

Crossfield Consulting Limited

Geotechnical and Environmental Consultants

B4 PROPERTIES LLP

OCKLEY ROAD, BOGNOR REGIS

DESK STUDY APPRAISAL

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1. INTRODUCTION

B4 Properties LLP proposes to redevelop a site at Ockley Road, Bognor Regis, West Sussex. The site is currently vacant with the buildings and an above-ground tank remaining from a previous Gas Board Depot. The proposed development is understood to comprise either two- to three-storey residential terraced town houses or a block of apartments of similar height.

Crossfield Consulting Limited has been commissioned to undertake a Desk Study Appraisal of the site to identify possible constraints to the development relating to the ground conditions.

The desk study includes a review of historical maps of the site and surrounding area and an appraisal of the published geological data and information from regulatory authorities. The report presents the results of the study, together with an assessment of the likely ground conditions, including potential contamination and foundation solutions.

It is considered that the report complies with the National Planning Policy Framework and is in general accordance with guidance provided by the NHBC and the Environment Agency.

2. THE SITE

2.1 Location

The site is located approximately 0.3 km southwest of Bognor Regis railway station, as shown on Figure 1. The National Grid Reference for the site is SZ 9315 9915. The site is bounded on the northern and eastern sides by residential terraced housing and associated back yards. The western boundary is formed by residential semi-detached housing and associated back gardens. To the south of the western half of the site is car parking associated with blocks of apartments. Offices and a used car sales company are present to the south of the eastern half of the site.

2.2 Site Description

The following site description is based on Ordnance Survey plans and photographs available on the internet. A site reconnaissance has not been carried out by staff from Crossfield Consulting Limited.

The site is an irregularly shaped plot of land, approximately 0.15 ha in area. The site and immediate area surrounding the site appears to be relatively flat. However, in the general region of the site, a gentle slope towards the sea to the south is anticipated.

The eastern part of the site comprises a triangular, tarmac-surfaced area which provides access to the site from Ockley Road and also serves the business premises to the south. On the basis of the photographs available on the internet, the remaining main part of the site comprises an existing or vacated business premises which consists of single-storey brick office structures on the western boundary and one and a half storey high garage buildings along the western part of the northern boundary. The remainder of this area is surfaced in tarmac. An above-ground, steel, rectangular tank, seated on a raised brick plinth, is indicated to be present adjacent to the southern site boundary.

2.3 Site History

The site history has been researched with reference to old editions of the County Series and National Grid Ordnance Survey Plans obtained from GroundSure. Extracts from a selection of these plans are presented in Appendix I. The plans indicate the following development has taken place on and around the site.

The County Series Plan, dated 1875-1876 identifies small structures were present in the western part of the site which may be farm buildings. A gas works is shown 20 m southeast of the site and some terraced housing front on to Circus Road to the east.

In 1898, there were no buildings present on the site. Within the northern boundary and to the north of the site, a brick field is identified. The gas works had extended westwards and new gas holders are shown. Further residential development had occurred southeast and east of the site. Circus Road is shown as Circus Street by this time.

By 1912, an enclosure is shown in the northeast corner of the site. Residential development continued around the site with the construction of Gainsboro Road and Southover Road to the north and Circus Street had been renamed Ockley Road. The workshop/warehouse had been constructed along the southeast boundary of the site.

The 1932, County Series Plan shows a structure present within the narrow central section of the site. Residential development continued in the area surrounding the site. By 1940, the structure present in the centre of the site had been demolished and replaced by several rectangular elongated, structures along the northern boundary. Three tanks are identified within the gas works site but no significant changes are identified off site.

The National Grid Plan, dated 1961 indicates the main part of the site to be split into two sections with further small structures present along the western boundary. The gas works is now identified just as 'works' and the gas holders had been removed.

By 1969, the structures along the western boundary of the site had been extended eastwards into the site which is identified as a Gas Board Depot with the present above-ground tank identified adjacent to the southern boundary. The gas works site to the south had been redeveloped with residential housing/flats in the western part and a warehouse and an Electricity Board Depot in the eastern part.

No changes can be identified within the site boundaries in 1978-1983. The residential development southwest of the site is identified as Sutherland Court. In the 1990-1994 Plan, a structure is shown immediately to the east and adjoining the buildings along the western boundary of the site. Aerial photographs of the site indicate these structures to be temporary, single-storey prefabricated buildings. It is understood that these temporary prefabricated buildings have now been removed from site. Information available on the internet indicate the site was occupied most recently by an office supply company but it is understood that the site is now vacant.

3. DESK STUDY ENQUIRIES

Enquiries were made to the GroundSure Environmental Database regarding the site and surrounding area. Information obtained from these enquiries is presented in Appendix II and summarised below.

There is one Part A(2) and Part B Activities and Enforcements listed within 250 m of the site relating to a dry cleaning company, 243 m to the east. There are no other facilities associated with integrated pollution or controls, radioactive substances or planning hazardous substance consents and enforcements listed within 250 m of the site.

There are no active or historical landfills, nor are there any waste treatment, transfer or disposal facilities, recorded within 250 m of the site.

There are 22 listed current industrial land uses within 250 m of the site including the tank identified on the site. The other uses listed within 30 m of the site include a radar and telecommunications equipment business, new and second-hand car sales, a depot and electricity sub-stations. There are no active petrol or fuel facilities located within 250 m of the site.

The superficial strata beneath the site are classified as a Secondary (A) Aquifer and the solid strata beneath the site are unproductive. There are no groundwater abstraction licences listed within 1 km and the site does not lie within a Groundwater Source Protection Zone. The proposed development property does not lie within an indicative flood plain, as defined by the Environment Agency.

The site is not located in or within 250 m of any designated environmentally sensitive land.

With reference to the Building Research Establishment Document *BR211 (2007) Radon: Guidance on protective measures for new buildings* indicates the site is not within an area where radon precautions are required.

4. PUBLISHED GEOLOGY

Reference to the 1:50,000 scale solid and drift geology map of Bognor (Sheet 317/332), published by the British Geological Survey, indicates that the site is underlain by superficial deposits of Aeolian 'Brickearth' described as mainly silts with gravel in parts. Raised Beach deposits of sandy gravels may be present beneath the 'Brickearth' deposits. The solid strata beneath the site are indicated to be the London Clay comprising silty clays and sands.

5. ASSESSMENT OF GROUND CONDITIONS

5.1 Ground Conditions

Buried foundations associated with the various structures that are, or have been, present across the site during the past should be anticipated beneath the site. The majority of these structures are likely to have been single-storey warehouse structures. Therefore any remaining foundations are expected at shallow depth. Buried services and drains associated with the present structures should also be anticipated.

Ground conditions beneath the site are expected to comprise a limited thickness of Made Ground associated with the previous developments, with deeper Made Ground anticipated along the northern boundary of the site where a "Brick field" was indicated in the site history.

The Made Ground is expected to be underlain by low permeability Brickearth deposits across the site which may be underlain by raised beach deposits containing more permeable sands and gravels. The low permeability London Clay is anticipated beneath these superficial deposits.

5.2 Environmental Assessment

The site history indicates the site has been occupied, in some part, since 1875 and has predominantly been used for commercial/industrial use. A brick-pit is identified within the northern boundary of the site and the adjacent land to the north from 1898 to before 1912. The material used to infill the pit is unknown and may potentially contain ashy material. However, given the pit was backfilled approximately 100 years ago, there will not be any putrescible materials associated with the Made Ground. The shallow Made Ground associated with the construction of the current and previous site structures may also potentially contain ashy material, containing heavy metals and polyaromatic hydrocarbons (PAHs).

The former Gas Board Depot, identified on site from 1969 with an above-ground fuel tank which remains in situ, may be associated with vehicle fuelling, repair and servicing. The Department of the Environment (1996) *Industry Profile – Road Vehicle Fuelling, Service and Repair (Garages and Filling Stations)* identifies petroleum hydrocarbons, PAHs, lubrication oils and solvents as potential contaminants associated with this land use. These organic contaminants are most likely to be present within the areas of fuel storage and filling operations, vehicle repair operations and in areas of former and existing drains. It is possible that unrecorded, underground tanks for fuel or oil may also be present at this site.

A gas works is indicated to the south of the site from 1875, with extension occurring westwards by 1912. It is unclear from the historical map evidence whether the site was part of the former gas work site. However, the identification of the site in 1969 as the Gas Board Depot suggests it was associated but the map evidence indicates that the majority of the production and processing operations are likely to have been carried out to the south of the site. Potential contaminants associated with a gas works land use include heavy metals, petroleum hydrocarbons, BTEX compounds, PAHs, asbestos, cyanides and ammonium compounds as outlined in the Department of the Environment (1995) *Industry Profile – Gas works, coke works and other coal carbonisation plants*. These contaminants are most likely to be present in areas of storage, waste storage, processing and within tar pits, effluent tanks, lagoons, pipework and pumps.

The available information has been used to produce a preliminary Conceptual Site Model for this site, in accordance with CIRIA C552 (2001) and BS 10175 (2011), and this is presented in Table 1.

5.2.1 Assessment of Human Health

In order to comply with statutory requirements, control risks to construction workers and to neighbours/general public during site development, there is a requirement to inspect the existing structures prior to any proposed works for materials containing asbestos. To control risks to construction workers and to neighbours/general public during site development, it will also be necessary to control dust arising from the development works. During site redevelopment,

groundworkers may be exposed to the shallow materials beneath the site and it is recommended that workers involved in groundworks should avoid dermal contact with the soils.

It will be necessary to remove the above-ground tank and any underground tanks present to enable foundations to be constructed or services/drains to be installed. The decommissioning and removal of any tanks should be undertaken in accordance with an approved method, to prevent spillages and leakages. If the soils beneath any fuel storage tanks have been impacted with hydrocarbons as a result of leakages or spillages, quantitative risk assessments may be required to assess the requirement for any remedial works with respect to vapours and/or direct contact. Due to the likely localised nature of any spillages such remedial works are likely to include the removal of impacted soils and/or the provision of effective barriers.

The presence of heavy metals and hydrocarbons will not have an adverse effect on end users in areas of the proposed development that will be hard surfaced and/or covered by buildings as an effective barrier will be present between the end users and the shallow materials. There may be a requirement to provide a “clean” capping layer in any new proposed landscape areas or private gardens, to provide an effective barrier between the site end users and the shallow soils and to provide a suitable medium for plant growth. The minimum thickness of a “clean” capping layer for private garden use is 600 mm which may be able to be reduced to 450 mm for managed landscaped areas.

Some organic compounds can penetrate and/or be deleterious to plastic pipes. If soils affected by such hydrocarbons are present in excavations for potable water pipes, there may be a requirement to use ductile iron pipes or proprietary double-lined pipes for the potable water supply.

5.2.2 Assessment of Controlled Waters

There is the potential for heavy metals and mobile organic contaminants to be present beneath the site.

The site is underlain by superficial deposits classified as a ‘Secondary Aquifer’ and solid strata classified as unproductive. There are no groundwater abstraction licences or source protection zones within the vicinity of the site. The nearest surface water receptor is the sea, approximately 0.4 km south of the site. If permeable sand and gravel strata are proven to underlie the low permeability Brickearth deposits at the site, a potential pathway to Controlled Waters may be present. The infiltration rate of contaminants would be greatest in areas where current or previous foundation structures cross this strata boundary if present.

Metal solubility, relating to materials within any ashy Made Ground (if present), is generally low at typical soil temperatures and expected soil pH values. Therefore, subject to investigation and assessment the potential for heavy metal migration, via leaching, to impact on the wider environment is considered to be very low.

It is unclear whether the above-ground tank and any underground tanks at the site have been decommissioned. Due to the likely age of the tanks, there is the potential for spillages and leakages to have taken place. On the assumption that fuel is no longer contained within the tanks, it is considered unlikely that spillages and leakages will be ongoing.

In the event that high concentrations of organic contaminants are identified within the soils beneath the site, quantitative risk assessments will be required to assess if any remedial works are necessary with respect to substances within the soils impacting Controlled Waters. Due to the likely localised nature of any spillages, such remedial works is likely to include the treatment/removal of significantly

impacted soils. Impacted materials due to leakages from the above-ground tank are likely to be limited due to presence of the hard standing surface.

In the event that high concentrations of organic contaminants are identified within the groundwater beneath the site, quantitative risk assessments will be required to assess if any remedial works are necessary with respect to substances within the groundwater impacting Controlled Waters. In the very unlikely event that significant groundwater impaction is identified beneath the site, there may be a requirement for groundwater remediation works.

5.2.3 Assessment of Ground Gases

There are no current or former landfills indicated in the vicinity of the site and the site does not lie within an area where radon precautions are required in new buildings. Putrescible material may have been used to infill the brick-pit along the northern boundary of the site. However, given that the infilling occurred approximately 100 years ago it is considered that any degradation of putrescible material will now be complete and the potential for combustible gas generation is now negligible.

To demonstrate that ground gases generated from the back-fill material will not pose an unacceptable risk to the site end users, ground gas monitoring is likely to be required. It should be appreciated that a programme of ground gas monitoring in compliance with the published requirements of the regulatory authorities normally requires a minimum period of three months and is subject to weather conditions. Depending on the results of ground gas monitoring, ground gas precautions may be required within any proposed building substructures.

Depending on the findings of the ground investigation and any associated quantitative risk assessments detailed in Section 5.2.1, there may be a requirement to provide a vapour barrier within the proposed structure to protect the site end users from nuisance hydrocarbon odours.

5.3 Assessment of Ground Stability

The site does not lie within an area of recorded mining. A brick-pit is recorded along the northern boundary of the site extending northwards. However, given the time since the pit was infilled, settlement movements should have ceased by now. Residential housing has been present above the backfilled pit since 1912 and the present site buildings are not known to be affected by poor ground support. Therefore, it is considered that the proposed development should not be constrained by ground stability issues.

5.4 Assessment of Foundations and Ground Floor Construction

It is understood the proposed development will consist of residential terraced town houses or a block of apartments of two- to three-storey height. It is understood the proposed buildings will be located within the footprint of the existing buildings and possibly extend into an area of deep Made Ground along the northern boundary of the site.

Depending on the variability of the shallow Brickearth deposits and depending on the depth and extent of the backfilled brick-pit there is a possibility that shallow strip foundations could be used for the proposed development.

However, due to the potential presence of weak/variable materials beneath the site, it is recommended that allowance be made for ground treatment using vibro-replacement techniques (stone columns).

Shallow reinforced strip foundations could then be constructed within the treated ground. As an alternative to ground treatment piled foundations could be used. Continuous Flight Augered (CFA) or auger displacement piles are likely to offer the most suitable piled foundation solution.

Due to the likely presence of Made Ground and the likely ground disturbance that will occur during the demolition and site clearance works, a suspended ground floor slab is likely to be required for the proposed development.

5.5 Soakaway Drainage

It is considered that soakaway drainage is effectively precluded for the proposed development due to the potential for deep Made Ground, the low permeability "Brickearth" strata underlying the site and the potential for impacted soils.

If the ground investigation proves the presence of permeable strata beneath the Brickearth deposits and the ground water level is sufficiently deep, soakaway drainage may be possible.

However, at this stage it would be prudent to identify an alternative method of surface water drainage for the site.

6. RECOMMENDATIONS FOR GROUND INVESTIGATIONS

It will be necessary to undertake a ground investigation, in order to confirm the ground conditions beneath the site, to allow an environmental assessment to be prepared and to provide information on foundation design. It should be noted that there is a slight risk the site may be associated with liabilities if groundwater is impacted with mobile substances (such as petroleum/oils) and groundwater treatment/remediation could be required by the authorities. Hence, it would be prudent to investigate the groundwater quality below the site.

It is understood that the site is vacant but a phased investigation is likely to be required due to the anticipated variable nature of the shallow ground. An initial phase ground investigation utilising windowless sampling is considered suitable to investigate the underlying strata and potential environmental issues. It is intended that the exploratory holes will be located to provide coverage, where possible, of the footprint of the proposed buildings and in this case to determine the depth of infill material within the former brick-pit. Soil samples should be recovered from exploratory holes for geotechnical and analytical, laboratory testing. Ground gas monitoring and groundwater sampling will also be required. The cost of this investigation is likely to be in the region of £6,500.

Depending on the findings from the first investigation, allowance should be made for a supplementary ground investigation following site purchase and demolition. As piled foundations may be required for this site, this investigation is likely to involve trial pits and deep boreholes to provide soil samples for geotechnical laboratory testing to obtain parameters for pile design. It is anticipated that the cost of this phase of investigation may be between £3,000 for trial pits only and up to £6,000 if boreholes are required.

7. SUMMARY

It is proposed to redevelop a site at Ockley Road, Bognor Regis, West Sussex. The site is currently vacant with the buildings and an above ground tank remaining from a previous Gas Board Depot. The proposed development is understood to comprise either residential terraced town houses or a block of apartments of two- to three-storey height. A review of the site history indicates the site has been associated with a "Brickpit" along the northern boundary in 1898, infilled before 1912 and a Gas Works to the south from 1912 onwards.

Ground conditions beneath the site are anticipated to comprise a limited thickness of Made Ground associated with the current developments with deep Made Ground within the infilled "brickpit". Brickearth deposits are present below the Made Ground and may be underlain by raised beach deposits of sands and gravels. London Clay is anticipated beneath these superficial deposits.

It is known that an above-ground fuel storage tank is present at the site associated with a former Gas Board Depot. There is the potential that unrecorded underground tanks may also be present on the site. Allowance should be made to safely decommission and remove such tanks to permit development and care should be taken when removing such structures to prevent spillages and leakages.

There is the potential for heavy metals and organic contaminants to be present beneath the site associated with the former land use.

There may be a requirement to provide a "clean" capping layer in any new proposed private gardens or landscape areas, to provide an effective barrier between the site end users and the shallow soils and to provide a suitable medium for plant growth.

Some organic compounds can penetrate and/or be deleterious to plastic pipes. If soils affected by such hydrocarbons are present in excavations for potable water pipes, there may be a requirement to use ductile iron pipes or proprietary double-lined pipes for the potable water supply.

It is possible that a minor source of ground gases exist that require investigation and/or the installation of barriers within the proposed structures.

In the event that high concentrations of organic contaminants are identified beneath the site, quantitative risk assessments will be required to assess if any remedial works are necessary with respect to vapours, direct contact and controlled waters. Such remedial works are likely to include the removal of impacted soils and/or the provision of effective barriers. In the very unlikely event that significant groundwater impaction is identified beneath the site, there may be a requirement for groundwater remediation works.

Depending on the variability of the shallow Brickearth deposits and depending on the depth and extent of the backfilled brick-pit, there is a possibility that shallow strip foundations could be used for the proposed development. However, it is anticipated that an alternative foundation solution utilising ground treatment and reinforced strip foundations or a piled foundation solution will be required.

A suspended ground floor slab is recommended to allow for the potential disturbance caused by the demolition and clearance of the site.

An initial ground investigation comprising windowless sampling will be required to confirm ground conditions beneath the site, especially the depth of Made Ground present. This will allow ground gas monitoring, groundwater sampling and soil sampling to be undertaken to provide information for environmental and geotechnical assessment.

A supplementary ground investigation following site purchase and demolition of the current buildings is likely to be required to obtain further parameters for foundation design especially if a piled foundation is required.

REFERENCES

BRE (2007) *BR211 – Radon: Guidance on protective measures for new buildings* BRE Press

BSI (2011) BS 10175 – *2011 Code of Practice for Investigation of Potentially Contaminated Sites* British Standards Institution

CIRIA (2001) *CIRIA C552 – Contaminated Land Risk Assessment: A guide to Good Practice* Construction Industry Research Association

Department for Communities and Local Government (2012) *National Planning Policy Framework*

Department of the Environment (1995) *Industry Profile – Gas Works, Coke Works and Other Coal Carbonisation Plants* DoE

Department of the Environment (1996) *Industry Profile – Road Vehicle Fuelling, Service and Repair (Garages and Filling Stations)* DoE

Environment Agency (2004) *Model Procedure for the Management of Land Contamination CLR 11* EA

Environment Agency (2005) *Environment Agency Guidance on Requirements for Land Contamination Reports* EA

NHBC (2011) *Standards* National House Building Council

UKWIR (2010) *Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites* Report Ref. No. 10/WM/03/21 UK Water Industry Research

GENERAL NOTES

1. This report is provided as a preliminary site appraisal only, in the context of the stated development proposals and should not be used in a different context. Further geotechnical assessment, and possibly detailed investigations, will be required prior to finalisation of ground related designs.
2. Where any data supplied by the Client or by other external sources, including previous site investigation data, have been used it has been assumed that the information is correct unless otherwise stated. No responsibility can be accepted by Crossfield Consulting Limited for inaccuracies within the data supplied by others.
3. Any assessments made in this report are based on the ground conditions indicated by the trial pits and desk study. Variations in ground conditions may occur between exploratory hole locations and there may be special conditions appertaining to the site which have not been revealed by the investigation and which have not been taken into account in the report. The assessment may be subject to amendment in the light of additional information becoming available.
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6. New information, improved practices and legislation may necessitate an alteration to the report in whole, or in part, after its submission. Therefore with any change in circumstances or after the expiry of one year from the date of the report, the report should be referred to Crossfield Consulting Limited for re-assessment and, if necessary, re-appraisal.

TABLES

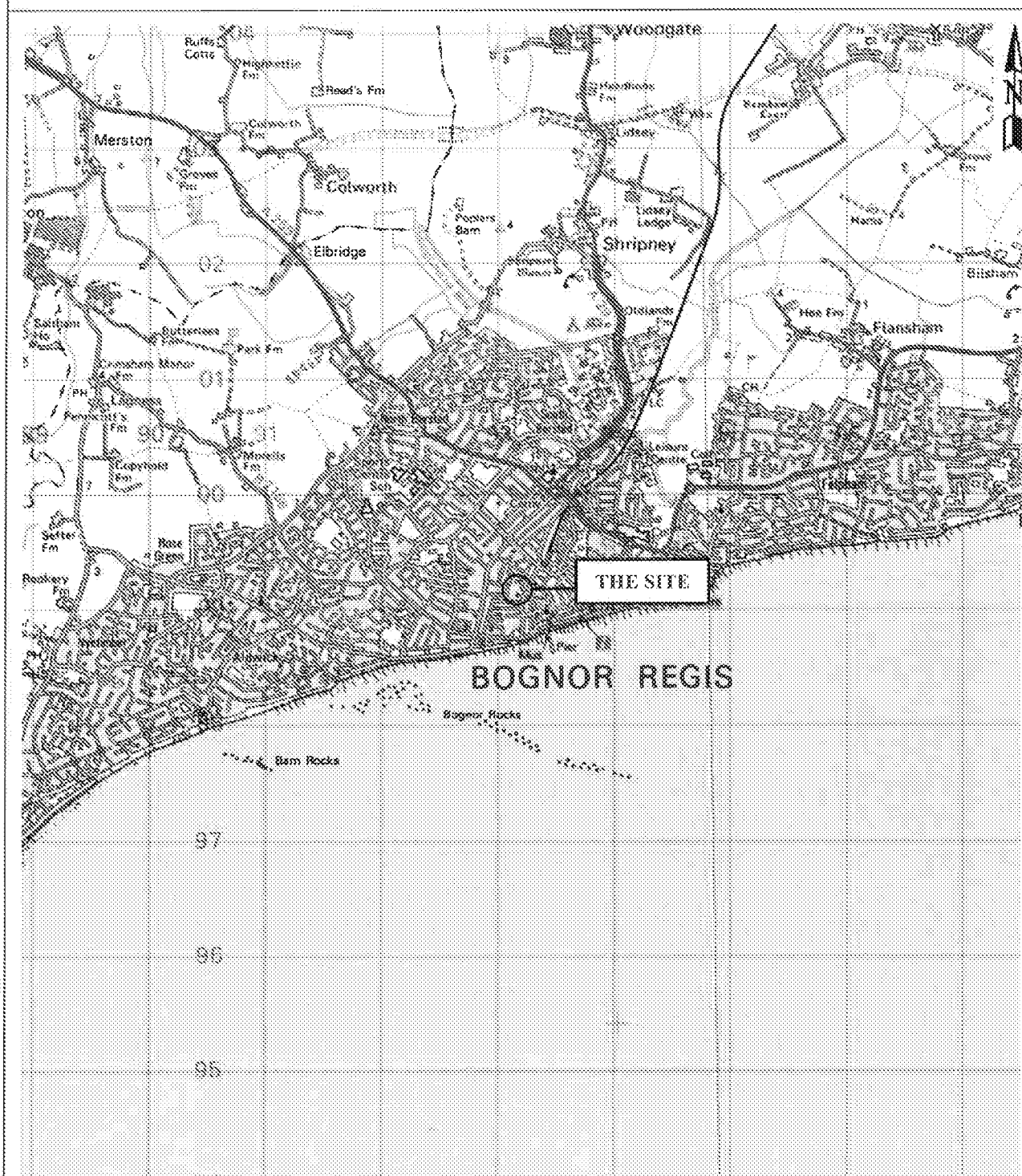
TABLE 1

CONCEPTUAL SITE MODEL

Potential Contaminant Source	Potential Migration Routes	Receptors and Assessed Pollutant Linkage
Solids <i>Ashy Made Ground</i>: Heavy Metals and Polyaromatic Hydrocarbons (PAHs) <i>Former Gas Works Site</i>: Heavy Metals, Petroleum Hydrocarbons, BTEX compounds, PAHs, Cyanides, Sulphates, Ammonia compounds and Asbestos <i>Fuel Storage</i>: Heavy Metals, Petroleum Hydrocarbons, PAHs and Volatile Organic Compounds (VOCs)	Movement of Solids Direct dermal contact, ingestion of soil and inhalation of dust are all viable pathways during construction. These exposure pathways are also possible in any proposed garden and landscaped areas following construction Release into Liquid Phase Heavy metals and PAHs are of generally low solubility and mobility. Potential for mobile hydrocarbons, VOCs and ammonia compounds to be present at the site Release into Gas/Vapour Phase Certain volatile hydrocarbons and solvents can readily form vapours which could migrate from a shallow source to the surface	Human Health <i>Construction workers</i>: Possible pollutant linkage <i>Site end users</i>: Possible pollutant linkage <i>Adjacent properties</i>: Possible pollutant linkage from dust during construction Buried Structures & Services <i>Plastic pipes for potable water supply</i>: Possible pollutant linkage <i>Other structures and services</i>: Possible pollutant linkage Landscape and Garden Areas Possible pollutant linkage
Liquids <i>Petroleum Hydrocarbons</i>: Potential source present within existing above-ground tank and any unrecorded underground tanks Off-site <i>Former Gas Works Site</i>: Potential for groundwater to be impacted if permeable strata present	Movement of Liquids Potential for mobile pollutants to migrate	Controlled Waters <i>Groundwater</i>: Secondary aquifer with no groundwater source protection zones – Possible pollutant linkage <i>Surface Water</i>: Nearest surface feature is the sea, 0.4 km away – Possible pollutant linkage if permeable strata present
Gases <i>Landfill gases</i>: No source <i>Radon gas</i>: No significant source identified <i>Back-filled Brickpit</i>: due to age and likely nature of backfill material – very low ground gas generation potential <i>Vapours</i>: Potential source if Petroleum hydrocarbons and BTEX compounds present on site	Movement of Gases Potential for migration through Made Ground	Human Health Possible pollutant linkage

NOTE: The above conceptual model is based on CIRIA C552 (2001) and BS 10175 (2011).

FIGURE 1

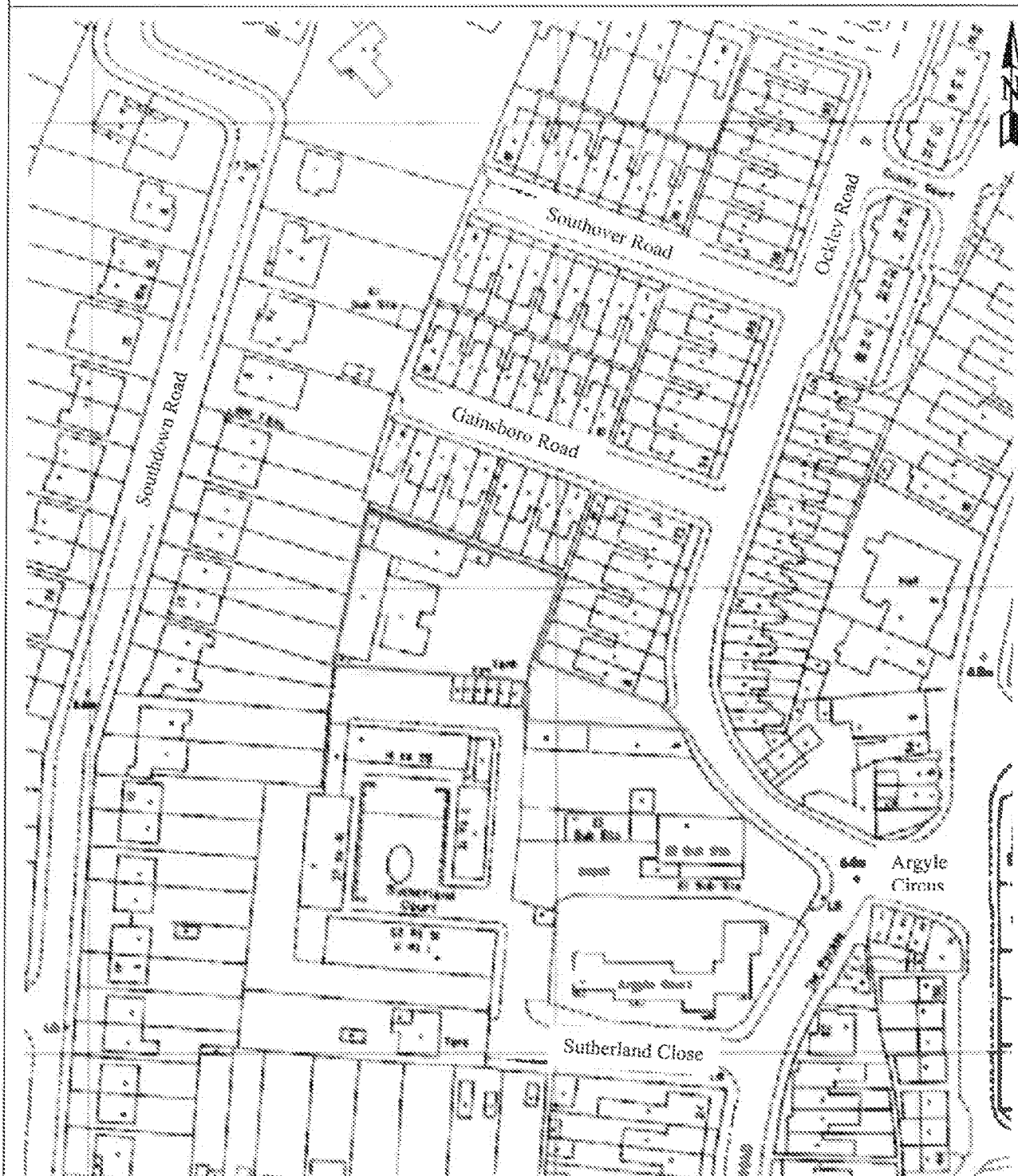


SITE LOCATION PLAN

Scale 1: 50,000

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FIGURE 2



SITE PLAN

Scale 1: 1250

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APPENDIX I

Site Details:
bognor regis

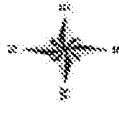
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Grid Ref: 493190, 99193

Map Name: County Series

Map date: 1988

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1988
Revised 1988
Drawn 1988
Copyright 1988
London SW1

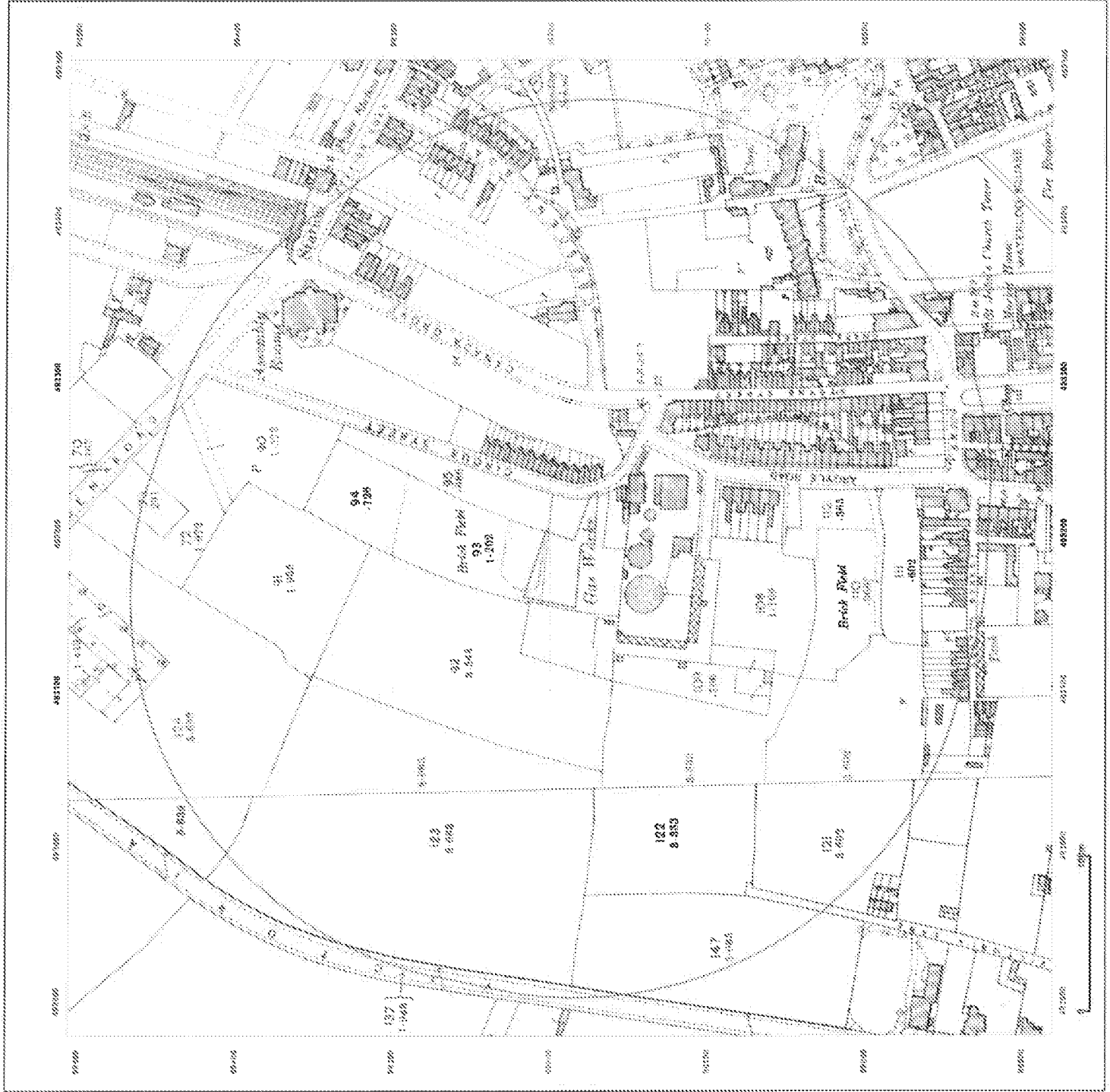
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Ordnance Survey
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Production date: 20 June 2012

To view map legend click here [Legend](#)



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bognor regis

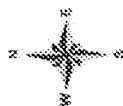
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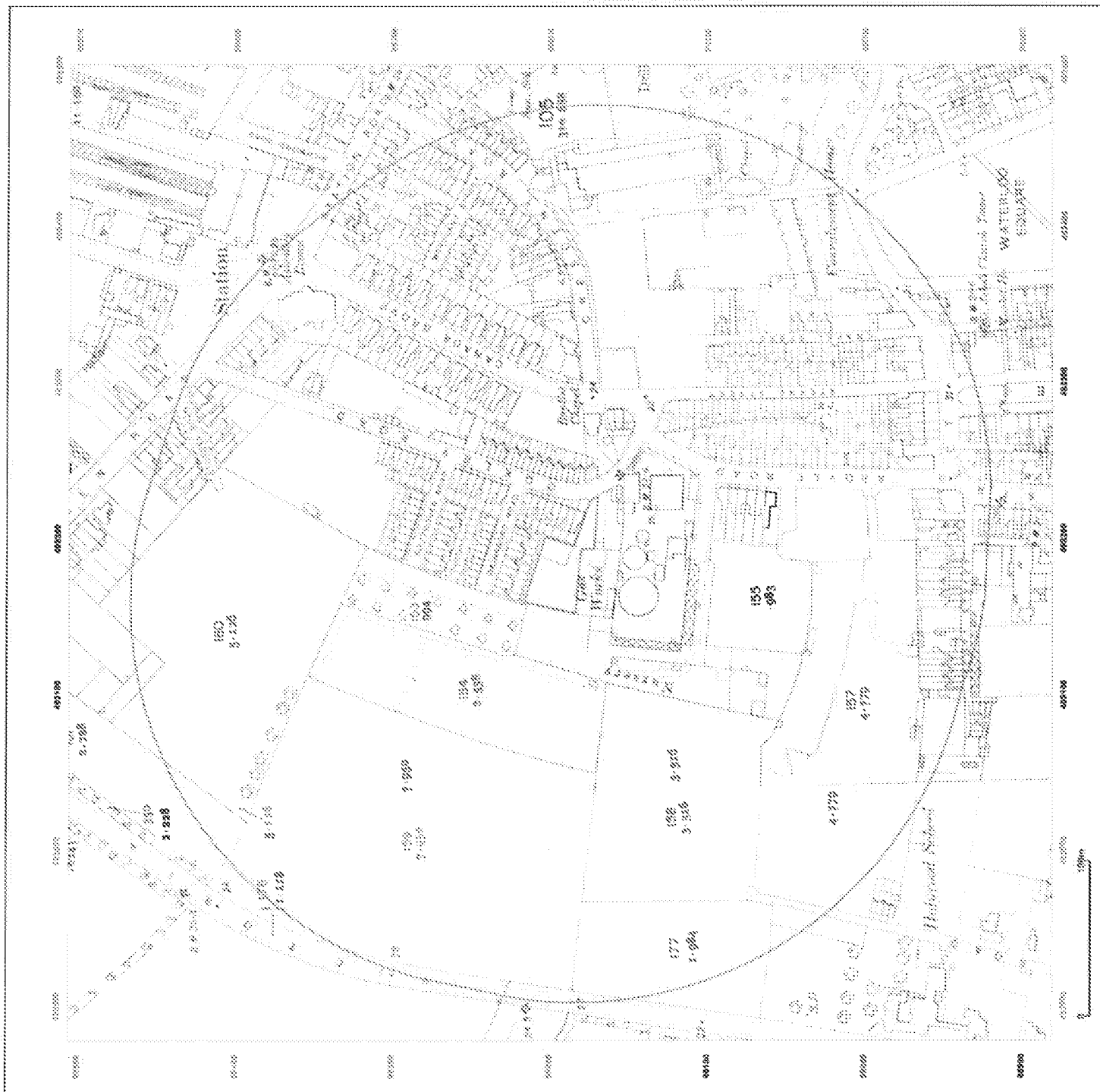
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To view map legend click here [Legend](#)



Site Details:
bognor regis

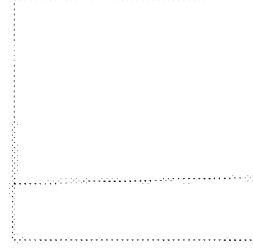
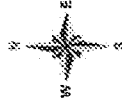
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Grid Ref: 493190, 99193

Map Name: County Series

Map date: 1940

Scale: 1:2,500

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Site Details:
bognor regia

Client Ref: EMS-167908-248544
Report Ref: S-EMS-167908-248544
Grid Ref: 493190, 99193

Map Name: National Grid

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Scale: 1:2,500

Printed at: 1:2,500

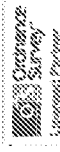


Surveyed 1961
Published 1961
Scale 1:2,500
London 1950

Surveyed 1961
Published 1961
Scale 1:2,500
London 1950



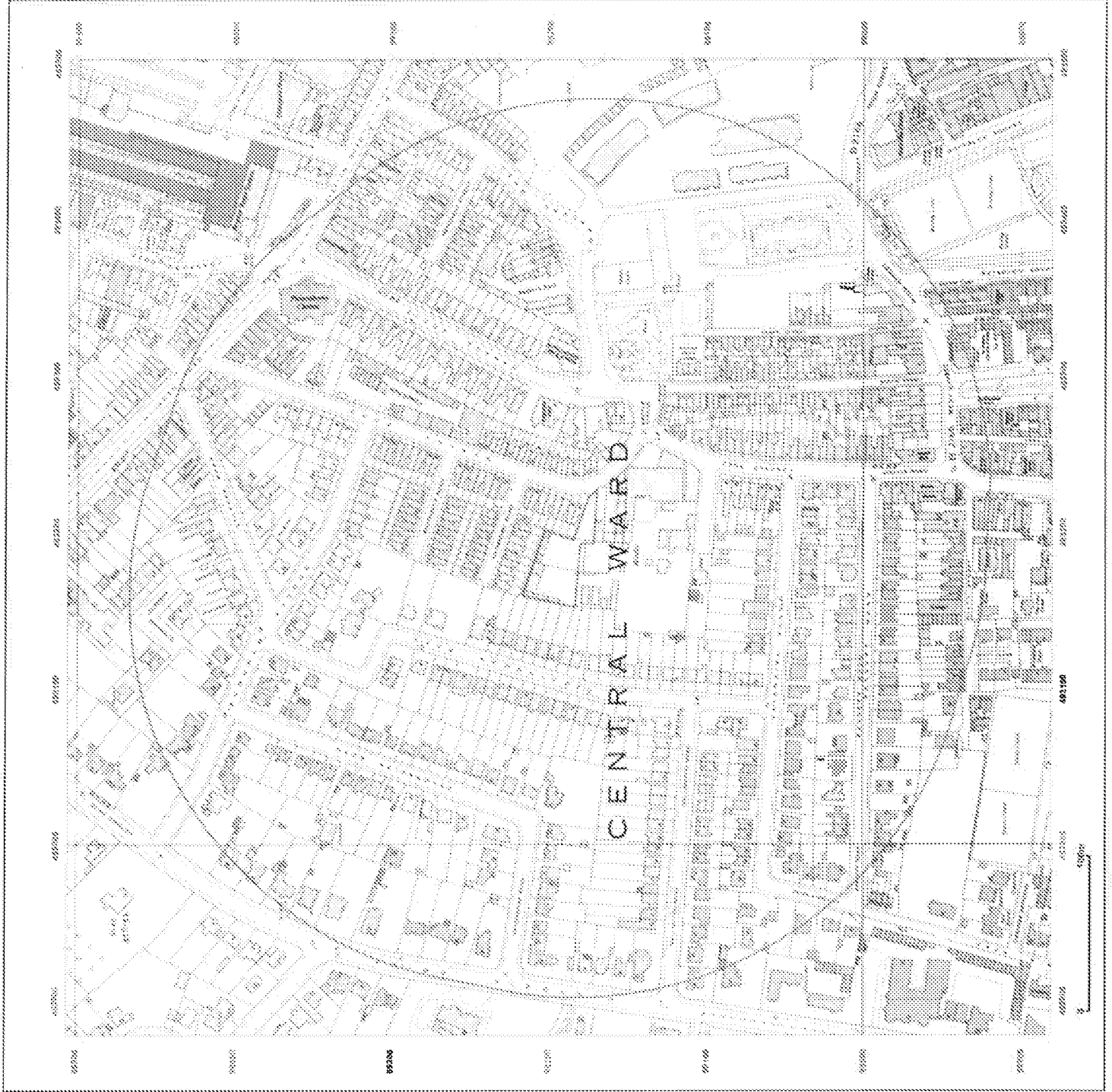
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Production date: 06 June 2012

To view map legend click here [1:2,500](#)



Site Details:
bognor regis

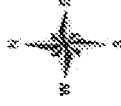
Client Ref: EMS-167908-248544
Report Ref: S-EMS-167908-248544
Grid Ref: 493190, 99193

Map Name: National Grid

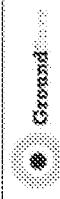
Map date: 1969

Scale: 1:2,500

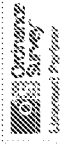
Printed at: 1:2,500



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Site Details:
bognor regia

Client Ref: EMS-167908_248544
Report Ref: S-EMS-167908_248544
Grid Ref: 493190, 99193

Map Name: National Grid

Map date: 1978-1983

Scale: 1:1,250

Printed at: 1:2,500



Download 1978 Report Ref: 167908 Source: EMS Grid Ref: 493190 Download 1978	Download 1978 Report Ref: 167908 Source: EMS Grid Ref: 493190 Download 1978	Download 1978 Report Ref: 167908 Source: EMS Grid Ref: 493190 Download 1978	Download 1978 Report Ref: 167908 Source: EMS Grid Ref: 493190 Download 1978
Download 1978 Report Ref: 167908 Source: EMS Grid Ref: 493190 Download 1978	Download 1978 Report Ref: 167908 Source: EMS Grid Ref: 493190 Download 1978	Download 1978 Report Ref: 167908 Source: EMS Grid Ref: 493190 Download 1978	Download 1978 Report Ref: 167908 Source: EMS Grid Ref: 493190 Download 1978

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To view map legend click here [Legend](#)



Site Details:
bognor regis

Client Ref: EMS-157908-248544
Report Ref: S-EMS-157908-248544
Grid Ref: 493190, 99193

Map Name: National Grid

Map date: 1990-1994

Scale: 1:1,250

Printed at: 1:2,500



Source of Data: Ordnance Survey 1:25,000 Scale 1990-1994	Source of Data: Ordnance Survey 1:25,000 Scale 1990-1994	Source of Data: Ordnance Survey 1:25,000 Scale 1990-1994	Source of Data: Ordnance Survey 1:25,000 Scale 1990-1994
Source of Data: Ordnance Survey 1:25,000 Scale 1990-1994	Source of Data: Ordnance Survey 1:25,000 Scale 1990-1994	Source of Data: Ordnance Survey 1:25,000 Scale 1990-1994	Source of Data: Ordnance Survey 1:25,000 Scale 1990-1994
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APPENDIX II

APPENDIX II – DESK STUDY INFORMATION

GroundSure Environmental Database

Enquiries were made to the GroundSure Environmental Database regarding the site and surrounding area. This database includes collated and continuously updated information from a variety of sources and includes entries that cover Environment Agency licences, waste sites, hazardous substances, geological data, industrial landuse, groundwater vulnerability, source protection zones and floodplains.

A report is included in this Appendix for a search radius of 1 km around the site and this report includes a summary table of the search results. Detailed information contained in the report has been included only if it is relevant to the geotechnical and environmental assessment. All other pages have been omitted. A full copy of the GroundSure Report can be provided on request.

GroundSure EnviroInsight

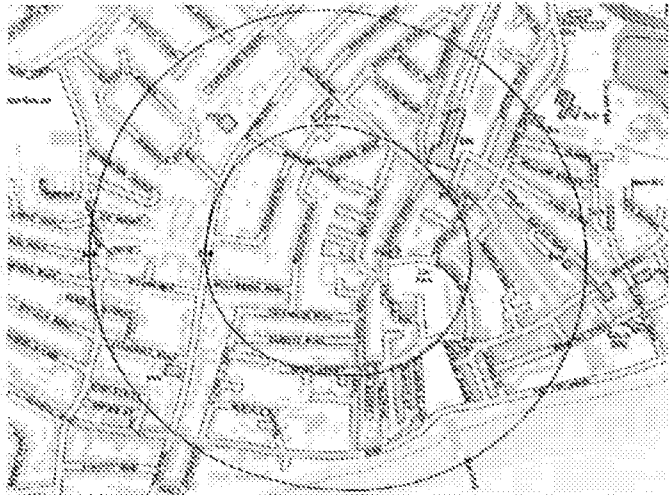
Address: bognor regis

Date: Jun 6, 2012

GroundSure Reference: S EMS-167908_248545

Your Reference: EMS_167908_248545

Client: EmapSite



Brought to you by GroundSure

Aerial Photograph of Study Site



Site Name: bagnor regis
Grid Reference: 493181,099193
Size of Site: 0.15 ha

Aerial photography supplied by Getmapping PLC.
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Overview of Findings

For further details on each dataset, please refer to each individual section in the main report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Report Section	Number of records found within (X) m of the study site boundary					
	on-site	0-50	51-250	251-500	501-1000	1000-1500
1. Environmental Permits, Incidents and Registers						
1.1 Industrial Sites Holding Environmental Permits and/or Authorisations						
Records of historic IPC Authorisations	0	0	0	0	-	-
Records of Part A(1) and IPPC Authorised Activities	0	0	0	0	-	-
Records of Water Industry Referrals (potentially harmful discharges to the public sewer)	0	0	0	0	-	-
Records of Red List Discharge Consents (potentially harmful discharges to controlled waters)	0	0	0	0	-	-
Records of List 1 Dangerous Substances Inventory sites	0	0	0	0	-	-
Records of List 2 Dangerous Substances Inventory sites	0	0	0	0	-	-
Records of Part A(2) and Part B Activities and Enforcements	0	0	1	2	-	-
Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0	-	-
Records of Licensed Discharge Consents	0	0	0	2	-	-
Records of Planning Hazardous Substance Consents and Enforcements	0	0	0	0	-	-
1.2 Records of COMAH and NIHHS sites	0	0	0	0	-	-
1.3 Environment Agency Recorded Pollution Incidents						
National Incidents Recording System, List 2	0	0	0	-	-	-
National Incidents Recording System, List 1	0	0	0	-	-	-
1.4 Sites Determined as Contaminated Land under Part IIA EPA 1990	0	0	0	0	-	-
2. Landfill and Other Waste Sites						
2.1 Landfill Sites						
Environment Agency Registered Landfill Sites	0	0	0	0	0	-
Landfill Data – Operational Landfill Sites	0	0	0	0	0	-
Environment Agency Historic Landfill Sites	0	0	0	0	0	2
Landfill Data – Non-Operational Landfill Sites	0	0	0	0	0	-
BGS/DoE Landfill Site Survey	0	0	0	0	0	0
GroundSure Local Authority Landfill Sites Data	0	0	0	0	0	6
2.2 Landfill and Other Waste Sites Findings						
Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	-	-
Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	-	-
Environment Agency Licensed Waste Sites	0	0	0	0	1	1

3. Current Land Uses	on-site	0-50	51-250	251-500	501-1000	1000-1500
3.1 Current Industrial Sites Data	1	10	11	-	-	-
3.2 Records of Petrol and Fuel Sites	0	0	0	1	-	-
3.3 Underground High Pressure Oil and Gas Pipelines	0	0	0	0	-	-

4. Geology	Description
4.1 Are there any records of Artificial Ground and Made Ground present beneath the study site? *	No
4.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site? *	Yes
4.3 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	

Source: Scale: 1:50,000 BGS Sheet 132

* This includes an automatically generated 50m buffer zone around the site.

5. Hydrogeology and Hydrology	on-site	0-50	51-250	251-500	501-1000	1001-2000
5.1 Are there any records of Productive Strata in the Superficial Geology within 500m of the study site?				Yes		
5.2 Are there any records of Productive Strata in the Bedrock Geology within 500m of the study site?				Yes		
5.3 Groundwater Abstraction Licences (within 2000m of the study site).	0	0	0	0	0	0
5.4 Surface Water Abstraction Licences (within 2000m of the study site).	0	0	0	0	0	1
5.5 Potable Water Abstraction Licences (within 2000m of the study site).	0	0	0	0	0	0
5.6 Are there any Source Protection Zones within 500m of the study site?					No	
5.7 River Quality						
Is there any Environment Agency information on river quality within 1500m of the study site?	No	No	No	No	No	Yes
5.8 Detailed River Network entries within 500m of the site	0	0	0	0	-	-
5.9 Surface water features within 250m of the study site	No	No	No	-	-	-

6. Flooding	
6.1 Are there any Environment Agency indicative Zone 2 floodplains within 250m of the study site?	No
6.2 Are there any Environment Agency indicative Zone 3 floodplains within 250m of the study site?	No
6.3 Are there any Flood Defences within 250m of the study site?	No
6.4 Are there any areas benefiting from Flood Defences within 250m of the study site?	No
6.5 Are there any areas used for Flood Storage within 250m of the study site?	No
6.6 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	High
6.7 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	Moderate

7. Designated Environmentally Sensitive Sites	on-site	0-50	51-250	251-500	501-1000	1001-1500
7.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	1	-	-
7.2 Records of National Nature Reserves (NNR)	0	0	0	0	-	-

7.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	1	-	-
7.3 Records of Local Nature Reserves (LNR)	0	0	0	0	-	-
7.4 Records of Special Areas of Conservation (SAC)	0	0	0	0	-	-
7.5 Records of Special Protection Areas (SPA)	0	0	0	0	-	-
7.6 Records of Ramsar sites	0	0	0	0	-	-
7.7 Records of World Heritage Sites	0	0	0	0	-	-
7.8 Records of Environmentally Sensitive Areas	0	0	0	0	-	-
7.9 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	-	-
7.10 Records of National Parks	0	0	0	0	-	-
7.11 Records of Nitrate Sensitive Areas	0	0	0	0	-	-
7.12 Records of Nitrate Vulnerable Zones	0	0	0	0	-	-

8. Natural Hazards

8.1 What is the maximum risk of natural ground subsidence? Low

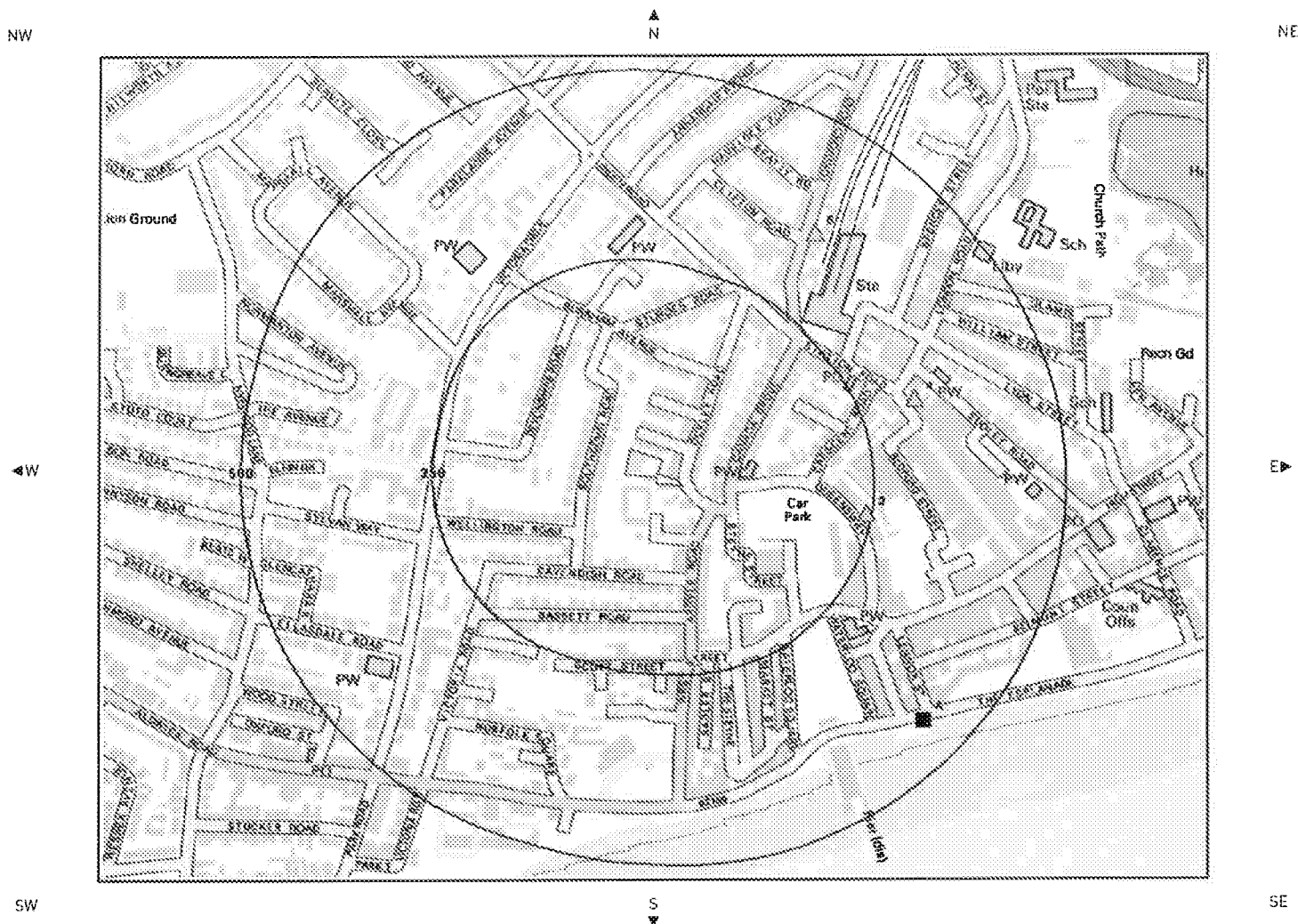
9. Mining

9.1 Are there any coal mining areas within 75m of the study site? No

9.2 What is the risk of subsidence relating to shallow mining within 150m of the study site? Negligible

9.3 Are there any brine affected areas within 75m of the study site? No

1. Environmental Permits, Incidents and Registers Map



Authorisations, Incidents and Registers Legend



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	Site Outline		Recorded Pollution Incident		RAS 3 & 4 Authorisations
	Search Buffers (m)		Dangerous Substances (List 1)		Part A(1) Authorised Processes and Historic IPC Authorisations
	250		Dangerous Substances (List 2)		Part A(2) and Part B Authorised Processes
	500		Water Industry Referrals		COMAH / NIHHS Sites
			Licenced Discharge Consents		Sites Determined as Contaminated Land
			Red List Discharge Consents		Hazardous Substance Consents and Enforcements

1.Environmental Permits, Incidents and Registers

1.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency and Local Authorities reveal the following information:

Records of historic IPC Authorisations within 500m of the study site: 0

Database searched and no data found.

Records of Part A(1) and IPPC Authorised Activities within 500m of the study site: 0

Database searched and no data found.

Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site: 0

Database searched and no data found.

Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site: 0

Database searched and no data found.

Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site: 0

Database searched and no data found.

Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site: 0

Database searched and no data found.

Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site: 3

The following Part A(2) and Part B Activities are represented as points on the Authorisations, Incidents and Registers map:

ID	Distance	Direction	NGR	Details	
3	243.0	E	493467, 99130	Address: Colshaz Limited, T/A James Dry Cleaners, 39a Queensway, Bognor Regis, PO21 1QN Process: Dry Cleaning Status: Current Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified

4	322.0	E	493529, 99281	Address: Johnson Cleaners UK Ltd, 2 Central Buildings, London Road, Bognor Regis, PO21 1PW Process: Dry Cleaning Status: Current Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
5	358.0	NE	493400, 99500	Address: Bognor Motors Ltd Longford Rd, Po21 1aq] Process: Waste Oil Burning Process, Process:petrol Vapour Recovery Process Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified

Records of Category 3 or 4 Radioactive Substance Licences within 500m of the study site: 0

Database searched and no data found.

Records of Licensed Discharge Consents within 500m of the study site: 2

The following Licensed Discharge Consents records are represented as points on the Authorisations, Incidents and Registers map:

ID	Distance	Direction	NGB	Details	
1A	441.0	SE	493540, 98860	Address: Cso At The Esplanade, Bognor Regis, The Esplanade, Bognor Regis, West Sussex, PO21 1SY Effluent Type: Sewage Discharges - Stw Storm Overflow/storm Tank - Water Company Permit Number: A01403 Permit Version: 1	Receiving Water: English Channel Via Sws Status: New Consent (wra 91, S88 & Sched 10 As Amended By Env Act 1995) Issue date: - Effective Date: - Revocation Date: 31/3/2008
2A	441.0	SE	493540, 98860	Address: Cso At The Esplanade, Bognor Regis, The Esplanade, Bognor Regis, West Sussex, PO21 1SY Effluent Type: Sewage Discharges - Stw Storm Overflow/storm Tank - Water Company Permit Number: A01403 Permit Version: 2	Receiving Water: English Channel Via Sws Status: New Consent (wra 91, S88 & Sched 10 As Amended By Env Act 1995) Issue date: - Effective Date: 1/4/2008 Revocation Date: -

Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site: 0

Database searched and no data found.

1.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site: 0

Database searched and no data found.

1.3 Environment Agency Recorded Pollution Incidents

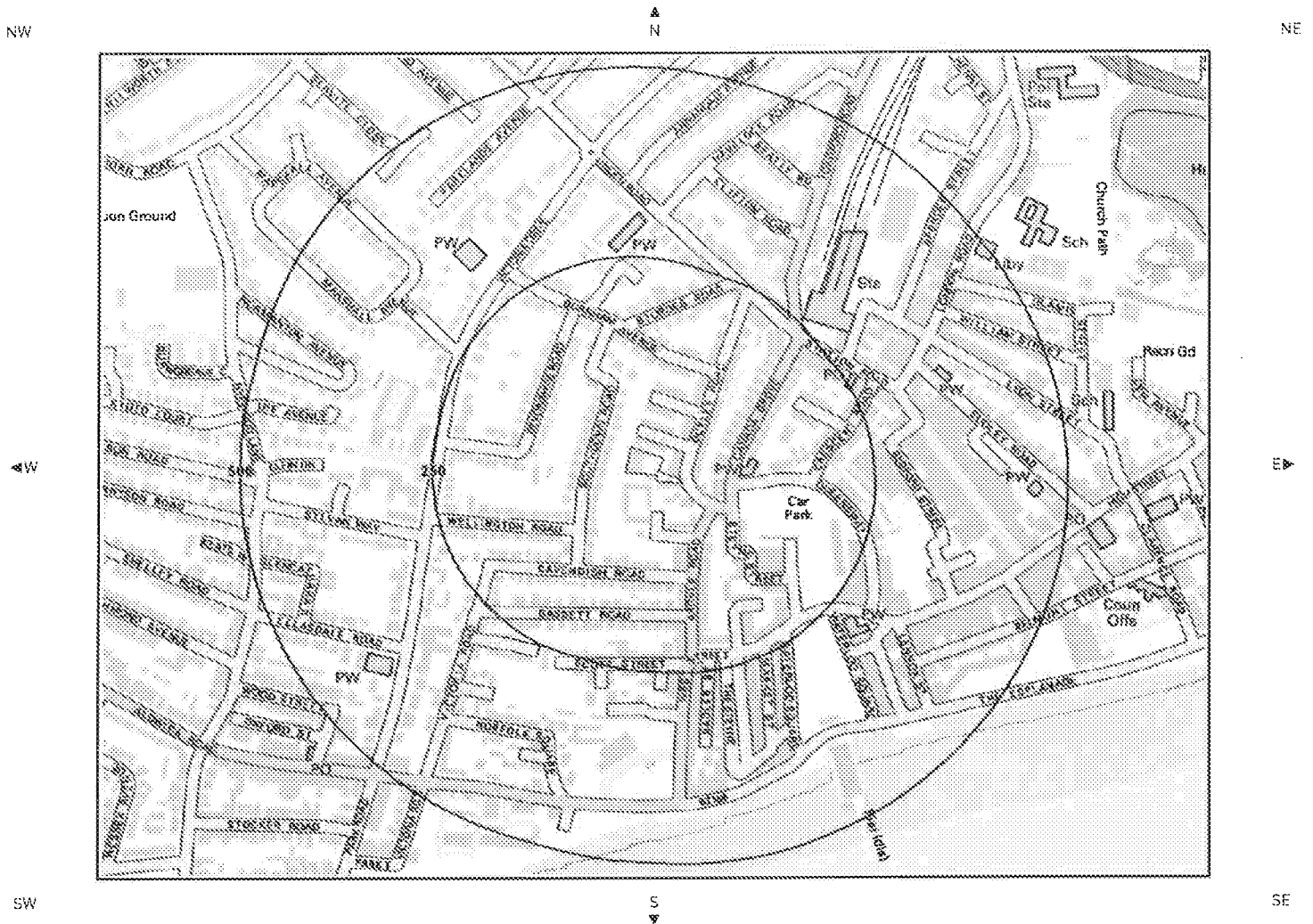
Records of National Incidents Recording System, List 2 within 250m of the study site: 0

Database searched and no data found.

Records of National Incidents Recording System, List 1 within 250m of the study site: 0

Report Reference: S EMS-167908_248545

2. Landfill and Other Waste Sites Map



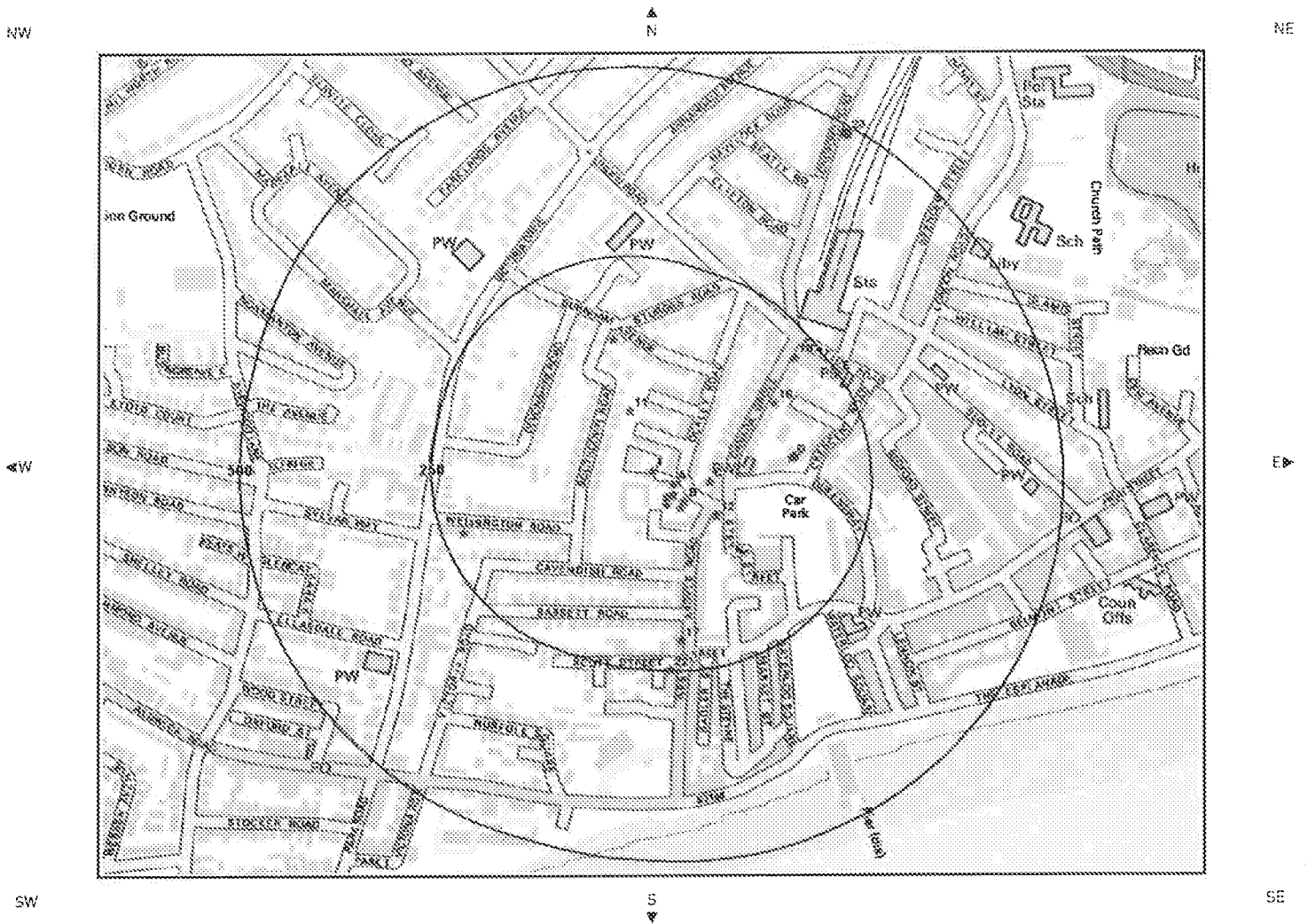
Landfill & Other Waste Sites Legend

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- | | | |
|--------------------|---------------------------------------|-------------------------------------|
| Site Outline | E.A. Active Landfill | Operational Waste Treatment Licence |
| Search Buffers (m) | E.A. Historic Landfill (Area Data) | Closed Waste Treatment Licence |
| | E.A. Historic Landfill (Point Data) | REGIS Waste Licence |
| | BGS / DoE Survey Landfill | Operational Landfill |
| | Local Authority Landfill (Area Data) | Closed Landfill |
| | Local Authority Landfill (Point Data) | |

3. Current Land Use Map



Current Land Use Legend



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- | | | | |
|---|--------------------|---|--|
|  | Site Outline |  | Current Industrial Sites |
|  | Search Buffers (m) |  | Petrol & Fuel Sites |
| | |  | Underground High Pressure Oil & Fuel Pipelines |

3. Current Land Uses

3.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site:

22

The following records are represented as points on the Current Land Uses map.

ID	Distance	Direction	Company	Address	Activity	Category
1	0.0	On Site	Tank	PO21	Tanks (Generic)	Industrial Features
2A	4.0	S	Cyclops Technologies Ltd	6, Ockley Road, Bognor Regis, PO21 2HW	Radar and Telecommunications Equipment	Industrial Products
3A	17.0	S	Tss Motor Company	2-4, Ockley Road, Bognor Regis, PO21 2HW	New Vehicles	Motoring
4A	17.0	S	T S S Motor Co Ltd	2-4, Ockley Road, Bognor Regis, PO21 2HW	Secondhand Vehicles	Motoring
5A	22.0	S	Electricity Sub Station	PO21	Electrical Features	Infrastructure and Facilities
6B	26.0	S	Electricity Sub Station	PO21	Electrical Features	Infrastructure and Facilities
7	32.0	S	Depot	PO21	Container and Storage	Transport, Storage and Delivery
8B	35.0	S	Electricity Sub Station	PO21	Electrical Features	Infrastructure and Facilities
9C	38.0	E	Ash Autos	3, Ockley Road, Bognor Regis, PO21 2HW	New Vehicles	Motoring
10	38.0	E	Ash Autos	3, Ockley Road, Bognor Regis, PO21 2HW	Secondhand Vehicles	Motoring
11	46.0	N	Electricity Sub Station	PO21	Electrical Features	Infrastructure and Facilities
12	65.0	SE	Southern Fire Alarms	2, Argyle Circus, Bognor Regis, PO21 1DS	Electronic Equipment	Industrial Products
13	142.0	N	Forrestburn Enterprises	25, Burnham Avenue, Bognor Regis, PO21 2LB	Construction and Tool Hire	Hire Services
14	150.0	E	Paul Inskip Photography	63, Queensway, Bognor Regis, PO21 1QL	Photographic and Optical Equipment	Household, Office, Leisure and Garden
15	153.0	E	B & W Services	61a, Queensway, Bognor Regis, PO21 1QL	Clearance and Salvage Dealers	Recycling Services
16	160.0	NE	Electrostage	28, Canada Grove, Bognor Regis, PO21 1DN	Sports and Leisure Equipment	Repair and Servicing
17	210.0	S	Works	PO21	Unspecified Works Or Factories	Industrial Features
18	218.0	NE	Reynolds Self Storage	Canada Grove, Bognor Regis, PO21 1DN	Container and Storage	Transport, Storage and Delivery
19	223.0	W	Word Edit	Wellington Road, Bognor Regis, West Sussex, PO21 2RR	Published Goods	Industrial Products
20E	249.0	NE	Cryolab Ltd Formerly Laboquip	Commercial House, 19 Station Road, Bognor Regis, West Sussex, PO21 1QD	Measurement and Inspection Equipment	Industrial Products
21E	249.0	NE	Greenvale a P	19a, Station Road, Bognor Regis, PO21 1QD	Fruit, Flower and Vegetable Growers	Farming
22	249.0	S	Advanced Security Data Electrical	26, West Street, Bognor Regis, PO21 1XE	Electronic Equipment	Industrial Products

3.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site:

1

Report Reference: S EMS-167908_248545

The following petrol or fuel site records provided by Catalist are represented as points on the Current Land Use map:

ID	Distance	Direction	NGR	Company	Address	LPG	Status
23	490.0	NE	493444, 99628	Texaco	Bognor Motors Ltd, 12- 28, Longford Road, Longford Road, Bognor Regis, West Sussex, PO21 1AQ	Not Applicable	Obsolete

3.3 Underground High Pressure Oil and Gas Pipelines

Records of high pressure underground pipelines within 500m of the study site:

0

Database searched and no data found.

5b. Hydrogeology - Aquifer Within Bedrock Geology and Abstraction Licenses

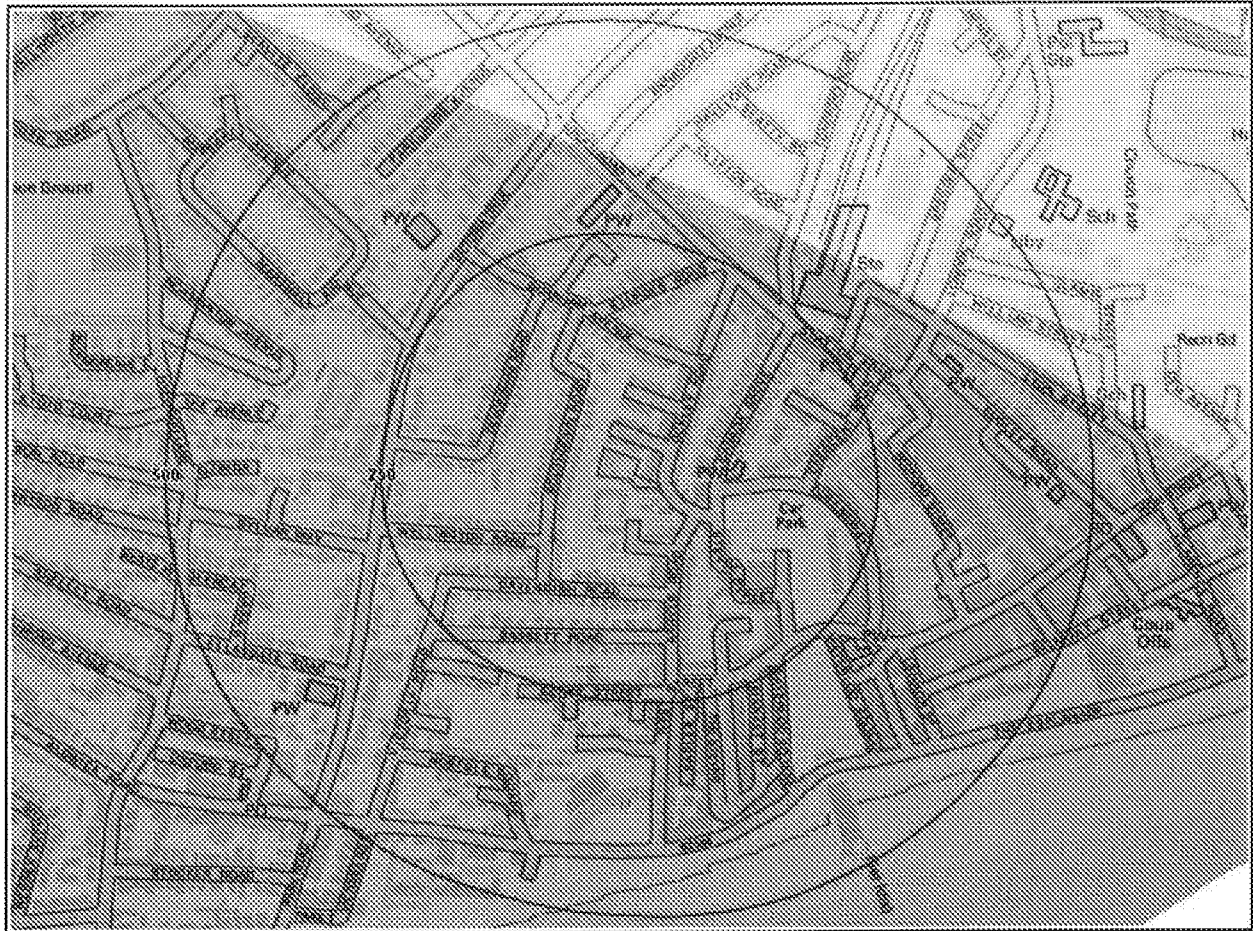
NW

N

NE

W

E



S

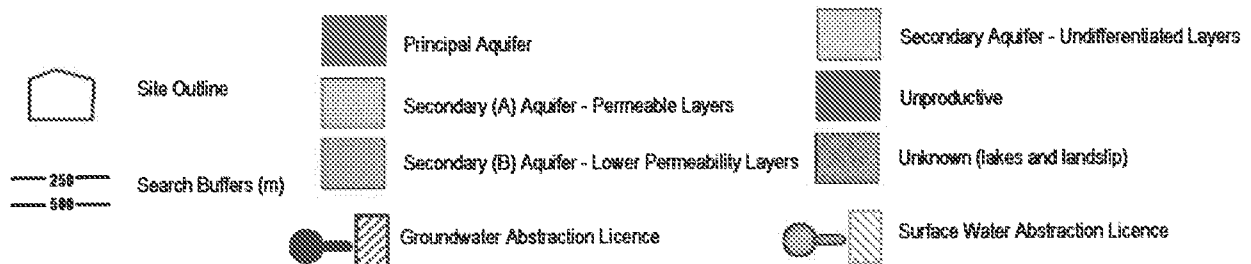
SE

SW

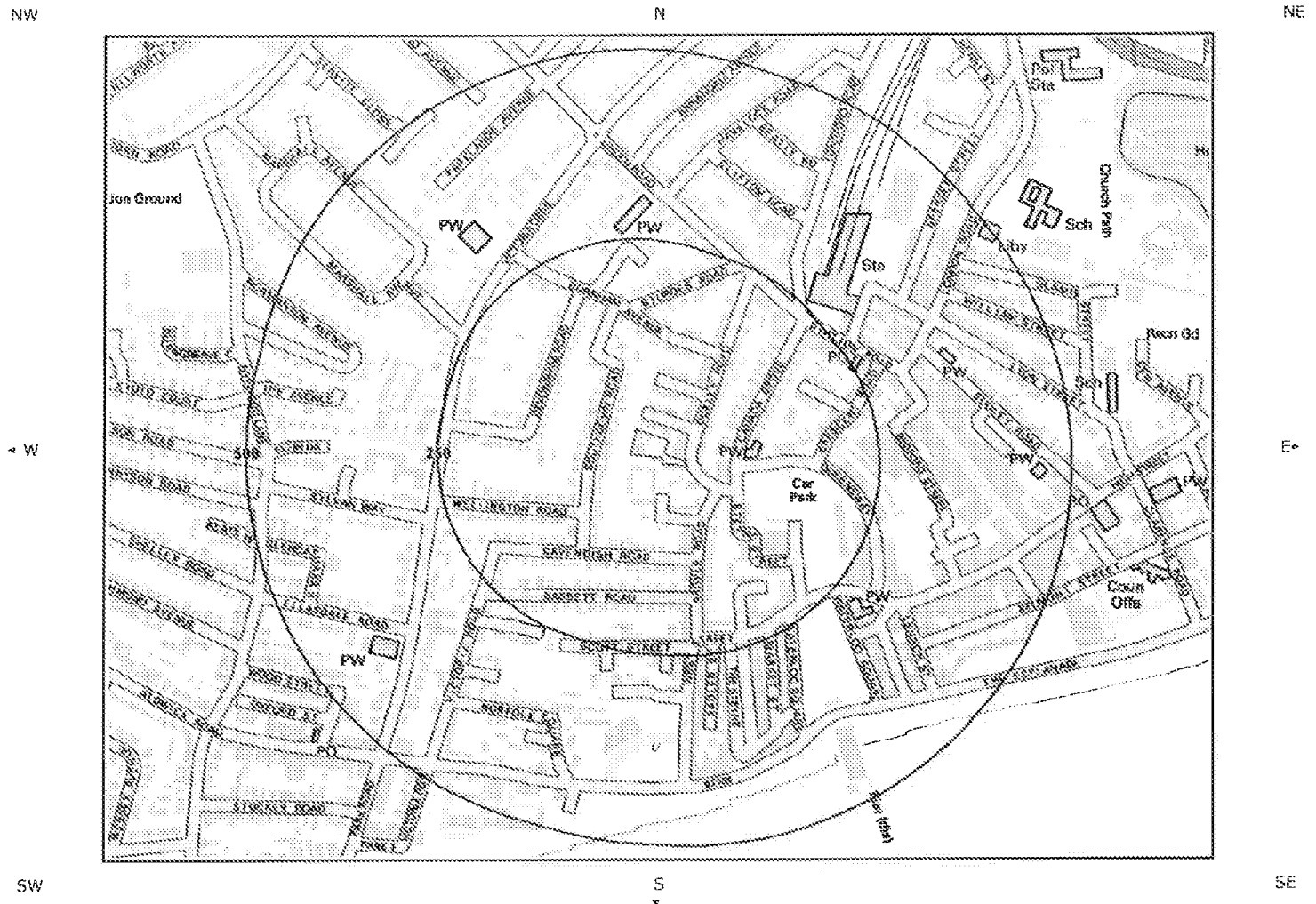
Aquifer Within Bedrock Geology Legend

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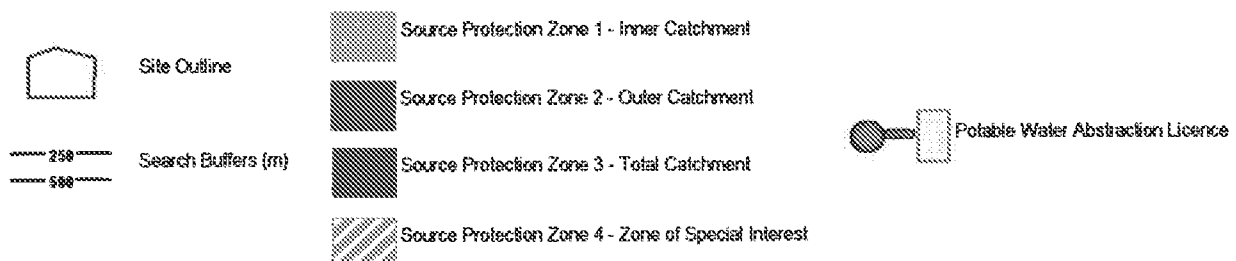
5c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses



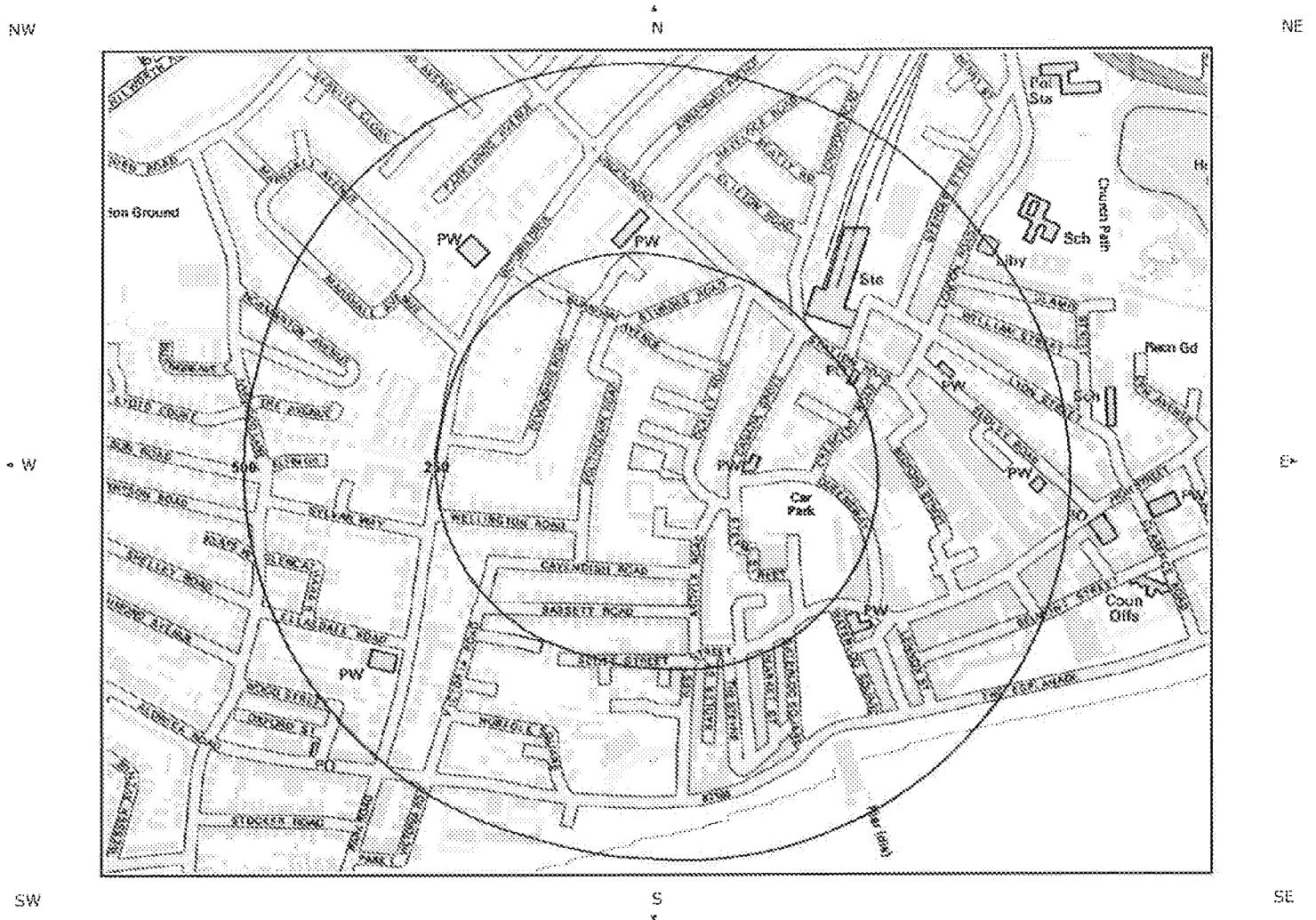
SPZ and Potable Water Abstraction Licenses
Legend



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5d. Hydrology – Detailed River Network and River Quality



Hydrology Legend

	Site Outline		Primary River		Canal
	250		Secondary River		Canal Tunnel
	500		Tertiary River		Extended Culvert (greater than 50m)
			Lake/Reservoir		D/S of High Water Mark
			Underground River (inferred)		D/S seaward extension
			General Quality Assessment: Chemistry		General Quality Assessment: Biology

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6. Environment Agency Flood Map

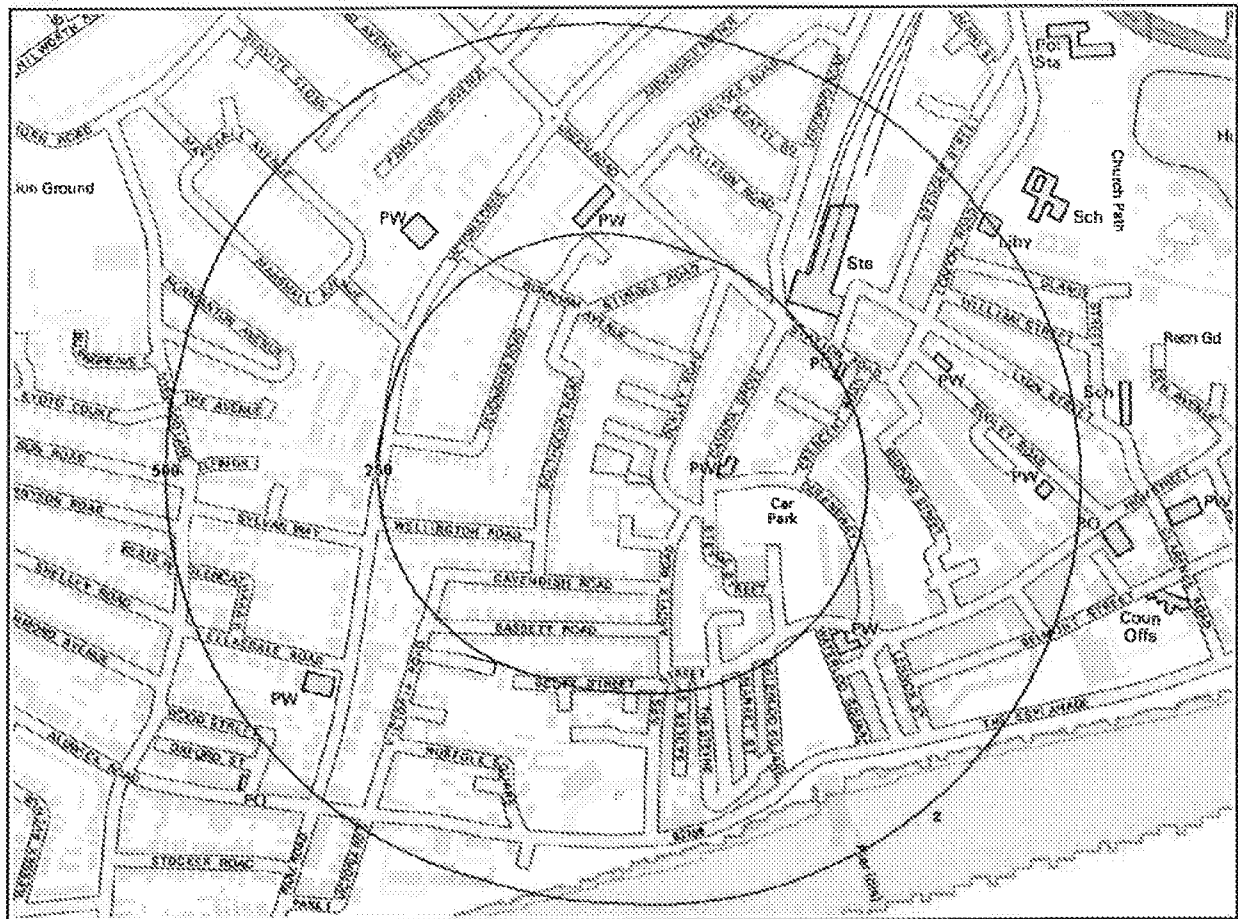
NW

N

NE

W

E



SW

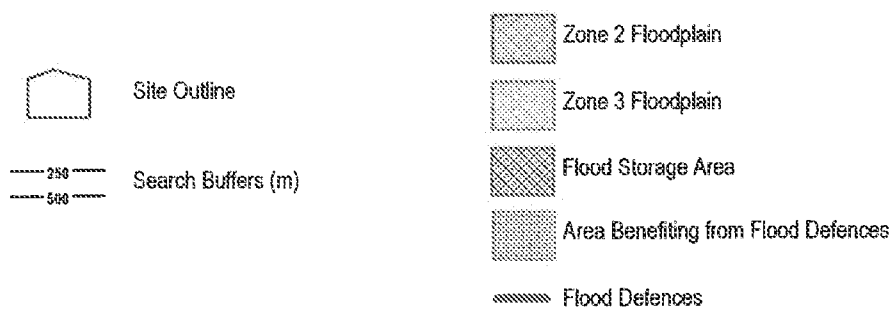
S

SE

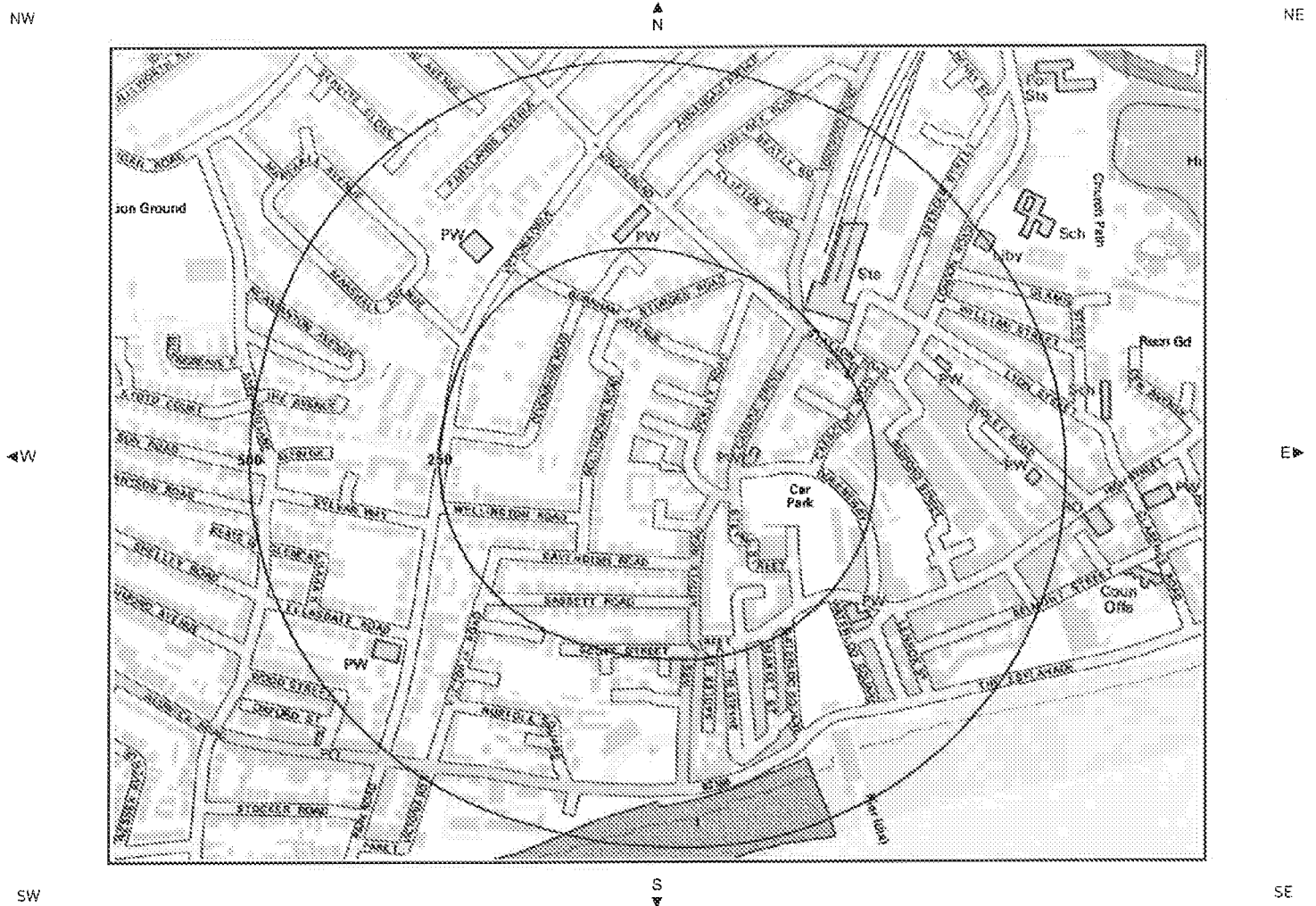
Environment Agency Flood Legend



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7.Designated Environmentally Sensitive Sites Map



Designated Environmentally Sensitive Sites Legend

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