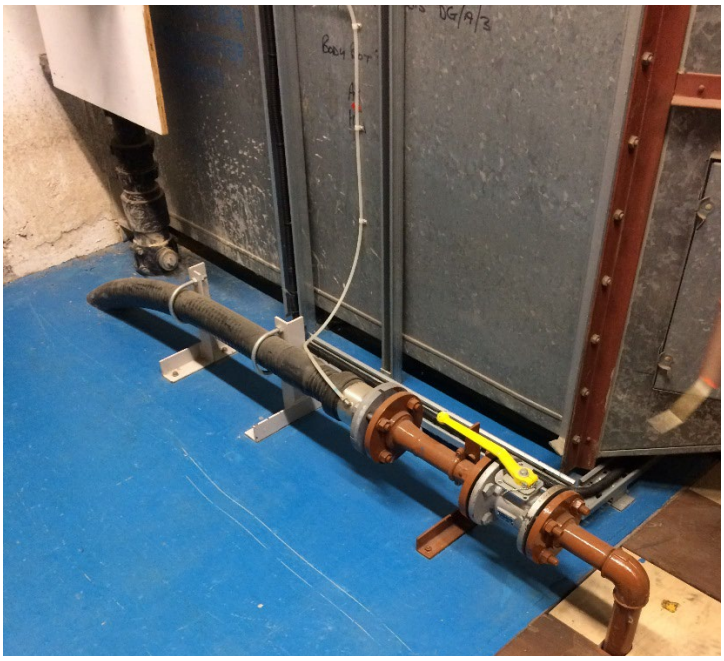


Photo 11. Ingress of fuel distribution pipeline connecting generator in Building 5 to main bulk fuel tank (and pump sets) in Building 7

Photo 12. Waste Lubrication Oil storage tank adjacent to CHP

Photo 13. Fire water pump house day tank

Photo 14. Building 27 Day tank (at elevation) and adjacent generator (right of frame)

Title:	Photographic Log	**Client:**	GSK
Site:	David Jack Research Centre	**Date:**	April 2019

APPENDIX 3
SAFETY DATA SHEETS

SAFETY DATA SHEET
CORTROL IS3000E

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name or designation of the mixture	CORTROL IS3000E
Version number	7.6
Revision date	15/04/2019
Supersedes date	08/03/2018

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses	Water based dissolved oxygen scavenger/ metal passivator.
Uses advised against	None known.

1.3. Details of the supplier of the safety data sheet

SUEZ Water Technologies & Solutions (UK) Limited Partnership
Hydro House
Newcombe Way
Orton Southgate
Peterborough
PE2 6SE
Tel.: +44 (0)1733 385444, Fax : 01733 391775
e-mail : emea.productregulatory.wts@suez.com

1.4. Emergency telephone number

Multilingual emergency number (24/7)

Europe, Middle East, Africa, Israel (Europe and English language speaking countries):
+44(0)1235 239670
Middle East & Africa (speaking Arabic):
+44(0)1235 239671

National Poisons Information Centre
NHS Direct on 111
Or a doctor

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 as amended

This mixture does not meet the criteria for classification according to Regulation (EC) 1272/2008 as amended.

2.2. Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

Hazard pictograms	None.
Signal word	None.
Hazard statements	The product does not need to be labelled in accordance with EC directives or respective national laws.

Precautionary statements

Prevention	Not available.
Response	Not available.
Storage	Not available.

SAFETY DATA SHEET
CORTROL IS3000E

Disposal	Not available.
Supplemental label information	EUH210 - Safety data sheet available on request.
2.3. Other hazards	None known.

SECTION 3: Composition/information on ingredients

Mixtures

Chemical description Sodium bisulphite, aqueous solution

Chemical name	%	CAS-No. / EC No.	REACH Registration No.	Index No.	Notes
Sodium bisulphite	30 - < 60	7631-90-5 231-548-0	01-2119524563-42	016-064-00-8	
Classification:	Acute Tox. 4;H302				B

The classification of the above substance(s) is given, including the hazard class, category code and hazard statements which are assigned in accordance with their physicochemical, health and environmental hazards. Please refer to section 16 where the full text of each relevant H-statement is listed.

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation	Remove victim to fresh air and keep at rest in a position comfortable for breathing.
Skin contact	Wash off immediately with plenty of water.
Eye contact	Rinse immediately with plenty of water for at least 15 minutes. Get medical attention if irritation persists after washing.
Ingestion	Rinse mouth. Do not give anything to eat or drink. Do not induce vomiting.
4.2. Most important symptoms and effects, both acute and delayed	Not applicable.
4.3. Indication of any immediate medical attention and special treatment needed	Not available.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media	Dry chemical, CO2, water spray or regular foam.
Unsuitable extinguishing media	None.
5.2. Special hazards arising from the substance or mixture	Oxides of sulphur evolved in fire.

5.3. Advice for firefighters

Special protective equipment for firefighters	Self contained breathing apparatus. (CEN : EN 137) Protective clothing (CEN : EN 469) Protective gloves (CEN : EN 659) Helmet (CEN : EN 443)
Special fire fighting procedures	Use standard firefighting procedures and consider the hazards of other involved materials. Prevent spillage and fire-fighting water from entering in public sewers or the immediate environment.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	Wear protective clothing, gloves and safety goggles.
For emergency responders	Use personal protection recommended in Section 8 of the SDS.

SAFETY DATA SHEET
CORTROL IS3000E

6.2. Environmental precautions
Prevent from entering sewers or the immediate environment.
Accidental release of large quantities into the aquatic environment may harm aquatic organisms.

6.3. Methods and material for containment and cleaning up
Contain and absorb on absorbent material (e.g. sand).
Place in waste disposal container.
Water contaminated with this product may be sent to a sanitary sewer treatment facility, or a permitted waste treatment facility, in accordance with any local agreements.

6.4. Reference to other sections
Please refer also to section no. 8 'Exposure controls' for further information.

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Vent carefully before opening.
Sulfur dioxide can be formed during the normal use and handling of this product.

7.2. Conditions for safe storage, including any incompatibilities
Reasonable and safe chemical storage.
Store at ambient temperature.
Store in a well ventilated place.
Avoid freezing.

7.3. Specific end use(s)
Only for professional and industrial users

Shelf life
135 days

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

UK. EH40 Workplace Exposure Limits (WELs)

Components	Type	Value
Sodium bisulphite (CAS 7631-90-5)	TWA	5 mg/m3

Biological limit values
No biological exposure limits noted for the ingredient(s).

Recommended monitoring procedures
Not available.

Derived no effect levels (DNELs)

Workers

Components	Value	Assessment factor	Notes
Sodium bisulphite (CAS 7631-90-5)			
Long-term, Systemic, Inhalation	246 mg/m3		

Predicted no effect concentrations (PNECs)

Components	Value	Assessment factor	Notes
Sodium bisulphite (CAS 7631-90-5)			
Freshwater	1,09 mg/l	10	
Marine water	0,11 mg/l	100	
STP	82,5 mg/l	10	

8.2. Exposure controls

Appropriate engineering controls
Adequate ventilation to maintain air contaminants below exposure limits.

Individual protection measures, such as personal protective equipment

Eye/face protection
Splash proof chemical goggles.
CEN : EN 166

Skin protection

- Hand protection
Neoprene gloves (Protection against unintentional short-term contact)
Nitrile gloves (Protection against unintentional short-term contact)
CEN : EN 374-1/2/3/4; EN 420

- Other
Protective clothing.
CEN : EN ISO 13688; EN ISO 6529; EN 14605

Respiratory protection
In case of insufficient ventilation, use a breathing mask with filter type: E2-P2
CEN : EN 140; EN 14387

Thermal hazards
Not available.

SAFETY DATA SHEET
CORTROL IS3000E

Environmental exposure controls	Prevent from entering in public sewers or the immediate environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance	
Colour	Colourless to light pink
Physical state	Liquid
Odour	Strong
Odour threshold	Not available.
pH (concentrated product)	3,2
pH in aqueous solution	3,5 (5% SOL.)
Melting point/freezing point	-8 °C
Initial boiling point and boiling range	Not available.
Flash point	Not applicable.
Evaporation rate	< 1 (Ether = 1)
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Vapour pressure	18 mm Hg
Vapour pressure temp.	21 °C
Vapour density	< 1 (Air = 1)
Relative density	1,26
Relative density temperature	21 °C
Solubility	
Solubility (water)	100 %
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not applicable.
Decomposition temperature	Not available.
Viscosity	6 cps
Viscosity temperature	21 °C
Explosive properties	Not available.
Oxidising properties	Not available.

9.2. Other information

Pour point	-5 °C
Shelf life	135 days
VOC	0 % (Calculated)

SECTION 10: Stability and reactivity

10.1. Reactivity	Not available.
10.2. Chemical stability	Material is stable under normal conditions.
10.3. Possibility of hazardous reactions	Not applicable.
10.4. Conditions to avoid	Keep away from heat.
10.5. Incompatible materials	Avoid contact with strong oxidisers.

SAFETY DATA SHEET
CORTROL IS3000E

10.6. Hazardous decomposition products Oxides of sulphur.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Product	Test Results
CORTROL IS3000E (Mixture)	Acute Dermal LD50 Rabbit: > 5000 mg/kg (Calculated according to GHS additivity formula) Acute Inhalation LC50 Rat: > 5 mg/l 4 hour (Calculated according to GHS additivity formula) Acute Oral LD50 Rat: 3030 mg/kg (Calculated according to GHS additivity formula)
Components	**Test Results**
Sodium bisulphite (7631-90-5)	Acute Dermal LD50 Rabbit: > 2000 mg/kg Acute Inhalation LC50 Rat: > 5,5 mg/l 4 hour Acute Oral LD50 Rat: 1420 mg/kg

Acute toxicity Not classified.

Skin corrosion/irritation Not classified.

Serious eye damage/irritation May be irritating to eyes.

Respiratory or skin sensitisation Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Specific target organ toxicity - single exposure Not classified.

Carcinogenicity Not classified.

Germ cell mutagenicity Not classified.

Reproductive toxicity Not classified.

Information on likely routes of exposure

Ingestion Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

Inhalation Prolonged or excessive inhalation may cause respiratory tract irritation.

Skin contact May be irritating to the skin.

Eye contact May be irritating to eyes.

Symptoms Not available.

Aspiration hazard Not classified.

Mixture versus substance information None known.

Other information Not available.

SECTION 12: Ecological information

12.1. Toxicity

Product		Species	Test Results
CORTROL IS3000E (CAS Mixture)			
Aquatic			
Crustacea	0% Mortality	Daphnia magna	100 mg/l, Static Screen, 48 hour
	100% Mortality	Daphnia magna	500 mg/l, Static Screen, 48 hour
Fish	0% Mortality	Rainbow trout	500 mg/l, Static Screen, 48 hour
	100% Mortality	Rainbow trout	1000 mg/l, Static Screen, 48 hour

SAFETY DATA SHEET
CORTROL IS3000E

12.2. Persistence and degradability

This product, being inorganic, has no TOC, BOD.

- COD (mgO2/g)	54
12.3. Bioaccumulative potential	Not available.
Partition coefficient n-octanol/water (log Kow)	Not available.
Bioconcentration factor (BCF)	Not available.
12.4. Mobility in soil	Not available.
12.5. Results of PBT and vPvB assessment	Not a PBT or vPvB substance or mixture.
12.6. Other adverse effects	Not available.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Contaminated packaging	EWC (European Waste Code) recommendation : 15 01 10 15 Waste packaging; absorbents, wiping cloths, filter materials and protective clothing not otherwise specified. 15 01 Packaging (including separately collected municipal packaging waste). 15 01 10 Packaging containing residues of or contaminated by dangerous substances. Depending on the origin and state of the waste, other EWC numbers may be applicable too.
Disposal methods/information	According to Hazardous Waste Regulations. EWC (European Waste Code) recommendation : 16 03 03 16 Wastes not otherwise specified in the list. 16 03 Off-specification batches and unused products. 16 03 03 Inorganic wastes containing dangerous substances. Depending on the origin and state of the waste, other EWC numbers may be applicable too.

SECTION 14: Transport information

ADR

Not regulated as dangerous goods.

RID

Not regulated as dangerous goods.

ADN

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU regulations

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and II, as amended

Not listed.

Regulation (EC) No. 850/2004 On persistent organic pollutants, Annex I as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3 as amended

Not listed.

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Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex V as amended

Not listed.

Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry, as amended

Not listed.

Regulation (EC) No. 1907/2006, REACH Article 59(10) Candidate List as currently published by ECHA

Not listed.

Authorisations

Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorization, as amended

Not listed.

Restrictions on use

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended

Not listed.

Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work, as amended.

Not listed.

Other EU regulations

Directive 2012/18/EU on major accident hazards involving dangerous substances, as amended

Not listed.

National regulations Not available.

15.2. Chemical safety assessment Not available.

NSF Registered and/or meets USDA (according to 1998 guidelines): Registration No. – 141468
Category Code(s):
G5 Cooling and retort water treatment products
G6 Boiler treatment products, steam line products – food contact

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

SECTION 16: Other information

List of abbreviations

COD: Chemical Oxygen Demand
CAS: Chemical Abstract Service.
EC-No: European Commission Number
CLP: Classification, Labeling and Packaging REGULATION (EC) No 1272/2008 on classification, labeling and packaging of substances and mixtures.
CEN: European Committee for Standardization (Comité Européen de Normalisation).
TWA: Time Weighted Average.
STEL: Short-term Exposure Limit.
LD50: Lethal Dose 50%.
LC50: Lethal Concentration 50%.
EC50: Effective Concentration 50%.
NOEL: No observed effect level.
BOD: Biochemical oxygen demand.
TOC: Total Organic Carbon.
ADR: European agreement concerning the international carriage of dangerous goods by road (Accord européen relatif transport des merchandises dangereuses par route).
ADN: European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (Accord européen relatif au transport international des marchandises dangereuses par voies de navigation intérieures).
IATA: International Air Transport Association

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	IMDG Code: International Maritime Dangerous Goods Code. RID: Regulations concerning the international carriage of dangerous goods by rail (Règlement International concernant le transport de marchandises dangereuses par chemin de fer).
References	Safety data sheets of raw materials.
Information on evaluation method leading to the classification of mixture	The physical, health and environmental hazards of this mixture are assessed by applying the classification criteria for each hazard class or differentiation in Parts 2 to 5 of Annex I to Regulation (EC) No 1272/2008 (CLP).
Full text of any H-statements not written out in full under Sections 2 to 15	H302 Harmful if swallowed.
Revision information	SECTION 6: Accidental release measures: For emergency responders Physical & Chemical Properties: Multiple Properties SECTION 16: Other information: Further information
Training information	Provide training on safe handling while considering the type of application and exposure scenarios.
Based on EC Directive / Regulations	(EC) No 1907/2006 (REACH) (EU) 2015/830 (EC) No 1272/2008 (EU) No 1357/2014
Further information	Correction in Section: 7,9

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CORTROL IS4990

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name or designation of the mixture	CORTROL IS4990
Version number	5.4
Revision date	26/02/2018
Supersedes date	18/01/2018

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses	Oxygen scavenger
Uses advised against	None known.

1.3. Details of the supplier of the safety data sheet

SUEZ Water Technologies & Solutions (UK) Limited Partnership
Hydro House
Newcombe Way
Orton Southgate
Peterborough
PE2 6SE
Tel.: +44 (0)1733 385444, Fax : 01733 391775
e-mail : emea.productregulatory.wts@suez.com

1.4. Emergency telephone number

Multilingual emergency number (24/7)

Europe, Middle East, Africa, Israel (Europe and English language speaking countries):
+44(0)1235 239670
Middle East & Africa (speaking Arabic):
+44(0)1235 239671

National Poisons Information Centre
NHS Direct on 111
Or a doctor

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 as amended

Health hazards

Skin corrosion/irritation	Category 2	H315 - Causes skin irritation.
Serious eye damage/eye irritation	Category 2	H319 - Causes serious eye irritation.

2.2. Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

Hazard pictograms

Signal word Warning

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Hazard statements

H315	Causes skin irritation.
H319	Causes serious eye irritation.

Precautionary statements

Prevention

P280	Wear protective gloves and eye/face protection.

Response

P302 + P352	IF ON SKIN: Wash with plenty of water.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P332 + P313	If skin irritation occurs: Get medical advice/attention.
P337 + P313	If eye irritation persists: Get medical advice/attention.

Storage Not available.

Disposal Not available.

Supplemental label information None.

2.3. Other hazards None known.

SECTION 3: Composition/information on ingredients

Mixtures

Chemical description Aqueous alkaline solution of tannins

Chemical name	%	CAS-No. / EC No.	REACH Registration No.	INDEX No.	Notes
Sodium hydroxide	0,5 - < 2	1310-73-2 215-185-5	01-2119457892-27	011-002-00-6	
Classification:	Met. Corr. 1;H290, Skin Corr. 1A;H314				

The classification of the above substance(s) is given, including the hazard class, category code and hazard statements which are assigned in accordance with their physicochemical, health and environmental hazards. Please refer to section 16 where the full text of each relevant H-statement is listed.

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation Move to fresh air.

Skin contact Take off immediately all contaminated clothing.
Wash off immediately with plenty of water for at least 15 minutes.
Get medical attention if irritation develops and persists.

Eye contact Rinse immediately with plenty of water for at least 15 minutes.
Get medical attention if irritation develops and persists.

Ingestion Rinse mouth.
Do not give anything to eat or drink.

4.2. Most important symptoms and effects, both acute and delayed Irritant effects.

4.3. Indication of any immediate medical attention and special treatment needed Not available.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media Dry chemical, CO2, water spray or regular foam.

Unsuitable extinguishing media Not available.

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5.2. Special hazards arising from the substance or mixture Oxides of carbon and sulphur evolved in fire.

5.3. Advice for firefighters

Special protective equipment for firefighters Self contained breathing apparatus. (CEN : EN 137)
Protective clothing (CEN : EN 469)
Protective gloves (CEN : EN 659)
Helmet (CEN : EN 443)

Special fire fighting procedures Use standard firefighting procedures and consider the hazards of other involved materials.
Prevent spillage and fire-fighting water from entering in public sewers or the immediate environment.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel Wear protective clothing, gloves and safety goggles.

For emergency responders Use personal protection recommended in Section 8 of the SDS.

6.2. Environmental precautions Prevent from entering sewers or the immediate environment.
Accidental release of large quantities into the aquatic environment may harm aquatic organisms.

6.3. Methods and material for containment and cleaning up Absorb onto inert material and dispose of according to Hazardous Waste Regulations.
Remove small spills with plenty of water.

6.4. Reference to other sections Please refer also to section no. 8 'Exposure controls' for further information.

SECTION 7: Handling and storage

7.1. Precautions for safe handling Avoid contact with skin and eyes.

7.2. Conditions for safe storage, including any incompatibilities Keep container tightly closed.
Store in cool, well ventilated area.
Protect from freezing.

7.3. Specific end use(s) Only for professional and industrial users

Shelf life 270 days

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

UK. EH40 Workplace Exposure Limits (WELs)

Components	Type	Value
Sodium hydroxide (CAS 1310-73-2)	STEL	2 mg/m3

Biological limit values No biological exposure limits noted for the ingredient(s).

Recommended monitoring procedures Not available.

Derived no effect levels (DNELs)

Workers

Components	Value	Assessment factor	Notes
Sodium hydroxide (CAS 1310-73-2)			
Long-term, Local, Inhalation	1 mg/m3	1	
Short-term, Local, Dermal	2 mg/kg/day		
Short-term, Local, Inhalation	2 mg/m3		

Predicted no effect concentrations (PNECs) Not available.

8.2. Exposure controls

Appropriate engineering controls Adequate ventilation to maintain air contaminants below exposure limits.

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Individual protection measures, such as personal protective equipment

Eye/face protection	Safety goggles. CEN : EN 166
Skin protection	
- Hand protection	Neoprene gloves (Protection against unintentional short-term contact) Nitrile gloves (Protection against unintentional short-term contact) CEN : EN 374-1/2/3/4; EN 420
- Other	Protective clothing. CEN : EN ISO 13688; EN ISO 6529; EN 14605
Respiratory protection	In case of insufficient ventilation, use a breathing mask with filter type: P2 CEN : EN 140; EN 143; EN 149
Thermal hazards	Not available.
Environmental exposure controls	Prevent from entering in public sewers or the immediate environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance	
Colour	Brown-black
Physical state	Liquid
Odour	Mild
Odour threshold	Not available.
pH (concentrated product)	9,6
Melting point/freezing point	Not available.
Initial boiling point and boiling range	102 °C
Flash point	> 100 °C P-M(CC)
Evaporation rate	< 1 (Ether = 1)
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Vapour pressure	18 mm Hg
Vapor pressure temp.	21 °C
Vapour density	< 1 (Air = 1)
Relative density	1,12
Relative density temperature	21 °C
Solubility	
Solubility (water)	100 %
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not applicable.
Decomposition temperature	Not available.
Viscosity	Not applicable.
Viscosity temperature	21 °C
Explosive properties	Not available.
Oxidising properties	Not available.

9.2. Other information

Shelf life	270 days

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VOC	0 % (Calculated)

SECTION 10: Stability and reactivity

10.1. Reactivity	Not available.
10.2. Chemical stability	Material is stable under normal conditions.
10.3. Possibility of hazardous reactions	Not applicable.
10.4. Conditions to avoid	Protect from freezing.
10.5. Incompatible materials	Avoid contact with strong acids.
10.6. Hazardous decomposition products	Oxides of carbon and sulphur evolved in fire.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Product	Test results
CORTROL IS4990 (Mixture)	Acute Dermal LD50 Rabbit: > 2000 mg/kg (Calculated according to GHS additivity formula) Acute Oral LD50 Rat: > 2000 mg/kg (Calculated according to GHS additivity formula)

Components	Test results
Sodium hydroxide (1310-73-2)	Acute Dermal LD50 Rabbit: 1350 mg/kg Acute Oral LD50 Rabbit: > 500 mg/kg

Acute toxicity	Not classified.
Skin corrosion/irritation	Causes skin irritation.
Serious eye damage/irritation	Causes serious eye irritation.
Respiratory or skin sensitisation	Not classified.
Specific target organ toxicity - repeated exposure	Not classified.
Specific target organ toxicity - single exposure	Not classified.
Carcinogenicity	Not classified.
Germ cell mutagenicity	Not classified.
Reproductive toxicity	Not classified.

Information on likely routes of exposure

Ingestion	May cause irritation of the gastrointestinal tract.
Inhalation	Prolonged or excessive inhalation may cause respiratory tract irritation.
Skin contact	Causes skin irritation.
Eye contact	Causes serious eye irritation.
Symptoms	Not available.
Aspiration hazard	Not classified.
Mixture versus substance information	None known.
Other information	Not available.

SECTION 12: Ecological information

12.1. Toxicity	No data available

12.2. Persistence and degradability

- COD (mgO2/g)	290

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12.3. Bioaccumulative potential	Not available.
Partition coefficient n-octanol/water (log Kow)	Not available.
Bioconcentration factor (BCF)	Not available.
12.4. Mobility in soil	Not available.
12.5. Results of PBT and vPvB assessment	Not a PBT or vPvB substance or mixture.
12.6. Other adverse effects	Nutrients: P : < 0,065 mg/g

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Contaminated packaging

According to Hazardous Waste Regulations.

EWC (European Waste Code) recommendation : 15 01 10
15 Waste packaging; absorbents, wiping cloths, filter materials and protective clothing not otherwise specified.
15 01 Packaging (including separately collected municipal packaging waste).
15 01 10 Packaging containing residues of or contaminated by dangerous substances.
Depending on the origin and state of the waste, other EWC numbers may be applicable too.

Disposal methods/information

According to Hazardous Waste Regulations.

EWC (European Waste Code) recommendation : 16 03 05
16 Wastes not otherwise specified in the list.
16 03 Off-specification batches and unused products.
16 03 05 Organic wastes containing dangerous substances.
Depending on the origin and state of the waste, other EWC numbers may be applicable too.

SECTION 14: Transport information

ADR

Not regulated as dangerous goods.

RID

Not regulated as dangerous goods.

ADN

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU regulations

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and II, as amended

Not listed.

Regulation (EC) No. 850/2004 On persistent organic pollutants, Annex I as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex V as amended

Not listed.

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Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry

Not listed.

Regulation (EC) No. 1907/2006, REACH Article 59(10) Candidate List as currently published by ECHA

Not listed.

Authorisations

Regulation (EC) No. 143/2011 Annex XIV Substances Subject to Authorisation

Not listed.

Restrictions on use

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended

Not listed.

Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work

Not listed.

Other EU regulations

Directive 2012/18/EU on major accident hazards involving dangerous substances, as amended

Not listed.

National regulations Not available.

15.2. Chemical safety assessment Not available.

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

SECTION 16: Other information

List of abbreviations

EC-No: European Commission Number
COD: Chemical Oxygen Demand
IATA: International Air Transport Association
CAS: Chemical Abstract Service.
CLP: Classification, Labeling and Packaging REGULATION (EC) No 1272/2008 on classification, labeling and packaging of substances and mixtures.
CEN: European Committee for Standardization (Comité Européen de Normalisation).
TWA: Time Weighted Average.
STEL: Short-term Exposure Limit.
LD50: Lethal Dose 50%.
LC50: Lethal Concentration 50%.
EC50: Effective Concentration 50%.
NOEL: No observed effect level.
BOD: Biochemical oxygen demand.
TOC: Total Organic Carbon.
ADR: European agreement concerning the international carriage of dangerous goods by road (Accord européen relatif transport des merchandises dangereuses par route).
ADN: European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (Accord européen relatif au transport international des marchandises dangereuses par voies de navigation intérieures).
IMDG Code: International Maritime Dangerous Goods Code.
RID: Regulations concerning the international carriage of dangerous goods by rail (Règlement International concernant le transport de marchandises dangereuses par chemin de fer).

References Safety data sheets of raw materials.

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Information on evaluation method leading to the classification of mixture	The physical, health and environmental hazards of this mixture are assessed by applying the classification criteria for each hazard class or differentiation in Parts 2 to 5 of Annex I to Regulation (EC) No 1272/2008 (CLP).
Full text of any H-statements not written out in full under Sections 2 to 15	H290 May be corrosive to metals. H314 Causes severe skin burns and eye damage.
Revision information	Physical & Chemical Properties: Multiple Properties GHS: Classification
Training information	Provide training on safe handling while considering the type of application and exposure scenarios.
Based on EC Directive / Regulations	(EC) No 1907/2006 (REACH) (EU) 2015/830 (EC) No 1272/2008 (EU) No 1357/2014
Further information	Correction in Section: 2,15,16

SAFETY DATA SHEET

OPTISPERSE ADJ5150

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name or designation of the mixture	OPTISPERSE ADJ5150
Version number	5.3
Revision date	20/02/2018
Supersedes date	12/12/2016

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses	Alkalinity provider
Uses advised against	None known.

1.3. Details of the supplier of the safety data sheet

SUEZ Water Technologies & Solutions (UK) Limited Partnership
Hydro House
Newcombe Way
Orton Southgate
Peterborough
PE2 6SE
Tel.: +44 (0)1733 385444, Fax : 01733 391775
e-mail : emea.productregulatory.wts@suez.com

1.4. Emergency telephone number

Multilingual emergency number (24/7)

Europe, Middle East, Africa, Israel (Europe and English language speaking countries):
+44(0)1235 239670
Middle East & Africa (speaking Arabic):
+44(0)1235 239671

National Poisons Information Centre
NHS Direct on 111
Or a doctor

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 as amended

Physical hazards		
Corrosive to metals	Category 1	H290 - May be corrosive to metals.
Health hazards		
Skin corrosion/irritation	Category 1A	H314 - Causes severe skin burns and eye damage.
Serious eye damage/eye irritation	Category 1	H318 - Causes serious eye damage.

2.2. Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

Contains:	Sodium hydroxide

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Hazard pictograms

Signal word Danger

Hazard statements

H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.

Precautionary statements

Prevention

P234 Keep only in original container.
P280 Wear protective gloves/protective clothing/eye protection/face protection.

Response

P301 + P330 + P331 IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 Immediately call a POISON CENTRE/doctor.

Storage Not available.

Disposal Not available.

Supplemental label information None.

2.3. Other hazards None known.

SECTION 3: Composition/information on ingredients

Mixtures

Chemical description Alkaline solution

Chemical name	%	CAS-No. / EC No.	REACH Registration No.	INDEX No.	Notes
Sodium hydroxide	>= 5	1310-73-2 215-185-5	01-2119457892-27	011-002-00-6	
Classification:	Met. Corr. 1;H290, Skin Corr. 1A;H314				

The classification of the above substance(s) is given, including the hazard class, category code and hazard statements which are assigned in accordance with their physicochemical, health and environmental hazards. Please refer to section 16 where the full text of each relevant H-statement is listed.

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation Remove victim to fresh air and keep at rest in a position comfortable for breathing.
Get medical attention immediately.

Skin contact Take off immediately all contaminated clothing.
Wash off immediately with plenty of water for at least 15 minutes.
Get medical attention immediately.

Eye contact Rinse immediately with plenty of water for at least 15 minutes.
Get medical attention immediately.

Ingestion Rinse mouth.
Do not give anything to eat or drink.
Do not induce vomiting.
Call a physician or poison control centre immediately.

4.2. Most important symptoms and effects, both acute and delayed Corrosive effects.

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OPTISPERSE ADJ5150

4.3. Indication of any immediate medical attention and special treatment needed Not available.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media Dry chemical, CO2, water spray or regular foam.

Unsuitable extinguishing media Not available.

5.2. Special hazards arising from the substance or mixture None known.

5.3. Advice for firefighters

Special protective equipment for firefighters Self contained breathing apparatus. (CEN : EN 137)
Protective clothing (CEN : EN 469)
Protective gloves (CEN : EN 659)
Helmet (CEN : EN 443)

Special fire fighting procedures Use standard firefighting procedures and consider the hazards of other involved materials.
Prevent spillage and fire-fighting water from entering in public sewers or the immediate environment.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel Wear protective clothing, gloves and safety goggles.

For emergency responders Use personal protection recommended in Section 8 of the SDS.

6.2. Environmental precautions Prevent from entering sewers or the immediate environment.
Accidental release of large quantities into the aquatic environment may harm aquatic organisms.

6.3. Methods and material for containment and cleaning up Absorb onto inert material and dispose of according to Hazardous Waste Regulations.
Neutralise with dilute acid.
Remove small spills with plenty of water.

6.4. Reference to other sections Please refer also to section no. 8 'Exposure controls' for further information.

SECTION 7: Handling and storage

7.1. Precautions for safe handling Alkaline.
Do not mix with acidic material.
Avoid contact with skin and eyes.

7.2. Conditions for safe storage, including any incompatibilities Keep container tightly closed.
Store away from acids.
Protect from freezing.
Store in dry, well ventilated area.

7.3. Specific end use(s) Only for professional and industrial users

Shelf life 720 days

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

UK. EH40 Workplace Exposure Limits (WELs)

Components	Type	Value
Sodium hydroxide (CAS 1310-73-2)	STEL	2 mg/m3

Biological limit values No biological exposure limits noted for the ingredient(s).

Recommended monitoring procedures Not available.

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OPTISPERSE ADJ5150

Derived no effect levels (DNELs)

Workers

Components	Value	Assessment factor	Notes
Sodium hydroxide (CAS 1310-73-2)			
Long-term, Local, Inhalation	1 mg/m3	1	
Short-term, Local, Dermal	2 mg/kg/day		
Short-term, Local, Inhalation	2 mg/m3		

Predicted no effect concentrations (PNECs) Not available.

8.2. Exposure controls

Appropriate engineering controls Adequate ventilation to maintain air contaminants below exposure limits.
Arrange for eye wash possibility.

Individual protection measures, such as personal protective equipment

Eye/face protection Splash proof chemical goggles.
Face shield.
CEN : EN 166

Skin protection

- Hand protection Gauntlet type neoprene gloves (Protection against unintentional short-term contact)
Gauntlet type nitrile gloves (Protection against unintentional short-term contact)
CEN : EN 374-1/2/3/4; EN 420

- Other Chemical resistant apron.
CEN : EN ISO 13688; EN ISO 6530; EN ISO 6529; EN 14605

Respiratory protection In case of insufficient ventilation, use a breathing mask with filter type: P2
CEN : EN 140; EN 143; EN 149

Thermal hazards Not available.

Environmental exposure controls Prevent from entering in public sewers or the immediate environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance

Colour Colourless to light yellow

Physical state Liquid

Odour None

Odour threshold Not available.

pH (concentrated product) 14

Melting point/freezing point -16 °C

Initial boiling point and boiling range 100 °C

Flash point Not applicable.

Evaporation rate < 1 (Ether = 1)

Flammability (solid, gas) Not applicable.

Upper/lower flammability or explosive limits

Flammability limit - lower (%) Not available.

Flammability limit - upper (%) Not available.

Vapour pressure 18 mm Hg

Vapor pressure temp. 21 °C

Vapour density < 1 (Air = 1)

Relative density 1,27

Relative density temperature 21 °C

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Solubility	
Solubility (water)	100 %
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not applicable.
Decomposition temperature	Not available.
Viscosity	20 cps
Viscosity temperature	21 °C
Explosive properties	Not available.
Oxidising properties	Not available.
9.2. Other information	
Pour point	-13 °C
Shelf life	720 days
VOC	0 % (Calculated)

SECTION 10: Stability and reactivity

10.1. Reactivity	Not available.
10.2. Chemical stability	Material is stable under normal conditions.
10.3. Possibility of hazardous reactions	Not applicable.
10.4. Conditions to avoid	No special requirement.
10.5. Incompatible materials	Avoid contact with strong acids. Avoid contact with combustible materials.
10.6. Hazardous decomposition products	None known.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Product	Test results
OPTISPERSE ADJ5150 (Mixture)	Acute Dermal LD50 Rabbit: > 5000 mg/kg (Calculated according to GHS additivity formula) Acute Oral LD50 Rat: > 2000 mg/kg (Calculated according to GHS additivity formula)

Components	Test results
Sodium hydroxide (1310-73-2)	Acute Dermal LD50 Rabbit: 1350 mg/kg Acute Oral LD50 Rabbit: > 500 mg/kg

Acute toxicity	Not classified.
Skin corrosion/irritation	Causes severe skin burns and eye damage.
Serious eye damage/irritation	Causes serious eye damage.
Respiratory or skin sensitisation	Not classified.
Specific target organ toxicity - repeated exposure	Not classified.
Specific target organ toxicity - single exposure	Not classified.
Carcinogenicity	Not classified.
Germ cell mutagenicity	Not classified.
Reproductive toxicity	Not classified.

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OPTISPERSE ADJ5150

Information on likely routes of exposure

Ingestion	Causes digestive tract burns.
Inhalation	May cause irritation to the respiratory system.
Skin contact	Causes severe skin burns.
Eye contact	Causes serious eye damage.
Symptoms	Not available.
Aspiration hazard	Not classified.
Mixture versus substance information	None known.
Other information	Not available.

SECTION 12: Ecological information

12.1. Toxicity	No toxicity data noted for the ingredient(s).
12.2. Persistence and degradability	This product, being inorganic and in its highest oxidation state, has no COD,BOD or TOC.
12.3. Bioaccumulative potential	Not available.
Partition coefficient n-octanol/water (log Kow)	Not available.
Bioconcentration factor (BCF)	Not available.
12.4. Mobility in soil	Not available.
12.5. Results of PBT and vPvB assessment	Not a PBT or vPvB substance or mixture.
12.6. Other adverse effects	Not available.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Contaminated packaging	According to Hazardous Waste Regulations. EWC (European Waste Code) recommendation : 15 01 10 15 Waste packaging; absorbents, wiping cloths, filter materials and protective clothing not otherwise specified. 15 01 Packaging (including separately collected municipal packaging waste). 15 01 10 Packaging containing residues of or contaminated by dangerous substances. Depending on the origin and state of the waste, other EWC numbers may be applicable too.
Disposal methods/information	According to Hazardous Waste Regulations. EWC (European Waste Code) recommendation : 16 03 03 16 Wastes not otherwise specified in the list. 16 03 Off-specification batches and unused products. 16 03 03 Inorganic wastes containing dangerous substances. Depending on the origin and state of the waste, other EWC numbers may be applicable too.

SECTION 14: Transport information

ADR

14.1. UN number	UN1824
14.2. UN proper shipping name	Sodium hydroxide solution
14.3. Transport hazard class(es)	8
Subsidiary class(es)	-
14.4. Packing group	II
14.5. Environmental hazards	No
Tunnel restriction code	(E)

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14.6. Special precautions for user	Not available.

RID

14.1. UN number	UN1824
14.2. UN proper shipping name	Sodium hydroxide solution
14.3. Transport hazard class(es)	8
Subsidiary class(es)	-
14.4. Packing group	II
14.5. Environmental hazards	No
14.6. Special precautions for user	Not available.

ADN

14.1. UN number	UN1824
14.2. UN proper shipping name	Sodium hydroxide solution
14.3. Transport hazard class(es)	8
Subsidiary class(es)	-
14.4. Packing group	II
14.5. Environmental hazards	No
14.6. Special precautions for user	Not available.

IATA

14.1. UN number	UN1824
14.2. UN proper shipping name	Sodium hydroxide solution
14.3. Transport hazard class(es)	8
Subsidiary class(es)	-
14.4. Packing group	II
14.5. Environmental hazards	No
ERG Code	Not available.
14.6. Special precautions for user	Not available.

IMDG

14.1. UN number	UN1824
14.2. UN proper shipping name	Sodium hydroxide solution
14.3. Transport hazard class(es)	8
Subsidiary class(es)	-
14.4. Packing group	II
14.5. Environmental hazards	
Marine pollutant	No
EmS No.	F-A, S-B
14.6. Special precautions for user	Not available.
14.7. Transport in bulk according to Annex II of MARPOL and the IBC Code	This substance/mixture is not intended to be transported in bulk.

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ADN; ADR; IATA; IMDG; RID

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU regulations

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and II, as amended

Not listed.

Regulation (EC) No. 850/2004 On persistent organic pollutants, Annex I as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex V as amended

Not listed.

Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry

Not listed.

Regulation (EC) No. 1907/2006, REACH Article 59(10) Candidate List as currently published by ECHA

Not listed.

Authorisations

Regulation (EC) No. 143/2011 Annex XIV Substances Subject to Authorisation

Not listed.

Restrictions on use

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended

Not listed.

Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work

Not listed.

Other EU regulations

Directive 2012/18/EU on major accident hazards involving dangerous substances, as amended

Not listed.

National regulations Not available.

15.2. Chemical safety assessment Not available.

NSF Registered and/or meets USDA (according to 1998 guidelines): Registration No. – 141529
Category Code(s):
G5 Cooling and retort water treatment products
G6 Boiler treatment products, steam line products – food contact

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes

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Country(s) or region	Inventory name	On inventory (yes/no)*
Europe	European List of Notified Chemical Substances (ELINCS)	No

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

SECTION 16: Other information

List of abbreviations

EC-No: European Commission Number
COD: Chemical Oxygen Demand
IATA: International Air Transport Association
CAS: Chemical Abstract Service.
CLP: Classification, Labeling and Packaging REGULATION (EC) No 1272/2008 on classification, labeling and packaging of substances and mixtures.
CEN: European Committee for Standardization (Comité Européen de Normalisation).
TWA: Time Weighted Average.
STEL: Short-term Exposure Limit.
LD50: Lethal Dose 50%.
LC50: Lethal Concentration 50%.
EC50: Effective Concentration 50%.
NOEL: No observed effect level.
BOD: Biochemical oxygen demand.
TOC: Total Organic Carbon.
ADR: European agreement concerning the international carriage of dangerous goods by road (Accord européen relatif transport des merchandises dangereuses par route).
ADN: European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (Accord européen relatif au transport international des marchandises dangereuses par voies de navigation intérieures).
IMDG Code: International Maritime Dangerous Goods Code.
RID: Regulations concerning the international carriage of dangerous goods by rail (Règlement International concernant le transport de marchandises dangereuses par chemin de fer).

References

Safety data sheets of raw materials.

Information on evaluation method leading to the classification of mixture

The physical, health and environmental hazards of this mixture are assessed by applying the classification criteria for each hazard class or differentiation in Parts 2 to 5 of Annex I to Regulation (EC) No 1272/2008 (CLP).

Full text of any H-statements not written out in full under Sections 2 to 15

H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.

Revision information

Physical & Chemical Properties: Multiple Properties
Transport Information: Agency Name and Packaging Type/Transport Mode Selection
SECTION 16: Other information: Disclaimer
SECTION 16: Other information: List of abbreviations

Training information

Provide training on safe handling while considering the type of application and exposure scenarios.

Based on EC Directive / Regulations

(EC) No 1907/2006 (REACH)
(EU) 2015/830
(EC) No 1272/2008
(EU) No 1357/2014

Further information

Correction in Section: 2,15,16

SAFETY DATA SHEET
OPTISPERSE PQ5176

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name or designation of the mixture	OPTISPERSE PQ5176
Version number	5.3
Revision date	23/02/2018
Supersedes date	28/09/2016

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses	Internal boiler treatment
Uses advised against	None known.

1.3. Details of the supplier of the safety data sheet

SUEZ Water Technologies & Solutions (UK) Limited Partnership
Hydro House
Newcombe Way
Orton Southgate
Peterborough
PE2 6SE
Tel.: +44 (0)1733 385444, Fax : 01733 391775
e-mail : emea.productregulatory.wts@suez.com

1.4. Emergency telephone number

Multilingual emergency number (24/7)

Europe, Middle East, Africa, Israel (Europe and English language speaking countries):
+44(0)1235 239670
Middle East & Africa (speaking Arabic):
+44(0)1235 239671

National Poisons Information Centre
NHS Direct on 111
Or a doctor

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 as amended

This mixture does not meet the criteria for classification according to Regulation (EC) 1272/2008 as amended.

2.2. Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

Hazard pictograms	None.
Signal word	None.
Hazard statements	The product does not need to be labelled in accordance with EC directives or respective national laws.

Precautionary statements

Prevention	Not available.
Response	Not available.
Storage	Not available.

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Disposal Not available.

Supplemental label information EUH210 - Safety data sheet available on request.

2.3. Other hazards None known.

SECTION 3: Composition/information on ingredients

Mixtures

Chemical description Aqueous alkaline solution of phosphonate and polymers

Chemical name	%	CAS-No. / EC No.	REACH Registration No.	INDEX No.	Notes
Phosphinocarboxylic acid	1 - < 3	71050-62-9 -	-	-	
Classification:	Met. Corr. 1;H290, Aquatic Chronic 3;H412				
Tripotassium hydrogen (1-hydroxyethylidene)bisphosphonate	1 - < 3	60376-08-1 262-203-2	-	-	
Classification:	Acute Tox. 4;H302				
Potassium hydroxide	< 0,5	1310-58-3 215-181-3	01-2119487136-33	019-002-00-8	
Classification:	Met. Corr. 1;H290, Acute Tox. 4;H302, Skin Corr. 1A;H314				

The classification of the above substance(s) is given, including the hazard class, category code and hazard statements which are assigned in accordance with their physicochemical, health and environmental hazards. Please refer to section 16 where the full text of each relevant H-statement is listed.

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation Move to fresh air.

Skin contact Wash off immediately with plenty of water.

Eye contact Immediately flush eye(s) with plenty of water.

Ingestion Rinse mouth.

4.2. Most important symptoms and effects, both acute and delayed Not applicable.

4.3. Indication of any immediate medical attention and special treatment needed Not available.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media Dry chemical, CO2, water spray or regular foam.

Unsuitable extinguishing media Not available.

5.2. Special hazards arising from the substance or mixture Phosphines and oxides of carbon and phosphorus evolved in fire.

5.3. Advice for firefighters

Special protective equipment for firefighters Self contained breathing apparatus. (CEN : EN 137)
Protective clothing (CEN : EN 469)
Protective gloves (CEN : EN 659)
Helmet (CEN : EN 443)

Special fire fighting procedures Use standard firefighting procedures and consider the hazards of other involved materials.
Prevent spillage and fire-fighting water from entering in public sewers or the immediate environment.

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SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	Protective clothing
For emergency responders	Use personal protection recommended in Section 8 of the SDS.
6.2. Environmental precautions	Prevent from entering sewers or the immediate environment. Accidental release of large quantities into the aquatic environment may harm aquatic organisms.
6.3. Methods and material for containment and cleaning up	Absorb onto inert material and dispose of according to Controlled Waste Regulations. Remove small spills with plenty of water.
6.4. Reference to other sections	Please refer also to section no. 8 'Exposure controls' for further information.

SECTION 7: Handling and storage

7.1. Precautions for safe handling	Avoid contact with skin and eyes. Do not breathe vapours.
7.2. Conditions for safe storage, including any incompatibilities	Keep container tightly closed. Store in cool, well ventilated area.
7.3. Specific end use(s)	Only for professional and industrial users
Shelf life	360 days

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

UK. EH40 Workplace Exposure Limits (WELs)

Components	Type	Value
Potassium hydroxide (CAS 1310-58-3)	STEL	2 mg/m3

Biological limit values No biological exposure limits noted for the ingredient(s).

Recommended monitoring procedures Not available.

Derived no effect levels (DNELs)

Workers

Components	Value	Assessment factor	Notes
Potassium hydroxide (CAS 1310-58-3)			
Long-term, Local, Inhalation	1 mg/m3	1	

Predicted no effect concentrations (PNECs) Not available.

8.2. Exposure controls

Appropriate engineering controls Ensure good ventilation.

Individual protection measures, such as personal protective equipment

Eye/face protection	Safety goggles. CEN : EN 166
Skin protection	
- Hand protection	Protective gloves (Plastic, impervious) (Protection against unintentional short-term contact) Rubber gloves (Protection against unintentional short-term contact) Nitrile gloves (Protection against unintentional short-term contact) CEN : EN 420
- Other	Protective clothing if splashing or repeated contact with product is likely. CEN : EN ISO 13688
Respiratory protection	Not required.
Thermal hazards	Not available.

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Environmental exposure controls	Prevent from entering in public sewers or the immediate environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance	
Colour	Colourless to light yellow
Physical state	Liquid
Odour	Slight
Odour threshold	Not available.
pH (concentrated product)	10
Melting point/freezing point	-1 °C
Initial boiling point and boiling range	Not available.
Flash point	Not applicable.
Evaporation rate	< 1 (Ether = 1)
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Vapour pressure	18 mm Hg
Vapor pressure temp.	21 °C
Vapour density	< 1 (Air = 1)
Relative density	1,08
Relative density temperature	21 °C
Solubility	
Solubility (water)	100 %
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not applicable.
Decomposition temperature	Not available.
Viscosity	12 cps
Viscosity temperature	21 °C
Explosive properties	Not available.
Oxidising properties	Not available.

9.2. Other information

Pour point	2 °C
Shelf life	360 days
VOC	0 % (Calculated)

SECTION 10: Stability and reactivity

10.1. Reactivity	Not available.
10.2. Chemical stability	Material is stable under normal conditions.
10.3. Possibility of hazardous reactions	Not applicable.
10.4. Conditions to avoid	Protect from freezing.
10.5. Incompatible materials	Avoid contact with strong acids.

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10.6. Hazardous decomposition products Phosphines, oxides of carbon and phosphorus evolved in fire.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Product	Test results
OPTISPERSE PQ5176 (Mixture)	Acute Dermal LD50 Rabbit: > 5000 mg/kg (Calculated according to GHS additivity formula) Acute Inhalation LC50 Rat: > 20 mg/l 4 hour (Calculated according to GHS additivity formula) Acute Oral LD50 Rat: > 5000 mg/kg (Calculated according to GHS additivity formula)

Components	Test results
Potassium hydroxide (1310-58-3)	Acute Oral LD50 Rat: 333 mg/kg

Acute toxicity Not classified.

Skin corrosion/irritation Not classified.

Serious eye damage/irritation May be irritating to eyes.

Respiratory or skin sensitisation Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Specific target organ toxicity - single exposure Not classified.

Carcinogenicity Not classified.

Germ cell mutagenicity Not classified.

Reproductive toxicity Not classified.

Information on likely routes of exposure

Ingestion May cause irritation of the gastrointestinal tract.

Inhalation Prolonged or excessive inhalation may cause respiratory tract irritation.

Skin contact May be irritating to the skin.

Eye contact May be irritating to eyes.

Symptoms Not available.

Aspiration hazard Not classified.

Mixture versus substance information None known.

Other information Not available.

SECTION 12: Ecological information

12.1. Toxicity

Product		Species	Test results
OPTISPERSE PQ5176 (CAS Mixture)			
	LC50	Fathead minnow	> 5000 mg/l, Acute toxicity, 96 hour, (Estimated)
	NOEL	Fathead minnow	3800 mg/l, Acute toxicity, 96 hour, (Estimated)
Aquatic			
Crustacea	LC50	Daphnia magna	4140 mg/l, Acute toxicity, 48 hour, (Estimated)

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Product		Species	Test results
	NOEL	Daphnia magna	1770 mg/l, Acute toxicity, 48 hour, (Estimated)

12.2. Persistence and degradability

- COD (mgO2/g)	75,8
- TOC (mg C/g)	20,3
12.3. Bioaccumulative potential	Not available.
Partition coefficient n-octanol/water (log Kow)	Not available.
Bioconcentration factor (BCF)	Not available.
12.4. Mobility in soil	Not available.
12.5. Results of PBT and vPvB assessment	Not a PBT or vPvB substance or mixture.
12.6. Other adverse effects	Nutrients: P= 5,7 mg/g

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Contaminated packaging

According to Controlled Waste Regulations.

EWC (European Waste Code) recommendation : 15 01 02
15 Waste packaging; absorbents, wiping cloths, filter materials and protective clothing not otherwise specified.
15 01 Packaging (including separately collected municipal packaging waste).
15 01 02 Plastic packaging.
Depending on the origin and state of the waste, other EWC numbers may be applicable too.

Disposal methods/information

According to Controlled Waste Regulations.

EWC (European Waste Code) recommendation : 16 03 06
16 Wastes not otherwise specified in the list.
16 03 Off-specification batches and unused products.
16 03 06 Organic wastes
Depending on the origin and state of the waste, other EWC numbers may be applicable too.

SECTION 14: Transport information

ADR

Not regulated as dangerous goods.

RID

Not regulated as dangerous goods.

ADN

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU regulations

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and II, as amended

Not listed.

Regulation (EC) No. 850/2004 On persistent organic pollutants, Annex I as amended

Not listed.

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Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex V as amended

Not listed.

Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry

Not listed.

Regulation (EC) No. 1907/2006, REACH Article 59(10) Candidate List as currently published by ECHA

Not listed.

Authorisations

Regulation (EC) No. 143/2011 Annex XIV Substances Subject to Authorisation

Not listed.

Restrictions on use

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended

Not listed.

Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work

Not listed.

Other EU regulations

Directive 2012/18/EU on major accident hazards involving dangerous substances, as amended

Not listed.

National regulations	Not available.
15.2. Chemical safety assessment	Not available.
NSF Registered and/or meets USDA (according to 1998 guidelines):	Registration No. – 140910 Category Code(s): G5 Cooling and retort water treatment products G6 Boiler treatment products, steam line products – food contact

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

SECTION 16: Other information

List of abbreviations

EC-No: European Commission Number
COD: Chemical Oxygen Demand
IATA: International Air Transport Association
CAS: Chemical Abstract Service.
CLP: Classification, Labeling and Packaging REGULATION (EC) No 1272/2008 on classification, labeling and packaging of substances and mixtures.
CEN: European Committee for Standardization (Comité Européen de Normalisation).
TWA: Time Weighted Average.
STEL: Short-term Exposure Limit.
LD50: Lethal Dose 50%.
LC50: Lethal Concentration 50%.
EC50: Effective Concentration 50%.
NOEL: No observed effect level.

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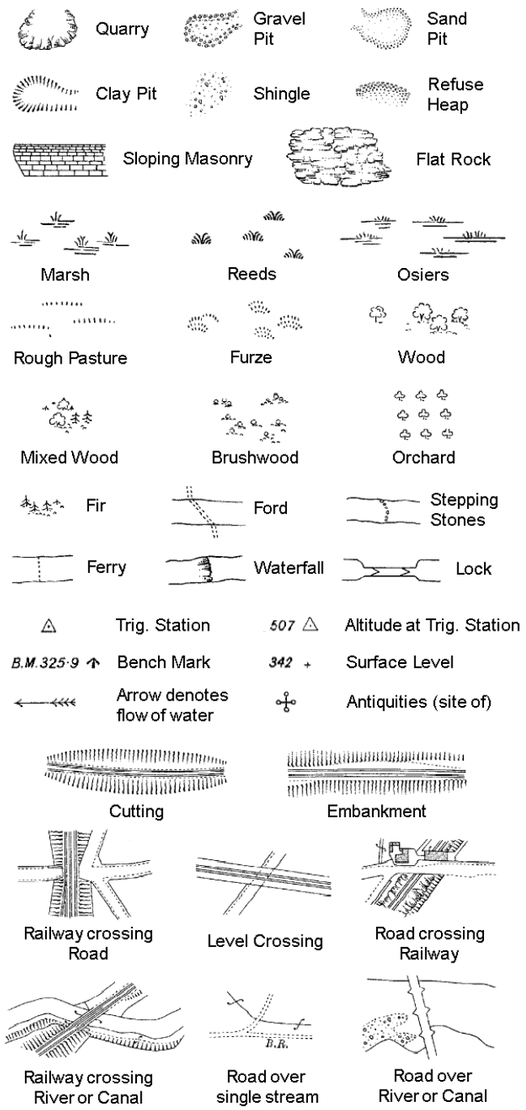
OPTISPERSE PQ5176

	BOD: Biochemical oxygen demand. TOC: Total Organic Carbon. ADR: European agreement concerning the international carriage of dangerous goods by road (Accord européen relatif transport des merchandises dangereuses par route). ADN: European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (Accord européen relatif au transport international des marchandises dangereuses par voies de navigation intérieures). IMDG Code: International Maritime Dangerous Goods Code. RID: Regulations concerning the international carriage of dangerous goods by rail (Règlement International concernant le transport de marchandises dangereuses par chemin de fer).
References	Safety data sheets of raw materials.
Information on evaluation method leading to the classification of mixture	The physical, health and environmental hazards of this mixture are assessed by applying the classification criteria for each hazard class or differentiation in Parts 2 to 5 of Annex I to Regulation (EC) No 1272/2008 (CLP).
Full text of any H-statements not written out in full under Sections 2 to 15	H290 May be corrosive to metals. H302 Harmful if swallowed. H314 Causes severe skin burns and eye damage. H412 Harmful to aquatic life with long lasting effects.
Revision information	SECTION 2: Hazards identification: Response SECTION 12: Ecological information: Persistence and degradability SECTION 12: Ecological information: 12,6. Other adverse effects SECTION 12: Ecological information: - COD (mgO2/g) SECTION 12: Ecological information: - TOC (mg C/g) SECTION 16: Other information: Disclaimer GHS: Classification
Training information	Provide training on safe handling while considering the type of application and exposure scenarios.
Based on EC Directive / Regulations	(EC) No 1907/2006 (REACH) (EU) 2015/830 (EC) No 1272/2008 (EU) No 1357/2014
Further information	Correction in Section: 2,3,9,11,15,16

APPENDIX 4
HISTORICAL MAPS

Historical Mapping Legends

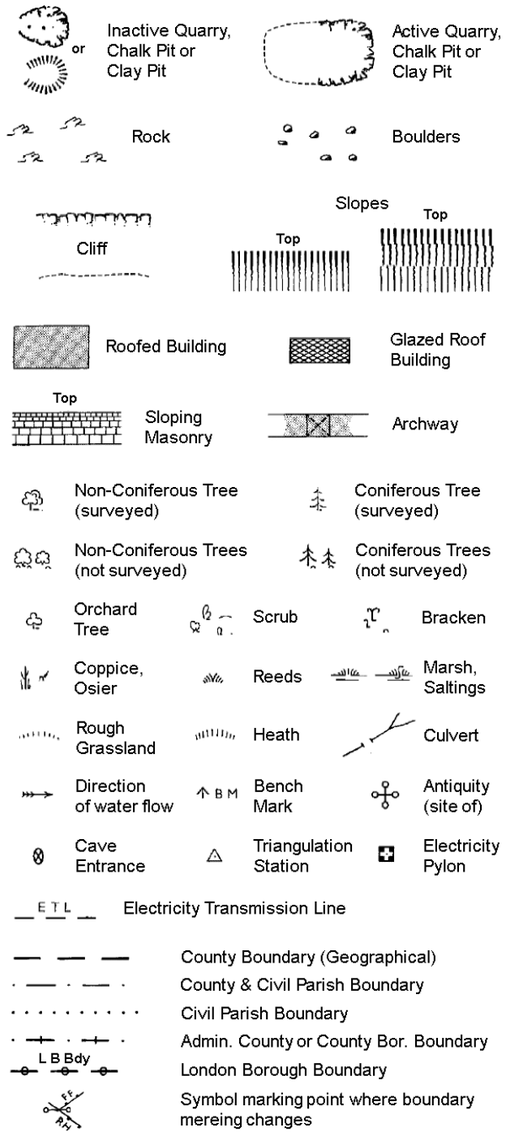
Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



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

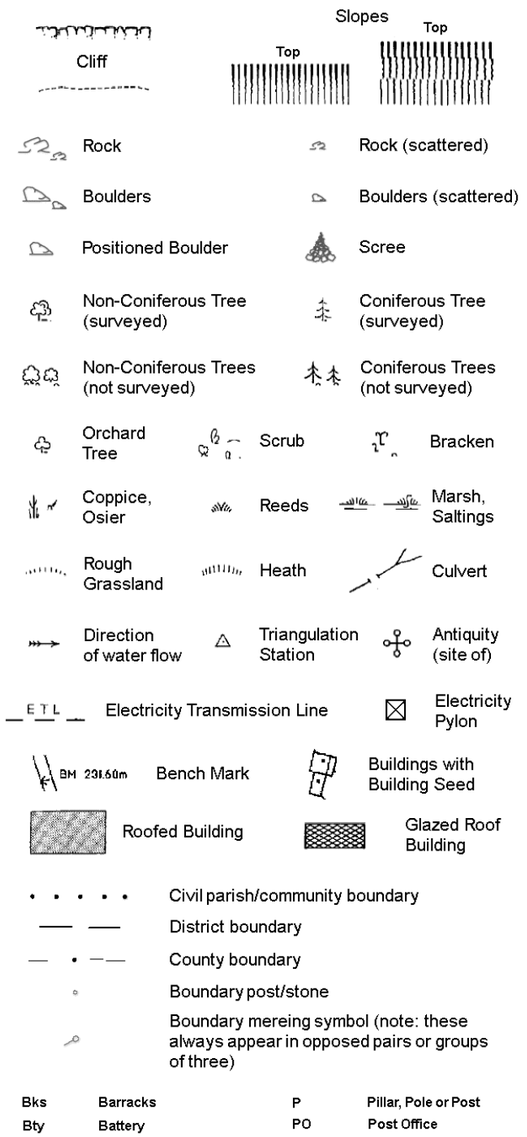
Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



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)

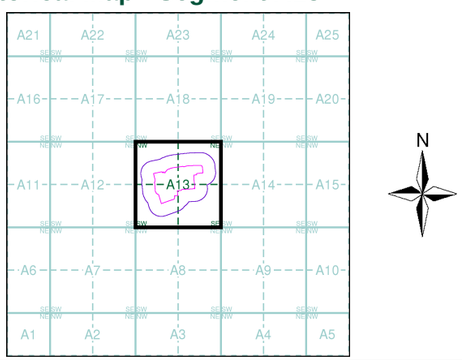
Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity 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

RAMBOLL

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Hertfordshire	1:2,500	1880	2
Hertfordshire	1:2,500	1898	3
Hertfordshire	1:2,500	1923	4
Hertfordshire	1:2,500	1938	5
Ordnance Survey Plan	1:1,250	1963 - 1964	6
Additional SIMs	1:1,250	1963 - 1989	7
Ordnance Survey Plan	1:1,250	1971 - 1988	8
Ordnance Survey Plan	1:2,500	1973	9
Supply of Unpublished Survey Information	1:1,250	1975	10
Supply of Unpublished Survey Information	1:2,500	1975	11
Supply of Unpublished Survey Information	1:2,500	1975	12
Additional SIMs	1:1,250	1977 - 1991	13
Additional SIMs	1:2,500	1981	14
Additional SIMs	1:1,250	1986 - 1991	15
Large-Scale National Grid Data	1:1,250	1993	16
Large-Scale National Grid Data	1:1,250	1994	17
Large-Scale National Grid Data	1:1,250	1996	18
Historical Aerial Photography	1:2,500	2000	19

Historical Map - Segment A13



Order Details

Order Number:	187313645_1_1
Customer Ref:	17000032XX_GSK Ware
National Grid Reference:	534890, 214440
Slice:	A
Site Area (Ha):	6.93
Search Buffer (m):	100

Site Details

Glaxosmithkline Pharmaceuticals (Ware) Ltd, Park Road, WARE, SG12 0DP

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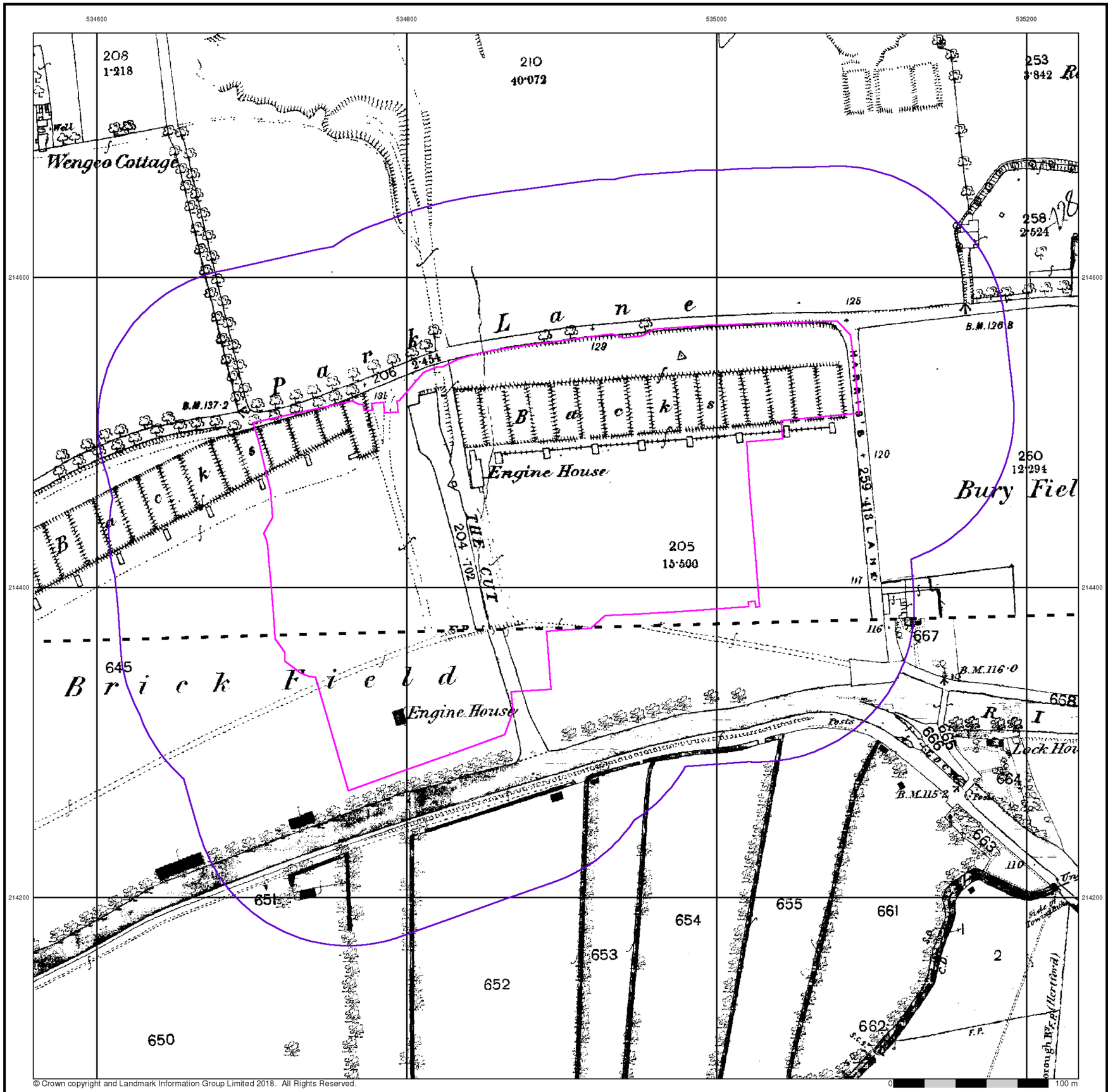


RAMBOLL

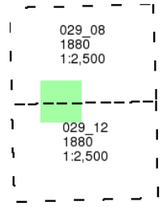
Hertfordshire

Published 1880

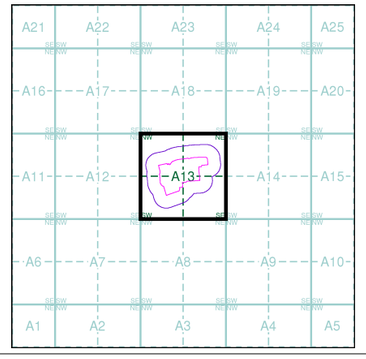
Source map scale - 1:2,500

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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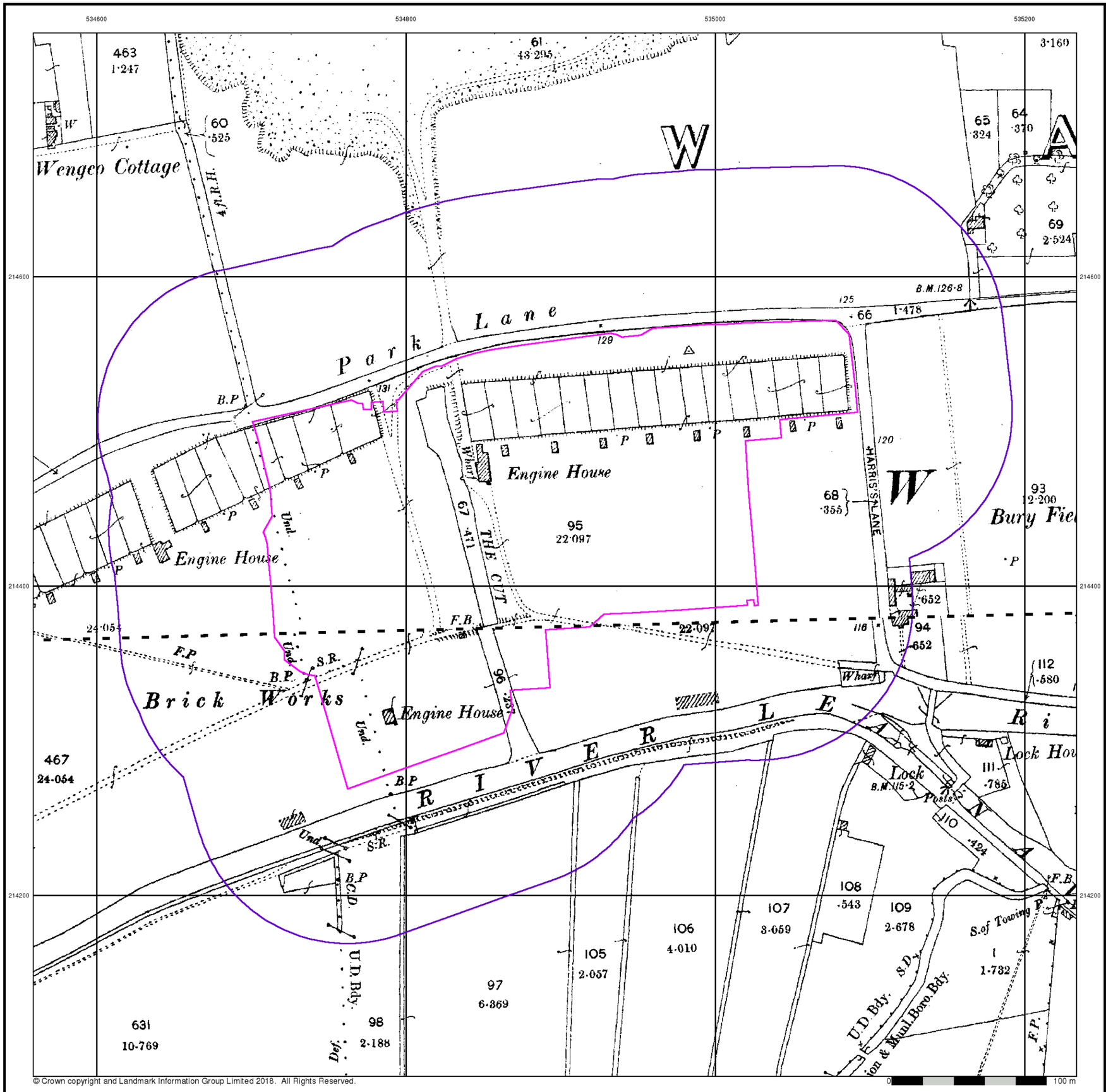


RAMBOLL

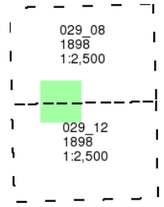
Hertfordshire

Published 1898

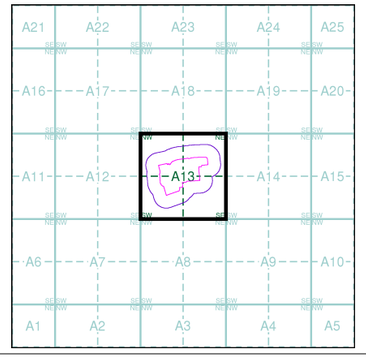
Source map scale - 1:2,500

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.

Map Name(s) and Date(s)



Historical Map - Segment A13



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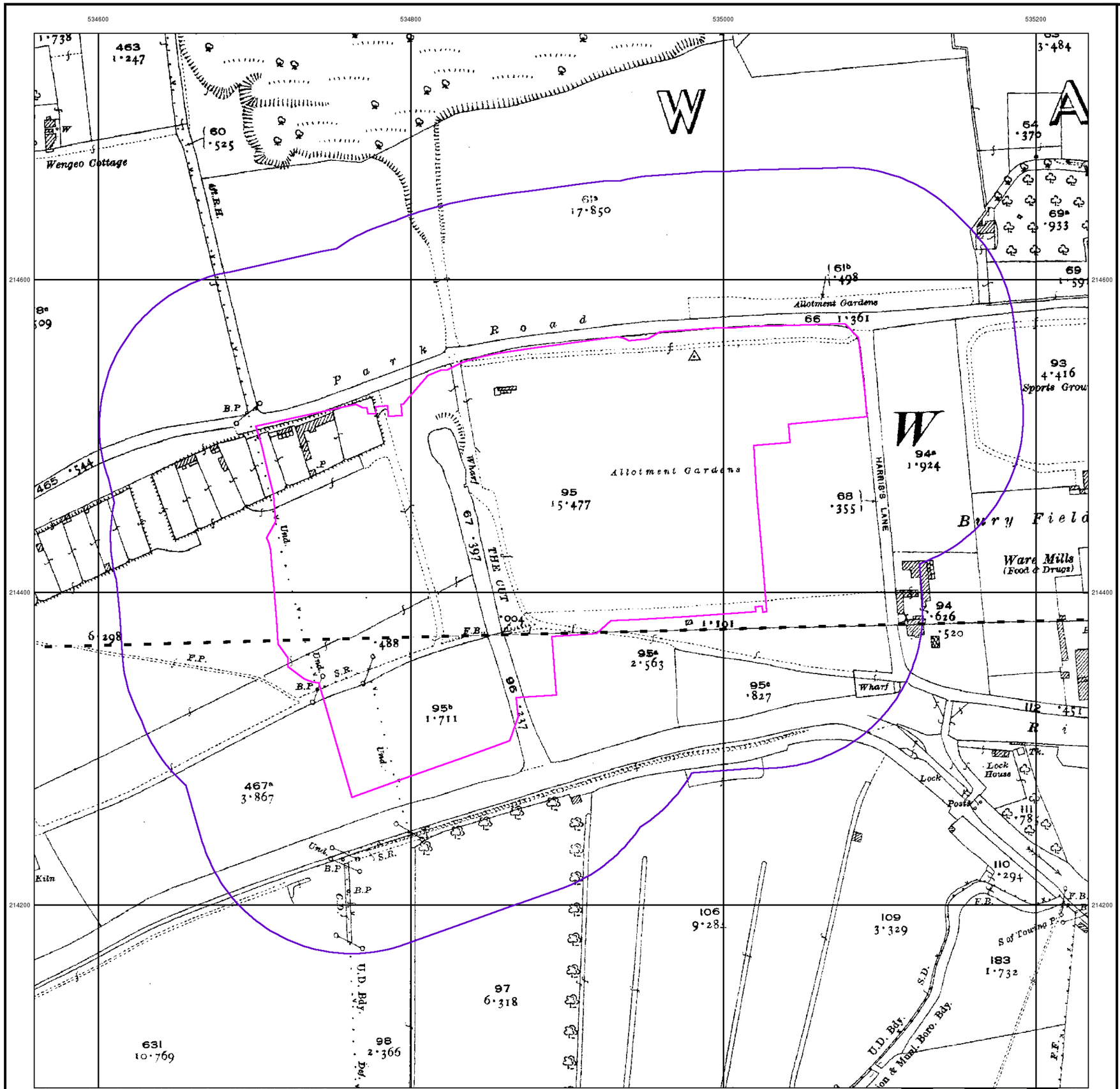


RAMBOLL

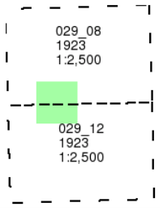
Hertfordshire

Published 1923

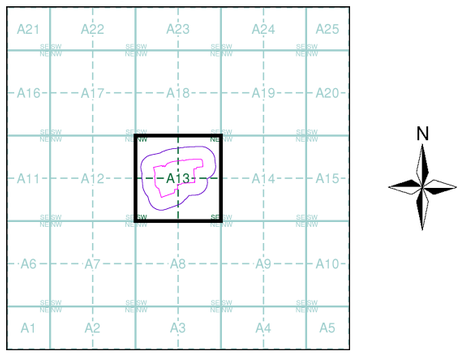
Source map scale - 1:2,500

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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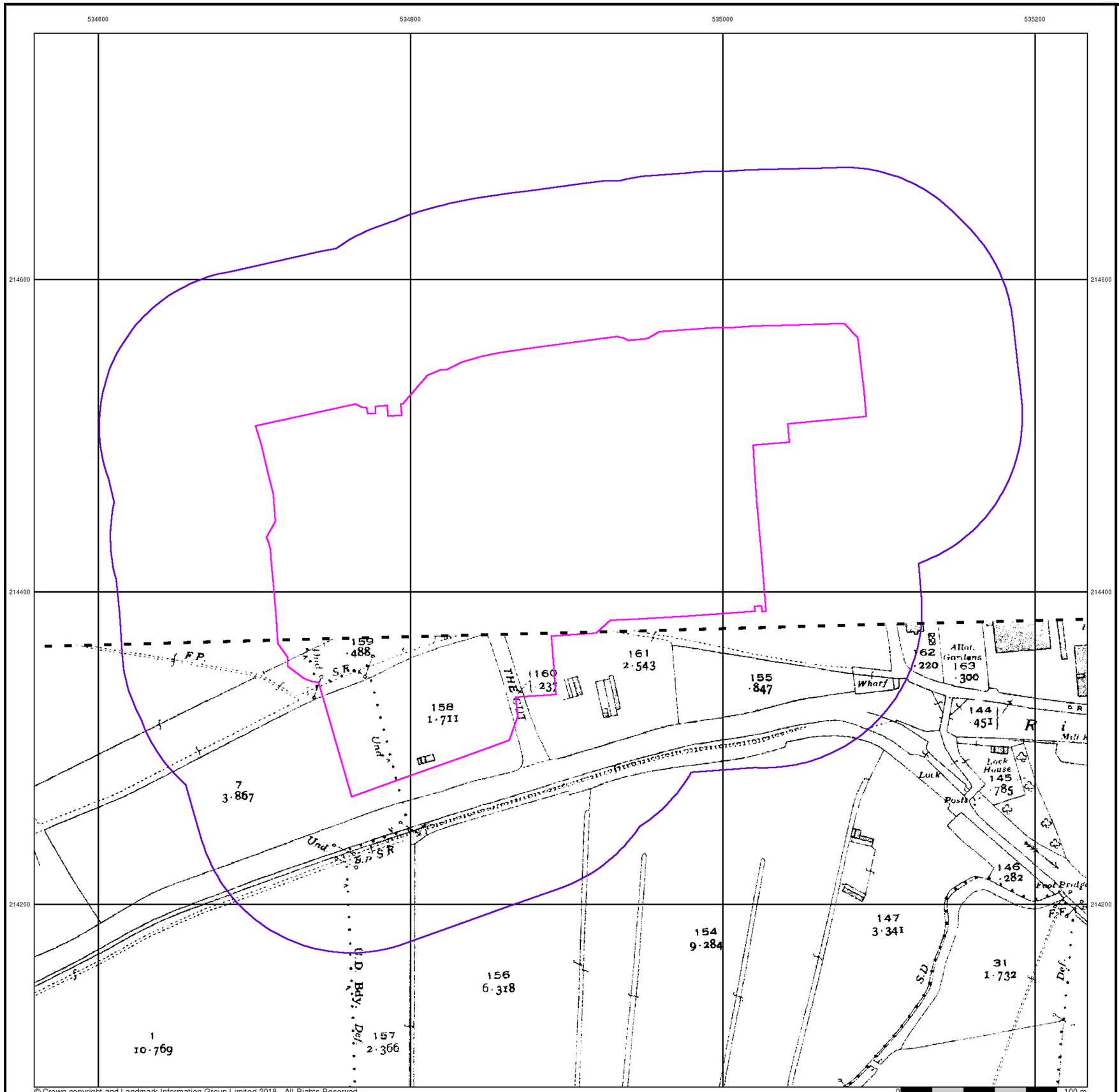

RAMBOLL

Hertfordshire

Published 1938

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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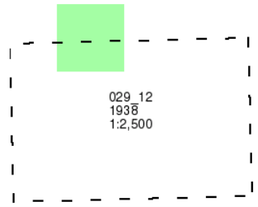
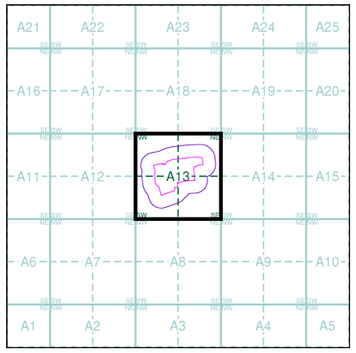


Historical Map - Segment A13



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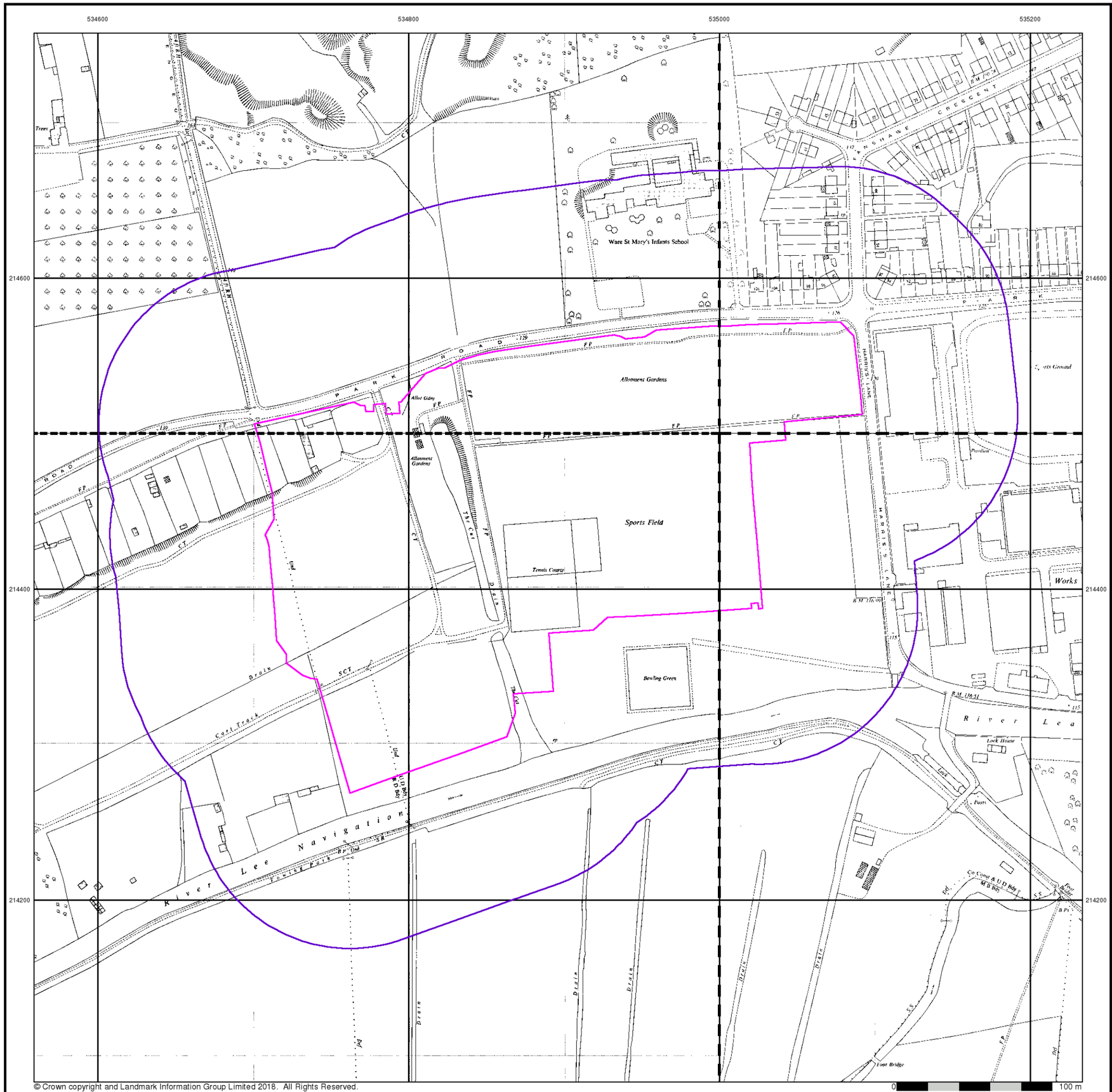


RAMBOLL

Ordnance Survey Plan

Published 1963 - 1964

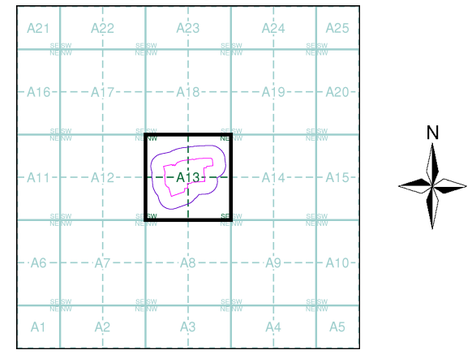
Source map scale - 1:1,250

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

Map Name(s) and Date(s)

TL3414NE 1963 1:1,250	TL3514NW 1964 1:1,250
TL3414SE 1963 1:1,250	TL3514SW 1964 1:1,250

Historical Map - Segment A13



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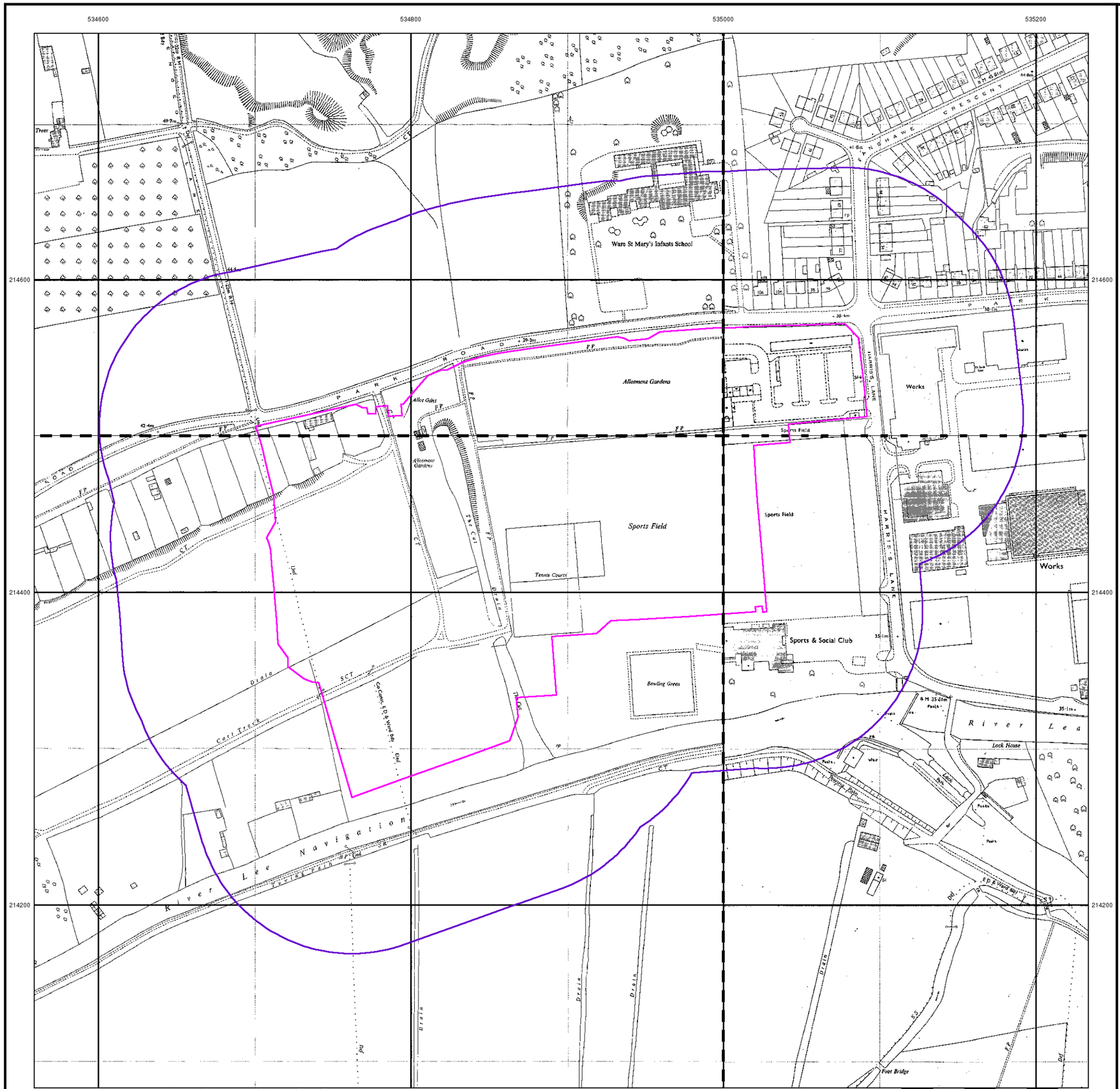


RAMBOLL

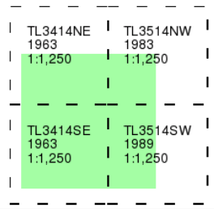
Additional SIMs

Published 1963 - 1989

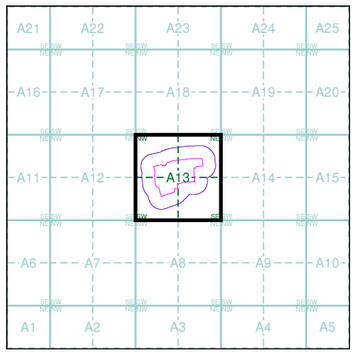
Source map scale - 1:1,250

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

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

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Slice:	A
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Site Details

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RAMBOLL

Ordnance Survey Plan

Published 1971 - 1988

Source map scale - 1:1,250

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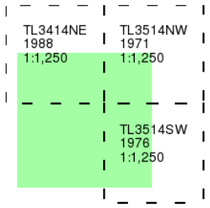
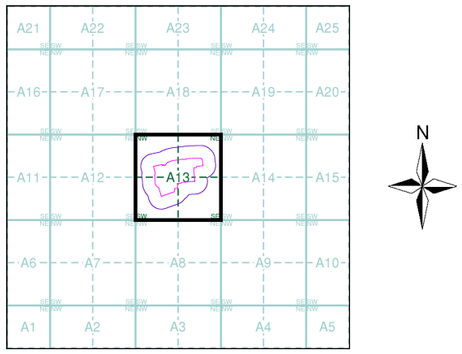
Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

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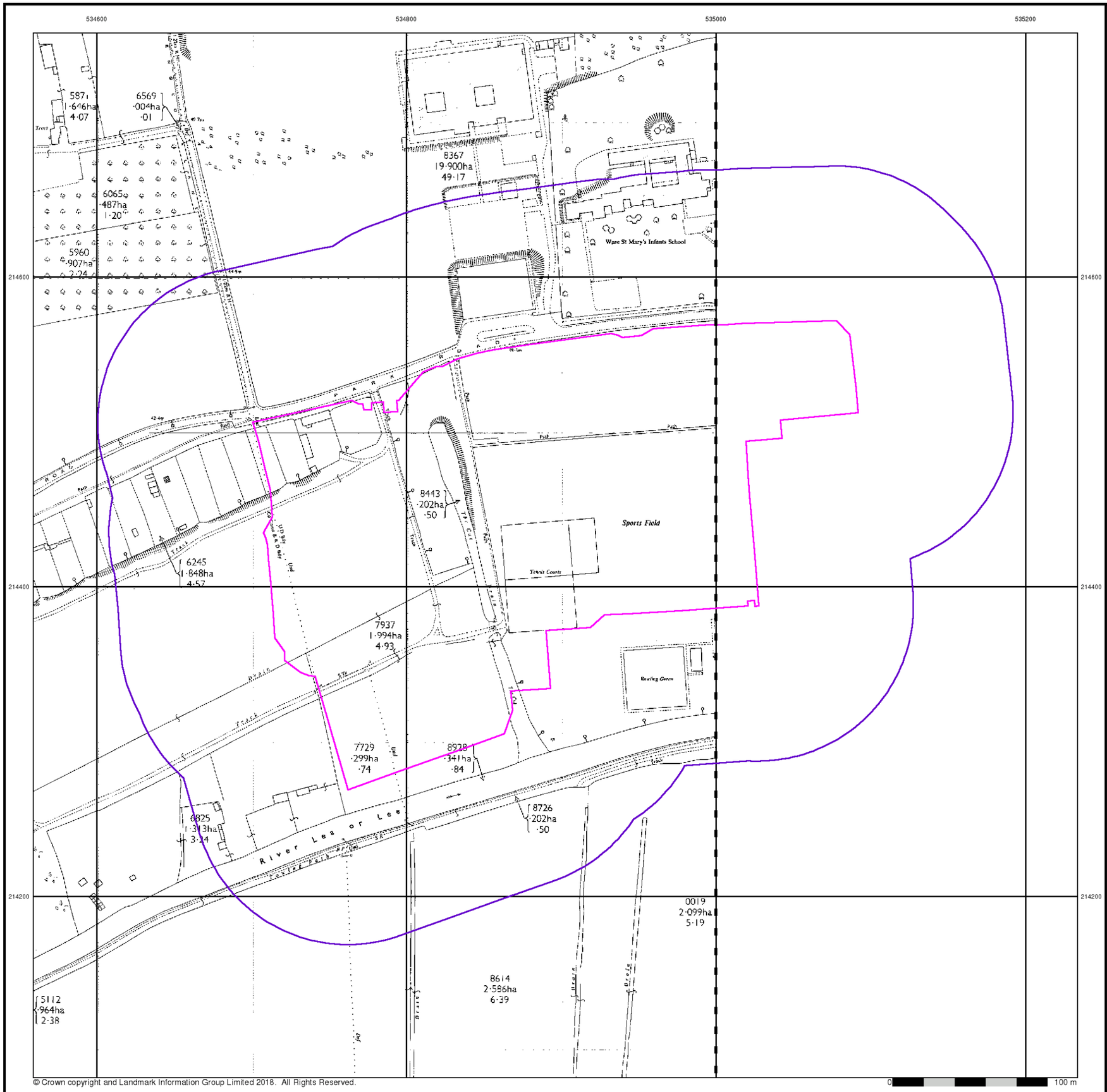


RAMBOLL

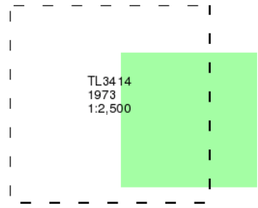
Ordnance Survey Plan

Published 1973

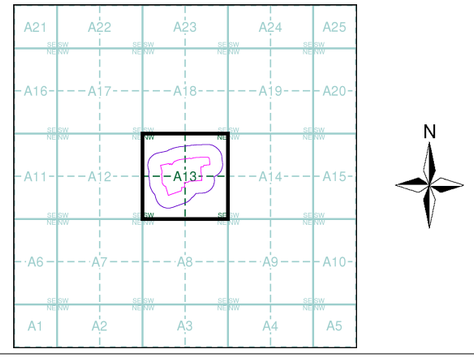
Source map scale - 1:2,500

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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RAMBOLL

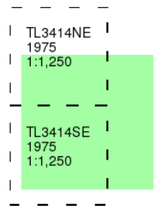
Supply of Unpublished Survey Information

Published 1975

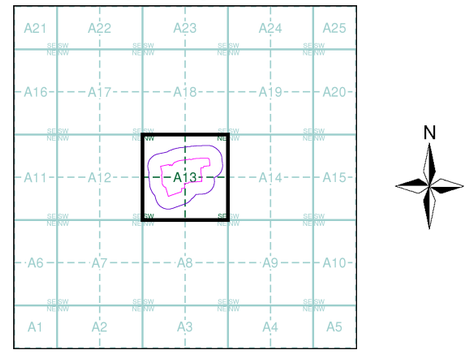
Source map scale - 1:1,250

SUSI maps (Supply of Unpublished Survey Information) were produced between 1972 and 1977, mainly for internal use at Ordnance Survey. These were more of a `work-in-progress' plan as they showed updates of individual areas on a map. These maps were unpublished, and they do not represent a single moment in time. They were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



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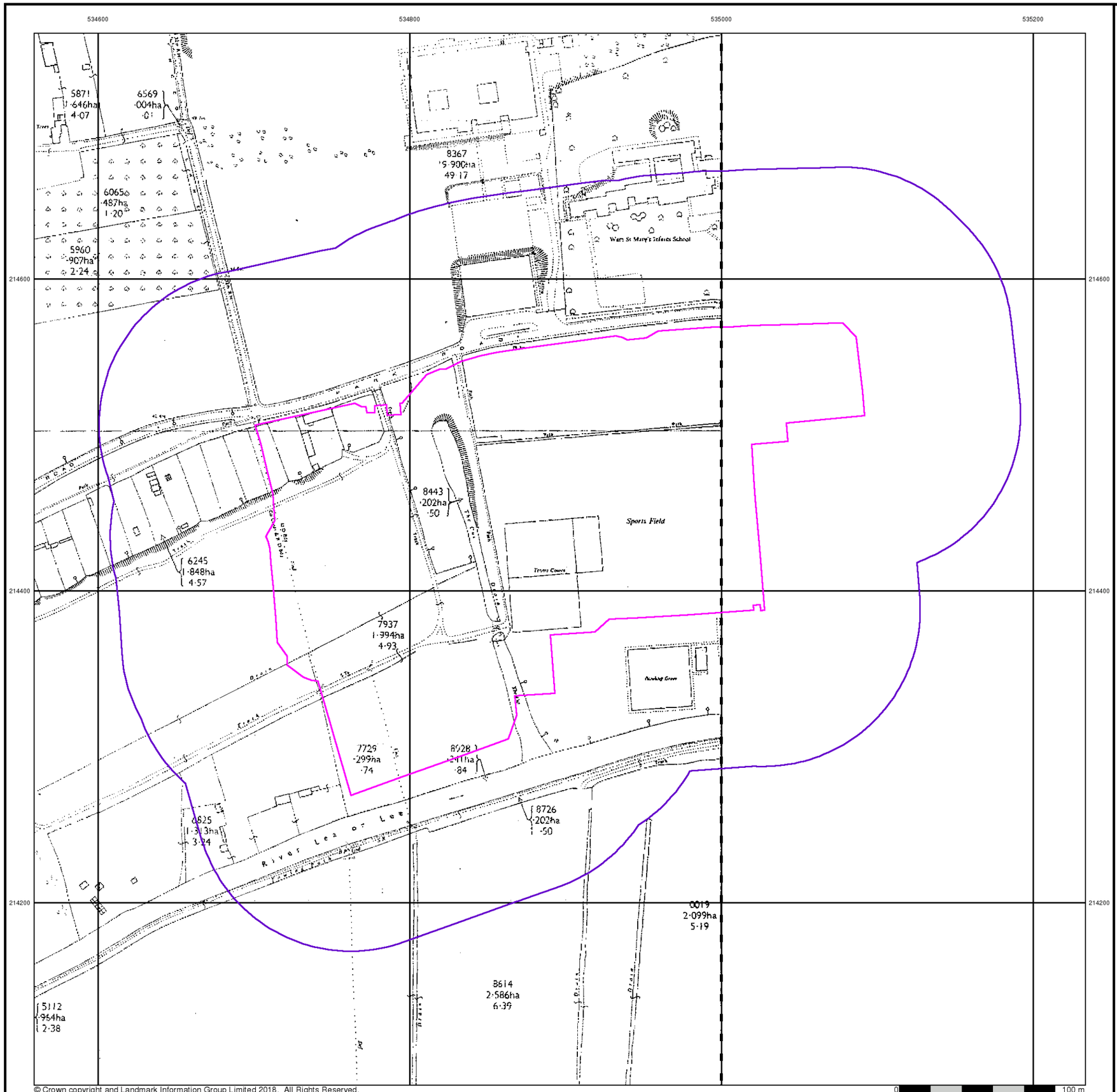

RAMBOLL

Supply of Unpublished Survey Information

Published 1975

Source map scale - 1:2,500

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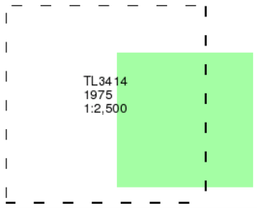
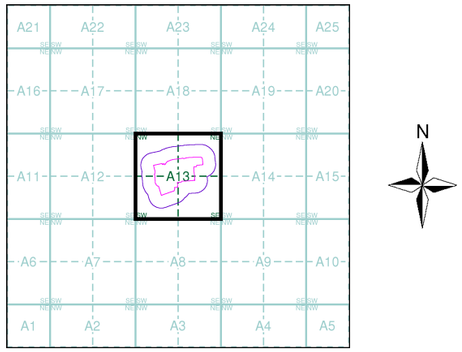
Map Name(s) and Date(s)



Historical Map - Segment A13



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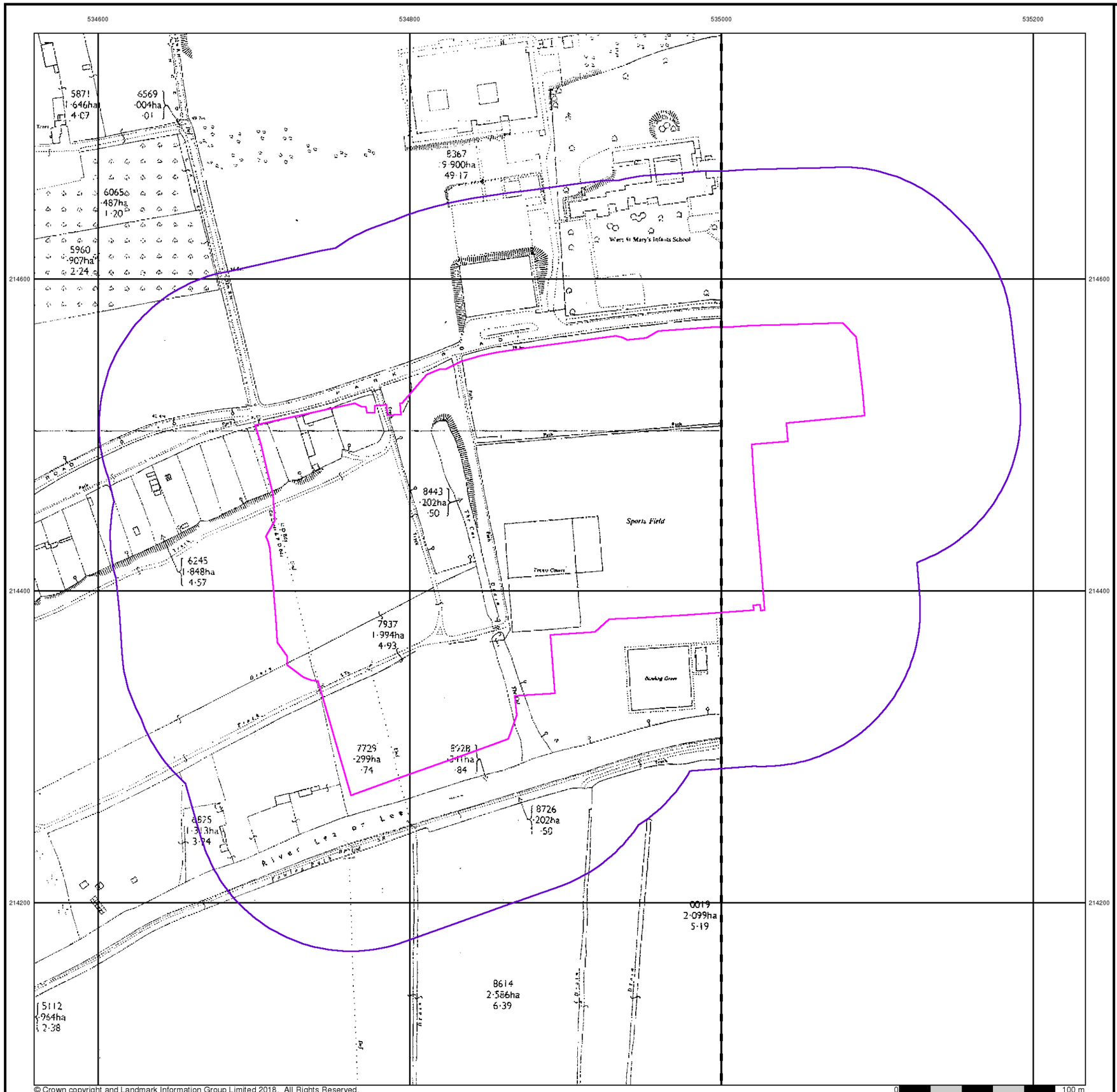

RAMBOLL

Supply of Unpublished Survey Information

Published 1975

Source map scale - 1:2,500

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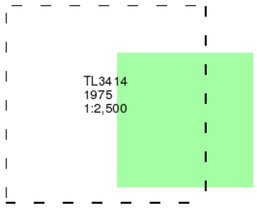
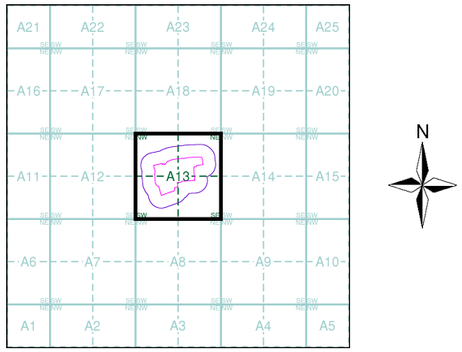
Map Name(s) and Date(s)



Historical Map - Segment A13



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RAMBOLL

Additional SIMs

Published 1977 - 1991

Source map scale - 1:1,250

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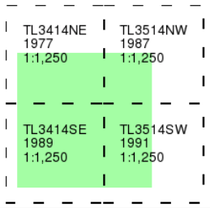
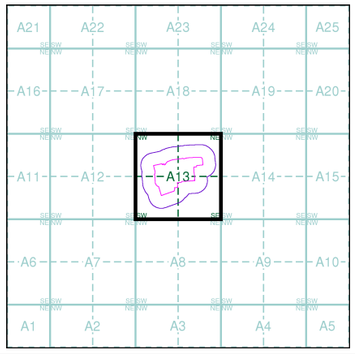
Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

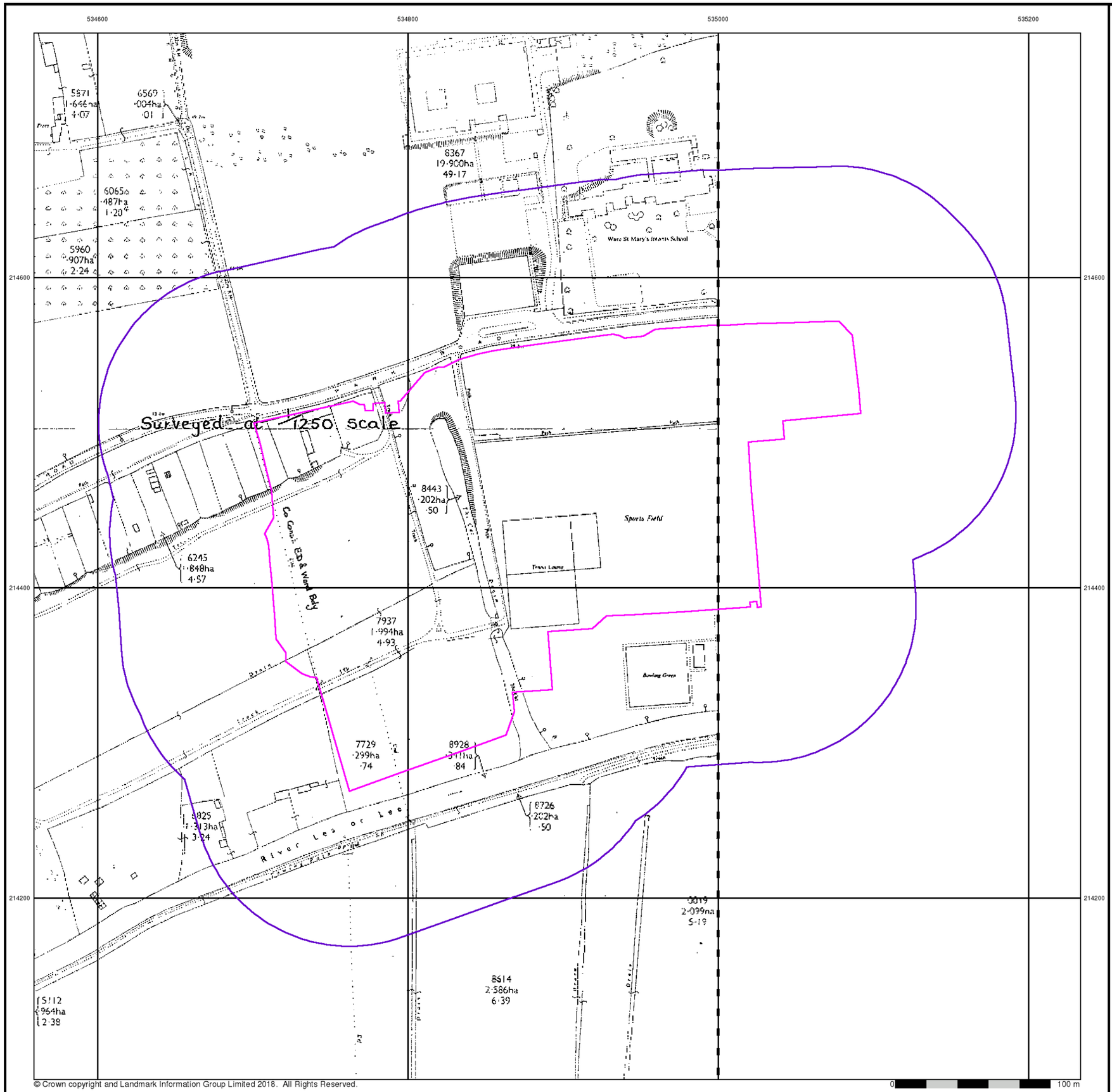
Order Number:	187313645_1_1
Customer Ref:	17000032XX_GSK Ware
National Grid Reference:	534890, 214440
Slice:	A
Site Area (Ha):	6.93
Search Buffer (m):	100

Site Details

Glaxosmithkline Pharmaceuticals (Ware) Ltd, Park Road, WARE, SG12 0DP

Landmark INFORMATION GROUP

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



RAMBOLL

Additional SIMs

Published 1981

Source map scale - 1:2,500

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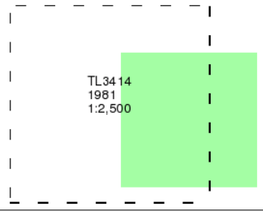
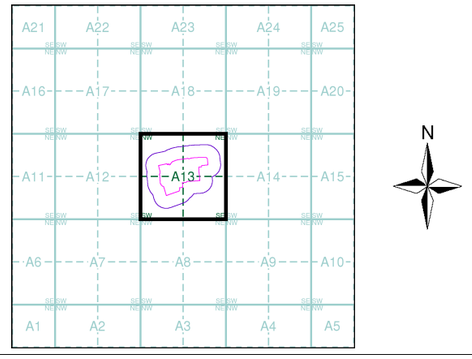


Historical Map - Segment A13



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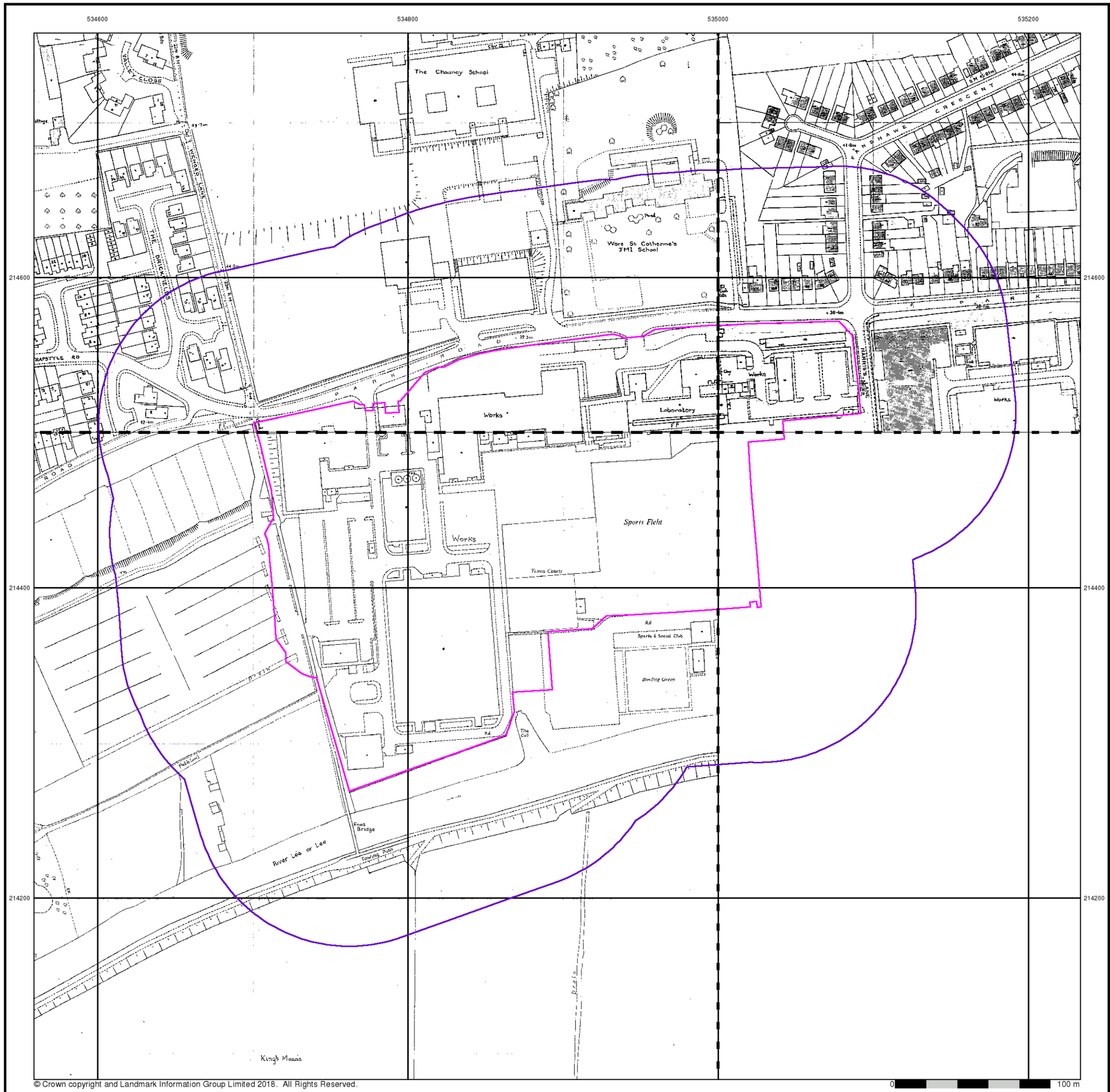

RAMBOLL

Additional SIMs

Published 1986 - 1991

Source map scale - 1:1,250

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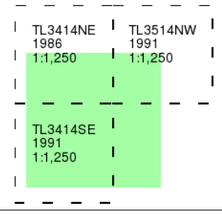
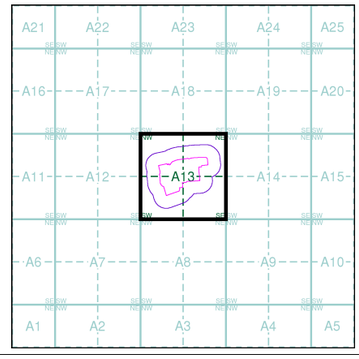


Historical Map - Segment A13



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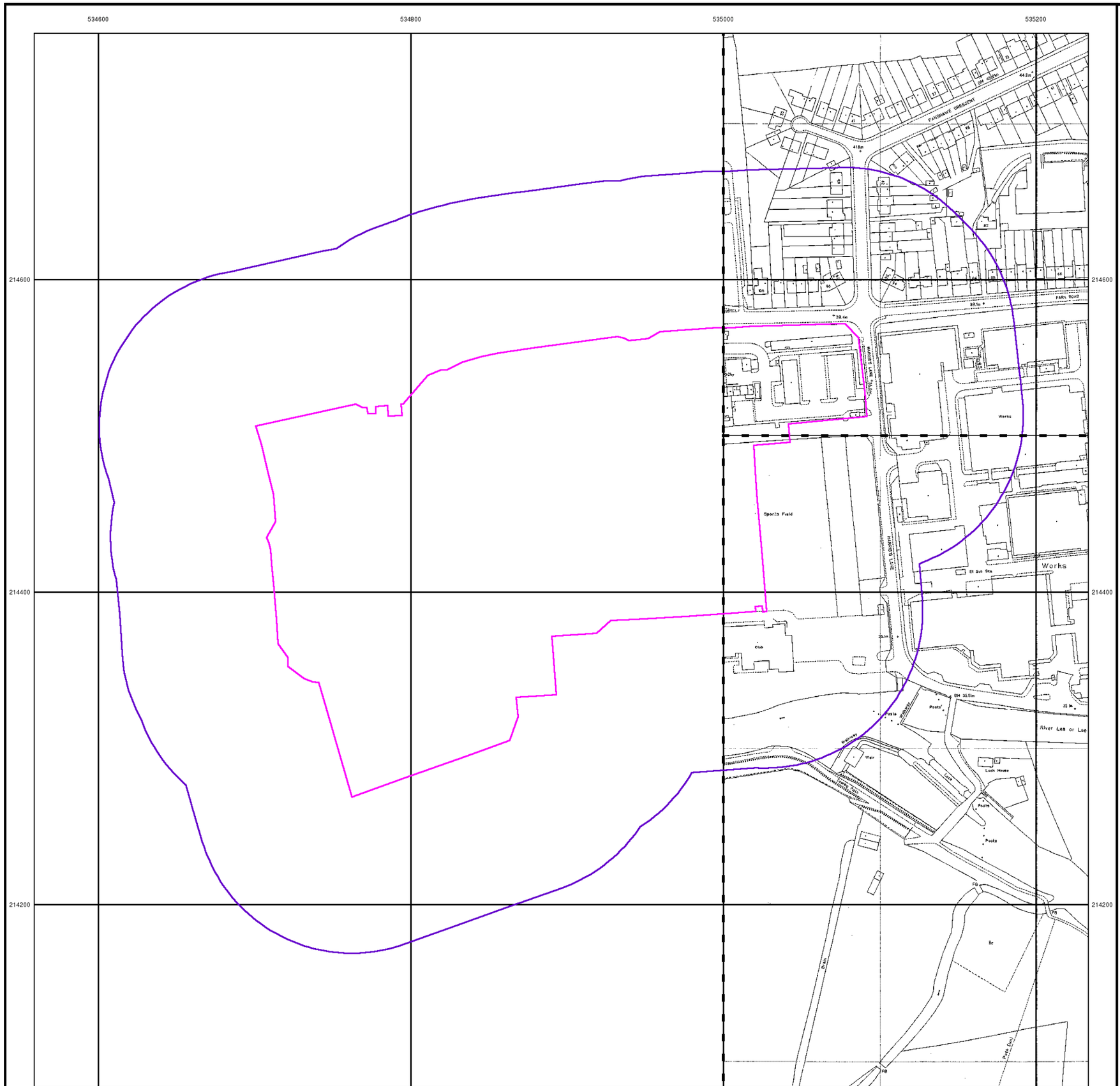


RAMBOLL

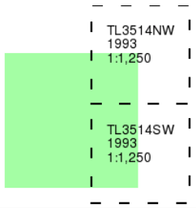
Large-Scale National Grid Data

Published 1993

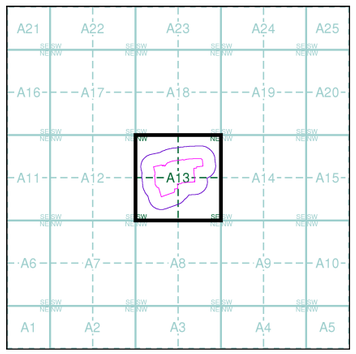
Source map scale - 1:1,250

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

Map Name(s) and Date(s)



Historical Map - Segment A13



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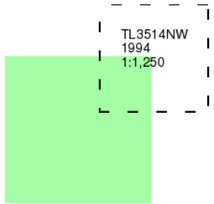
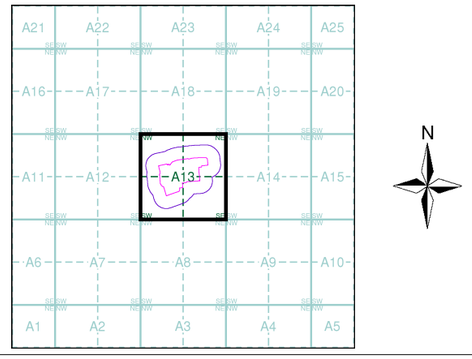


Historical Map - Segment A13



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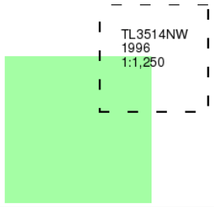
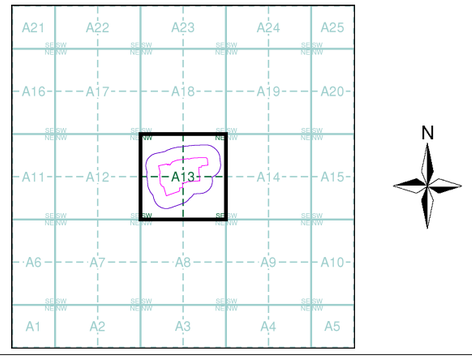


Historical Map - Segment A13



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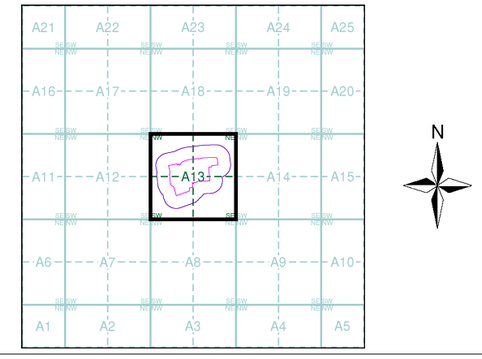
Historical Aerial Photography

Published 2000

This aerial photography was produced by Getmapping, these vertical aerial photographs provide a seamless, full colour survey of the whole of Great Britain

Historical Aerial Photography - Segment A13



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