Standard Terms and Conditions

1 Definitions

I**n these terms and conditions unless the context otherwise requires:**

"Beneficiary" means the person or entity for whose benefit the Client has obtained the Services.

"Client" means the party or parties entering into a Contract with Groundsure.

"Commercial" means any building or property which is not Residential.

"Confidential Information" means the contents of this Contract and all information received from the Client as a result of, or in connection with, this Contract other than

(i) information which the Client can prove was rightfully in its possession prior to disclosure by Groundsure and

(ii) any information which is in the public domain (other than by virtue of a breach of this Contract).

"Support Services" means Support Services provided by Groundsure including, without limitation, interpreting third party and in-house environmental data, providing environmental support advice, undertaking environmental audits and assessments, Site investigation, Site monitoring and related items.

"Contract" means the contract between Groundsure and the Client for the provision of the Services, and which shall incorporate these terms and conditions, the Order, and the relevant User Guide.

"Third Party Data Provider" means any third party providing Third Party Content to Groundsure.

"Data Reports" means reports comprising factual data with no accompanying interpretation.

"Fees" has the meaning set out in clause 5.1.

"Groundsure" means Groundsure Limited, a company registered in England and Wales under number 03421028.

"Groundsure Materials" means all materials prepared by Groundsure and provided as part of the Services, including but not limited to Third Party Content, Data Reports, Mapping, and Risk Screening Reports.

"Intellectual Property" means any patent, copyright, design rights, trade or service mark, moral rights, data protection rights, know-how or trade mark in each case whether registered or not and including applications for the same or any other rights of a similar nature anywhere in the world.

"Mapping" means a map, map data or a combination of historical maps of various ages, time periods and scales.

"Order" means an electronic, written or other order form submitted by the Client requesting Services from Groundsure in respect of a specified Site.

"Ordnance Survey" means the Secretary of State for Business, Innovation and Skills, acting through Ordnance Survey, Adanac Drive, Southampton, SO16 0AS, UK.

"Order Website" means the online platform through which Orders may be placed by the Client and accepted by Groundsure.

"Report" means a Risk Screening Report or Data Report for Commercial or Residential property.

"Residential" means any building or property used as or intended to be used as a single dwelling.

"Risk Screening Report" means a risk screening report comprising factual data with an accompanying interpretation by Groundsure.

"Services" means any Report, Mapping and/or Support Services which Groundsure has agreed to provide by accepting an Order pursuant to clause 2.6.

"Site" means the area of land in respect of which the Client has requested Groundsure to provide the Services.

"Third Party Content" means data, database information or other information which is provided to Groundsure by a Third Party Data Provider.

"User Guide" means the user guide, as amended from time to time, available upon request from Groundsure and on the website (www.Groundsure.com) and forming part of this Contract.

2 Scope of Services, terms and conditions, requests for insurance and quotations

2.1 Groundsure agrees to provide the Services in accordance with the Contract.

2.2 Groundsure shall exercise reasonable skill and care in the provision of the Services.

2.3 Subject to clause 7.3 the Client acknowledges that it has not relied on any statement or representation made by or on behalf of Groundsure which is not set out and expressly agreed in writing in the Contract and all such statements and representations are hereby excluded to the fullest extent permitted by law.

2.4 The Client acknowledges that terms and conditions appearing on a Client's order form, printed stationery or other communication, or any terms or conditions implied by custom, practice or course of dealing shall be of no effect, and that this Contract shall prevail over all others in relation to the Order.

2.5 If the Client or Beneficiary requests insurance in conjunction with or as a result of the Services, Groundsure shall use reasonable endeavours to recommend such insurance, but makes no warranty that such insurance shall be available from insurers or that it will be offered on reasonable terms. Any insurance purchased by the Client or Beneficiary shall be subject solely to the terms of the policy issued by insurers and Groundsure will have no liability therefor. In addition you acknowledge and agree that Groundsure does not act as an agent or broker for any insurance providers. The Client should take (and ensure that the Beneficiary takes) independent advice to ensure that the insurance policy requested or offered is suitable for its requirements.

2.6 Groundsure's quotations or proposals are valid for a period of 30 days only unless an alternative period of time is explicitly stipulated by Groundsure. Groundsure reserves the right to withdraw any quotation or proposal at any time before an Order is accepted by Groundsure. Groundsure's acceptance of an Order shall be binding only when made in writing and signed by Groundsure's authorised representative or when accepted through the Order Website.

3 The Client's obligations

3.1The Client shall comply with the terms of this Contract and

(i) procure that the Beneficiary or any third party relying on the Services complies with and acts as if it is bound by the Contract and

(ii) be liable to Groundsure for the acts and omissions of the Beneficiary or any third party relying on the Services as if such acts and omissions were those of the Client.

3.2 The Client shall be solely responsible for ensuring that the Services are appropriate and suitable for its and/or the Beneficiary's needs.

3.3 The Client shall supply to Groundsure as soon as practicable and without charge all requisite information (and the Client warrants that such information is accurate, complete and appropriate), including without limitation any environmental information relating to the Site and shall give such assistance as Groundsure shall reasonably require in the provision of the Services including, without limitation, access to the Site, facilities and equipment.

3.4 Where the Client's approval or decision is required to enable Groundsure to carry out work in order to provide the Services, such approval or decision shall be given or procured in reasonable time and so as not to delay or disrupt the performance of the Services.

3.5 Save as expressly permitted by this Contract the Client shall not, and shall procure that the Beneficiary shall not, re-sell, alter, add to, or amend the Groundsure Materials, or use the Groundsure Materials in a manner for which they were not intended. The Client may make the Groundsure Materials available to a third party who is considering acquiring some or all of, or providing funding in relation to, the Site, but such third party cannot rely on the same unless expressly permitted under clause 4.

3.6 The Client is responsible for maintaining the confidentiality of its user name and password if using the Order Website and the Client acknowledges that Groundsure accepts no liability of any kind for any loss or damage suffered by the Client as a consequence of using the Order Website.

4 Reliance

4.1The Client acknowledges that the Services provided by Groundsure consist of the presentation and analysis of Third Party Content and other content and that information obtained from a Third Party Data Provider cannot be guaranteed or warranted by Groundsure to be reliable.

4.2 In respect of Data Reports, Mapping and Risk Screening Reports, the following classes of person and no other are entitled to rely on their contents;

(i) the Beneficiary,

(ii) the Beneficiary's professional advisers, (iii) any person providing funding to the Beneficiary in relation to the Site (whether directly or as part of a lending syndicate),

(iv) the first purchaser or first tenant of the Site, and

(v) the professional advisers and lenders of the first purchaser or tenant of the Site.

4.3 In respect of Support Services, only the Client, Beneficiary and parties expressly named in a Report and no other parties are entitled to rely on its contents.

4.4 Save as set out in clauses 4.2 and 4.3 and unless otherwise expressly agreed in writing, no other person or entity of any kind is entitled to rely on any Services or Report issued or provided by Groundsure. Any party considering such Reports and Services does so at their own risk.

5 Fees and Disbursements

5.1Groundsure shall charge and the Client shall pay fees at the rate and

frequency specified in the written proposal, Order Website or Order acknowledgement form, plus (in the case of Support Services) all proper disbursements incurred by Groundsure. The Client shall in addition pay all value added tax or other tax payable on such fees and disbursements in relation to the provision of the Services (together "Fees").

5.2 The Client shall pay all outstanding Fees to Groundsure in full without deduction, counterclaim or set off within 30 days of the date of Groundsure's invoice or such other period as may be agreed in writing between Groundsure and the Client ("Payment Date"). Interest on late payments will accrue on a daily basis from the Payment Date until the date of payment (whether before or after judgment) at the rate of 8% per annum.

5.3 The Client shall be deemed to have agreed the amount of any invoice unless an objection is made in writing within 28 days of the date of the invoice. As soon as reasonably practicable after being notified of an objection, without prejudice to clause 5.2 a member of Groundsure's management team will contact the Client and the parties shall then use all reasonable endeavours to resolve the dispute within 15 days.

6 Intellectual Property and Confidentiality

6.1 Subject to

(i) full payment of all relevant Fees and

(ii) compliance with this Contract, the Client is granted (and is permitted to sub-licence to the Beneficiary) a royalty-free, worldwide, non-assignable and (save to the extent set out in this Contract) non-transferable licence to make use of the Groundsure Materials.

6.2 All Intellectual Property in the Groundsure Materials are and shall remain owned by Groundsure or Groundsure's licensors (including without limitation the Third Party Data Providers) the Client acknowledges, and shall procure acknowledgement by the Beneficiary of, such ownership. Nothing in this Contract purports to transfer or assign any rights to the Client or the Beneficiary in respect of such Intellectual Property.

6.3 Third Party Data Providers may enforce any breach of clauses 6.1 and 6.2 against the Client or Beneficiary.

6.4 The Client shall, and shall procure that any recipients of the Groundsure Materials shall:

(i) not remove, suppress or modify any trade mark, copyright or other proprietary marking belonging to Groundsure or any third party from the Services;

(ii) use the information obtained as part of the Services in respect of the subject Site only, and shall not store or reuse any information obtained as part of the Services provided in respect of adjacent or nearby sites;

(iii) not create any product or report which is derived directly or indirectly from the Services (save that those acting in a professional capacity to the Beneficiary may provide advice based upon the Services);

(iv) not combine the Services with or incorporate such Services into any other information data or service;

(v) not reformat or otherwise change (whether by modification, addition or enhancement), the Services (save that those acting for the Beneficiary in a professional capacity shall not be in breach of this clause 6.4(v) where such reformatting is in the normal course of providing advice based upon the Services);

(vi) where a Report and/or Mapping contains material belonging to Ordnance Survey, acknowledge and agree that such content is protected by Crown Copyright and shall not use such content for any purpose outside of receiving the Services; and

(vii) not copy in whole or in part by any means any map prints or run-on copies containing content belonging to Ordnance Survey (other than that contained within Ordnance Survey's OS Street Map) without first being in possession of a valid Paper Map Copying Licence from Ordnance Survey,

6.5 Notwithstanding clause 6.4, the Client may make reasonable use of the Groundsure Materials in order to advise the Beneficiary in a professional capacity. However, Groundsure shall have no liability in respect of any advice, opinion or report given or provided to Beneficiaries by the Client.

6.6 The Client shall procure that any person to whom the Services are made available shall notify Groundsure of any request or requirement to disclose, publish or disseminate any information contained in the Services in accordance with the Freedom of Information Act 2000, the Environmental Information Regulations 2004 or any associated legislation or regulations in force from time to time.

7.Liability: Particular Attention Should Be Paid To This Clause

7.1 This Clause 7 sets out the entire liability of Groundsure, including any liability for the acts or omissions of its employees, agents, consultants, subcontractors and Third Party Content, in respect of:

(i) any breach of contract, including any deliberate breach of the Contract by Groundsure or its employees, agents or subcontractors;

(ii) any use made of the Reports, Services, Materials or any part of them; and

(iii) any representation, statement or tortious act or omission (including negligence) arising under or in connection with the Contract.

7.2 All warranties, conditions and other terms implied by statute or common law are, to the fullest extent permitted by law, excluded from the Contract.

7.3 Nothing in the Contract limits or excludes the liability of the Supplier for death or personal injury resulting from negligence, or for any damage or liability incurred by the Client or Beneficiary as a result of fraud or fraudulent misrepresentation.

7.4 Groundsure shall not be liable for

(i) loss of profits;

(ii) loss of business;

(iii) depletion of goodwill and/or similar losses;

(iv) loss of anticipated savings;

(v) loss of goods;

(vi) loss of contract;

(vii) loss of use;

(viii) loss or corruption of data or information;

(ix) business interruption;

(x) any kind of special, indirect, consequential or pure economic loss, costs, damages, charges or expenses;

(xi) loss or damage that arise as a result of the use of all or part of the Groundsure Materials in breach of the Contract;

(xii) loss or damage arising as a result of any error, omission or inaccuracy in any part of the Groundsure Materials where such error, omission or inaccuracy is caused by any Third Party Content or any reasonable interpretation of Third Party Content;

(xiii) loss or damage to a computer, software, modem, telephone or other property; and

(xiv) loss or damage caused by a delay or loss of use of Groundsure's internet ordering service.

7.5 Groundsure's total liability in relation to or under the Contract shall be limited to £10 million for any claim or claims.

7.6 Groundsure shall procure that the Beneficiary shall be bound by limitations and exclusions of liability in favour of Groundsure which accord with those detailed in clauses 7.4 and 7.5 (subject to clause 7.3) in respect of all claims which the Beneficiary may bring against Groundsure in relation to the Services or other matters arising pursuant to the Contract.

8 Groundsure's right to suspend or terminate

8.1 If Groundsure reasonably believes that the Client or Beneficiary has not provided the information or assistance required to enable the proper provision of the Services, Groundsure shall be entitled to suspend all further performance of the Services until such time as any such deficiency has been made good.

8.2 Groundsure shall be entitled to terminate the Contract immediately on written notice in the event that:

(i) the Client fails to pay any sum due to Groundsure within 30 days of the Payment Date; or

(ii) the Client (being an individual) has a bankruptcy order made against him or (being a company) shall enter into liquidation whether compulsory or voluntary or have an administration order made against it or if a receiver shall be appointed over the whole or any part of its property assets or undertaking or if the Client is struck off the Register of Companies or dissolved; or

(iii) the Client being a company is unable to pay its debts within the meaning of Section 123 of the Insolvency Act 1986 or being an individual appears unable to pay his debts within the meaning of Section 268 of the Insolvency Act 1986 or if the Client shall enter into a composition or arrangement with the Client's creditors or shall suffer distress or execution to be levied on his goods; or

(iv) the Client or the Beneficiary breaches any term of the Contract (including, but not limited to, the obligations in clause 4) which is incapable of remedy or if remediable, is not remedied within five days of notice of the breach.

9. Client's Right to Terminate and Suspend

9.1 Subject to clause 10.1, the Client may at any time upon written notice terminate or suspend the provision of all or any of the Services.

9.2 In any event, where the Client is a consumer (and not a business) he/she hereby expressly acknowledges and agrees that:

(i) the supply of Services under this Contract (and therefore the performance of this Contract) commences immediately upon Groundsure's acceptance of the Order; and

(ii) the Reports and/or Mapping provided under this Contract are

(a) supplied to the Client's specification(s) and in any event

(b) by their nature cannot be returned.

10 Consequences of Withdrawal, Termination or Suspension

10.1 Upon termination of the Contract:

(i) Groundsure shall take steps to bring to an end the Services in an orderly manner, vacate any Site with all reasonable speed and shall deliver to the Client and/or Beneficiary any property of the Client and/or Beneficiary in Groundsure's possession or control; and

(ii) the Client shall pay to Groundsure all and any Fees payable in respect of the performance of the Services up to the date of termination or suspension. In respect of any Support Services provided, the Client shall also pay Groundsure any additional costs incurred in relation to the termination or suspension of the Contract.

11 Anti-Bribery

11.1 The Client warrants that it shall:

(i) comply with all applicable laws, statutes and regulations relating to anti-bribery and anti-corruption including but not limited to the Bribery Act 2010;

(ii) comply with such of Groundsure's anti-bribery and anti-corruption policies as are notified to the Client from time to time; and

(iii) promptly report to Groundsure any request or demand for any undue financial or other advantage of any kind received by or on behalf of the Client in connection with the performance of this Contract.

11.2 Breach of this Clause 11 shall be deemed a material breach of this Contract.

12 General

12.1 The Mapping contained in the Services is protected by Crown copyright and must not be used for any purpose other than as part of the Services or as specifically provided in the Contract.

12.2 The Client shall be permitted to make one copy only of each Report or Mapping Order. Thereafter the Client shall be entitled to make unlimited copies of the Report or Mapping Order only in accordance with an Ordnance Survey paper map copy license available through Groundsure.

12.3 Groundsure reserves the right to amend or vary this Contract. No amendment or variation to this Contract shall be valid unless signed by an authorised representative of Groundsure.

12.4 No failure on the part of Groundsure to exercise, and no delay in exercising, any right, power or provision under this Contract shall operate as a waiver thereof.

12.5 Save as expressly provided in this Contract, no person other than the persons set out therein shall have any right under the Contract (Rights of Third Parties) Act 1999 to enforce any terms of the Contract.

12.6 The Secretary of State for Business, Innovation and Skills ("BIS") or BIS' successor body, as the case may be, acting through Ordnance Survey may enforce a breach of clause 6.4(vi) and clause 6.4(vii) of these terms and conditions against the Client in accordance with the provisions of the Contracts (Rights of Third Parties) Act 1999.

12.7 Groundsure shall not be liable to the Client if the provision of the Services is delayed or prevented by one or more of the following circumstances:

(i) the Client or Beneficiary's failure to provide facilities, access or information;

(ii) fire, storm, flood, tempest or epidemic;

(iii) Acts of God or the public enemy;

(iv) riot, civil commotion or war;

(v) strikes, labour disputes or industrial action;

(vi) acts or regulations of any governmental or other agency;

(vii) suspension or delay of services at public registries by Third Party Data Providers;

(viii) changes in law; or

(ix) any other reason beyond Groundsure's reasonable control.

In the event that Groundsure is prevented from performing the Services (or any part thereof) in accordance with this clause 12.6 for a period of not less than 30 days then Groundsure shall be entitled to terminate this Contract immediately on written notice to the Client.

12.8 Any notice provided shall be in writing and shall be deemed to be properly given if delivered by hand or sent by first class post, facsimile or by email to the address, facsimile number or email address of the relevant party as may have been notified by each party to the other for such purpose or in the absence of such notification the last known address.

12.9 Such notice shall be deemed to have been received on the day of delivery if delivered by hand, facsimile or email (save to the extent such day is not a working day where it shall be deemed to have been delivered on the next working day) and on the second working day after the day of posting if sent by first class post.

12.10 The Contract constitutes the entire agreement between the parties and shall supersede all previous arrangements between the parties relating to the subject matter hereof.

12.11 Each of the provisions of the Contract is severable and distinct from the others and if one or more provisions is or should become invalid, illegal or unenforceable, the validity and enforceability of the remaining provisions shall not in any way be tainted or impaired.

12.12 This Contract shall be governed by and construed in accordance with English law and any proceedings arising out of or connected with this Contract shall be subject to the exclusive jurisdiction of the English courts.

12.13 Groundsure is an executive member of the Council of Property Search Organisation (CoPSO) and has signed up to the Search Code administered by the Property Codes Compliance Board (PCCB). All Risk Screening Reports shall be supplied in accordance with the provisions of the Search Code.

12.14 If the Client or Beneficiary has a complaint about the Services, written notice should be given to the Compliance Officer at Groundsure who will respond in a timely manner. In the event you are not satisfied with Groundsure's complaints handling process or you are unable to resolve the complaint, at your discretion you may refer the complaint to The Property Ombudsman Scheme at the following URL/email: website www.tpos.co.uk or email: admin@tpos.co.uk

12.15 The Client agrees that it shall, and shall procure that each Beneficiary shall, treat in confidence all Confidential Information and shall not, and shall procure that each Beneficiary shall not (i) disclose any Confidential Information to any third party other than in accordance with the terms of this Contract; and (ii) use Confidential Information for a purpose other than the exercise of its rights and obligations under this Contract. Subject to clause 6.6, nothing shall prevent the Client or any Beneficiary from disclosing Confidential Information to the extent required by law.

CENTREMAPS

Open Space, Upper Interfields,
Worcester, WR14 1UT

Report Reference: CMAPS-AAG-549269-4165-290716GEO

Your Reference: 4165

Report Date 29 Jul 2016

Report Delivery Method: Email - pdf

Groundsure Geo Insight

Address: 4 Paul Street, Liverpool, L3 6DX

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Geo Insight** as requested.

If you need further assistance, please do not hesitate to contact our helpline on 01886 832972 quoting the above CENTREMAPS reference number.

Yours faithfully,

CENTREMAPS

Enc.
Groundsure Geoinsight

Groundsure Geo Insight

Address:	**4 Paul Street, Liverpool, L3 6DX**
Date:	**29 Jul 2016**
Reference:	**CMAPS-AAG-549269-4165-290716GEO**
Client:	**CENTREMAPS**

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	02-May-2007
Grid Reference:	334389,391329
Site Size:	0.19ha

Contents Page

Overview of Findings

The Groundsure Geo Insight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Shallow Mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database, Johnson Poole and Bloomer mining data and Groundsure's unique database including historical surface ground and underground workings.

For further details on each dataset, please refer to each individual section in the 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.

Section 1:Geology		
1.1 Artificial Ground	1.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	No
	1.1.2 Are there any records relating to permeability of artificial ground within the study site* boundary?	No
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?	Yes
	1.2.2 Are there any records relating to permeability of superficial geology within the study site boundary?	Yes
	1.2.3 Are there any records of landslip within 500m of the study site boundary?	No
	1.2.4 Are there any records relating to permeability of landslips within the study site boundary?	No
1.3 Bedrock, Solid Geology & Faults	1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	1.3.2 Are there any records relating to permeability of bedrock within the study site boundary?	Yes
	1.3.3 Are there any records of faults within 500m of the study site boundary?	Yes
1.4 Radon data	1.4.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level
	1.4.2 Is the property in an area where Radon Protection Measures are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary

Section 2:Ground Workings	On-site	0-50m	51-250	251-500	501-1000
2.1 Historical Surface Ground Working Features from Small Scale Mapping	0	0	4	Not Searched	Not Searched
2.2 Historical Underground Workings from Small Scale Mapping	0	0	22	5	8
2.3 Current Ground Workings	0	0	0	0	0

Section 3: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
3.1 Historical Mining	0	0	13	0	0
3.2 Coal Mining	0	0	0	0	0
3.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
3.4 Non-Coal Mining	0	0	0	0	0
3.5 Non-Coal Mining Cavities	0	0	0	0	0
3.6 Natural Cavities	0	0	0	0	0
3.7 Brine Extraction	0	0	0	0	0
3.8 Gypsum Extraction	0	0	0	0	0
3.9 Tin Mining	0	0	0	0	0
3.10 Clay Mining	0	0	0	0	0

Section 4: Natural Ground Subsidence	On-site
4.1 Shrink Swell Clay	Very Low
4.2 Landslides	Very Low
4.3 Ground Dissolution of Soluble Rocks	Negligible
4.4 Compressible Deposits	Negligible
4.5 Collapsible Deposits	Very Low
4.6 Running Sand	Very Low

Section 5: Borehole Records	On-site	0-50m	51-250
5 BGS Recorded Boreholes	0	8	142

Section 6: Estimated Background Soil Chemistry	On-site	0-50m	51-250
6 Records of Background Soil Chemistry	1	1	7

Section 7: Railways and Tunnels	On-site	0-50m	51-250	251-500
7.1 Tunnels	0	0	0	Not Searched
7.2 Historical Railway and Tunnel Features	0	0	52	Not Searched
7.3 Historical Railways	0	0	1	Not Searched
7.4 Active Railways	0	0	0	Not Searched

Section 7:Railways and Tunnels	On-site	0-50m	51-250	251-500
7.5 Railway Projects	0	0	0	0

1 Geology

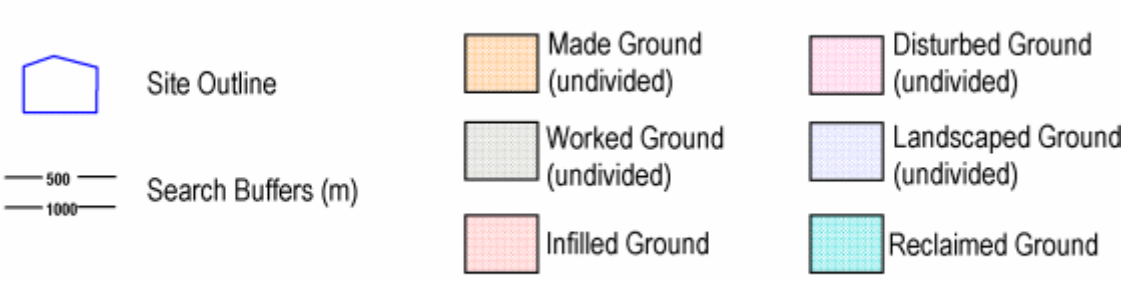
1.1 Artificial Ground Map

NW N NE

W E

SW S SE

Artificial Ground Legend



1 Geology

1.1 Artificial Ground

1.1.1Artificial/ Made Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:096

Are there any records of Artificial/Made Ground within 500m of the study site boundary? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	134.0	N	WGR-OPEN	WORKED GROUND (UNDIVIDED)	VOID

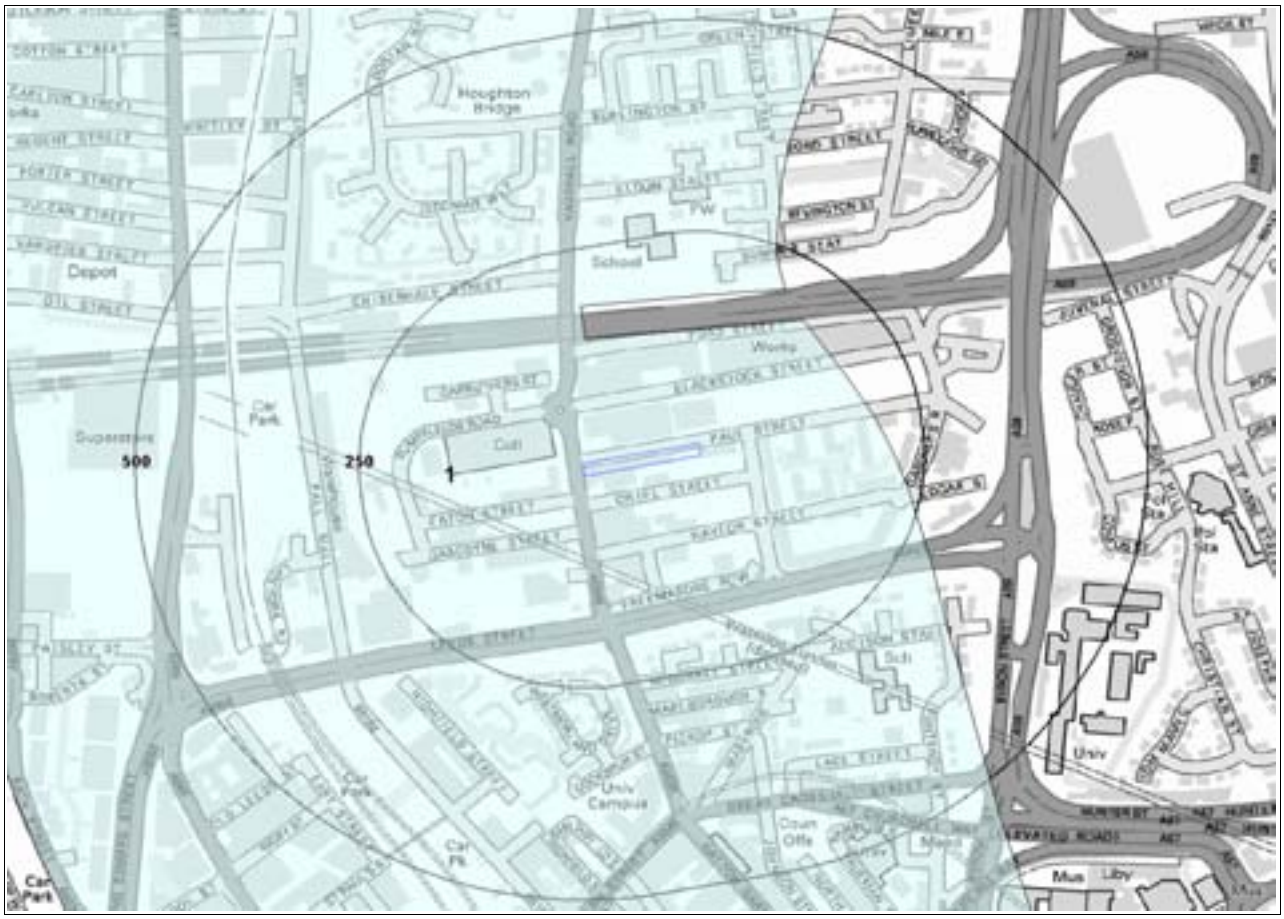
1.1.2 Permeability of Artificial Ground

Are there any records relating to permeability of artificial ground within the study site boundary? No

Database searched and no data found.

1.2 Superficial Deposits and Landslips Map

NW N NE



W E

SW S SE

Superficial Deposits and Landslips Legend

Site Outline

500
1000
Search Buffers (m)

1.2 Superficial Deposits and Landslips

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	TILLD	TILL, DEVENSIAN	CLAY, SANDY, GRAVELLY, COBBLY [UNLITHIFIED DEPOSITS CODING SCHEME]

1.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	High	Low

1.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary? No

Database searched and no data found.

This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

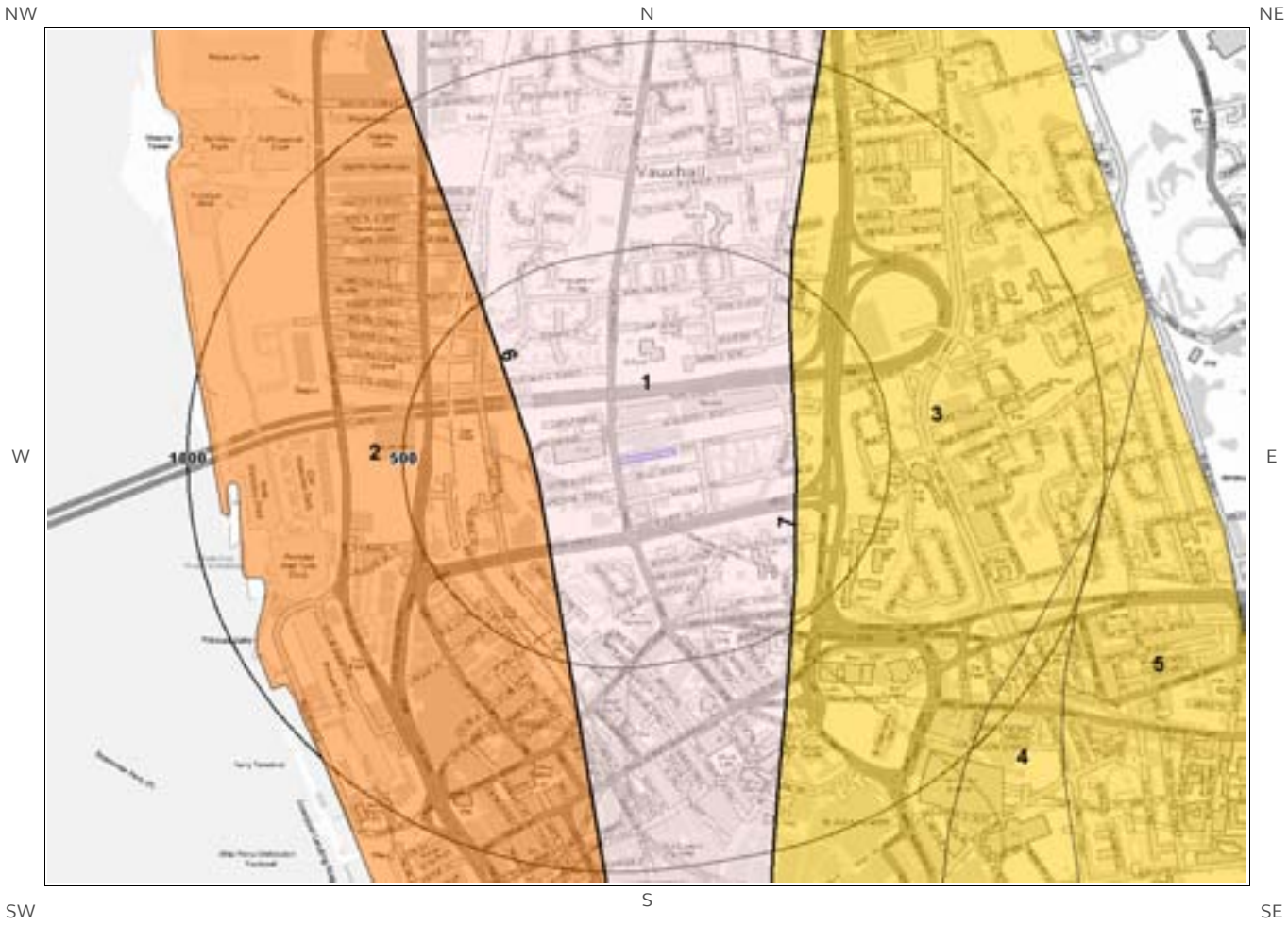
1.2.4 Landslip Permeability

Are there any records relating to permeability of landslips within the study site* boundary? No

Database searched and no data found.

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

1.3 Bedrock and Faults Map



Bedrock and Faults Legend

Site Outline

500
1000
Search Buffers (m)

1.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:096

1.3.1 Bedrock/ Solid Geology

Records of Bedrock/ Solid Geology within 500m of the study site boundary:

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
1	0.0	On Site	WLSF-SDST	Wilmslow Sandstone Formation - Sandstone	No Details
2	194.0	W	CPB-PESST	Chester Pebble Beds Formation - Sandstone, Pebbly (gravelly)	No Details
3	281.0	E	HEY-SDST	Helsby Sandstone Formation - Sandstone	Anisian /

1.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site* boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Intergranular	High	High

1.3.3 Faults

Are there any records of Faults within 500m of the study site boundary? Yes

ID	Distance (m)	Direction	Category Description	Feature Description
6	194.0	W	FAULT	Fault, inferred, displacement unknown
7	281.0	E	FAULT	Fault, inferred, displacement unknown

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as Faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

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

1.4 Radon Data

1.4.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level

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1.4.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary

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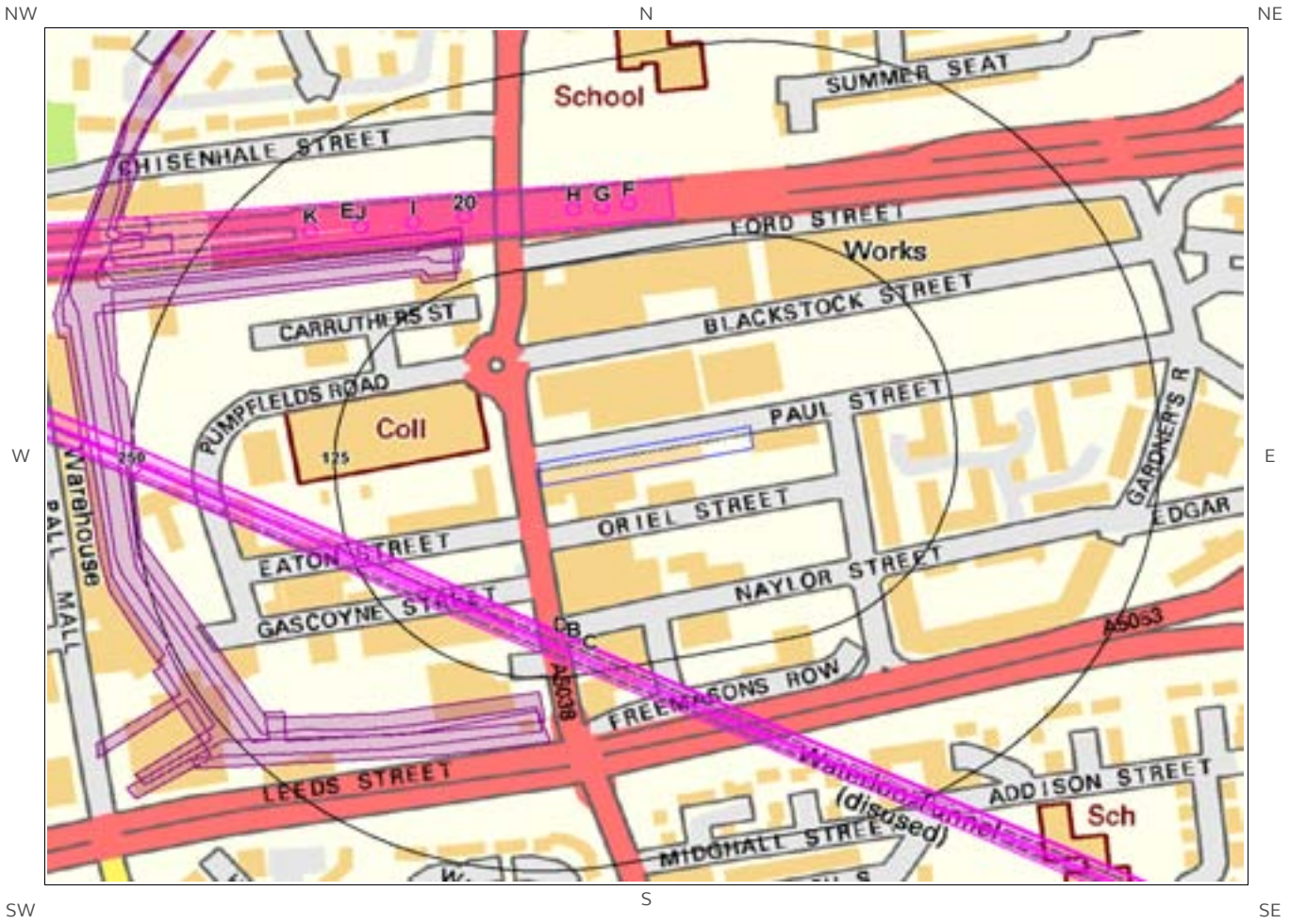
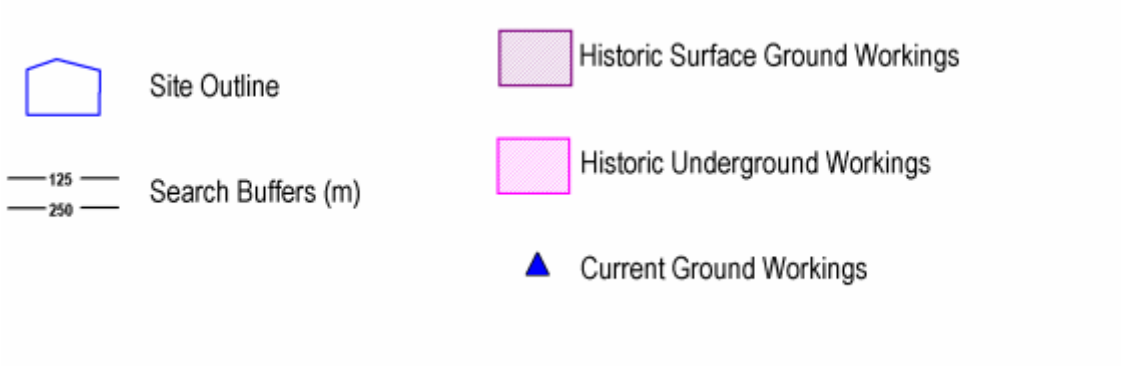
2 Ground Workings Map



Ground Workings Legend



2 Ground Workings

2.1 Historical Surface Ground Working Features derived from Historical Mapping

This dataset is based on Groundsure's unique Historical Land Use Database derived from 1:10,560 and 1:10,000 scale historical mapping.

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? Yes

The following Historical Surface Ground Working Features are provided by Groundsure:

ID	Distance (m)	Direction	NGR	Use	Date
1	129.0	NW	334187 391710	Canal	1890
2	133.0	N	334233 391858	Canal	1906
3A	134.0	S	334324 392207	Canal	1938
4A	134.0	S	334324 392207	Canal	1909

2.2 Historical Underground Working Features derived from Historical Mapping

This data is derived from the Groundsure unique Historical Land Use Database. It contains data derived from 1:10,000 and 1:10,560 historical Ordnance Survey Mapping and includes some natural topographical features (Shake Holes for example) as well as manmade features that may have implications for ground stability. Underground and mining features have been identified from surface features such as shafts. The distance that these extend underground is not shown.

Are there any Historical Underground Working Features within 1000m of the study site boundary? Yes

The following Historical Underground Working Features are provided by Groundsure:

ID	Distance (m)	Direction	NGR	Use	Date
5B	81.0	SW	334360 391203	Tunnel	1909
6B	81.0	SW	334360 391203	Tunnel	1938
7D	82.0	SW	335048 390893	Tunnel	1938
8C	84.0	SW	334365 391194	Tunnel	1967
9C	84.0	SW	334365 391194	Tunnel	1973
10D	90.0	SW	335047 390885	Tunnel	1906

ID	Distance (m)	Direction	NGR	Use	Date
11E	142.0	N	332953 391163	Tunnel	1990
12E	142.0	N	332953 391163	Tunnel	1982
13E	142.0	N	332953 391163	Tunnel	1973
14F	152.0	N	334378 391493	Air Shafts	1982
15F	152.0	N	334378 391493	Air Shafts	1990
16G	152.0	N	334362 391490	Air Shafts	1982
17G	152.0	N	334362 391490	Air Shafts	1990
18H	154.0	N	334345 391489	Air Shafts	1990
19H	154.0	N	334345 391489	Air Shafts	1982
20	162.0	N	334278 391484	Air Shafts	1982
21I	170.0	NW	334246 391480	Air Shafts	1990
22I	170.0	NW	334246 391480	Air Shafts	1982
23J	184.0	NW	334214 391478	Air Shafts	1982
24J	184.0	NW	334214 391478	Air Shafts	1990
25K	202.0	NW	334183 391475	Air Shafts	1982
26K	202.0	NW	334183 391475	Air Shafts	1990
Not shown	326.0	W	333949 391375	Tunnel	1973
Not shown	447.0	SE	334874 390969	Tunnel	1938
Not shown	447.0	SE	334874 390969	Tunnel	1909
Not shown	454.0	SE	334888 390960	Tunnel	1967
Not shown	454.0	SE	334888 390960	Tunnel	1973
Not shown	630.0	S	334192 390366	Tunnel	1990
Not shown	630.0	S	334192 390366	Tunnel	1982
Not shown	630.0	S	334192 390366	Tunnel	1973
Not shown	631.0	S	334192 390366	Tunnel	1967
Not shown	689.0	SE	336017 390460	Tunnel	1968
Not shown	689.0	SE	336017 390460	Tunnel	1975
Not shown	689.0	SE	336017 390460	Tunnel	1957
Not shown	864.0	SE	335210 390415	Tunnel	1989

2.3 Current Ground Workings

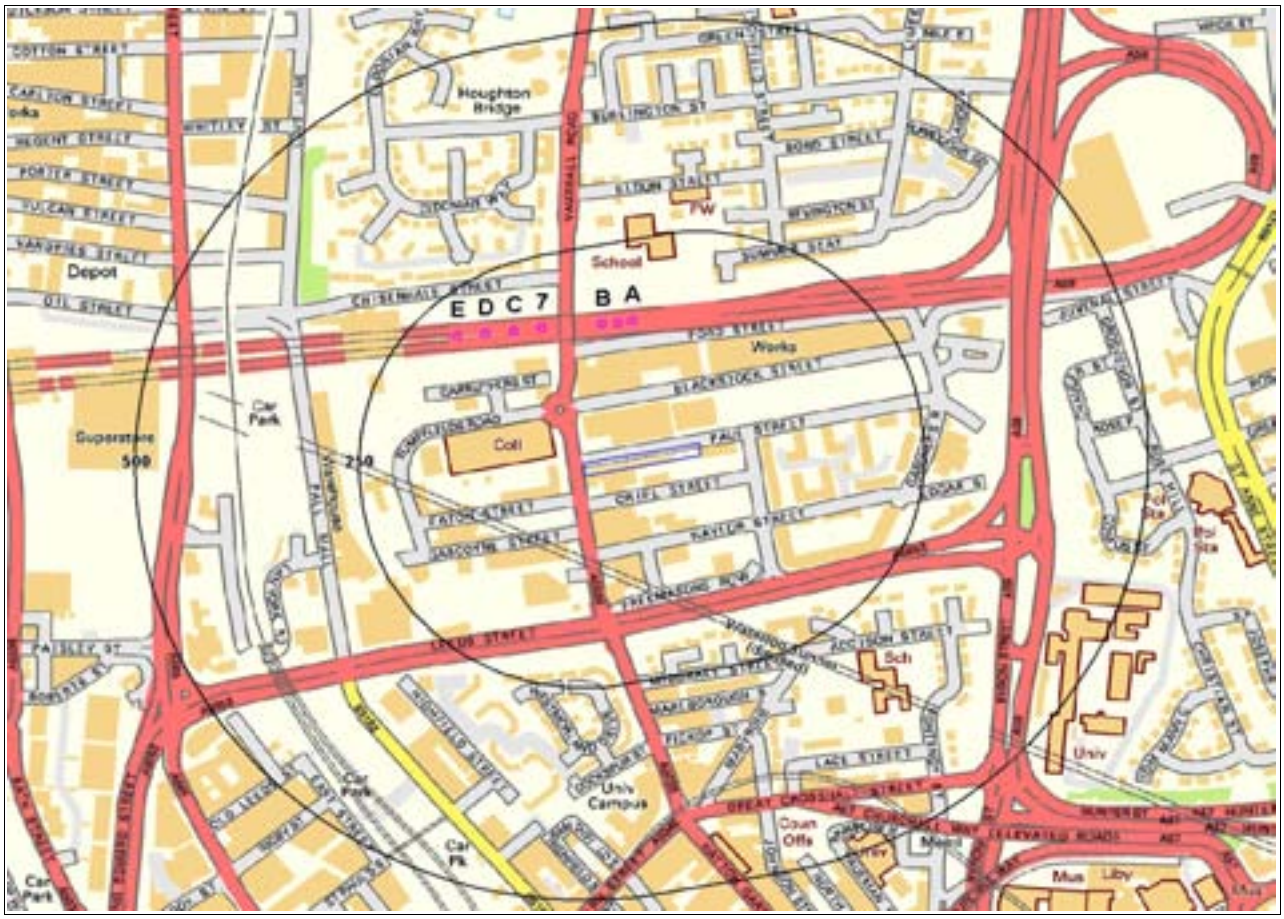
This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

Are there any BGS Current Ground Workings within 1000m of the study site boundary? No

Database searched and no data found.

3 Mining, Extraction & Natural Cavities Map

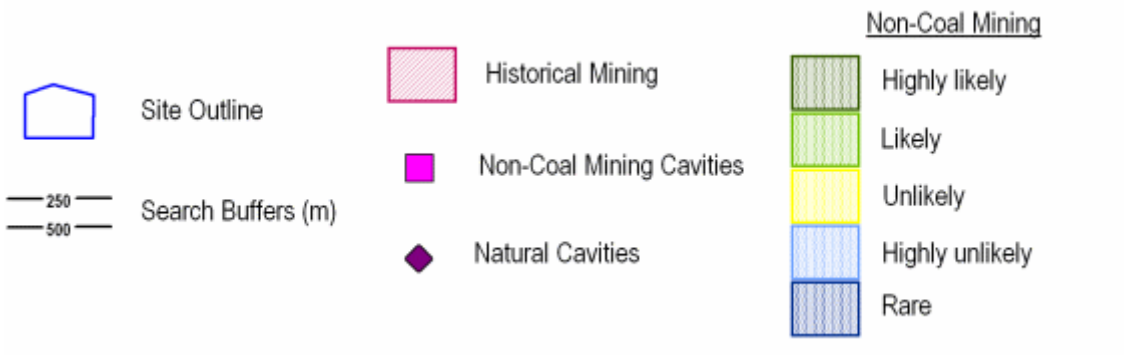
NW N NE



W E

SW S SE

Mining, Extraction and Natural Cavities Legend



3 Mining, Extraction & Natural Cavities

3.1 Historical Mining

This dataset is derived from Groundsure unique Historical Land-use Database that are indicative of mining or extraction activities.

Are there any Historical Mining areas within 1000m of the study site boundary? Yes

The following Historical Mining information is provided by Groundsure:

ID	Distance (m)	Direction	NGR	Details	Date
1A	152.0	N	334378 391493	Air Shafts	1990
2A	152.0	N	334378 391493	Air Shafts	1982
3A	152.0	N	334362 391490	Air Shafts	1990
4A	152.0	N	334362 391490	Air Shafts	1982
5B	154.0	N	334345 391489	Air Shafts	1982
6B	154.0	N	334345 391489	Air Shafts	1990
7	162.0	N	334278 391484	Air Shafts	1982
8C	170.0	NW	334246 391480	Air Shafts	1990
9C	170.0	NW	334246 391480	Air Shafts	1982
10D	184.0	NW	334214 391478	Air Shafts	1982
11D	184.0	NW	334214 391478	Air Shafts	1990
12E	202.0	NW	334183 391475	Air Shafts	1990
13E	202.0	NW	334183 391475	Air Shafts	1982

3.2 Coal Mining

This dataset provides information as to whether the study site lies within a known coal mining affected area as defined by the coal authority.

Are there any Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

3.3 Johnson Poole and Bloomer

This dataset provides information as to whether the study site lies within an area where JPB hold information relating to mining.

Are there any JPB Mining areas within 1000m of the study site boundary? No

The following information provided by JPB is not represented on mapping: Database searched and no data found.

3.4 Non-Coal Mining

This dataset provides information as to whether the study site lies within an area which may have been subject to non-coal historic mining.

Are there any Non-Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

3.5 Non-Coal Mining Cavities

This dataset provides information from the Peter Brett Associates (PBA) mining cavities database (compiled for the national study entitled "Review of mining instability in Great Britain, 1990" PBA has also continued adding to this database) on mineral extraction by mining.

Are there any Non-Coal Mining cavities within 1000m of the study site boundary? No

Database searched and no data found.

3.6 Natural Cavities

This dataset provides information based on Peter Brett Associates natural cavities database.

Are there any Natural Cavities within 1000m of the study site boundary? No

Database searched and no data found.

3.7 Brine Extraction

This data provides information from the Coal Authority issued on behalf of the Cheshire Brine Subsidence Compensation Board.

Are there any Brine Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

3.8 Gypsum Extraction

This dataset provides information on Gypsum extraction from British Gypsum records.

Are there any Gypsum Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

3.9 Tin Mining

This dataset provides information on tin mining areas and is derived from tin mining records. This search is based upon postcode information to a sector level.

Are there any Tin Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

3.10 Clay Mining

This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

Are there any Clay Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

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4 Natural Ground Subsidence

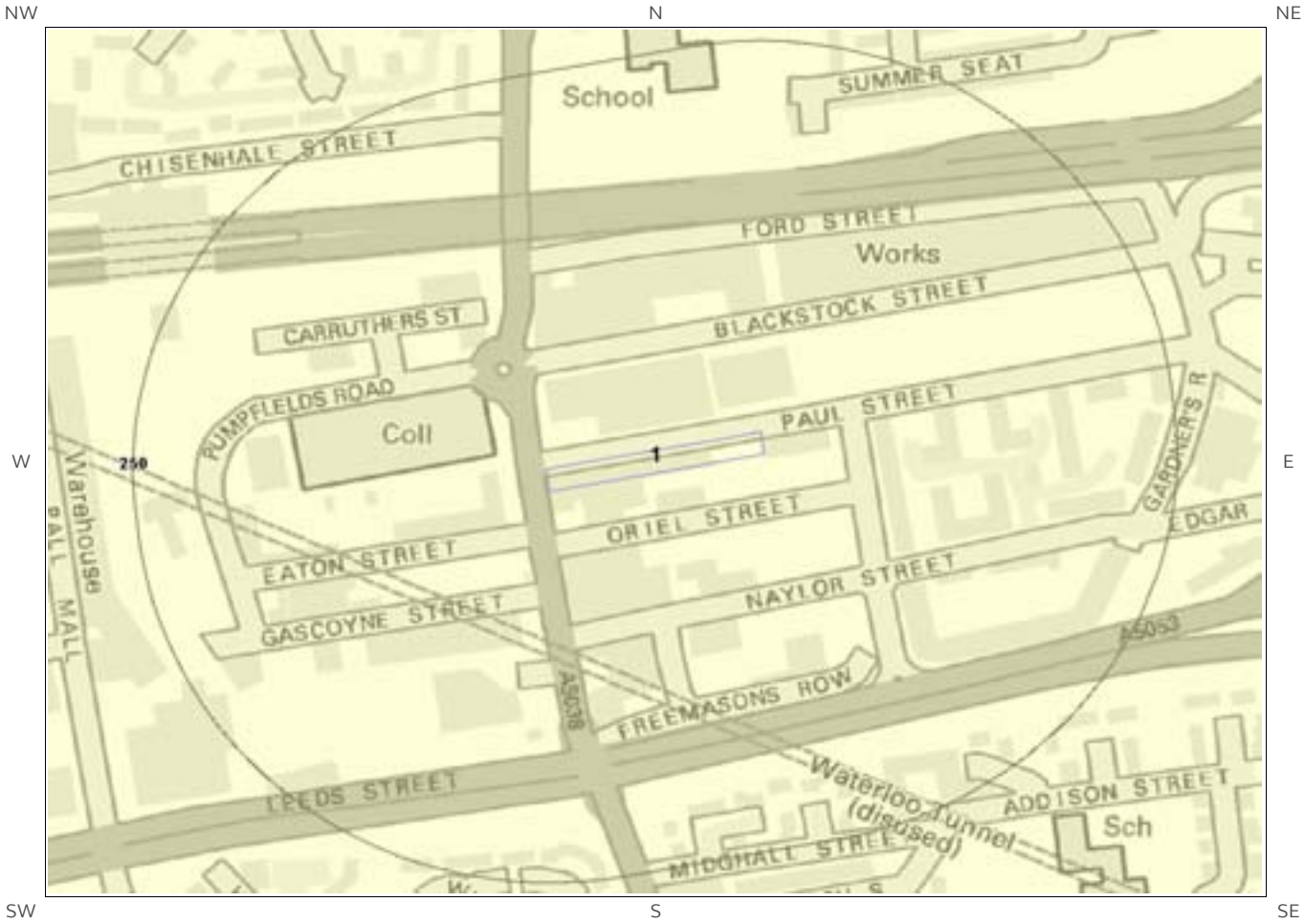
4.1 Shrink-Swell Clay Map

Shrink Swell Clay Legend

4.2 Landslides Map

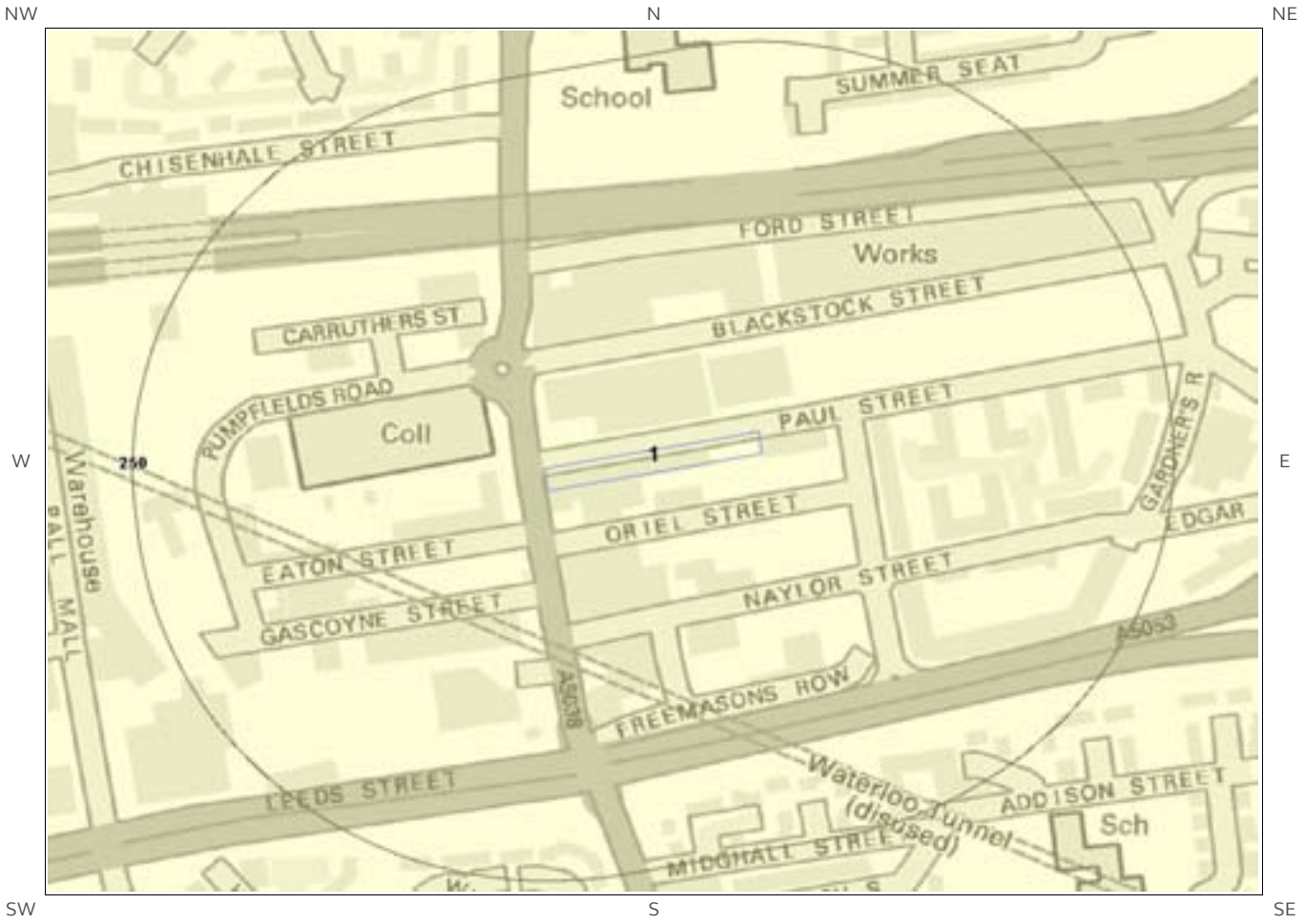
Landslides Legend

4.3 Ground Dissolution Soluble Rocks Map



Ground Dissolution Soluble Rocks Legend

4.4 Compressible Deposits Map



Compressible Deposits Legend

4.5 Collapsible Deposits Map

Collapsible Deposits Legend

4.6 Running Sand Map

Running Sand Legend

4 Natural Ground Subsidence

The National Ground Subsidence rating is obtained through the 6 natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS).

The following GeoSure data represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

What is the maximum hazard rating of natural subsidence within the study site*[*] boundary? Very Low

4.1 Shrink-Swell Clays

The following Shrink Swell information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

4.2 Landslides

The following Landslides information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

4.3 Ground Dissolution of Soluble Rocks

The following Ground Dissolution information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

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

4.4 Compressible Deposits

The following Compressible Deposits information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for compressible ground identified. No special actions required to avoid problems due to compressible ground. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible ground.

4.5 Collapsible Deposits

The following Collapsible Rocks information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

4.6 Running Sands

The following Running Sands information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

5 Borehole Records Map

Borehole Records Legend

Site Outline

Borehole Locations

125
250
Search Buffers (m)

5 Borehole Records

The systematic analysis of data extracted from the BGS Borehole Records database provides the following information.

Records of boreholes within 250m of the study site boundary: 150

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1	25.0	W	334298 391328	SJ39SW1660	3.0	PUMPFIELDS POWER STATION TP 1
2	33.0	W	334290 391320	SJ39SW1387	4.0	PUMPFIELDS A4
3	34.0	W	334290 391330	SJ39SW1231	5.0	PUMPFIELDS LIVERPOOL 5
4A	42.0	NW	334290 391350	SJ39SW1399	4.0	PUMPFIELDS TP A20
5	45.0	W	334278 391325	SJ39SW1661	3.0	PUMPFIELDS POWER STATION TP 2
6A	45.0	NW	334291 391356	SJ39SW1678	3.1	PUMPFIELDS POWER STATION TP 19
7	46.0	S	334470 391290	SJ39SW1483	10.6	LEEDS STREET REDEVELOPMENT LIVERPOOL C1
8	49.0	NW	334290 391360	SJ39SW1388	5.0	PUMPFIELDS A5
9	53.0	W	334270 391320	SJ39SW1398	3.0	PUMPFIELDS TP A19
10	55.0	E	334510 391330	SJ39SW1497	3.0	LEEDS STREET REDEVELOPMENT LIVERPOOL WSD3
11	57.0	E	334510 391350	SJ39SW1486	11.5	LEEDS STREET REDEVELOPMENT LIVERPOOL E3
12	59.0	NW	334272 391354	SJ39SW1697	3.1	PUMPFIELDS POWER STATION TP 38
13	60.0	SE	334480 391280	SJ39SW1502	2.45	LEEDS STREET REDEVELOPMENT LIVERPOOL TPB2
14	63.0	SE	334500 391290	SJ39SW1507	3.15	LEEDS STREET REDEVELOPMENT LIVERPOOL TPC2
15	66.0	S	334470 391270	SJ39SW1501	3.35	LEEDS STREET REDEVELOPMENT LIVERPOOL TPB1
16	66.0	W	334257 391321	SJ39SW1662	3.0	PUMPFIELDS POWER STATION TP 3
17	69.0	NW	334287 391383	SJ39SW1679	3.0	PUMPFIELDS POWER STATION TP 20
18	69.0	E	334520 391310	SJ39SW1496	4.0	LEEDS STREET REDEVELOPMENT LIVERPOOL WSC3
19B	74.0	W	334253 391348	SJ39SW1698	3.1	PUMPFIELDS POWER STATION TP 39

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
20	77.0	N	334420 391420	SJ39SW1056	-1.0	VAUXHALL RICE MILLS
21B	77.0	W	334250 391350	SJ39SW422	-1.0	PUMPFIELDS POWER STATION BH301
22B	77.0	W	334250 391350	SJ39SW1230	5.0	PUMPFIELDS LIVERPOOL 4
23B	77.0	W	334250 391350	SJ39SW437	-1.0	PUMPFIELDS POWER STATION TP316
24B	77.0	W	334250 391350	SJ39SW425	-1.0	PUMPFIELDS POWER STATION BH304
25B	77.0	W	334250 391350	SJ39SW427	-1.0	PUMPFIELDS POWER STATION BH306
26B	77.0	W	334250 391350	SJ39SW423	-1.0	PUMPFIELDS POWER STATION BH302
27B	77.0	W	334250 391350	SJ39SW432	-1.0	PUMPFIELDS POWER STATION BH311
28B	77.0	W	334250 391350	SJ39SW421	-1.0	PUMPFIELDS POWER STATION BH300
29B	77.0	W	334250 391350	SJ39SW433	-1.0	PUMPFIELDS POWER STATION BH312
30B	77.0	W	334250 391350	SJ39SW442	-1.0	PUMPFIELDS POWER STATION TP321
31B	77.0	W	334250 391350	SJ39SW429	-1.0	PUMPFIELDS POWER STATION BH308
32B	77.0	W	334250 391350	SJ39SW430	-1.0	PUMPFIELDS POWER STATION BH309
33B	77.0	W	334250 391350	SJ39SW439	-1.0	PUMPFIELDS POWER STATION TP318
34B	77.0	W	334250 391350	SJ39SW431	-1.0	PUMPFIELDS POWER STATION BH310
35B	77.0	W	334250 391350	SJ39SW441	-1.0	PUMPFIELDS POWER STATION TP320
36B	77.0	W	334250 391350	SJ39SW438	-1.0	PUMPFIELDS POWER STATION TP317
37B	77.0	W	334250 391350	SJ39SW436	-1.0	PUMPFIELDS POWER STATION TP315
38B	77.0	W	334250 391350	SJ39SW424	-1.0	PUMPFIELDS POWER STATION BH303
39B	77.0	W	334250 391350	SJ39SW435	-1.0	PUMPFIELDS POWER STATION TP314
40B	77.0	W	334250 391350	SJ39SW443	-1.0	PUMPFIELDS POWER STATION TP322
41B	77.0	W	334250 391350	SJ39SW440	-1.0	PUMPFIELDS POWER STATION TP319
42B	77.0	W	334250 391350	SJ39SW426	-1.0	PUMPFIELDS POWER STATION BH305
43B	77.0	W	334250 391350	SJ39SW434	-1.0	PUMPFIELDS POWER STATION TP313
44B	77.0	W	334250 391350	SJ39SW428	-1.0	PUMPFIELDS POWER STATION BH307
45	78.0	E	334530 391360	SJ39SW1521	3.05	LEEDS STREET REDEVELOPMENT LIVERPOOL TPE4
46	84.0	NW	334260 391380	SJ39SW1397	4.0	PUMPFIELDS TP A18
47	85.0	SE	334520 391280	SJ39SW1491	4.0	LEEDS STREET REDEVELOPMENT LIVERPOOL WSB3

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
48	85.0	E	334540 391330	SJ39SW1513	2.1	LEEDS STREET REDEVELOPMENT LIVERPOOL TPD4
49	85.0	S	334470 391250	SJ39SW1480	10.5	LEEDS STREET REDEVELOPMENT LIVERPOOL A1
50	86.0	NW	334267 391389	SJ39SW1680	3.1	PUMPFIELDS POWER STATION TP 21
51D	86.0	W	334237 391316	SJ39SW1663	3.0	PUMPFIELDS POWER STATION TP 4
52	87.0	SE	334500 391260	SJ39SW1489	2.55	LEEDS STREET REDEVELOPMENT LIVERPOOL WSA2
53	88.0	E	334540 391310	SJ39SW1484	11.25	LEEDS STREET REDEVELOPMENT LIVERPOOL C4
54	88.0	W	334238 391348	SJ39SW1677	3.1	PUMPFIELDS POWER STATION TP 18
55C	91.0	SE	334520 391270	SJ39SW1490	0.55	LEEDS STREET REDEVELOPMENT LIVERPOOL WSA3
56C	91.0	SE	334520 391270	SJ39SW1498	3.0	LEEDS STREET REDEVELOPMENT LIVERPOOL TPA3
57	92.0	N	334450 391440	SJ39SW31	141.42	VAUXHALL RICE MILLS
58D	93.0	W	334230 391320	SJ39SW1228	15.0	PUMPFIELDS LIVERPOOL 2
59	98.0	NW	334245 391384	SJ39SW1681	3.1	PUMPFIELDS POWER STATION TP 22
60	105.0	SE	334550 391290	SJ39SW1503	1.95	LEEDS STREET REDEVELOPMENT LIVERPOOL TPB4
61	105.0	E	334560 391340	SJ39SW1514	1.55	LEEDS STREET REDEVELOPMENT LIVERPOOL TPD5
62	106.0	SE	334540 391270	SJ39SW1499	2.35	LEEDS STREET REDEVELOPMENT LIVERPOOL TPA4
63	106.0	W	334217 391314	SJ39SW1664	3.0	PUMPFIELDS POWER STATION TP 5
64	108.0	E	334560 391360	SJ39SW1522	3.1	LEEDS STREET REDEVELOPMENT LIVERPOOL TPE5
65	108.0	E	334560 391310	SJ39SW1508	1.35	LEEDS STREET REDEVELOPMENT LIVERPOOL TPC5
66	111.0	W	334213 391340	SJ39SW1676	3.1	PUMPFIELDS POWER STATION TP 17
67	112.0	N	334450 391460	SJ39SW1043	-1.0	DOWNLAND BEDDING
68	114.0	NW	334225 391383	SJ39SW1696	3.1	PUMPFIELDS POWER STATION TP 37
69	116.0	W	334210 391350	SJ39SW1229	5.0	PUMPFIELDS LIVERPOOL 3
70	119.0	E	334570 391370	SJ39SW1523	1.7	LEEDS STREET REDEVELOPMENT LIVERPOOL TPE6

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
71	120.0	E	334570 391300	SJ39SW1504	3.2	LEEDS STREET REDEVELOPMENT LIVERPOOL TPB5
72E	123.0	W	334200 391330	SJ39SW1227	15.0	PUMPFIELDS LIVERPOOL 1
73	125.0	E	334580 391340	SJ39SW1515	2.8	LEEDS STREET REDEVELOPMENT LIVERPOOL TPD6
74F	126.0	NW	334210 391380	SJ39SW1395	3.6	PUMPFIELDS TP A16
75E	128.0	W	334196 391337	SJ39SW1675	3.0	PUMPFIELDS POWER STATION TP 16
76	128.0	W	334195 391315	SJ39SW1665	3.0	PUMPFIELDS POWER STATION TP 6
77F	130.0	NW	334205 391379	SJ39SW1695	3.1	PUMPFIELDS POWER STATION TP 36
78	136.0	E	334590 391320	SJ39SW1509	3.2	LEEDS STREET REDEVELOPMENT LIVERPOOL TPC6
79	136.0	S	334370 391180	SJ39SW612	12.19	VAUXHALL RD LIVERPOOL 2
80	136.0	SE	334580 391280	SJ39SW1481	12.4	LEEDS STREET REDEVELOPMENT LIVERPOOL A5
81	139.0	E	334590 391300	SJ39SW1492	3.0	LEEDS STREET REDEVELOPMENT LIVERPOOL WSB6
82	142.0	NW	334210 391410	SJ39SW1384	4.5	PUMPFIELDS A1
83	142.0	S	334350 391170	SJ39SW611	15.24	VAUXHALL RD LIVERPOOL 1
84G	143.0	W	334187 391367	SJ39SW1682	3.0	PUMPFIELDS POWER STATION TP 23
85	146.0	S	334370 391170	SJ39SW613	6.4	VAUXHALL RD LIVERPOOL 3
86	146.0	E	334600 391350	SJ39SW1516	2.5	LEEDS STREET REDEVELOPMENT LIVERPOOL TPD7
87G	146.0	W	334182 391363	SJ39SW1683	3.1	PUMPFIELDS POWER STATION TP 24
88	147.0	E	334600 391310	SJ39SW1493	3.2	LEEDS STREET REDEVELOPMENT LIVERPOOL WSB7
89	149.0	E	334600 391370	SJ39SW1487	10.0	LEEDS STREET REDEVELOPMENT LIVERPOOL E7
90	151.0	W	334173 391337	SJ39SW1672	3.1	PUMPFIELDS POWER STATION TP 13
91	155.0	E	334610 391330	SJ39SW1510	3.3	LEEDS STREET REDEVELOPMENT LIVERPOOL TPC7
92	163.0	W	334167 391372	SJ39SW1673	3.1	PUMPFIELDS POWER STATION TP 14
93	166.0	E	334620 391350	SJ39SW1517	1.8	LEEDS STREET REDEVELOPMENT LIVERPOOL TPD8
94	168.0	NW	334192 391429	SJ39SW1684	3.1	PUMPFIELDS POWER STATION TP 25

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
95	168.0	E	334620 391370	SJ39SW1524	1.7	LEEDS STREET REDEVELOPMENT LIVERPOOL TPE8
96	170.0	NW	334167 391391	SJ39SW1694	3.1	PUMPFIELDS POWER STATION TP 35
97	171.0	E	334620 391290	SJ39SW1500	1.7	LEEDS STREET REDEVELOPMENT LIVERPOOL TPA7
98	175.0	E	334630 391330	SJ39SW1511	2.25	LEEDS STREET REDEVELOPMENT LIVERPOOL TPC8
99H	177.0	E	334630 391310	SJ39SW1505	2.7	LEEDS STREET REDEVELOPMENT LIVERPOOL TPB8
100H	177.0	E	334630 391310	SJ39SW1494	0.55	LEEDS STREET REDEVELOPMENT LIVERPOOL WSB8
101I	182.0	W	334150 391380	SJ39SW1402	7.5	PUMPFIELDS S1
102	189.0	NW	334163 391424	SJ39SW1685	3.1	PUMPFIELDS POWER STATION TP 26
103	190.0	E	334640 391380	SJ39SW1525	3.0	LEEDS STREET REDEVELOPMENT LIVERPOOL TPE9
104I	190.0	W	334144 391387	SJ39SW1693	3.1	PUMPFIELDS POWER STATION TP 34
105	190.0	W	334133 391327	SJ39SW1671	3.1	PUMPFIELDS POWER STATION TP 12
106I	191.0	W	334140 391380	SJ39SW1401	2.6	PUMPFIELDS TP A22
107K	193.0	NW	334150 391410	SJ39SW1409	6.0	PUMPFIELDS M02
108J	195.0	W	334140 391390	SJ39SW1392	2.6	PUMPFIELDS TP A13
109J	195.0	W	334140 391390	SJ39SW1416	7.0	PUMPFIELDS M12
110J	195.0	W	334137 391382	SJ39SW1692	3.1	PUMPFIELDS POWER STATION TP 33
111	197.0	E	334650 391360	SJ39SW1518	2.3	LEEDS STREET REDEVELOPMENT LIVERPOOL TPD9
112L	198.0	NW	334140 391400	SJ39SW1415	2.6	PUMPFIELDS M11
113M	200.0	W	334127 391366	SJ39SW1674	3.0	PUMPFIELDS POWER STATION TP 15
114	204.0	NW	334151 391434	SJ39SW1688	3.1	PUMPFIELDS POWER STATION TP 29
115O	205.0	E	334660 391340	SJ39SW1512	2.4	LEEDS STREET REDEVELOPMENT LIVERPOOL TPC9
116K	205.0	NW	334134 391404	SJ39SW1691	3.1	PUMPFIELDS POWER STATION TP 32
117	205.0	E	334660 391320	SJ39SW1506	2.4	LEEDS STREET REDEVELOPMENT LIVERPOOL TPB9
118L	207.0	W	334130 391400	SJ39SW1403	12.0	PUMPFIELDS S2

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
119L	207.0	W	334130 391400	SJ39SW1393	2.7	PUMPFIELDS TP A14
120	208.0	E	334660 391300	SJ39SW1482	10.08	LEEDS STREET REDEVELOPMENT LIVERPOOL A9
121M	208.0	W	334120 391370	SJ39SW1407	7.0	PUMPFIELDS S6
122S	211.0	NW	334136 391421	SJ39SW1686	3.1	PUMPFIELDS POWER STATION TP 27
123N	211.0	NW	334130 391410	SJ39SW1411	12.0	PUMPFIELDS M04
124N	211.0	NW	334130 391410	SJ39SW1410	2.7	PUMPFIELDS M03
125	213.0	NE	334650 391430	SJ39SW32	216.41	MAUBRE & GARTON LTD
126O	215.0	E	334670 391340	SJ39SW1485	8.3	LEEDS STREET REDEVELOPMENT LIVERPOOL C10
127P	216.0	W	334110 391360	SJ39SW1412	3.7	PUMPFIELDS M05
128P	216.0	W	334110 391360	SJ39SW1413	7.6	PUMPFIELDS M06
129	217.0	E	334670 391360	SJ39SW1519	1.85	LEEDS STREET REDEVELOPMENT LIVERPOOL TPD10
130Q	218.0	W	334110 391370	SJ39SW1418	7.0	PUMPFIELDS M14
131Q	218.0	W	334110 391370	SJ39SW1400	3.6	PUMPFIELDS TP A21
132Q	218.0	W	334110 391370	SJ39SW1417	3.6	PUMPFIELDS M13
133R	220.0	W	334103 391323	SJ39SW1670	3.1	PUMPFIELDS POWER STATION TP 11
134	220.0	W	334110 391380	SJ39SW1391	3.1	PUMPFIELDS TP A12
135	221.0	E	334670 391390	SJ39SW1526	1.9	LEEDS STREET REDEVELOPMENT LIVERPOOL TPE10
136R	223.0	W	334100 391320	SJ39SW1394	2.9	PUMPFIELDS TP A15
137S	225.0	NW	334120 391420	SJ39SW1408	4.0	PUMPFIELDS M01
138	225.0	E	334680 391330	SJ39SW1495	5.0	LEEDS STREET REDEVELOPMENT LIVERPOOL WSB10
139R	231.0	W	334092 391322	SJ39SW1669	3.0	PUMPFIELDS POWER STATION TP 10
140	233.0	W	334091 391340	SJ39SW1667	3.0	PUMPFIELDS POWER STATION TP 8
141	236.0	W	334100 391400	SJ39SW1404	8.0	PUMPFIELDS S3
142	236.0	E	334690 391360	SJ39SW1520	4.0	LEEDS STREET REDEVELOPMENT LIVERPOOL TPD11
143	236.0	NW	334106 391418	SJ39SW1687	3.1	PUMPFIELDS POWER STATION TP 28
144	237.0	W	334090 391370	SJ39SW1406	7.5	PUMPFIELDS S5

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
145	239.0	W	334087 391360	SJ39SW1666	3.0	PUMPFIELDS POWER STATION TP 7
146	240.0	W	334083 391321	SJ39SW1668	2.6	PUMPFIELDS POWER STATION TP 9
147	241.0	E	334690 391390	SJ39SW1488	6.15	LEEDS STREET REDEVELOPMENT LIVERPOOL E11
148	242.0	W	334090 391390	SJ39SW1390	3.0	PUMPFIELDS TP A11
149	243.0	S	334360 391070	SJ39SW1081	-1.0	MERSEY LOOP TUNNEL MRL1
150	243.0	W	334080 391310	SJ39SW1386	4.5	PUMPFIELDS A3

The borehole records are available using the hyperlinks below: Please note that if the donor of the borehole record has requested the information be held as commercial-in-confidence, the additional data will be held separately by the BGS and a formal request must be made for its release.

#1: scans.bgs.ac.uk/sobi_scans/boreholes/17318075
#2: scans.bgs.ac.uk/sobi_scans/boreholes/17293695
#3: scans.bgs.ac.uk/sobi_scans/boreholes/17291914
#4A: scans.bgs.ac.uk/sobi_scans/boreholes/17293740
#5: scans.bgs.ac.uk/sobi_scans/boreholes/17318076
#6A: scans.bgs.ac.uk/sobi_scans/boreholes/17318119
#7: scans.bgs.ac.uk/sobi_scans/boreholes/17295920
#8: scans.bgs.ac.uk/sobi_scans/boreholes/17293706
#9: scans.bgs.ac.uk/sobi_scans/boreholes/17293738
#10: scans.bgs.ac.uk/sobi_scans/boreholes/17295934
#11: scans.bgs.ac.uk/sobi_scans/boreholes/17295923
#12: scans.bgs.ac.uk/sobi_scans/boreholes/17318141
#13: scans.bgs.ac.uk/sobi_scans/boreholes/17295955
#14: scans.bgs.ac.uk/sobi_scans/boreholes/17295960
#15: scans.bgs.ac.uk/sobi_scans/boreholes/17295954
#16: scans.bgs.ac.uk/sobi_scans/boreholes/17318083
#17: scans.bgs.ac.uk/sobi_scans/boreholes/17318120
#18: scans.bgs.ac.uk/sobi_scans/boreholes/17295933
#19B: scans.bgs.ac.uk/sobi_scans/boreholes/17318143
#20: scans.bgs.ac.uk/sobi_scans/boreholes/162025
#22B: scans.bgs.ac.uk/sobi_scans/boreholes/17291912
#45: scans.bgs.ac.uk/sobi_scans/boreholes/17295974
#46: scans.bgs.ac.uk/sobi_scans/boreholes/17293730
#47: scans.bgs.ac.uk/sobi_scans/boreholes/17295928
#48: scans.bgs.ac.uk/sobi_scans/boreholes/17295966
#49: scans.bgs.ac.uk/sobi_scans/boreholes/17295917
#50: scans.bgs.ac.uk/sobi_scans/boreholes/17318121
#51D: scans.bgs.ac.uk/sobi_scans/boreholes/17318084
#52: scans.bgs.ac.uk/sobi_scans/boreholes/17295926
#53: scans.bgs.ac.uk/sobi_scans/boreholes/17295921
#54: scans.bgs.ac.uk/sobi_scans/boreholes/17318118
#55C: scans.bgs.ac.uk/sobi_scans/boreholes/17295927
#56C: scans.bgs.ac.uk/sobi_scans/boreholes/17295935
#57: scans.bgs.ac.uk/sobi_scans/boreholes/160990
#58D: scans.bgs.ac.uk/sobi_scans/boreholes/17291909
#59: scans.bgs.ac.uk/sobi_scans/boreholes/17318122

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#72E: scans.bgs.ac.uk/sobi_scans/boreholes/17291908
#73: scans.bgs.ac.uk/sobi_scans/boreholes/17295968
#74F: scans.bgs.ac.uk/sobi_scans/boreholes/17293725
#75E: scans.bgs.ac.uk/sobi_scans/boreholes/17318116
#76: scans.bgs.ac.uk/sobi_scans/boreholes/17318086
#77F: scans.bgs.ac.uk/sobi_scans/boreholes/17318139
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#79: scans.bgs.ac.uk/sobi_scans/boreholes/161581
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#115O: scans.bgs.ac.uk/sobi_scans/boreholes/17295965
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#120: scans.bgs.ac.uk/sobi_scans/boreholes/17295919
#121M: scans.bgs.ac.uk/sobi_scans/boreholes/17294339
#122S: scans.bgs.ac.uk/sobi_scans/boreholes/17318128
#123N: scans.bgs.ac.uk/sobi_scans/boreholes/17294346
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#137S: scans.bgs.ac.uk/sobi_scans/boreholes/17294340
#138: scans.bgs.ac.uk/sobi_scans/boreholes/17295932
#139R: scans.bgs.ac.uk/sobi_scans/boreholes/17318108
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#150: scans.bgs.ac.uk/sobi_scans/boreholes/17293691

6 Estimated Background Soil Chemistry

Records of background estimated soil chemistry within 250m of the study site boundary: 9

For further information on how this data is calculated and limitations upon its use, please see the Groundsure Geo Insight User Guide, available on request.

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	200 - 300 mg/kg
45.0	E	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	200 - 300 mg/kg
149.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	200 - 300 mg/kg
152.0	N	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg
159.0	N	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg
195.0	NE	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg
216.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	200 - 300 mg/kg
227.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	200 - 300 mg/kg
242.0	NE	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg

*As this data is based upon underlying 1:50,000 scale geological information, a 50m buffer has been added to the search radius.

7 Railways and Tunnels Map

Railways and Tunnels Legend

7 Railways and Tunnels

7.1 Tunnels

This data is derived from OpenStreetMap and provides information on the possible locations of underground railway systems in the UK - the London Underground, the Tyne & Wear Metro and the Glasgow Subway.

Have any underground railway lines been identified within the study site boundary? No

Have any underground railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

This data is derived from Ordnance Survey mapping and provides information on the possible locations of railway tunnels forming part of the UK overground railway network.

Have any other railway tunnels been identified within the site boundary? No

Have any other railway tunnels been identified within 250m of the site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

7.2 Historical Railway and Tunnel Features

This data is derived from Groundsure's unique Historical Land-use Database and contains features relating to tunnels, railway tracks or associated works that have been identified from historical Ordnance Survey mapping.

Have any historical railway or tunnel features been identified within the study site boundary? No

Have any historical railway or tunnel features been identified within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Details	Date
41I	81	SW	334360 391203	Tunnel	1909
42I	81	SW	334360 391203	Tunnel	1938
43	82	SW	335048 390893	Tunnel	1938
44	84	SW	334318 391220	Tunnel	1928
45J	84	SW	334365 391194	Tunnel	1967
46J	84	SW	334365 391194	Tunnel	1973

ID	Distance (m)	Direction	NGR	Details	Date
1B	86	SW	334251 391243	Disused Tunnel	1987
47	86	SW	334359 391198	Tunnel	1927
2A	87	SW	334360 391196	Tunnel	1953
3A	87	SW	334360 391196	Tunnel	1959
4A	87	SW	334360 391196	Tunnel	1953
5A	87	SW	334360 391196	Tunnel	1959
6A	87	SW	334360 391196	Tunnel	1970
7B	87	SW	334252 391243	Tunnel	1953
8B	87	SW	334252 391243	Tunnel	1976
9B	87	SW	334252 391243	Tunnel	1989
10B	87	SW	334252 391243	Tunnel	1965
11B	89	SW	334252 391242	Disused Tunnel	1995
12B	89	SW	334252 391242	Disused Tunnel	1995
13	90	SW	n/a	Tunnel	1908
48	90	SW	335047 390885	Tunnel	1906
14C	91	SW	334750 391016	Tunnel	1908
15C	91	SW	334750 391016	Tunnel	1927
49	93	SW	334332 391201	Tunnel	1851
16	94	SW	n/a	Railway Tunnel	1910
17D	137	N	334250 391471	Tunnel	1989
18D	137	N	334250 391471	Tunnel	1976
19D	139	N	334207 391471	Tunnel	1983
20D	139	N	334207 391471	Tunnel	1987
50K	142	N	332953 391163	Tunnel	1973
51K	142	N	332953 391163	Tunnel	1982
52K	142	N	332953 391163	Tunnel	1990
21	157	N	334358 391505	Tunnel	1990
22	165	N	334420 391513	Tunnel	1976
23	165	N	334418 391512	Tunnel	1993

ID	Distance (m)	Direction	NGR	Details	Date
24E	166	N	334355 391506	Tunnel	1997
25E	166	N	334355 391506	Tunnel	1994
26E	166	N	334355 391506	Tunnel	1993
27E	166	N	334355 391506	Tunnel	1995
28E	166	N	334355 391506	Tunnel	1997
29E	167	N	334355 391507	Tunnel	1984
30E	167	N	334355 391507	Tunnel	1989
31E	167	N	334355 391507	Tunnel	1989
32F	202	S	334610 391085	Tunnel	1953
33F	202	S	334610 391085	Tunnel	1973
34F	202	S	334610 391085	Tunnel	1960
35F	202	S	334610 391085	Disused Tunnel	1988
36G	202	S	334642 391068	Disused Tunnel	1995
37G	203	S	334653 391068	Disused Tunnel	1987
38	203	S	334654 391068	Disused Tunnel	1998
39H	208	NW	334087 391464	Tunnel	1995
40H	208	NW	334087 391464	Tunnel	1995

Any records that have been identified are represented on the Railways and Tunnels Map.

7.3 Historical Railways

This data is derived from OpenStreetMap and provides information on the possible alignments of abandoned or dismantled railway lines in proximity to the study site.

Have any historical railway lines been identified within the study site boundary? No

Have any historical railway lines been identified within 250m of the study site boundary? Yes

Distance (m)	Direction	Status
93	SW	Abandoned

Note: multiple sections of the same track may be listed in the detail above

Any records that have been identified are represented on the Railways and Tunnels Map.

7.4 Active Railways

These datasets are derived from Ordnance Survey mapping and OpenStreetMap and provide information on the possible locations of active railway lines in proximity to the study site.

Have any active railway lines been identified within the study site boundary? No

Have any active railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Note: multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels Map.

7.5 Railway Projects

These datasets provide information on the location of large scale railway projects High Speed 2 and Crossrail 1 .

Is the study site within 5km of the route of the High Speed 2 rail project? No

Is the study site within 500m of the route of the Crossrail 1 rail project? No

*Further information on proximity to these routes, the project construction status and associated works can be obtained through the purchase of a **Groundsure HS2 and Crossrail 1 Report**.*

The route data has been digitised from publicly available maps by Groundsure. The route as provided relates to the Crossrail 1 project only, and does not include any details of the Crossrail 2 project, as final details of the route for Crossrail 2 are still under consultation.

Contact Details

CENTREMAPS

Telephone: #CustomerHelpLine#
Groundsure@centremaps.co.uk

British Geological Survey Enquiries

Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email:**enquiries@bgs.ac.uk**
Web:**www.bgs.ac.uk**
BGS Geological Hazards Reports and general geological enquiries

British Gypsum

British Gypsum Ltd
East Leake
Loughborough
Leicestershire
LE12 6HX

The Coal Authority

200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk

Public Health England

Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
https://www.gov.uk/government/organisations/public-health-england
Email: **enquiries@phe.gov.uk**
Main switchboard: 020 7654 8000

Johnson Poole & Bloomer Limited

Harris and Pearson Building, Brettel Lane
Brierley Hill, West Midlands
DY5 3LH
Tel: +44 (0) 1384 262 000
Email:**enquiries.gs@jpb.co.uk**
Website: **www.jpb.co.uk**

Ordnance Survey

Adanac Drive, Southampton
SO16 0AS

Tel: 08456 050505
Website: http://www.ordnancesurvey.co.uk/

Getmapping PLC

Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
Tel: 01252 845444
Website:**http://www1.getmapping.com/**

Contact Details

Peter Brett Associates

Caversham Bridge House
Waterman Place
Reading
Berkshire RG1 8DN
Tel: +44 (0)118 950 0761 E-mail:**reading@pba.co.uk**
Website:**http://www.peterbrett.com/home**

Standard Terms and Conditions

1 Definitions

I**n these terms and conditions unless the context otherwise requires:**
"Beneficiary" means the person or entity for whose benefit the Client has obtained the Services.
"Client" means the party or parties entering into a Contract with Groundsure.
"Commercial" means any building or property which is not Residential.
"Confidential Information" means the contents of this Contract and all information received from the Client as a result of, or in connection with, this Contract other than
(i) information which the Client can prove was rightfully in its possession prior to disclosure by Groundsure and
(ii) any information which is in the public domain (other than by virtue of a breach of this Contract).
"Support Services" means Support Services provided by Groundsure including, without limitation, interpreting third party and in-house environmental data, providing environmental support advice, undertaking environmental audits and assessments, Site investigation, Site monitoring and related items.
"Contract" means the contract between Groundsure and the Client for the provision of the Services, and which shall incorporate these terms and conditions, the Order, and the relevant User Guide.
"Third Party Data Provider" means any third party providing Third Party Content to Groundsure.
"Data Reports" means reports comprising factual data with no accompanying interpretation.
"Fees" has the meaning set out in clause 5.1.
"Groundsure" means Groundsure Limited, a company registered in England and Wales under number 03421028.
"Groundsure Materials" means all materials prepared by Groundsure and provided as part of the Services, including but not limited to Third Party Content, Data Reports, Mapping, and Risk Screening Reports.
"Intellectual Property" means any patent, copyright, design rights, trade or service mark, moral rights, data protection rights, know-how or trade mark in each case whether registered or not and including applications for the same or any other rights of a similar nature anywhere in the world.
"Mapping" means a map, map data or a combination of historical maps of various ages, time periods and scales.
"Order" means an electronic, written or other order form submitted by the Client requesting Services from Groundsure in respect of a specified Site.
"Ordnance Survey" means the Secretary of State for Business, Innovation and Skills, acting through Ordnance Survey, Adanac Drive, Southampton, SO16 0AS, UK.
"Order Website" means the online platform through which Orders may be placed by the Client and accepted by Groundsure.
"Report" means a Risk Screening Report or Data Report for Commercial or Residential property.
"Residential" means any building or property used as or intended to be used as a single dwelling.
"Risk Screening Report" means a risk screening report comprising factual data with an accompanying interpretation by Groundsure.
"Services" means any Report, Mapping and/or Support Services which Groundsure has agreed to provide by accepting an Order pursuant to clause 2.6.
"Site" means the area of land in respect of which the Client has requested Groundsure to provide the Services.
"Third Party Content" means data, database information or other information which is provided to Groundsure by a Third Party Data Provider.
"User Guide" means the user guide, as amended from time to time, available upon request from Groundsure and on the website (www.Groundsure.com) and forming part of this Contract.

2 Scope of Services, terms and conditions, requests for insurance and quotations

2.1 Groundsure agrees to provide the Services in accordance with the Contract.
2.2 Groundsure shall exercise reasonable skill and care in the provision of the Services.
2.3 Subject to clause 7.3 the Client acknowledges that it has not relied on any statement or representation made by or on behalf of Groundsure which is not set out and expressly agreed in writing in the Contract and all such statements and representations are hereby excluded to the fullest extent permitted by law.
2.4 The Client acknowledges that terms and conditions appearing on a Client's order form, printed stationery or other communication, or any terms or conditions implied by custom, practice or course of dealing shall be of no effect, and that this Contract shall prevail over all others in relation to the Order.
2.5 If the Client or Beneficiary requests insurance in conjunction with or as a result of the Services, Groundsure shall use reasonable endeavours to recommend such insurance, but makes no warranty that such insurance shall be available from insurers or that it will be offered on reasonable terms. Any insurance purchased by the Client or Beneficiary shall be subject solely to the terms of the policy issued by insurers and Groundsure will have no liability therefor. In addition you acknowledge and agree that Groundsure does not act as an agent or broker for any insurance providers. The Client should take (and ensure that the Beneficiary takes) independent advice to ensure that the insurance policy requested or offered is suitable for its requirements.
2.6 Groundsure's quotations or proposals are valid for a period of 30 days only unless an alternative period of time is explicitly stipulated by Groundsure. Groundsure reserves the right to withdraw any quotation or proposal at any time before an Order is accepted by Groundsure. Groundsure's acceptance of an Order shall be binding only when made in writing and signed by Groundsure's authorised representative or when accepted through the Order Website.

3 The Client's obligations

3.1The Client shall comply with the terms of this Contract and
(i) procure that the Beneficiary or any third party relying on the Services complies with and acts as if it is bound by the Contract and
(ii) be liable to Groundsure for the acts and omissions of the Beneficiary or any third party relying on the Services as if such acts and omissions were those of the Client.
3.2 The Client shall be solely responsible for ensuring that the Services are appropriate and suitable for its and/or the Beneficiary's needs.
3.3 The Client shall supply to Groundsure as soon as practicable and without charge all requisite information (and the Client warrants that such information is accurate, complete and appropriate), including without limitation any environmental information relating to the Site and shall give such assistance as Groundsure shall reasonably require in the provision of the Services including, without limitation, access to the Site, facilities and equipment.
3.4 Where the Client's approval or decision is required to enable Groundsure to carry out work in order to provide the Services, such approval or decision shall be given or procured in reasonable time and so as not to delay or disrupt the performance of the Services.
3.5 Save as expressly permitted by this Contract the Client shall not, and shall procure that the Beneficiary shall not, re-sell, alter, add to, or amend the Groundsure Materials, or use the Groundsure Materials in a manner for which they were not intended. The Client may make the Groundsure Materials available to a third party who is considering acquiring some or all of, or providing funding in relation to, the Site, but such third party cannot rely on the same unless expressly permitted under clause 4.
3.6 The Client is responsible for maintaining the confidentiality of its user name and password if using the Order Website and the Client acknowledges that Groundsure accepts no liability of any kind for any loss or damage suffered by the Client as a consequence of using the Order Website.

4 Reliance

4.1The Client acknowledges that the Services provided by Groundsure consist of the presentation and analysis of Third Party Content and other content and that information obtained from a Third Party Data Provider cannot be guaranteed or warranted by Groundsure to be reliable.
4.2 In respect of Data Reports, Mapping and Risk Screening Reports, the following classes of person and no other are entitled to rely on their contents;
(i) the Beneficiary,
(ii) the Beneficiary's professional advisers, (iii) any person providing funding to the Beneficiary in relation to the Site (whether directly or as part of a lending syndicate),
(iv) the first purchaser or first tenant of the Site, and
(v) the professional advisers and lenders of the first purchaser or tenant of the Site.
4.3 In respect of Support Services, only the Client, Beneficiary and parties expressly named in a Report and no other parties are entitled to rely on its contents.
4.4 Save as set out in clauses 4.2 and 4.3 and unless otherwise expressly agreed in writing, no other person or entity of any kind is entitled to rely on any Services or Report issued or provided by Groundsure. Any party considering such Reports and Services does so at their own risk.

5 Fees and Disbursements

5.1Groundsure shall charge and the Client shall pay fees at the rate and frequency specified in the written proposal, Order Website or Order acknowledgement form, plus (in the case of Support Services) all proper disbursements incurred by Groundsure. The Client shall in addition pay all value added tax or other tax payable on such fees and disbursements in relation to the provision of the Services (together "Fees").
5.2 The Client shall pay all outstanding Fees to Groundsure in full without deduction, counterclaim or set off within 30 days of the date of Groundsure's invoice or such other period as may be agreed in writing between Groundsure and the Client ("Payment Date"). Interest on late payments will accrue on a daily basis from the Payment Date until the date of payment (whether before or after judgment) at the rate of 8% per annum.
5.3 The Client shall be deemed to have agreed the amount of any invoice unless an objection is made in writing within 28 days of the date of the invoice. As soon as reasonably practicable after being notified of an objection, without prejudice to clause 5.2 a member of Groundsure's management team will contact the Client and the parties shall then use all reasonable endeavours to resolve the dispute within 15 days.

6 Intellectual Property and Confidentiality

6.1 Subject to
(i) full payment of all relevant Fees and
(ii) compliance with this Contract, the Client is granted (and is permitted to sub-licence to the Beneficiary) a royalty-free, worldwide, non-assignable and (save to the extent set out in this Contract) non-transferable licence to make use of the Groundsure Materials.
6.2 All Intellectual Property in the Groundsure Materials are and shall remain owned by Groundsure or Groundsure's licensors (including without limitation the Third Party Data Providers) the Client acknowledges, and shall procure

acknowledgement by the Beneficiary of, such ownership. Nothing in this Contract purports to transfer or assign any rights to the Client or the Beneficiary in respect of such Intellectual Property.
6.3 Third Party Data Providers may enforce any breach of clauses 6.1 and 6.2 against the Client or Beneficiary.
6.4 The Client shall, and shall procure that any recipients of the Groundsure Materials shall:

(i) not remove, suppress or modify any trade mark, copyright or other proprietary marking belonging to Groundsure or any third party from the Services;

(ii) use the information obtained as part of the Services in respect of the subject Site only, and shall not store or reuse any information obtained as part of the Services provided in respect of adjacent or nearby sites;

(iii) not create any product or report which is derived directly or indirectly from the Services (save that those acting in a professional capacity to the Beneficiary may provide advice based upon the Services);

(iv) not combine the Services with or incorporate such Services into any other information data or service;

(v) not reformat or otherwise change (whether by modification, addition or enhancement), the Services (save that those acting for the Beneficiary in a professional capacity shall not be in breach of this clause 6.4(v) where such reformatting is in the normal course of providing advice based upon the Services);

(vi) where a Report and/or Mapping contains material belonging to Ordnance Survey, acknowledge and agree that such content is protected by Crown Copyright and shall not use such content for any purpose outside of receiving the Services; and

(vii) not copy in whole or in part by any means any map prints or run-on copies containing content belonging to Ordnance Survey (other than that contained within Ordnance Survey's OS Street Map) without first being in possession of a valid Paper Map Copying Licence from Ordnance Survey,

6.5 Notwithstanding clause 6.4, the Client may make reasonable use of the Groundsure Materials in order to advise the Beneficiary in a professional capacity. However, Groundsure shall have no liability in respect of any advice, opinion or report given or provided to Beneficiaries by the Client.
6.6 The Client shall procure that any person to whom the Services are made available shall notify Groundsure of any request or requirement to disclose, publish or disseminate any information contained in the Services in accordance with the Freedom of Information Act 2000, the Environmental Information Regulations 2004 or any associated legislation or regulations in force from time to time.

7.Liability: Particular Attention Should Be Paid To This Clause

7.1 This Clause 7 sets out the entire liability of Groundsure, including any liability for the acts or omissions of its employees, agents, consultants, subcontractors and Third Party Content, in respect of:

(i) any breach of contract, including any deliberate breach of the Contract by Groundsure or its employees, agents or subcontractors;

(ii) any use made of the Reports, Services, Materials or any part of them; and

(iii) any representation, statement or tortious act or omission (including negligence) arising under or in connection with the Contract.

7.2 All warranties, conditions and other terms implied by statute or common law are, to the fullest extent permitted by law, excluded from the Contract.
7.3 Nothing in the Contract limits or excludes the liability of the Supplier for death or personal injury resulting from negligence, or for any damage or liability incurred by the Client or Beneficiary as a result of fraud or fraudulent misrepresentation.
7.4 Groundsure shall not be liable for

(i) loss of profits;
(ii) loss of business;
(iii) depletion of goodwill and/or similar losses;
(iv) loss of anticipated savings;
(v) loss of goods;
(vi) loss of contract;
(vii) loss of use;
(viii) loss or corruption of data or information;
(ix) business interruption;
(x) any kind of special, indirect, consequential or pure economic loss, costs, damages, charges or expenses;
(xi) loss or damage that arise as a result of the use of all or part of the Groundsure Materials in breach of the Contract;
(xii) loss or damage arising as a result of any error, omission or inaccuracy in any part of the Groundsure Materials where such error, omission or inaccuracy is caused by any Third Party Content or any reasonable interpretation of Third Party Content;
(xiii) loss or damage to a computer, software, modem, telephone or other property; and
(xiv) loss or damage caused by a delay or loss of use of Groundsure's internet ordering service.

7.5 Groundsure's total liability in relation to or under the Contract shall be limited to £10 million for any claim or claims.
7.6 Groundsure shall procure that the Beneficiary shall be bound by limitations and exclusions of liability in favour of Groundsure which accord with those detailed in clauses 7.4 and 7.5 (subject to clause 7.3) in respect of all claims which the Beneficiary may bring against Groundsure in relation to the Services or other matters arising pursuant to the Contract.

8 Groundsure's right to suspend or terminate

8.1 If Groundsure reasonably believes that the Client or Beneficiary has not provided the information or assistance required to enable the proper provision of the Services, Groundsure shall be entitled to suspend all further performance of the Services until such time as any such deficiency has been made good.
8.2 Groundsure shall be entitled to terminate the Contract immediately on written notice in the event that:

(i) the Client fails to pay any sum due to Groundsure within 30 days of the Payment Date; or

(ii) the Client (being an individual) has a bankruptcy order made against him or (being a company) shall enter into liquidation whether compulsory or voluntary or have an administration order made against it or if a receiver shall be appointed over the whole or any part of its property assets or undertaking or if the Client is struck off the Register of Companies or dissolved; or

(iii) the Client being a company is unable to pay its debts within the meaning of Section 123 of the Insolvency Act 1986 or being an individual appears unable to pay his debts within the meaning of Section 268 of the Insolvency Act 1986 or if the Client shall enter into a composition or arrangement with the Client's creditors or shall suffer distress or execution to be levied on his goods; or

(iv) the Client or the Beneficiary breaches any term of the Contract (including, but not limited to, the obligations in clause 4) which is incapable of remedy or if remediable, is not remedied within five days of notice of the breach.

9. Client's Right to Terminate and Suspend

9.1 Subject to clause 10.1, the Client may at any time upon written notice terminate or suspend the provision of all or any of the Services.
9.2 In any event, where the Client is a consumer (and not a business) he/she hereby expressly acknowledges and agrees that:

(i) the supply of Services under this Contract (and therefore the performance of this Contract) commences immediately upon Groundsure's acceptance of the Order; and

(ii) the Reports and/or Mapping provided under this Contract are

(a) supplied to the Client's specification(s) and in any event
(b) by their nature cannot be returned.

10 Consequences of Withdrawal, Termination or Suspension

10.1 Upon termination of the Contract:

(i) Groundsure shall take steps to bring to an end the Services in an orderly manner, vacate any Site with all reasonable speed and shall deliver to the Client and/or Beneficiary any property of the Client and/or Beneficiary in Groundsure's possession or control; and

(ii) the Client shall pay to Groundsure all and any Fees payable in respect of the performance of the Services up to the date of termination or suspension. In respect of any Support Services provided, the Client shall also pay Groundsure any additional costs incurred in relation to the termination or suspension of the Contract.

11 Anti-Bribery

11.1 The Client warrants that it shall:

(i) comply with all applicable laws, statutes and regulations relating to anti-bribery and anti-corruption including but not limited to the Bribery Act 2010;

(ii) comply with such of Groundsure's anti-bribery and anti-corruption policies as are notified to the Client from time to time; and

(iii) promptly report to Groundsure any request or demand for any undue financial or other advantage of any kind received by or on behalf of the Client in connection with the performance of this Contract.

11.2 Breach of this Clause 11 shall be deemed a material breach of this Contract.

12 General

12.1 The Mapping contained in the Services is protected by Crown copyright and must not be used for any purpose other than as part of the Services or as specifically provided in the Contract.
12.2 The Client shall be permitted to make one copy only of each Report or Mapping Order. Thereafter the Client shall be entitled to make unlimited copies of the Report or Mapping Order only in accordance with an Ordnance Survey paper map copy license available through Groundsure.
12.3 Groundsure reserves the right to amend or vary this Contract. No amendment or variation to this Contract shall be valid unless signed by an authorised representative of Groundsure.
12.4 No failure on the part of Groundsure to exercise, and no delay in exercising, any right, power or provision under this Contract shall operate as a waiver thereof.
12.5 Save as expressly provided in this Contract, no person other than the persons set out therein shall have any right under the Contract (Rights of Third Parties) Act 1999 to enforce any terms of the Contract.
12.6 The Secretary of State for Business, Innovation and Skills ("BIS") or BIS' successor body, as the case may be, acting through Ordnance Survey may enforce a breach of clause 6.4(vi) and clause 6.4(vii) of these terms and conditions against the Client in accordance with the provisions of the Contracts (Rights of Third Parties) Act 1999.
12.7 Groundsure shall not be liable to the Client if the provision of the Services is delayed or prevented by one or more of the following circumstances:

(i) the Client or Beneficiary's failure to provide facilities, access or information;
(ii) fire, storm, flood, tempest or epidemic;
(iii) Acts of God or the public enemy;
(iv) riot, civil commotion or war;
(v) strikes, labour disputes or industrial action;
(vi) acts or regulations of any governmental or other agency;
(vii) suspension or delay of services at public registries by Third Party Data Providers;
(viii) changes in law; or
(ix) any other reason beyond Groundsure's reasonable control.

In the event that Groundsure is prevented from performing the Services (or any part thereof) in accordance with this clause 12.6 for a period of not less than 30 days then Groundsure shall be entitled to terminate this Contract immediately on written notice to the Client.

12.8 Any notice provided shall be in writing and shall be deemed to be properly given if delivered by hand or sent by first class post, facsimile or by email to the address, facsimile number or email address of the relevant party as may have been notified by each party to the other for such purpose or in the absence of such notification the last known address.

12.9 Such notice shall be deemed to have been received on the day of delivery if delivered by hand, facsimile or email (save to the extent such day is not a working day where it shall be deemed to have been delivered on the next working day) and on the second working day after the day of posting if sent by first class post.

12.10 The Contract constitutes the entire agreement between the parties and shall supersede all previous arrangements between the parties relating to the subject matter hereof.

12.11 Each of the provisions of the Contract is severable and distinct from the others and if one or more provisions is or should become invalid, illegal or unenforceable, the validity and enforceability of the remaining provisions shall not in any way be tainted or impaired.

12.12 This Contract shall be governed by and construed in accordance with English law and any proceedings arising out of or connected with this Contract shall be subject to the exclusive jurisdiction of the English courts.

12.13 Groundsure is an executive member of the Council of Property Search Organisation (CoPSO) and has signed up to the Search Code administered by the Property Codes Compliance Board (PCCB). All Risk Screening Reports shall be supplied in accordance with the provisions of the Search Code.

12.14 If the Client or Beneficiary has a complaint about the Services, written notice should be given to the Compliance Officer at Groundsure who will respond in a timely manner. In the event you are not satisfied with Groundsure's complaints handling process or you are unable to resolve the complaint, at your discretion you may refer the complaint to The Property Ombudsman Scheme at the following URL/email: website www.tpos.co.uk or email: admin@tpos.co.uk

12.15 The Client agrees that it shall, and shall procure that each Beneficiary shall, treat in confidence all Confidential Information and shall not, and shall procure that each Beneficiary shall not (i) disclose any Confidential Information to any third party other than in accordance with the terms of this Contract; and (ii) use Confidential Information for a purpose other than the exercise of its rights and obligations under this Contract. Subject to clause 6.6, nothing shall prevent the Client or any Beneficiary from disclosing Confidential Information to the extent
required by law

Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: 1056 Scale Town Plan

Map date: **1850**

Scale: 1:1,056

Printed at: 1:1,056

N
W E
S

Surveyed 1848
Revised N/A
Edition 1850
Copyright N/A
Levelled N/A

Produced by
Groundsure Insights
www.groundsure.com

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 29 July 2016

To view map legend click here *Legend*

Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: 1056 Scale Town Plan

Map date: **1864**

Scale: 1:1,056

Printed at: 1:1,056

N
W E
S

Surveyed 1848
Revised 1864
Edition N/A
Copyright 1850
Levelled N/A

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Supplied by:
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Production date: 29 July 2016

To view map legend click here *Legend*

Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: County Series

Map date: **1893**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1893
Revised 1893
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 29 July 2016

To view map legend click here *Legend*

Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: County Series

Map date: **1908**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1908
Revised 1908
Edition N/A
Copyright N/A
Levelled N/A

Produced by
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Supplied by:
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groundsure@centremaps.com

Production date: 29 July 2016

To view map legend click here *Legend*

Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: County Series

Map date: **1927**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1927
Revised 1927
Edition N/A
Copyright N/A
Levelled N/A

Groundsure INSIGHTS

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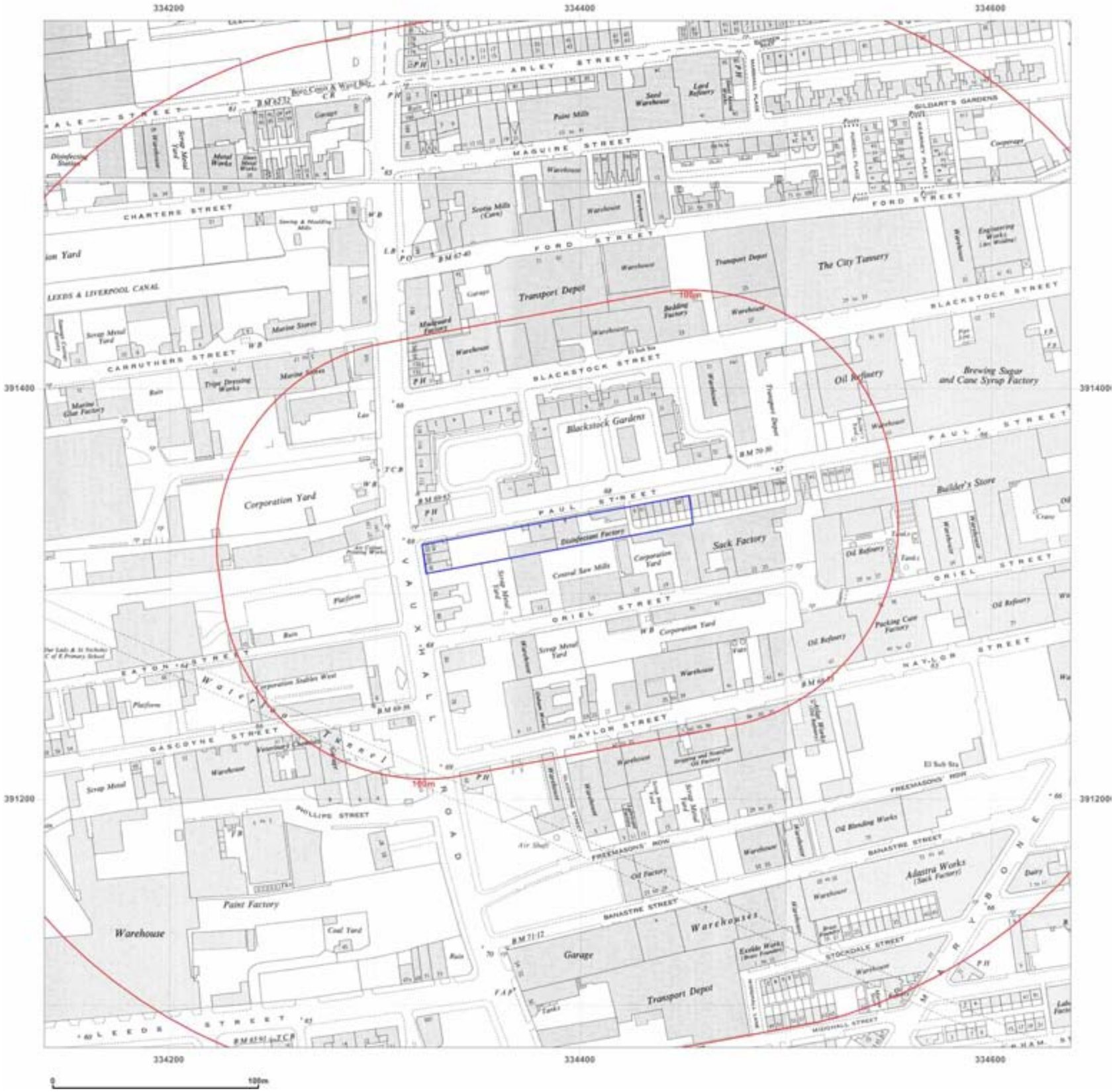
www.groundsure.com

Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 29 July 2016

To view map legend click here *Legend*



Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: National Grid

Map date: **1953**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

Surveyed 1953
Revised 1953
Edition N/A
Copyright N/A
Levelled 1947

Surveyed 1953
Revised 1953
Edition N/A
Copyright N/A
Levelled 1947

Surveyed 1953
Revised 1953
Edition N/A
Copyright N/A
Levelled 1947

Surveyed 1953
Revised 1953
Edition N/A
Copyright N/A
Levelled 1947

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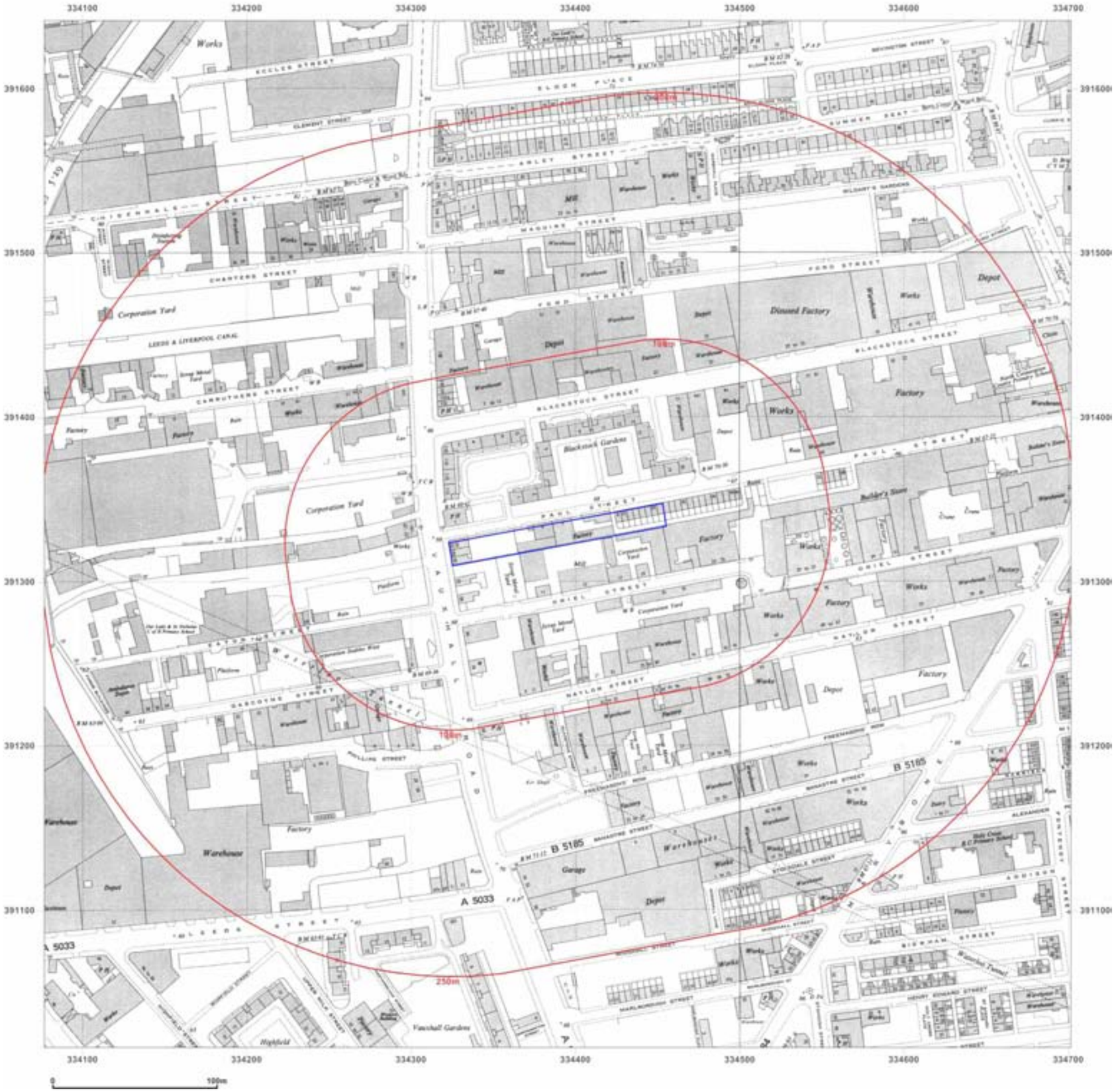
Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 29 July 2016

To view map legend click here *Legend*



CCG

Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: National Grid

Map date: **1959**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1959
Revised 1959
Edition 1961
Copyright 1961
Levelled 1947

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www.groundsure.com

Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 29 July 2016

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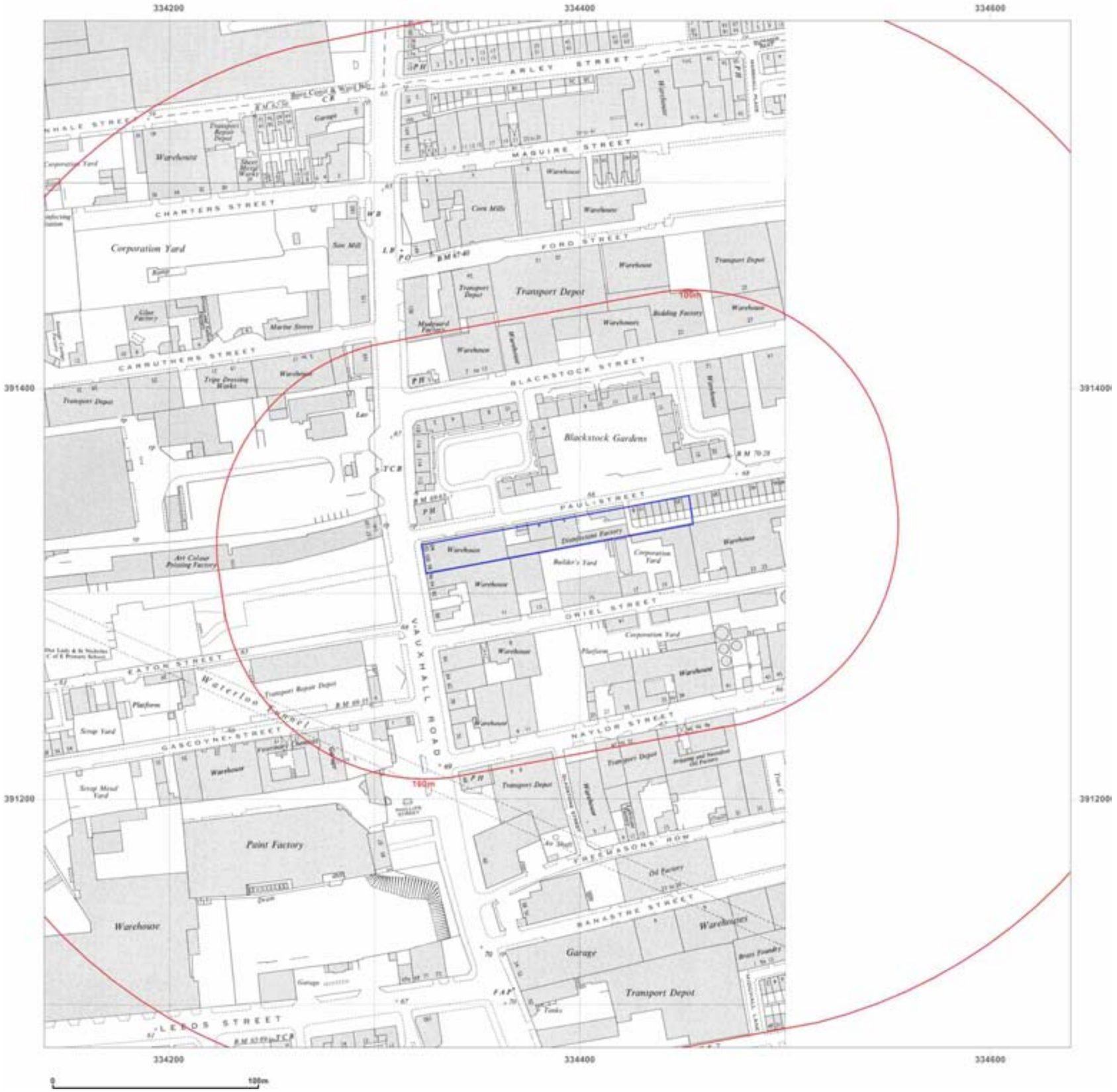

CCG

Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: National Grid

Map date: **1965**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

Surveyed 1953
Revised 1964
Edition N/A
Copyright 1965
Levelled 1960

Surveyed 1953
Revised 1964
Edition N/A
Copyright 1965
Levelled 1960

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Production date: 29 July 2016

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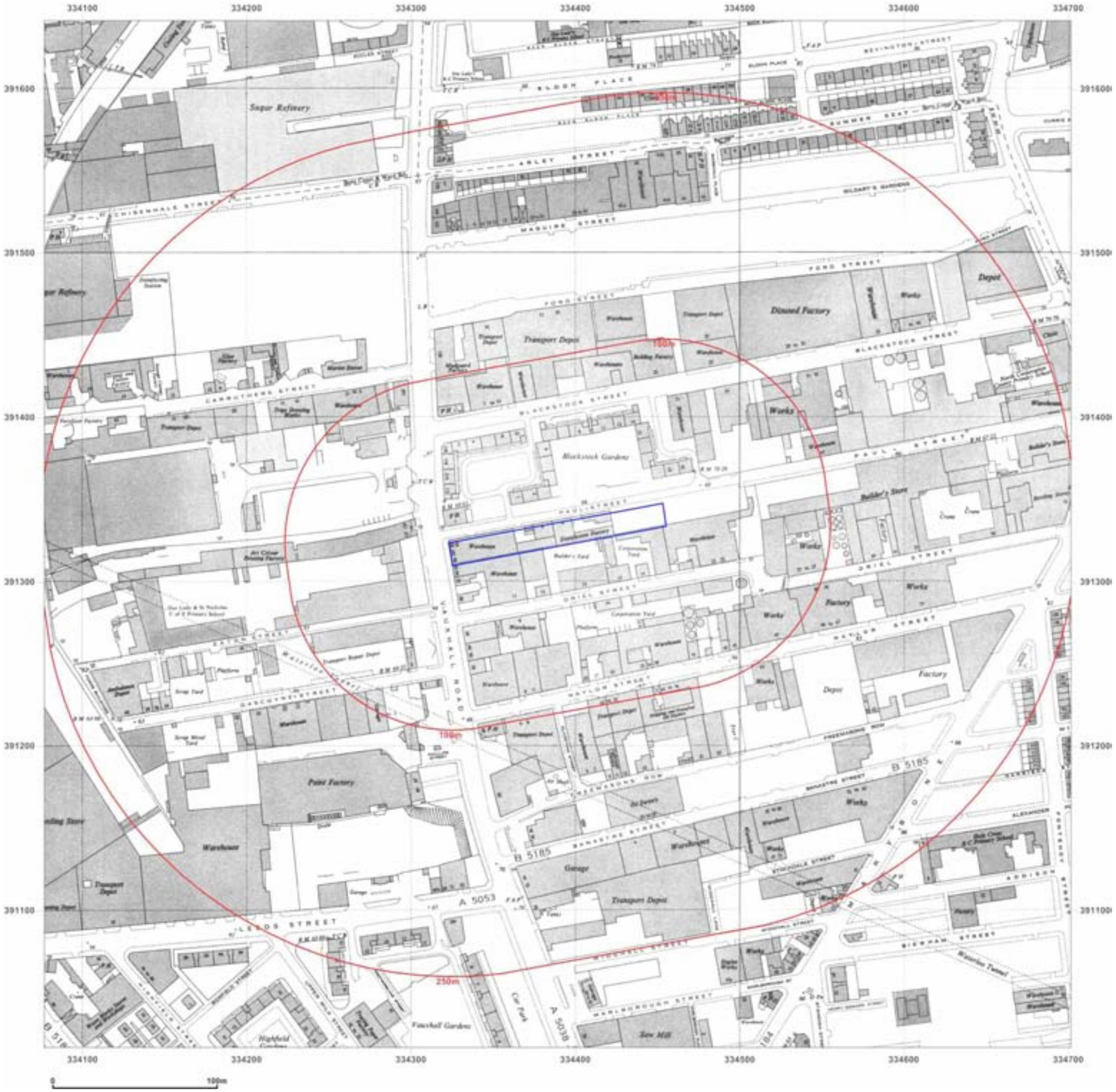

Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: National Grid

Map date: **1970**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1970
Revised 1970
Edition N/A
Copyright 1971
Levelled 1960

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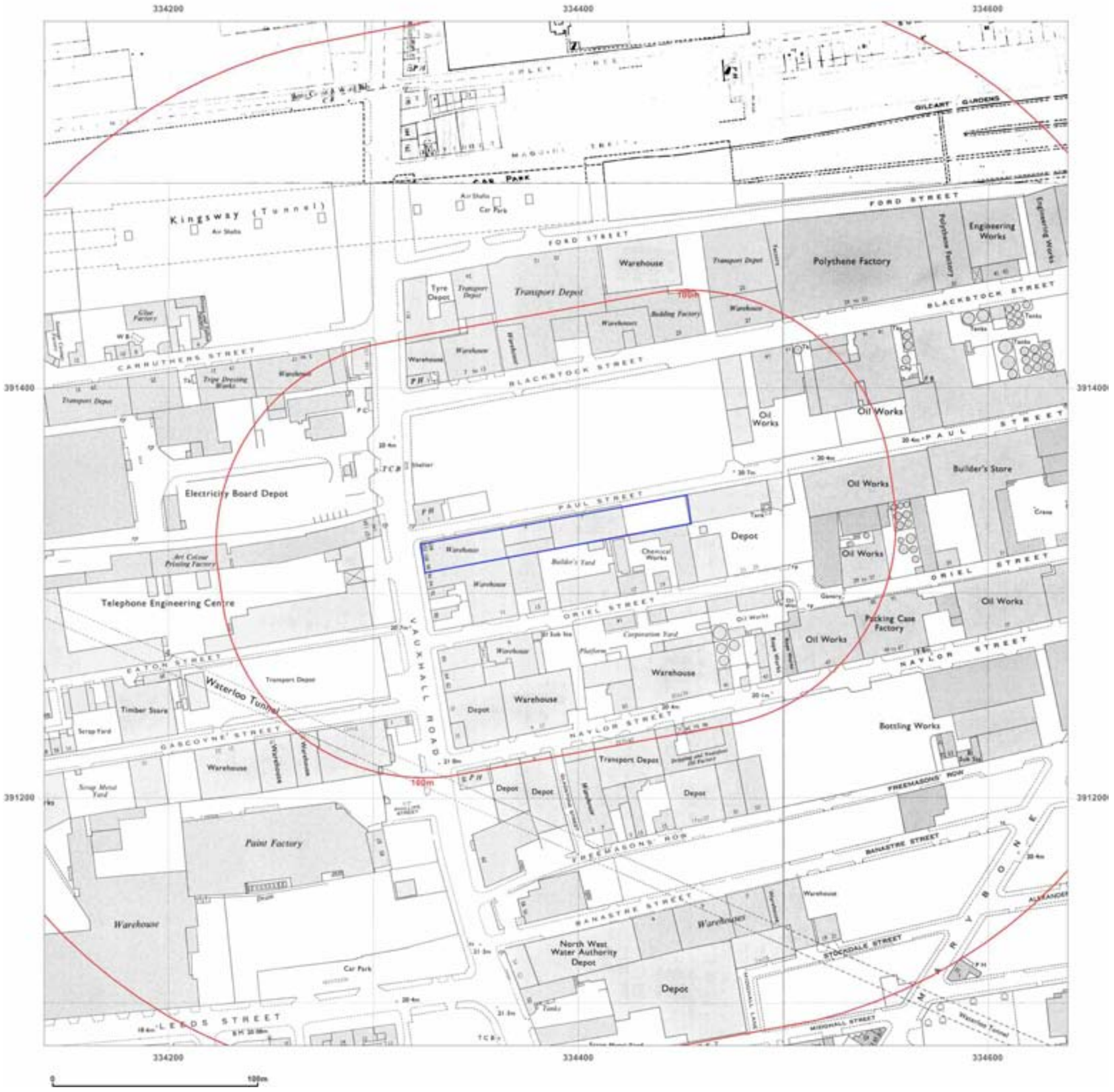
Production date: 29 July 2016

To view map legend click here *Legend*



Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: National Grid

Map date: **1973-1976**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1973
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1974
Levelled N/A

Surveyed 1953
Revised 1975
Edition N/A
Copyright 1976
Levelled 1960

Surveyed 1953
Revised 1973
Edition N/A
Copyright 1973
Levelled 1960

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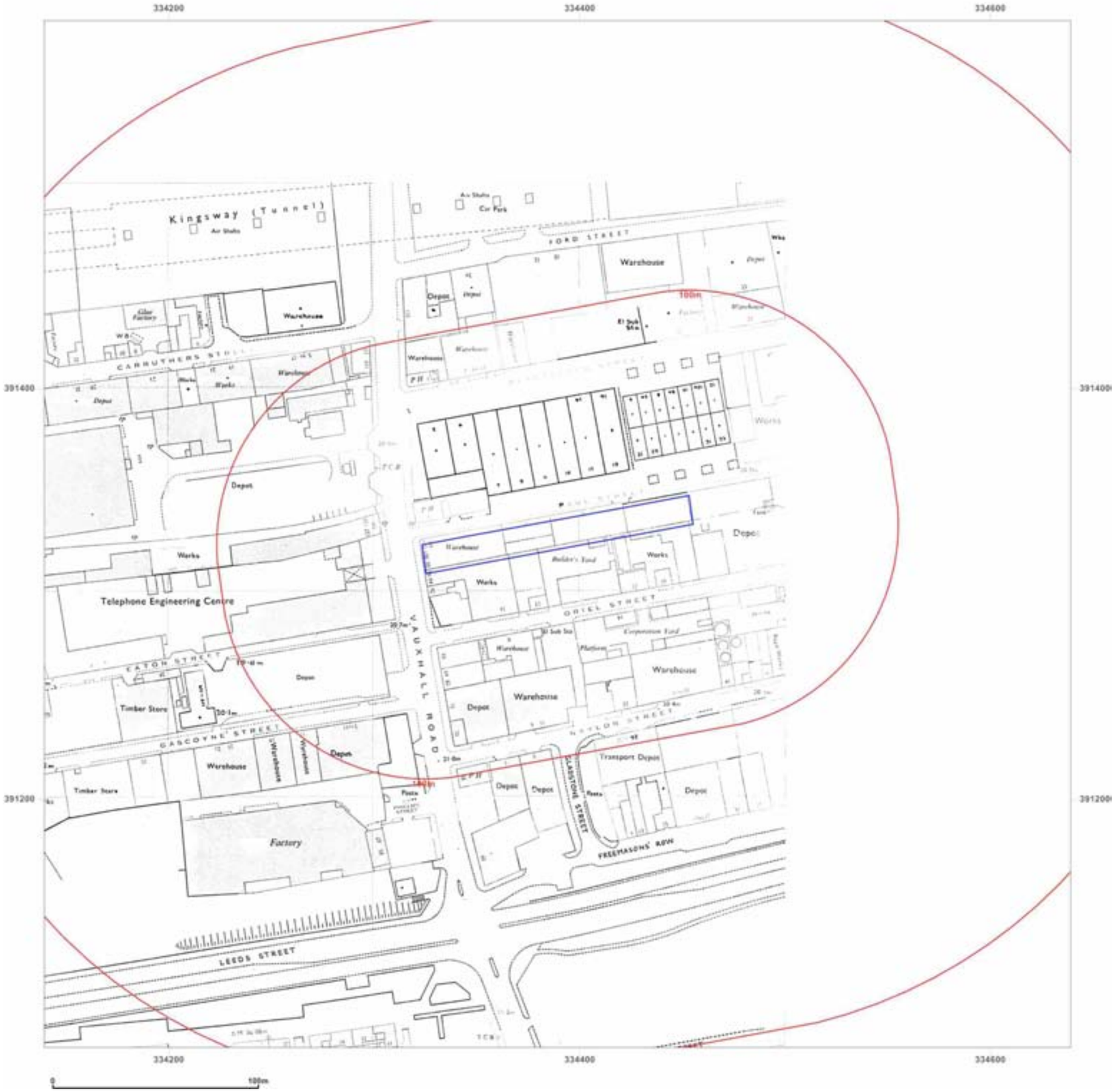
Production date: 29 July 2016

To view map legend click here *Legend*



Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: National Grid

Map date: **1983**

Scale: 1:1,250

Printed at: 1:2,000

N
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Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: National Grid

Map date: **1983-1987**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1984
Levelled 1960

Surveyed 1960
Revised 1985
Edition N/A
Copyright 1985
Levelled 1960

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1987
Levelled 1960

Surveyed 1960
Revised 1983
Edition N/A
Copyright 1983
Levelled 1960

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Production date: 29 July 2016

To view map legend click here *Legend*

Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: National Grid

Map date: **1987-1989**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

Surveyed 1960 Revised 1988 Edition N/A Copyright 1988 Levelled 1960	Surveyed 1960 Revised 1988 Edition N/A Copyright 1988 Levelled 1960
Surveyed 1953 Revised 1989 Edition N/A Copyright 1989 Levelled N/A	Surveyed 1960 Revised 1987 Edition N/A Copyright 1987 Levelled 1960

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Production date: 29 July 2016

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Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: National Grid

Map date: **1988-1993**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

Surveyed 1960
Revised 1989
Edition N/A
Copyright 1989
Levelled 1960

Surveyed 1953
Revised 1989
Edition N/A
Copyright 1990
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

Surveyed 1953
Revised 1988
Edition N/A
Copyright 1988
Levelled 1960

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Production date: 29 July 2016

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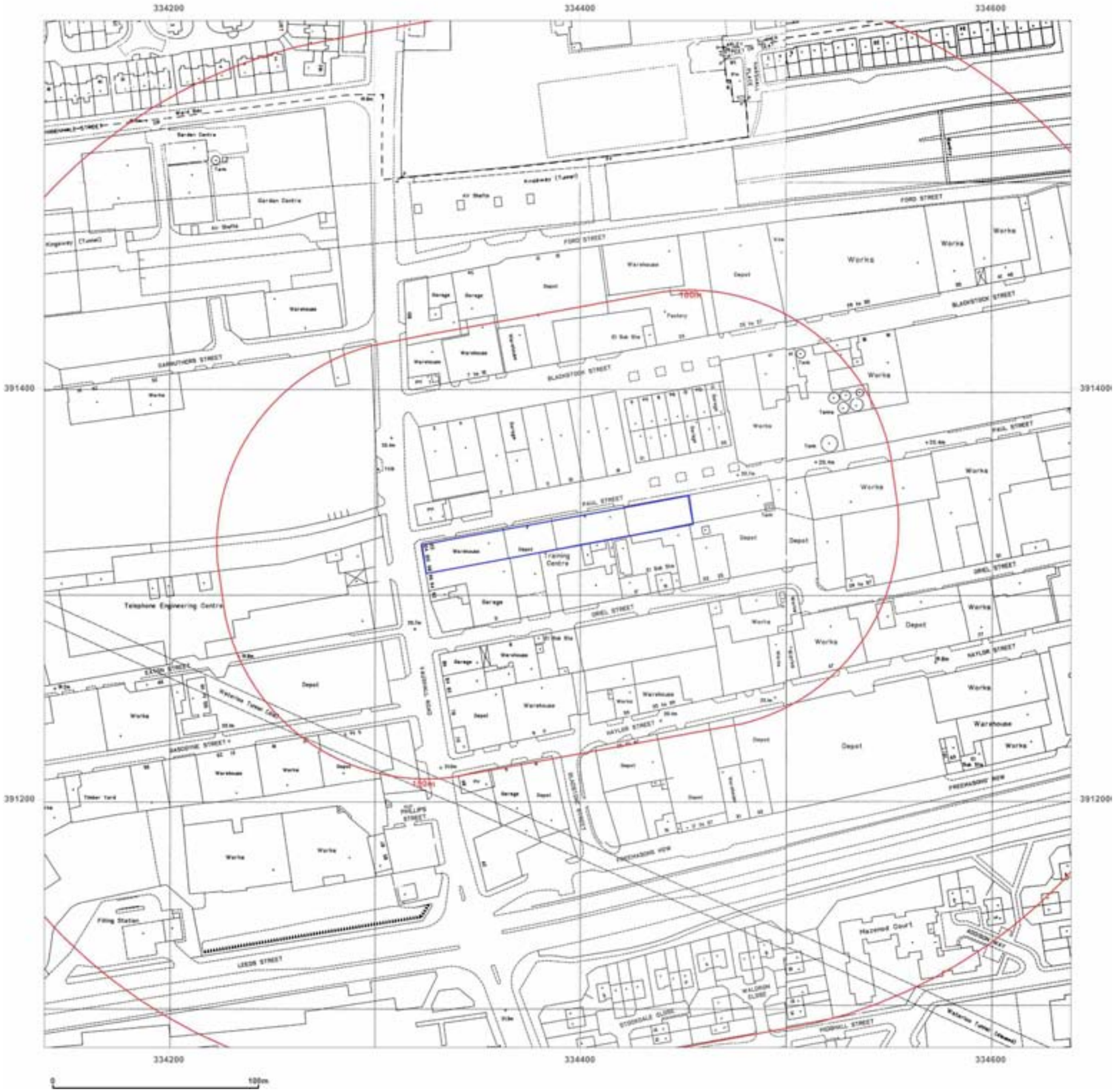

Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: National Grid

Map date: **1993-1995**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
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Surveyed N/A Revised N/A Edition N/A Copyright 1993 Levelled N/A	Surveyed 1993 Revised 1993 Edition N/A Copyright 1993 Levelled N/A
Surveyed 1995 Revised 1995 Edition N/A Copyright 1995 Levelled N/A	Surveyed 1995 Revised 1995 Edition N/A Copyright 1995 Levelled N/A

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Production date: 29 July 2016

To view map legend click here *Legend*

Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: County Series

Map date: **1851**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1849
Revised N/A
Edition 1851
Copyright N/A
Levelled N/A

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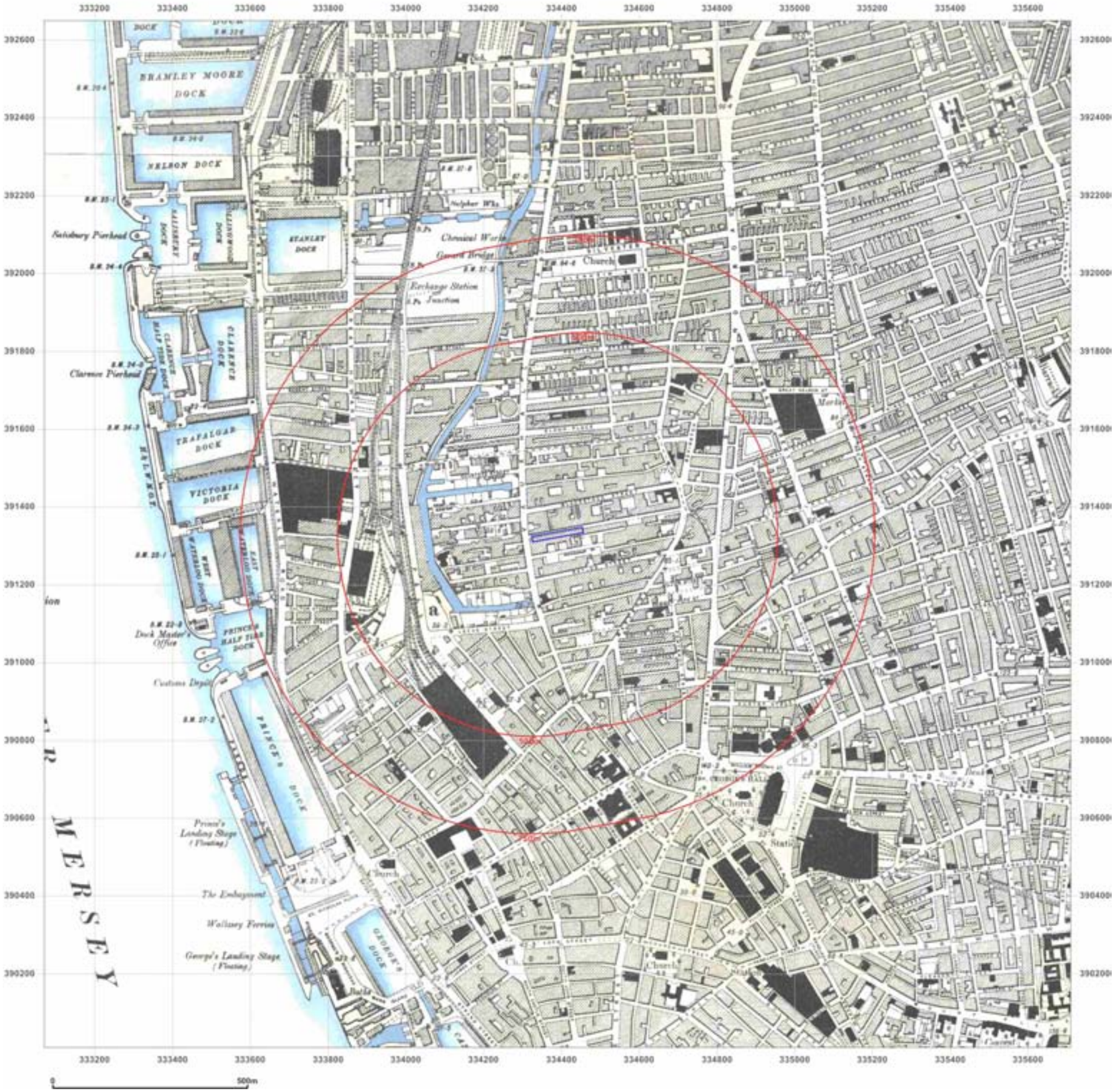
Production date: 29 July 2016

To view map legend click here *Legend*



Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: County Series

Map date: **1890**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1890
Revised 1890
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1890
Revised 1890
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 29 July 2016

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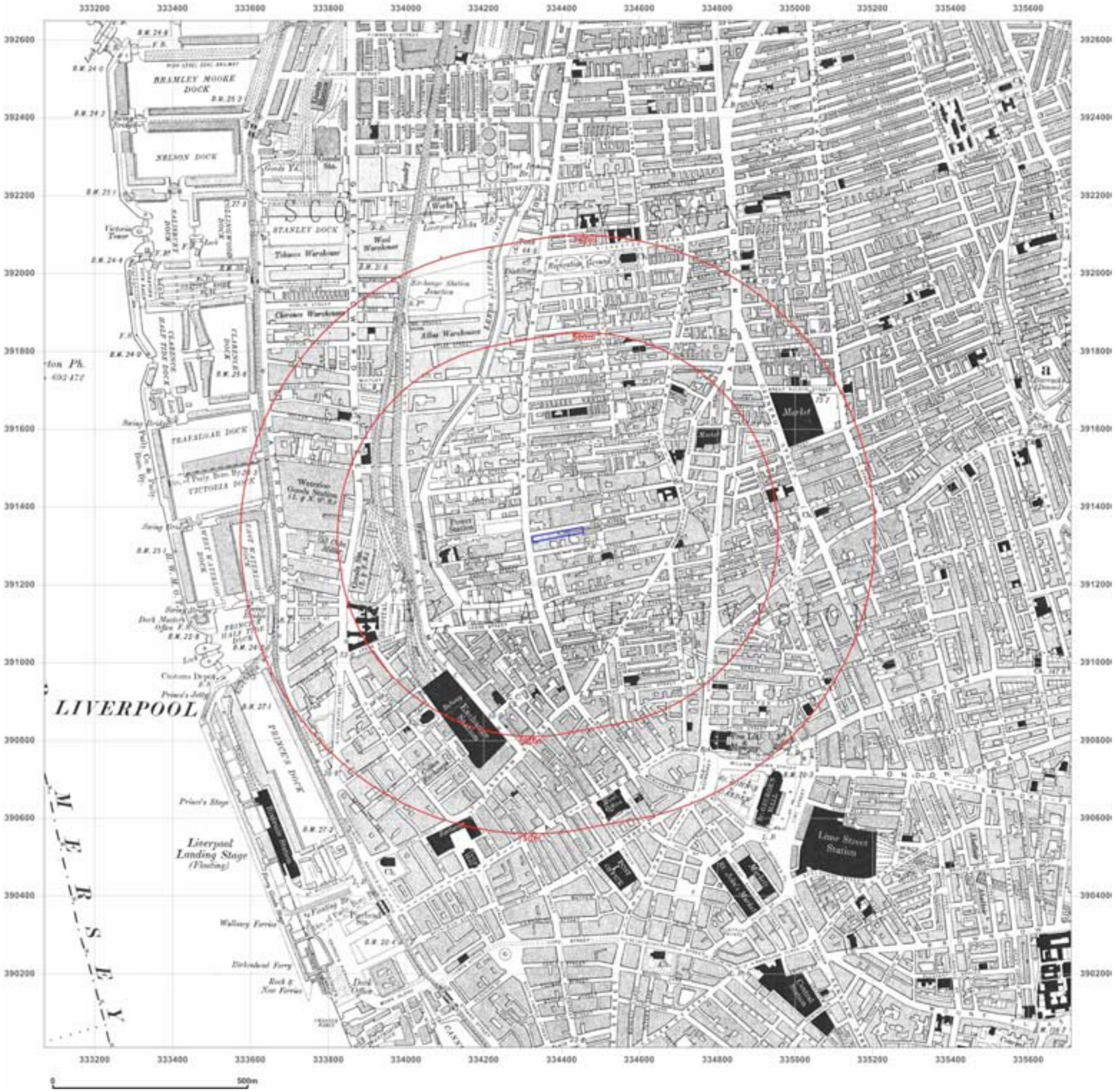


Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: County Series

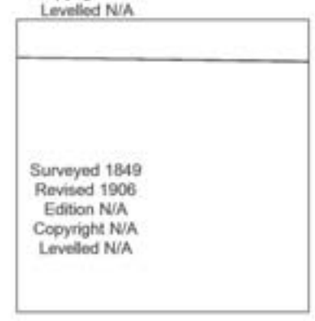
Map date: **1906-1907**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1849
Revised 1907
Edition N/A
Copyright N/A
Levelled N/A



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Production date: 29 July 2016

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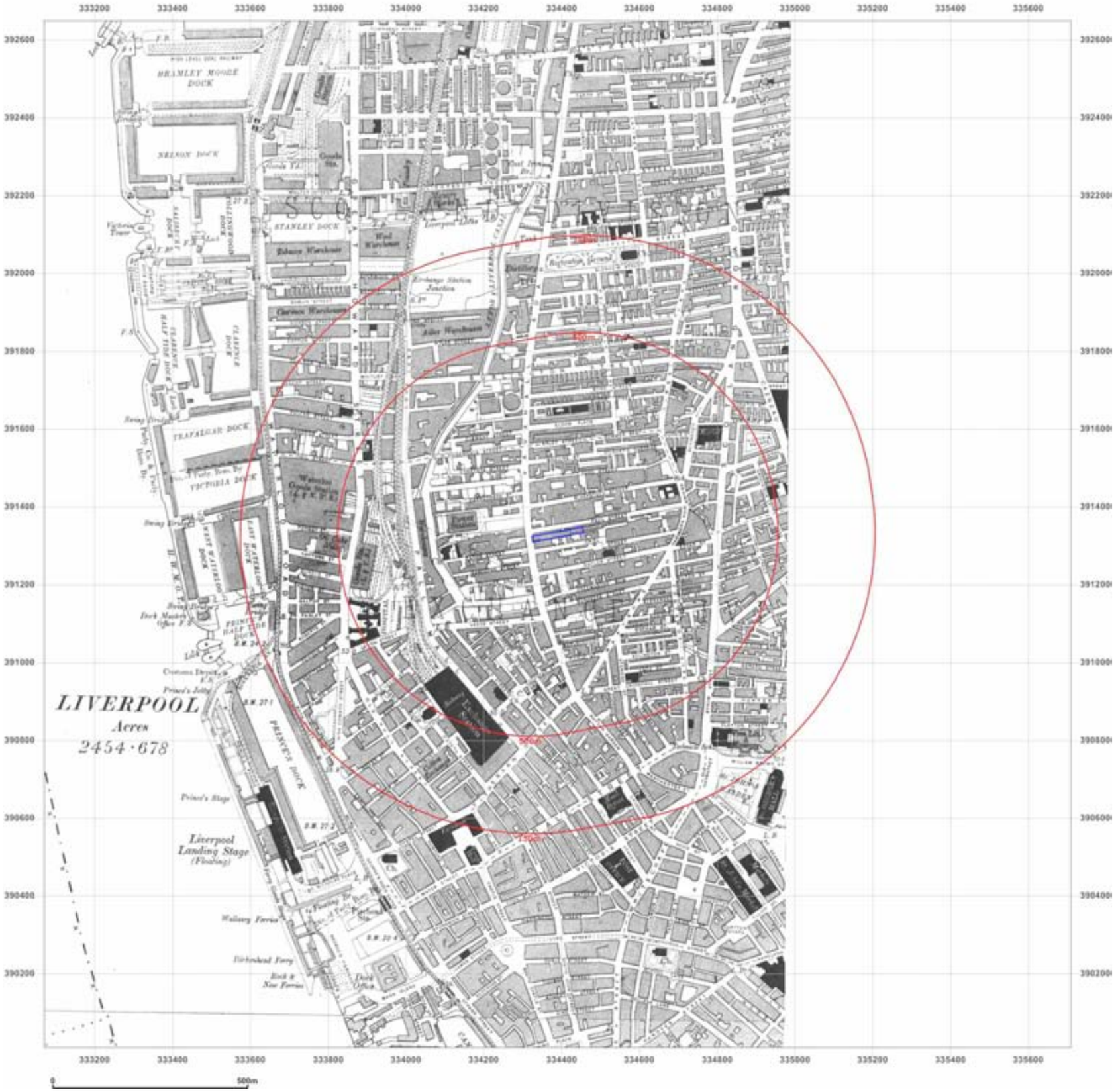

Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: County Series

Map date: **1909**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
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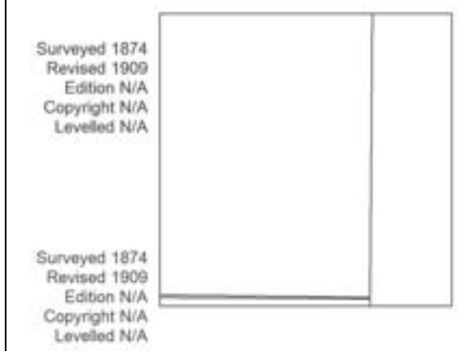

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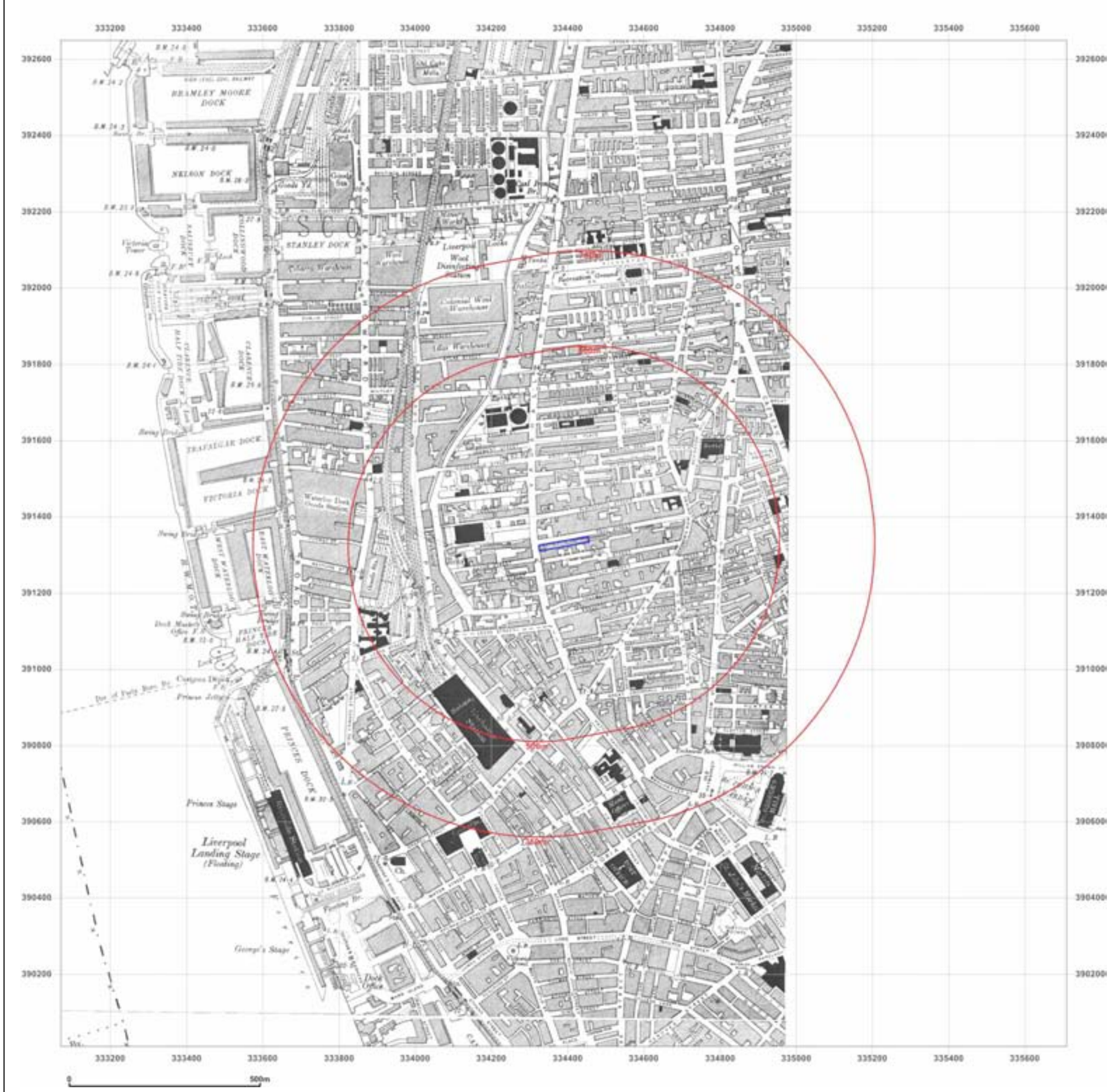
groundsure@centremaps.com

Production date: 29 July 2016

To view map legend click here *Legend*



Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

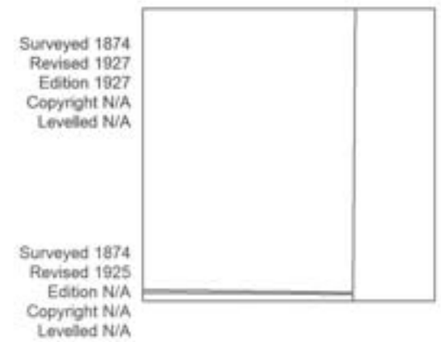
Map Name: County Series

Map date: **1925-1927**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S



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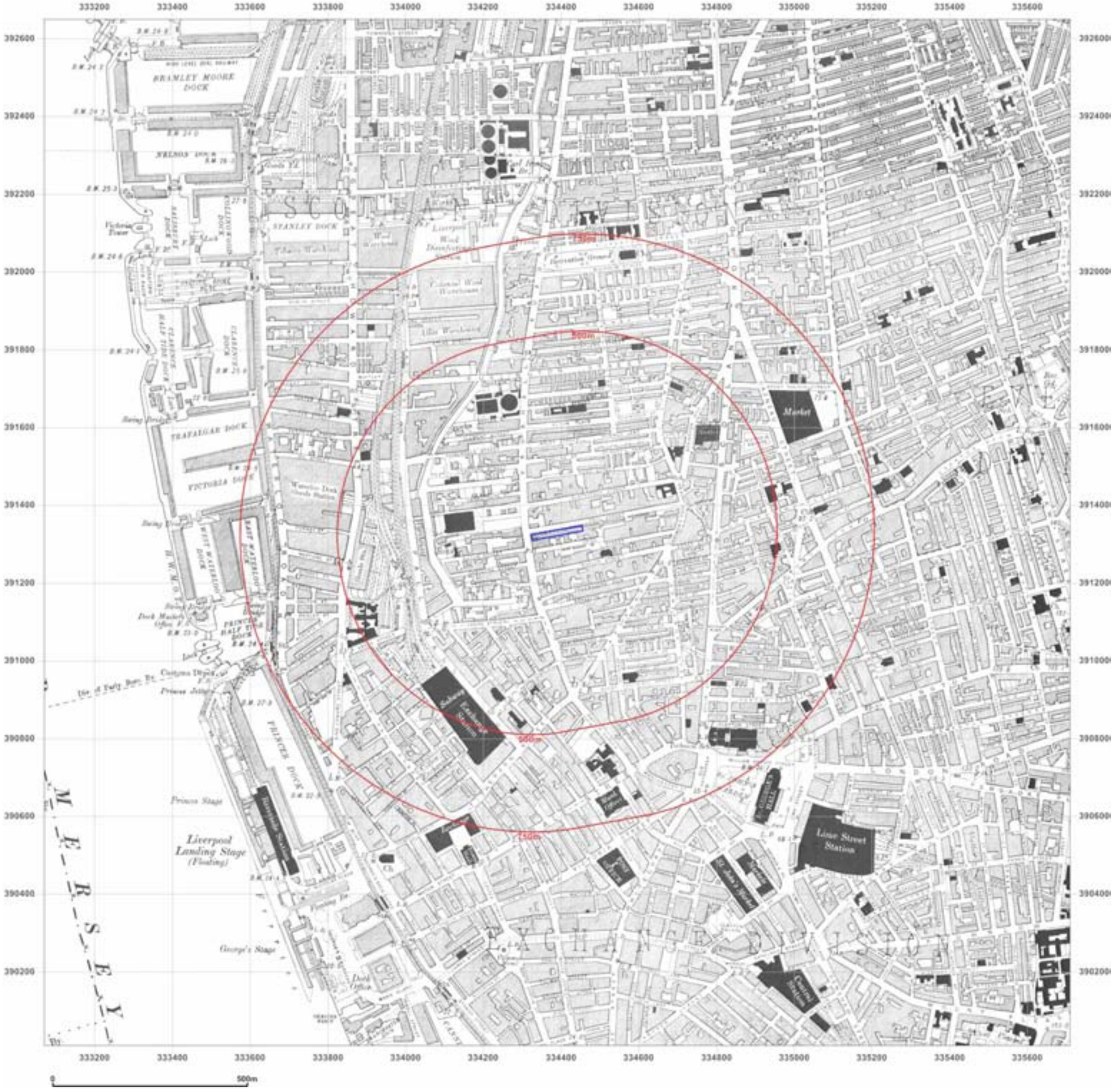
Production date: 29 July 2016

To view map legend click here *Legend*



Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: County Series

Map date: **1928**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1849
Revised 1928
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1849
Revised 1928
Edition 1928
Copyright N/A
Levelled N/A

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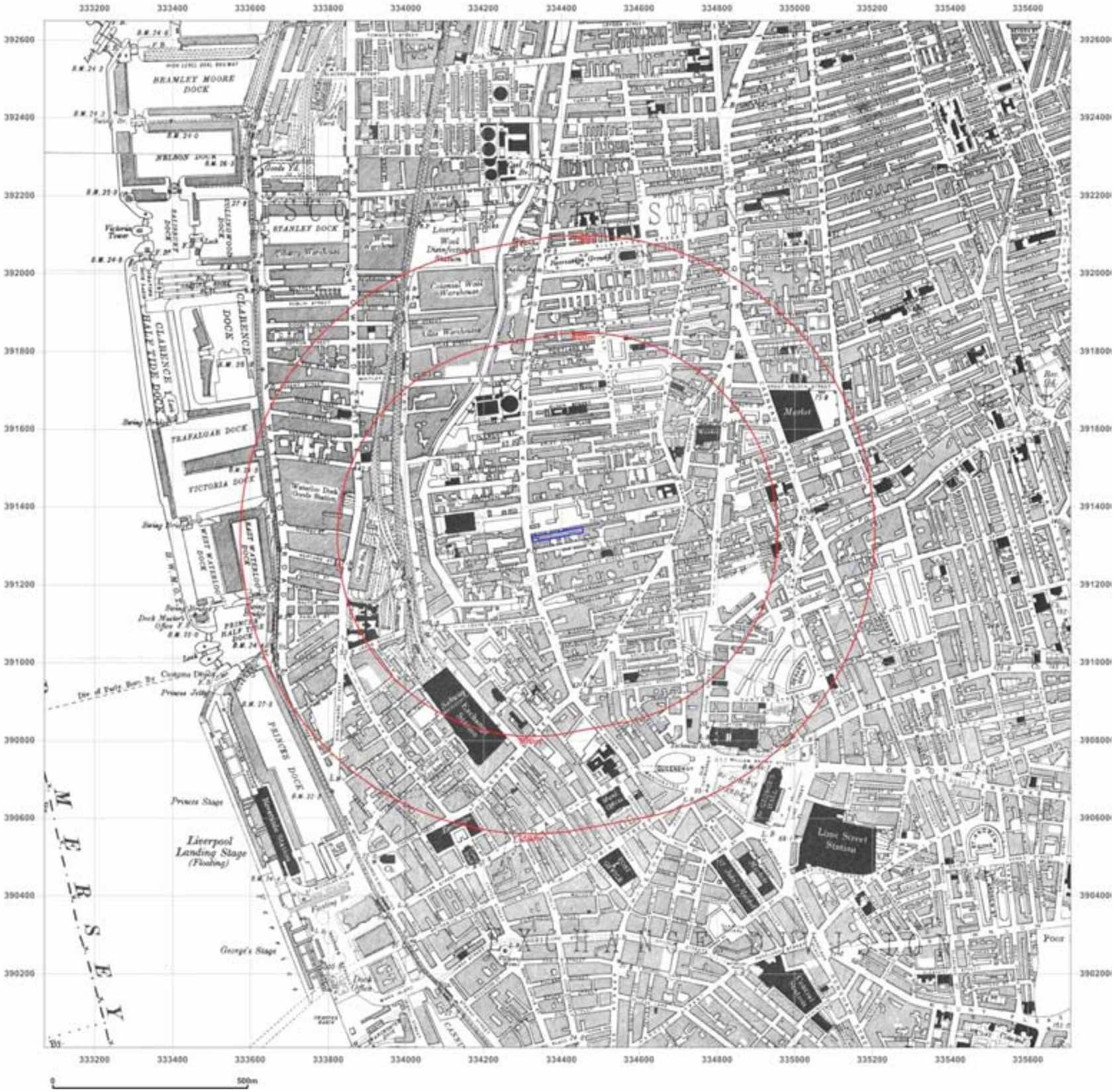
Production date: 29 July 2016

To view map legend click here *Legend*



Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: County Series

Map date: **1938**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1849
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1849
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 29 July 2016

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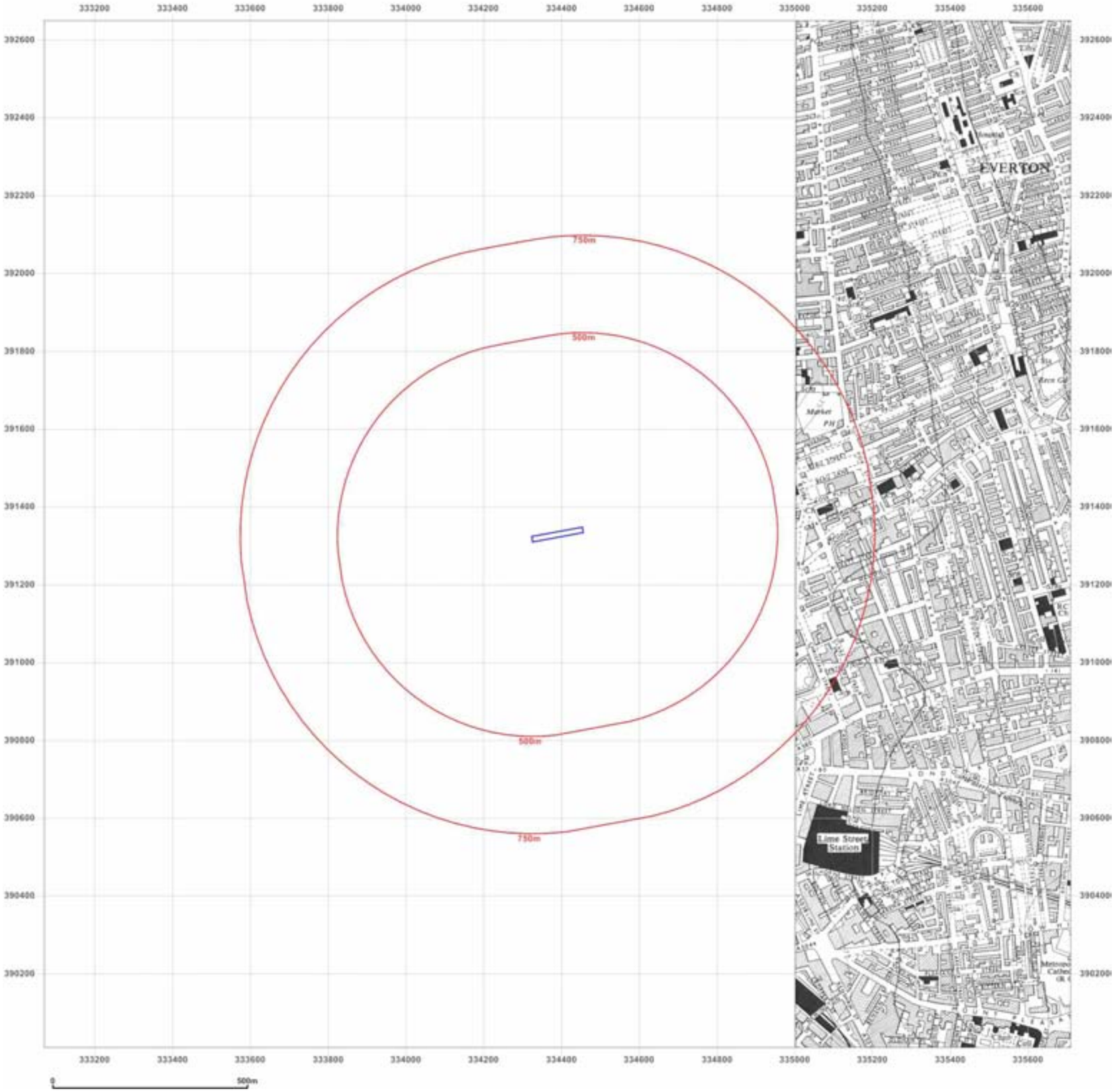

Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: Provisional

Map date: **1957**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1957
Revised 1957
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 29 July 2016

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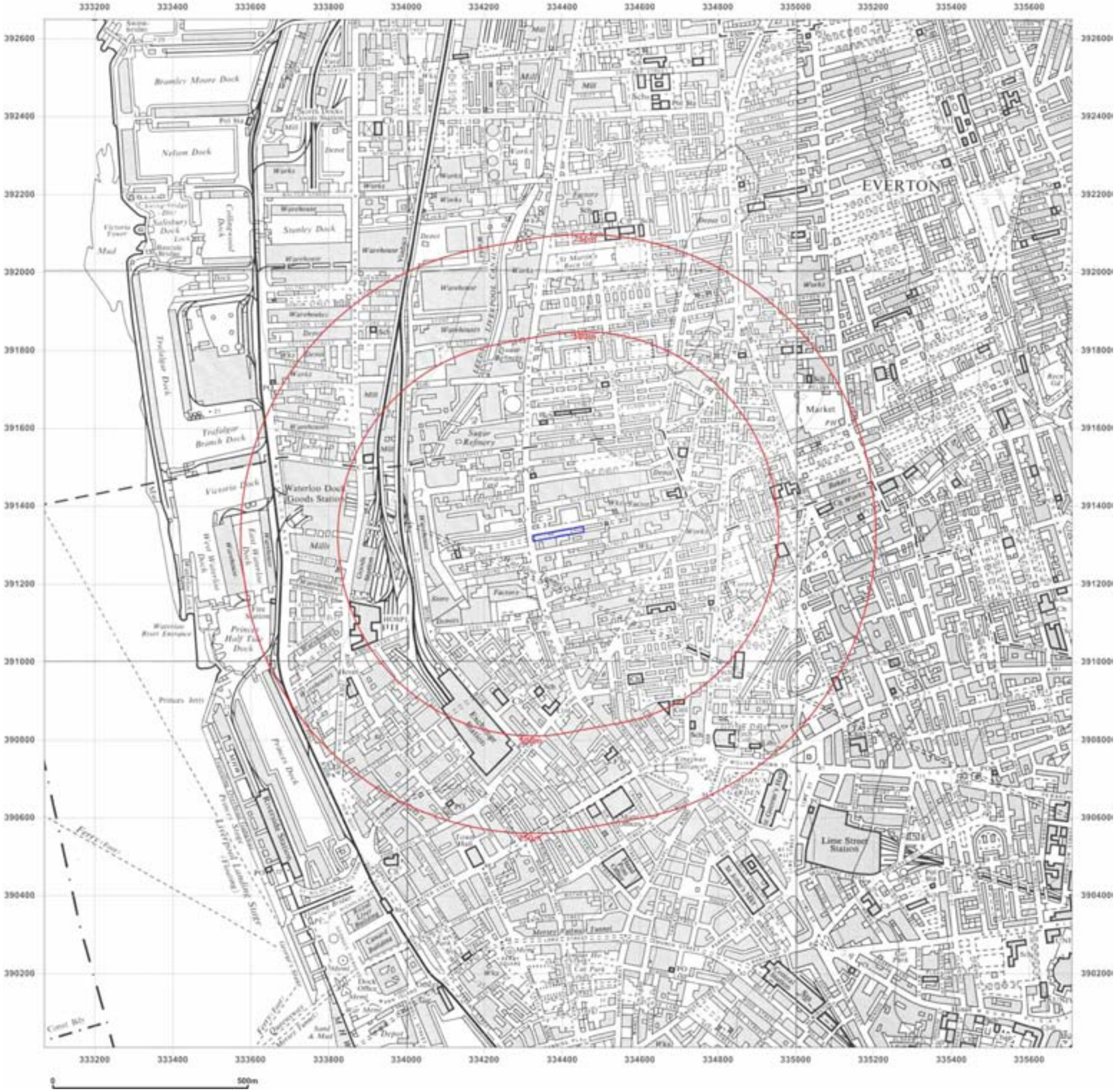

Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: Provisional

Map date: **1967-1968**

Scale: 1:10,560

Printed at: 1:10,560

N
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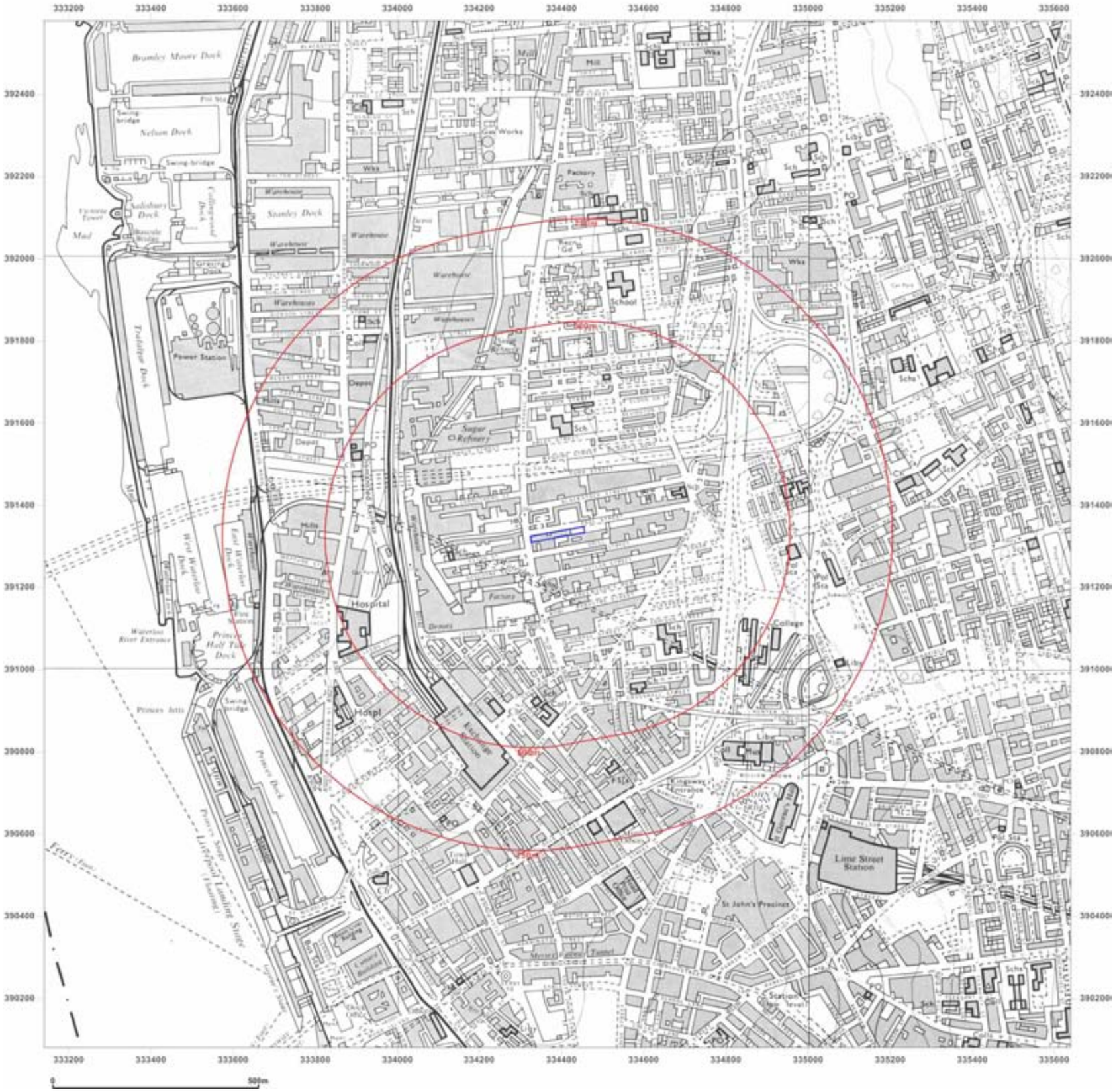
Production date: 29 July 2016

To view map legend click here *Legend*



Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: National Grid

Map date: **1973-1977**

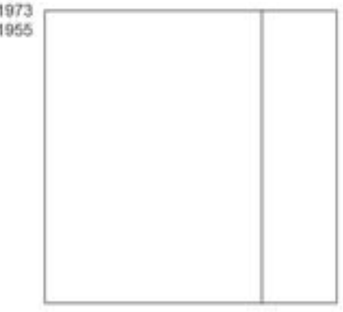
Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

Surveyed 1972
Revised 1973
Edition N/A
Copyright 1973
Levelled 1955

Surveyed 1974
Revised 1977
Edition N/A
Copyright 1977
Levelled 1976



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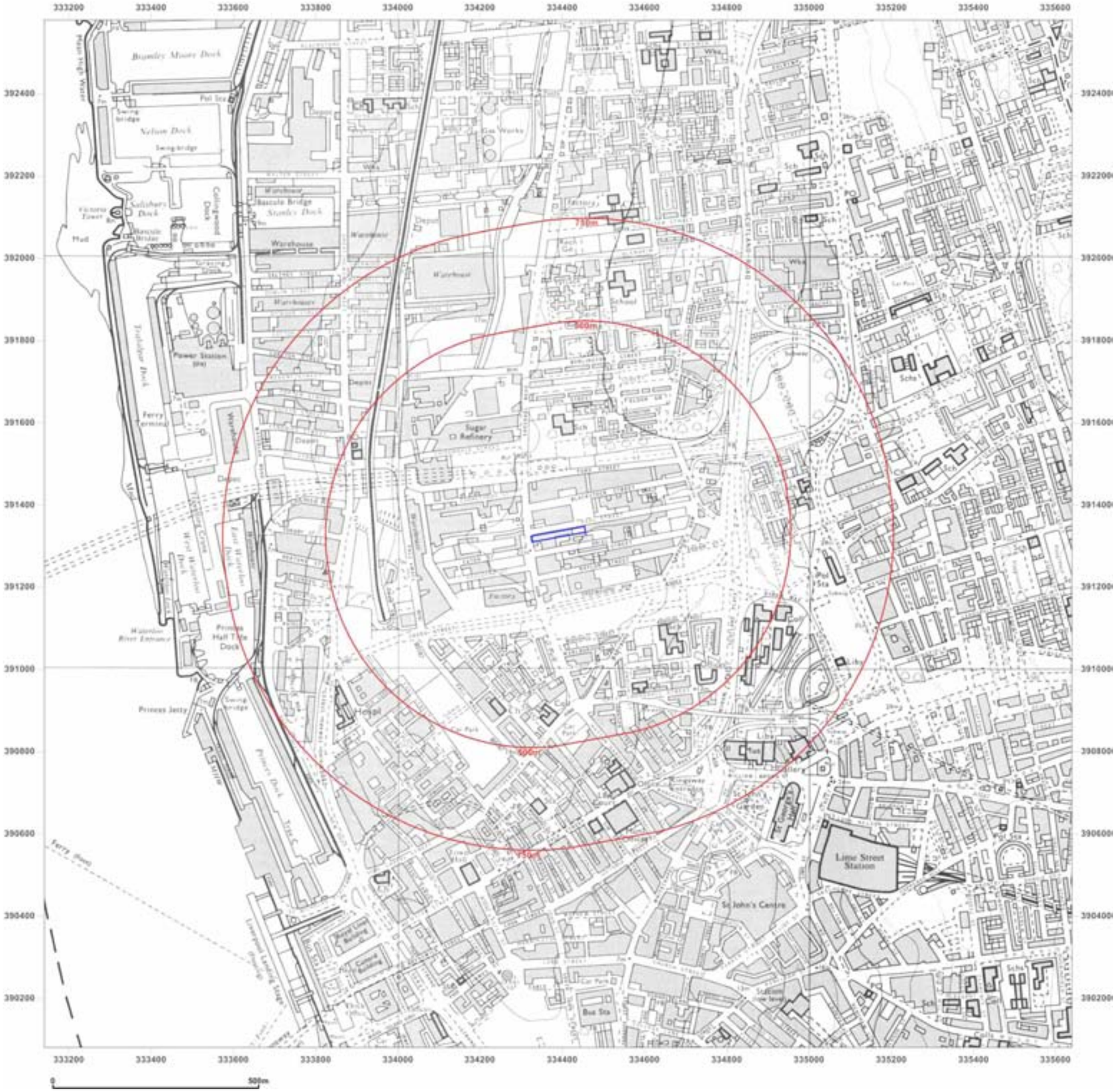
Production date: 29 July 2016

To view map legend click here *Legend*



Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: National Grid

Map date: **1977-1982**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

Surveyed 1981
Revised 1982
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1974
Revised 1977
Edition N/A
Copyright 1977
Levelled 1976

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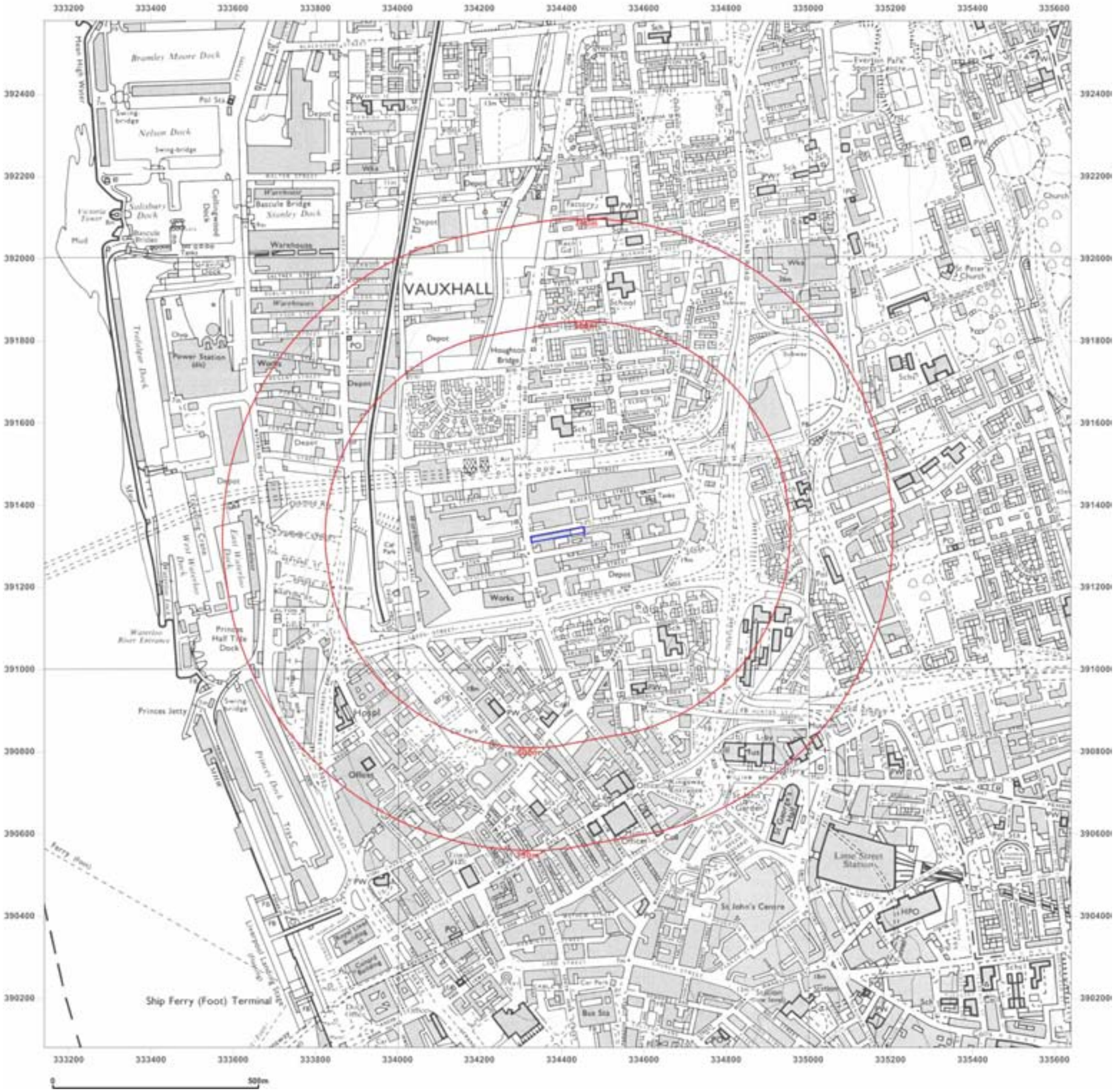
Production date: 29 July 2016

To view map legend click here *Legend*



Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: National Grid

Map date: **1989-1990**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

Surveyed 1989
Revised 1990
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1987
Revised 1989
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 29 July 2016

To view map legend click here *Legend*

Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: 1:10,000 Raster

Map date: **2002**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
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2002

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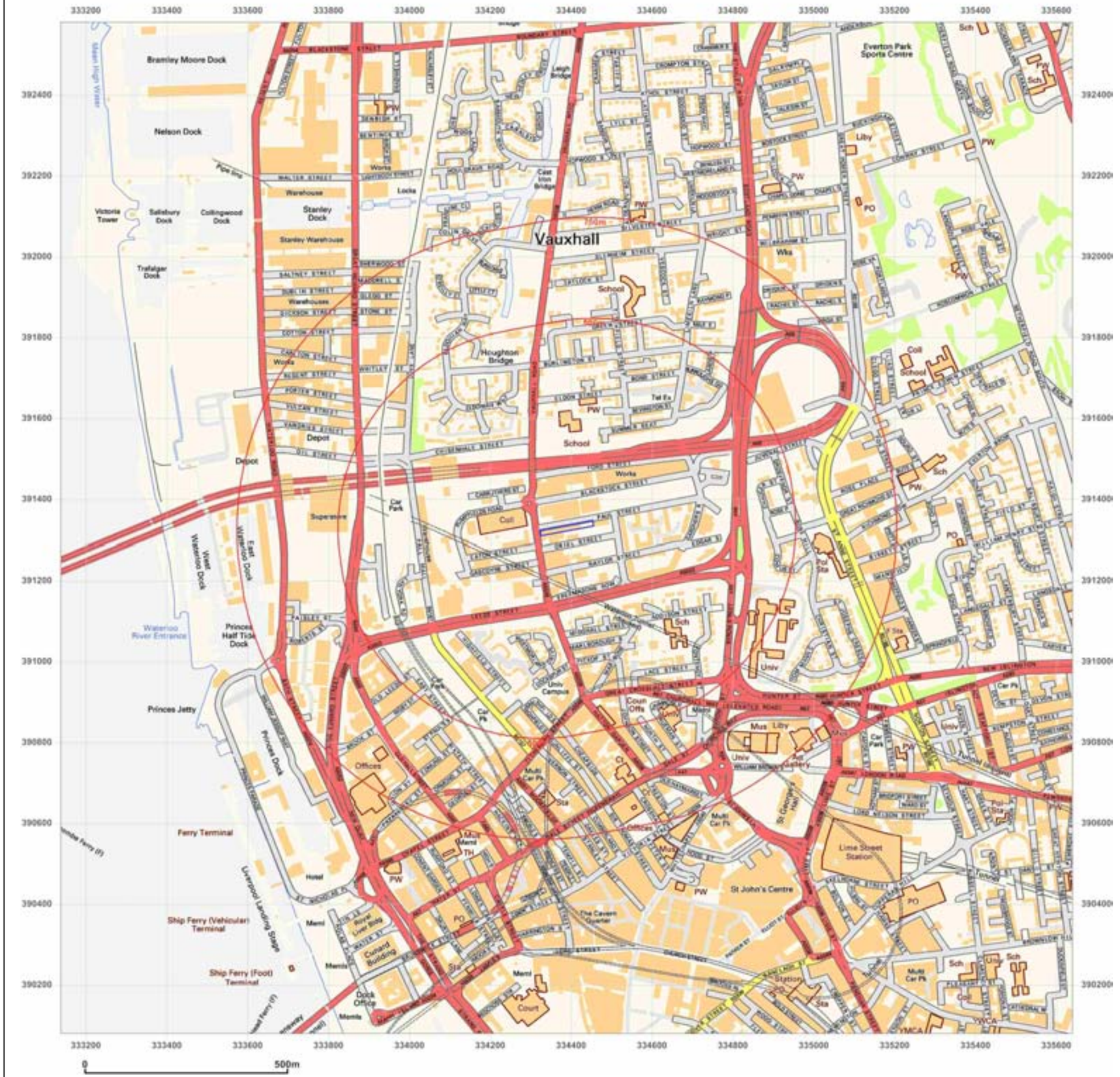
Production date: 29 July 2016

To view map legend click here *Legend*



Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: National Grid

Map date: **2010**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

2010

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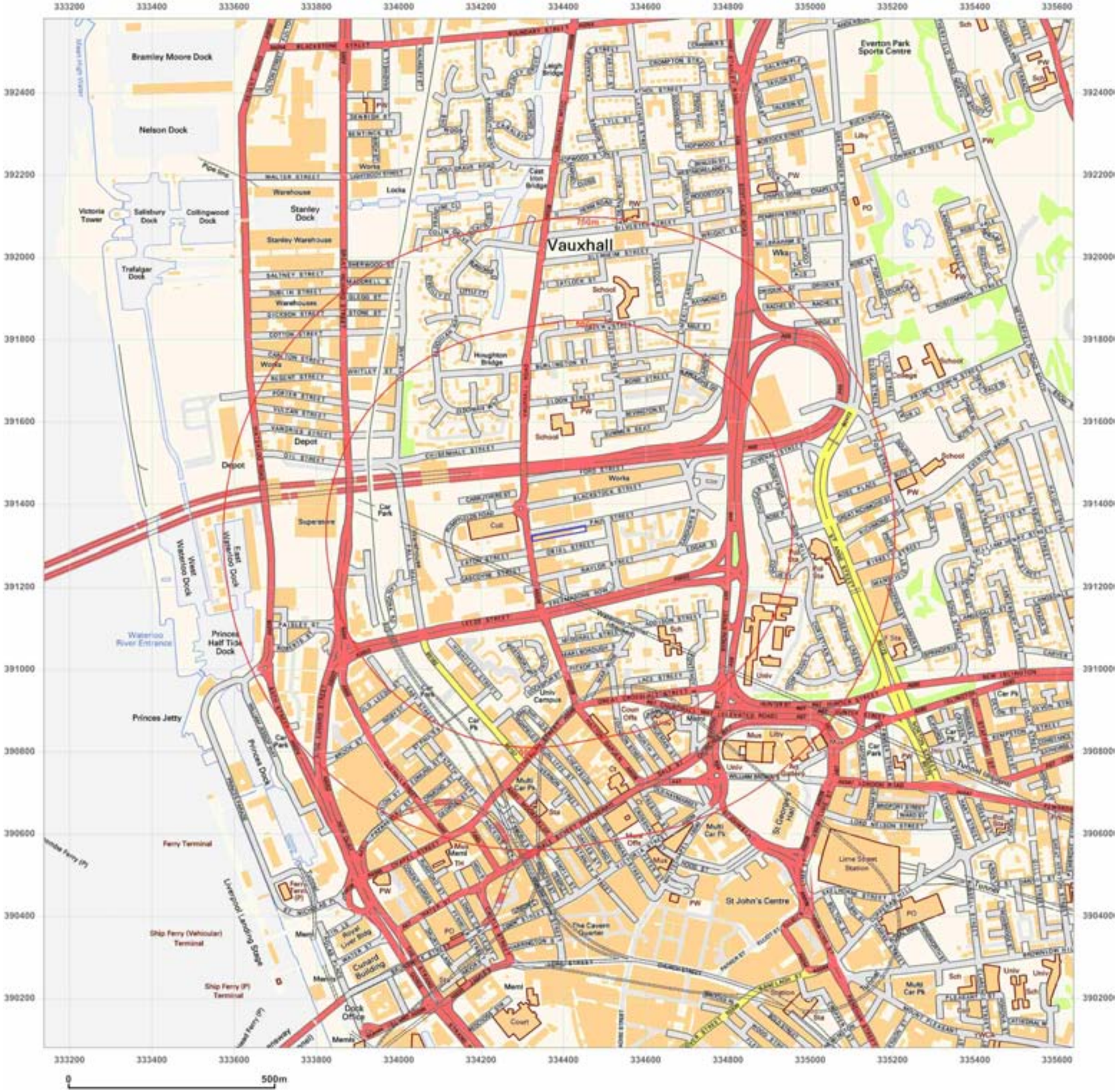
Production date: 29 July 2016

To view map legend click here *Legend*



Site Details:

4 Paul Street, Liverpool, L3 6DX

Client Ref: 4165
Report Ref: CMAPS-AAG-549269-4165-290716HIS
Grid Ref: 334389, 391329

Map Name: National Grid

Map date: **2014**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

2014

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groundsure@centremaps.com

Production date: 29 July 2016

To view map legend click here *Legend*

APPENDIX D

RISK ASSESSMENT GUIDANCE & METHODOLOGIES

CURRENT CONTAMINATED LAND LEGISLATION / GUIDANCE & ENVIRONMENTAL RISK ASSESSMENT METHODLOGY

LEGISLATION OVERVIEW

This report includes hazard identification and risk assessment in line with the risk-based methods referred to in relevant UK legislation and guidance. Government environmental policy is based upon a "suitable for use approach". When considering the current use of land, Part IIA of the Environment Protection Act 1990 (EPA 1990) provides the regulatory regime, which was introduced by Section 57 of the Environment Act 1995, which came into force in England on 1 April 2000. The main objective of introducing the Part IIA regime is to provide an improved system for the identification and remediation of land where contamination is causing unacceptable risks to human health or the wider environment given the current use and circumstances of the land.

Part IIA provides a statutory definition of contaminated land under Section 78A(2) 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:

(a) Significant harm is being caused or there is a significant possibility of such harm being caused;
or
(b) Pollution of controlled waters is being, or is likely to be, caused."

Part IIA provides a statutory definition of the pollution of controlled waters under Section 78A(9) as:

*"the entry into controlled waters of **any** poisonous, noxious or polluting matter or **any** solid waste matter"*.

In order to assist in establishing if there is a "significant possibility of significant harm" there must be a "significant pollutant linkage" for potential harm to exist. That means there must be a source(s) of contamination, sensitive receptors present and a connection or pathway between the two. This combination of source-pathway-receptor is termed a "pollutant linkage or SPR linkage."

Part IIA of The Environmental Protection Act 1990 is supported by a substantial quantity of guidance and other Regulations, especially DEFRA Circular 01/2006 Contaminated Land (this replaces DETR Circular 02/2000). Part IIA defines the duties of Local Authorities in dealing with it. With the exception of situations of very high pollution risk, Part IIA places contaminated land responsibility on thee planning and redevelopment process. In situations where there is very high pollution risk direct action from the Local Authority is usually necessary. Planning Policy Statement 23 (PPS23) provides guidance on the planning process and requires that sites which have been developed shall not be capable of being determined "contaminated land" under Part IIA.

The criteria for assessing levels of pollutants and hence determining whether a site represents a hazard are based on a range of techniques, models and guidance. Within this context it is relevant to note that Government objectives are:

(a) to identify and remove unacceptable risks to human health and the environment;
(b) to seek to bring damaged land back into beneficial use;
(c) to seek to ensure that the cost burdens faced by individuals, companies and society as a whole are proportionate, manageable and economically sustainable.

These three objectives underlie the "suitable for use" approach to remediation of contaminated land. The "suitable for use" approach focuses on the risks caused by land contamination. The approach recognises that the risks presented by any given level of contamination will vary greatly according to the use of the land and a wide range of other factors, such as the underlying geology of the site. Risks therefore should be assessed on a site-by-site basis.

The "suitable for use" approach then consists of three elements:

(a) ensuring that land is suitable for its current use - in other words, identifying any land where contamination is causing unacceptable risks to human health and the environment, assessed on the basis of the current use and circumstances of the land, and returning such land to a condition where such risks no longer arise; the contaminated land regime provides the regulatory mechanisms to achieve this;

(b) ensuring that land is made suitable for any new use, as planning permission is given for that new use - in other words, assessing the potential risks from contamination, on the basis of the proposed future use and circumstances, before official permission is given for the development and, where necessary to avoid unacceptable risks to human health and the environment, remediating the land before the new use commences; this is the role of the town and country planning and building control regimes; and

(c) limiting requirements for remediation to the work necessary to prevent unacceptable risks to human health or the environment in relation to the current use or future use of the land for which planning permission is being sought - in other words, recognising that the risks from contaminated land can be satisfactory assessed only in the context of specific uses of the land (whether current or proposed), and that any attempt to guess what might be needed at some time in the future for other uses is likely to result either in premature work (thereby running the risk of distorting social, economic and environmental priorities) or in unnecessary work (thereby wasting resources).

The mere presence of pollutants does not therefore necessarily warrant action, and consideration must be given to the scale of risk involved for the current and proposed end use of the site.

RISK ASSESSMENT METHODOLOGY

Current practice recommends that the determination of potential liabilities that could arise from land contamination be carried out using the process of risk assessment, whereby "risk" is defined as:

"(a) The probability, or frequency, or occurrence of a defined hazard; and
(b) The magnitude (including the seriousness) of the consequences."

The UK's approach to the assessment of environmental risk is set out in by the Department of the Environment (2000) publication "A Guide to Risk Assessment and Risk Management for Environmental Protection." This established an iterative, systematic staged process which comprises:

(a) Hazard identification
(b) Hazard assessment
(c) Risk estimation
(d) Risk evaluation
(e) Risk Assessment

At each stage during the investigation process the above steps are repeated as more detailed information becomes available for the site.

CLR11- 'Model Procedures for the Management of Land Contamination', a document published by the Department for Environment, Food and Rural Affairs (DEFRA) and the Environment Agency (EA) outlines a tiered approach to the assessment of risks posed by contaminated land, as summarised hereunder:

Tier 1: Preliminary Risk Assessment

A Preliminary Risk Assessment is usually undertaken as part of a desk study, outlines potential risks posed by potential contamination to all receptors by defining plausible "pollution linkages" and developing a preliminary conceptual model (PCM). The purpose of this model is to define all possible complete pollution linkages, where the requisite source – pathway – target elements are present, and these elements being defined as:

- a contaminant (source) is a hazardous substance or agent, present at levels that have the potential to cause harm or damage a receptor
- a pathway is the means by or through which a contaminant comes into contact with, or otherwise affects, the receptor
- a receptor (target) is an entity (human being, aquatic environment, flora and fauna etc) that is vulnerable to the adverse effects of the contaminant

This relationship is termed a "pollution linkage". It should be recognised that for a health or environmental risk to exist, all three elements of the relationship or linkage must be present, i.e.

- if there is no contaminant, or contaminant present at levels below those considered to be harmful or damaging to a receptor, then there can be no adverse effect on a receptor
- if there is no receptor present that can be adversely affected by a contaminant, no harm or damage can arise
- even where both a contaminant and a receptor are present, no harm or damage will occur if there is no pathway by or through which a linkage between the two can be established

The absence of one or more of each component (source, pathway, receptor) would prevent a pollutant linkage being established and there would be no significant environmental risk.

The PCM is subject to continual refinement as additional data becomes available. As part of a Phase I Investigation (Desk Study and site walk over) a PCM is formed. Based on the PCM, potential pollutant linkages can be assessed. If the PCM and hazard assessment indicate that a pollution linkage is not of significance then no further assessment or action is required due to this linkage. For each significant and possible linkage a risk assessment is carried out. The linkages which potentially pose significant risks may require a variety of responses ranging from immediate remedial action or risk management or, more commonly, further investigation and risk assessment. This next stage is usually termed a Phase II Main Site Investigation and should provide additional data to allow refinement of the PCM and assess the level of risk from each pollutant linkage. Risk assessment will usually include Tier 2 Generic Quantitative Risk Assessment and / or, if necessary, a Tier 3 Detailed Quantitative Risk Assessment.

Tier 2: Generic Quantitative Risk Assessment (GQRA)

GQRA requires an intrusive investigation in order to characterise the site assisting in the re-assessment of the source-pathway receptor linkage. The conceptual model should be refined accordingly.

Upon completion of an intrusive investigation a it must be decided whether Generic Assessment Criteria (GAC) are suitable for assessing the risk posed by potential contaminantion at the site. If GAC are deemed unacceptable for risk assessment purposes or cannot be developed a Tier 3 Detailed Quantitative Risk Assessment (DQRA) is required.

If GQRA reveals that unnacceptable risks are not present then no further action is required. If GQRA identifies a possibility of risk, a decision must be made whether further work is required or necessary for the purposes of risk assessment. If further risk assessment is is deemed not suitable not required an Options Appraisal should be undertaken. If further risk assessment is required, the scope nature of further risk assessment must be decided – it is possible that a Tier 3 DQRA will be undertaken in this scenario.

Where the Environment Agency have published an SGV for a contaminant, this will be used in lieu, if the SGV is suitable for the subject site, of the GAC derived by ***CC GEOTECHNICAL LTD.*** For contaminants where an SGV has not been published

and a GAC has been published by LQM, then this GAC will be used. In house derived GAC's will only be used for contaminants where there is no SGV or LQM GAC.

Tier 3: Detailed Quantitative Risk Assessment (DQRA)
DQRA is used when pollutant linkages require further assessment. DQRA is often undertaken for pollutant linkages where GAC are unavailable or inappropriate for or more conservative than the actual circumstances of the site. Site specific data is used to create Site Specific Assessment Criteria (SSAC) and enable a more accurate assessment of the risks. Further investigation may or may not be required to formulate SSAC depending on the site specific conditions and information alrerady obtained.

If DQRA reveals that unnacceptable risks are not present then no further action is required. If DQRA identifies a possibility of risk, a decision must be made whether further work is required or necessary for the purposes of risk assessment. If further risk assessment is is deemed not suitable not required an Options Appraisal should be undertaken. If further risk assessment is required, the scope and nature of further risk assessment must be decided at this point.

NOTE: A Tier 1 Preliminary Risk Assessment is undertaken as part of a Desk Study Report and a Preliminary Conceptual Model is devloped for all pollutant linkages. However, the methodologies for assessing the risks to human health, risks to controlled waters and risk posed by ground gas using quantative techniques vary considerably, therefore GQRA and DQRA for human health, controlled waters and ground gas must be undertaken seperately. The risk assessment methodologies where quantative assessment is used for risks to human health, risks to controlled waters and risks posed by ground gas, if relevant, are described hereunder.

BACKGROUND INFROMATION, CURRENT GUIDANCE AND RISK ASSESSMENT METHODOLOGY FOR RISKS POSED TO HUMAN HEALTH

Background
In March 2002, the Department for Environment, Food and Rural Affairs (DEFRA) and the EA published the Contaminated Land Exposure Assessment (CLEA) Model and a series of related reports. These were designed to provide a scientifically based framework for the assessment of chronic risks to human health from contaminated land. These reports (CLR7-10) together with associated "SGV" documents have since been withdrawn (August 2008) and the following documents have been published as revised guidance to the CLEA assessment:

- Environment Agency : 2008: Updated Technical Background to the CLEA model Science Report SC050021/SR3
- Environment Agency : 2008: Human Health Toxicological Assessment of Contaminants in Soil SC050021/SR2

Additional guidance on statistical assessment replacing CLR 7 is provided in:

- CL:AIRE :2008 Guidance on Comparing Data With a Critical Concentration

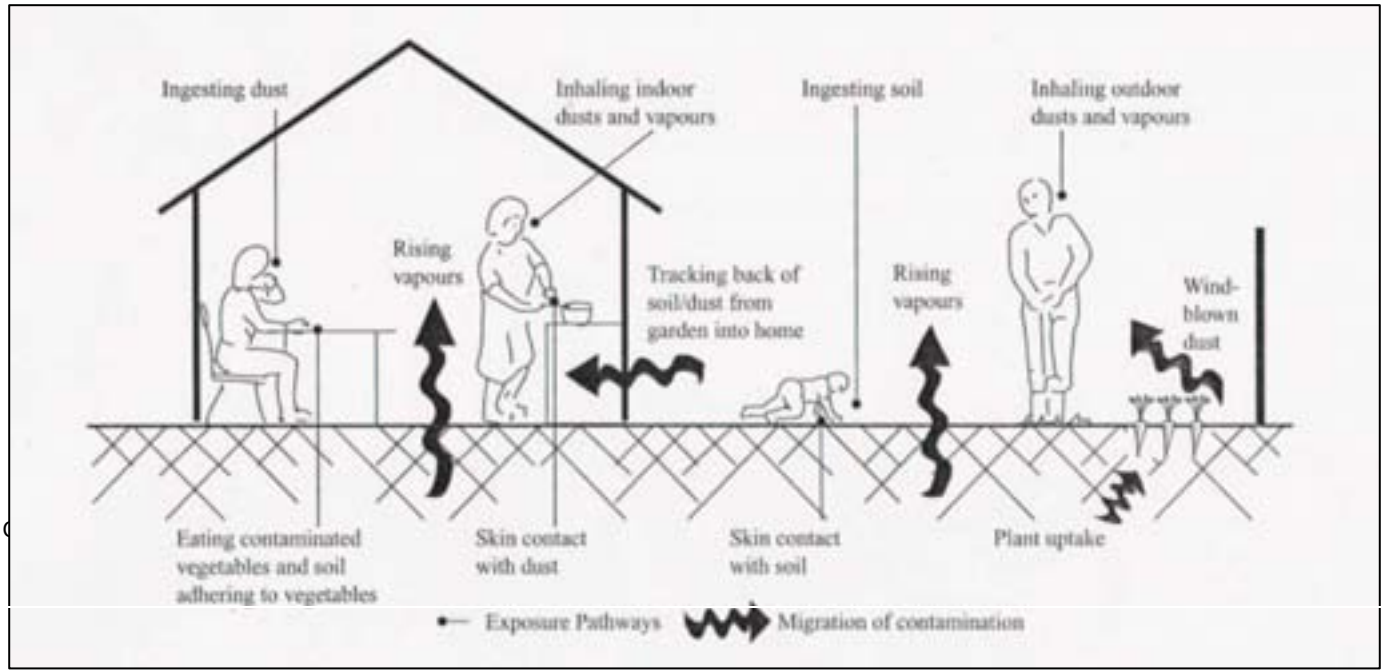
Other guidance/software used in spatial / statistical assessment is provided in:

- USEPA 2006: Data Quality Assessment: Statistical Methods for Practitioners
- Spatial Analysis and Decision Assistance (SADA) – The University of Tennessee

A different approach to the statistical appraisal of data is required depending on whether the assessment of risk is to assess whether land is Contaminated Land in accordance with regulations, or whether the assessment is to determine whether the site is suitable for new development in according with Planning guidance. This is discussed further in CL:AIRE :2008 "Guidance on Comparing Data With a Critical Concentration".

A program for the derivation of GAC`s based on the above guidance is provided by the Environment Agency and is entitled "CLEA Software Version 1.06".

The CLEA model has been developed to calculate an estimated tolerable daily soil intake (TDSI) for site users given a set 'default' exposure pathways. Ten human exposure pathways are covered in the CLEA model as presented below:



Ingestion
- ingestion of outdoor soil
- ingestion of indoor dust
- ingestion of home grown produce
- ingestion of soil attached to home grown produce

Dermal Contact
- dermal contact with outdoor soil
- dermal contact with indoor dust

Inhalation
- inhalation of outdoor dust
- inhalation of indoor dust
- inhalation of outdoor soil vapour
- inhalation of indoor soil vapour

It should be noted that there are other potential exposure pathways on some sites not included in the CLEA model e.g. certain organic compounds can pass through plastic water pipes into drinking water supply.

Where contaminated water is present at a depth less than 2.00mbgl and there is a potential risk of inhalation of vapours (only when volatile compounds are present) the risk from inhalation of vapours from soil water will be assessed using a UK compliant version of BP Risc v4.02.

The presence and/or significance of each of the above exposure pathways are dependent on the type of land use being considered and the nature of the contaminant under scrutiny. Accordingly, the CLEA model considers for principle 'default' land use types and makes a series of 'default' assumptions with regard to human exposure frequency, duration and critical human target groups for each land use considered:

- residential
- allotments
- commercial / industrial land use

The above land use categories defined in the CLEA are detailed below:

Residential: This generic scenario assumes a typical residential property consisting of a two-storey house built on a ground-bearing slab with a private garden consisting of lawn, flowerbeds, and a small fruit and vegetable patch. The occupants are assumed to be parents with young children, who make regular use of the garden area.

Allotments: This generic scenario assumes a plot of open space (about 250 m2), commonly made available by the local authority to tenants to grow fruit and vegetables for their own consumption. There are usually several plots to a site and the overall site area may cover more than a hectare. The tenants are assumed to be parents or grandparents and that young children make occasional accompanied visits to the plot.

Commercial/Industrial: There are many different kinds of workplace and work-related activities. This generic scenario assumes a typical commercial or light industrial property consisting of a threestorey building at which employees spend most time indoors and are involved in officebased or relatively light physical work.

Human Health Risk Assessment Methodolgy
Assessment of risk for the protection of human health is undertaken using the methodology as outlined previously, and summarised hereunder:

- Tier 1 Preliminary Risk Assessmnent
- Tier 2 Generic Quantitative Risk Assessment
- Tier 3 Detailed Quantitative Risk Assessment

The Tier 1 Preliminary Risk Assessment is undertaken as part of the desk study report and includes the development of a Preliminary Conceptuel Model. Tier 2 and Tier 3 Quantitative Risk Assessments are undertaken in order to develop and refine the Preliminary Conceptual Model aiding a more detailed assessment of the risk posed by contaminants revelaed by site investigation and soil / soil water chemical analyses.

The methods used by ***CC GEOTECHNICAL LTD*** to derive assessment criteria, to statistically analyse chemical data and to compare chemical data to the derived assessment criteria are discussed herunder.

Derivation of Generic Assessment Criteria (GAC) and Site Specific Assessment Criteria (SSAC)
GAC`s are derived on the basis of the proposed land use and the associated applicable exposure pathways. It should be noted that there are difficulties in establishing soil concentrations of contaminants beyond which risks from exposure to these contaminants would be 'unacceptable' and the GAC value does not necessarily equate to the level for "significant possibility of significant harm" as defined in Part IIA of The Environmental Protection Act (1990) to determine whether land is "contaminated." This ultimately requires detailed 'toxicological' information of the health effects of individual contaminants and also a scientific judgement on what constitutes an 'unacceptable' risk. The primary purpose of the CLEA derived GAC's are as 'minimal risk thresholds' for the assessment of human health risks in relation to land use.

Minimal risk thresholds calculated using generic input parameters for each of the above land uses are termed Generic Assessment Criteria (GAC) and are used for Generic Quanatative Risk Assessment (GQRA). However, further assessment may be required taking into consideration site specific factors such as the way the land is used, the soil type, the building

characteristics and the exact nature of the receptor, to determine whether there is a significant possibility of risk to human health to site users. Such an assessment is known as a Detailed Quantitative Risk Assessment (DQRA) and the resultant threshold concentrations are known as Site Specific Assessment Criteria (SSAC). Such assessments should be conducted with the agreement of the local authority (or the Environment Agency) since it is the authority that determines whether land is Contaminated Land or whether Planning Permission for a new development may be granted.

For the purposes of this report, assessment criteria have been derived in accordance with current guidance based on the conceptual model for the proposed land use using the CLEA v1.06 software. These criteria are not intended to indicate whether the site may be contaminated land nor do they replace any published soil guideline values. However, the values are intended to provide guidance for the local authority on whether the site may be considered uncontaminated. If, based on the site's proposed future use, the site would be considered by the local authority to be uncontaminated and therefore, on the basis of soil concentrations, fit for purpose, then no further risk assessment based on soil concentrations and the risk to human health would be necessary. However, should these criteria be exceeded or the conceptual site model vary from the model used in the risk assessment to derive these values then the risk assessment should be updated accordingly.

For contaminants routinely analysed where inhalation is a significant pathway (naphthalene, phenanthrene, Aromatic EC5-EC7, Aromatic EC7-EC8, Aromatic EC8-EC10, Aromatci EC10-EC12, Aromatic EC12-EC16, Aliphatic EC5-EC6, Aliphatic EC8_EC10, Aliphatic EC10-EC12, Aliphatic EC12-EC16), plots of the GAC as a function of Soil Organic Matter (SOM) are used to determine if they pose a potential risk to human health, which are presented hereunder. Where there is an exceedance further assessment may be undertaken.

Statistical Assessment of Soil Contamination Data & Comparison of Contamination Data to Threshold Values

In any site investigation only a small fraction of the soil on the site is analysed. Therefore the mean derived from the contamination data for a contaminant may not be the same as the true mean for the contaminant distribution on the site. To improve the reliability of any assessment a statistical analyses is undertaken in line with the CL:AIRE document "Guidance on Comparing Soil Contamination Data with a Critical Concentration".

Statistical assessment of soil data is undertaken using programs based on the guidance in the CL:AIRE document or the USEPA software ProUCL v4.0.

Where the number of results in a dataset is less than four, a statistical assessment is not undertaken, and the assessment is performed by comparison of the maximum value(s) with a Health Criteria Value (HCV), such as Generic Assessement Criteria value(s).

For the Planning situation, the regulator needs to check whether the concentration of contaminants is low compared to the HCV. This decision is based on whether there is at least a 95% confidence level that the true mean of the dataset is lower than the HCV.

For the Part IIA scenario the regulator needs to determine whether the concentration of contaminants is greater than the HCV. This decision is based on whether there is at least a 95% confidence level that the true mean of the dataset is higher than the HCV. However, the regulator may proceed with determination if there is just a 51% probability, "on the balance of probabilities".

The Outlier Test used in the statistical assessment may not be able identify separate populations if numerous populations are present. Inorder to ensure that this is not the case a spatial assessment of the data will be undertaken using SADA.

If the screening levels are exceeded then more sophisticated quantitative risk assessment or remedial action may be undertaken. The benefits of undertaking a quantitative risk assessment must be weighed against the likelihood that it will bring about cost savings in the proposed remediation.

BACKGROUND INFORMATION, CURRENT GUIDANCE AND RISK ASSESSMENT METHODOLOGY FOR RISKS POSED TO CONTROLLED WATER

Definition of Controlled Waters

The term 'controlled waters' is defined in Section 104 of the Water Resources Act 1991 as:

"Territorial Waters…which extend seawards for three miles…, coastal waters…, inland freshwaters, waters in any relevant lake or pond or of so much of any relevant river or watercourse as is above the freshwater limit, and ground waters, that is to say, any waters contained in underground strata."

Note that the definition of groundwater under the Water Resources Act 1991 includes all water within underground strata (including soil / pore water in the unsaturated zone). The definition of groundwater under the Groundwater Directive however is limited to water in the saturated zone. For the purposes of Part IIA of the Environmental Protection Act 1990, the Environment Agency recommends that the groundwater within the saturated zone only is considered as the receptor (rather than soil / pore water).

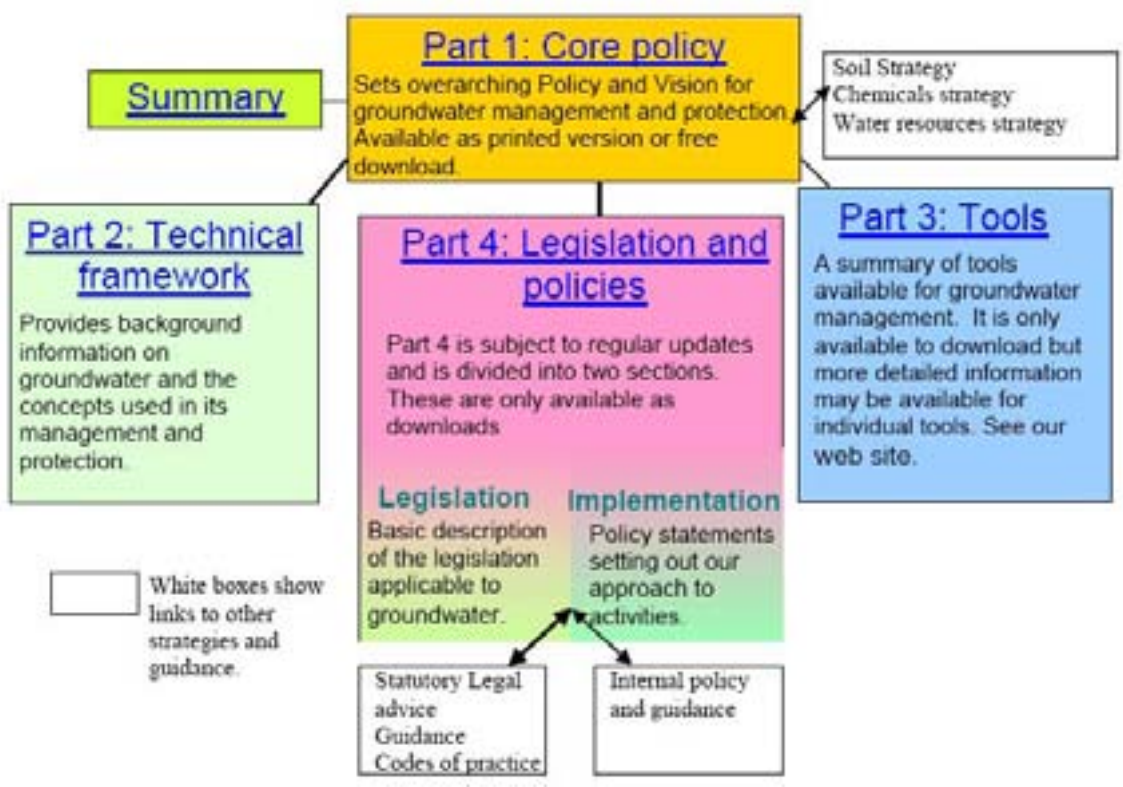
Environment Agency Guidance

Legislation and guidance surrounding the protection of controlled waters in the UK is abundant and can be complex. The Environment Agency's overall position on groundwater is *"To protect and manage groundwater resources for present and future generation in ways that are appropriate for the risks that we identify"* (Groundwater Protection : Policy and Practice GP3, 2006). In brief, the core objectives of the existing legislation serve to enforce this position.

In 1992, the National Rivers Authority published their Policy and Practice for the Protection of Groundwater (PPPG), this document was influential as it provided a focus for key developments such as Source Protection Zones (SPZs) and

Groundwater Vulnerability Maps. The Policy was then revised in 1998, since which there have been substantial changes in legislation, driven by Europe. Key European Directives relating to groundwater include the Groundwater Directive (80/68/EEC) and the Water Framework Directive (2000/60/EC). Aspects of these directives are controlled by primary UK legislation such as the Water Resources Act 1991. Further to legislative changes, gaps identified in the 1998 PPPG required addressing. These changes are reflected in the forthcoming Environment Agency Policy document entitled *Groundwater Protection : Policy and Practice (GP3)*, a draft version of which was available for public consultation (Parts 1 to 3) ending July 2006 with Part 4 issued in March 2008. Part 4 includes a section on key groundwater legislation and the Environment Agency's interpretation of it.

The following gives a breakdown of the structure of the document (taken from the Environment Agency GP3 draft consultation document, 2006)



Controlled Water Risk Assessment Methodology
The risk posed to controlled water is assessed by ***CC GEOTECHNICAL*** in accordance with current guidance as outlined hereunder.

In order for a developer of a potentially contaminated site to fulfil their obligations under the legislation, a site assessment would be required to be undertaken in order to identify any potential risks to controlled waters and to derive suitable clean-up criteria if necessary to ensure the protection of controlled waters. The general approach for Groundwater Protection is detailed further in Part 3 of GP3.

When assessing groundwater impact the Environment Agency advocate the application of their framework methodology "Remedial Targets Methodology – Hydrogeological Risk Assessment for Land Contamination" Environment Agency (2006). The methodology has four levels of assessment as described below:

- **Level 1** considers whether contaminant concentrations in "pore water" in contaminated soil are sufficient to impact on the receptor, ignoring dilution, dispersion and attenuation along the pathway. The "pore water" concentration is determined from:

  i) measured "pore water" concentrations or perched water quality
  ii) soil leaching tests
  iii) theoretical calculations based on soil/water partitioning equations

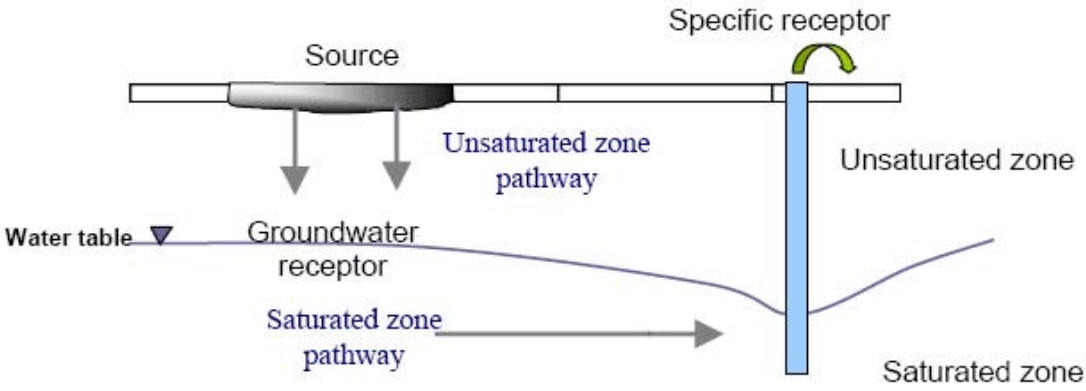
- **Level 2** considers dilution by the receiving groundwater or surface water body and whether this is sufficient to reduce contaminant concentrations to acceptable levels. The remedial target is defined as the target concentration multiplied by a dilution factor (DF).

- **Levels 3 and 4** consider whether natural attenuation (including dispersion, retardation and degradation) of the contaminant as it moves through the unsaturated and saturated zones to the receptor are sufficient to reduce contaminant concentrations to acceptable levels. The remedial target is defined as target concentration multiplied by a dilution factor (DF) and attenuation factor (AF). In **Level 3** simple analytical models are used to calculate the significance of attenuation. The Environment Agency has released a "Remedial targets worksheet v3.1" to carry out basic calculations using a conservative approach up to **Level 3** using basic principles assuming a simple migration of contaminants from the

source zone into the aquifer receptor. **Level 4** assessment uses more sophisticated numerical models, and allows for the introduction of additional geological horizons and is used mainly to determine whether soil contaminants will reach their target within a specified timeframe. Use of such software should only be used once agreement has been obtained from the Environment Agency.

Three main stages apply to any risk assessment of controlled waters, these are:

1. **Risk Screening (Tier 1 Preliminary Risk Assessment):** The understanding of the Conceptual Site Model (CSM) is the key to assessing any site. Using a robust CSM, potential pathways or receptors may be screened out from any further assessment at an early stage. For example if the pathway through the unsaturated zone is blocked by the presence of a significant thickness of low permeability clay. A greater understanding of the CSM is achieved with each tier of risk assessment. An example of a basic CSM is given below (taken from the Environment Agency GP3 draft consultation document, 2006):



2. **Generic Hydrogeological Risk Assessment (EA Remedial Targets Methodology Level 1):** When undertaking the Generic Hydrogeological Risk Assessment (EA Remedial Targets Methodology Tier 1), comparison of chemical analytical results is made with screening criteria. Published values of screening criteria with which chemical test results can be compared are published in the following guidance:

   - Water Supply (Water Quality) Regulations 2000
   - The Private Water Supplies Regulations 1991
   - Environmental Quality Standards for surface waters based on The EC Dangerous Substnaces Directive (76/464/EEC and Daughter Directives)
   - The Surface Waters(Abstraction for Drinking Water Classification) Reguslations 1996
   - World Health Organisation Drinking Water Standards 2004

   Should the Level 1 assessment indicate threshold levels to be exceeded, then there are three alternative ways in which to proceed:

   - To devise suitable remedial solutions
   - To carry out more investigation, sampling and analysis
   - To conduct a site specific Detailed Quantitative Risk Assessment (DQRA) to determine determine if the materials are suitable for thair proposed use, or devise site specific clean-up level

3. **Detailed Quantitative Risk Assessment (EA Remedial Targets Methodology Levels 2 to 4):** The decision to carry out a DQRA will be dependant on the extent and implications of the initial qualitative and generic assessment. The scope of any such assessment will be accurately defined by the outcomes of the previous levels of assessment. The conceptual model will be sufficiently refined by this stage that only certain contaminants of concern, certain pathways and certain receptors will require further assessment, the remainder having been screened out.

   Additional site specific data is normally required for this stage of assessment, as explained above, more processes that are capable of affecting contaminant concentrations are considered (such as dilution and attenuation).

   Remediation criteria, if derived, will therefore be specific to each site and will be based on a detailed assessment of the potential impact at the identified receptor or *compliance point*. A greater level of confidence can be placed on the predicted impact on the compliance point following a DQRA.

BACKGROUND INFORMATION, CURRENT GUIDANCE AND RISK ASSESSMENT METHODOLOGY FOR RISKS POSED BY GROUND GAS

Background

Origin of Ground and Landfill Gases

When carrying out a ground gas risk assessment, the origin or source of the gases is important as potential risks will vary depending on the source. This Appendix relates to the risk of the two main ground gases of concern; methane and carbon dioxide, and does not apply to other ground gases (e.g. radon or vapours from hydrocarbon spills). Methane and carbon dioxide are major constituents of landfill gas but can also occur from a variety of anthropogenic and natural sources, as summarised in Table 5 below:

Gas	Source	Comments
Landfill Gas	Anaerobic decomposition of degradable waste within landfill sites. Typically 60% methane and 40% carbon dioxide during methanogenic phase.	Composition varies over time, particularly in early stages. Contains a range of minor constituents (particularly carbon monoxide and hydrogen sulphide).
Landfill Associated Gases	- Anaerobic degradation of leachate external to the site; - Degassing of dissolved gases in groundwater; - Evolution of gases following interaction between leachate and groundwater	Can result in secondary (external) production of methane or carbon dioxide.
Made Ground	Anaerobic degradation of organic components	Very variable depending on source
Sewer Gas, Cess Pits	Anaerobic degradation of organic components of sewage producing methane and carbon dioxide.	Often characterised by hydrogen sulphide odour.
Mains Gas	Leakage from underground pipework or storage tanks. Mainly methane but often contains higher alkanes.	An odouriser is added to permit detection of leaks. Typically 90% CH_4, but 1 to 27% C_2-C_4 alkanes, May also contain other trace gases e.g. CO, helium and CO_2 (from degradation of CH_4 in the ground).
Other Anthropogenic Sources	- Degradation of leaked or spilled hydrocarbons or other industrial chemicals; - Anaerobic degradation of organic contaminants in groundwaters (e.g. silage liquor); - Reactions between monitoring well construction components and environment; - Burial grounds/cemeteries.	Hydrocarbon spillages often have an 'oily' odour. Fuel spillages common – Petrol or Diesel and can contain a wide range of VOC's. Can degrade to produce methane / carbon dioxide.
Alluvium / Marsh / Peat Gas	Anaerobic microbial degradation of organic material (usually waterlogged vegetation / peat). Often associated with the presence of alluvial deposits or dredgings.	
Geogenic Gas	Natural seepages of carbon dioxide and hydrocarbon gases derived from geologic sources such as coal seams and deep oil / gas source formations. Can be present in solution in groundwaters.	Methane most common but can contain carbon dioxide and higher alkanes.
Mine Gases	Various types. Most common is "fire damp" with high methane, produced by the desorption of gas trapped in coal. "Black damp" (Stythe gas) with high carbon dioxide and denser than air. "White damp" is high in carbon monoxide.	Methane most common. Can contain higher alkanes, carbon dioxide and carbon monoxide. Often low in oxygen.
Natural Shallow Ground Gas	Various types - high carbon dioxide formed by subsurface aerobic activity leading to depleted oxygen and elevated carbon dioxide; - chemical degradation of rocks (e.g. carbonates) producing carbon dioxide; - carbon dioxide production in root zone of soils by plants.	Gases can be emitted from ground under falling barometric pressure conditions.

Table 5. Potential Sources of Ground Gases

This Appendix does not provide guidance for the assessment of risk when other gases are present due to 'Other Sources' from the above table (particularly organic compounds such as BTEX and VOC's or for the risk from radon or hydrogen sulphide).

To determine the origin of the gas a range of factors must be considered together, including;

1. Proximity of likely sources
2. Ground conditions (geology, hydrogeology, anthropogenic pathways etc)
3. Properties of gases present including:
   - Chemical composition
   - Physical properties
   - Ratios of components e.g. methane : carbon dioxide
4. Timeframe of activities such as infilling periods, capping works, installation of gas control systems etc

Identification of the originating source may be problematic given that there may be more than one source present and trace gas analysis may be required. Identification of the sources of the gases encountered during monitoring is usually carried out through a process of eliminating the most unlikely potential sources (given the site setting) and selecting those which are most likely.

Hazards Associated with Presence of Methane

Methane gas is combustible and potentially explosive. When the concentration of methane in air is between the limits of 5.0%v/v and 15.0%v/v an explosive mixture is formed. The Lower Explosive Limit (LEL) of methane is 5.0%v/v, which is equivalent to 100% LEL. The 15.0%v/v limit is known as the Upper Explosive Limit (UEL), but concentrations above this level cannot be assumed to represent safe concentrations. Further, the LEL and UEL will vary (up and down) depending upon the proportion of other gases (including oxygen). However, the fact that methane is a colourless, odourless gas means that there

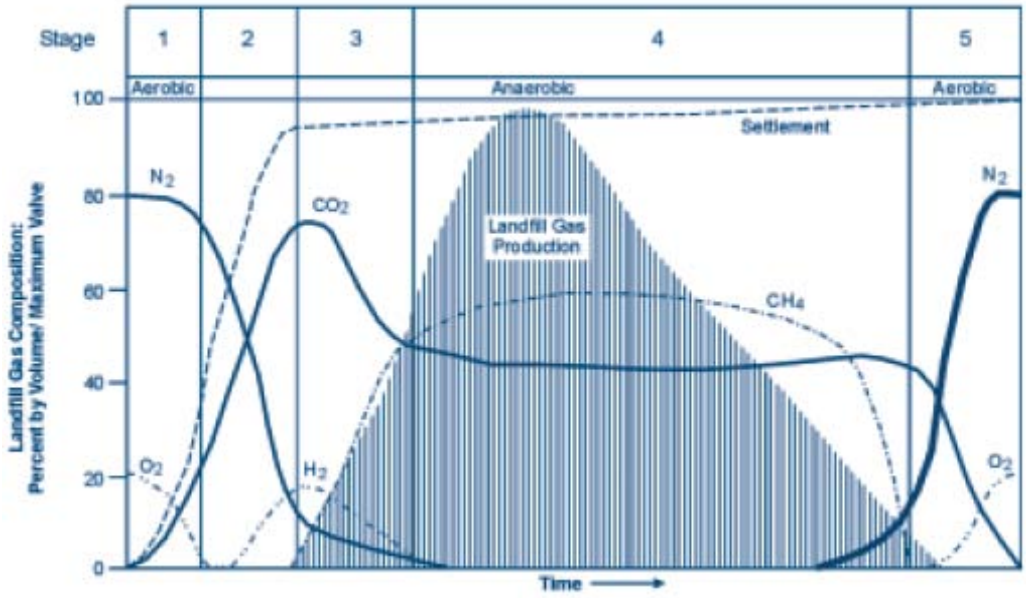
is no simple indicator of the presence of the gas until such a time as explosive limits are reached and an incident occurs. Methane is lighter than air and has a low toxicity. However, at high concentrations it can result in asphyxiation due to oxygen displacement.

Hazards Associated with Presence of Carbon Dioxide

Carbon dioxide is a colourless, odourless gas, which, although non-flammable, is both toxic and an asphyxiant. As carbon dioxide is denser than air, it will collect in low points and depressions. The UK Health & Safety Executive (HSE) has published information relating to concentrations of carbon dioxide that humans may be exposed to, which uses concentrations contained in the Control of Substances Hazardous to Health Regulations 2002 (as amended). These are the Long Term Occupational Exposure Limit (LTOEL, 8 hour period) and the Short Term Occupational Exposure Limit (STOEL, 15 minute period), which are 0.5% and 1.5% carbon dioxide, respectively.

Parameters Influencing the Rate of Ground Gas Production

The figure below is taken from EA guidance document LFTGN 03 illustrates typical ground gas generation curves from biodegradable materials:



The production of methane and carbon dioxide at a landfill site may be expected to be considerable and ongoing. Concentrations of methane will eventually decrease, followed by concentrations of carbon dioxide, but the duration and rate of gas production can vary markedly between sites. Five distinct phases of gas production occur during the process which are, in order of event as marked above, as follows:

1. An aerobic phase involving oxygen depletion and temperature increase through aerobic respiration;
2. The establishment of anaerobic conditions and the evolution of carbon dioxide and hydrogen through acidogenic activity;
3. Commencement of methanogenic activity; the establishment of populations of methanogenic bacteria;
4. A phase of stable methanogenic activity, which may go on for many tens of years;
5. A phase of decreasing methanogenic activity, representing depletion of the organic material and a return to aerobic conditions.

The time scale for the return to the normal ground gas concentrations will be highly variable, depending upon the types and quantities of materials present. In addition, the optimum parameters influencing the rate of decomposition and ground gas production within the ground at a site are as follows:

- High water content with adequate rainfall and water infiltration to provide moisture content between approximately 20 to 26%;
- Conditions that either are or are very close to anaerobic;
- High proportion of biodegradable materials;
- A pH between 6.5 and 8.5, ideally verging slightly on the acidic between pH 6 to 7;
- Temperature between 25°C and 55°C;
- The ratio of the biochemical and chemical oxygen demands (BOD:COD);
- High permeability;
- Small particle size, as finer subsurface materials possess a greater surface area to provide a growing 'face' for the micro-organisms but high fines levels reduces permeability and reduces decomposition rate.

For this reason, it is vital that sources of methane and carbon dioxide are identified prior to the commencement of any work on a construction site, and that the ground gas regime is characterised at the worst temporal conditions a site may experience. From this, a risk assessment is carried out to identify the risk at the site from ground gases so that suitable protection measures can be designed and incorporated into a development to prevent a dangerous build-up of gas occurring.

Factors Influencing the Migration and Behaviour of Ground Gases

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There are many factors that influence the migration of ground gases which can effect the risk from a gassing source:

- driving force – pressure differential along a pathway, diffusion and dissolved in solution;
- meteorological conditions – short term and seasonal conditions including atmospheric pressure changes (e.g. rapidly falling pressure causes gas to expand increasing emission rates), rainfall, frozen ground and thawing, temperature;
- geological and groundwater conditions – these can have the over riding influence on the direction/pathways and quantity of migrating gas;
- anthropogenic influences – man-made pathways include mine shafts, service runs/drains, foundation piles, underground voids/pits/basements, foundation/building design/construction

Current Guidance
Previous versions of Building Regulations Approved Document C provided statutory guidance stating that consideration should be given to appropriate action and / or specific solutions in situations where methane concentration exceeded 1%v/v or carbon dioxide concentrations exceeded 5%v/v. The latest Building Regulations Approved Document C (DoE 2004) no longer endorses this approach and recommends the use of a risk based approach to interpreting a gas monitoring survey. This is in line with current EA guidance for landfill gas (LFTGN 03, 2004) which recommends the use of a structured risk based approach similar to that outlined in CLR 11. On this basis, recent guidance has been produced in 2006 and 2007 with the aim of providing up to date advice in relation to residential and commercial development. The guidance does not address issues associated with gas derived from landfills, for this refer to *"Guidance on the Management of Landfill Gas"* (Environment Agency 2004) for an overview.

Recent guidance relevant to gas assessments for residential and commercial development includes;

- **Wilson *et al.* (CIRIA C665, December 2007) *"Assessing Risks Posed by Hazardous Ground Gases for Buildings."***
  This document provides up to date advice on all aspects of ground gas risk assessment such as investigation, monitoring programmes, data collection and interpretation. The guidance presents separate methodologies for the characterisation of:
  - All development types except low rise housing with gardens (Situation A)
  - Low rise housing with gardens (Situation B)

- **Boyle and Witherington (NHBC / RSK Group, Report 10627-R01(04) January 2007) *"Guidance on the Evaluation of Development Proposals on Sites where Methane and Carbon Dioxide are Present."***
  This document presents the "Traffic Lights System" detailed below and is relevant only for low rise properties (e.g. bungalows and town houses) that have a ventilated sub-floor void (i.e. Situation B as described in CIRIA C665).

- **British Standard (BS 8485, December 2007) *"Code of Practice for the Characterization and Remediation from Ground Gas in Affected Developments"***
  This document provides an overview of gas characterisation and assessment. The Standard is intended to be used by designers of gas protection measures and regulators involved in the assessment of design solutions.

Further guidance, **Wilson and Card (CIEH) *"Ground Gas Handbook for Designers and Regulators"*** providing practical guidance on ground gas assesments and the design and evaluation of protection measures, is expected to be published in March 2009.

Each of these documents continues to highlight the importance of, and give further guidance towards, carrying out a tiered risk-based decision-making process in accord with government policy on dealing with contamination from historic or natural sources and highlight the importance of the Conceptual Model in site characterisation.

Ground Gas Risk Assessment Methodology
Assessment of risk posed by ground gas is undertaken using the methodology as outlined previously, and summarised hereunder:

- Tier 1 Preliminary Risk Assessmnent
- Tier 2 Generic Quantitative Risk Assessment
- Tier 3 Detailed Quantitative Risk Assessment

The methodology used in each of the above assessments with concern to ground gas is discussed hereunder.

<u>Tier 1 Preliminary Risk Assessment</u>
All potential sources of methane and carbon dioxide are identified in the Preliminary Conceptual Model and the generation potential determined. The background information discussed earlier is referred to in order to determine the potential for a source to generate ground gas.

CIRIA C665 provides idealised monitoring frequency / period dependant upon generation potential of gas source and sensitivity of the proposed land use as below:

Idealised Frequency and Period of Monitoring (after Table 5.5a and 5.5b, CIRIA C665)

		Generation Potential of Source				
		Very Low	**Low**	**Moderate**	**High**	**Very High**
Sensitivity of Development	**Low** (Commercial)	4/1	6/2	6/3	12/6	12/12
	Moderate (Flats)	6/2	6/3	9/6	12/12	24/24
	High (Residential with Gardens)	6/3	9/6	12/6	24/12	24/24

Notes
1. First number is the number of readings and the second is the minimum period in months (e.g. 6/2 – six sets of readings over two months).
2. At least two sets of readings must be at low (preferably under 1,000 mb) and falling pressure.

The monitoring programme is decided using the above table prior to the intrusive site investigation. However, if the intrusive investigation reveals that a the potential source is better or worse than anticipated the monitoring programme should be modified accordingly. For example, if the made ground contains no evidence of organic material and comprises entirely granular brick fill, the potential for that made ground to generate ground gas is reduced considerably.

Tier 2 Generic Quantitative Risk Assessment
Generic Quantitiative Risk Assessment is undertaken upon completion of the required gas monitoring period.

All three current guidance documents propose that both ground gas concentrations and flow rates are used to calculate the limiting gas well gas volume flow rates for methane and carbon dioxide, based on the ground gas conditions monitored for during the worse-case temporal conditions. This limiting gas well volume flow rate is termed the Gas Screening Value (GSV, note that this was termed borehole gas volume flow), and is calculated as follows:

$$\textbf{GSV}\ (\text{l/hr}) = \frac{[\text{gas well gas concentration (\%v/v)}] \times [\text{gas well flow rate (l/hr)}]}{100}$$

GSV's are compared to typical max concentrations and limiting gas screening values derived for either Situation A - All development except low rise housing with gardens, or Situation B low rise housing with gardens (NHBC Traffic Light System). Table 8.5 from CIRIA C665 is used for comparison of gas screening values for "Situation A Developments" and is presented hereunder:

Characteristic Situation (CIRIA R149)	Comparable Partners in Technology gas Regime (see Box 8.2)	Risk Classification	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]	Additional Factors	Typical Source of Generation
1	A	Very low risk	<0.07	Typically methane ≤ 1% and/or carbon dioxide ≤ 5%. Otherwise consider increase to Situation 2	Natural soils with low organic content "Typical" made ground
2	B	Low risk	<0.7	Borehole air flow rate not to exceed 70l/hr. Otherwise consider increase to characteristic Situation 3	Natural soil, high peat/organic content. "Typical" made ground
3	C	Moderate risk	<3.5		Old landfill, inert waste, mineworking flooded
4	D	Moderate to high risk	<15	Quantitative risk assessment required to evaluate scope of protective measures.	Mineworking susceptible to flooding, completed landfill (WMP 26B criteria)
5	E	High risk	<70		Mineworking unflooded inactive with shallow workings near surface
6	F	Very high risk	>70		Recent landfill site

Table 8.5 from CIRIA C665 Modified Wilson and Card Classification

Table 8.7 is used for comparison of gas screening values for "Situation B Developments" and is presented herunder:

Traffic Light	Methane[1]		Carbon Dioxide[2]	
	Typical max concentration[3] (% by volume)	Gas screening value[2,4] (litres/hour)	Typical max concentration[3] (% by volume)	Gas screening value[2,4] (litres/hour)
Green	1	0.13	5	0.78
Amber 1	5	0.63	10	1.60
Amber 2	20	1.60	30	3.10
Red				

Notes:
1. The worst-case ground gas regime identified on the site, either methane or carbon dioxide, at the worst-case temporal conditions that the site may be expected to encounter will be the decoder as to what Traffic Light is allocated;
2. Borehole Gas Volume Flow Rate, in litres per hour as defined in Wilson and Card (1999), is the borehole flow rate multiplied by the concentration in the air stream of the particular gas being considered;
3. The Typical Maximum Concentration can be exceeded in certain circumstances should the Conceptual Site Model indicate it is safe to do so;
4. The Gas Screening Value thresholds should not generally be exceeded without the completion of a detailed ground gas risk assessment taking into account site-specific conditions.

Table 8.7 from CIRIA C665 - NHBC Traffic light system for 150 mm void

Dependant on the outcome of the assessment of risk posed by ground gas it is determined whether gas protection measures are required for the proposed development, and or whether a detailed quantitative risk assessment is required for the site.

Selection & Design of Protective Measures
Table 8.6 and Box 8.4 of CIRIA C665 contain information on the detailed design of protection measures and were initially intended for the purposes of determining then level of protection measures a development requires. These tables and related text include some useful information on the design of gas protection measures, however BS84845:2007, which supersedes the guidance included within CIRIA C665, is used for selection of gas protection measures.

BS8485: 2007 uses a scoring system dependant on the Characteristic Situation / NHBC Traffic Light and proposed end use of the site. The scoring system is summarised in BS8485:2007 Table 2 as presented hereunder:

Characteristic gas situation, CS	NHBC traffic light	Required gas protection			
		Non-managed property e.g. private housing	Public building (a)	Commercial buildings	Industrial buildings (b)
1	*Green*	0	0	0	0
2	*Amber 1*	3	3	2	1 (c)
3	*Amber 2*	4	3	2	2
4	*Red*	6 (d)	5(d)	4	3
5			6(e)	5	4
6				7	6

NOTE *Traffic light indications are taken from NHBC Report no.:10627-RO1 (04) and are mainly applicable to low-rise residential housing[1]. These are for comparative purposes but the boundaries between the traffic light indications and CS values do not coincide.*

a) Public buildings include, for example, managed apartments, schools and hospitals.
b) Industrial buildings are generally open and well ventilated. However, areas such as office pods might require a separate assessment and may be classified as commercial buildings and require a different scope of gas protection to the main building.
c) Maximum methane concentration 20% otherwise consider and increase to CS3.
d) Residential building on higher traffic light/CS sites is not recommended unless the type of construction or site circumstances allow additional levels of protection to be incorporated, e.g. high-performance ventilation or pathway intervention measures, and an associated sustainable system of management of maintenance of the gas control system, e.g. in institutional and/or fully serviced contractual situations.
e) Consideration of issues such as ease of evacuation and how false alarms will be handled are needed when completing the design specification of any gas protection scheme

[1] The NHBC guidance and CIRIA C665 guidance refers to low rise housing (which is up to three storeys without lifts) that is constructed with a 150mm ventilated sub-floor void.

BS8485:2007 Table 2 Required gas protection by characteristic gas situation and type of building

Once a score is assigned, a combination of protection systems / elements is chosen from BS8485:2007 Table 3 shown below:
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PROTECTION ELEMENT / SYSTEM		SCORE	COMMENTS
a) Venting / dilution (See Annex A BS8485)			
Passive sub floor ventilation (venting layer can be a clear void or formed using gravel, geocomposites, polystyrene void formers, etc.)[A]	Very good performance	2.5	*Ventilation performance in accordance with Annex A (BS8485)*
	Good performance	1	*If passive ventilation is poor this is generally unacceptable and some form of active system will be required.*
Subfloor ventilation with active abstraction/pressurization (venting layer can be a clear void or formed using gravel, geocomposites, polystyrene void formers, etc.)[A]		2.5	*There have to be robust management systems in place to ensure the continued maintenance of any ventilation system. Active ventilation can always be designed to meet good performance.*
Ventilated car park (basement or undercroft)		4	*Mechanically assisted systems come in two forms: extraction and positive pressurization.*
b) Barriers			
Floor slabs			
Block and beam floor slab		0	*It is good practice to install ventilation in all foundation systems to effect pressure relief as a minimum. Breaches in floor slabs such as joints have to be effectively sealed against gas ingress in order to maintain these performances.*
Reinforced concrete ground bearing slab		0.5	
Reinforced concrete ground bearing foundation raft with limited service penetrations that are cast into slab		1.5	
Reinforced concrete cast in situ suspended floor slab with minimal service penetrations and water bars around all slab penetrations and at joints		1.5	
Fully tanked basement		2	
c) Membranes			
Taped and sealed membrane to reasonable levels of workmanship/in line with current good practice with validation [B,C]		0.5	*The performance of membranes is heavily dependent on the quality of design of the installation, resistance to damage after installation, and the integrity of joints.*
Proprietary gas resistant membrane to reasonable levels of workmanship /in line with good practice under independent inspection (CQA)[B,C]		1	
Proprietary gas resistant membrane installed to reasonable levels of workmanship/in line with current good practice under CQA with integrity testing and independent validation		2	
d) Monitoring and detection (not applicable to non-managed property, or in isolation)			
Intermittent monitoring using hand held equipment		0.5	*Where fitted, permanent monitoring systems ought to be installed in the underfloor venting/dilution system in the first instance but can also be provided within the occupied space as a fail safe.*
Permanent monitoring and alarm system [A]	Installed in the underfloor venting/dilution system	2	
	Installed in the building	1	
e) Pathway Intervention			
Pathway intervention		-	*This can consist of site protection measures for off-site or on-site sources (see Annex A, BS8485)*
NOTE In practice the choice of materials might well rely on factors such as construction method and the risk of damage after installation. It is important to ensure that the chosen combination gives an appropriate level of protection			
A) It is possible to test ventilation systems by installing monitoring probes for post installation validation. *B) If a 1 200g DPM material is to function as a gas barrier it should be installed according to BRE 212 /BRE 414 being taped and sealed to all penetrations* *C) Polymeric Materials> 1200 g (proportional to thickness) but their physical properties mean that they are more robust and resistant to damage.*			

BS8485:2007 Table 3 Solution Scores

Where the gas situation is 4 or more (and for NHBC Red situations) the site requires a comprehensive risk assessment to confirm the scope of protection measures. These are higher risk sites and reliance on Table 2 and 3 alone is not sufficient.

For a site which is impacted by migratory gases from an off site source, the development may be protected by imposing pathway intervention methods, which if successfully validated, could also remove the need for further analysis. It is essential that the gas regime in these circumstances has been fully characterised and that the only source impacting the site is located off site and that the pathway is clearly defined and its interception equally proven before construction commences. Pathway intervention methods may include vertical membrane installations, venting trenches, rows of stone columns, activated trenches and various proprietary systems. These systems are particularly relevant to domestic housing where there is limited scope for foundation type solutions.

CURRENT GUIDANCE ON REMEDIATION

When risk assessment of the site has been completed and it indicates that remedial works are required, the main guidance in managing this process is set out in the DEFRA/EA publication CLR11 (2004) "Model Procedures for the Management of Land Contamination." The stages of managing remediation are as follows:

(a) Options Appraisal and develop Remediation Strategy;
(b) Develop Implementation Plan and Verification Plan;
(c) Remediation, Verification and Monitoring.

The Remediation Strategy sets out the remediation targets, identifies technically feasible remedial solutions and presents an evaluation of the options so that these can be assessed enabling that the most suitable solution is adopted. An outline of the proposed remedial method should be presented. Agreement should be sought of the appropriate statutory bodies for the Remediation Strategy before proceeding to the next stage.

The Implementation Plan is a detailed method statement setting out how the remediation is to be carried out including stating how the site will be managed, welfare procedures, health and safety considerations together with practical measures such as details of temporary works, programme of works, waste management licences and regulatory consents required. Agreement should again be sought of the appropriate statutory bodies for this Plan.

The Verification Plan sets out the requirements for gathering data to demonstrate that the remediation has met the required remediation objectives and criteria. The Verification Plan presents the requirements for a wide range of issues including the level of supervision, sampling and testing regimes for treated materials, waste and imported materials, required monitoring works during and post remediation, how compliance with all licenses and consents will be checked etc. Agreement should again be sought of the appropriate statutory bodies for the Verification Plan. On completion of the remediation a Verification Report should be produced to provide a complete record of all remediation activities on site and the data collected as required in the Verification Plan. The Verification Report should demonstrate that the remediation has met the remedial targets to show that the site is suitable for the proposed use.

APPENDIX E

NOTES ON LIMITATIONS

Standard Terms and Conditions of Engagement
Notes on Limitations
For
Geoenvironmental and Geotechnical Consultancy Services

General

CC GEOTECHNICAL LTD has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from CC GEOTECHNICAL LTD and a charge may be levied against such approval.

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1. the consequences of this document being used for any purpose or project other than for which it was commissioned

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2. the consequences of use of this document by any party with whom an agreement has not been executed.

Phase I Environmental Audits / Desk Studies

The work undertaken to provide the basis of a Phase 1 Desk Study report comprises a study of available documented information from a variety of sources (including the client), together with (where appropriate) a walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in a Desk Study report have been dictated by finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in the report, CC GEOTECHNICAL LTD reserves the right to review such information and to modify the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Phase II Environmental Audits

The investigation of the site has been carried out with the intention of providing sufficient information concerning the type and degree of contamination, and ground and groundwater conditions to allow a reasonable risk assessment to be made. The objectives of the investigation have been limited to establishing the risks associated to potential human targets, building materials, the environment (including adjacent land), and surface and groundwater.

The amount of exploratory work and chemical testing undertaken may have been restricted by the timescale available, and the locations of the exploratory holes may have been restricted to areas unoccupied by the building(s) on the site, and further restricted by the existence of buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, a number of important engineering and environmental issues may need to be resolved.

For those reasons, if costs have been included in relation to site remediation these must be considered as tentative only and must, in any event, be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, investigate only a small volume of the ground in relation to the size of the site, and can only provide a general indication of site conditions. The number of sampling points and the methods of sampling and testing do not preclude the existence of localised “hotspots” of contamination where concentrations may be significantly higher than those actually encountered.

Geoenvironmental Ground Investigations

The investigation of the site has been carried out to provide sufficient information within the agreed scope of the investigation, under the general headings of type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions, to provide a reasonable assessment of the environmental risks together with engineering and development implications.

If costs have been included in relation to the site remediation, these must be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, investigate only a small volume of the ground in relation to the size of the site, and can only provide a general indication of the site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site of each of the exploratory holes. There may be ground conditions present on the site which have not been disclosed by this investigation, and which have therefore not been taken into account in this report.

The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that groundwater levels will vary owing to seasonal, tidal, weather, or other effects.

The risk assessment and opinions provided, inter alia, take into consideration currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.