



BDW Southern Counties

Rustington Golf Course, BN16 4NB

Preliminary Risk Assessment

305199 R01 (02)

RSK GENERAL NOTES

Project No.: 305199 R01 (02)

Title: Preliminary Risk Assessment: Rustington Golf Course, BN16 4NB

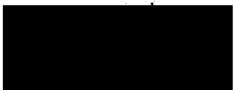
Client: BDW Southern Counties

Date: 4th March 2022

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Status: Rev 02

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Revision control sheet

Revision reference	Date	Reason for revision
Rev 01	23 rd June 2021	First issue
Rev 02	4 th March 2022	Second issue

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK Environment Ltd.

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1 INTRODUCTION

1.1 Commissioning

RSK Environment Limited (RSK) was commissioned by BDW Southern Counties to carry out a Preliminary Risk Assessment of the land at Rustington Golf Course, BN16 4NB. The project was carried out to an agreed brief as set out in RSK's proposal, dated 5 March 2021.

This report is subject to the RSK service constraints given in **Appendix A** and limitations that may be described through this document.

1.2 Proposed development

The Site in question is being considered for development for residential use. The planned layout of the site is shown in **Appendix B**.

1.3 Objectives

The objective of the work is:

- to provisionally identify any land contamination and/or geotechnical constraints to the proposed development and to support discharge of relevant planning conditions and relevant building control requirements; and
- to identify the need for investigation or remediation works to demonstrate that the site is suitable for its proposed use.

1.4 Scope of works

The scope of this assessment has been developed in accordance with relevant British Standards and authoritative technical guidance as referenced through the report. The assessment of the contamination status of the site is in line with the technical approach presented in Land Contamination Risk Management (LCRM) (Environment Agency, 2020) – which supersedes CLR11 Model Procedures for Land Contamination – and in general accordance with BS 10175: 2011 + A2 2017 (BSI, 2017). It is also compliant with relevant planning policy and guidance.

A brief summary of relevant legislation and policy relating to land contamination is given in **Appendix C**.

The scope of works for the assessment has included the following:

- review of the history of development on the site and surroundings, including a study of historical ordnance Survey mapping and other sources of historical information via an environmental database report.
- assessment of local geology, hydrogeology and surface water setting, including the identification of potential geological hazards including mining etc.

- assessment of the potential risks from past, present and future coal mining activities obtained from a Coal Authority Mining Report.
- review of relevant information held by appropriate statutory authorities, e.g. local authority Environmental Health Departments and Environment Agency/NRW/SEPA*, obtained from the environmental database report and/or consultations.
- review of any previous site investigation reports made available.
- completion of a site reconnaissance survey to assess the visual condition of the site.
- development of an initial conceptual site model (CSM) identifying potential contaminant linkages for potential contaminants, completion of a preliminary risk assessment (PRA) and identification of key uncertainties and assumptions in the CSM.
- preliminary consideration of geotechnical constraints and hazards.
- identification of the need for further action, e.g. intrusive investigations, where applicable.

1.5 Existing reports

No existing reports relevant to the site assessment have been provided to RSK. However, RSK is currently carrying out an intrusive site investigation at the site. The initial findings will be included in relevant sections.

1.6 Limitations

The study aims principally to identify and assess the potential risks and liabilities associated with contamination of the ground, on and in the vicinity of the site. While this includes consideration of current operations and housekeeping on the site, the report does not constitute a comprehensive environmental audit of the site, as covered under ISO 14001.

The study was designed generally to meet the objectives of a preliminary (phase 1) investigation, as defined by BS 10175:2011 (BSI, 2017).

This report should be considered in the light of any changes in legislation, statutory requirement or industry practices that have occurred subsequent to the date of issue.

The "vicinity" of the site for the purposes of this report is defined as locations situated within an approximate 250 m radius of the site, although certain sources and/or sensitive targets further than 250 m may also have been considered.

The opinions expressed in this report, and the comments and recommendations given, are based on the information obtained from the desk assessment and the site reconnaissance survey. No intrusive investigations have been undertaken to confirm the actual ground conditions and hence the environmental status of the site.

While asbestos-containing materials are not suspected to be present at the site, asbestos may well be present in soils in discrete areas and may be encountered during future ground investigation.

A detailed survey of invasive plant species is outside the scope of this investigation therefore detailed comments with regards to such species have been omitted from this report.

2 SITE DETAILS

2.1 Site location

Site location details are presented in **Table 1** and a site location plan is provided on **Figure 1**.

Table 1 Site location details

Site name	Rustington Golf Course
Full site address and postcode	Golfers Ln, Angmering, Littlehampton BN16 4NB
National Grid reference (centre of site)	505517, 103428

2.2 Site description

The Site boundary and current site layout are shown on **Figure 2**. The Site covers an area of c. 7.5hectares. It is currently occupied by the Rustington Golf Centre. The golf centre infrastructure itself is located immediately north of the site in question.

2.3 Surrounding land uses

The Site is located close to the village of Angmering, within a predominantly rural and residential setting. Immediate surrounding land uses are described in below in **Table 2**.

Table 2 Surrounding land uses

North	Rustington Golf infrastructure Open greenfield with a lake further north
East	Farmland with residential properties to the north-east
South	A259 dual carriage way immediately to the south, commercial properties, including ALDI supermarket and Chandlers Worthing BMW with residential housing further south
West	Open greenfield – part of the Golf Centre

2.4 Development plans

The proposed layout of the site, at the time of preparing this report, is shown in **Appendix B**.

The proposed development includes residential dwellings with associated private gardens and areas of public open space.



No details of the proposed ground levels have been provided therefore for the purpose of this report it has been assumed that the current levels will remain unchanged.

3 DESK-BASED ASSESSMENT

3.1 Site history

3.1.1 Historical development record

The development history of the site and surrounding area based upon assessment of historical plans and records is detailed in **Table 3** Summary of historical development. The historical maps reviewed are shown within the environmental database report in **Appendix D**.

Table 3 Summary of historical development

Date from	Date to	Historical Land Use (on-site)	Area of site
1876-1878	1932	Undeveloped land	Entire
1896	N/A	No significant changes	N/A
1910-1911			
1932	Present day	Row of trees bisecting the site south to north	Centre
1938-1943		Electricity transmission lines with several posts/pillars	Northern boundary
		1974	South-eastern corner
1957	N/A	No significant changes	N/A
1971			
1974-1975			
1979			
1984-1989	Present day	Golfers Lane road	Northern and eastern boundary
1991-1994		Dual carriageway A259	Southern boundary
1970	N/A	No significant changes	
1995 (based on: https://rgcgolf.com/)	Present day	Rustington Golf Centre	Entire
2001 (Google Earth satellite image)	Present day	Water feature	Centre of eastern section
2010	N/A	No significant changes	N/A
2021	N/A		

Date from	Date to	Historical Land Use (off-site)	Distance (m) and orientation
1876	Present day	South Coast Railway	200 m SW
	1974	Ham Manor Farm	100 m NE
	1932	Gasometer	300 m NE
	Present day	Ditch	150 m SW
	1910	Rustington Mill and Windmill Inn	400 m S
1896	1938	Brickworks with associated quarries and brickfields. By 1910 becoming Brick&Tile works with kilns	Between 350 m SW and 500 m S
	1974	Windmill. On the map of 1910 shown as Windpump&Water Tower	300 m N
	1910	Unspecified tank	180 m NE
1910	1974	Nursery	300 m S

1932	1957	Unspecified tank	300 m N
	1974/Present day	Nurseries	400 m S and 750 m S
	1957	Gasholder Station	500 m S
1938-1943	Present day	Golf Course	Immediately E and 400 m N
		Residential development	250 m S
1957	Present day	Residential development expansion south of the railway line: Rustington	250 m S
	Various	Unspecified pits	140 m SW, 200 m S
1970	1994?	Electricity substation	130 m E
	Present day	Engineering works, becoming depot and unspecified works from ca. 1979, by 1994 becoming Brookside Industrial Estate	120 m SW
	1993	Unspecified tank	120 m SW
	1994?	Electricity substation	150 m SW
1974	?	Nurseries	300 m SE
	Present day	Residential development	1000 m NE
1981	N/A	No significant changes	N/A
1992	Present day	New Road A259	Along the southern boundary
2001		Several lakes/ponds	North of site
2010		Golf course becoming Sport Centre	Immediately N
2021	N/A	No significant changes	N/A
Relevant information sources: Historical OS maps ☒ Aerial photography ☒ Additional information found on https://rgcgolf.com/ ☒			
<i>Note: Reference to published historical maps provides invaluable information regarding the land use history of the site, but historical evidence may be incomplete for the period pre-dating the first edition and between successive maps</i>			

3.1.2 Unexploded ordnance

A review of publicly available unexploded ordnance (UXO) risk maps indicates that the site is located in an area with low potential for wartime bombs to be present (Zetica, 2021).

A screenshot of the map is included in **Appendix E**.

3.2 Information from environmental database report

Relevant environmental permits and incidents detailed within the environmental database report (see **Appendix D**) are summarised below in **Table 4** Summary of environmental permits, landfills and incidents.

Table 4 Summary of environmental permits, landfills and incidents

Data type	Entries on-site	Entries <250 m from site	Entries >250 m from site of relevance	Details
Agency and hydrological				
Environmental permits – incorporating Integrated Pollution Prevention and Control	0	0	0	N/A
Pollution incidents to controlled waters, Prosecutions relating to controlled waters, Substantiated pollution incident register	0	1	0	<u>210 m SE</u> Substantiated pollution incident: crude sewage, recorded Sept 2009 Water Impact: Significant

Discharge consents	0	5	11	<u>160 m SW</u> at Brookside Avenue, Rustington, Littlehampton Effluent type: miscellaneous Operating time: 26/06/1978- 09/08/2010 Receiving water: freshwater river <u>190 m SE</u> at New by-pass, Rustington Effluent type: miscellaneous Operating time: 12/06/1989- 31/03/1997 Receiving water: freshwater river <u>200 m SW</u> brookside avenue, Rustington Effluent type: miscellaneous Operating time: 31/08/1964- 31/03/1997 Receiving water: freshwater river <u>220 m SW</u> at industrial site, Penfold Lane, Rustington, Littlehampton Effluent type: miscellaneous Operating time: 01/10/1975-? Receiving water: freshwater river <u>230 m SE</u> at Barn nursery Effluent type: miscellaneous Operating time: 12/07/1988-? Receiving water: freshwater river
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Data type	Entries on-site	Entries <250 m from site	Entries >250 m from site of relevance	Details
Registered radioactive substances	0	0	0	N/A
Landfill and waste				
Active landfills	0	0	0	N/A
Historic/closed landfills	0	1	0	240 m W at Penfold Lane, Rustington Waste type: Inert, Commercial, Household Operating time: 31/12/1945-31/12/1955
Other waste management licences	0	0	0	
Potentially in-filled land (pit, quarry, pond, marsh, river, stream, dock etc)	0	0	7	Off site: 140 m SW, 190 m S, 220 m SW: unspecified pits 160 m SW, 350 m SW, 460 m S and 460 m SW: historical brick works
Hazardous substances/industrial land uses				
Control of Major Accident Hazards (COMAH) sites	0	0	0	N/A
Explosives sites, Notification of Installations Handling Hazardous Substances (NIHHS), Planning hazardous substance consents/enforcements	0	0	0	N/A
Contaminated land Part 2A register entries and notices	0	0	0	N/A

Data type	Entries on-site	Entries <250 m from site	Entries >250 m from site of relevance	Details
Contemporary trade directory entries	1	22	N/A	On site: Pylon (electrical features) <250 m Various: electrical features, vehicle repair testing and servicing, depot,
Fuel station entries	0	0	1	447 m SW BP at Worthing Road, Rustington, Littlehampton
<i>Note: Entries have only been included within the table where they are located within a 250m radius of the site or, where they fall outside of this radius but are considered to comprise a significant entry.</i>				

In summary, items that have been identified to represent an on-going potential source of contamination that could affect the site comprise:

- 210 m SE Substantiated pollution incident: crude sewage, recorded in September 2009, significantly impacting surface and/or groundwater;
- Historical landfill, located 240 m west, at Penfold Lane, Rustington, accepting inert, commercial and household and waste between December 1945 and 1955; and
- Various unspecified pits and quarries, possibly infilled, some of which associated with brick works.

Discharge consents, recorded in the vicinity are all located downstream from site and as such are not considered a source of contamination.

These entries have been carried forward for consideration within the initial conceptual site model contained in Section 6.

3.3 Information from regulatory authorities

3.3.1 Planning records

No planning records held by the Local Authority Planning Department pertaining to the site and relevant to the current assessment have been found on the planning portal.

3.3.2 Local Authority environmental health department information

The Environmental Health Department of West Sussex County Council has been contacted for information regarding records of contamination in connection with the site.

The Council is not aware of any specific pollution events or contamination incidents related to the site. Based on the plans provided by the Council (included in **Appendix F**), it is

understood that the site lies within close proximity of an area highlighted as potentially contaminated land, believed to be due to the presence of fuel tank(s), comprising 80 litre petroleum mixtures located approximately 62 m north of the site.

A copy of the response is included in **Appendix F**.

3.3.3 Site services

Buried utility services and their backfill can provide preferential pathways for gas, vapour or groundwater to migrate along to another part of the site or to a receptor. RSK was provided with a plan, showing services that represent significant constraints to development. This is included in **Appendix G**.

Obtaining a full set of service plans was outside the scope of this report.

Buried services present on-site or located adjacent to site boundaries, shown on the constraints plan, that could represent a pathway for migration of groundwater and gases/vapours comprise:

- Sewage/drainage pipes, bisecting the site north to south, located within the eastern section of the site; and
- A gas main, located along the southern boundary.

3.4 Site geology

3.4.1 Anticipated geological sequence

Published records (British Geological Survey, Sheet 317, 1:63 360, dated 1972) for the area and available historical borehole logs indicate the geology of the site to be characterised by the succession recorded in **Table 5**. There are number of publicly available BGS historical boreholes located within 500 m of the site, a selection of which are presented in **Appendix D**.

In addition, the preliminary findings of an intrusive site investigation carried out on 4 March 2021 by RSK appear to confirm the stratigraphical succession encountered within the previous intrusive investigations. The borehole logs revealed that the site is underlain by topsoil encountered between the ground level and 0.4 m bgl, overlying superficial deposits of the River Terrace with the Chalk at depth. The superficial deposits encountered at 0.4 m bgl, varied in thickness between 0.75 m and 3.20 m and were typically described as brown to orange brown clayey silt with variable proportions of sand and flint gravel. Locally, sand with gravel of flint and chalk was encountered within these deposits. The Chalk, underlying these superficial deposits, was recorded between 1.15 m and 4.10 m and recovered as weathered brownish cream chalk comprising sandy gravelly silt or possibly structured white chalk of silty sandy gravel towards base.

Table 5 Site geology

Strata	Description	Estimated thickness	Permeability
River Terrace Deposits (undifferentiated): majority of the site	Brown clayey silt/silty clay with variable proportions of sand and flint gravel Brown clayey silty sand becoming orangish brown very gravelly sand with flint	Several metres 1.10 m – 4.10 m (RSK, March 2021)	Secondary A Aquifer
Raised Beach Deposits: south-western corner of the site	Shingle, sand, silt and clay; may be bedded or chaotic	Several metres	
Brickearth Deposits	Homogeneous loam or silt	?	
New Pit Chalk Formation	Principally blocky, white firm to moderately hard chalk with numerous marls or paired marl seams. Flint occurs sporadically in the upper part	Typically between 35 m and 50 m	Principal Aquifer
Relevant information sources: BGS Geoindex ☒ borehole logs ☒ Ongoing SI, RSK (March 2021) ☒			

3.4.2 Radon

The environmental database report provides an assessment of site-specific radon risk. The report indicates that between 1% and 3% of homes are above the Action Level of 200 Bq m⁻³ and that no radon protective measures are required within new dwellings at the site.

The site-specific assessment within the environmental database report is at a higher resolution and therefore provides greater detail than that publicly available in the indicative radon atlas at www.ukradon.org.

3.5 Mining and quarrying

Evidence has been sought to identify any mining, quarrying, landfilling and land reclamation operations, past and present, which have taken place within 500 m of the site.

3.5.1 Areas of other (rock or mineral) mining

The site lies in an area with a known history of quarrying. Brick works with associated quarries have been recorded between 160 m south-west and 460 m south of the site. in

addition, unspecified pits were recorded some 190 m south and 220 m south-west of the site.

The report indicates that sporadic underground mining associated with chalk extraction may have occurred historically on site. However, potential for difficult ground conditions are unlikely, localized and are at a level where they need not be considered.

3.6 Hydrogeology

A summary of the hydrogeological setting of the site, with respect to the anticipated geological sequence set out in Section 3.5 is presented below in **Table 6**.

Table 6 Summary of hydrogeological setting

Condition	Description
Aquifer characteristics	The site is underlain by a secondary A relating to the superficial deposits of the River Terrace Deposits, recorded on the majority of the site and Raised Beach Deposits, identified in the south-west corner of the site. The site is further underlain by a principal aquifer relating to the New Pit Chalk Formation. The presence of low permeability clay at relatively shallow depths beneath the site, while restricting downwards migration, may increase the potential for lateral migration of shallow groundwater (and therefore mobile contamination, if present). Groundwater quality beneath the site may be affected by saline intrusion.
Depth to groundwater and flow	The anticipated depth to the groundwater table is in the order of 5 m bgl estimated from the historical boreholes publicly available on the BGS website. The intrusive site investigation (RSK, March 2021) recorded a groundwater seepage between 3.5 m and 4.10 m bgl in three of six shallow boreholes. Shallow groundwater in the site area is anticipated to flow in a southern direction, i.e. towards the English Channel. The regional direction of groundwater flow is to the south towards the English Channel and may be affected by local groundwater abstractions. The vicinity of the English Channel suggest that the groundwater levels might be influenced by tidal effects.
Groundwater recharge/attenuation	Most of the site is currently unsurfaced and will therefore drain to ground.
Historical implications for hydrogeology	Limited underground chalk mining might have occurred historically, which could affect the groundwater regime on site.
Licensed groundwater abstractions	The environmental database report indicates that there are three current licensed groundwater abstractions, none of which are public water supply boreholes within a 2 km radius of the site. The closest to the site is located approximately 450 m north of the site at Black Ditch, Ham Manor Golf Club and is utilised for spray irrigation purposes.

Condition	Description
Source protection zones	Information available in the Groundsure report indicates that the site does not lie within a currently designated groundwater Source Protection Zone (SPZ).

3.7 Hydrology

A summary of the hydrology within the site area is summarised in **Table 7**.

Table 7 Summary of hydrology in site area

Condition	Description
Surface watercourse s/features	There is a heavily vegetated pond identified in the eastern section of the site. Several ponds were also identified in the vicinity of the site. The nearest identified surface watercourse to the site is the Black Ditch located approximately 200 m to the south-west of the site. The EA classification of the chemical and ecological water quality in the stretch of the Black Ditch nearest to the site is poor.
Surface water abstractions	The environmental database report indicates that there are two current licensed surface water abstractions within a 2 km radius of the site. The closest of these, located on site at Black Ditch Ham Manor, Farm is utilised for spray irrigation.
Site drainage	Surface drainage from the site appears to be discharged into the ground.
Preliminary flood risk assessment	The indicative floodplain map for the area, shows that the site does not lie within the designated floodplain of the Black Ditch.

3.8 Sensitive land uses

Table 8 provides a summary of any environmentally sensitive areas identified within 500 m of the site based on the environmental database report.

Table 8 Environmentally sensitive areas

Feature	Present within 500 m of site?	Details	Likely pathways from site?
International designations – Ramsar wetland, Special Area of Conservation (SAC), Special Protection Area (SPA)	No	N/A	

Feature	Present within 500 m of site?	Details	Likely pathways from site?
National designations – Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), ancient woodland			
Local designations – Local Nature Reserve, Site of Importance for Nature Conservation (SINC)			
Nearest high sensitivity development, e.g. residential			

4 SITE RECONNAISSANCE FINDINGS

A site reconnaissance survey was completed on 4 March 2021 by RSK. The characteristics of the site observed during the walkover and from current ordnance Survey maps are summarised in **Table 9**.

A site layout plan is provided in **Figure 2** with photographic records included in **Appendix H** detailing the main features identified in **Table 9** below.

Whilst the walkover summary includes consideration of current operations and housekeeping on the site as potential sources of contamination, it does not constitute a comprehensive environmental audit of the site, as covered under ISO 14001.

Table 9 Site reconnaissance findings

Feature	Description
Physical characteristics	
Access constraints	Entirety of site was accessible.
Site topography	The Site is essentially level in that there is no overall slope direction, there are however many hummocks.
Surface cover	The entirety of the site is covered by grass.
Site drainage	The site generally drains into the groundwater table, with the exception of the golf greens and tees where there is an infiltration system. The lake in the eastern half does have an overflow to another lake to the west (still within the Golf Centre land but not on the development site).
Surface water	There is a lake in the centre of the eastern half of the site, which is artificially created and was originally lined with clay. The lake is heavily vegetated with reeds, there is no visual evidence of contamination.
Trees and hedges	Vegetation present on-site comprises a number of large trees situated in a row that dissects the eastern and western halves of the site from north to south. There are also a large number of trees that are spread across the site, generally surrounding the greens. There is also a row of trees and hedges running along the southern boundary of the site, adjacent to the A529.
Invasive species	Based upon the walkover survey obvious evidence of Japanese Knotweed or other invasive species has not been identified on-site. However, it should be noted that a detailed survey of the possible presence or absence of invasive species is outside of the scope of investigation and consideration should be given to commissioning a specialist survey, as necessary.
Existing buildings on-site	No buildings are present on-site, there is however a small refreshments hut located along the western portion of the northern site boundary. There is a large clubhouse and leisure facility building beyond the northern boundary of the site.

Feature	Description
Retaining walls and adjacent buildings on or close to site boundary	There are no such structures on or close to the site boundary.
Basements on-site	No evidence of existing or infilled basements was observed
Made ground, earthworks and quarrying	No evidence of made ground was observed. However, there are many mounds and bunkers on the site – typical of the topography of the golf course which are obviously not natural and have been deliberately landscaped.
Potentially unstable slopes on or close to site	None observed.
Buried and overhead services present	There are a series of overhead electricity lines supported by pylons that run adjacent and within to the northern site boundary. There is evidence of an infiltration and sprinkler system on site in the form of small covers situated close to the greens.
Environmental characteristics	
Underground/ above ground storage tanks and pipework	None observed.
Potentially hazardous materials storage and use	None observed.
Asbestos-containing materials	No obvious asbestos construction materials were observed.
Waste storage	None observed.
Fly-tipping	None observed.
Electricity sub-stations/ transformers	None observed on or close to site.
Evidence of possible land contamination on-site	None observed.
Potential off-site sources of ground contamination	None observed.

No potentially significant land contamination or geotechnical issues were identified during the site reconnaissance survey.

5 PRELIMINARY GEOTECHNICAL CONSTRAINTS

5.1 Design class

BS EN 1997-1 defines three different Geotechnical Categories that structures may fall into, which are summarised as follows:

- Category 1: Small and relatively simple structures for which it is possible to ensure that the fundamental requirements will be satisfied on the basis of experience and qualitative geotechnical investigations; with negligible risk;
- Category 2: Conventional types of structure and foundation with no exceptional risk or difficult ground or loading conditions; or
- Category 3: Structures or part of structures, which fall outside limits of Geotechnical Categories 1 and 2. Examples include very large or unusual structures; structures involving abnormal risks, or unusual or exceptionally difficult ground or loading conditions; structures in highly seismic areas; structures in areas of probable site instability or persistent ground movements that require separate investigation or special measures.

Based on the information provided above on the proposed development and in view of the anticipated ground conditions, a Geotechnical Category of 1 has been assumed.

5.2 Preliminary geotechnical hazards assessment

A summary of commonly occurring geotechnical hazards associated with the anticipated geology outlined in Section 3 above is given in **Table 10** together with an assessment of whether the site may be affected by each of the stated hazards.

Table 10 Summary of preliminary geotechnical risks that may affect site

Hazard category	Hazard status based on desk study findings and proposed development		Engineering considerations if hazard affects site
	Could be present and/or affect site	Unlikely to be present and/or affect site	
Sudden lateral changes in ground conditions	☒	☐	Likely to affect ground engineering and foundation design and construction
Shrinkable clay soils	☒	☐	Design to NHBC Standards Chapter 4 or similar
Highly compressible and low bearing capacity soils, (including peat and soft clay)	☐	☒	Likely to affect ground engineering and foundation design and construction

Hazard category	Hazard status based on desk study findings and proposed development		Engineering considerations if hazard affects site
	Could be present and/or affect site	Unlikely to be present and/or affect site	
Silt-rich soils susceptible to rapid loss of strength in wet conditions	☒	☐	Likely to affect ground engineering and foundation design and construction
Running sand at and below water table	☐	☒	Likely to affect ground engineering and foundation design and construction
Karstic dissolution features (including 'swallow holes' in Chalk terrain)	☒	☐	May affect ground engineering and foundation design and construction – refer to Section 4.1.2
Evaporite dissolution features and/or subsidence	☐	☒	May affect ground engineering and foundation design and construction
Ground subject to or at risk from landslides	☐	☒	Likely to require special stabilisation measures
Ground subject to peri-glacial valley cambering with gulls possibly present	☐	☒	Likely to affect ground engineering and foundation design and construction
Ground subject to or at risk from coastal or river erosion	☐	☒	Likely to require special protection/stabilisation measures
High groundwater table (including waterlogged ground)	☐	☒	May affect temporary and permanent works
Rising groundwater table due to diminishing abstraction in urban area	☐	☒	May affect deep foundations, basements and tunnels
Underground mining	☒	☐	Likely to require special stabilisation measures
Effects of extreme temperature (e.g. cold stores or brick kilns/furnaces)	☐	☒	Likely to affect ground engineering and foundation design and construction
Existing sub-structures (e.g. tunnels, foundations, basements, and adjacent sub-structures)	☐	☒	Likely to affect ground engineering and foundation design and construction
Filled and made ground (including embankments, infilled ponds and quarries)	☒	☐	Likely to affect ground engineering and foundation design and construction

Hazard category	Hazard status based on desk study findings and proposed development		Engineering considerations if hazard affects site
	Could be present and/or affect site	Unlikely to be present and/or affect site	
Adverse ground chemistry (including expansive slags and weathering of sulphides to sulphates)	☐	☒	May affect ground engineering and foundation design and construction
Site topography	☒	☐	May affect ground engineering and foundation design and construction
Note: Seismicity is not included in the above table as this is not normally a design consideration in the UK.			

5.2.1 Chalk

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

Based on the Edmund's risk assessment model for natural dissolution features referred to in CIRIA Report C574 (Lord et al. 2002), the site falls into the moderate anticipated subsidence risk' category. With reference to Edmund's database of known natural and man-made chalk solution features there are no such features in the immediate vicinity of the site.

Furthermore, the Groundsure report indicates that although sporadic underground mining of restricted extent may have occurred historically and therefore a few dissolution features are likely to be present on site, the potential for difficult ground conditions or localised subsidence are at a level where they need not be considered.

6 INITIAL CONCEPTUAL SITE MODEL

In the UK land contamination is assessed using a risk-based approach taking account of the magnitude (severity of the hazard) and likelihood (probability) of occurrence. A 'receptor' is something that could be adversely affected by contamination (e.g. people, an ecological system, property or a water body). A 'pathway' is a route or means by which a receptor is or could be exposed to or affected by a contaminant. A 'contaminant source' is a hazard but it can only pose a risk to a receptor where a pathway is present. The relationship between sources, pathways and receptors are referred to as a conceptual site model. A risk can only be released where a contaminant source, pathway and receptor are all in place, referred to as a 'pollutant linkage'.

In line with CLR11 (Environment Agency, 2004) and BS 10175: 2011 + A2 2017 (BSI, 2017), RSK has used information in the preceding sections to identify sources of contaminants, receptors that may be impacted and plausible linking pathways. Where all three are present this is termed a potentially complete contaminant linkage and a qualitative risk estimation is made.

6.1 Potential soil, soil vapour and groundwater linkages

6.1.1 Potential sources of contamination

Potential sources of soil and groundwater contamination identified from current activities and the history of the site and surrounding area are presented in **Table 11**. Ground gas sources are addressed in the next section.

Table 11 Potential sources of soil and groundwater contamination

Potential sources	Contaminants of concern	Current or historical?
On-site		
Potential small scale underground chalk mining	Unknown fill material but potentially including brick, ash and clinker and containing toxic and phytotoxic metals, inorganics, polycyclic aromatic hydrocarbons (PAHs), asbestos	Historical
Off-site		
Petroleum Tank located 62 m north	Petroleum hydrocarbons, fuel additives, PAHs	Historical
Sept 2009 Substantiated pollution incident: crude sewage, significantly impacting surface/groundwater, 210 m SE	Petroleum hydrocarbons	Current
Petrol filling station, 400 m SW	Petroleum hydrocarbons, fuel additives, PAHs, chlorinated solvents, asbestos	Historical

Potential sources	Contaminants of concern	Current or historical?
Gasworks, 500 m S Gasometer, 270 m N	Coal tars, PAHs, toxic and phytotoxic metals, inorganics e.g. cyanide, sulphide, sulphate, ammonia, volatile organic compounds e.g. BTEX, semi-volatile organic compounds (SVOCs) e.g. phenols, asbestos	Historical
Numerous infilled former pits and quarries Historical landfill, 240 m W	Inert/commercial/industrial/municipal waste. Landfill leachate including ammoniacal nitrogen, chloride	Historical
Railway, 200 m SW	Petroleum hydrocarbons, toxic and phytotoxic metals, inorganics, PAHs, asbestos, herbicides	Current
Engineering works, unspecified works, 150 m SW	Petroleum hydrocarbons, chlorinated solvents, toxic and phytotoxic metals, asbestos	Historical
Unspecified tank and associated pipework	Petroleum hydrocarbons (petrol/diesel)	Historical
Numerous electricity substations	PAHs, PCB	Historical

The crude sewage released into the ground is likely to form a NAPL plume, which can further release some vapours of volatile compounds and migrate horizontally within the unsaturated zone of permeable deposits, if present.

6.1.2 Sensitive receptors and linking exposure/migration pathways

Sensitive receptors identified at or in the vicinity of the site that could be affected by the potential sources identified above comprise:

- current site users—commercial workers, public open space users [oral, dermal and inhalation exposure with impacted soil, soil vapour and dust/fibres, ingestion of home-grown produce];
- future site users – public open space users, residential users, commercial workers [oral, dermal and inhalation exposure with impacted soil, soil vapour and dust];
- current adjacent site users – commercial, public open space users [migration of contamination via dust/fibre deposition, vapour or groundwater migration combined with inhalation];
- future buildings and services [direct contact with contaminated soils or groundwater and chemical attack];
- existing/future vegetation [direct contact with contaminated soils or groundwater and root uptake leading to phytotoxicity];
- groundwater in secondary A aquifer within superficial deposits of the River Terrace, Raised Beach and Brickearth Deposits [leaching from soils/percolation to aquifer/ lateral migration of dissolved phase/NAPL];

- groundwater in principal through permeable strata to aquifer [lateral migration of dissolved phase/NAPL];
- groundwater abstraction situated some 450 m north of the site [lateral migration of dissolved phase/NAPL etc]; and
- surface watercourse Black Ditch and associated surface water abstraction situated on site [lateral migration of dissolved phase/LNAPL/site run-off/drainage].

Potential linking pathways are show in brackets for each item above.

Please note that construction workers and future maintenance workers have not been identified in the conceptual model as receptors because risks are considered to be managed through health and safety procedures according to the CDM Regulations.

Ecological receptors are only considered within the conceptual model in the context of statutory protected sites.

6.2 Potential ground gas linkages

6.2.1 Ground gas generation potential

Potential ground gas sources identified for the site and surrounding are shown in **Table 12**.

Table 12 Potential ground gas sources

Potential sources	Indicative ground gas generation potential (CIEH, 2002)	Additional information
On-site		
New Pit Chalk Formation (Upper Chalk)	Very low	Present on site
Made ground with low degradable organic content (e.g. up to 5% organic material and no easily degradable waste)	Low	Possibly present on site
Mine workings less than 50 years since last worked	Moderate	No records of any on site or off site
Off-site		
Infilled pits	Low/Moderate	Various possibly infilled recorded in the vicinity
Landfill 1945-1960s, 240 m W at Penfold Lane, Rustington	Low/Moderate	Operating time: 31/12/1945-31/12/1955, accepting inert, commercial, household waste

6.2.2 Preferential pathways for ground gas migration

Credible preferential pathways potentially connecting the source and receptor through vertical and lateral migration are:

- geology of the superficial and bedrock deposits which is likely to be permeable;
- faults and fractures;
- building foundations, piled foundations and vibro-stone columns;
- construction joints and cracks within building structure;
- utility routes and service penetrations into buildings; and
- mine workings extending laterally.

6.2.3 Sensitive receptors and linking pathways

Sensitive receptors identified at or in the vicinity of the site that could be affected by the potential ground gas sources identified above comprise:

- current site users –residential users, commercial workers [migration and ingress of ground gases into buildings, build-up in confined spaces and explosion/asphyxiation];
- adjacent site users –commercial users [migration and ingress of ground gases into buildings, build-up in confined spaces and explosion/asphyxiation]; and
- current/future buildings and services [migration and ingress of ground gases into buildings, build-up in confined spaces and explosion].

The assessment has identified receptors to include building structures, current and proposed end-users.

Construction workers have not been identified as receptors for the purposes of this assessment. Risks may still be present to construction workers especially where works include the entry into excavations within the ground. Construction workers should undertake appropriate risk assessments and risks should be managed through health and safety procedures and the use of PPE.

6.3 Preliminary risk assessment

The preliminary risk assessment findings and potentially complete contaminant linkages are shown in **Table 13** overleaf. The risk classification based on the combination of hazard consequence and probability using a risk matrix from CIRIA C552 (Rudland et al., 2001), a summary of which is included in **Appendix I**.

Table 13 Risk estimation for potentially complete contaminant linkages

Source	Receptor	Possible pathway	Likelihood	Severity	Risk and justification
On-Site Sources					
Potential small scale underground chalk mining (infill material)	Future site residents	Direct contact (soil dermal contact, ingestion and dust, and vapour inhalation).	Low likelihood	Medium	Moderate/Low –the site might have been subject to small scale underground chalk mining and associated fill material, although there is no evidence from available information. Further assessment would be required to confirm an absence of the contamination
	Adjacent site users		Unlikely	Medium	Low – Commercial properties are located adjacent to the site, however, post-development exposure to contamination in soils would be unlikely.
	Future Vegetation	Root uptake	Low likelihood	Mild	Low – Potential risk from unknown made ground (including fill material) on site could impact proposed future vegetation however these would be subject to planting requirements and are of low sensitivity.
	Groundwater of Secondary A and Principal Aquifers	Vertical and lateral migration including leaching	Low likelihood	Medium	Moderate/Low – The site is underlain by sensitive Secondary A and Principal Aquifers comprising the River Terrace Deposits and White Chalk respectively but is not in a Source Protection Zone. However, further assessment would be required to confirm an absence of the contamination
	Surface water (on site and off site ponds, River Black Ditch)	Leaching from soil followed by migration in groundwater	Low Likelihood	Medium	Moderate/Low – Surface water monitoring would be required to assess the contamination status of the surface water features
	Potable water supply pipes	Chemical attack of infrastructure (including water	Low likelihood	Medium	Moderate/Low – Further assessment is likely to be required to determine potential risks to future potable water supplies, if these are to be laid in Made Ground or within the contaminated soils if present

Source	Receptor	Possible pathway	Likelihood	Severity	Risk and justification
	Buildings and infrastructure (e.g. foundations)	supply pipes) and buildings	Low likelihood	Mild	Low – Contamination in made ground and groundwater could pose a risk to proposed buildings and foundations, however risks are considered to be managed through foundation design.
Ground gas (methane and carbon dioxide) associated with presence of Made Ground and Upper Chalk	Future site occupants/residents	Migration and accumulation of ground gases followed by inhalation and asphyxiation and/or explosion.	Low likelihood	Severe	Moderate/Low – Sources of ground gas generation are indicated to be of medium hazard (small scale underground chalk mining). Therefore, further assessment is required to confirm the site's gas regime.
	Buildings and infrastructure (e.g. foundations)	Migration and accumulation of ground gases followed by explosion.	Low likelihood	Mild	Very low – As identified for human health, further assessment of risk from ground gas has been identified.
Off-Site Sources					
Historic petrol filling station Historical fuel tanks Pollution incident: crude sewage (2009) Gasworks, 500 m S Gasometer, 270 m N Potential infilled pits Historical landfill, 240 m W	Future site users	Inhalation of vapours in soil and groundwater	Likely	Medium	Moderate/Low – The potential exists for off-site contamination sources, therefore further assessment would be required.

Source	Receptor	Possible pathway	Likelihood	Severity	Risk and justification
Numerous infilled former pits and quarries Railway, 200 m SW Engineering works, unspecified works, 150 m SW Unspecified tanks and associated pipework Numerous electricity substations		Dust migration and inhalation			

Risk matrix		Consequences			
		Severe	Medium	Mod	Minor
Probability	Highly likely	Very high	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/low	Low	Very low	Very low

Potentially complete contaminant linkages with a potential risk of moderate to low or higher identified in **Table 13** comprise:

- Contamination in on-site Made Ground associated with historical site use to impact future site users, secondary A and principal aquifers, surface water features and potable water supply pipes;
- Hazardous ground gases associated with on-site sources including Made Ground associated with historical small scale underground chalk mining and the underlying chalk to impact future site users; and
- Off-site sources, comprising a substantiated pollution incident of crude sewage release that impacted controlled waters (2009), historic petrol station, historical fuel tank, gasworks, historic landfill, numerous infilled former pits and quarries, a railway, engineering and unspecified works, an unspecified tank with associated pipework, electricity substations to impact future site users from vapour inhalation from soil and groundwater.

These potentially complete contaminant linkages need to be assessed further through appropriate site investigation to target the identified sources of potential contamination and assess the feasibility of identified pathways.

6.4 Data gaps and uncertainties

Key data gaps and uncertainties identified in the CSM at desk study stage include:

- gaps in available historical OS maps;
- there are no previous investigations available for the site, therefore no information on actual concentrations of contaminants in soil and groundwater or ground gas at this stage; and
- groundwater depth and flow direction are conceptual at this stage.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Environmental assessment

Potentially complete contaminant linkages with a potential risk of moderate to low or higher identified comprise:

- Contamination in on-site Made Ground associated with historical site use to impact future site users, secondary A and principal aquifers, surface water features and potable water supply pipes.
- Hazardous ground gases associated with on-site sources including Made Ground and the underlying chalk to impact future site users; and
- Off-site sources, comprising a substantiated pollution incident of crude sewage release that impacted controlled waters (2009), historic petrol station, gasworks, historic landfill, numerous infilled former pits and quarries, a railway, engineering and unspecified works, an unspecified tank with associated pipework, electricity substations to impact future site users from vapour inhalation from soil and groundwater.

The preliminary findings of the intrusive site investigation (RSK, March 2021) suggest that the site is underlain by topsoil, overlying superficial deposits of the River Terrace Deposits with the Chalk at depth. Geotechnical assessment

The key findings of the geotechnical assessment are as follows:

- The site falls into the moderate anticipated subsidence risk' category based on Based on the Edmund's risk assessment model for natural dissolution features referred to in CIRIA Report C574 (Lord et al. 2002). With reference to Edmund's database there are no natural and man-made chalk solution features within 500m radius of the site. Furthermore, the Groundsure report indicates that although sporadic underground mining of restricted extent may have occurred historically and therefore a few dissolution features are likely to be present on site, the potential for difficult ground conditions or localised subsidence are at a level where they need not be considered. Based on this information, the potential for ground disturbance, filled ground should be not overlooked; and
- Overhead electricity cables and buried services, including a gas main and foul water drainage, presented in **Appendix G** are present on site which should be considered as constraints in the proposed layout of the future development.

7.2 Recommendations

An intrusive exploratory investigation at the site is recommended to address the potential contaminant linkages identified above and to provide information for foundation design and associated works.

This would ideally comprise targeted boreholes and trial pits to further assess the ground conditions and potential for on-site sources of contamination. Groundwater and ground

gas monitoring well installations would also be required to confirm the potential for existing contamination in groundwater and potential connectivity with off-site sources and receptors and assess groundwater regime on site. Subject to the findings of the investigation, sampling of soil vapours may be required to confirm potential soil vapour linkages.

8 REFERENCES

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

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

Part IIA of the Environmental Protection Act (Contaminated Land Regulations (England) 2002 (London: HMSO).

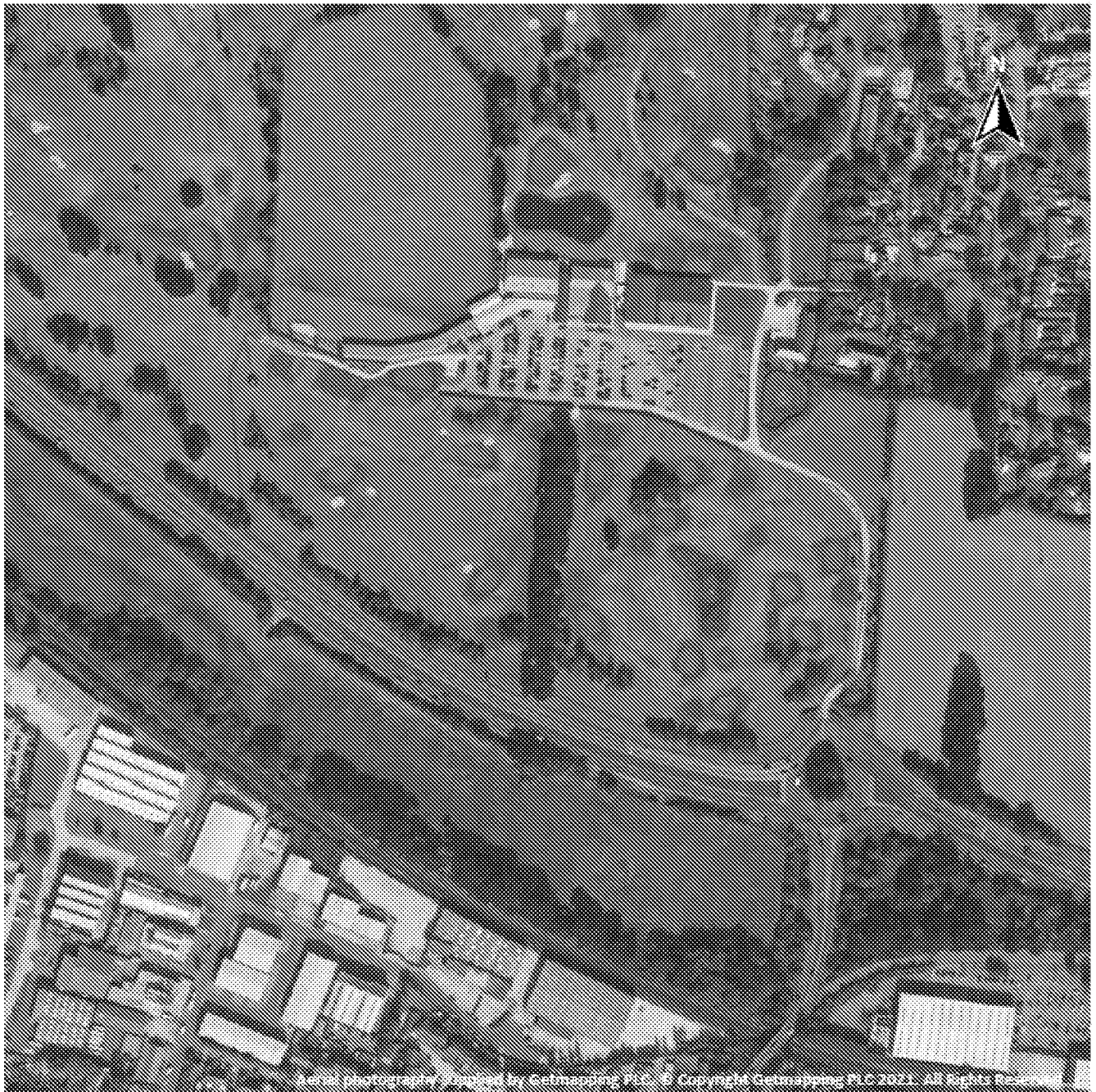
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FIGURES



	Site Location Plan	Client: BDW Southern Counties	Figure No: 1
		Site: Rustington Golf Course	Job No: 305199 R01 (00)
		Scale: NTS	



	Site Layout Plan	Client: BDW Southern Counties	Figure No: 2
		Site: Rustington Golf Course	Job No: 305199 R01 (00)
		Scale: NTS	

APPENDIX A

SERVICE CONSTRAINTS

1. This report and the site investigation carried out in connection with the report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) for BDW Southern Counties (the "Client") in accordance with the terms of a contract [RSK Environment Standard Terms and Conditions] between RSK and the Client, dated 5 March 2021. The Services were performed by RSK with the reasonable skill and care ordinarily exercised by an environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the Client.
2. Other than that, expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.
3. Unless otherwise agreed in writing, the Services were performed by RSK exclusively for the purposes of the Client. RSK is not aware of any interest of or reliance by any party other than the Client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. **Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.**
4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date of this report, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.
5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the Client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.
6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the Client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, invasive plants, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials, unless specifically identified in the Services.
7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a visual inspection of the site together with RSK's interpretation of information, including documentation, obtained from third parties and from the Client on the history and usage of the site, unless specifically identified in the Services or accreditation system (such as UKAS ISO 17020:2012 clause 7.1.6):

- a. The Services were based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely.
- b. The Services were limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the visual inspection.
- c. The Services did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services.

RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the Client and RSK.

8. The intrusive environmental site investigation aspects of the Services are a limited sampling of the site at pre-determined locations based on the known historic / operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the properties of the materials adjacent and local conditions, together with the position of any current structures and underground utilities and facilities, and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters (as stipulated in the scope between the client and RSK, based on an understanding of the available operational and historical information) and it should not be inferred that other chemical species are not present.
9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (intrusive and sample locations etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for setting out and should be considered indicative only.
10. The comments given in this report and the opinions expressed are based on the ground conditions encountered during the site work and on the results of tests made in the field and in the laboratory. However, there may be conditions pertaining to the site that have not been disclosed by the investigation and therefore could not be taken into account. In particular, it should be noted that there may be areas of made ground not detected due to the limited nature of the investigation or the thickness and quality of made ground across the site may be variable. In addition, groundwater levels and ground gas concentrations and flows, may vary from those reported due to seasonal, or other, effects and the limitations stated in the data should be recognised.
11. Asbestos is often observed to be present in soils in discrete areas. Whilst asbestos-containing materials may have been locally encountered during the fieldworks or supporting laboratory analysis, the history of brownfield and demolition sites indicates that asbestos fibres may be present more widely in soils and aggregates, which could be encountered during more extensive ground works.
12. Unless stated otherwise, only preliminary geotechnical recommendations are presented in this report and these should be verified in a Geotechnical Design Report, once proposed construction and structural design proposals are confirmed.

APPENDIX B

DEVELOPMENT DRAWINGS



Legend

Application Boundary	Parking Space	Communal Bin Store	1.2m Post & Rail Fence
Indicative Tree Position	Main Entrance	Communal Cycle Store	1m Estate Railings
Indicative Landscaping	Secondary Entrance	Shed Location	0.45m Knee Rail
Existing Tree	Garage Entrance	1.8m Brick Wall	1.8m Brick Pier & Timber Panel Wall
Existing Tree	Bin Storage Area	1.8m Closed Board Fence	Ballards
Existing Hedge	Bin Collection Point	1.8m Larchlap Fence	Informal Path

Project: LAND AT GOLFERS LANE
RUSTINGTON GOLF CENTRE
RUSTINGTON
Drawing Title: SITE LAYOUT
COLOUR

BARRATT HOMES

carlton
design partnership

Scale: 1:500
Date: 28/02/22
Drawn: MAJW
Checked: MAJW
Rev: E

APPENDIX C

SUMMARY OF LEGISLATION AND POLICY RELATING TO LAND CONTAMINATION

Part IIA of the Environmental Protection Act 1990

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

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

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

Planning Policy

Contaminated land is often dealt with through planning because of land redevelopment. This approach was documented in Planning Policy Statement: Planning and Pollution Control PPS23, which states that it remains the responsibility of the landowner and developer to identify land affected by contamination and carry out sufficient remediation to render the land suitable for use. PPS23 was withdrawn early in 2012 and has been replaced by much reduced guidance within the National Planning Policy Framework (NPPF), reference ISBN: 978-1-5286-1033-9, February 2019.

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

Chapter 11. Making effective use of land

- 117 Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or 'brownfield' land.
- 118. Planning policies and decisions should:

c) give substantial weight to the value of using suitable brownfield land within settlements for homes and other identified needs, and support appropriate opportunities to remediate despoiled, degraded, derelict, contaminated or unstable land.

Chapter 15. Conserving and enhancing the natural environment

170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and

f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

Ground conditions and pollution

178. Planning policies and decisions should ensure that:

a) a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);

b) after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990; and

c) adequate site investigation information, prepared by a competent person, is available to inform these assessments.

179. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.

Water Resources Act (WRA)

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

Water Framework Directive (WFD)

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

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

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

Groundwater Directive (GWD)

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

Priority Substances Directive (PSD)

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

Environmental Permitting Regulations (EPR)

The Environmental Permitting (England and Wales) Regulations 2016 (as amended) provide a single regulatory framework that streamlines and integrates waste management licensing, pollution prevention and control, water discharge consenting, groundwater authorisations, and radioactive substances regulation. Schedule 22, paragraph 6 of EPR 2016 states: 'the regulator must, in exercising its relevant functions, take all necessary measures - (a) to prevent the input of any hazardous substance to groundwater; and (b) to limit the input of non-hazardous pollutants to groundwater so as to ensure that such inputs do not cause pollution of groundwater.'

Notes:

- 1. The above information is provided for background but does not constitute site-specific advice*
- 2. The above summary applies to England only. Variations exist within other countries of the United Kingdom*

APPENDIX D

ENVIRONMENTAL DATABASE REPORT

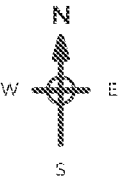


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Map Name: National Grid
Map date: 1970
Scale: 1:1,250
Printed at: 1:2,000



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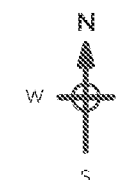
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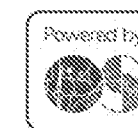


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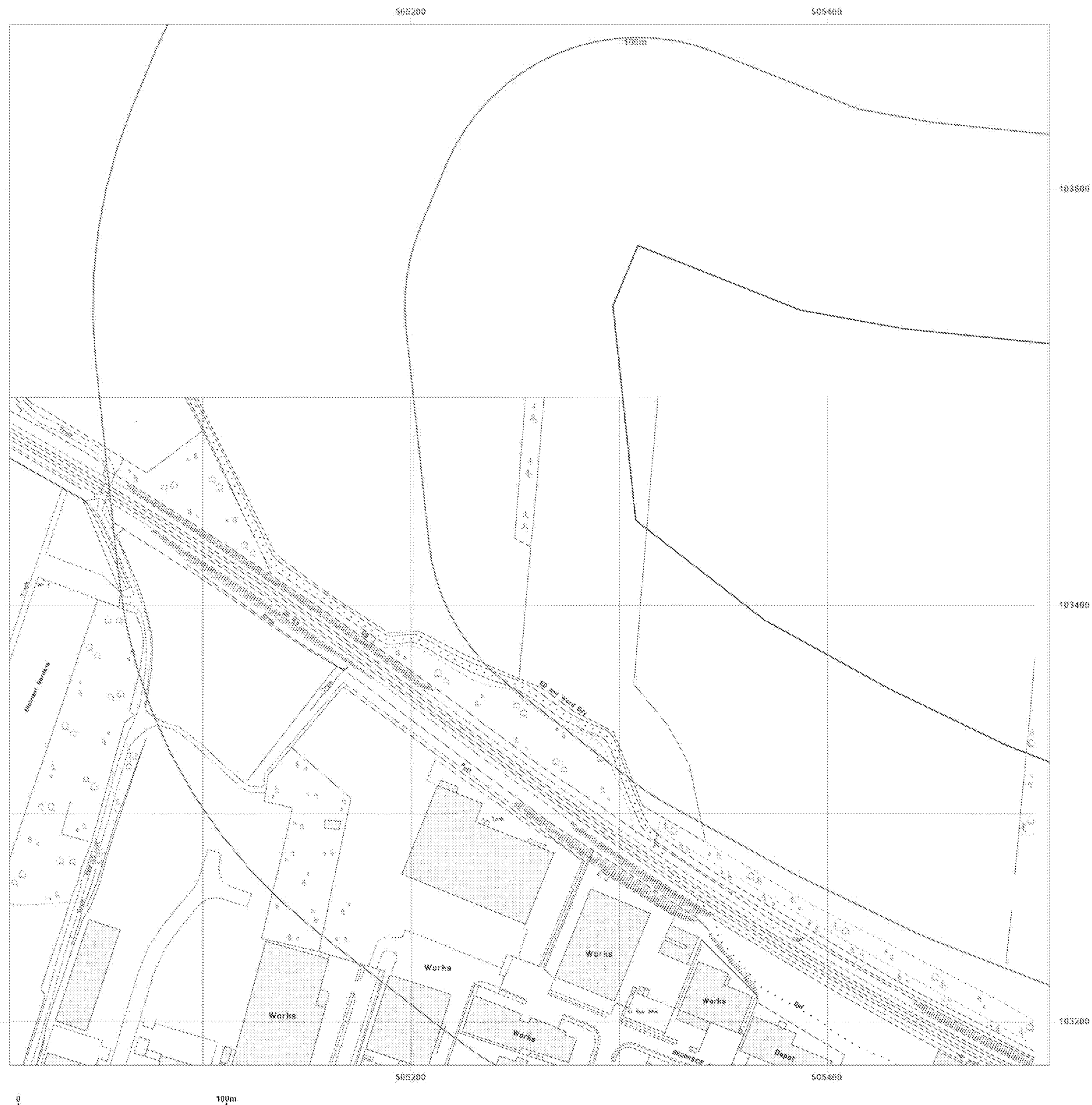


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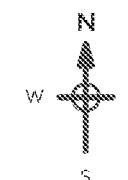
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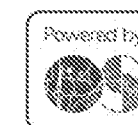
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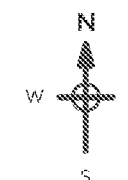
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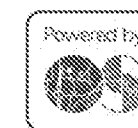


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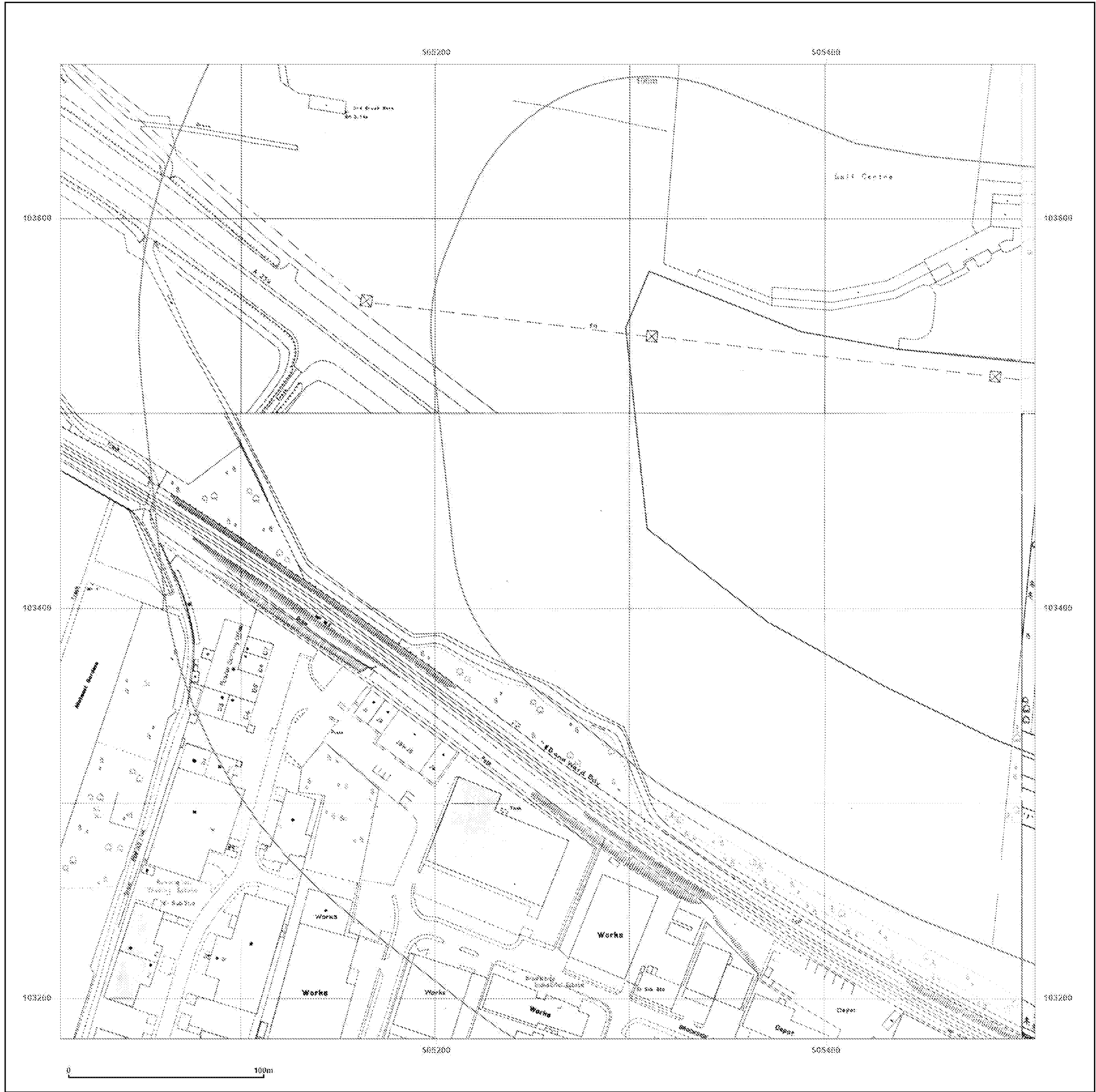


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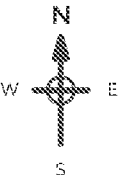


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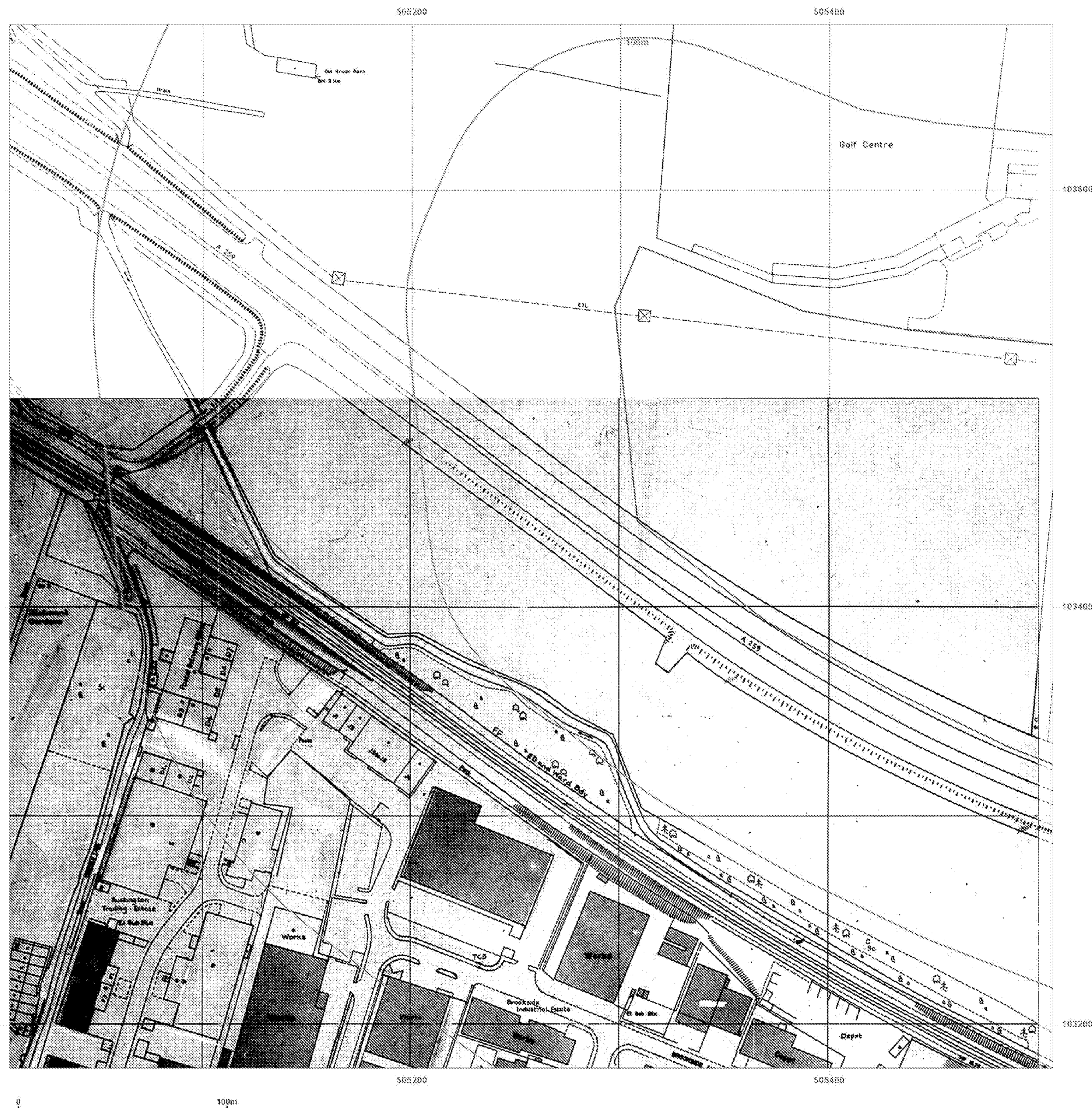


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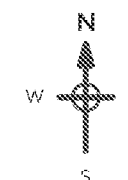
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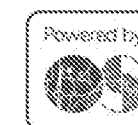
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