



Appendix G-4 Part 5 – Consultation Materials: Preliminary Environmental Information Report

5. Geology

5.1 Artificial Ground and Made Ground

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT

5.2 Superficial Ground and Drift Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
NRD-XSV	NORTH DENES FORMATION	SAND AND GRAVEL
BRYD-P	BREYDON FORMATION	PEAT
BRYD-XCZ	BREYDON FORMATION	CLAY AND SILT
BRYD-XCZ	BREYDON FORMATION	CLAY AND SILT
TRD-XCZ	TIDAL RIVER OR CREEK DEPOSITS	CLAY AND SILT
HPGL-S	HAPPISBURGH GLACIGENIC FORMATION	SAND
BSA-S	BLOWN SAND	SAND

5.3 Bedrock and Solid Geology

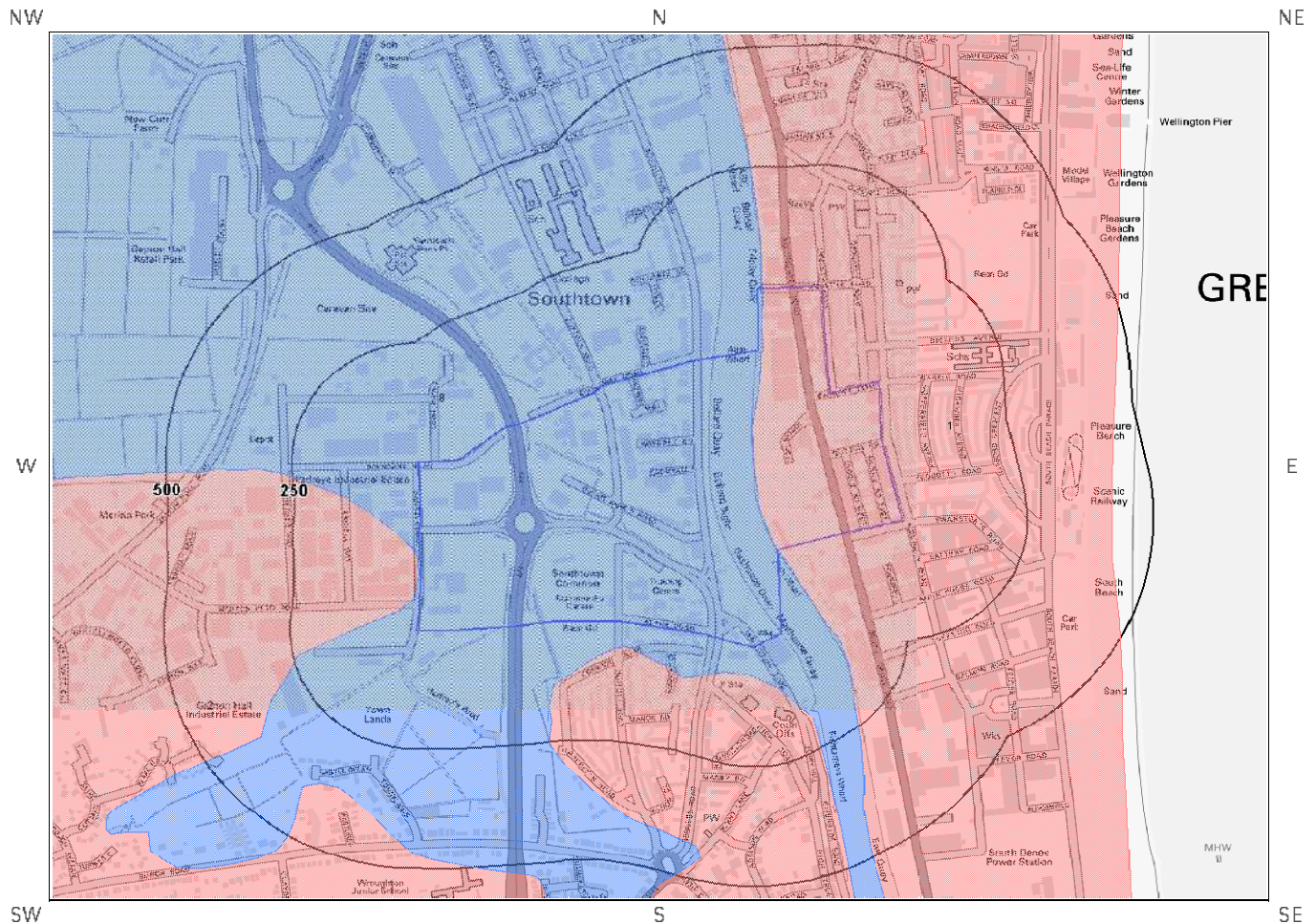
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
CRAG-XSV	CRAG GROUP	SAND AND GRAVEL

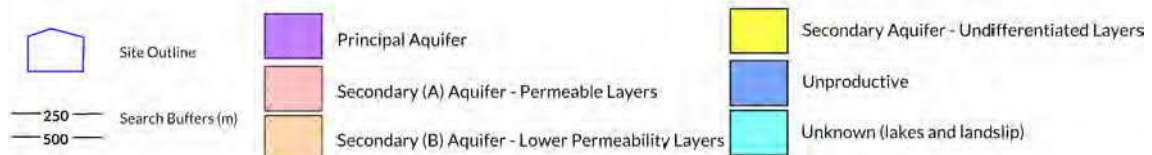
(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology



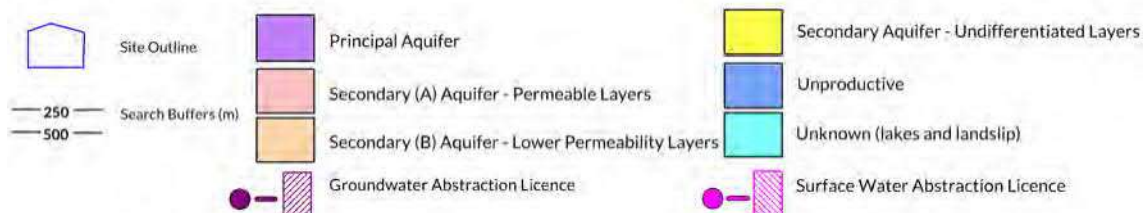
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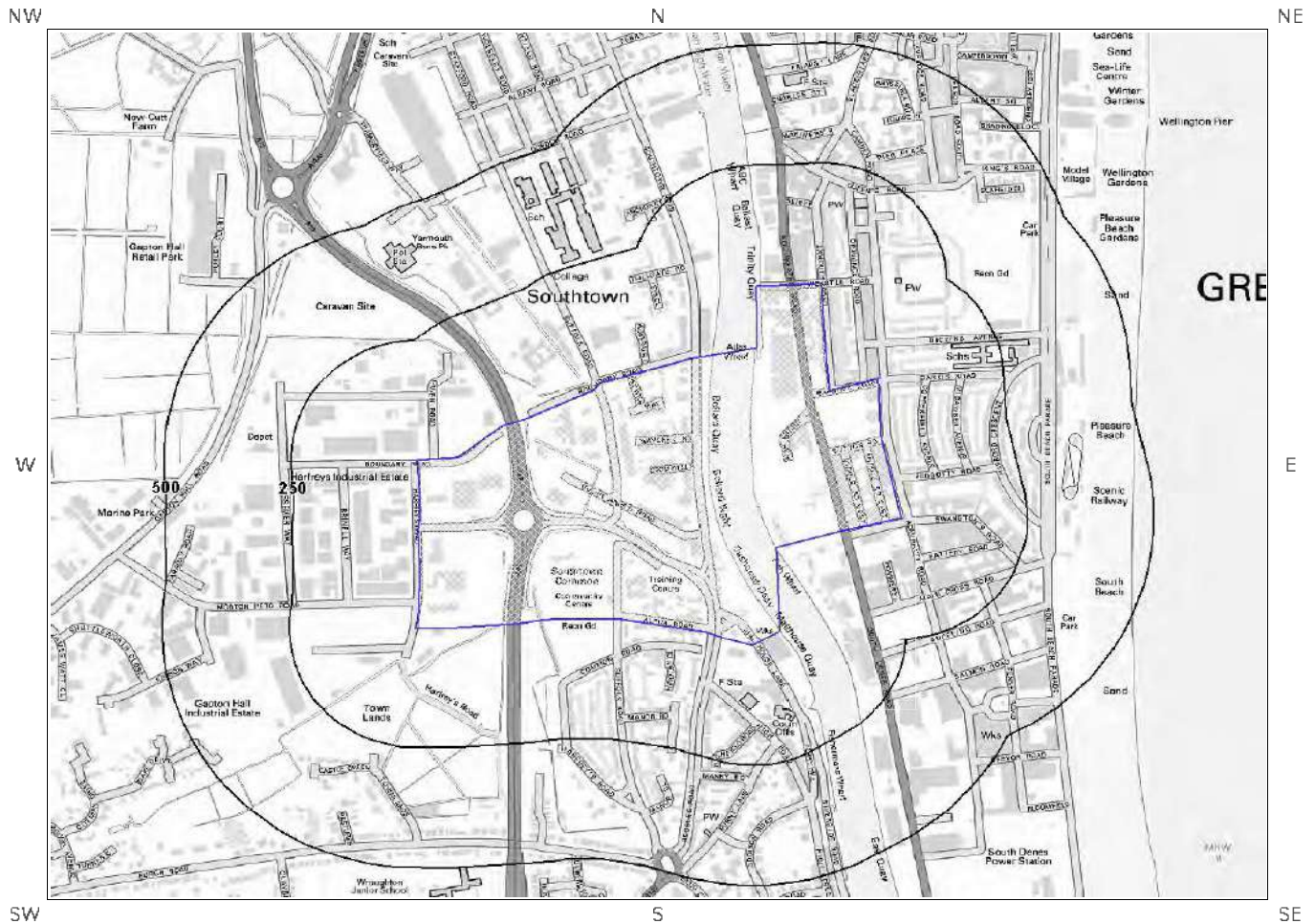
6b. Aquifer Within Bedrock Geology and Abstraction Licenses



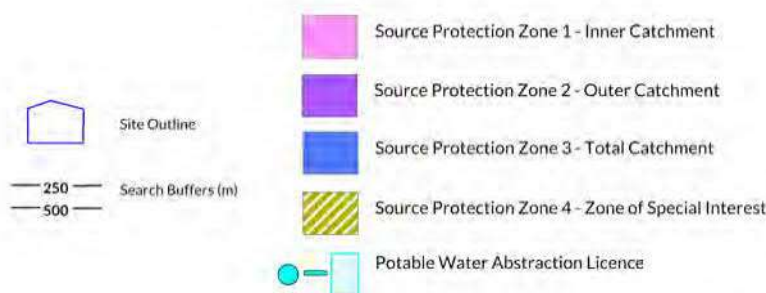
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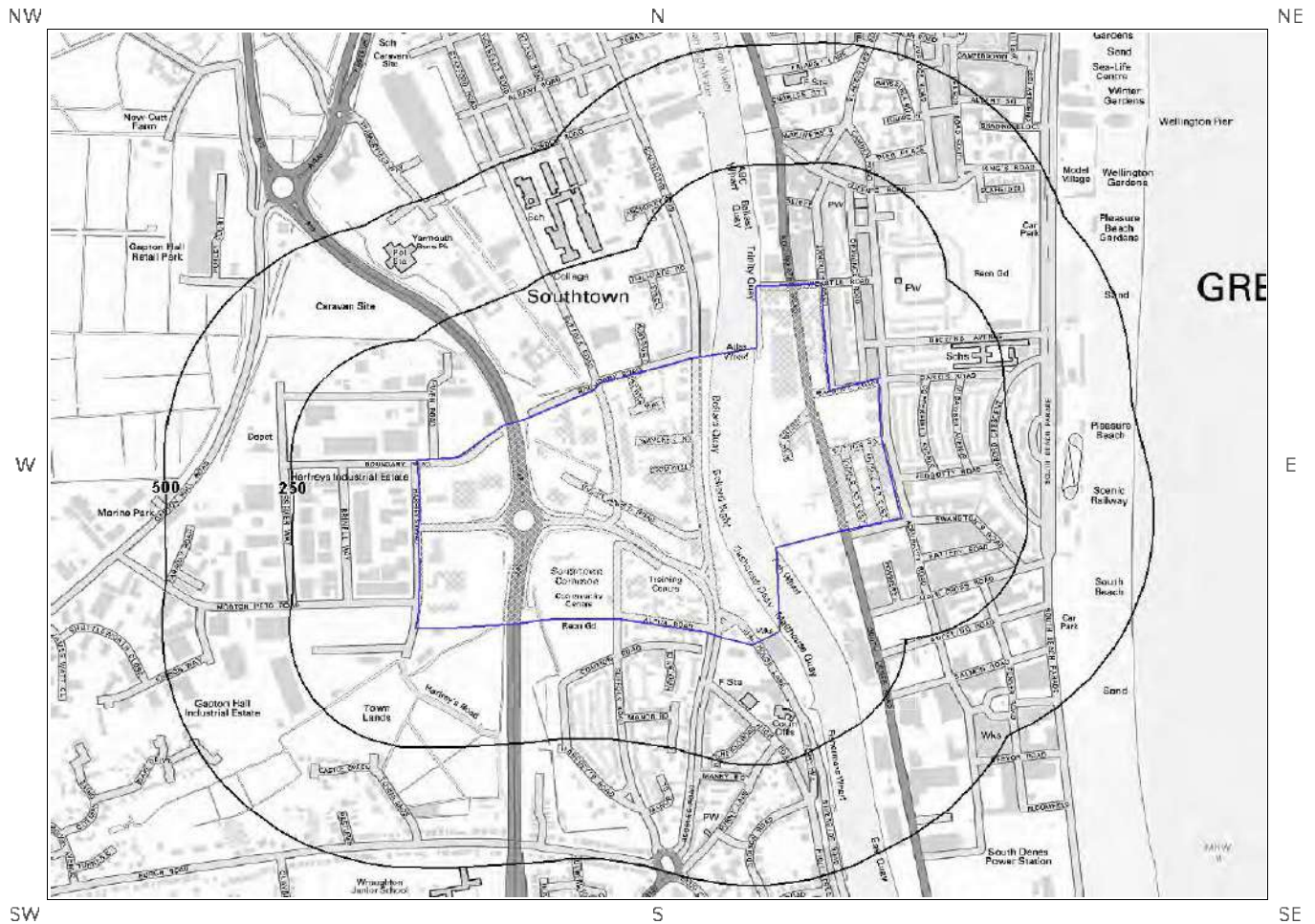
6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses



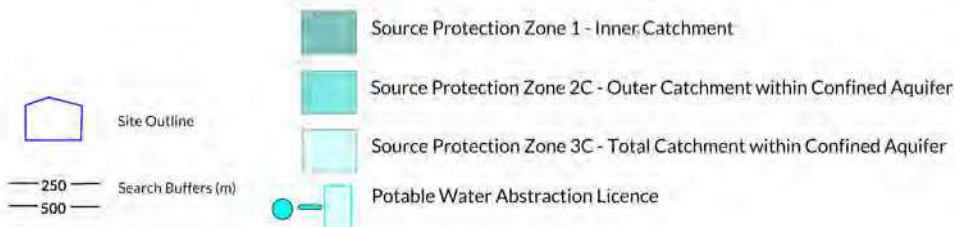
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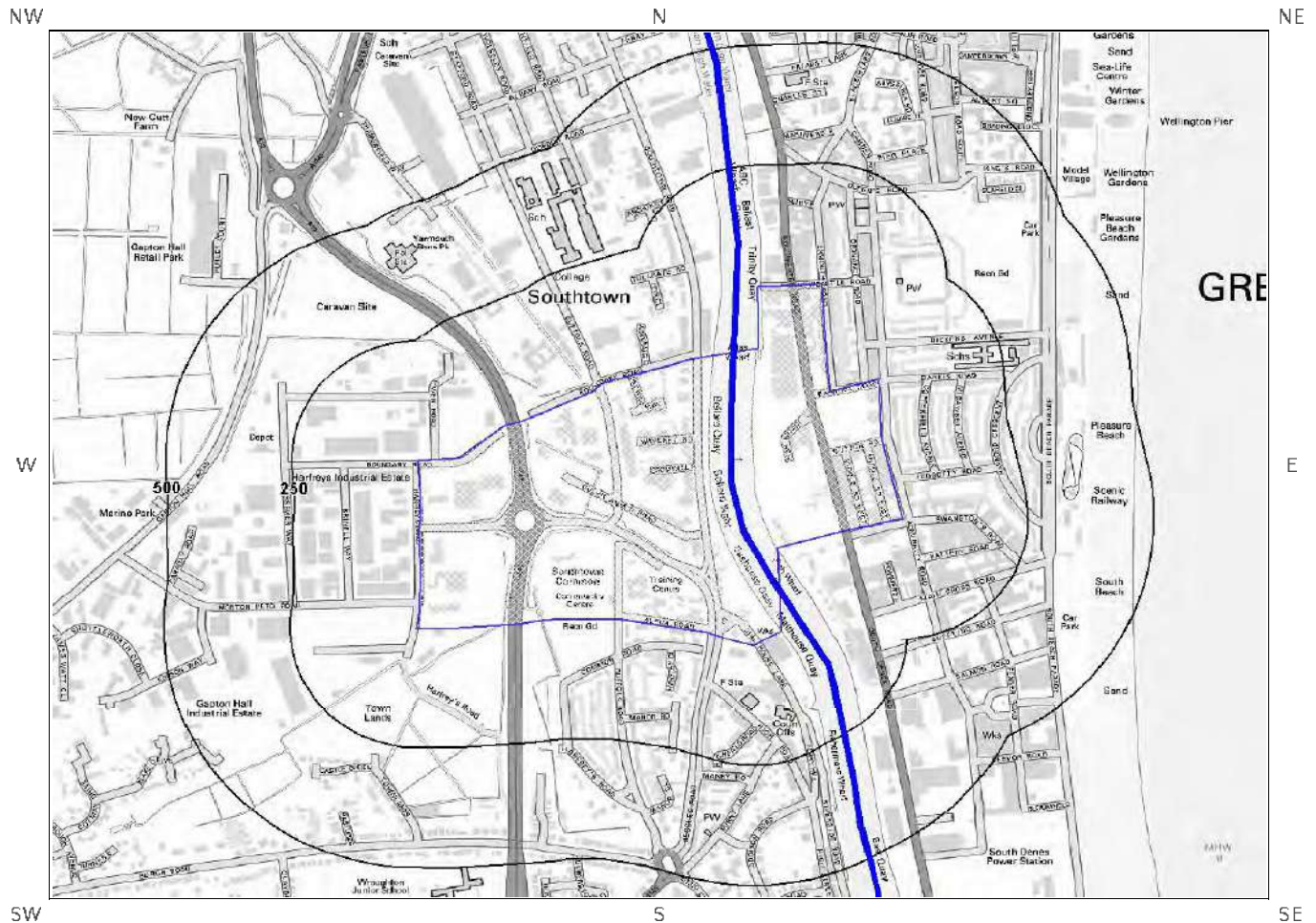
6d. Hydrogeology – Source Protection Zones within confined aquifer



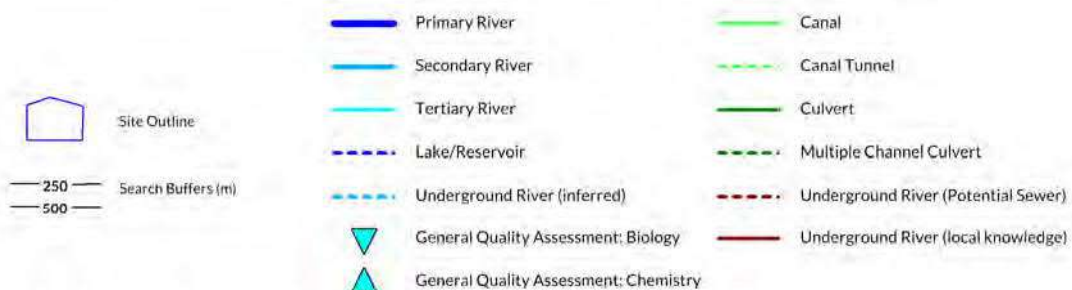
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6e. Hydrology – Detailed River Network and River Quality



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6. Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Are there records of strata classification within the superficial geology at or in proximity to the property? **Yes**

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (6a):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
8	0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
2	3	W	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.2 Aquifer within Bedrock Deposits

Are there records of strata classification within the bedrock geology at or in proximity to the property? **Yes**

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers

6.3 Groundwater Abstraction Licences

Are there any Groundwater Abstraction Licences within 2000m of the study site?

Yes

The following Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details
3	71	N	651820 306080	<p>Status: Active Licence No: AN/034/0015/020 Details: Laundry Use Direct Source: Ground Water Source Of Supply Point: Wellpoints At The Laundry, Portland Lane, Great Yarmouth Data Type: Point Name: Camplings Limited</p> <p>Annual Volume (m³): 60000 Max Daily Volume (m³): 210 Original Application No: NPS/WR/024446 Original Start Date: 1/12/2016 Expiry Date: 31/3/2030 Issue No: 1 Version Start Date: 1/12/2016 Version End Date:</p>
Not shown	1187	NE	653140 307460	<p>Status: Historical Licence No: 7/34/15/*G/0220 Details: Make-Up or Top Up Water Direct Source: Ground Water Source Of Supply Point: Wellpoint At Gt Yarmouth Data Type: Point Name: B & M LEISURE</p> <p>Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 1/3/1997 Expiry Date: - Issue No: 100 Version Start Date: 1/3/1997 Version End Date:</p>

6.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 2000m of the study site?

Yes

The following Surface Water Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details
5	443	N	652372 306914	<p>Status: Historical Licence No: AN/034/0015/013 Details: Hydraulic Testing Direct Source: Surface Water Source Of Supply Point: River Yare At Berth 28, Great Yarmouth Data Type: Line Name: INTERSERVE CONSTRUCTION LIMITED</p> <p>Annual Volume (m³): 4000 Max Daily Volume (m³): 100 Application No: NPS/WR/014706 Original Start Date: 16/12/2013 Expiry Date: 31/3/2015 Issue No: 1 Version Start Date: 16/12/2013 Version End Date:</p>

6.5 Potable Water Abstraction Licences

Are there any Potable Water Abstraction Licences within 2000m of the study site?

No

Database searched and no data found.

6.6 Source Protection Zones

Are there any Source Protection Zones within 500m of the study site?

No

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

Are there any Source Protection Zones within the Confined Aquifer within 500m of the study site?

No

Historically, Source Protection Zone maps have been focused on regulation of activities which occur at or near the ground surface, such as prevention of point source pollution and bacterial contamination of water supplies. Sources in confined aquifers were often considered to be protected from these surface pressures due to the presence of a low permeability confining layer (e.g. glacial till, clay). The increased interest in subsurface activities such as onshore oil and gas exploration, ground source heating and cooling requires protection zones for confined sources to be marked on SPZ maps where this has not already been done.

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

Is there any Environment Agency/Natural Resources Wales information on groundwater vulnerability and soil leaching potential within 500m of the study site?

Yes

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Major Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.
0	On Site	Major Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.
487	W	Major Aquifer/High Leaching Potential	H1	Soils which readily transmit liquid discharges because they are shallow or susceptible to rapid flow directly to rock, gravel or groundwater.

6.9 River Quality

Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site?

No

Database searched and no data found.

6.9.2 Chemical Quality:

Database searched and no data found.

6.10 Detailed River Network

Are there any Detailed River Network entries within 500m of the study site?

Yes

The following Detailed River Network records are represented on the Hydrology Map (6e):

ID	Distance (m)	Direction	Details
1	0	On Site	<div> <div> River Name: River Yare Welsh River Name: - Alternative Name: - </div> <div> River Type: Primary River Main River Status: Currently Undefined </div> </div>

6.11 Surface Water Features

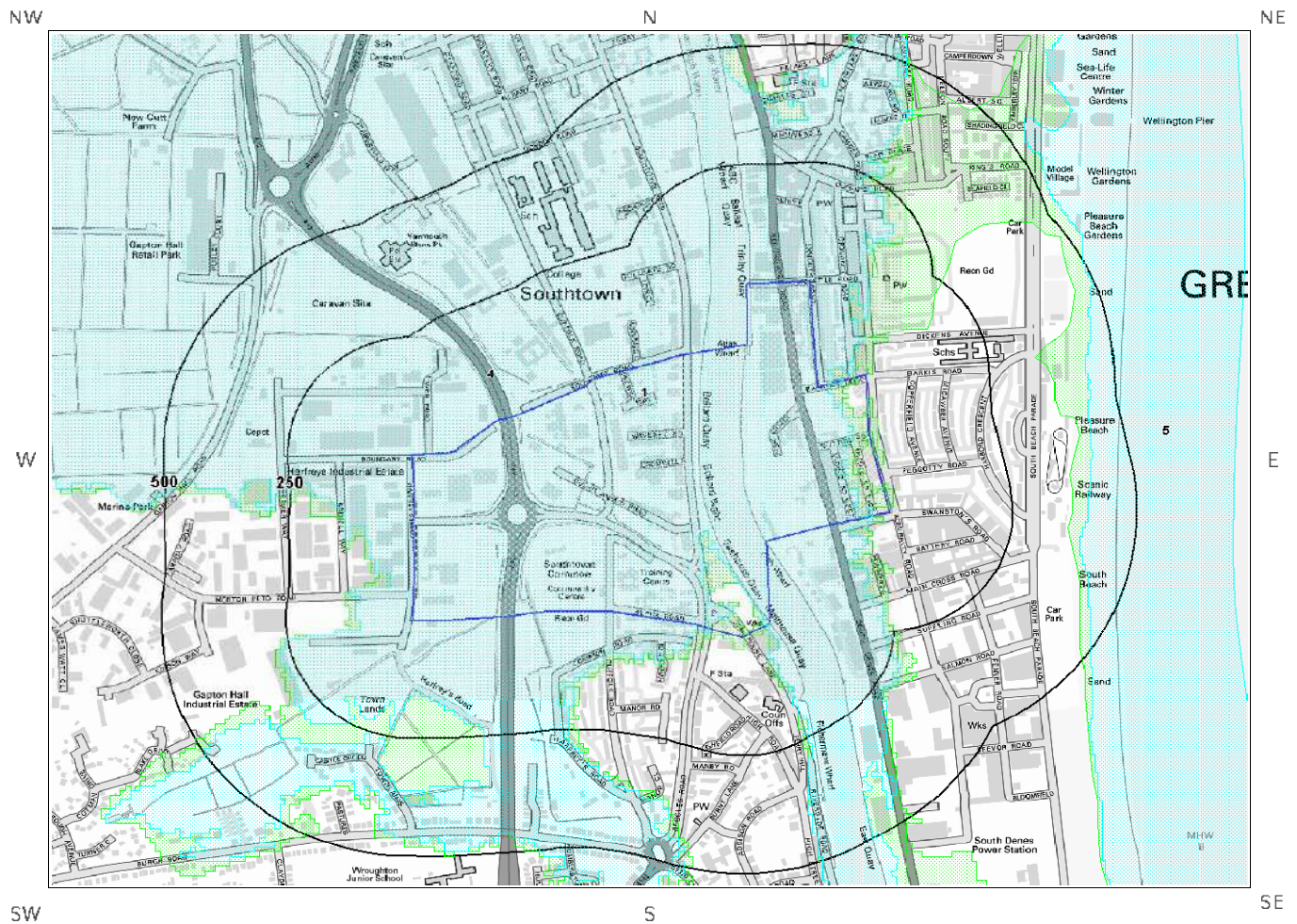
Are there any surface water features within 250m of the study site?

Yes

The following surface water records are not represented on mapping:

Distance (m)	Direction
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
17	NW
25	NW
29	N
37	NW
52	NW
74	SW
105	NW
118	S
143	S
158	NW
176	S

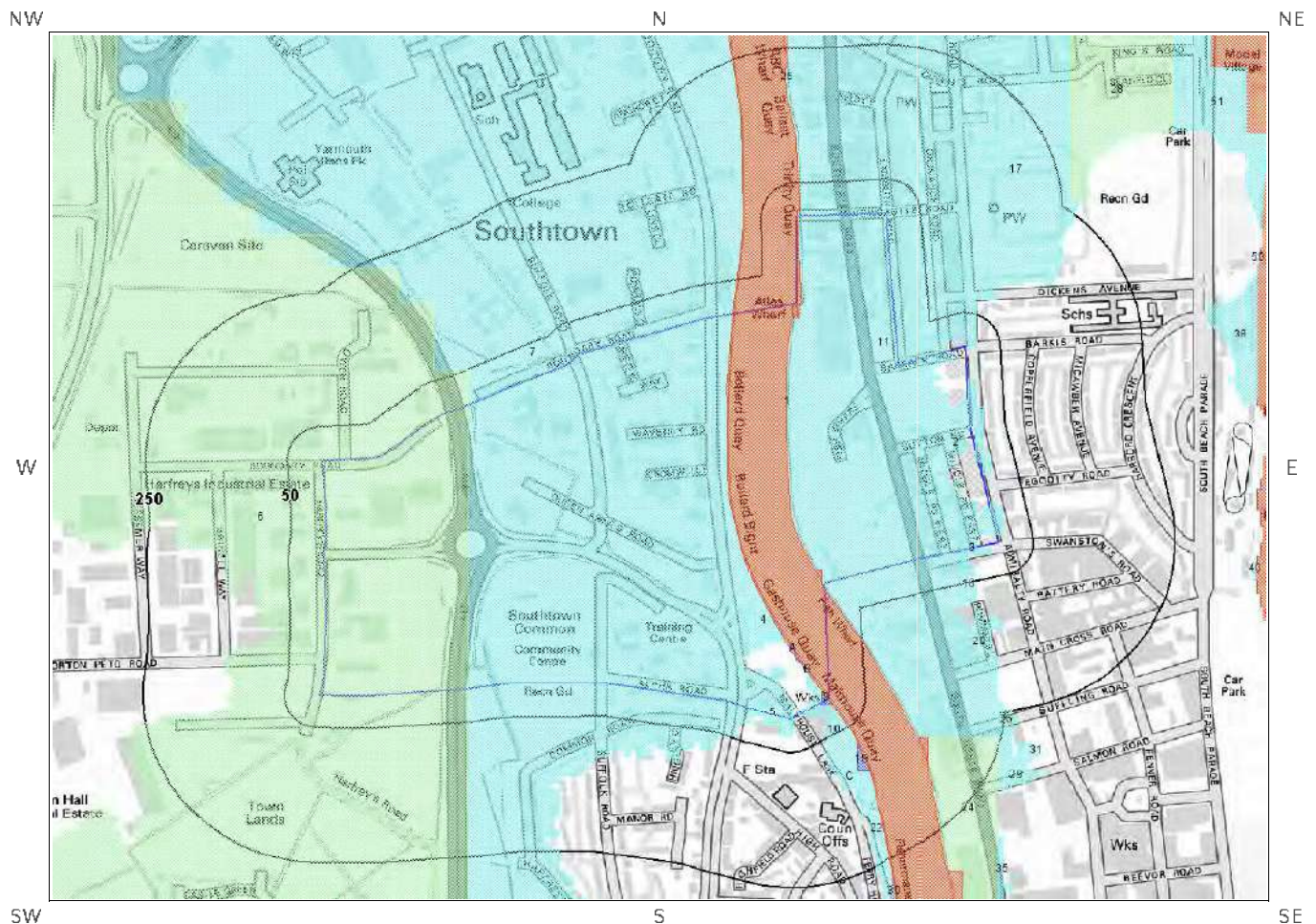
7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea)



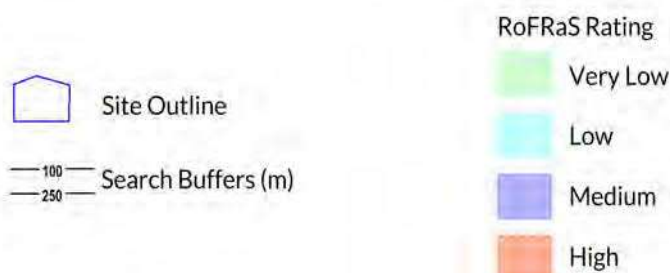
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7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Map



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7 Flooding

7.1 River and Coastal Zone 2 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 2 floodplain? **Yes**

Environment Agency/Natural Resources Wales Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. Any relevant data is represented on Map 7a – Flood Map for Planning:

ID	Distance (m)	Direction	Update	Type
1	0	On Site	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 3 floodplain? **Yes**

Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year. Any relevant data is represented on Map 7a – Flood Map for Planning.

ID	Distance (m)	Direction	Update	Type
1	0	On Site	19-Jun-2017	Zone 3 - (Fluvial Models)

7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating

What is the highest risk of flooding onsite? **High**

The Environment Agency/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

RoFRaS data for the study site indicates the property is in an area with a High (1 in 30 or greater) chance of flooding in any given year.

Any relevant data within 250m is represented on the RoFRaS Flood map. Data to 50m is reported in the table below.

ID	Distance (m)	Direction	RoFRaS flood Risk
1	0.0	On Site	Low
2	0.0	On Site	Low

3	0.0	On Site	Low
4	0.0	On Site	Low
5	0.0	On Site	Low
6	0.0	On Site	Very Low
7	0.0	On Site	Low
8B	0.0	On Site	Low
9	0.0	On Site	Medium
10	0.0	On Site	Low
11	0.0	On Site	Low
12A	0.0	On Site	Medium
13A	0.0	On Site	Medium
14B	0.0	On Site	Medium
15B	0.0	On Site	Medium
16	0.0	On Site	High
17	5.0	E	Low
18	30.0	S	Low

7.4 Flood Defences

Are there any Flood Defences within 250m of the study site? No
Database searched and no data found.

7.5 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site? No

7.6 Areas benefiting from Flood Storage

Are there any areas used for Flood Storage within 250m of the study site? No

7.7 Groundwater Flooding Susceptibility Areas

7.7.1 Are there any British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site? Yes

Does this relate to Clearwater Flooding or Superficial Deposits Flooding? Clearwater Flooding

Notes: Groundwater flooding may either be associated with shallow unconsolidated sedimentary aquifers which overlie unproductive aquifers (Superficial Deposits Flooding), or with unconfined aquifers (Clearwater Flooding).

7.7.2 What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions?

Limited potential

Where limited potential for groundwater flooding to occur is indicated, this means that although given the geological conditions there may be a groundwater flooding hazard, unless other relevant information, e.g. records of previous flooding, suggests groundwater flooding has occurred before in this area, you need take no further action in relation to groundwater flooding hazard.

7.8 Groundwater Flooding Confidence Areas

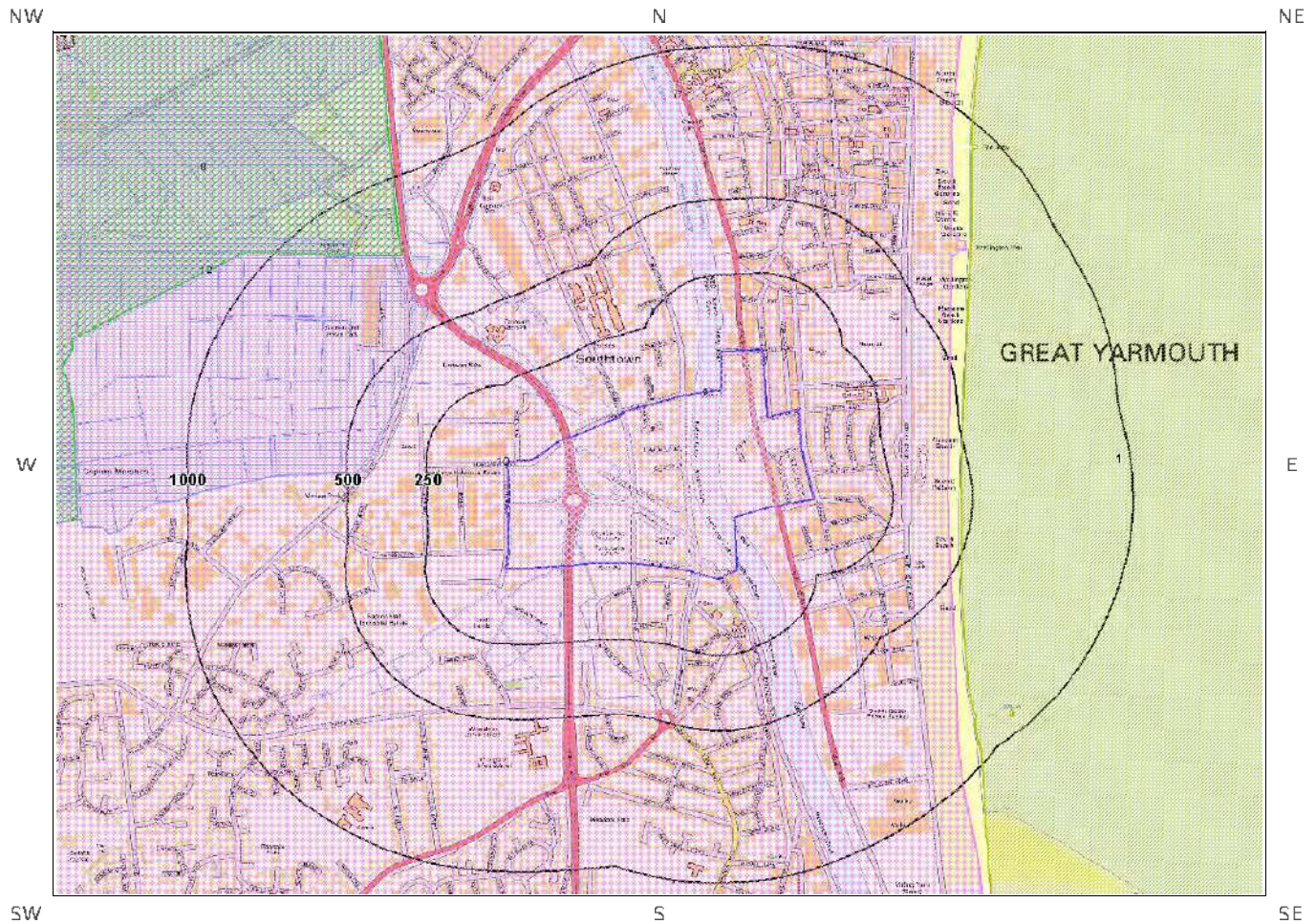
What is the British Geological Survey confidence rating in this result?

Low

Notes: Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The confidence rating is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

8. Designated Environmentally Sensitive Sites Map



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8. Designated Environmentally Sensitive Sites

Presence of Designated Environmentally Sensitive Sites within 2000m of the study site?

Yes

8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site:

3

The following Site of Special Scientific Interest (SSSI) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	SSSI Name	Data Source
Not shown	1794	NW	Breydon Water	Natural England
4	1848	NW	Breydon Water	Natural England
Not shown	1949	NW	Breydon Water	Natural England

8.2 Records of National Nature Reserves (NNR) within 2000m of the study site:

0

Database searched and no data found.

8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site:

0

Database searched and no data found.

8.4 Records of Special Protection Areas (SPA) within 2000m of the study site:

2

The following Special Protection Area (SPA) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	SPA Name	Data Source
1	465	E	Outer Thames Estuary	Natural England

ID	Distance (m)	Direction	SPA Name	Data Source
2A	1794	NW	Breydon Water	Natural England

8.5 Records of Ramsar sites within 2000m of the study site:

1

The following Ramsar records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	Ramsar Site Name	Ramsar Site Status	Data Source
6A	1794	NW	Breydon Water	Listed	Natural England

8.6 Records of Ancient Woodland within 2000m of the study site:

0

Database searched and no data found.

8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site:

1

The following Local Nature Reserve (LNR) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	LNR Name	Data Source
7	1797	NW	Breydon Water	Natural England

8.8 Records of World Heritage Sites within 2000m of the study site:

0

Database searched and no data found.

8.9 Records of Environmentally Sensitive Areas within 2000m of the study site:

2

The following Environmentally Sensitive Area records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	ESA Name	Data Source
12	392	W	Broads	Natural England
Not shown	1839	W	Broads	Natural England

8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site:

0

Database searched and no data found.

8.11 Records of National Parks (NP) within 2000m of the study site:

2

The following National Park records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NP Name	Data Source
8	754	NW	The Broads	Natural England
Not shown	1839	W	The Broads	Natural England

8.12 Records of Nitrate Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site:

2

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NVZ Name	Data Source
10	0	On Site	Existing	DEFRA
Not shown	1839	W	Existing	DEFRA

8.14 Records of Green Belt land within 2000m of the study site:

0

Database searched and no data found.

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information on geology and ground stability, please obtain a Groundsure Geo Insight, available from our [website](#). The following information has been found:

9.1.1 Shrink Swell

What is the maximum Shrink-Swell* hazard rating identified on the study site? Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Ground conditions predominantly medium plasticity. Do not plant trees with high soil moisture demands near to buildings. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a possible increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a possible increase in insurance risk, especially during droughts or where vegetation with high moisture demands is present.

9.1.2 Landslides

What is the maximum Landslide* hazard rating identified on the study site? Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to drainage or excavations take place. Possible increase in construction cost to reduce potential slope stability problems. Existing property no significant increase in insurance risk due to natural slope instability problems.

9.1.3 Soluble Rocks

What is the maximum Soluble Rocks* hazard rating identified on the study site? Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
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 indicates an automatically generated 50m buffer and site.

9.1.4 Compressible Ground

What is the maximum Compressible Ground* hazard rating identified on the study site?

High

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Very significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Construction may not be possible at economic cost. For existing property probable increase in insurance risk from compressibility especially if water conditions or loading of the ground change significantly.

9.1.5 Collapsible Rocks

What is the maximum Collapsible Rocks* hazard rating identified on the study site?

Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
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.

9.1.6 Running Sand

What is the maximum Running Sand* hazard rating identified on the study site?

Moderate

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Significant potential for running sand problems with relatively small changes in ground conditions. Avoid large amounts of water entering the ground (for example through pipe leakage or soak-aways). Do not dig (deep) holes into saturated ground near the property without technical advice. For new build consider the consequences of soil and groundwater conditions during and after construction. For existing property possible increase in insurance risk from running sand, for example, due to water leakage, high rainfall events or flooding.

9.2 Radon

9.2.1 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.

* This indicates an automatically generated 50m buffer and site.

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.

10. Mining

10.1 Coal Mining

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

Database searched and no data found.

10.2 Non-Coal Mining

Are there any Non-Coal Mining areas within 50m of the study site boundary? No

Database searched and no data found.

10.3 Brine Affected Areas

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

Guidance: No Guidance Required.

Contact Details

CENTREMAPS

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www.coal.gov.uk



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Tel: 08456 050505



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Hampshire RG27 8NW
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Acknowledgements: Site of Special Scientific Interest, National Nature Reserve, Ramsar Site, Special Protection Area, Special Area of Conservation data is provided by, and used with the permission of, Natural England who retain the Copyright and Intellectual Property Rights for the data.

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<https://www.groundsure.com/terms-and-conditions-sept-2016>



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030717GEO

Your Reference: 16287

Report Date 3 Jul 2017

Report Delivery Email - pdf
Method:

Geo Insight

Address: ,

Dear Sir/ Madam,

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

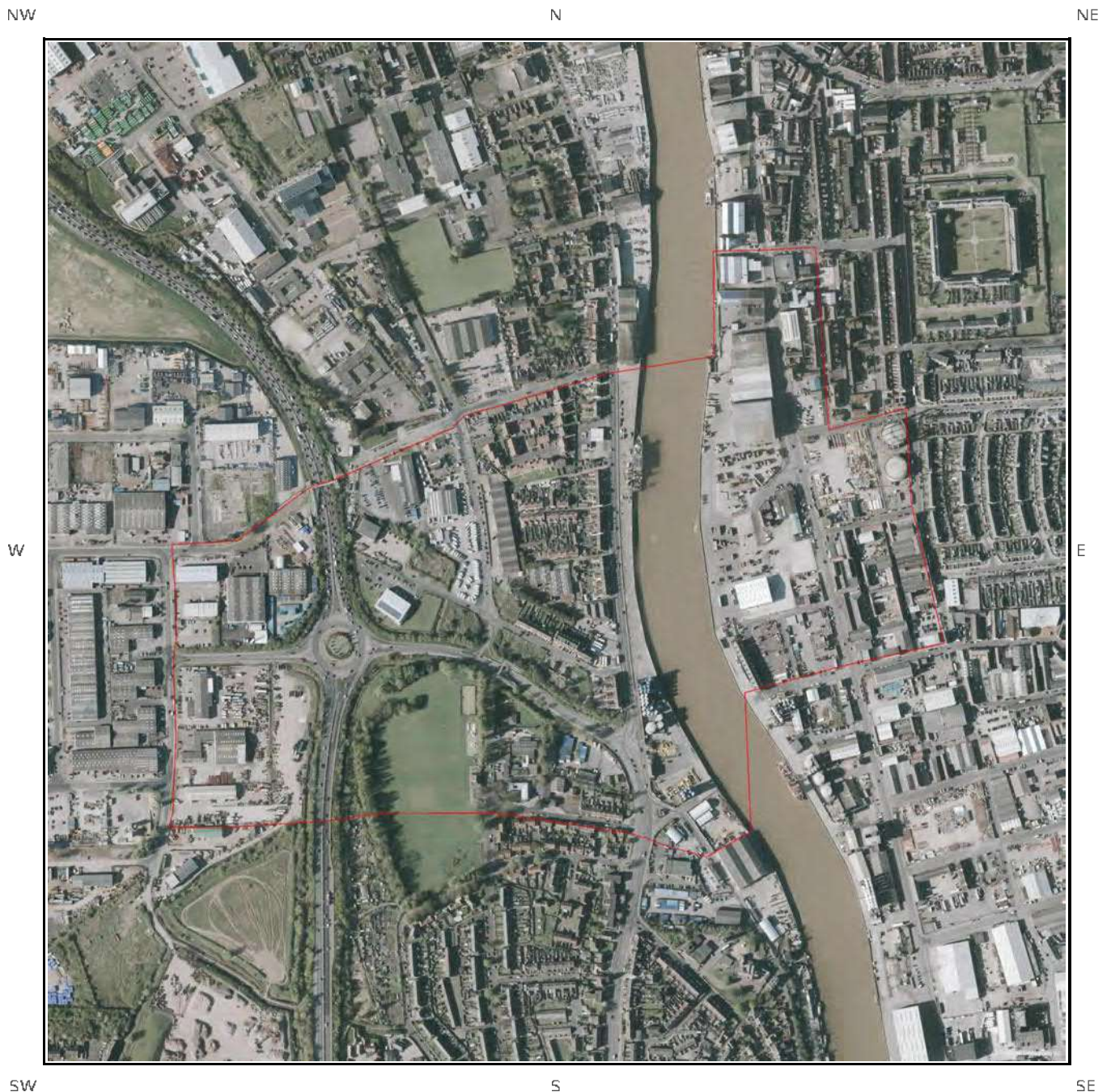
If you need any further assistance, please do not hesitate to contact our helpline on 01886 832972 quoting the above CENTREMAPS reference number.

Yours faithfully,

CENTREMAPS

Enc.
Groundsure Geo Insight

Address: ,
Date: 3 Jul 2017
Reference: CMAPS-CM-636391-16287-030717GEO
Client: CENTREMAPS



Aerial Photograph Capture date: 16-Apr-2014
Grid Reference: 652320,306005
Site Size: 43.58ha

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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 and 1:10,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Non-coal 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 1:10,000 Scale

1.1 Artificial Ground	1.1 Is there any Artificial Ground/ Made Ground present beneath the study site at 1:10,000 scale?	Yes
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site at 1:10,000 scale?*	No
	1.2.2 Are there any records of landslip within 500m of the study site boundary at 1:10,000 scale?	No
1.3 Bedrock, Solid Geology and 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 of faults within 500m of the study site boundary at 1:10,000 scale?	No

Section 2: Geology 1:50,000 Scale

2.1 Artificial Ground	2.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	Yes
	2.1.2 Are there any records relating to permeability of artificial ground within the study site*boundary?	Yes
2.2 Superficial Geology and Landslips	2.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	Yes
	2.2.2 Are there any records of permeability of superficial ground within 500m of the study site?	Yes
	2.2.3 Are there any records of landslip within 500m of the study site boundary?	No
	2.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No

Section 2: Geology 1:50,000 Scale

2.3 Bedrock, Solid Geology and Faults

2.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.

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

Yes

2.3.3 Are there any records of faults within 500m of the study site boundary?

No

Section 3: Radon

3. Radon

3.1 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.

3.2 Radon Protection

No radon protective measures are necessary.

Section 4: Ground Workings

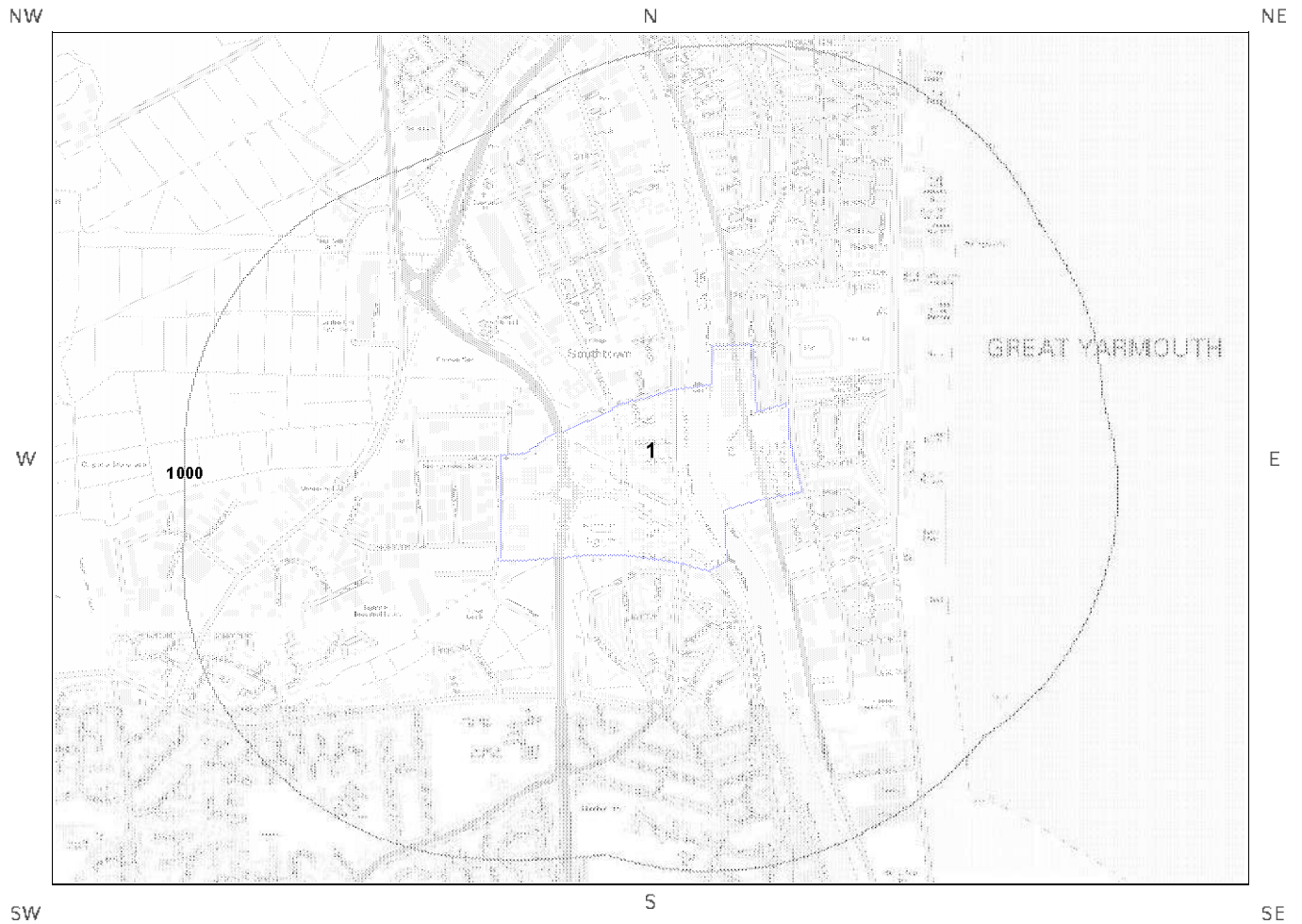
	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	11	1	12	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
4.3 Current Ground Workings	1	2	0	1	4

Section 5: Mining, Extraction & Natural Cavities

	On-site	0-50m	51-250	251-500	501-1000
5.1 Historical Mining	0	0	0	0	0
5.2 Coal Mining	0	0	0	0	0
5.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
5.4 Non-Coal Mining*	0	0	0	0	0
5.5 Non-Coal Mining Cavities	0	0	0	0	0
5.5 Natural Cavities	0	0	0	0	0

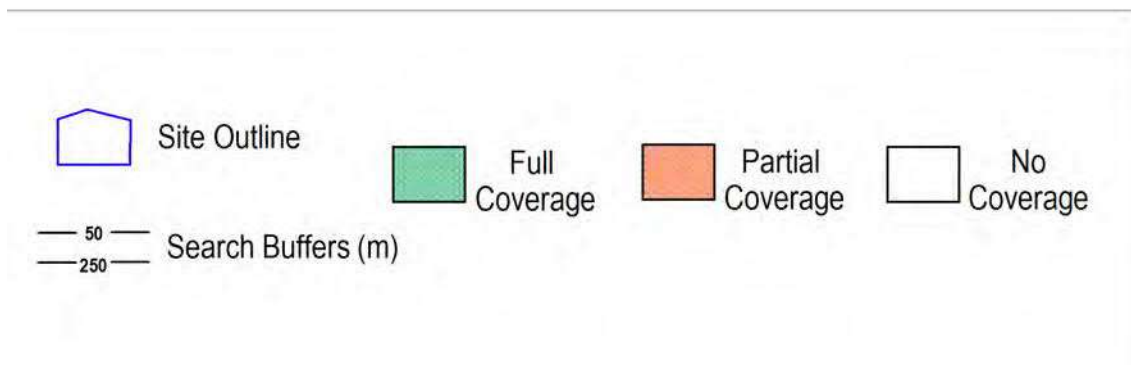
Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Tin Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0
Section 6: Natural Ground Subsidence	On-site				
6.1 Shrink-Swell Clay	Low				
6.2 Landslides	Low				
6.3 Ground Dissolution of Soluble Rocks	Negligible				
6.4 Compressible Deposits	High				
6.5 Collapsible Deposits	Very Low				
6.5 Running Sand	Moderate				
Section 7: Borehole Records	On-site	0-50m	51-250		
7 BGS Recorded Boreholes	107	33	77		
Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250		
8 Records of Background Soil Chemistry	16	3	0		
Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500	
9.1 Tunnels	0	0	0	Not Searched	
9.2 Historical Railway and Tunnel Features	31	6	21	Not Searched	
9.3 Historical Railways	3	0	0	Not Searched	
9.4 Active Railways	0	0	0	Not Searched	
9.5 Railway Projects	0	0	0	0	

1:10,000 Scale Availability



1_10,000 Availability Legend

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Availability of 1:10,000 Scale Geology Mapping

The following information represents the availability of the key components of the 1:10,000 scale geological data.

ID	Distance	Artificial Coverage	Superficial Coverage	Bedrock Coverage	Mass Movement Coverage
1	0.0	No deposits are mapped	No coverage	No coverage	No coverage

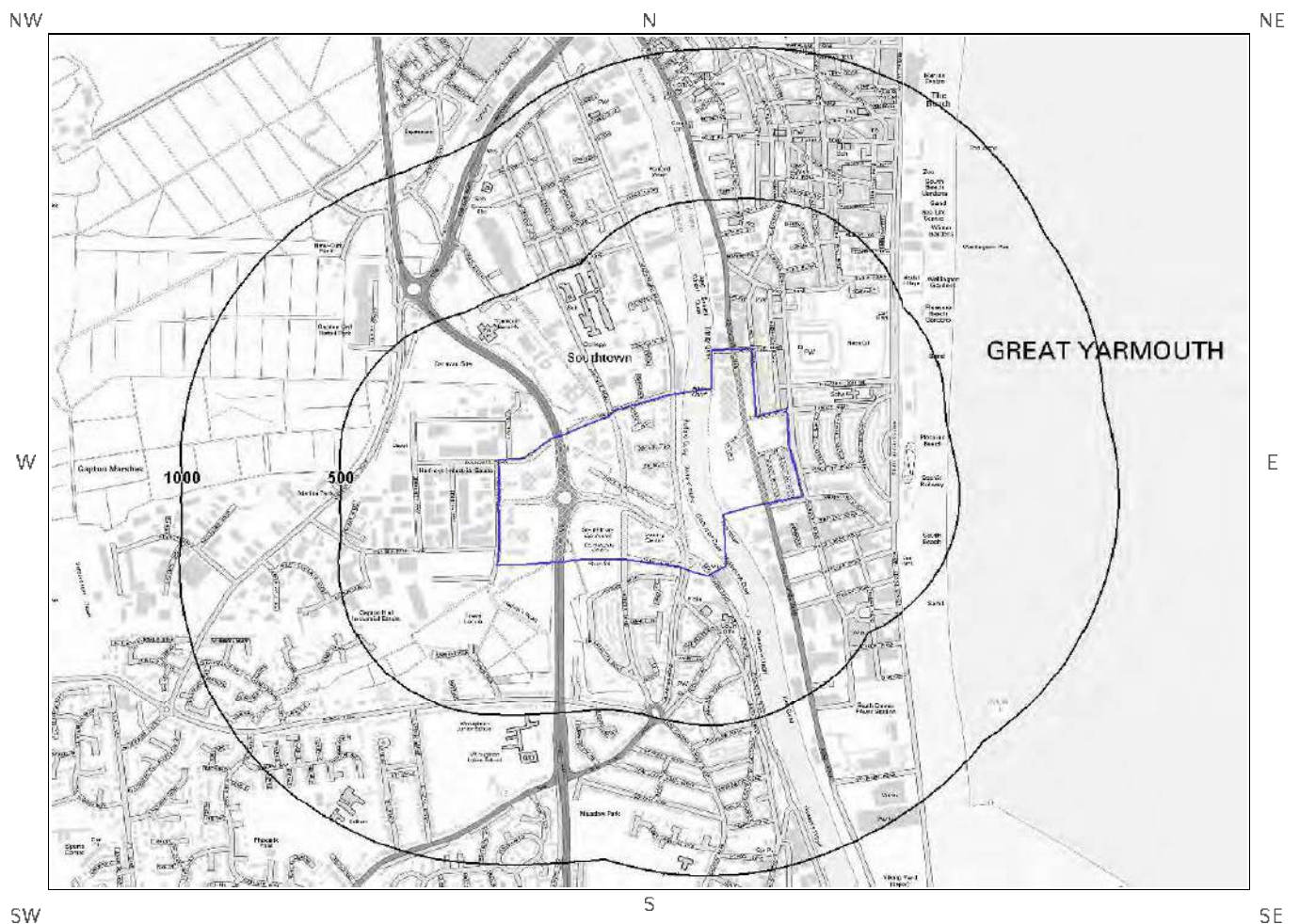
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not all themes are mapped or available on every map sheet. Therefore a coverage layer showing the availability of the four themes is presented above.

The definitions of coverage are as follows:

Geology	Full Coverage	Partial Coverage	No Coverage
Bedrock	The whole tile has been mapped	Some but not all the tile has been mapped	No coverage
Superficial	The whole tile has been mapped	Some but not all of the tile has been mapped	No coverage
Artificial	Some deposits are mapped on this tile	-	No deposits are mapped
Mass Movement	Some deposits are mapped on this tile	-	No coverage

1 Geology (1:10,000 scale).

1.1 Artificial Ground Map (1:10,000 scale)



Artificial Ground Legend

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1. Geology 1:10,000 scale

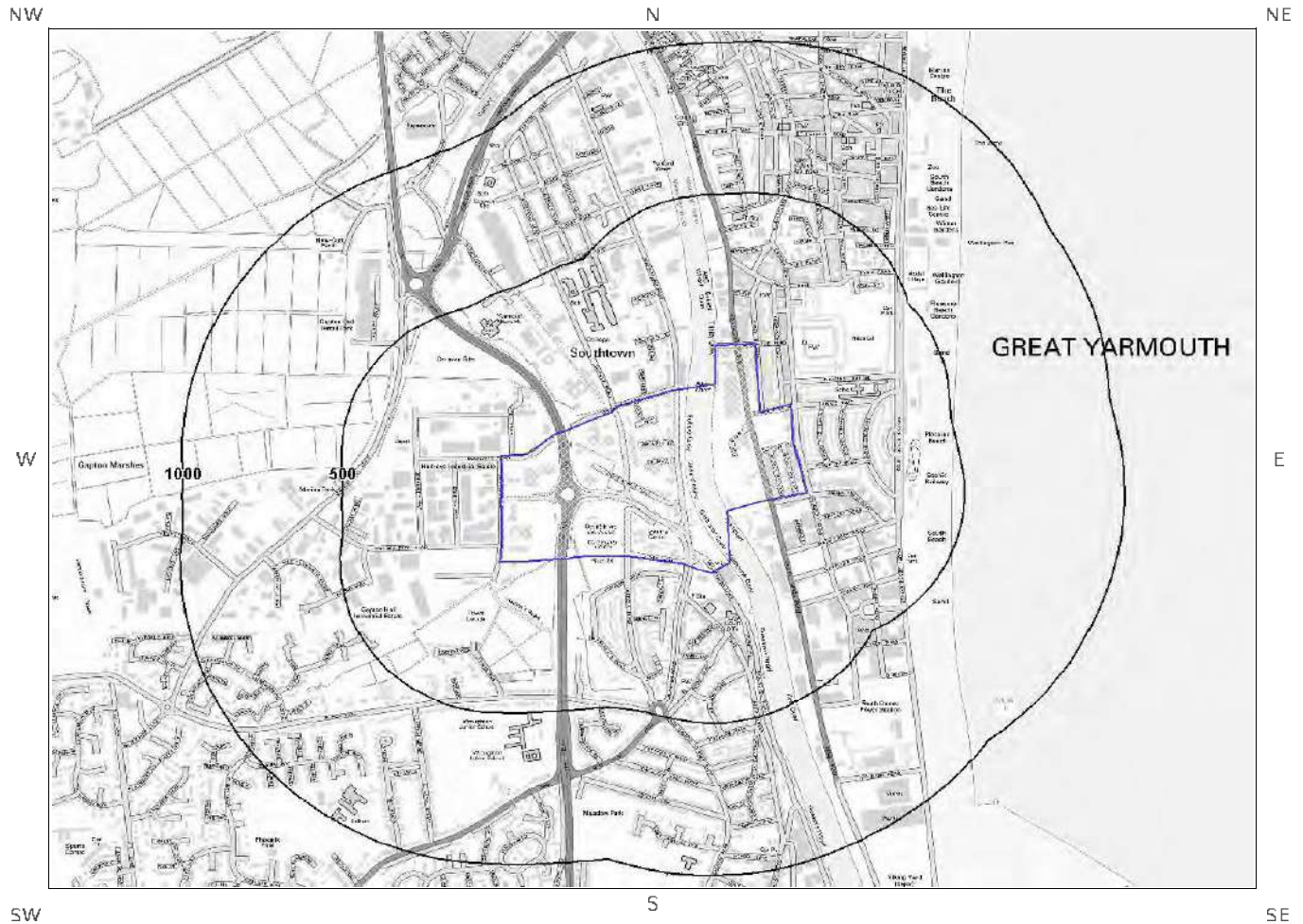
1.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

Are there any records of Artificial/ Made Ground within 500m of the study site boundary at 1:10,000 scale? No

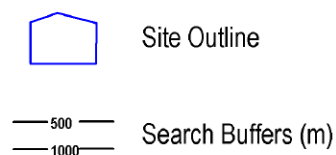
Database searched and no data found.

1.2 Superficial Deposits and Landslips Map (1:10,000 scale)



Artificial Ground Legend

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1.2 Superficial Deposits and Landslips

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary at 1:10,000 scale? No

Database searched and no data found.

1.2.2 Landslip

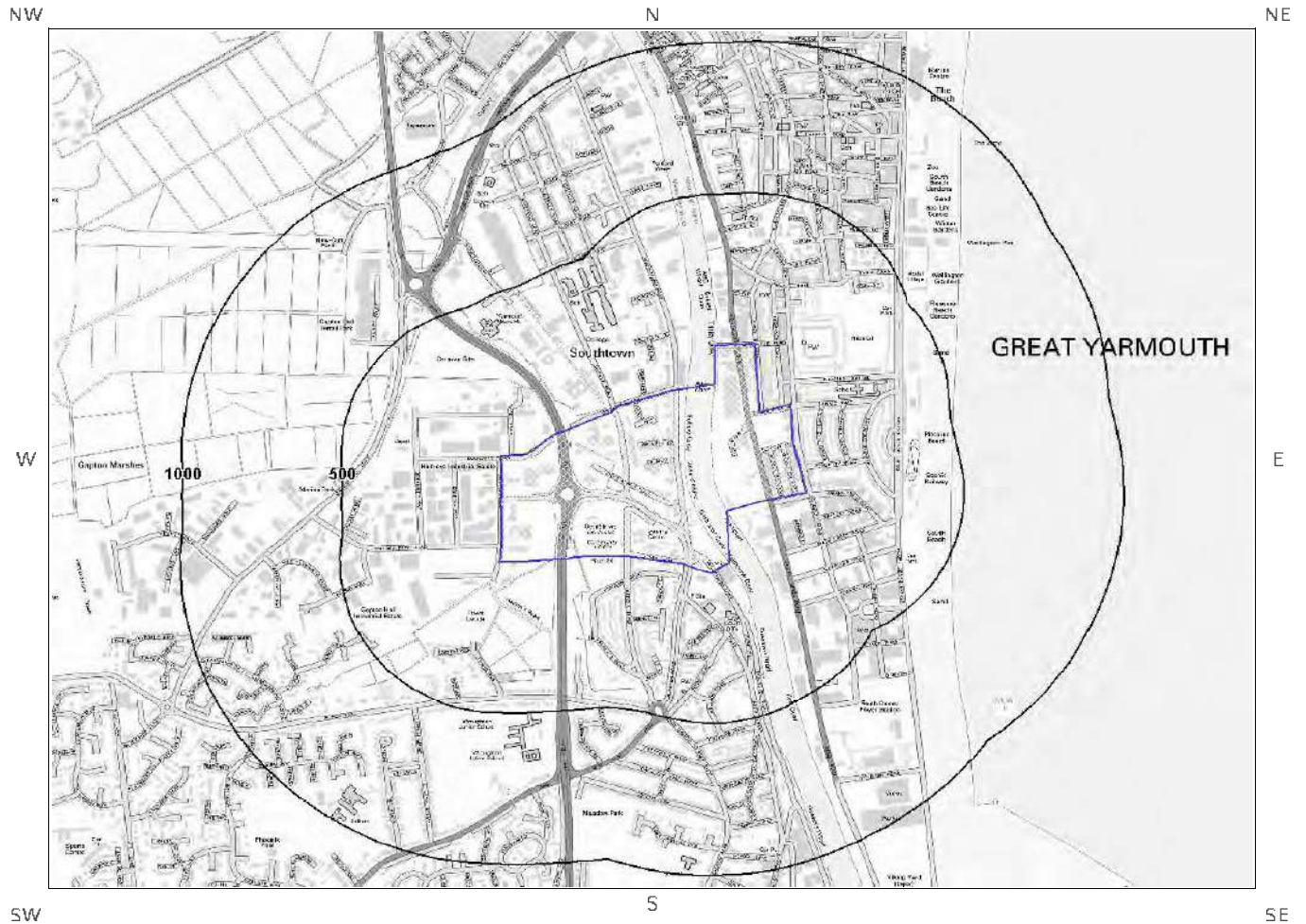
Are there any records of Landslip within 500m of the study site boundary at 1:10,000 scale? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:10,000 scale

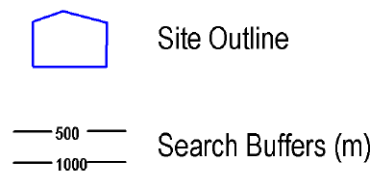
This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.3 Bedrock and Faults Map (1:10,000 scale)



Bedrock and Faults Legend

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1.3 Bedrock and Faults

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

1.3.1 Bedrock/ Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary at 1:10,000 scale.

Database searched and no data found at this scale.

1.3.2 Faults

Are there any records of Faults within 500m of the study site boundary at 1:10,000 scale? No

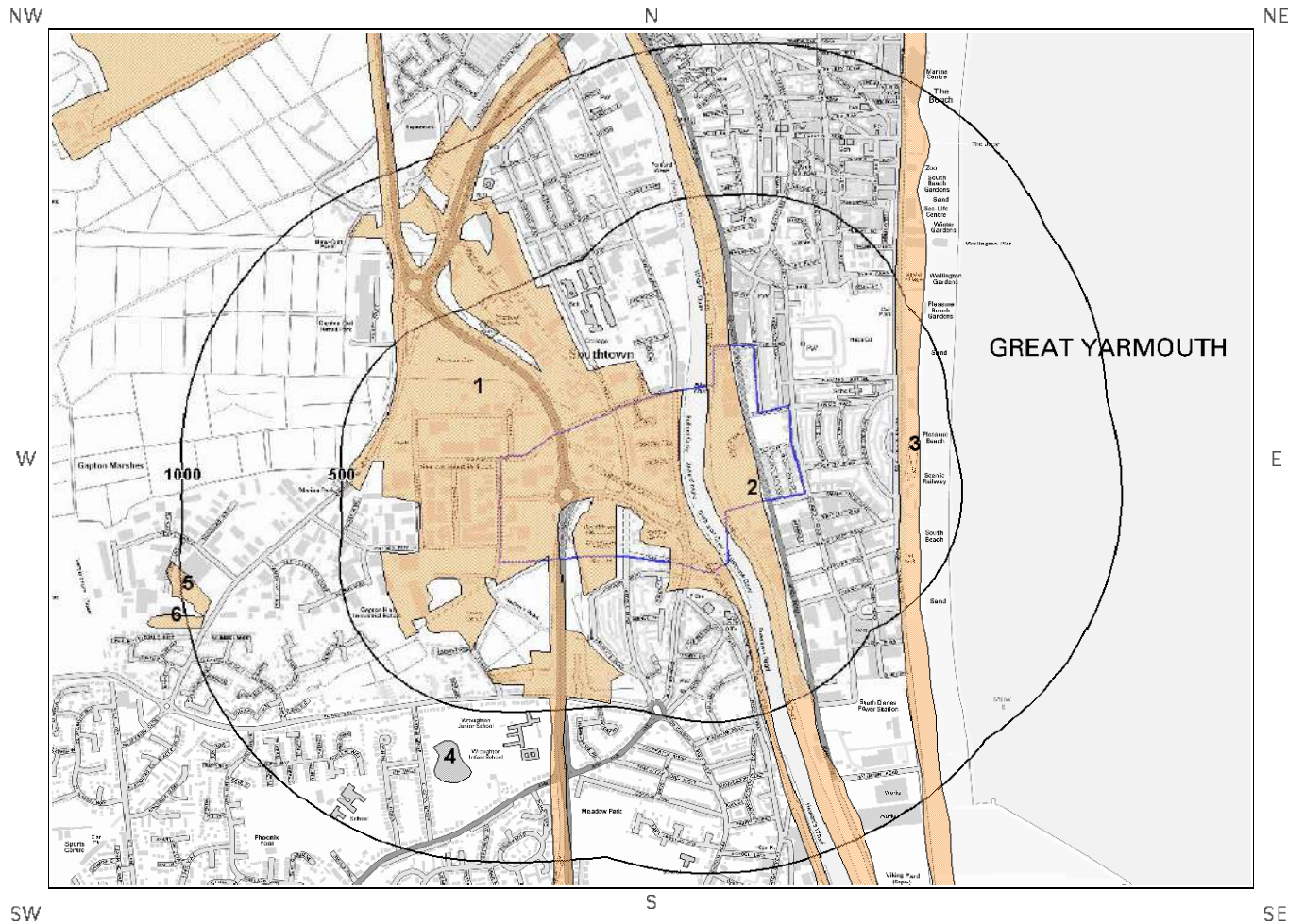
Database searched and no data found at this scale.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of great Britain at 1:10,000 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.

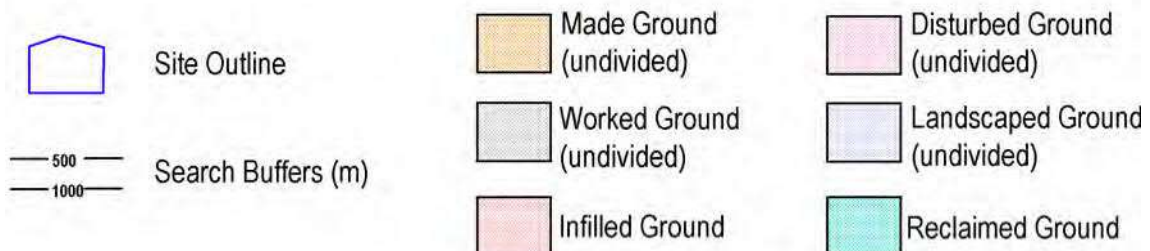
2 Geology 1:50,000 Scale

2.1 Artificial Ground Map



Ground Workings Legend

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2. Geology 1:50,000 scale

2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 162

2.1.1 Artificial/ Made Ground

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

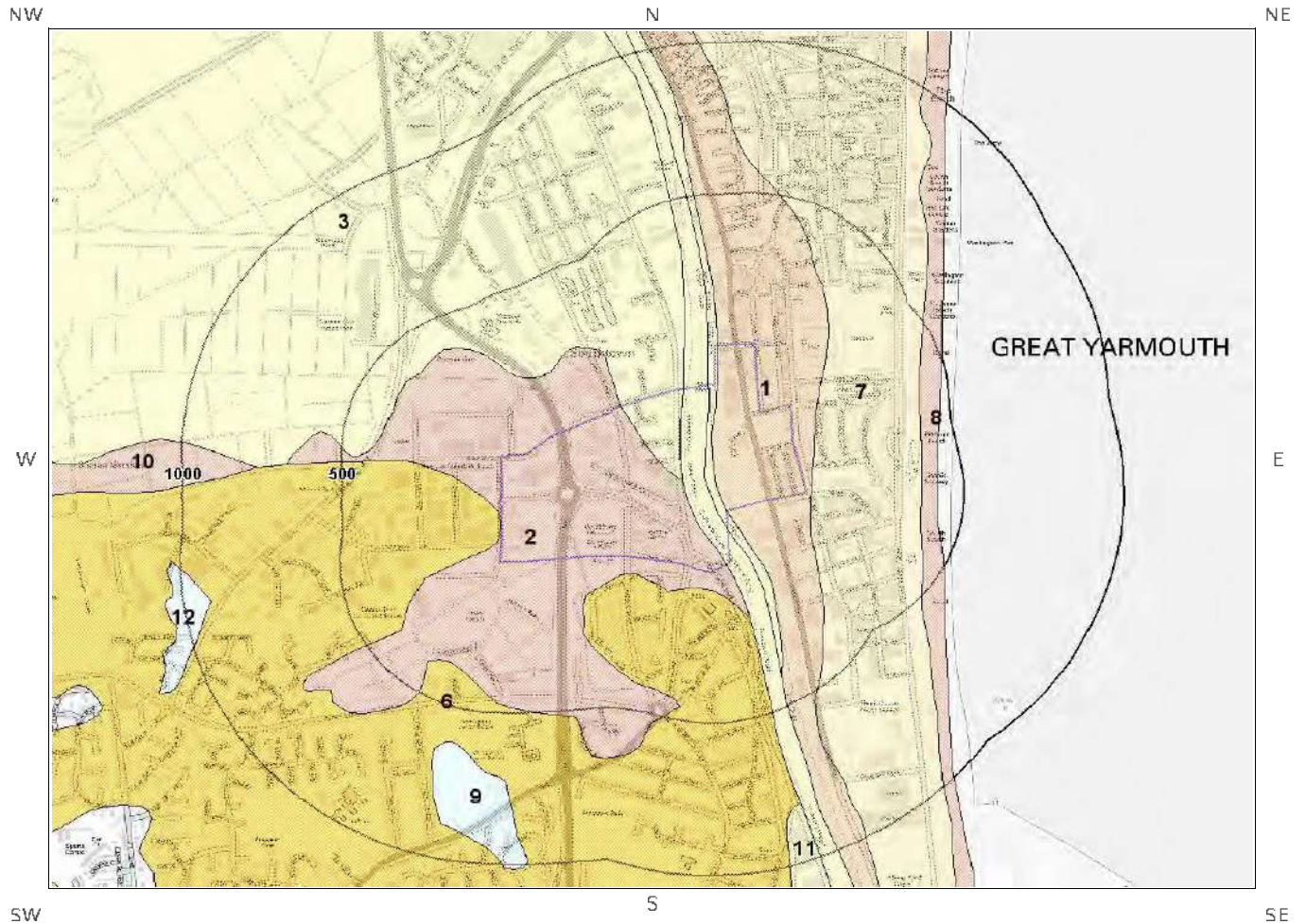
ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
2	0.0	On Site	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
3	300.0	E	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT

2.1.2 Permeability of Artificial Ground

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

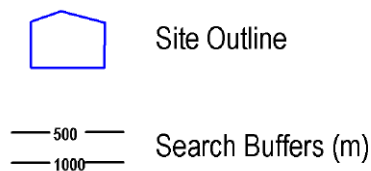
Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	Very High	Low
0.0	On Site	Mixed	Very High	Low

2.2 Superficial Deposits and Landslips Map (1:50,000 scale)



Ground Workings Legend

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2.2 Superficial Deposits and Landslips

2.2.1 Superficial Deposits/ Drift Geology

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

ID	Distance	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	NRD-XSV	NORTH DENES FORMATION	SAND AND GRAVEL
2	0.0	On Site	BRYD-P	BREYDON FORMATION	PEAT
3	0.0	On Site	BRYD-XCZ	BREYDON FORMATION	CLAY AND SILT
4	0.0	On Site	BRYD-XCZ	BREYDON FORMATION	CLAY AND SILT
5	0.0	On Site	TRD-XCZ	TIDAL RIVER OR CREEK DEPOSITS	CLAY AND SILT
6	3.0	W	HPGL-S	HAPPISBURGH GLACIGENIC FORMATION	SAND
7	16.0	E	BSA-S	BLOWN SAND	SAND
8	366.0	E	MBD-XSV	MARINE BEACH DEPOSITS	SAND AND GRAVEL

2.2.2 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	Low	Very Low
0.0	On Site	Intergranular	Low	Very Low
0.0	On Site	Mixed	Low	Very Low
0.0	On Site	Mixed	Low	Very Low
0.0	On Site	Intergranular	Very High	High
3.0	W	Intergranular	High	High
16.0	E	Intergranular	High	High

2.2.3 Landslip

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

No

Database searched and no data found.

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, there 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.

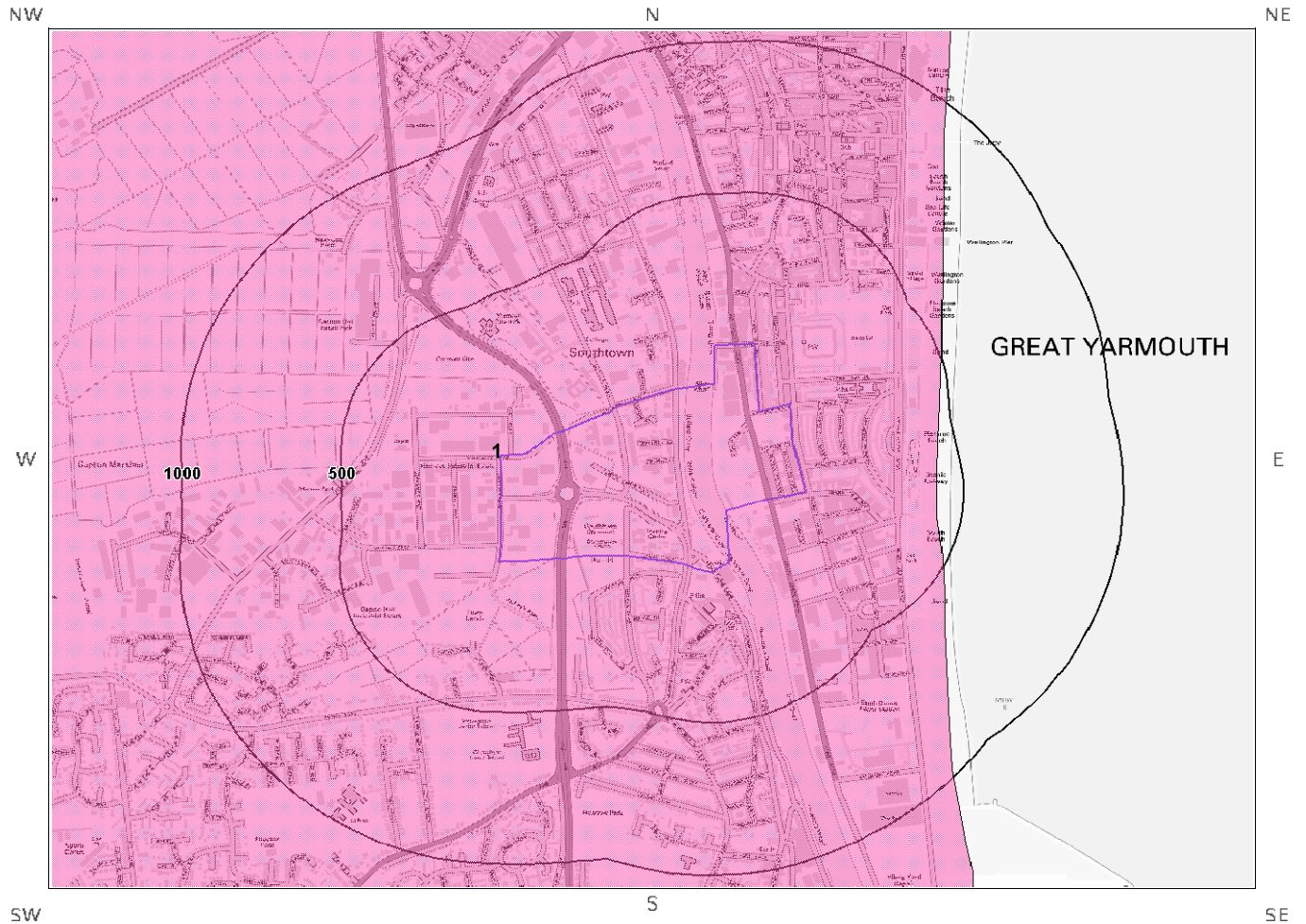
2.2.4 Landslip Permeability

Are there any records relating to permeability of landslips within the study site boundary?

No

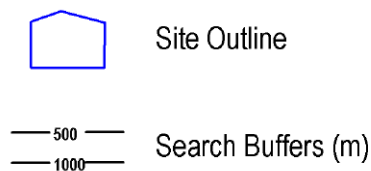
Database searched and no data found.

2.3 Bedrock and Faults Map (1:50,000 scale)



Ground Workings Legend

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2.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 162

2.3.1 Bedrock/Solid Geology

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

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	CRAG.XSV	CRAG GROUP - SAND AND GRAVEL	-

2.3.2 Permeability of Bedrock Ground

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

Distance	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Intergranular	Very High	High

2.3.3 Faults

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

Database searched and no data found.

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 nation wide coverage.

3 Radon Data

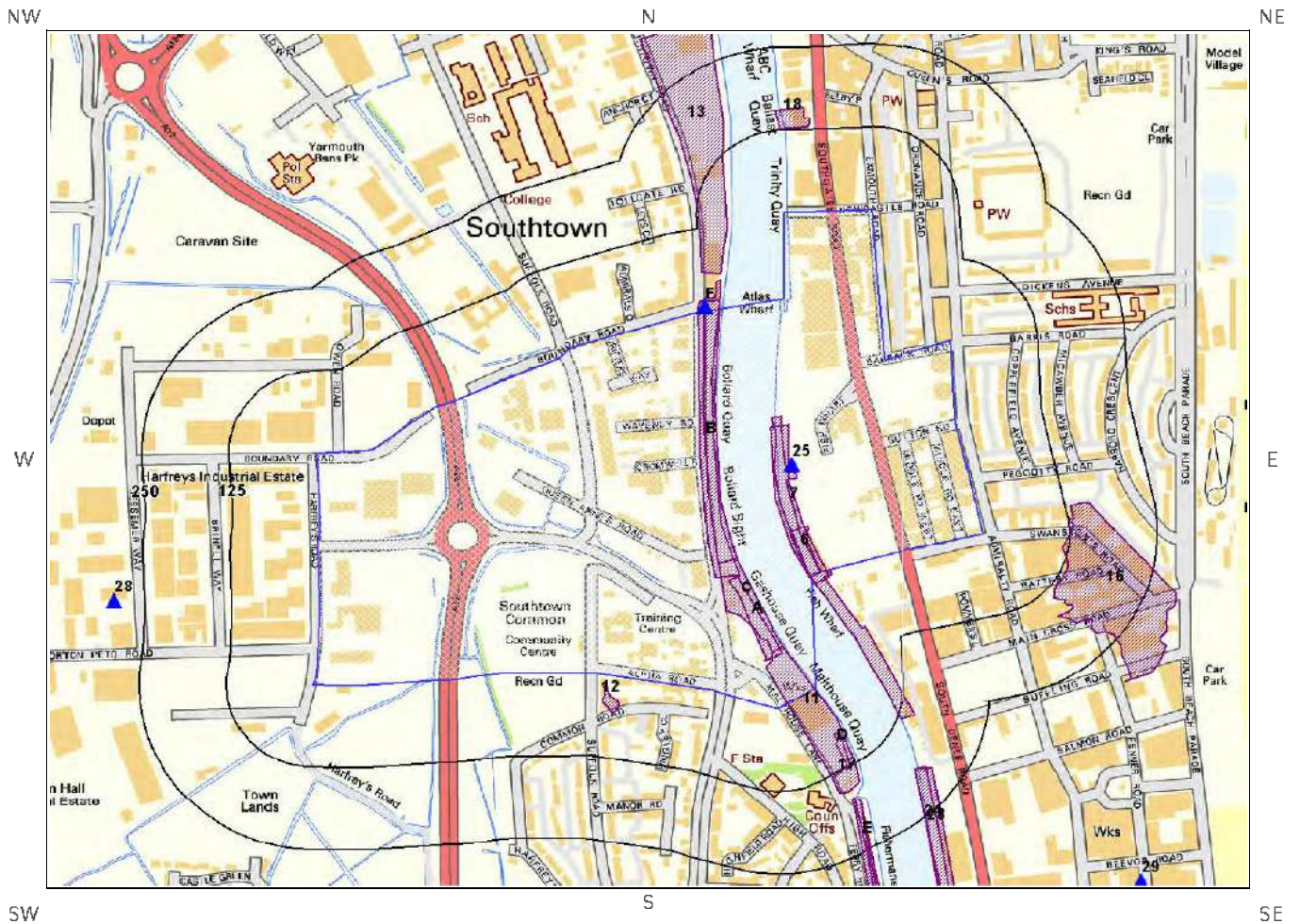
3.1 Radon Affected Areas

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.

3.2 Radon Protection


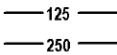



Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

4 Ground Workings Map



Ground Workings Legend

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-  Site Outline
-  Search Buffers (m)
125
250
-  Historic Surface Ground Workings
-  Historic Underground Workings
-  Current Ground Workings

4 Ground Workings

4.1 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

ID	Distance (m)	Direction	NGR	Use	Date
1B	0.0	On Site	652403 306035	Quay	1952
2A	0.0	On Site	652474 305764	Quay	1904
3A	0.0	On Site	652474 305764	Quay	1946
4B	0.0	On Site	652408 306062	Quay	1988
5B	0.0	On Site	652408 306062	Quay	1978
6	0.0	On Site	652545 305863	Unspecified Wharf	1988
7	0.0	On Site	652518 305936	Unspecified Wharf	1884
8C	0.0	On Site	652466 305783	Quay	1988
9C	0.0	On Site	652466 305783	Quay	1978
10	0.0	On Site	652556 305840	Unspecified Wharf	1978
11	0.0	On Site	652552 305622	Quay	1978
12	15.0	S	652266 305643	Pond	1884
13	52.0	N	652371 306479	Dock	1946
14D	73.0	SE	652596 305561	Quay	1946
15D	73.0	SE	652596 305561	Quay	1904
16	117.0	E	652990 305803	Sand Pit	1884
17	124.0	SE	652602 305523	Quay	1988
18	127.0	N	652526 306521	Dry Docks	1904
19E	169.0	SE	652639 305395	Quay	1978
20E	169.0	SE	652639 305395	Quay	1988
21E	172.0	SE	652636 305385	Quay	1904

ID	Distance (m)	Direction	NGR	Use	Date
22E	172.0	SE	652636 305385	Quay	1946
23	188.0	SE	652776 305268	Quay	1952
24	188.0	SE	652742 305367	Quay	1978

4.2 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? No

Database searched and no data found.

4.3 Current Ground Workings

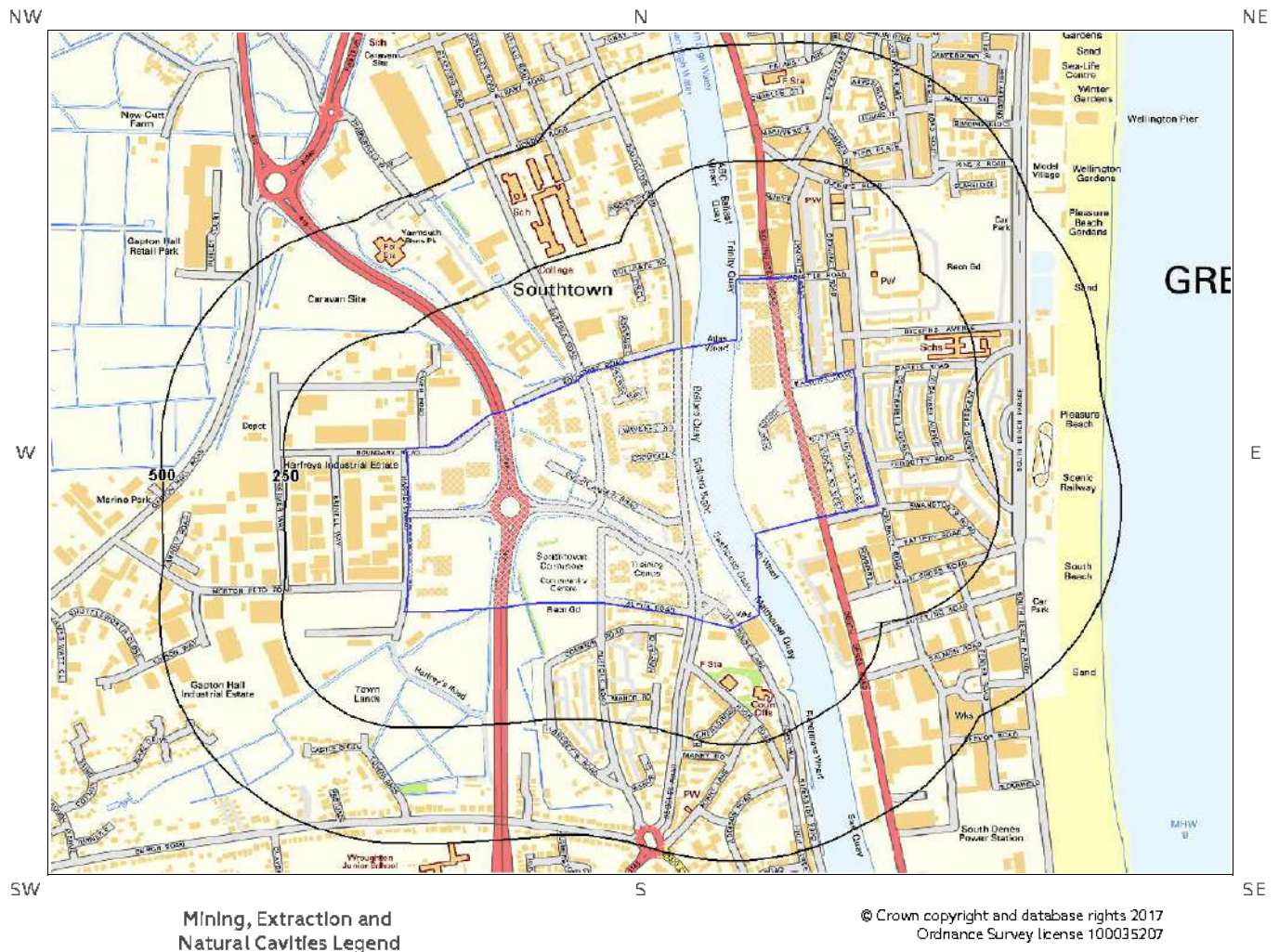
This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

Are there any BGS Current Ground Workings within 1000m of the study site boundary? Yes

The following Current Ground Workings information is provided by British Geological Survey:

ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
25	0.0	On Site	652525 305995	Crushed Rock	Berth 4 Great Yarmouth Docks	Sea, river or canal wharf where mineral commodities are unloaded and stored	Active
26F	6.0	N	652400 306235	Crushed Rock	Great Yarmouth Wharf	Sea, river or canal wharf where mineral commodities are unloaded and stored	Inactive
27F	6.0	N	652400 306235	Secondary	Great Yarmouth Wharf	Sea, river or canal wharf where mineral commodities are unloaded and stored	Inactive
28	294.0	W	651553 305790	Sand & Gravel	Harfrey's Farm Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
29	549.0	SE	653026 305365	Sand	Nelson Sand Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	686.0	S	651666 304999	Clay & Shale	Lilypit Cottage Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	766.0	S	651860 304897	Clay & Shale	Lily Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	911.0	N	652250 307250	Secondary	Yeoman Wharf	Sea, river or canal wharf where mineral commodities are unloaded and stored	Active

5 Mining, Extraction & Natural Cavities Map



5 Mining, Extraction & Natural Cavities

5.1 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? No

Database searched and no data found.

5.2 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.

5.3 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.

5.4 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.

5.5 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.

5.6 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.

5.7 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.

5.8 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.

5.9 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.

5.10 Clay Mining

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

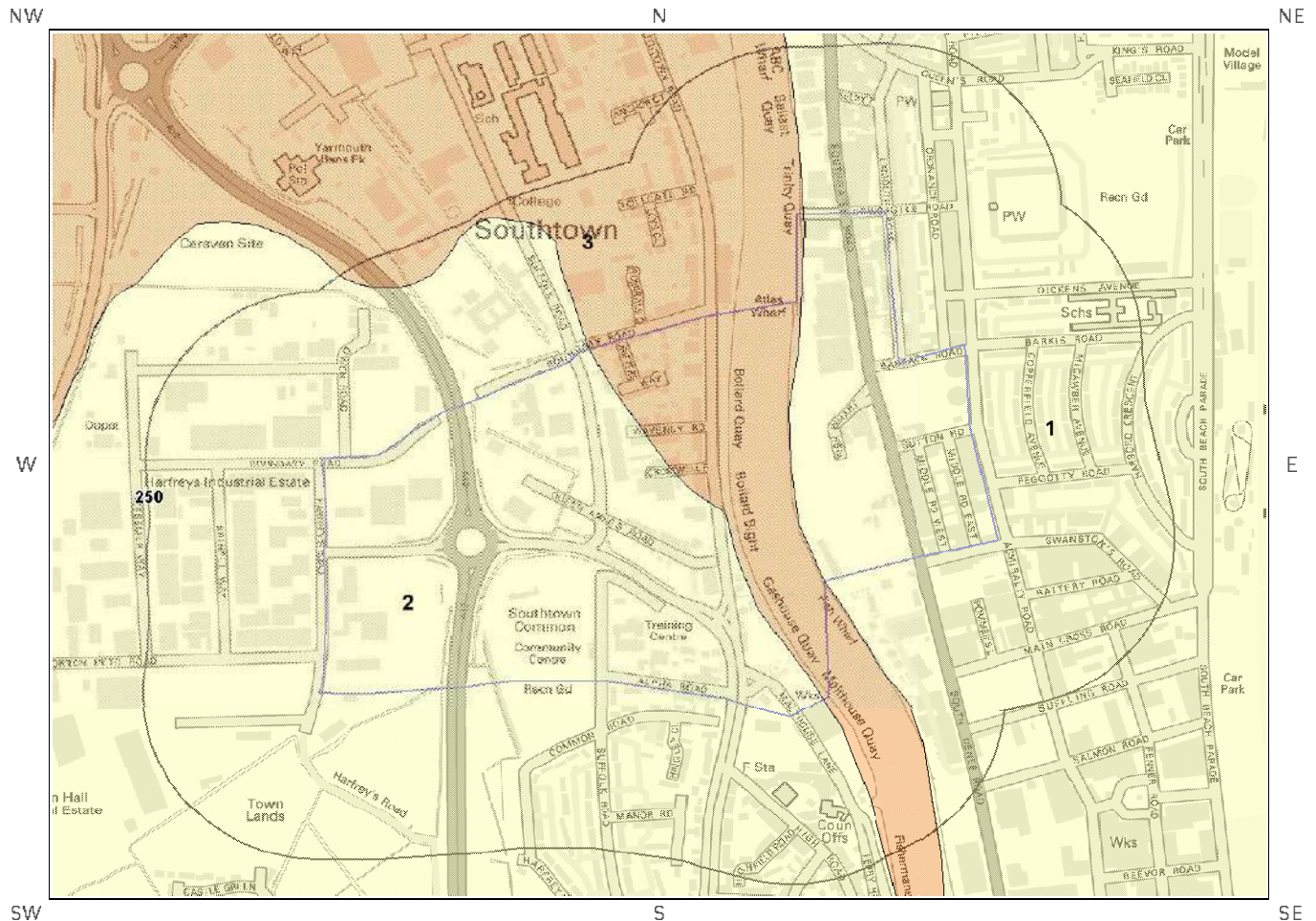
Are there any Clay Mining areas within 1000m of the study site boundary?

No

Database searched and no data found.

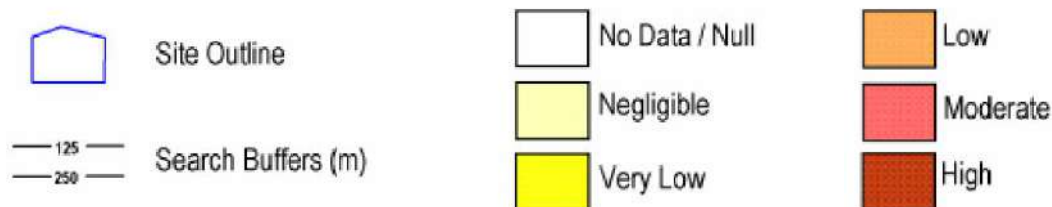
6 Natural Ground Subsidence

6.1 Shrink-Swell Clay Map

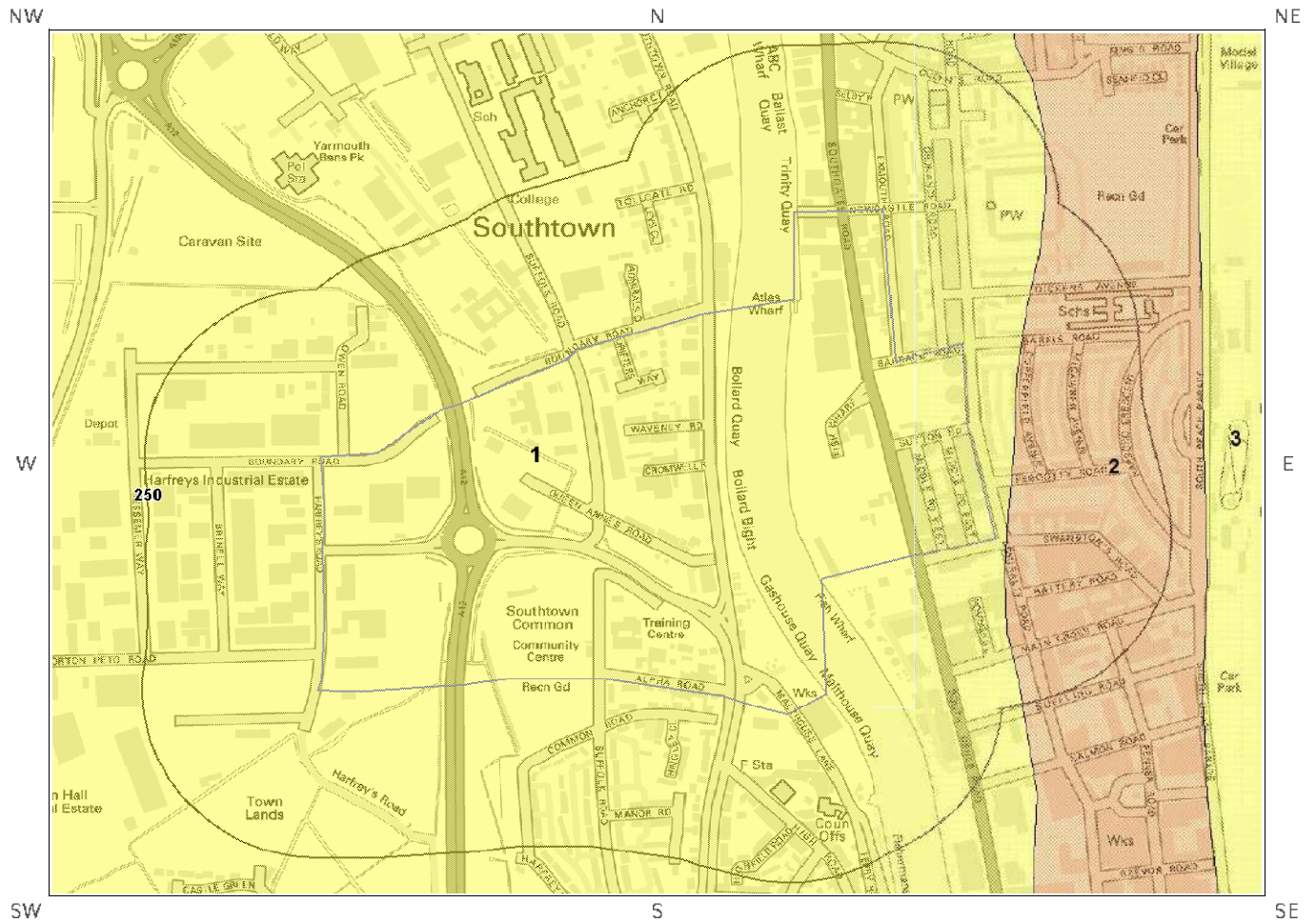


Shrink Swell Clay Legend

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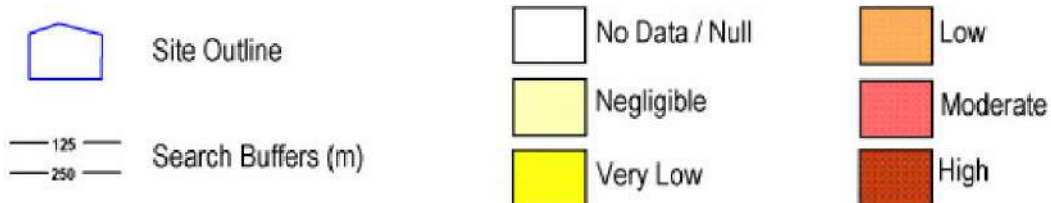


6.2 Landslides Map



Landslides Legend

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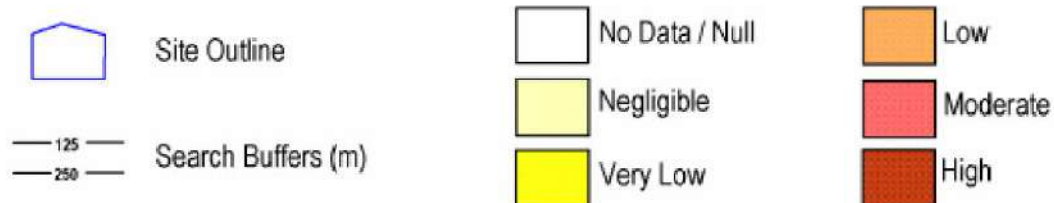


6.3 Ground Dissolution of Soluble Rocks Map

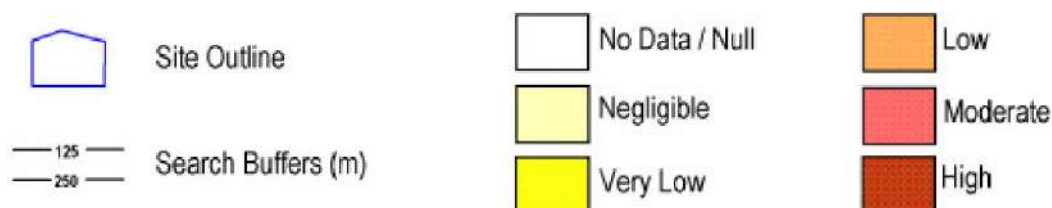


Ground Dissolution
Soluble Rocks Legend

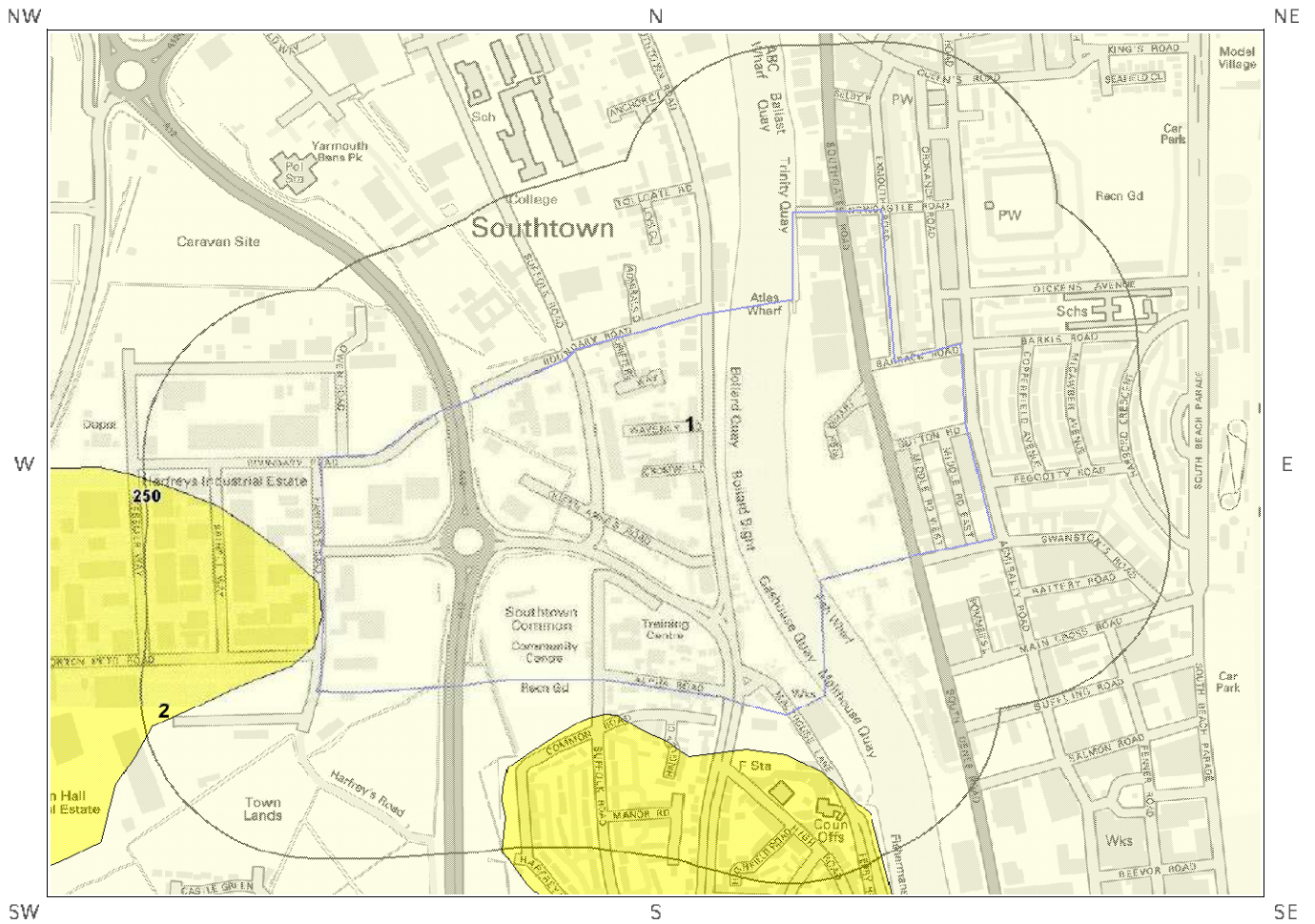
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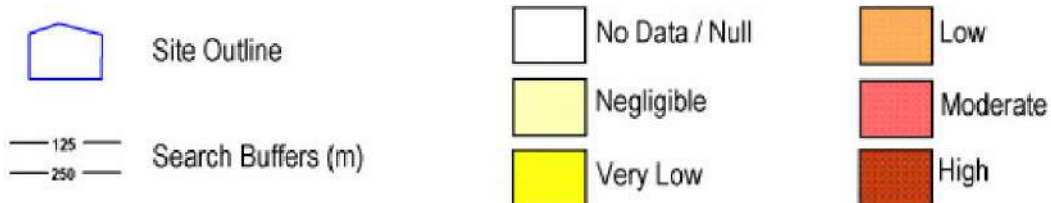


6.5 Collapsible Deposits Map

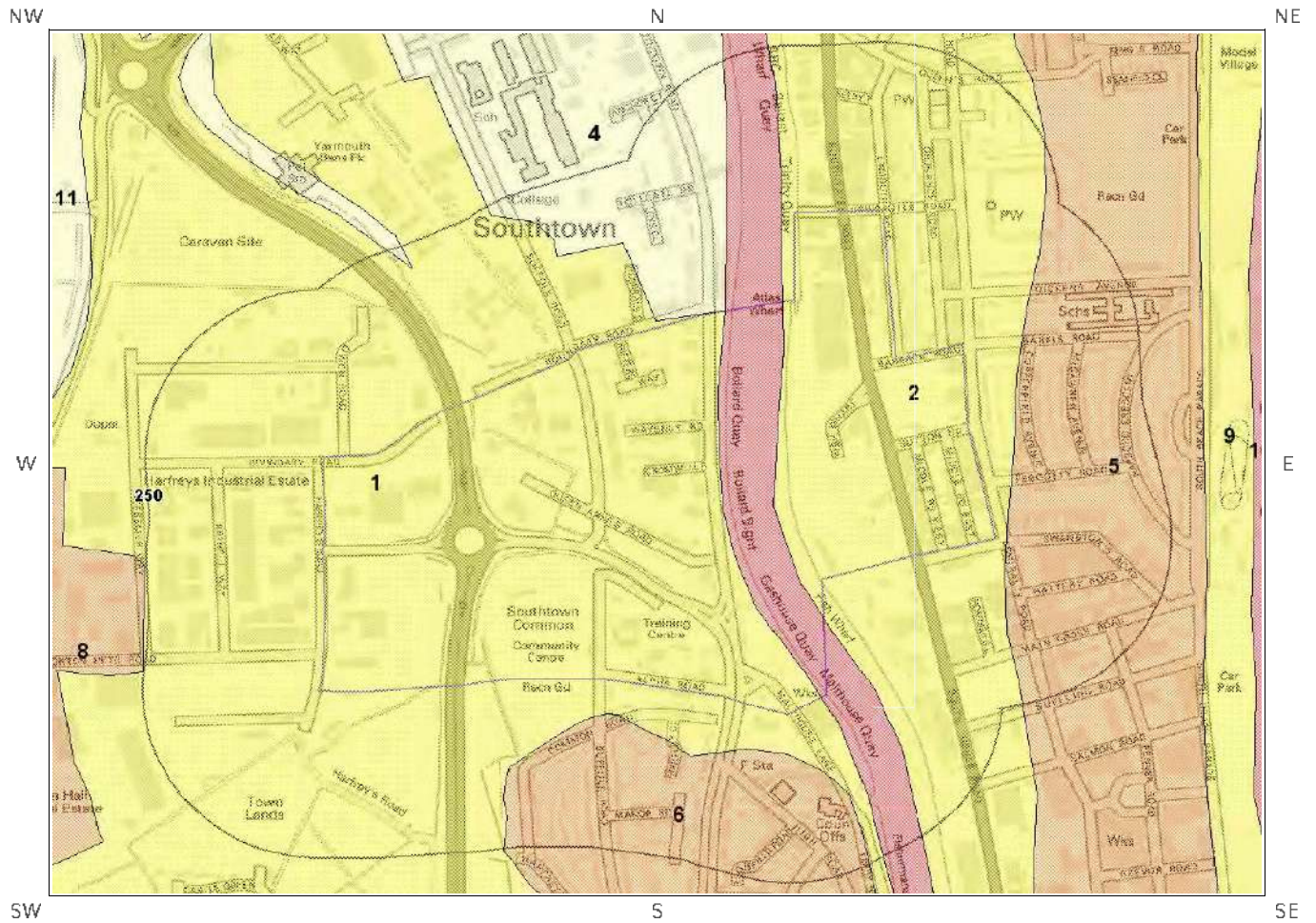


Collapsible Deposits Legend

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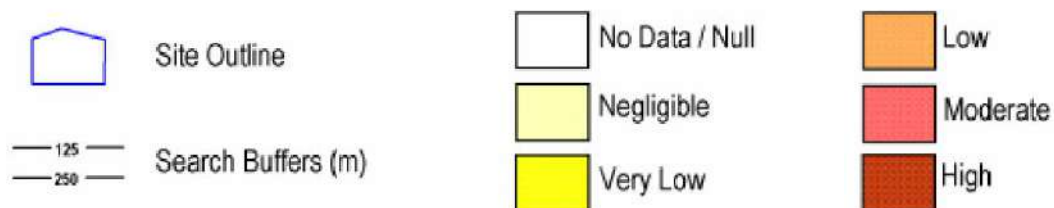


6.6 Running Sand Map



Running Sand Legend

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6 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? **High**

6.1 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	Negligible	Ground conditions predominantly non-plastic. 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 likely due to potential problems with shrink-swell clays.
2	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. 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 likely due to potential problems with shrink-swell clays.
3	0.0	On Site	Low	Ground conditions predominantly medium plasticity. Do not plant trees with high soil moisture demands near to buildings. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a possible increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a possible increase in insurance risk, especially during droughts or where vegetation with high moisture demands is present.

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

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.
2	16.0	E	Low	Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to drainage or excavations take place. Possible increase in construction cost to reduce potential slope stability problems. Existing property - no significant increase in insurance risk due to natural slope instability problems.

6.3 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.

6.4 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	Very Low	Very low potential for compressible deposits to be present. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.
2	0.0	On Site	Very Low	Very low potential for compressible deposits to be present. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.
3	0.0	On Site	Moderate	Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build - consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property - possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.

ID	Distance (m)	Direction	Hazard Rating	Details
4	0.0	On Site	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.
5	0.0	On Site	High	Very significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build - consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Construction may not be possible at economic cost. For existing property - probable increase in insurance risk from compressibility especially if water conditions or loading of the ground change significantly.
6	0.0	On Site	High	Very significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build - consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Construction may not be possible at economic cost. For existing property - probable increase in insurance risk from compressibility especially if water conditions or loading of the ground change significantly.
7	0.0	On Site	High	Very significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build - consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Construction may not be possible at economic cost. For existing property - probable increase in insurance risk from compressibility especially if water conditions or loading of the ground change significantly.
8	50.0	S	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

6.5 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	Negligible	No indicators for collapsible deposits identified. No actions required to avoid problems due to collapsible deposits. No special ground investigation required, or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
2	3.0	W	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.

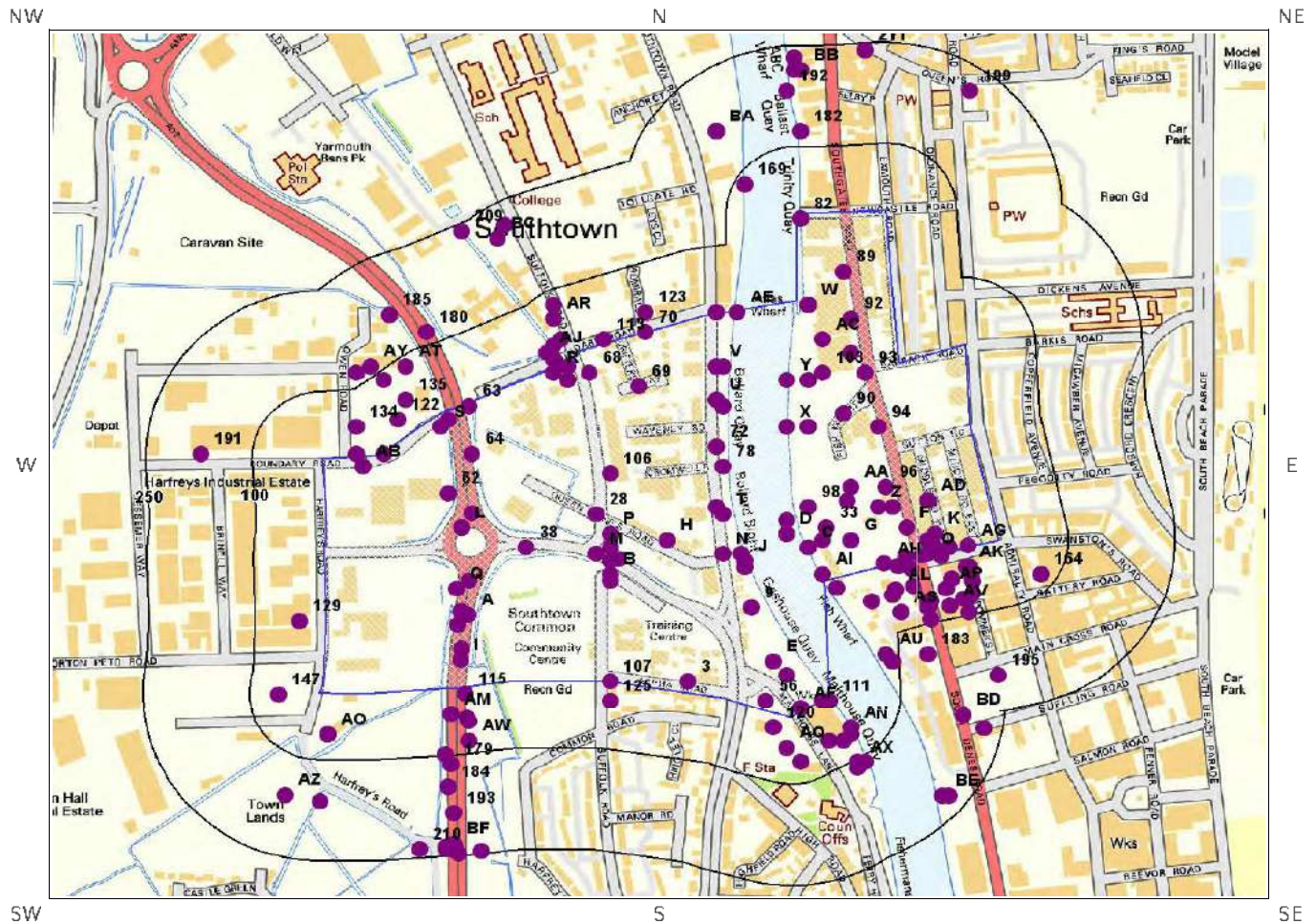
6.6 Running Sands

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.

ID	Distance (m)	Direction	Hazard Rating	Details
2	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.
3	0.0	On Site	Moderate	Significant potential for running sand problems with relatively small changes in ground conditions. Avoid large amounts of water entering the ground (for example through pipe leakage or soak-aways). Do not dig (deep) holes into saturated ground near the property without technical advice. For new build - consider the consequences of soil and groundwater conditions during and after construction. For existing property - possible increase in insurance risk from running sand, for example, due to water leakage, high rainfall events or flooding.
4	1.0	N	Negligible	No indicators for running sand identified. 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	16.0	E	Low	Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build - consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property - no significant increase in insurance risk due to running sand problems is likely.
6	50.0	S	Low	Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build - consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property - no significant increase in insurance risk due to running sand problems is likely.

7 Borehole Records Map



Borehole Records Legend

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7 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:

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ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1Q	0.0	On Site	652033 305818	TG50NW45	5.0	A47 GORLESTON RELIEF ROAD
2A	0.0	On Site	652049 305780	TG50NW43	6.2	A47 GORLESTON RELIEF ROAD
3	0.0	On Site	652360 305680	TG50NW332	7.62	GT YAR BOR CNCL ALPHA ROAD 27
4AI	0.0	On Site	652550 305840	TG50NW590	15.0	FISHWHARF ZAPATA QUAY 2
5B	0.0	On Site	652250 305840	TG50NW164	24.38	GT YAR BOROUGH COUNCIL YARE TUNNEL 7
6J	0.0	On Site	652440 305860	TG50NW583	15.5	BOLLARD QUAY 6
7M	0.0	On Site	652230 305870	TG50NW185	6.71	GT YAR BOROUGH COUNCIL DRAINAGE SCHEME 3
8C	0.0	On Site	652530 305880	TG50NW591	15.0	FISHWHARF ZAPATA QUAY 3
9	0.0	On Site	652450 305790	TG50NW840	10.0	GAS QUAY GT YARMOUTH 1
10A	0.0	On Site	652038 305785	TG50NW374	2.3	A12 GORLESTON RELIEF RD GT YAR S BY PASS
11B	0.0	On Site	652250 305830	TG50NW27	12.0	A47 GT YARMOUTH WESTERN BY PASS 237
12C	0.0	On Site	652550 305890	TG50NW592	15.5	FISHWHARF ZAPATA QUAY 4
13H	0.0	On Site	652330 305890	TG50NW1008	18.28	CENTRAL ELECTRICITY BOARD GORLESTON
14D	0.0	On Site	652500 305900	TG50NW892	20.0	SOUTHGATES RD GT YARMOUTH 3
15D	0.0	On Site	652500 305900	TG50NW891	20.0	SOUTHGATES RD GT YARMOUTH 2
16D	0.0	On Site	652500 305900	TG50NW893	20.0	SOUTHGATES RD GT YARMOUTH 4
17A	0.0	On Site	652034 305764	TG50NW32	7.05	A47/A12 GORLESTON RELIEF ROAD
18L	0.0	On Site	652040 305910	TG50NW13	20.12	GORING CEB GREAT YARMOUTH
19I	0.0	On Site	652038 305712	TG50NW386	14.3	A12/A47 GORLESTON RELIEF RD REPORT
20E	0.0	On Site	652480 305710	TG50NW942	8.0	GAS HOUSE QUAY GT YARMOUTH 3
21F	0.0	On Site	652670 305910	TG50NW570	-1.0	FISH QUAY TRIAL PIT PS22

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
22E	0.0	On Site	652500 305690	TG50NW792	10.0	MALTHOUSE QUAY GT YARMOUTH 7
23D	0.0	On Site	652500 305920	TG50NW571	-1.0	FISH QUAY TRIAL PIT PS23
24G	0.0	On Site	652590 305890	TG50NW17/C	17.37	HIPPERSON & SON ELECTRICITY POWER STN
25F	0.0	On Site	652700 305890	TG50NW109	-1.0	CEGB 132 KV TRANSFORMER SITE GT YAR DKM 3
26G	0.0	On Site	652590 305890	TG50NW998	17.1	ELECTRICAL POWER STATION GREAT YARMOUTH NO 1
27H	0.0	On Site	652330 305890	TG50NW995	13.71	CENTRAL ELECTRICITY BOARD GORLESTON
28	0.0	On Site	652230 305930	TG50NW184	7.01	GT YAR BOROUGH COUNCIL DRAINAGE SCHEME 2
29T	0.0	On Site	652410 305930	TG50NW582	15.5	BOLLARD QUAY 5
30K	0.0	On Site	652710 305900	TG50NW108	-1.0	CEGB 132 KV TRANSFORMER SITE GT YAR DKM 2
31I	0.0	On Site	652040 305728	TG50NW44	6.2	A47 GORLESTON RELIEF ROAD
32D	0.0	On Site	652500 305900	TG50NW890	20.0	SOUTHGATES RD GT YARMOUTH 1
33	0.0	On Site	652555 305910	TG50NW162	36.58	GT YAR BOROUGH COUNCIL YARE TUNNEL 5
34O	0.0	On Site	652700 305870	TG50NW110	-1.0	CEGB 132 KV TRANSFORMER SITE GT YAR DKM 4
35N	0.0	On Site	652410 305870	TG50NW588	20.0	BOLLARD QUAY 11
36J	0.0	On Site	652435 305870	TG50NW163	36.58	GT YAR BOROUGH COUNCIL YARE TUNNEL 6
37K	0.0	On Site	652710 305880	TG50NW107	-1.0	CEGB 132 KV TRANSFORMER SITE GT YAR DKM 1
38	0.0	On Site	652130 305880	TG50NW472	15.0	A12 GT YARMOUTH WESTERN BY-PASS 318
39G	0.0	On Site	652590 305890	TG50NW17/B	14.02	HIPPERSON & SON ELECTRICITY POWER STN
40P	0.0	On Site	652250 305900	TG50NW29	10.0	A47 GT YARMOUTH WESTERN BY PASS 239
41L	0.0	On Site	652040 305910	TG50NW1026	17.67	CENTRAL ELECTRICITY BOARD GREAT YARMOUTH
42L	0.0	On Site	652040 305910	TG50NW1005	20.11	CENTRAL ELECTRICITY BOARD GREAT YARMOUTH
43M	0.0	On Site	652250 305860	TG50NW26	11.0	A47 GT YARMOUTH WESTERN BY PASS 236
44N	0.0	On Site	652440 305850	TG50NW180	9.15	GT YAR BOROUGH COUNCIL SEWERAGE WORKS 14
45O	0.0	On Site	652668 305865	TG50NW1057	8.0	ADMIRALTY ROAD GREAT YARMOUTH 210

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
46B	0.0	On Site	652262 305862	TG50NW429	7.6	A12 GT YAR W BY PASS DOT REPORT
47P	0.0	On Site	652250 305880	TG50NW28	11.5	A47 GT YARMOUTH WESTERN BY PASS 238
48Q	0.0	On Site	652050 305830	TG50NW46	4.5	A47 GORLESTON RELIEF ROAD
49L	0.0	On Site	652054 305931	TG50NW428	17.0	A12 GT YAR W BY PASS DOT REPORT
50H	0.0	On Site	652330 305890	TG50NW1009	24.38	CENTRAL ELECTRICITY BOARD GORLESTON
51AH	0.0	On Site	652638 305856	TG50NW1050	17.0	ADMIRALTY ROAD GREAT YARMOUTH 202
52L	0.0	On Site	652040 305910	TG50NW1006	16.76	CENTRAL ELECTRICITY BOARD GREAT YARMOUTH
53G	0.0	On Site	652590 305890	TG50NW17/A	17.07	HIPPERSON & SON ELECTRICITY POWER STN
54H	0.0	On Site	652330 305890	TG50NW12	18.29	GORING CEG GREAT YARMOUTH
55AF	0.0	On Site	652520 305640	TG50NW793	19.0	MALHOUSE QUAY GT YARMOUTH 8
56	0.0	On Site	652470 305650	TG50NW795	10.5	MALHOUSE QUAY GT YARMOUTH 10
57K	0.0	On Site	652730 305880	TG50NW1063	4.0	ADMIRALTY ROAD GREAT YARMOUTH WS 106
58O	0.0	On Site	652691 305868	TG50NW1053	8.5	ADMIRALTY ROAD GREAT YARMOUTH 205
59AG	0.0	On Site	652757 305882	TG50NW1065	5.0	ADMIRALTY ROAD GREAT YARMOUTH WS 108
60AB	0.0	On Site	651900 306000	TG50NW687	0.9	BGS AUGR HL 162 GAPTON MARSHES
61S	0.0	On Site	652010 306060	TG50NW467	2.5	A12 GT YARMOUTH WESTERN BY-PASS 235
62	0.0	On Site	652020 305960	TG50NW226	11.8	GT YAR BOR CNCL A12 WESTERN BY PASS
63	0.0	On Site	652050 306090	TG50NW466	24.3	A12 GT YARMOUTH WESTERN BY-PASS 234
64	0.0	On Site	652054 306020	TG50NW430	11.3	A12 GT YAR W BY PASS DOT REPORT
65R	0.0	On Site	652170 306140	TG50NW308	-1.0	GT YAR BOR CNCL HIGH MILL RD CPT 11
66R	0.0	On Site	652190 306150	TG50NW181	14.8	GT YAR BOROUGH COUNCIL SEWERAGE WORKS 25
67R	0.0	On Site	652190 306130	TG50NW306	-1.0	GT YAR BOR CNCL HIGH MILL RD CPT 9
68	0.0	On Site	652220 306140	TG50NW183	7.01	GT YAR BOROUGH COUNCIL DRAINAGE SCHEME 1
69	0.0	On Site	652290 306120	TG50NW307	-1.0	GT YAR BOR CNCL HIGH MILL RD CPT 10
70	0.0	On Site	652300 306200	TG50NW310	-1.0	GT YAR BOR CNCL HIGH MILL RD CPT 13
71S	0.0	On Site	652020 306070	TG50NW468	25.0	A12 GT YARMOUTH WESTERN BY-PASS 235A
72	0.0	On Site	652400 306030	TG50NW586	20.0	BOLLARD QUAY 9
73U	0.0	On Site	652400 306100	TG50NW908	25.0	SOUTHTOWN RD GT YARMOUTH 1

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
74V	0.0	On Site	652400 306150	TG50NW585	15.5	BOLLARD QUAY 8
75T	0.0	On Site	652400 305940	TG50NW587	11.5	BOLLARD QUAY 10
76U	0.0	On Site	652410 306090	TG50NW580	15.5	BOLLARD QUAY 3
77V	0.0	On Site	652410 306150	TG50NW579	15.0	BOLLARD QUAY 2
78	0.0	On Site	652410 306000	TG50NW581	15.0	BOLLARD QUAY 4
79AE	0.0	On Site	652430 306230	TG50NW578	15.5	BOLLARD QUAY 1
80Y	0.0	On Site	652500 306130	TG50NW341	20.5	GREAT YARMOUTH FLOOD DEFENCES 1
81X	0.0	On Site	652500 306060	TG50NW342	22.1	GREAT YARMOUTH FLOOD DEFENCES 2
82	0.0	On Site	652520 306370	TG50NW928	26.0	TRINITY QUAY GT YARMOUTH 2
83W	0.0	On Site	652530 306240	TG50NW934	20.0	SOUTHGATES RD GT YARMOUTH 12
84W	0.0	On Site	652530 306240	TG50NW935	20.0	SOUTHGATES RD GT YARMOUTH 13
85W	0.0	On Site	652530 306240	TG50NW933	20.0	SOUTHGATES RD GT YARMOUTH 11
86X	0.0	On Site	652530 306060	TG50NW344	25.0	GREAT YARMOUTH FLOOD DEFENCES 4
87Y	0.0	On Site	652530 306130	TG50NW343	25.0	GREAT YARMOUTH FLOOD DEFENCES 3
88R	0.0	On Site	652170 306140	TG50NW210	18.5	GT YAR COUNCIL STH TOWN PUMPING STN 2A
89	0.0	On Site	652580 306290	TG50NW276	-1.0	GT YAR BOR CNCL SOUTHGATE ROAD 2047A
90	0.0	On Site	652580 306080	TG50NW573	-1.0	FISH QUAY TRIAL PIT PS25
91AA	0.0	On Site	652590 305970	TG50NW577	-1.0	FISH QUAY TRIAL PIT PP4
92	0.0	On Site	652590 306220	TG50NW279	-1.0	GT YAR BOR CNCL SOUTHGATE ROAD 2047D
93	0.0	On Site	652610 306140	TG50NW277	-1.0	GT YAR BOR CNCL SOUTHGATE ROAD 2047B
94	0.0	On Site	652630 306060	TG50NW572	-1.0	FISH QUAY TRIAL PIT PS24
95Z	0.0	On Site	652630 305940	TG50NW576	-1.0	FISH QUAY TRIAL PIT PP3
96	0.0	On Site	652640 305970	TG50NW574	-1.0	FISH QUAY TRIAL PIT PP1
97Z	0.0	On Site	652650 305940	TG50NW575	-1.0	FISH QUAY TRIAL PIT PP2
98	0.0	On Site	652530 305940	TG50NW368	3.0	GREAT YARMOUTH FLOOD DEFENCES TP 12
99AA	0.0	On Site	652585 305950	TG50NW161	24.38	GT YAR BOROUGH COUNCIL YARE TUNNEL 4
100A D	0.0	On Site	652700 305950	TG50NW996	9.4	SUTTON ROAD GREAT YARMOUTH

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
101A B	0.0	On Site	651930 306020	TG50NW1081	5.0	TRAVIS PERKINS GREAT YARMOUTH WS 102
102A C	0.0	On Site	652550 306190	TG50NW1046	30.34	GREAT YARMOUTH (FISHWHARF OFF SOUTH DENES ROAD) 3
103	0.0	On Site	652550 306140	TG50NW1045	30.32	GREAT YARMOUTH (FISHWHARF OFF SOUTH DENES ROAD) 2
104A C	0.0	On Site	652590 306170	TG50NW1044	30.45	GREAT YARMOUTH (FISHWHARF OFF SOUTH DENES ROAD) 1A
105A D	0.0	On Site	652700 305950	TG50NW23	9.45	SUTTON RD GT YARMOUTH
106	0.0	On Site	652250 305990	TG50NW4	7.01	GREAT YARMOUTH NO 4
107	0.0	S	652250 305680	TG50NW331	7.62	SUFFOLK ROAD 26
108A E	1.0	N	652400 306230	TG50NW584	20.0	BOLLUAY QUAY 7
109A F	1.0	SE	652550 305650	TG50NW353	25.0	GREAT YARMOUTH FLOOD DEFENCES 13
110A B	4.0	N	651890 306020	TG50NW1076	20.2	TRAVIS PERKINS GREAT YARMOUTH 101
111	6.0	SE	652560 305650	TG50NW350	20.0	GREAT YARMOUTH FLOOD DEFENCES 10
112A G	6.0	S	652719 305867	TG50NW1048	8.2	ADMIRALTY ROAD GREAT YARMOUTH 102
113	7.0	N	652240 306190	TG50NW309	-1.0	GT YAR BOR CNCL HIGH MILL RD CPT 12
114A H	7.0	S	652658 305852	TG50NW1070	4.0	ADMIRALTY ROAD GREAT YARMOUTH WS 201
115	10.0	S	652045 305662	TG50NW41	7.8	A47 GORLESTON RELIEF ROAD
116R	11.0	NW	652170 306160	TG50NW209	15.25	GT YAR COUNCIL STH TOWN PUMPING STN 1A
117R	11.0	NW	652170 306160	TG50NW182	15.25	GT YAR BOROUGH COUNCIL SEWERAGE WORKS 26
118AI	14.0	S	652570 305820	TG50NW281	-1.0	GT YAR BOR CNCL FISH WHARF B12
119O	15.0	S	652676 305848	TG50NW1051	14.4	ADMIRALTY ROAD GREAT YARMOUTH 203
120	23.0	S	652480 305610	TG50NW796	10.0	MALHOUSE QUAY GT YARMOUTH 11
121AJ	24.0	NW	652160 306170	TG50NW179	18.3	GT YAR BOROUGH COUNCIL SEWERAGE WORKS 11
122	26.0	NW	651950 306070	TG50NW1079	18.5	TRAVIS PERKINS GREAT YARMOUTH 104
123	28.0	N	652300 306230	TG50NW3	10.67	GREAT YARMOUTH NO 3
124AJ	29.0	NW	652170 306180	TG50NW212	15.0	GT YAR COUNCIL SUFFOLK RD SEWERAGE 5
125	30.0	S	652250 305650	TG50NW5	7.62	GREAT YARMOUTH NO 5
126AJ	30.0	NW	652180 306190	TG50NW178	18.3	GT YAR BOROUGH COUNCIL SEWERAGE WORKS 10

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
127A K	31.0	S	652754 305850	TG50NW1067	4.0	ADMIRALTY ROAD GREAT YARMOUTH WS 110
128A K	31.0	S	652760 305851	TG50NW1068	4.0	ADMIRALTY ROAD GREAT YARMOUTH WS 111
129	38.0	W	651810 305770	TG50NW958	-1.0	HARFREYS ROAD GRT YARMOUTH 1
130AL	39.0	S	652653 305817	TG50NW1054	9.0	ADMIRALTY ROAD GREAT YARMOUTH 207
131A M	40.0	S	652025 305630	TG50NW31	9.5	A47/A12 GORLESTON RELIEF ROAD
132AL	41.0	S	652679 305822	TG50NW1052	13.1	ADMIRALTY ROAD GREAT YARMOUTH 204
133A K	43.0	S	652734 305833	TG50NW1066	4.0	ADMIRALTY ROAD GREAT YARMOUTH WS 109
134	44.0	N	651890 306060	TG50NW1080	6.0	TRAVIS PERKINS GREAT YARMOUTH WS101
135	45.0	NW	651960 306100	TG50NW1084	5.0	TRAVIS PERKINS GREAT YARMOUTH WS105
136AL	46.0	S	652649 305809	TG50NW1071	4.0	ADMIRALTY ROAD GREAT YARMOUTH WS 202
137A K	46.0	S	652762 305836	TG50NW1069	4.0	ADMIRALTY ROAD GREAT YARMOUTH WS 112
138AL	47.0	S	652620 305800	TG50NW287	-1.0	GT YAR BOR CNCL FISH WHARF B22
139A Q	47.0	S	652500 305580	TG50NW797	15.5	MALTHOUSE QUAY GT YARMOUTH 12A
140A M	47.0	S	652048 305625	TG50NW42	8.0	A47 GORLESTON RELIEF ROAD
141A M	52.0	S	652050 305620	TG50NW385	12.0	A12 GORLESTON RELIEF RD GT YAR S BY PASS
142A K	53.0	S	652763 305829	TG50NW1064	1.0	ADMIRALTY ROAD GREAT YARMOUTH WS 107
143A P	56.0	S	652726 305818	TG50NW1047	8.0	ADMIRALTY ROAD GREAT YARMOUTH 101
144A N	56.0	SE	652590 305610	TG50NW349	20.0	GREAT YARMOUTH FLOOD DEFENCES 9
145A N	59.0	SE	652560 305590	TG50NW794	19.0	MALTHOUSE QUAY GT YARMOUTH 9A
146A R	59.0	NW	652170 306220	TG50NW211	27.0	GT YAR COUNCIL SUFFOLK RD SEWERAGE 4
147	59.0	W	651780 305660	TG50NW225	10.7	GT YAR BOR CNCL A12 WESTERN BY PASS
148A O	63.0	S	651850 305600	TG50NW923	20.0	HARFREYS RD GT YARMOUTH 1
149A O	63.0	S	651850 305600	TG50NW924	20.0	HARFREYS RD GT YARMOUTH 2
150A O	63.0	S	651850 305600	TG50NW925	20.0	HARFREYS RD GT YARMOUTH 3
151A O	63.0	S	651850 305600	TG50NW926	20.0	HARFREYS RD GT YARMOUTH 4
152A N	64.0	SE	652590 305600	TG50NW75	1.2	GT YARMOUTH FLOOD DEFENCES POSFORD PAVRY C15
153A P	68.0	S	652700 305800	TG50NW946	20.0	SOUTH DENES ROAD 1
154A P	68.0	S	652700 305800	TG50NW947	15.5	SOUTH DENES ROAD 2

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
155A Q	68.0	S	652520 305560	TG50NW798	10.0	MALTHOUSE QUAY GT YARMOUTH 13
156A N	68.0	SE	652580 305590	TG50NW352	25.0	GREAT YARMOUTH FLOOD DEFENCES 12
157A P	70.0	S	652705 305799	TG50NW1055	8.0	ADMIRALTY ROAD GREAT YARMOUTH 208
158A P	70.0	S	652764 305812	TG50NW1062	4.0	ADMIRALTY ROAD GREAT YARMOUTH WS 105
159A S	74.0	S	652662 305783	TG50NW1049	15.35	ADMIRALTY ROAD GREAT YARMOUTH 201
160A P	75.0	S	652750 305804	TG50NW1060	4.0	ADMIRALTY ROAD GREAT YARMOUTH WS 103
161A R	76.0	NW	652170 306240	TG50NW177	9.15	GT YAR BOROUGH COUNCIL SEWERAGE WORKS 9
162A P	76.0	S	652758 305804	TG50NW1061	4.0	ADMIRALTY ROAD GREAT YARMOUTH WS 104
163A S	77.0	S	652700 305790	TG50NW569	-1.0	FISH QUAY TRIAL PIT PS21
164	79.0	SE	652860 305840	TG50NW589	15.0	FISHWHARF ZAPATA QUAY 1
165A V	81.0	S	652731 305793	TG50NW1059	4.0	ADMIRALTY ROAD GREAT YARMOUTH WS 102
166A U	82.0	E	652640 305720	TG50NW871	10.0	FISH WHARF GT YARMOUTH 1
167A W	82.0	S	652050 305590	TG50NW39	5.0	A47/A12 GORLESTON RELIEF ROAD
168A T	85.0	NW	651960 306150	TG50NW1078	16.2	TRAVIS PERKINS GREAT YARMOUTH 103
169	86.0	NW	652440 306420	TG50NW927	22.0	TRINITY QUAY GT YARMOUTH 1
170A T	87.0	NW	651930 306130	TG50NW1082	5.0	TRAVIS PERKINS GREAT YARMOUTH WS103
171A U	91.0	E	652650 305710	TG50NW872	10.0	FISH WHARF GT YARMOUTH 2
172A S	95.0	S	652704 305773	TG50NW1056	8.0	ADMIRALTY ROAD GREAT YARMOUTH 209
173A V	96.0	S	652758 305784	TG50NW1058	4.0	ADMIRALTY ROAD GREAT YARMOUTH WS 101
174A W	100.0	S	652016 305570	TG50NW40	6.1	A47 GORLESTON RELIEF ROAD
175A X	104.0	SE	652600 305560	TG50NW76	2.4	GT YARMOUTH FLOOD DEFENCES POSFORD PAVRY C16
176A X	109.0	SE	652610 305560	TG50NW348	20.0	GREAT YARMOUTH FLOOD DEFENCES 8
177A X	113.0	SE	652600 305550	TG50NW351	25.5	GREAT YARMOUTH FLOOD DEFENCES 11
178A Y	114.0	NW	651910 306150	TG50NW1083	5.0	TRAVIS PERKINS GREAT YARMOUTH WS104
179	115.0	S	652025 305555	TG50NW384	14.7	A12 GORLESTON RELIEF RD GT YAR S BY PASS
180	118.0	N	651990 306200	TG50NW227	11.5	GT YAR BOR CNCL A12 WESTERN BY PASS
181A Y	118.0	NW	651890 306140	TG50NW1077	23.0	TRAVIS PERKINS GREAT YARMOUTH 102
182	122.0	N	652520 306500	TG50NW786	20.0	SOUTHGATES RD GT YARMOUTH 3

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
183	142.0	E	652700 305720	TG50NW568	-1.0	FISH QUAY TRIAL PIT PS20
184	148.0	S	652020 305522	TG50NW30	6.2	A47/A12 GORLESTON RELIEF ROAD
185	161.0	NW	651938 306226	TG50NW431	13.0	A12 GT YAR W BY PASS DOT REPORT
186A Z	161.0	S	651790 305510	TG50NW971	7.7	HARFREYS FARM GT YARMOUTH 13
187A Z	163.0	S	651840 305500	TG50NW959	9.0	HARFREYS FARM GT YARMOUTH 1
188B A	167.0	NW	652400 306500	TG50NW895	2.0	INSPECTORATE QUAY GT YAR' 2
189B A	167.0	NW	652400 306500	TG50NW896	25.0	INSPECTORATE QUAY GT YAR' 2A
190B A	167.0	NW	652400 306500	TG50NW894	25.0	INSPECTORATE QUAY GT YAR' 1
191	173.0	W	651670 306020	TG50NW686	1.2	BGS AUGR HL 161 GAPTON MARSHES
192	183.0	N	652500 306560	TG50NW789	25.7	SOUTHGATES RD GT YARMOUTH 1
193	187.0	S	652028 305483	TG50NW383	12.3	A12 GORLESTON RELIEF RD GT YAR S BY PASS CPT 129
194B D	191.0	E	652750 305630	TG50NW567	-1.0	EAST QUAY TRIAL PIT PS19
195	197.0	S	652800 305690	TG50NW283	-1.0	GT YAR BOR CNCL FISH WHARF B14
196B C	203.0	NW	652090 306340	TG50NW176	9.15	GT YAR BOROUGH COUNCIL SEWERAGE WORKS 8
197B B	212.0	N	652520 306590	TG50NW785	17.3	SOUTHGATES RD GT YARMOUTH 2
198B B	212.0	N	652510 306590	TG50NW784	20.0	SOUTHGATES RD GT YARMOUTH 1
199	214.0	NE	652760 306560	TG50NW196	6.1	GT YAR BOR CNCL MAVERS RD PUMPING STN 23
200B C	215.0	NW	652100 306360	TG50NW213	15.4	GT YAR COUNCIL SUFFOLK RD SEWERAGE 6
201B E	217.0	SE	652720 305510	TG50NW991	25.0	GREAT YARMOUTH SALMON ROAD 4
202B D	224.0	E	652780 305610	TG50NW993	10.5	GREAT YARMOUTH SALMON ROAD 5
203B E	224.0	SE	652730 305510	TG50NW992	25.25	GREAT YARMOUTH SALMON ROAD 4A
204B F	232.0	S	652028 305438	TG50NW388	1.5	A12/A47 GORLESTON RELIEF RD REPORT
205B B	232.0	N	652510 306610	TG50NW790	3.0	SOUTHGATES RD GT YARMOUTH 2
206B B	232.0	N	652510 306610	TG50NW791	26.0	SOUTHGATES RD GT YARMOUTH 2A
207B F	236.0	S	652018 305434	TG50NW37	0.6	A47/A12 GORLESTON RELIEF ROAD
208B F	236.0	S	652030 305434	TG50NW373	0.8	A12 GORLESTON RELIEF RD GT YAR S BY PASS
209	237.0	NW	652040 306350	TG50NW214	15.4	GT YAR COUNCIL SUFFOLK RD SEWERAGE 7

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
210	237.0	S	651980 305430	TG50NW961	8.0	HARFREYS FARM GT YARMOUTH 3
211	239.0	N	652610 306620	TG50NW274	-1.0	GT YAR BOR CNCL QUEENS RD B18
212B F	239.0	S	652032 305431	TG50NW387	1.8	A12/A47 GORLESTON RELIEF RD REPORT
213B F	240.0	S	652020 305430	TG50NW224	6.4	GT YAR BOR CNCL A12 WESTERN BY PASS DKM2
214B F	240.0	S	652018 305429	TG50NW38	10.0	A47/A12 GORLESTON RELIEF ROAD
215B F	241.0	S	652030 305429	TG50NW401	1.8	A12/A47 GORLESTON RELIEF RD REPORT
216B F	246.0	S	652068 305427	TG50NW389	8.05	A12/A47 GORLESTON RELIEF RD REPORT
217B F	249.0	S	652035 305422	TG50NW372	4.3	A12 GORLESTON RELIEF RD GT YAR S BY PASS

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.

#1Q: scans.bgs.ac.uk/sobi_scans/boreholes/519577
 #2A: scans.bgs.ac.uk/sobi_scans/boreholes/519575
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8 Estimated Background Soil Chemistry

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

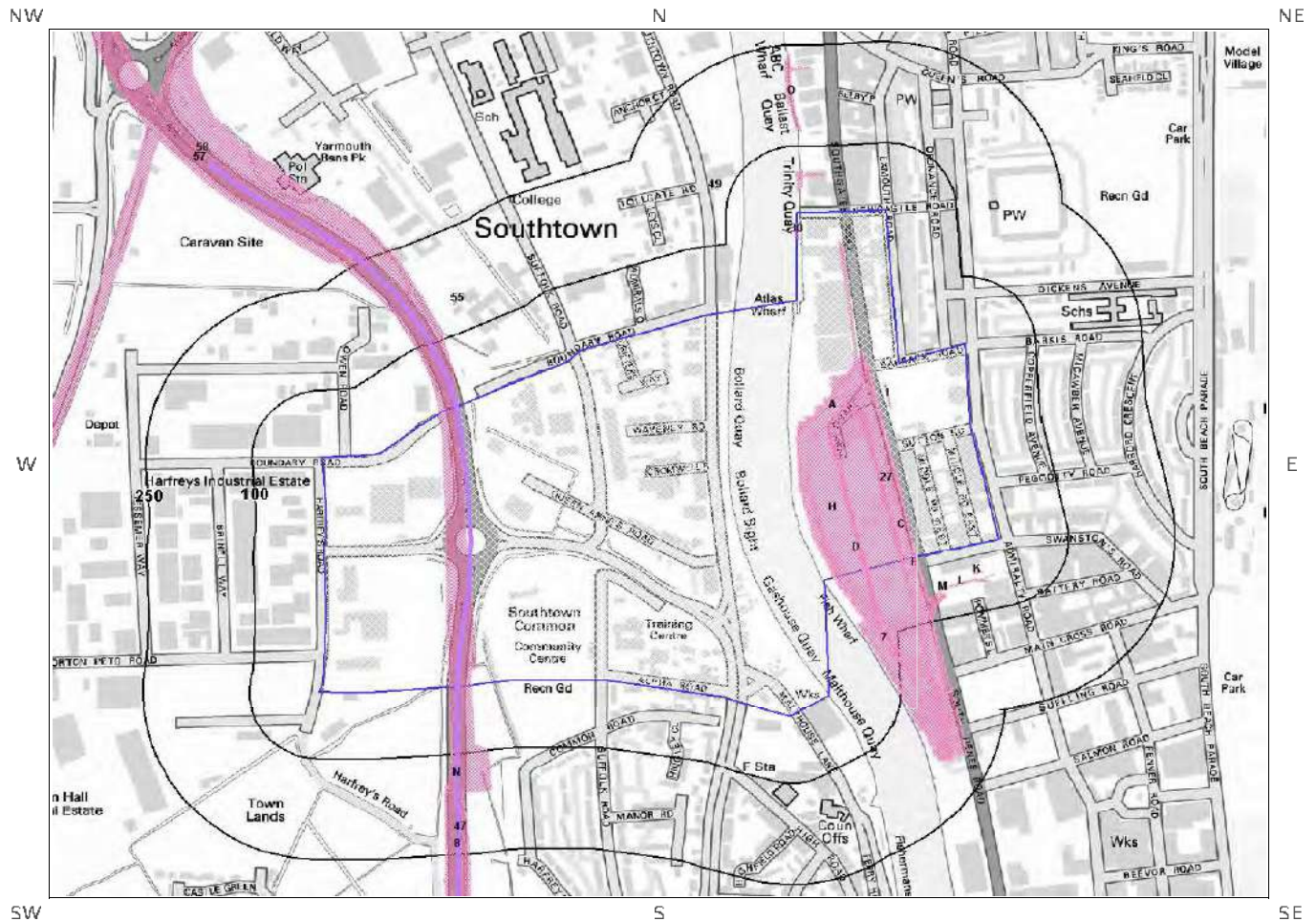
19

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	25 - 35 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	25 - 35 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	25 - 35 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	25 - 35 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	25 - 35 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	25 - 35 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	25 - 35 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	25 - 35 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	25 - 35 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	15 - 30 mg/kg	<100 mg/kg
3.0	W	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
16.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
48.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg

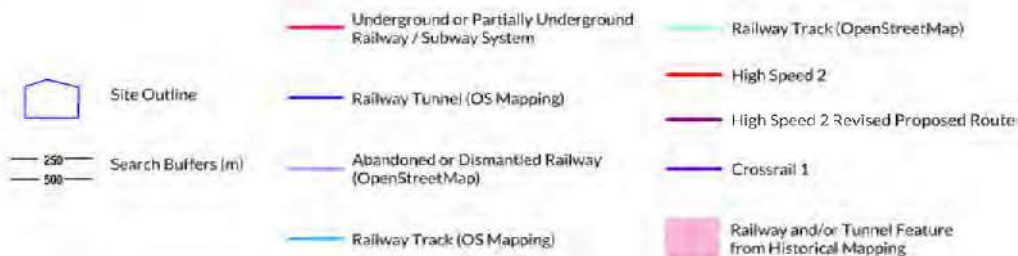
*As this data is based upon underlying 1:50,000 scale geological information, a 50m buffer has been added to the search radius.

9 Railways and Tunnels Map



Railways and Tunnels Legend

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9 Railways and Tunnels

9.1 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.

9.2 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? Yes

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

ID	Distance (m)	Direction	NGR	Details	Date
1D	0	On Site	652582 305858	Railway Sidings	1946
2B	0	On Site	652582 305860	Railway Sidings	1904
3A	0	On Site	652564 306095	Railway Sidings	1978
4C	0	On Site	652661 305900	Railway Sidings	1946
5A	0	On Site	652564 306095	Railway Sidings	1952
6	0	On Site	652583 305858	Railway Sidings	1938

ID	Distance (m)	Direction	NGR	Details	Date
9E	0	On Site	652580 305840	Railway Sidings	1958
10F	0	On Site	652683 305838	Railway Sidings	1958
11B	0	On Site	652626 305950	Railway Sidings	1927
12C	0	On Site	652662 305924	Railway Sidings	1981
13D	0	On Site	652558 305882	Railway Sidings	1981
14H	0	On Site	652540 306032	Railway Sidings	1887
15G	0	On Site	652567 306085	Railway Sidings	1966
16E	0	On Site	652580 305840	Railway Sidings	1949
17E	0	On Site	652580 305840	Railway Sidings	1968
18E	0	On Site	652580 305839	Railway Sidings	1957
19E	0	On Site	652580 305839	Railway Sidings	1949
20E	0	On Site	652580 305839	Railway Sidings	1968
21F	0	On Site	652683 305838	Railway Sidings	1968
22F	0	On Site	652683 305837	Railway Sidings	1968
23F	0	On Site	652683 305837	Railway Sidings	1957
24F	0	On Site	652683 305838	Railway Sidings	1949
25F	0	On Site	652683 305837	Railway Sidings	1949
26G	0	On Site	652567 306085	Railway Sidings	1949
27	0	On Site	652641 305980	Railway Sidings	1905
28I	0	On Site	652643 306106	Railway Sidings	1949
29H	0	On Site	652585 305922	Railway Sidings	1883
30	0	On Site	652515 306351	Railway Sidings	1905
31	0	On Site	n/a	Railway	1946
32I	0	On Site	652643 306106	Railway Sidings	1963
33I	0	On Site	652643 306106	Railway Sidings	1949
34J	33	N	652516 306425	Railway Sidings	1928
35J	37	N	652521 306429	Railway Sidings	1949
36K	40	S	652771 305842	Railway Sidings	1958
37K	40	S	652771 305842	Railway Sidings	1949

ID	Distance (m)	Direction	NGR	Details	Date
38K	42	S	652772 305841	Railway Sidings	1949
39K	42	S	652772 305841	Railway Sidings	1957
40L	51	S	652777 305830	Railway Sidings	1958
41L	51	S	652777 305830	Tramway Sidings	1949
42K	52	S	652777 305829	Railway Sidings	1957
43K	52	S	652777 305829	Railway Sidings	1949
44M	54	S	652722 305817	Tramway Sidings	1949
45M	54	S	652718 305816	Railway Sidings	1957
7	67	E	652638 305740	Railway Sidings	1884
46N	97	S	652033 305537	Railway Sidings	1958
47	111	S	652044 305396	Railway Sidings	1927
48N	112	S	652033 305529	Railway Sidings	1905
49	117	W	652398 306417	Railway Sidings	1928
50	117	E	652706 305621	Railway Sidings	1905
51O	122	N	652505 306558	Railway Sidings	1966
52O	122	N	652505 306558	Railway Sidings	1975
53O	122	N	652505 306558	Railway Sidings	1954
54O	127	N	652505 306558	Railway Sidings	1949
55	141	NW	652035 306248	Railway Sidings	1968
8	146	S	652035 305381	Railway Sidings	1938
56	163	N	652500 306574	Railway Sidings	1928
57	235	N	n/a	Railway	1906
58	243	N	n/a	Railway	1906

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

9.3 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? Yes

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

Distance (m)	Direction	Status
0	On Site	Abandoned
0	On Site	Abandoned
0	On Site	Dismantled

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.

9.4 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.

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.

9.5 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.

Please note that this assessment takes account of both the original Phase 2b proposed route and the amended route proposed in 2016. As the Phase 2b route is still under consultation, Groundsure are providing information on both options until the final route is formally confirmed. Practitioners should take account of this uncertainty when advising clients.

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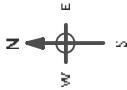
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Map Name: National Grid
Map data: 1953-1955
Scale: 1:1,250
Printed at: 1:2,000



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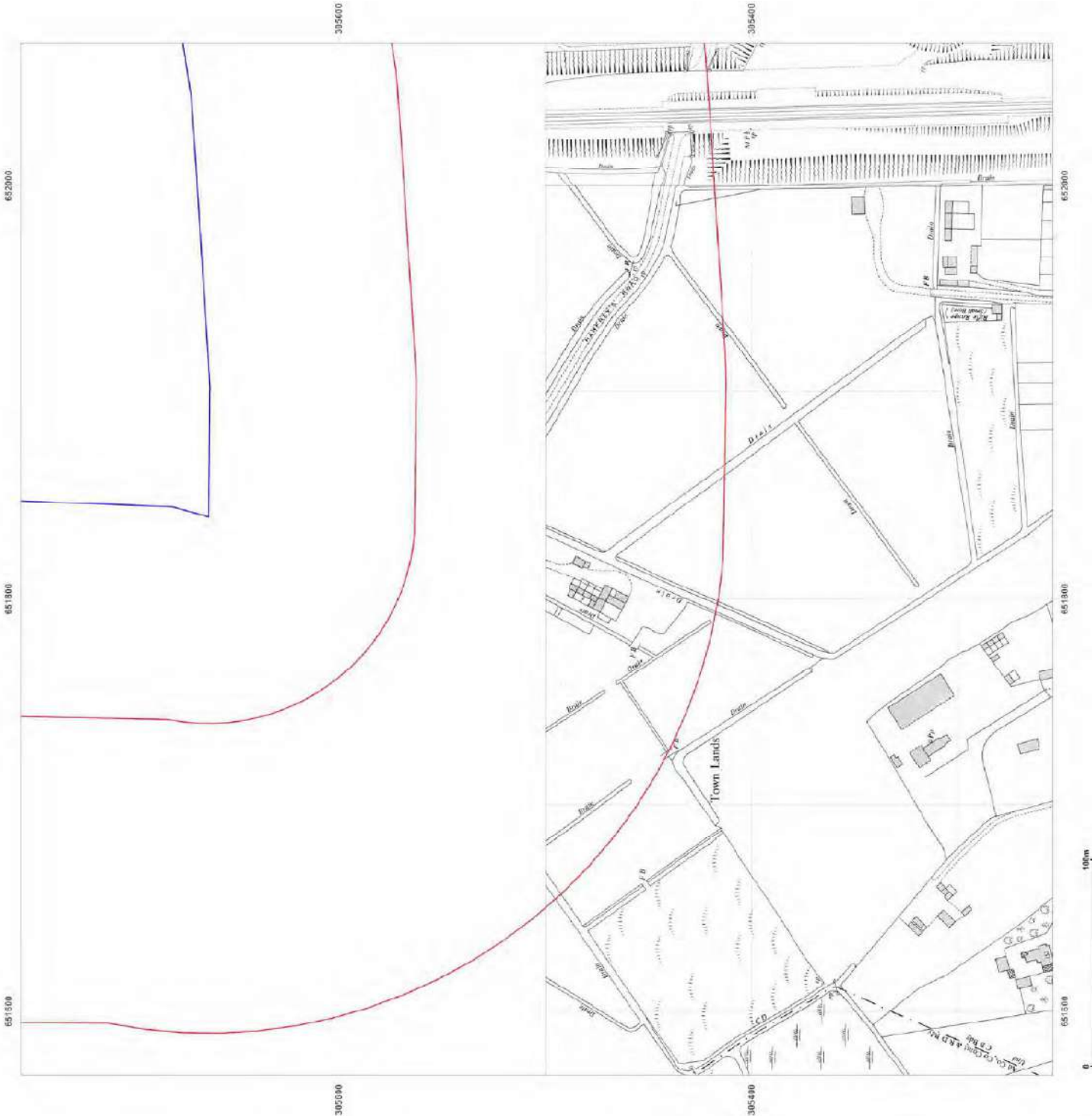


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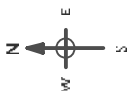
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Revised N/A	Revised 1958
Edition N/A	Edition N/A
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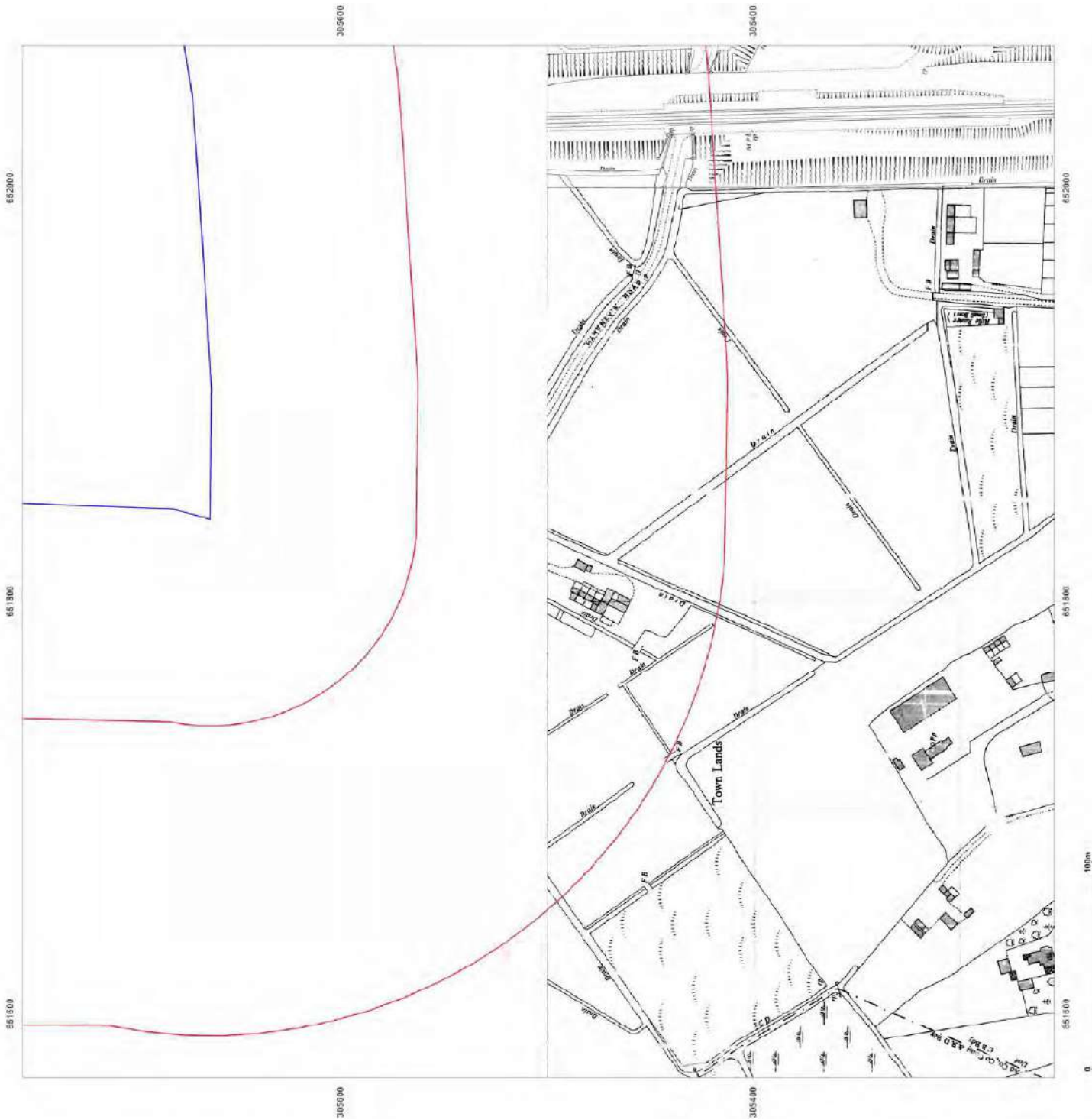


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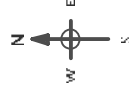
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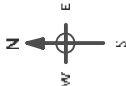
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Grid Ref: 651819, 305504

Map Name: National Grid
Map date: 1976-1978
Scale: 1:1,250
Printed at: 1:2,000



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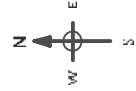




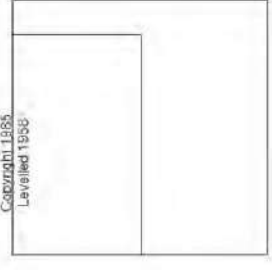
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Printed at: 1:2,000



Surveyed 1958
Revised 1985
Edition N/A
Copyright 1985
Levelled 1986



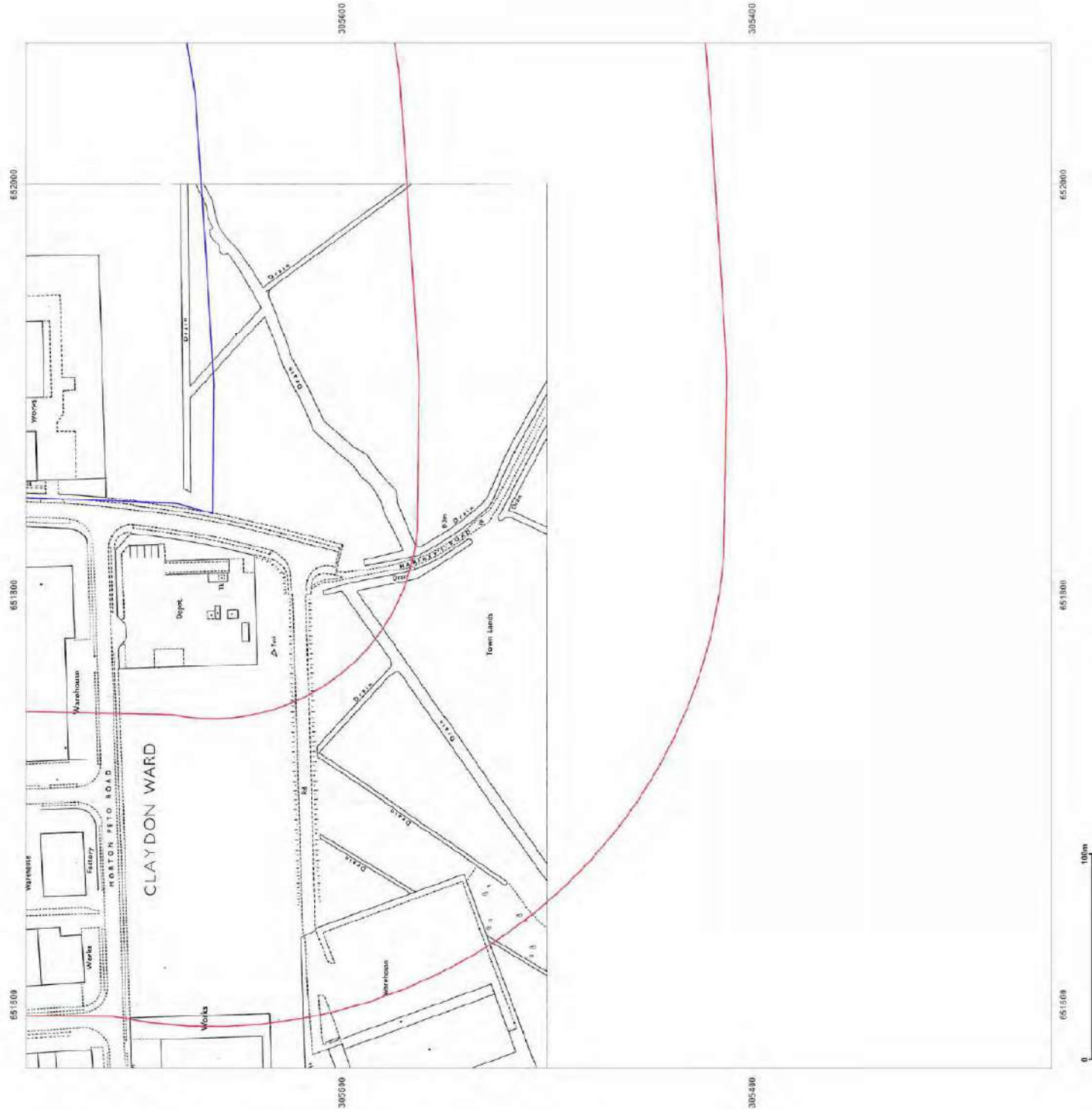
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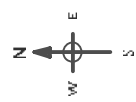
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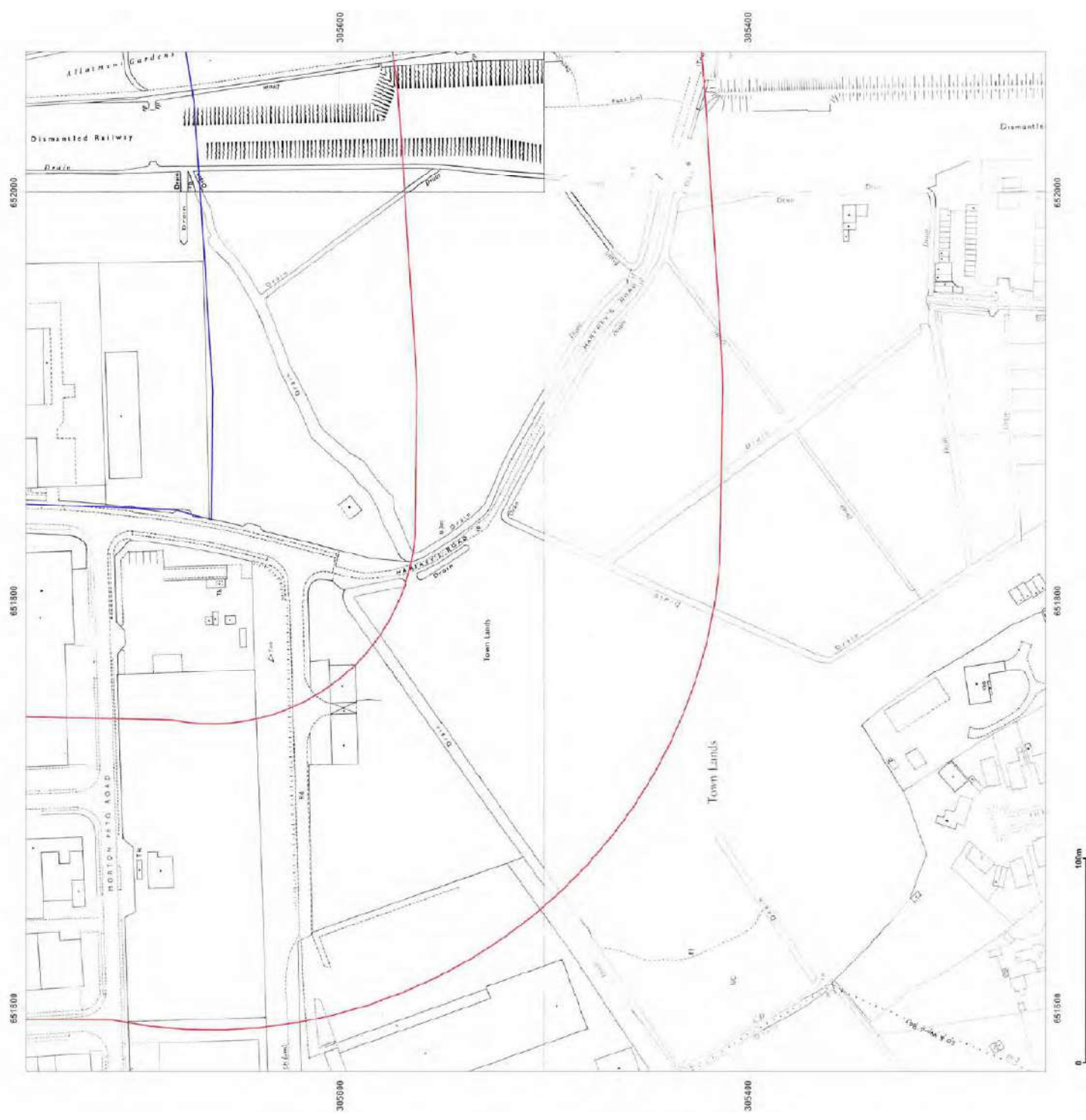
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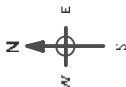
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Map Name: National Grid
Map date: 1990-1994
Scale: 1:1,250
Printed at: 1:2,000



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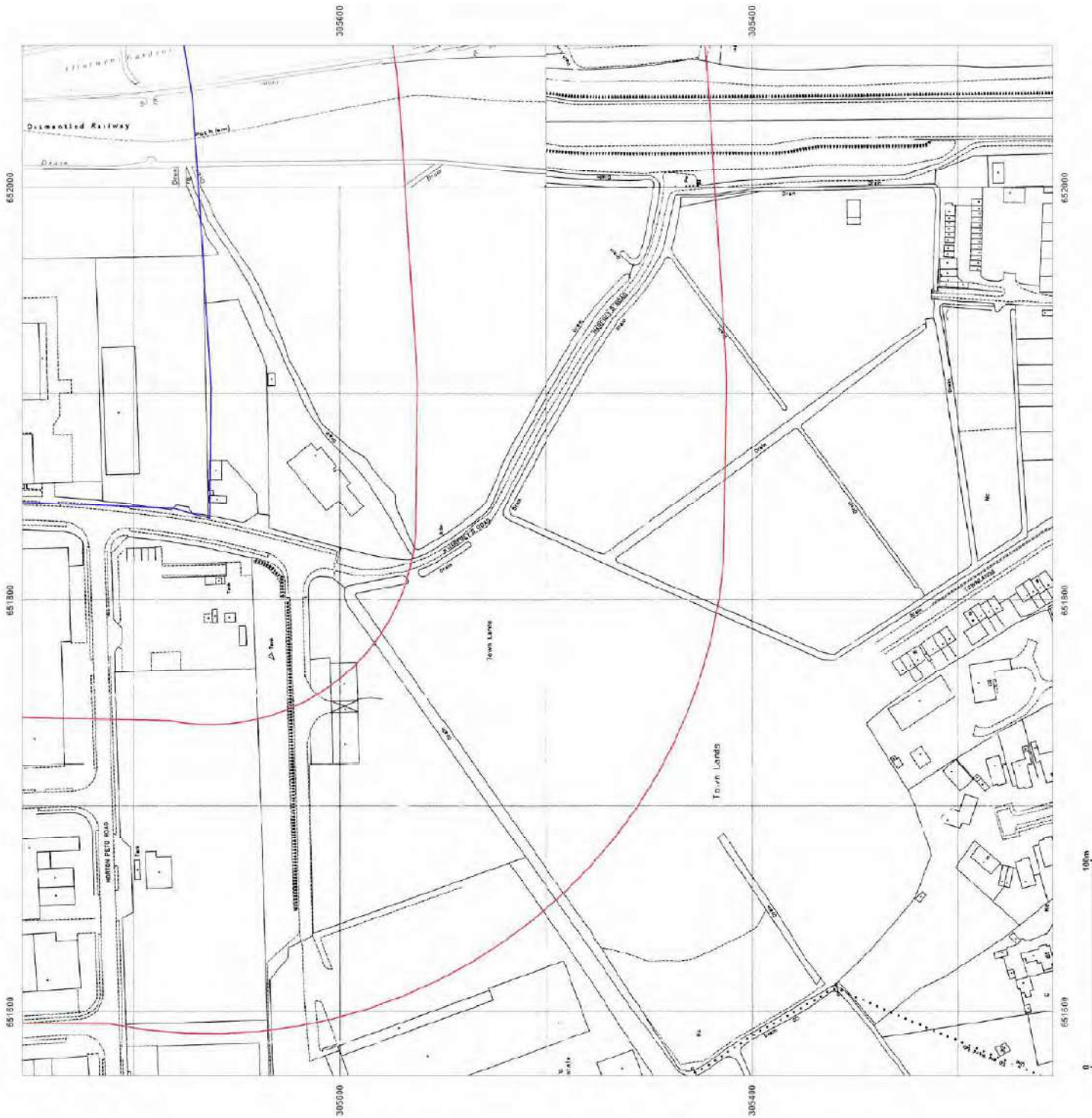
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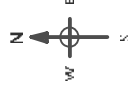
To view map legend click here [Legend](#)



Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 651819, 306034

Map Name: National Grid
Map date: 1975-1978
Scale: 1:1,250
Printed at: 1:2,000



Surveyed 1978 Revised 1978 Edition N/A Copyright 1978 Levelled 1968		Surveyed 1949 Revised 1975 Edition N/A Copyright 1975 Levelled 1968
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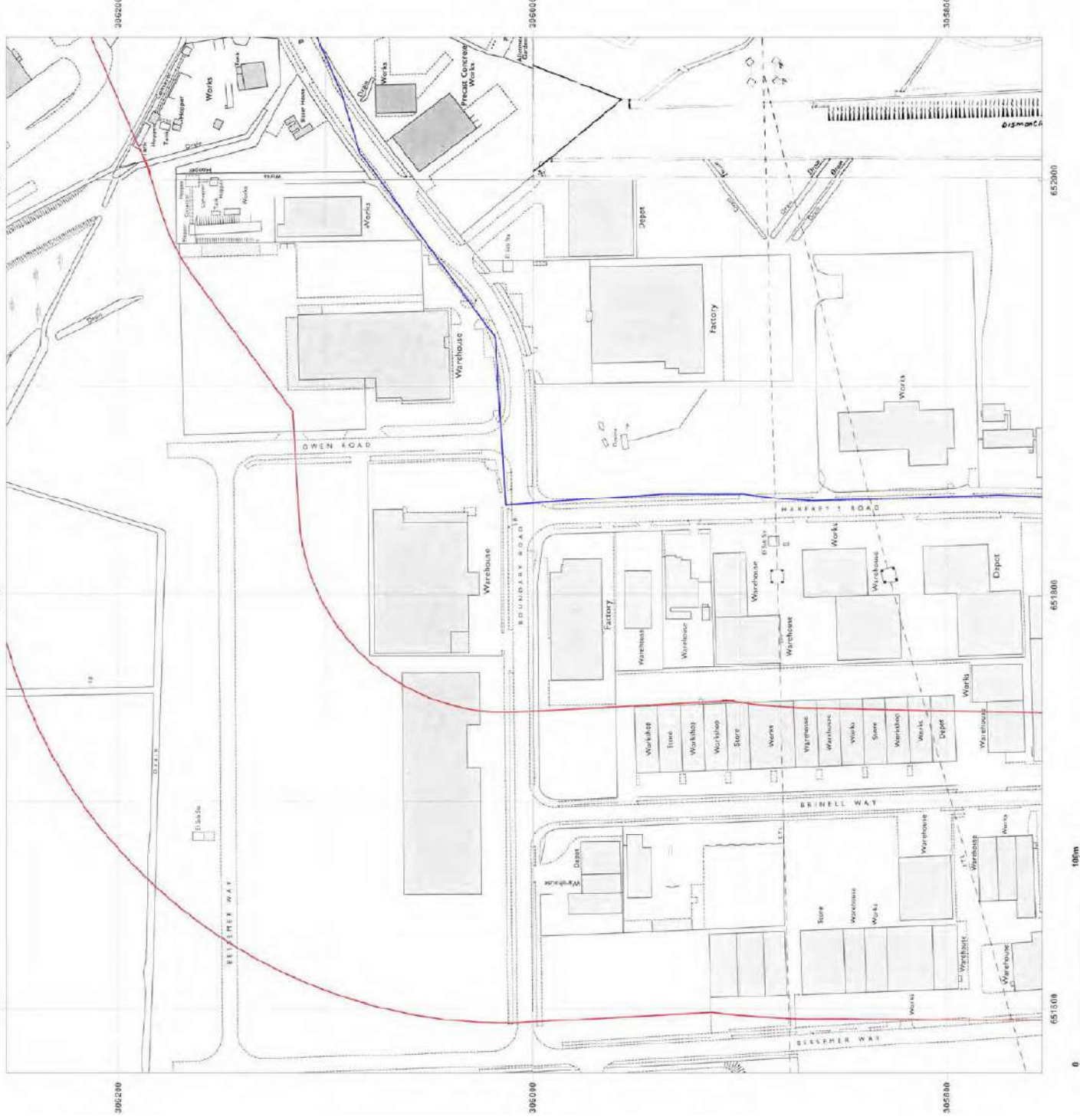
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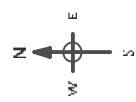
To view map legend click here [Legend](#)



Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 651819, 306034

Map Name: National Grid
Map date: 1976-1980
Scale: 1:1,250
Printed at: 1:2,000



Surveyed N/A Revised N/A Edition N/A Copyright N/A Levelled N/A	
Surveyed 1949 Revised 1975 Edition N/A Copyright 1976 Levelled 1958	

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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 651819, 306034

Map Name: National Grid
Map date: 1985-1990
Scale: 1:1,250
Printed at: 1:2,000



Surveyed 1958
 Revised 1985
 Edition N/A
 Copyright 1985
 Levelled 1958



Surveyed 1958
 Revised 1985
 Edition N/A
 Copyright 1985
 Levelled 1958



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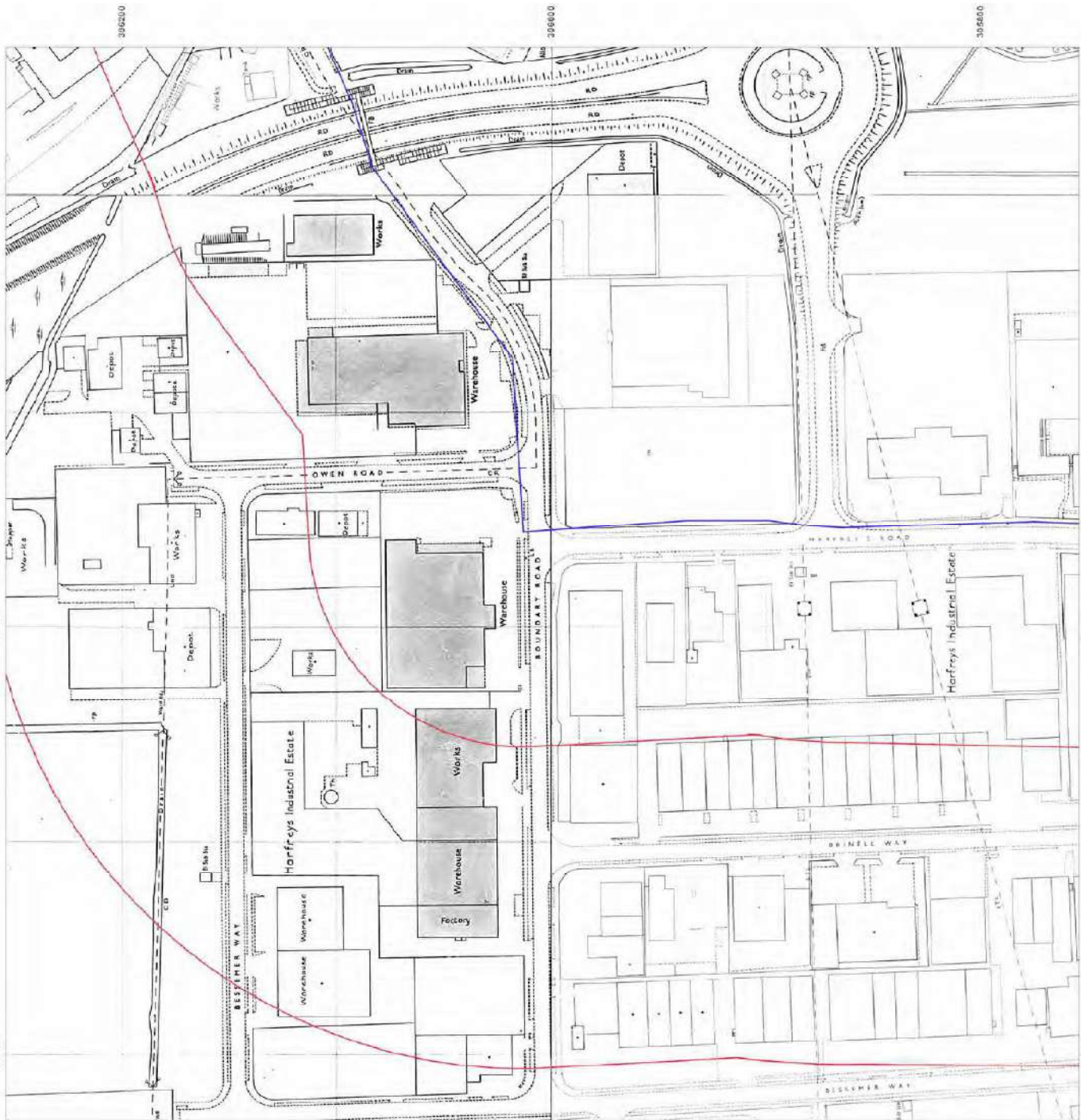


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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 651819, 306004

Map Name: National Grid
Map date: 1990-1994
Scale: 1:1,250
Printed at: 1:2,000



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

Surveyed 1958
Revised 1990
Edition N/A
Copyright 1990
Levelled 1958

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A



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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 651819, 306034

Map Name: National Grid
Map date: 1985-1994
Scale: 1:1,250
Printed at: 1:2,000



Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

Surveyed 1958
Revised 1990
Edition N/A
Copyright 1990
Levelled 1998

Surveyed 1958
Revised 1985
Edition N/A
Copyright 1985
Levelled 1998

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A



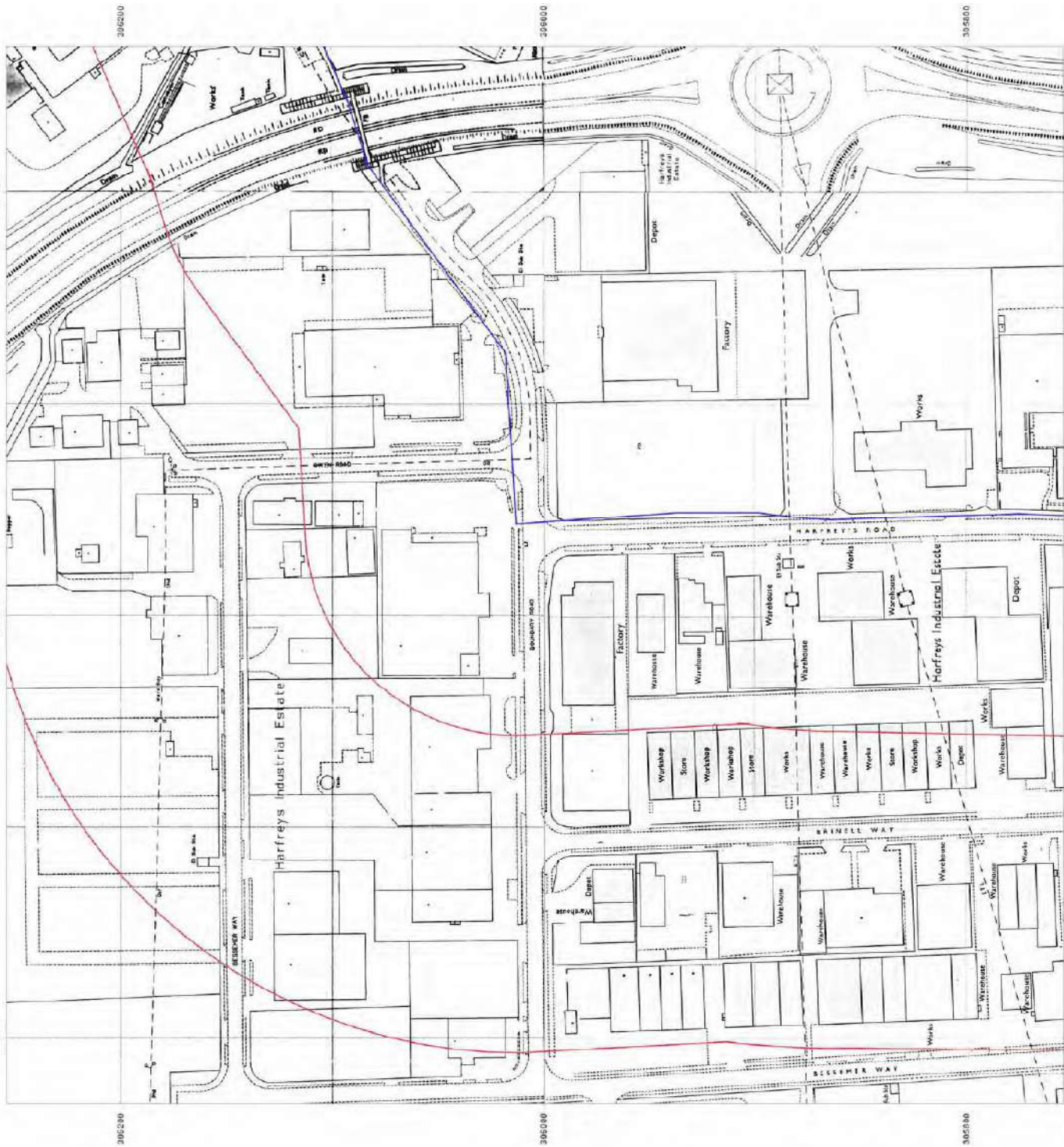
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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM436391-16287-030717HIS_1250scale
Ghd Ref: 651819, 306504

Map Name: County Series Town Plan

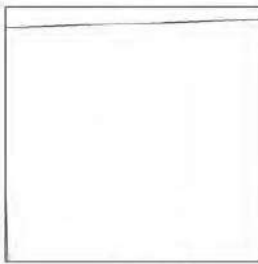
Map data: 1884-1885

Scale: 1:500

Printed at: 1:1,000



Surveyed 1885
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1884
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A



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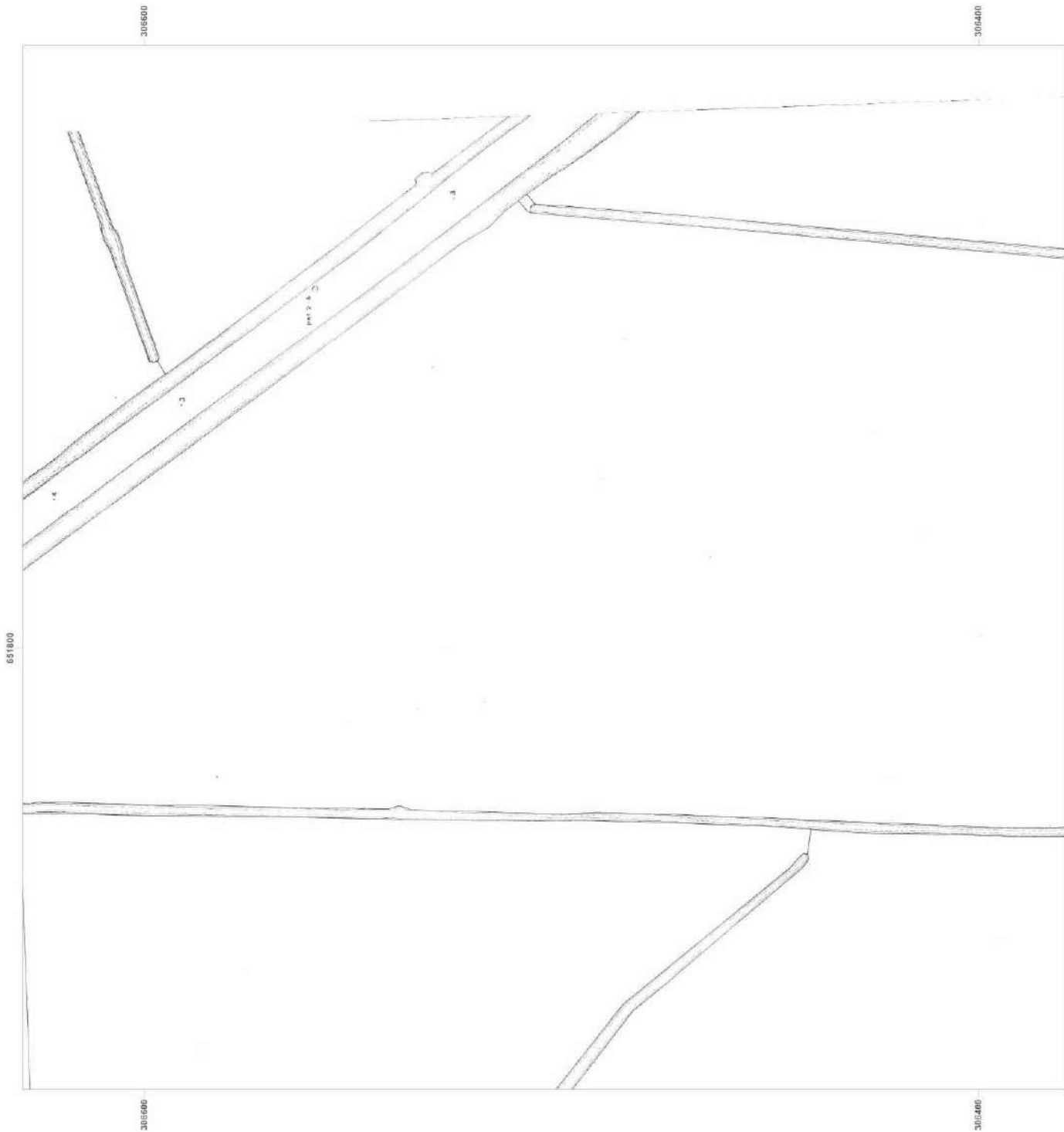


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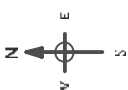
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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 651819, 306504

Map Name: National Grid
Map date: 1949
Scale: 1:1,250
Printed at: 1:2,000



Surveyed 1949 Revised 1949 Edition N/A Copyright N/A Levelled 1946	
Surveyed 1949 Revised 1949 Edition N/A Copyright N/A Levelled 1946	

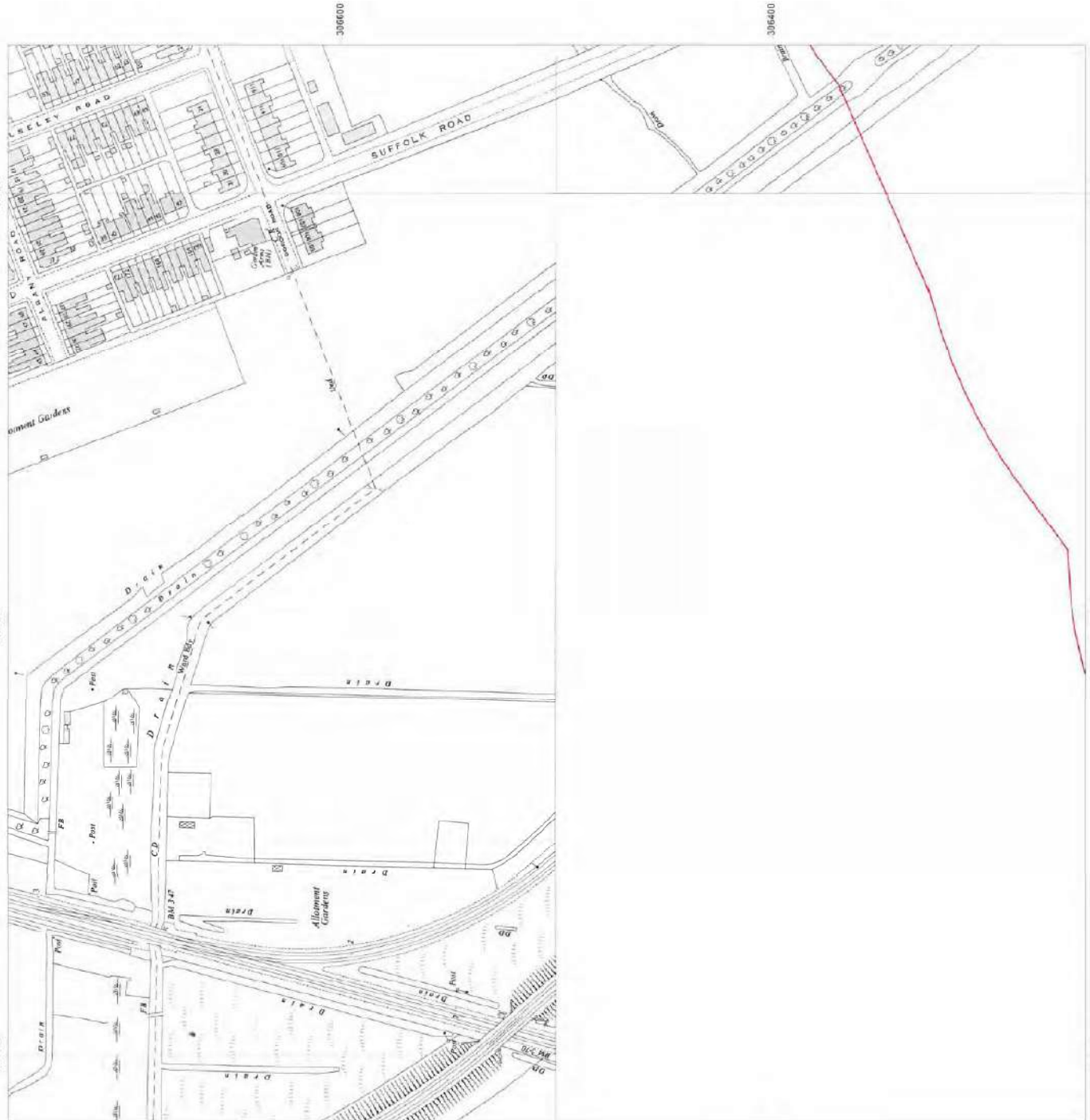
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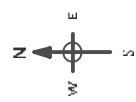
To view map legend click here [Legend](#)



Site Details:

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Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 651819, 306504

Map Name: National Grid
Map date: 1951
Scale: 1:1,250
Printed at: 1:2,000



Surveyed 1951
Revised 1951
Edition N/A
Copyright N/A
Levelled 1946

Surveyed 1951
Revised 1951
Edition N/A
Copyright N/A
Levelled 1946

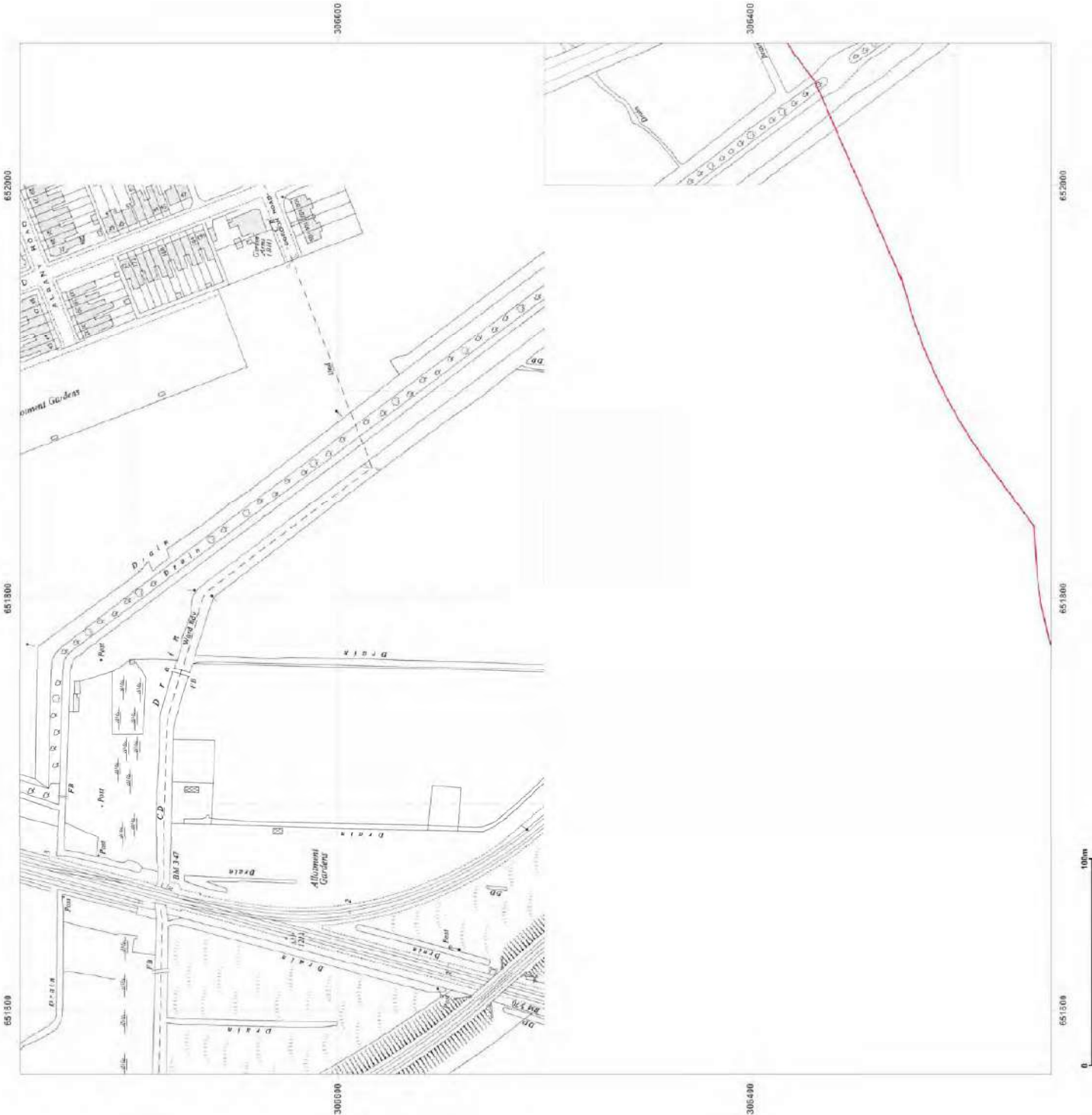
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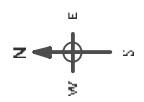
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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 651819, 306504

Map Name: National Grid
Map date: 1968
Scale: 1:1,250
Printed at: 1:2,000



Surveyed 1967 Revised 1967 Edition N/A Copyright 1968 Levelled 1958	
Surveyed 1949 Revised 1967 Edition N/A Copyright 1968 Levelled 1958	

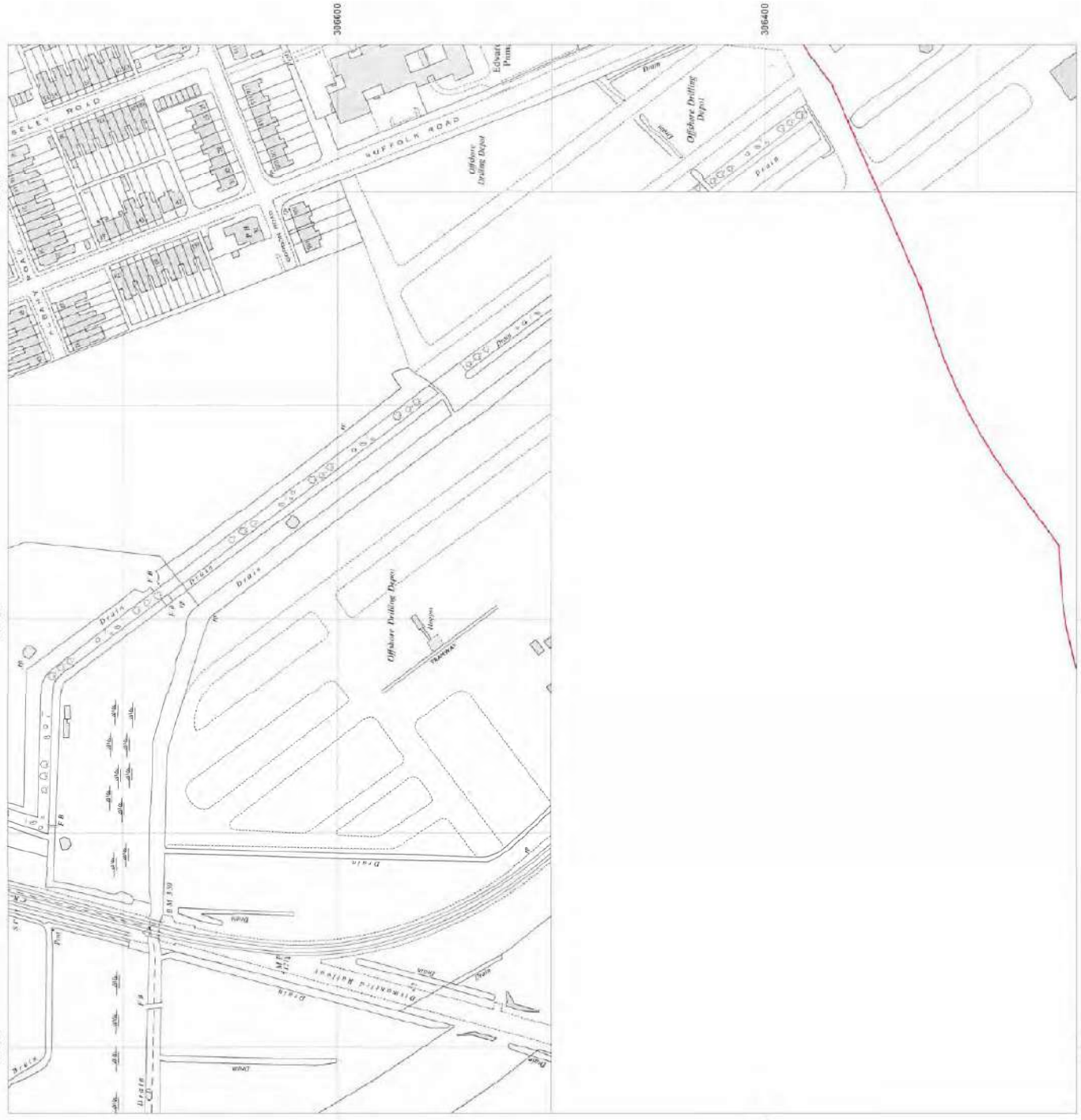
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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 651819, 306504

Map Name: National Grid
Map date: 1975-1978
Scale: 1:1,250
Printed at: 1:2,000



Surveyed N/A Revised N/A Edition N/A Copyright N/A Levelled N/A	Surveyed 1949 Revised 1975 Edition N/A Copyright 1975 Levelled 1958
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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 651819, 306504

Map Name: National Grid
Map date: 1978-1980
Scale: 1:1,250
Printed at: 1:2,000



Surveyed N/A Revised N/A Edition N/A Copyright N/A Levelled N/A		Surveyed N/A Revised N/A Edition N/A Copyright N/A Levelled N/A
Surveyed 1956 Revised 1980 Edition N/A Copyright 1980 Levelled 1956		

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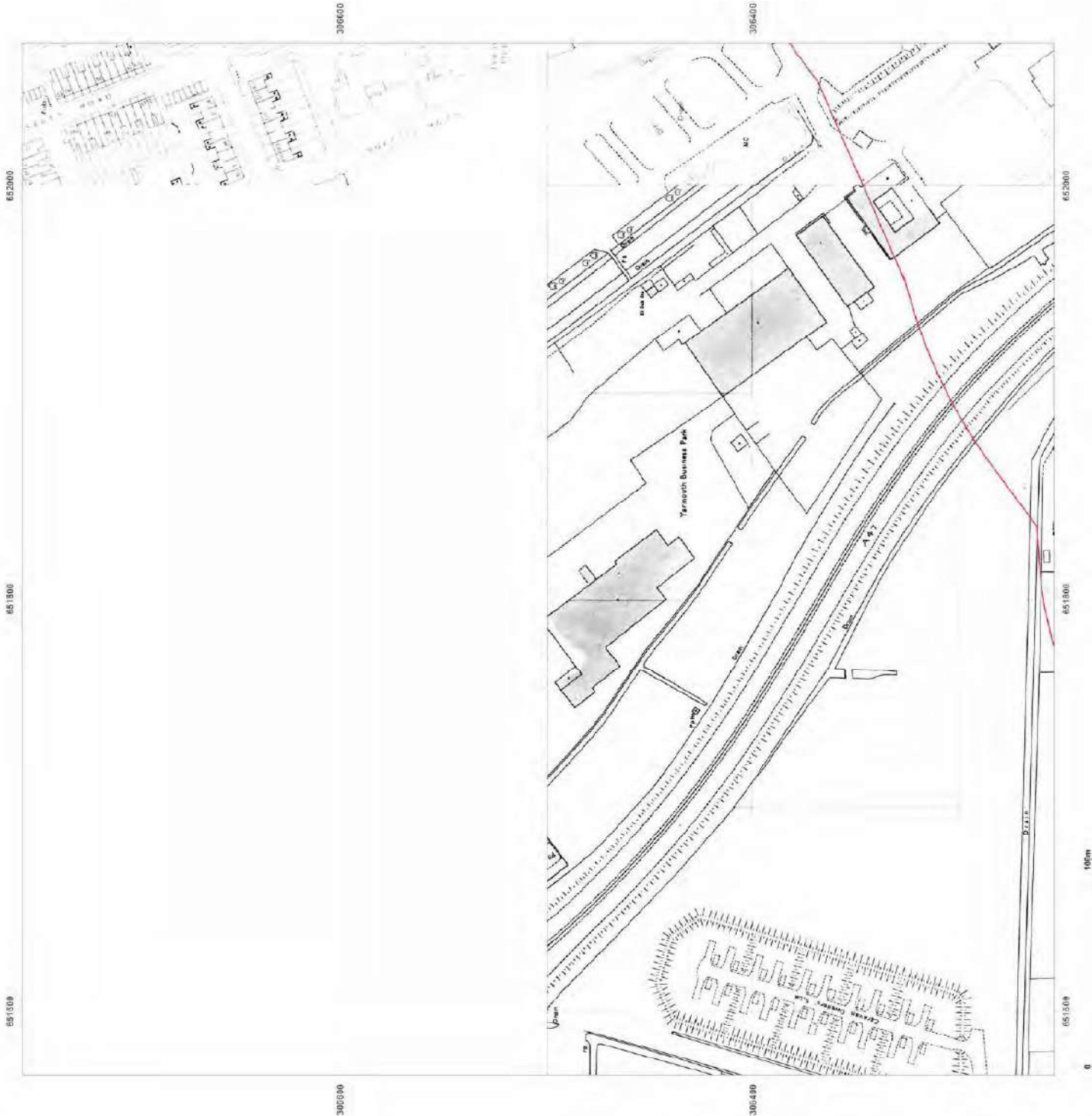
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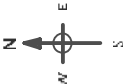
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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scal
Grid Ref: 651819, 306504

Map Name: National Grid
Map date: 1986-1990
Scale: 1:1,250
Printed at: 1:2,000



Surveyed 1958 Revised 1987 Edition N/A Copyright 1987 Levelled 1958		Surveyed 1956 Revised 1987 Edition N/A Copyright 1987 Levelled 1956
Surveyed N/A Revised N/A Edition N/A Copyright N/A Levelled N/A		Surveyed 1958 Revised 1986 Edition N/A Copyright 1986 Levelled 1958



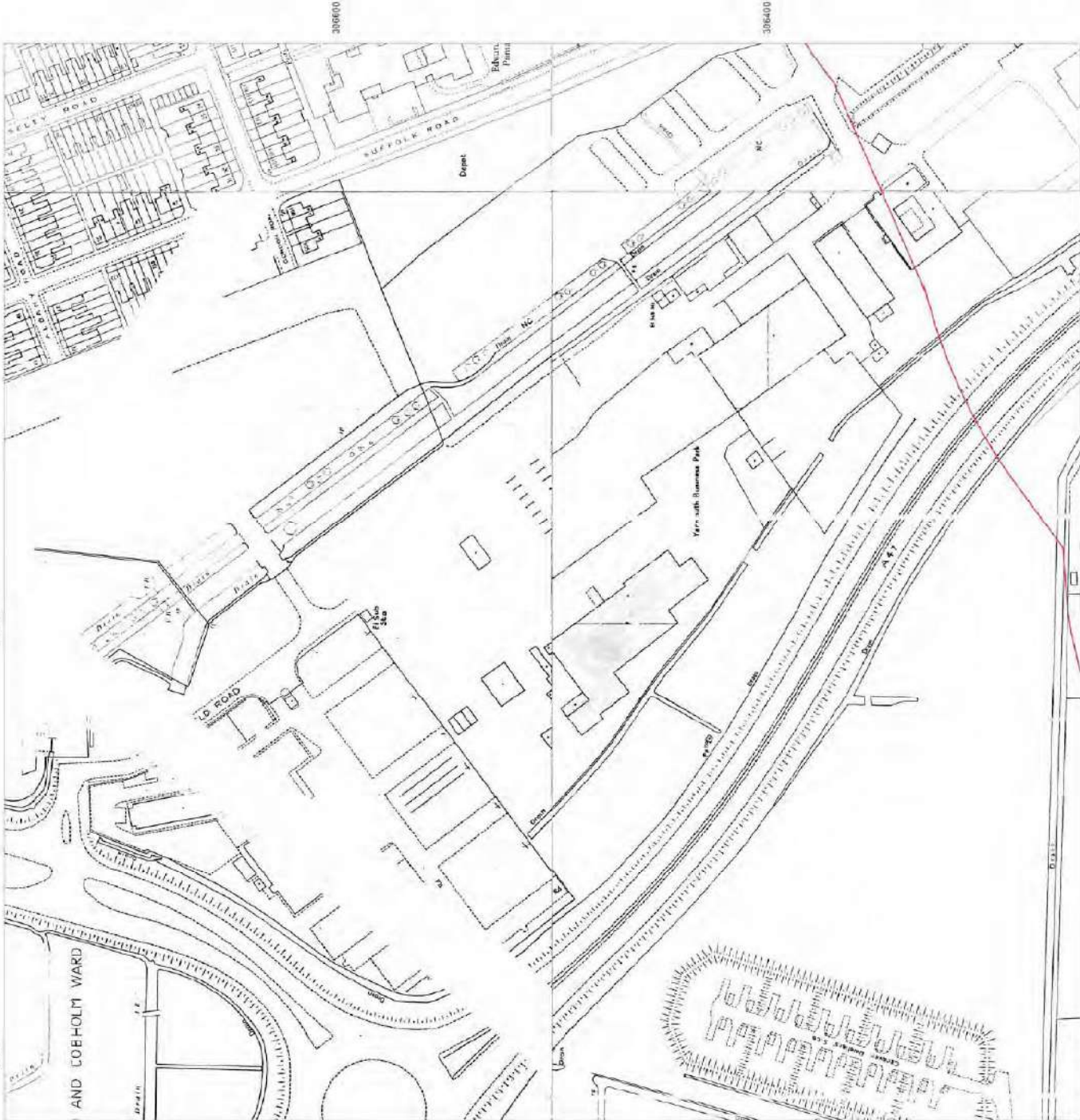
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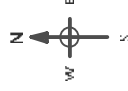
To view map legend click here [Legend](#)



Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 651819, 306504

Map Name: National Grid
Map date: 1985-1990
Scale: 1:1,250
Printed at: 1:2,000



Surveyed 1958 Revised 1987 Edition N/A Copyright 1987 Levelled 1958		Surveyed 1958 Revised 1980 Edition N/A Copyright 1990 Levelled 1958
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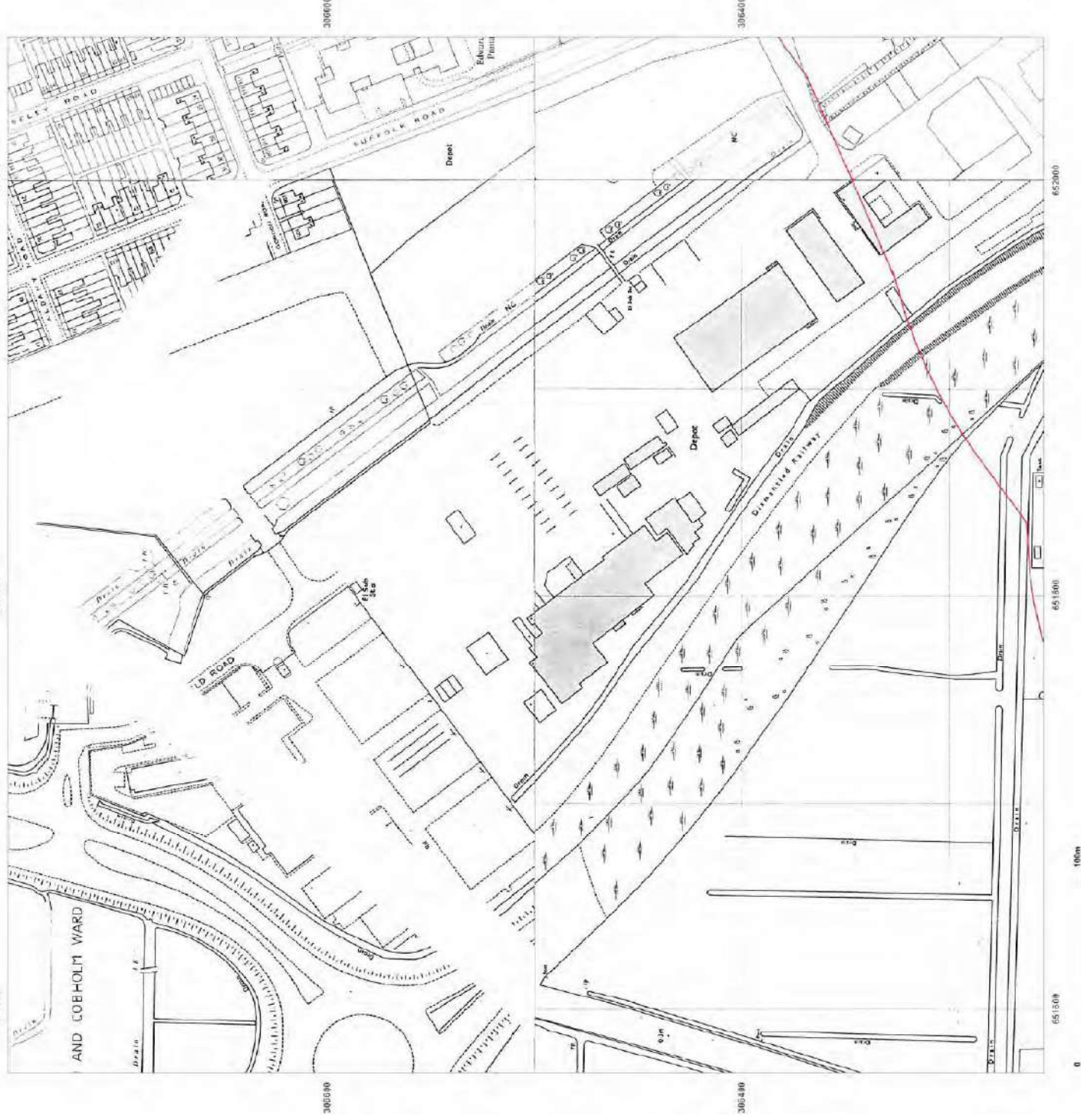
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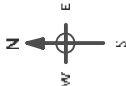
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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 651819, 306504

Map Name: National Grid
Map date: 1994
Scale: 1:1,250
Printed at: 1:2,000



Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
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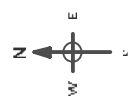




Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 651819, 306504

Map Name: National Grid
Map date: 1989-1994
Scale: 1:1,250
Printed at: 1:2,000



Surveyed 1958 Revised 1990 Edition N/A Copyright 1990 Levelled 1958		Surveyed 1958 Revised 1990 Edition N/A Copyright 1990 Levelled 1958
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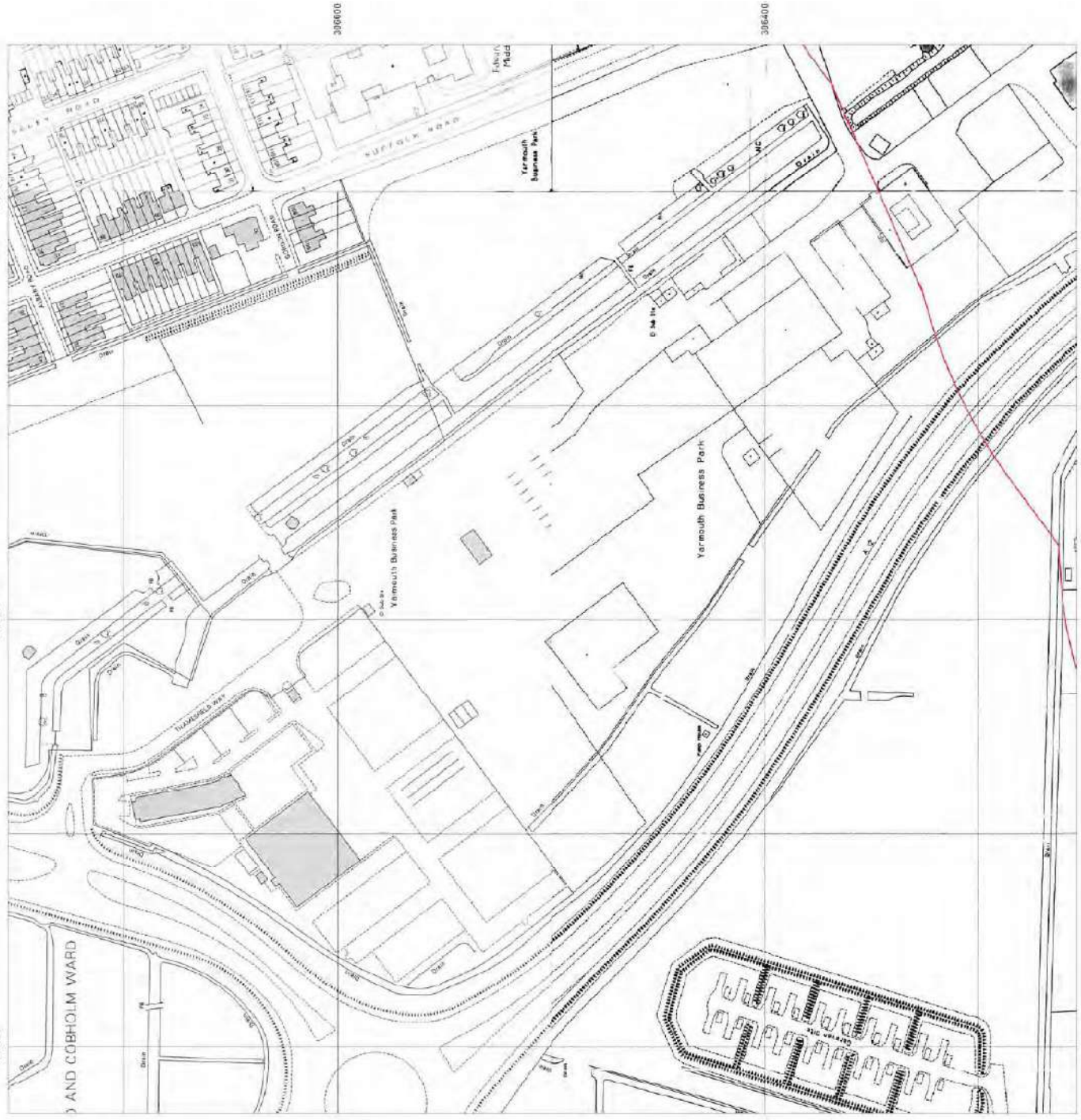
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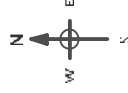
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Report Ref: CMAPS-CM-636391-16287-030717HIS_12505ca
Grid Ref: 652319, 305504

Map Name: County Series Town Plan

Map date: 1885

Scale: 1:500

Printed at: 1:1,000



Surveyed 1885
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1885
Revised N/A
Edition N/A
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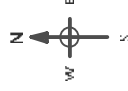
To view map legend click here [Legend](#)



Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652319, 305504

Map Name: National Grid
Map date: 1949
Scale: 1:1,250
Printed at: 1:2,000



Surveyed 1949 Revised 1949 Edition N/A Copyright N/A Levelled 1946		Surveyed 1949 Revised 1949 Edition N/A Copyright N/A Levelled 1946

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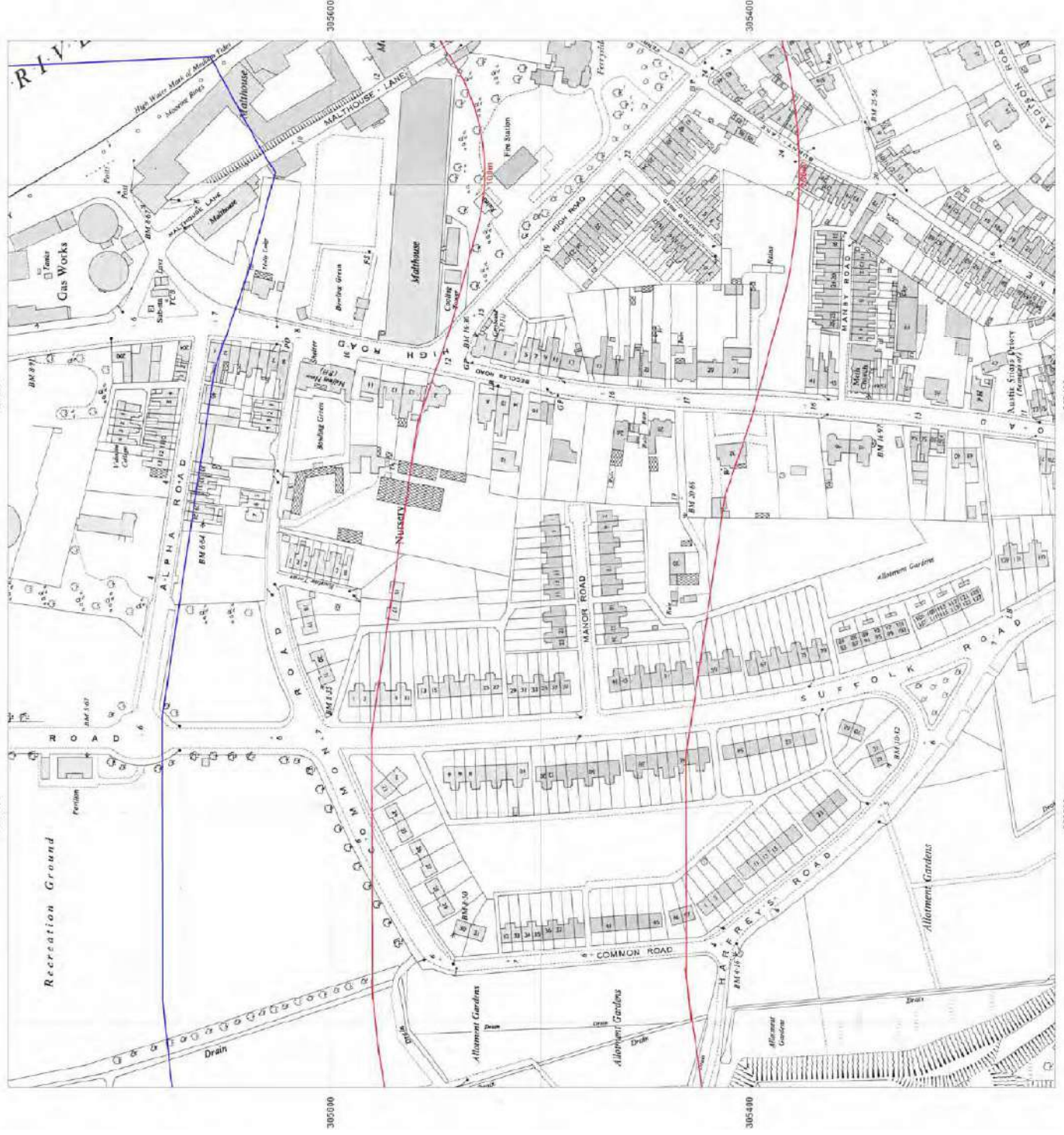
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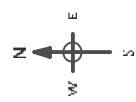




Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652319, 305504

Map Name: National Grid
Map date: 1953-1957
Scale: 1:1,250
Printed at: 1:2,000



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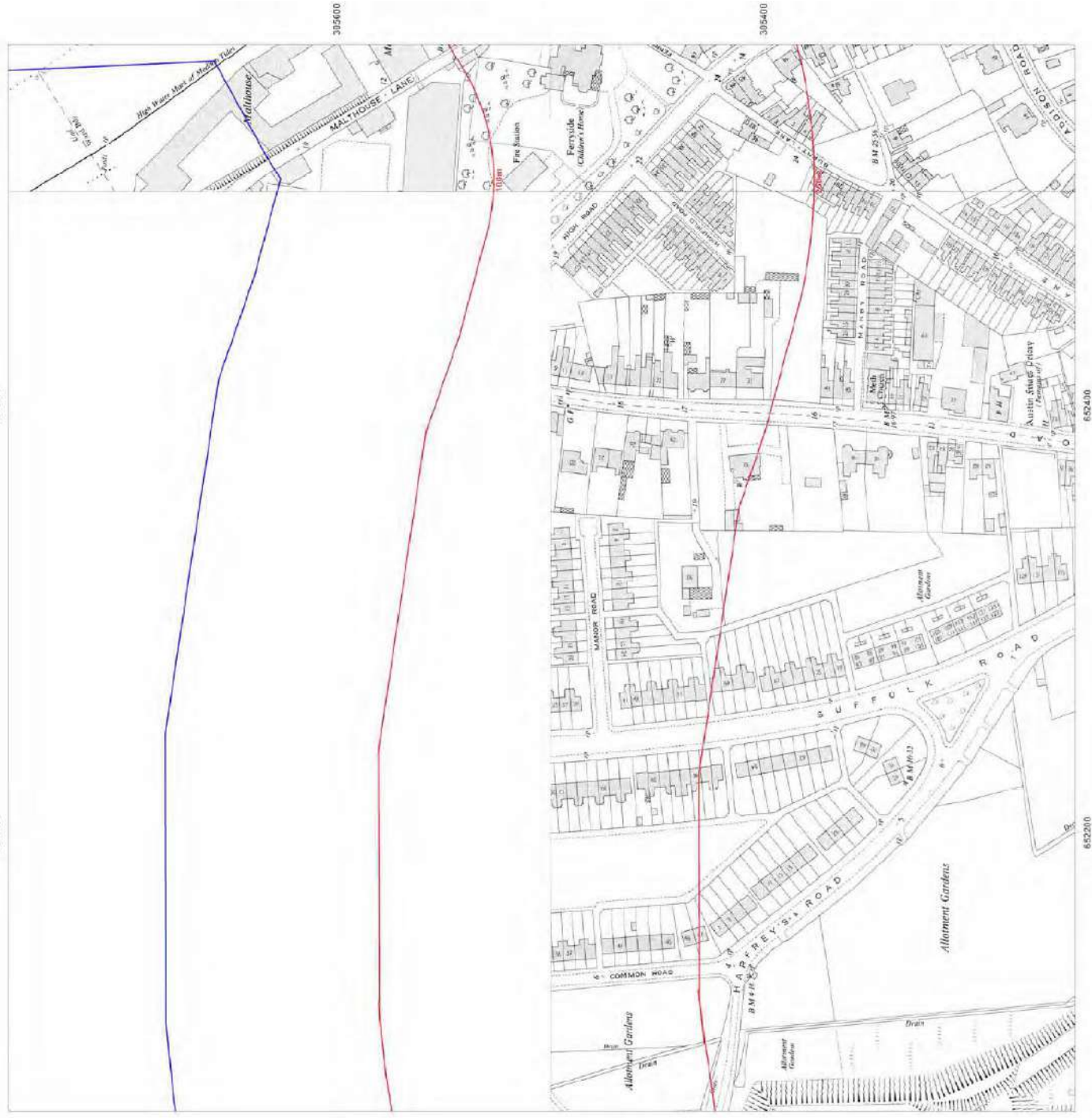
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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652319, 305504

Map Name: National Grid
Map date: 1958
Scale: 1:1,250
Printed at: 1:2,000



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

Surveyed 1949
Revised 1958
Edition N/A
Copyright 1955
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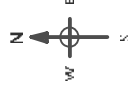


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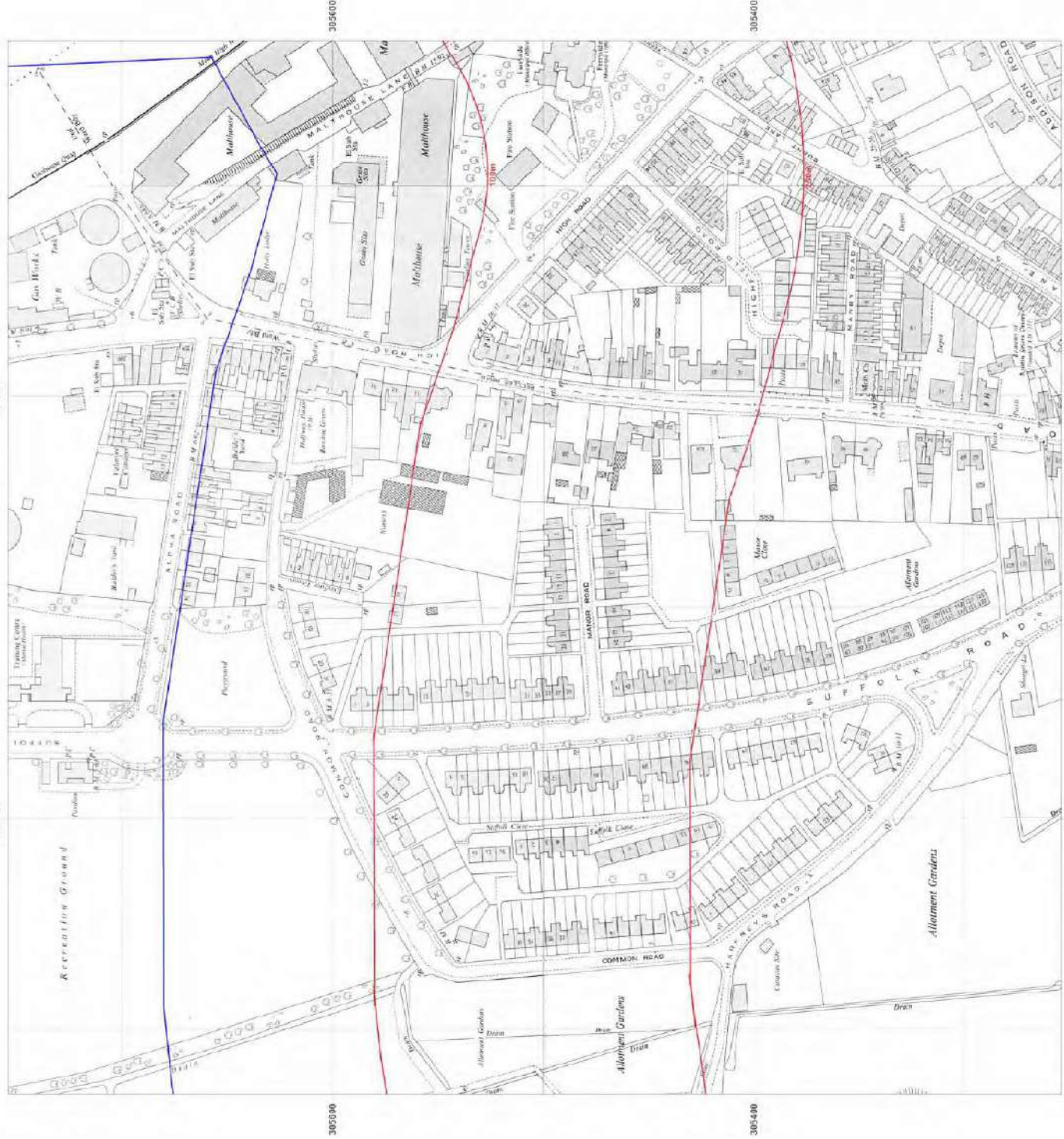
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Grid Ref: 652319, 305504

Map Name: National Grid
Map date: 1967-1968
Scale: 1:1,250
Printed at: 1:2,000



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Copyright 1968
Levelled 1968

Surveyed 1949
Revised 1967
Edition N/A
Copyright 1968
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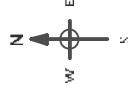
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Grid Ref: 652319, 305504

Map Name: National Grid

Map date: 1968-1972

Scale: 1:1,250

Printed at: 1:2,000



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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652319, 305504

Map Name: National Grid
Map date: 1975-1977
Scale: 1:1,250
Printed at: 1:2,000



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

Surveyed 1949
Revised 1975
Edition N/A
Copyright 1976
Levelled 1958



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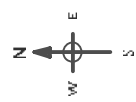
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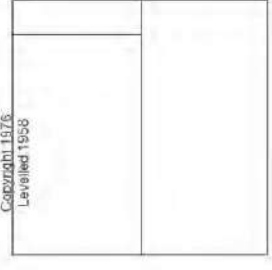
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Grid Ref: 652319, 305504

Map Name: National Grid
Map date: 1976-1981
Scale: 1:1,250
Printed at: 1:2,000



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Edition N/A
Copyright 1981
Levelled 1958

Surveyed 1958
Revised 1981
Edition N/A
Copyright 1981
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652300

652400

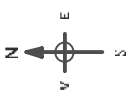
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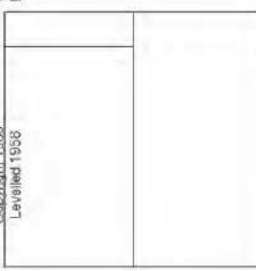
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Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652319, 305504

Map Name: National Grid
Map date: 1984-1986
Scale: 1:1,250
Printed at: 1:2,000



Surveyed 1958
Revised 1996
Edition N/A
Copyright 1984
Levelled 1958



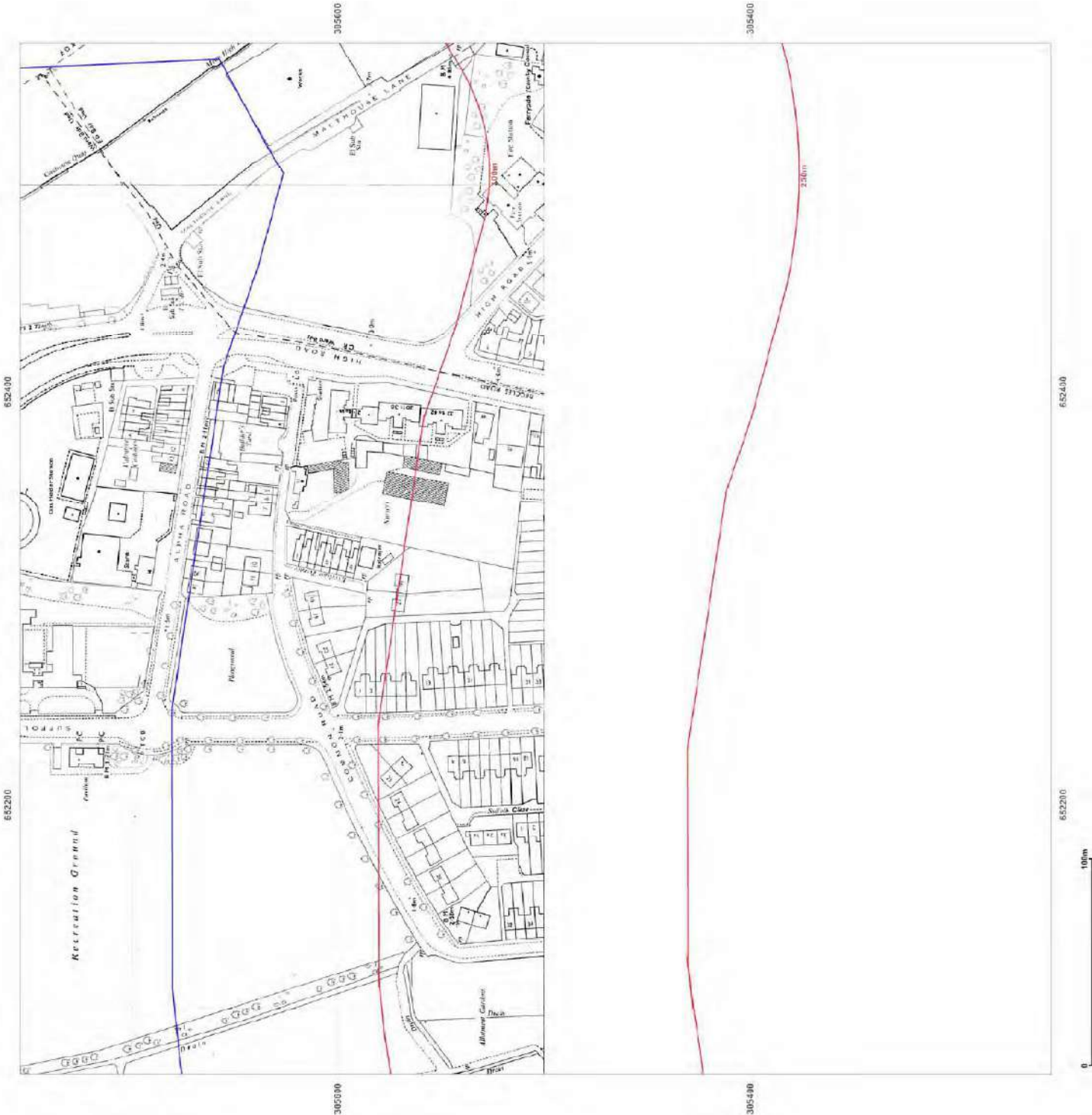
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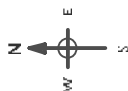
To view map legend click here [Legend](#)



Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652319, 305504

Map Name: National Grid
Map date: 1990
Scale: 1:1,250
Printed at: 1:2,000



Surveyed 1958 Revised 1990 Edition N/A Copyright 1990 Levelled 1958		Surveyed 1958 Revised 1990 Edition N/A Copyright 1990 Levelled 1958
Surveyed N/A Revised N/A Edition N/A Copyright 1990 Levelled 1958		Surveyed 1958 Revised 1990 Edition N/A Copyright 1990 Levelled 1958

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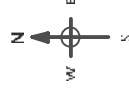
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Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 652319, 305504

Map Name: National Grid

Map date: 1994

Scale: 1:1,250

Printed at: 1:2,000



Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A



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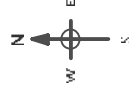
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Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652319, 306004

Map Name: County Series Town Plan

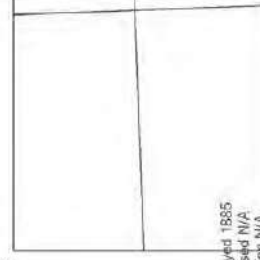
Map date: 1885

Scale: 1:500

Printed at: 1:1,000



Surveyed 1885
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1885
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

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Revised N/A
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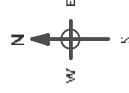
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Report Ref: CMAPS
Grid Ref: 652319

Map Name: National Grid

Mapdate: 1949

Scale: 1:1,250

Printed at 1:2,000



Surveyed 1949	Revised 1949	Edition N/A	Copyright N/A	Levelled 1946
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Surveyed 1949	Copyright N/A
Revised 1949	Labelled 1948
Edition N/A	

Surveyed 1949
Revised 1949
Edition N/A
Copyright N/A
Levelled 1945

Surveyed 1949
Revised 1949
Edition N/A
Copyright N/A
Levelled 1945



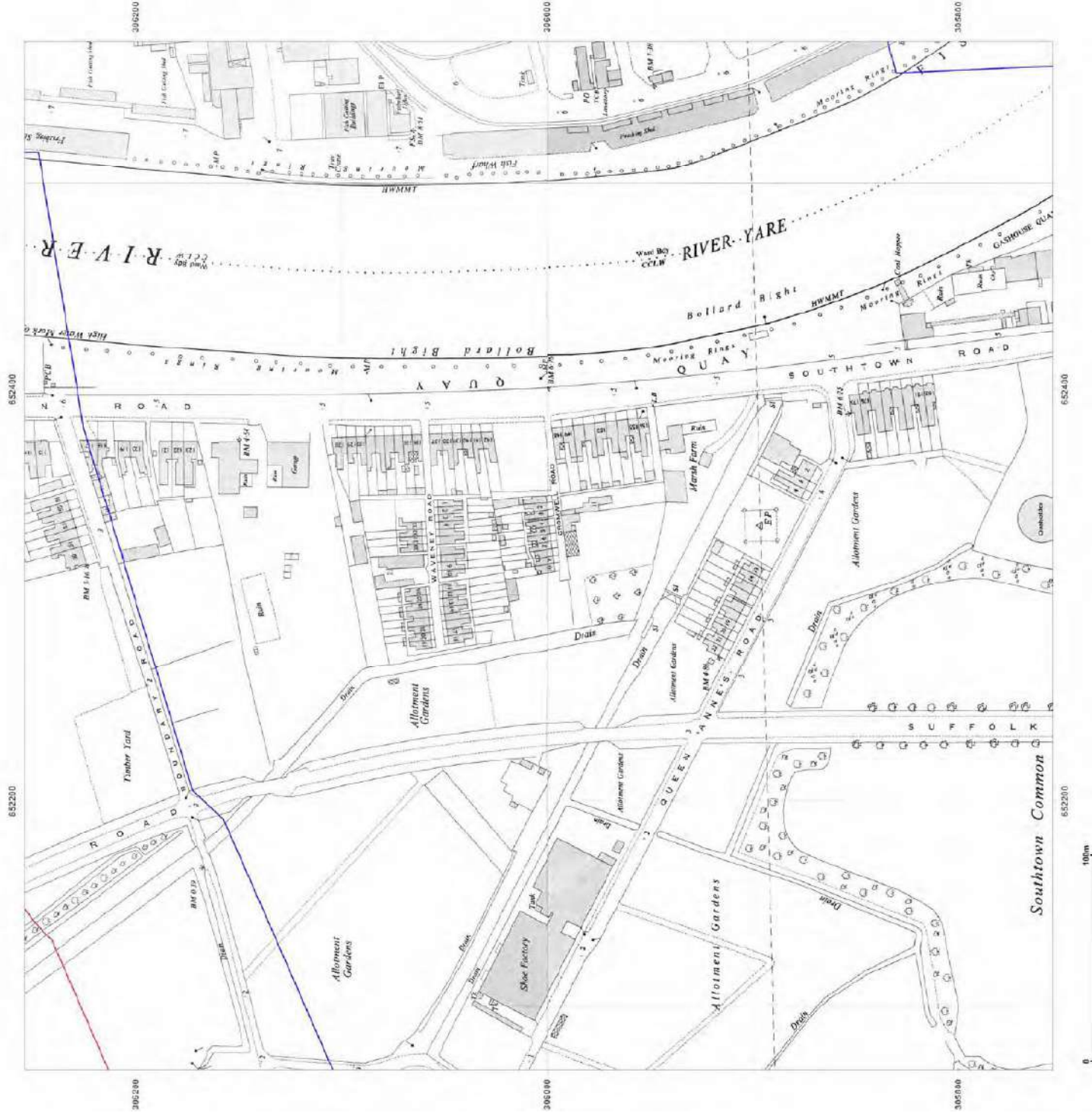
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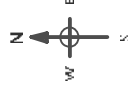
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Grid Ref: 652319, 306004

Map Name: National Grid

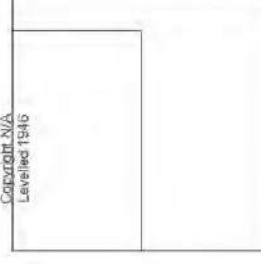
Map date: 1951

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1951
Revised 1951
Edition N/A
Copyright N/A
Levelled 1946



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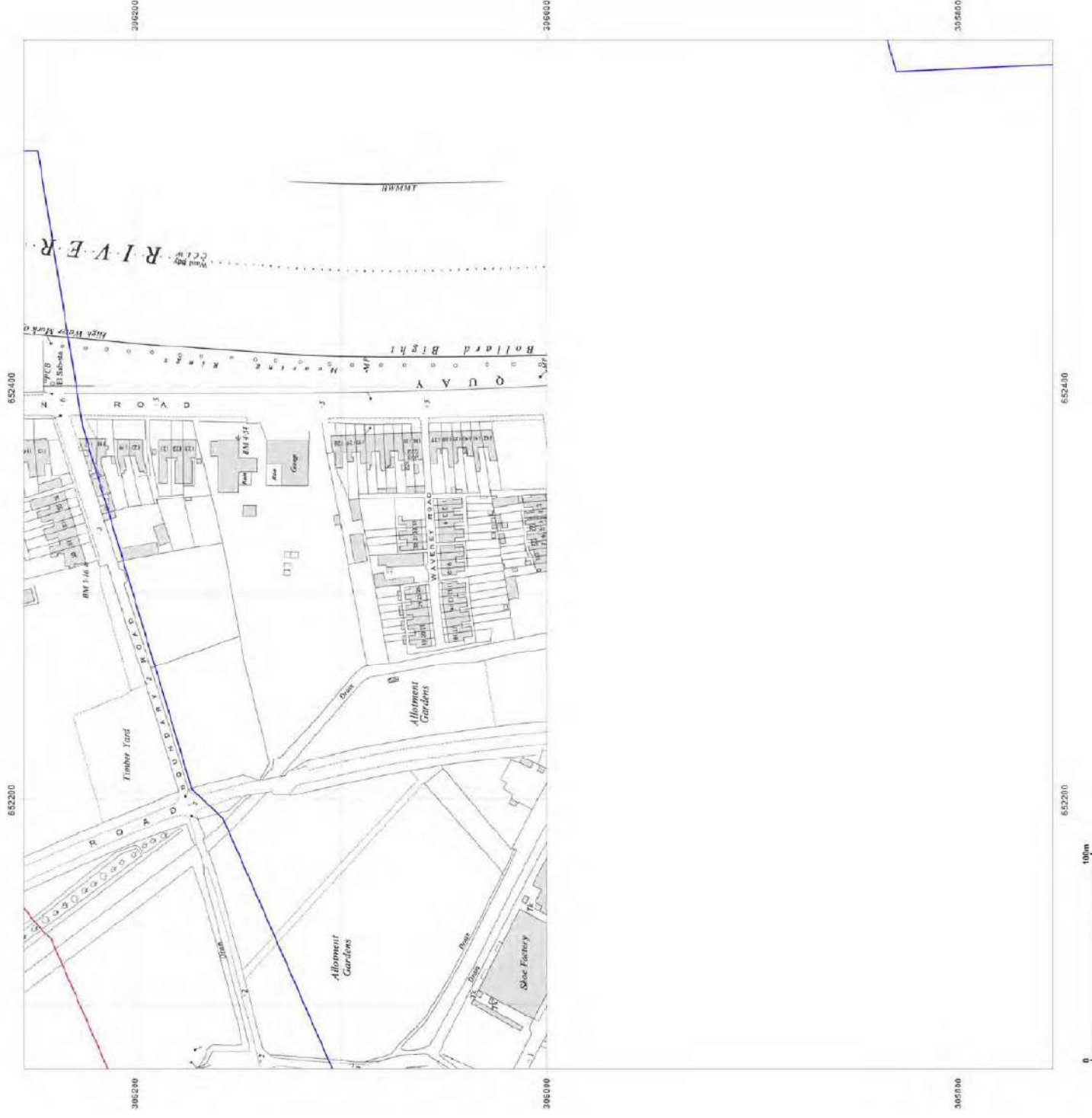


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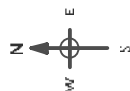
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Grid Ref: 652319, 306034

Map Name: National Grid

Map date: 1966-1968

Scale: 1:1,250

Printed at: 1:2,000



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Edition N/A
Copyright 1968
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Surveyed 1949
Revised 1967
Edition N/A
Copyright 1968
Levelled 1968



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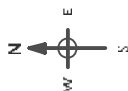
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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652319, 306004

Map Name: National Grid
Map date: 1970-1975
Scale: 1:1,250
Printed at: 1:2,000



Surveyed 1849
 Revised 1975
 Edition N/A
 Copyright N/A
 Levelled 1958

Surveyed N/A Revised N/A Edition N/A Copyright N/A Levelled N/A	
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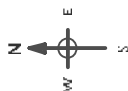
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Site Details:

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Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652319, 306034

Map Name: National Grid
Map date: 1976-1981
Scale: 1:1,250
Printed at: 1:2,000



Surveyed N/A Revised N/A Edition N/A Copyright N/A Levelled N/A	Surveyed 1949 Revised 1975 Edition N/A Copyright 1976 Levelled 1968
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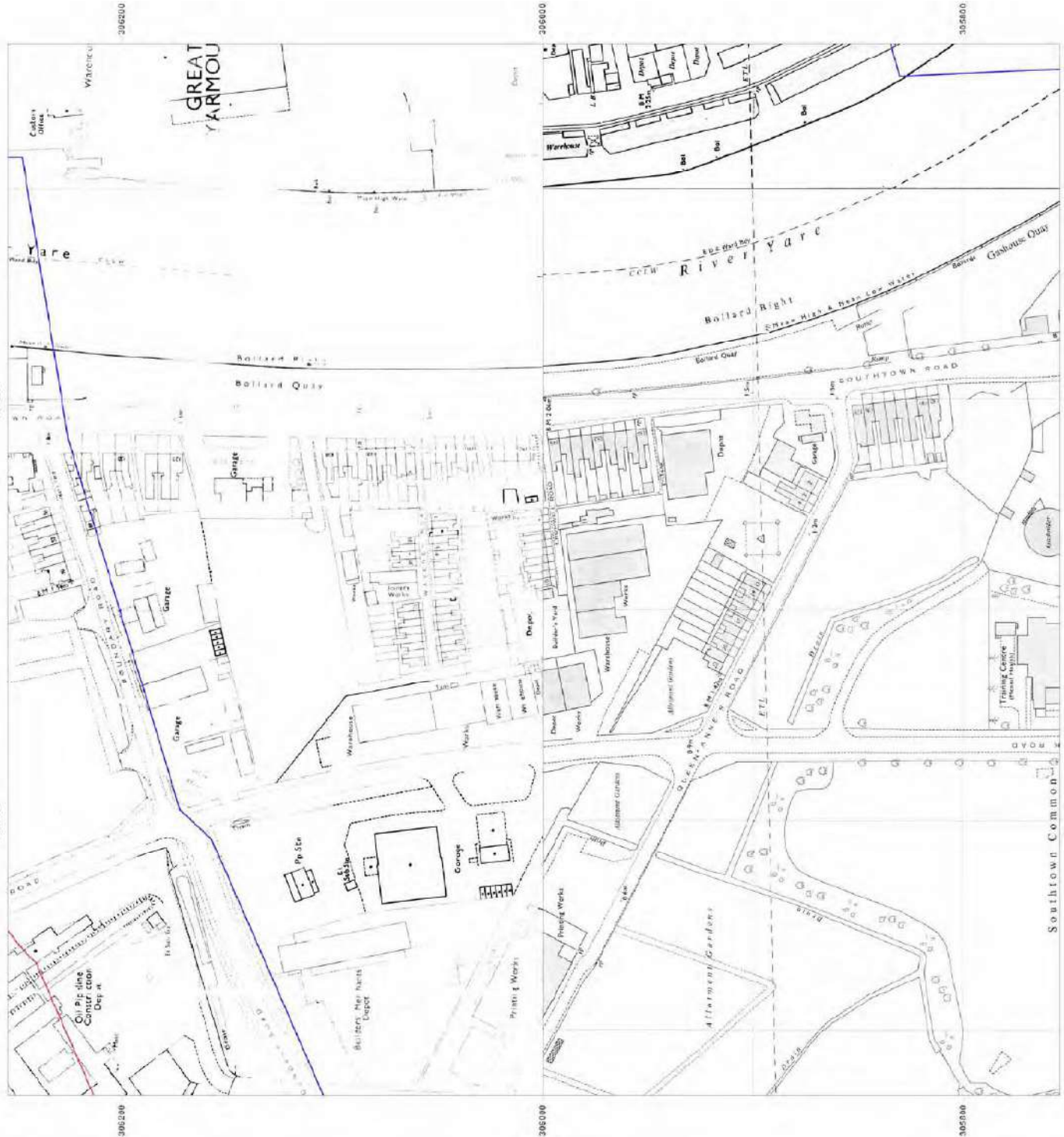
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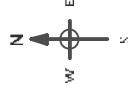
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Grid Ref: 652319, 306034

Map Name: National Grid

Map date: 1984-1986

Scale: 1:1,250

Printed at: 1:2,000



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Edition N/A
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Levelled 1958

Surveyed 1958
Revised 1984
Edition N/A
Copyright 1984
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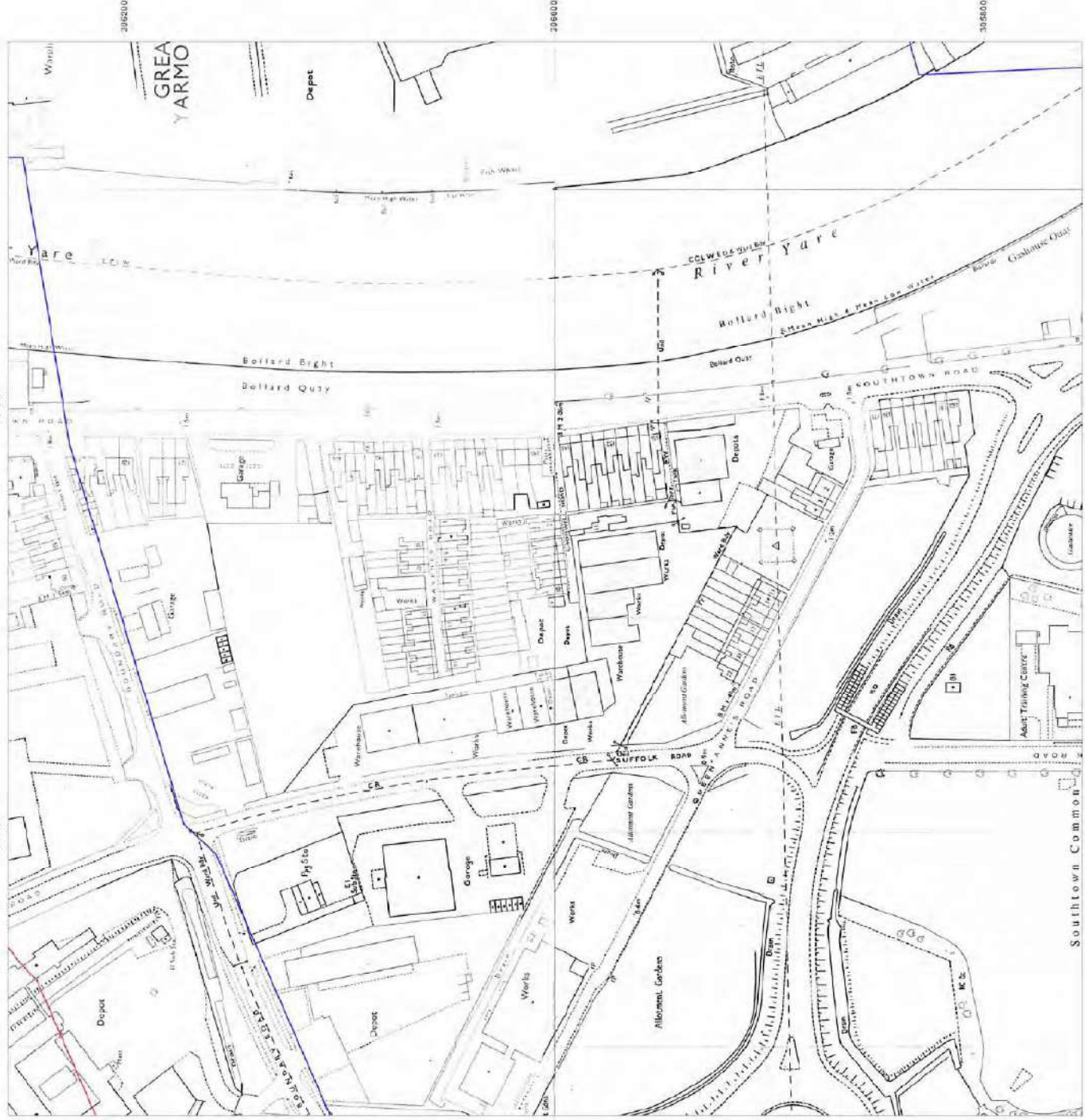


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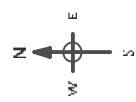
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Site Details:

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Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652319, 306034

Map Name: National Grid
Map date: 1990
Scale: 1:1,250
Printed at: 1:2,000



Surveyed 1958 Revised 1990 Edition N/A Copyright 1990 Levelled 1958		Surveyed N/A Revised N/A Edition N/A Copyright 1990 Levelled 1958
Surveyed 1958 Revised 1990 Edition N/A Copyright 1990 Levelled 1958		Surveyed N/A Revised N/A Edition N/A Copyright 1990 Levelled 1958

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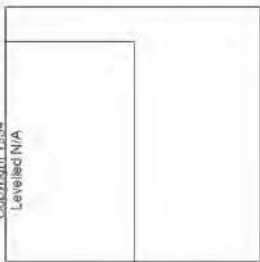
Site Details:

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Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652319, 306004

Map Name: National Grid
Map date: 1994
Scale: 1:1,250
Printed at: 1:2,000



Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A



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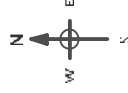
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Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 652319, 306004

Map Name: National Grid

Map date: 1990-1994

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1958
Revised 1990
Edition N/A
Copyright 1990
Levelled 1998

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
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Revised N/A
Edition N/A
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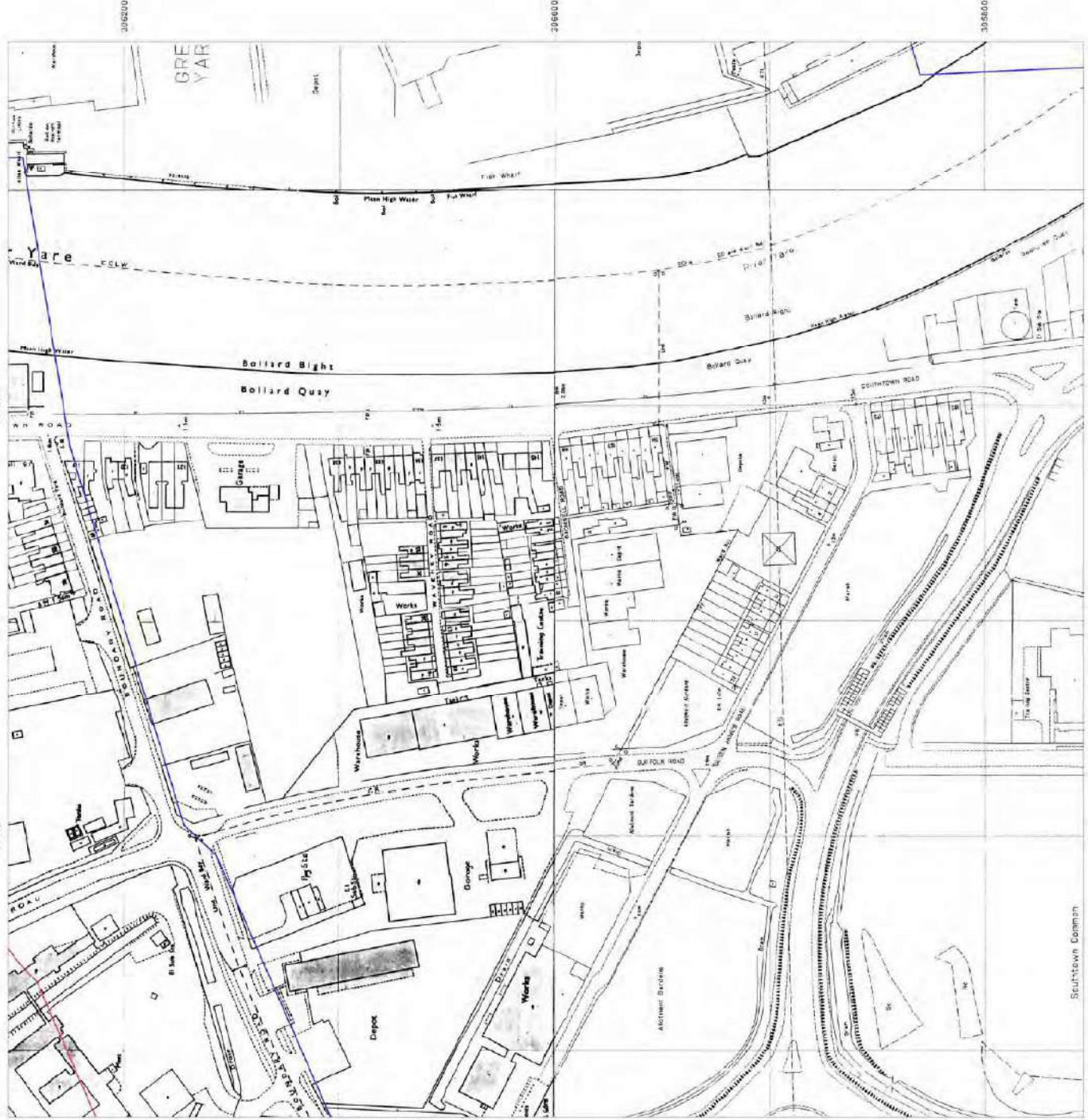


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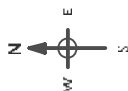
To view map legend click here [Legend](#)



Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 652319, 306504

Map Name: National Grid
Map date: 1949
Scale: 1:1,250
Printed at: 1:2,000



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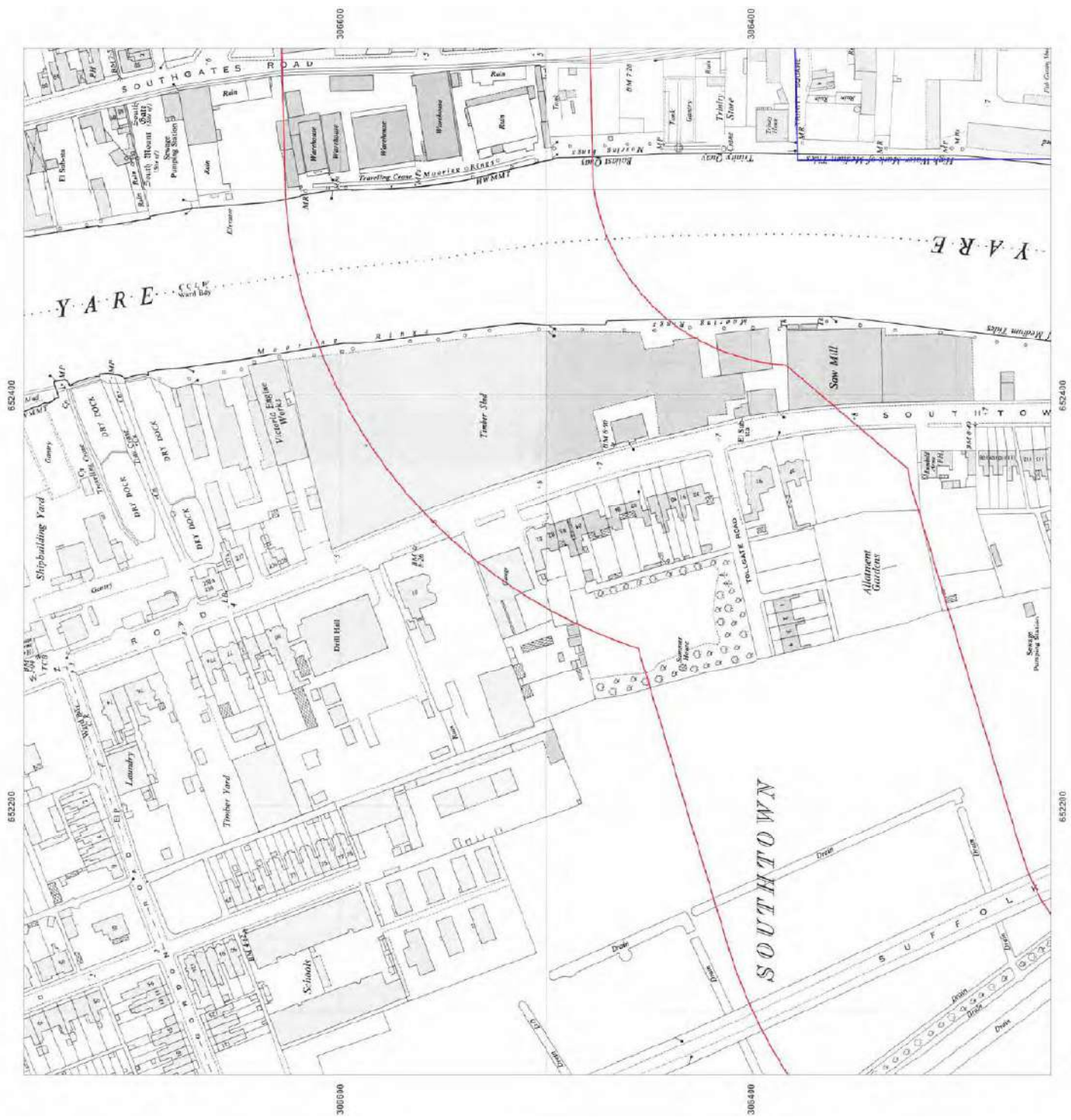


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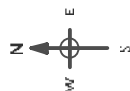
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Ghd Ref: 652319, 3065D4

Map Name: National Grid

Mapdate: 1951-1954

Scale: 1:1,250

Printed at 1:2,000



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Revised 1954
Edition N/A
Copyright N/A
Levelled 1946

Survived 1951	Copyright N/A
Revised 1951	Labelled 1946
Edition N/A	



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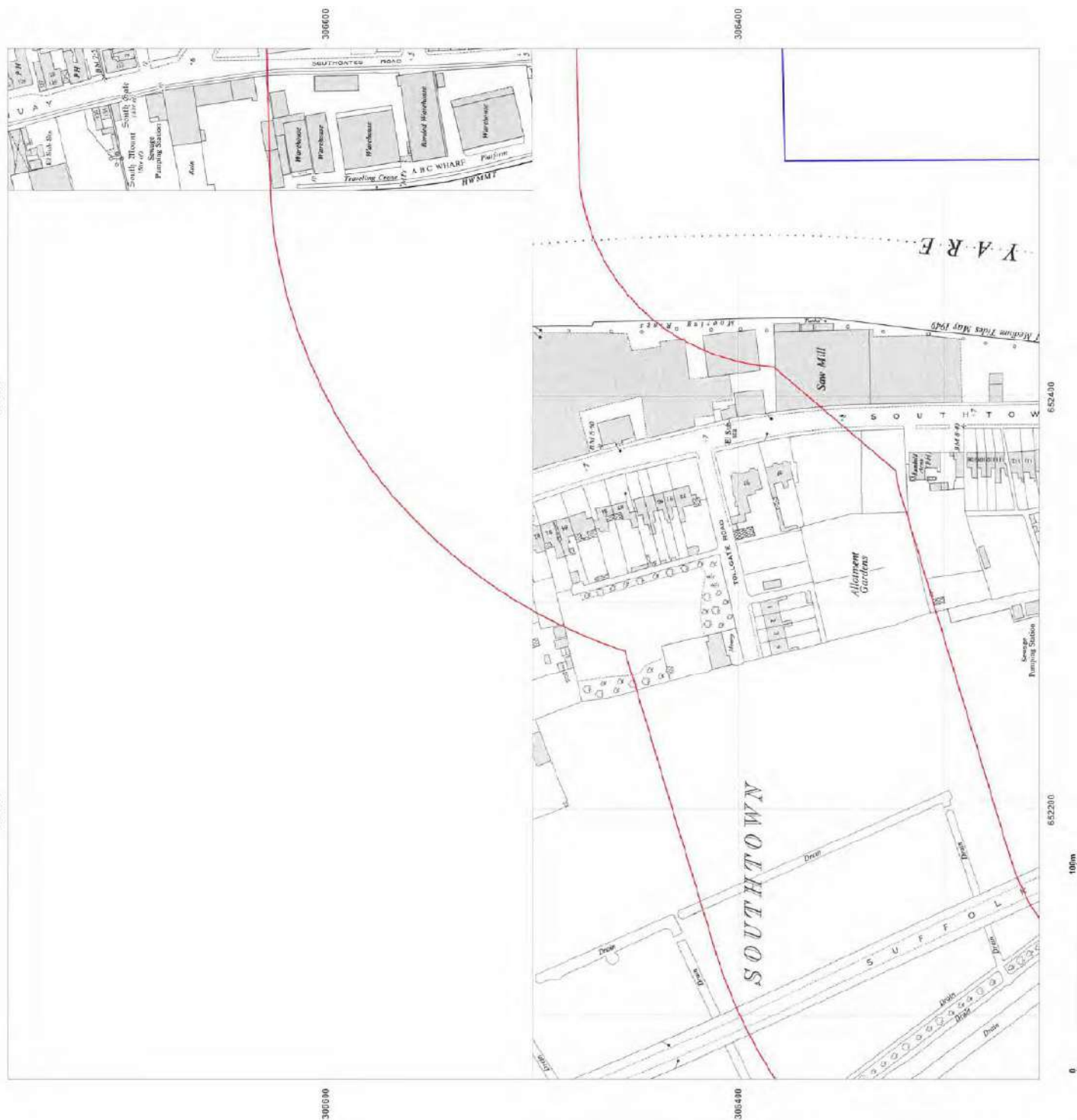
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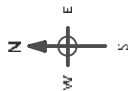
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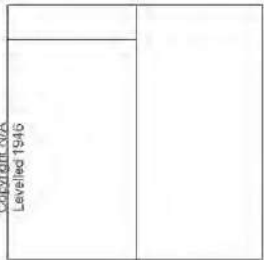
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Grid Ref: 652319, 306504

Map Name: National Grid
Map date: 1955-1957
Scale: 1:1,250
Printed at: 1:2,000



Surveyed 1857
Revised 1957
Edition N/A
Copyright N/A
Levelled 1946

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



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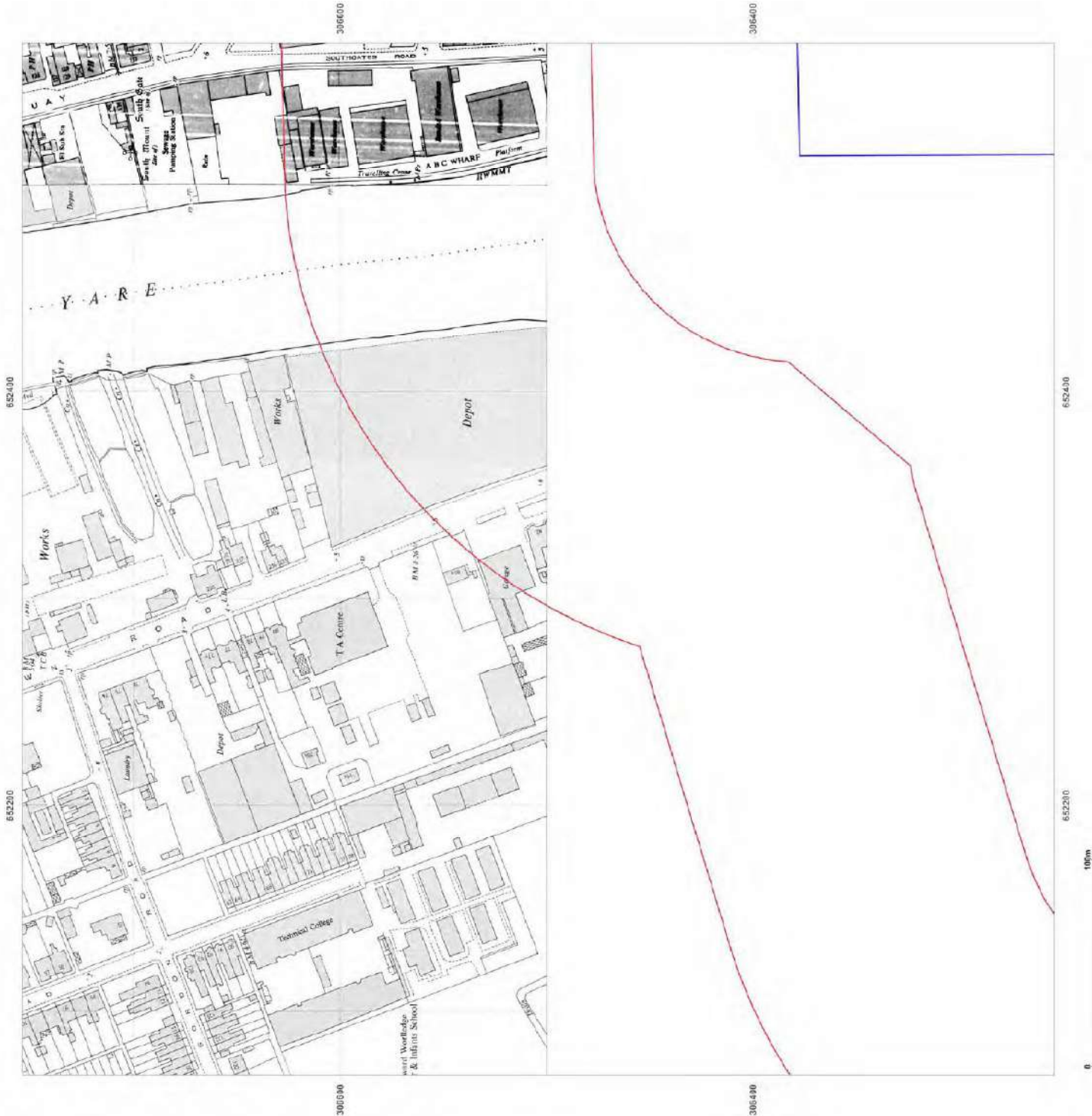


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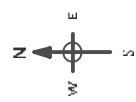




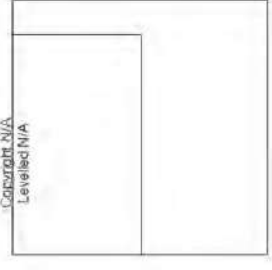
Site Details:

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Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652319, 306504

Map Name: National Grid
Map date: 1958
Scale: 1:1,250
Printed at: 1:2,000



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



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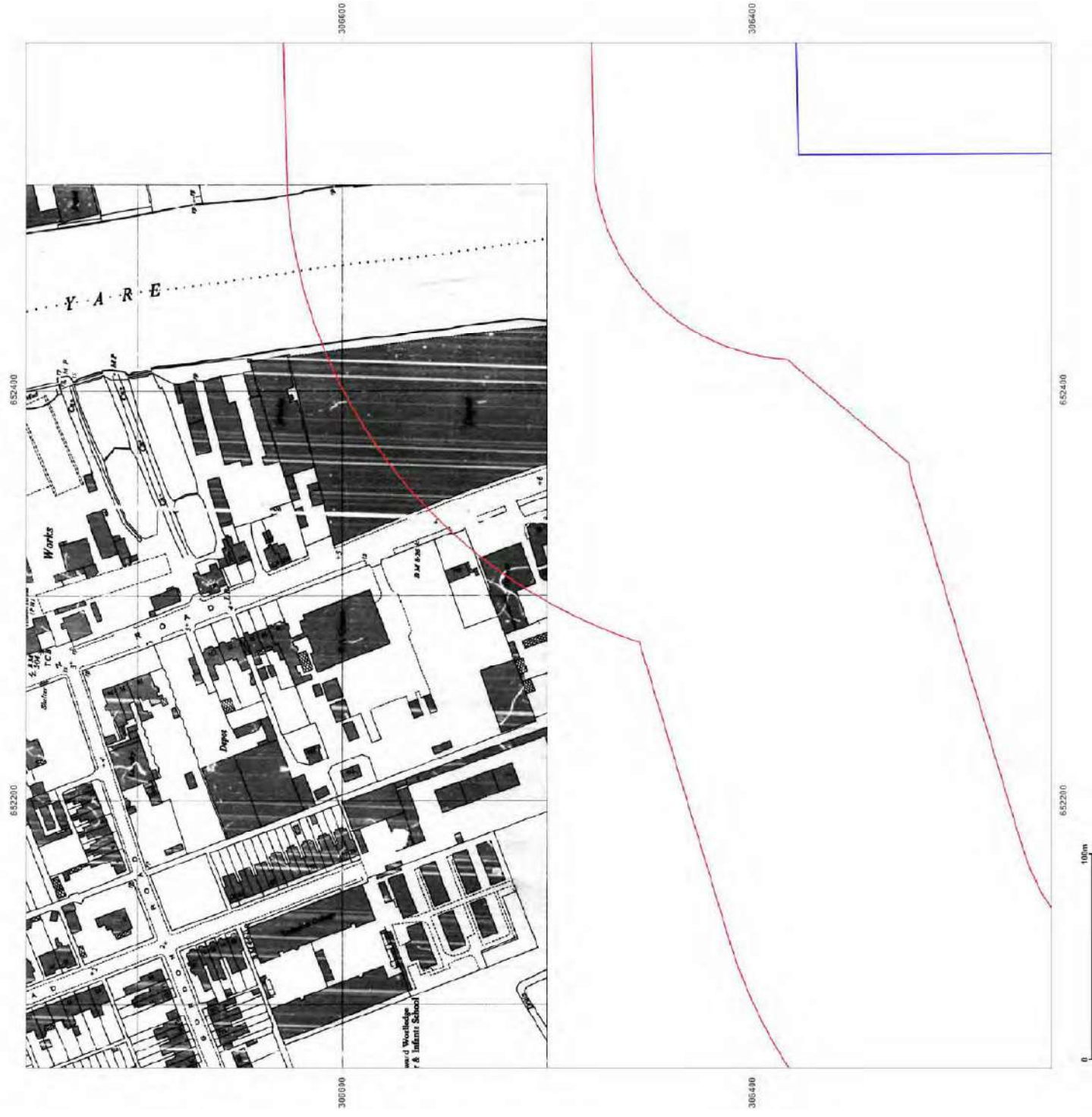


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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652319, 306504

Map Name: National Grid
Map data: 1966-1968
Scale: 1:1,250
Printed at: 1:2,000



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<p>Surveyed 1949 Revised 1967 Edition N/A Copyright 1968 Levelled 1968</p>	<p>Surveyed 1949 Revised 1964 Edition N/A Copyright 1968 Levelled 1968</p>

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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652319, 306504

Map Name: National Grid
Map date: 1970-1975
Scale: 1:1,250
Printed at: 1:2,000



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Surveyed 1949 Revised 1975 Edition N/A Copyright 1975 Levelled 1968		Surveyed N/A Revised N/A Edition N/A Copyright N/A Levelled N/A

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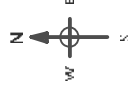
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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652319, 306504

Map Name: National Grid
Map date: 1975-1978
Scale: 1:1,250
Printed at: 1:2,000



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

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Revised 1975
Edition N/A
Copyright 1975
Levelled 1958

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

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



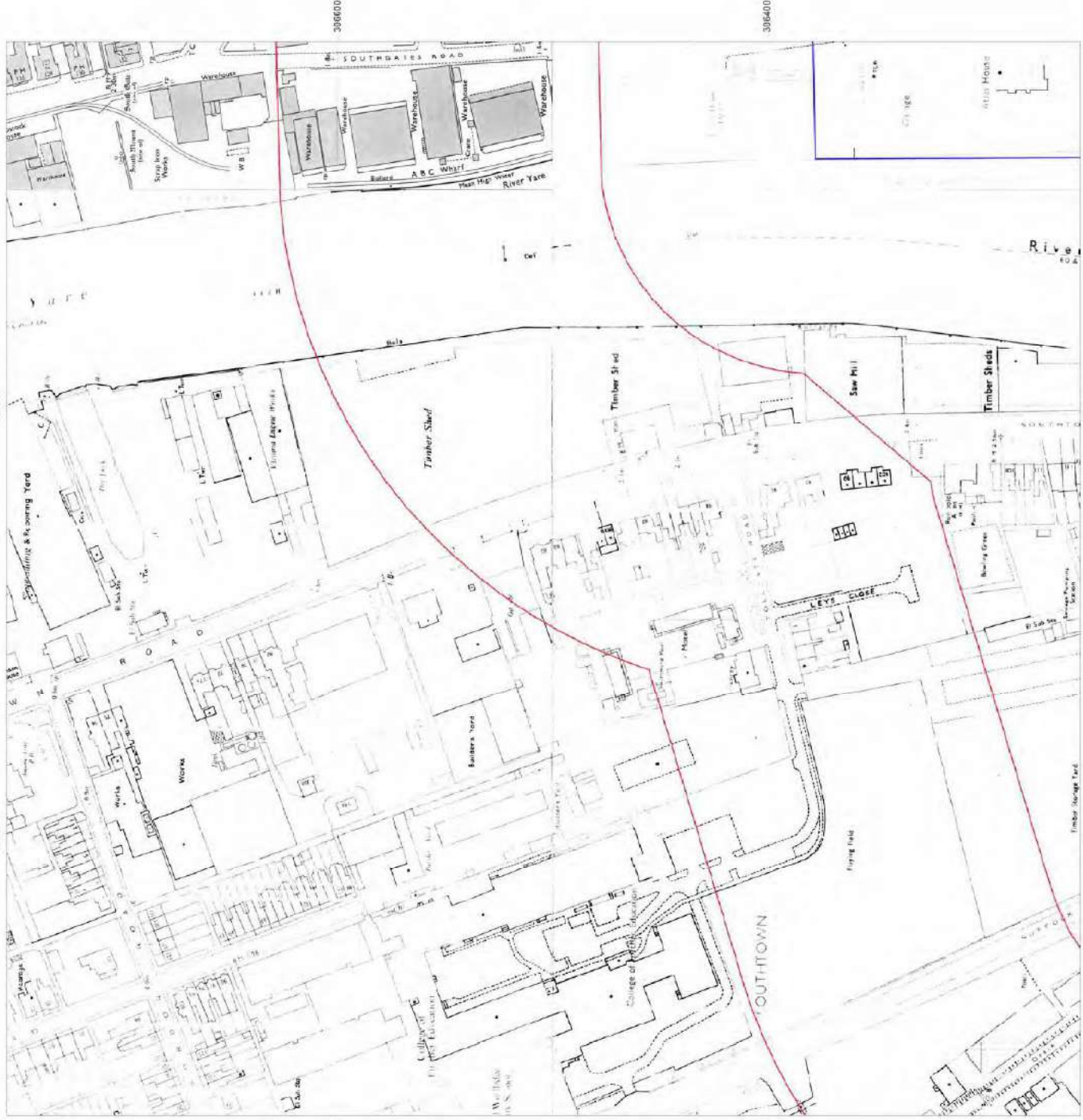
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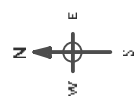
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Grid Ref: 652319, 306504

Map Name: National Grid

Map date: 1986-1990

Scale: 1:1,250

Printed at: 1:2,000



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Surveyed 1958
 Revised 1986
 Edition N/A
 Copyright 1986
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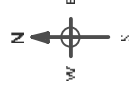
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Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652319, 306504

Map Name: National Grid

Map date: 1984-1990

Scale: 1:1,250

Printed at: 1:2,000



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Revised 1987
Edition N/A
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1990
Levelled 1958

Surveyed 1958
Revised 1990
Edition N/A
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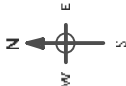
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Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652319, 306504

Map Name: National Grid

Map date: 1990-1994

Scale: 1:1,250

Printed at: 1:2,000



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Revised 1990
Edition N/A
Copyright 1990
Levelled 1958

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
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Surveyed 1958
Revised 1990
Edition N/A
Copyright 1990
Levelled 1958

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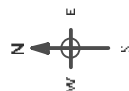
Client Ref: 16287
Report Ref: CMAP5-CM-636391-16287-030717HIS_125050scale
Grid Ref: 652319, 3065D4

Map Name: National Grid

Map date: 1994

Scale: 1:1,250

Printed at 1:2,000



Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

Survived N/A
Revised N/A
Edition N/A
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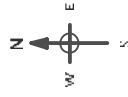
Client Ref: 16287
Report Ref: CMAPS-CM636391-16287-030717HIS_1250scale
Grid Ref: 652819, 305504

Map Name: County Series Town Plan

Map data: 1884-1885

Scale: 1:500

Printed at: 1:1,000



Surveyed 1885
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Surveyed 1884
Revised N/A
Edition N/A
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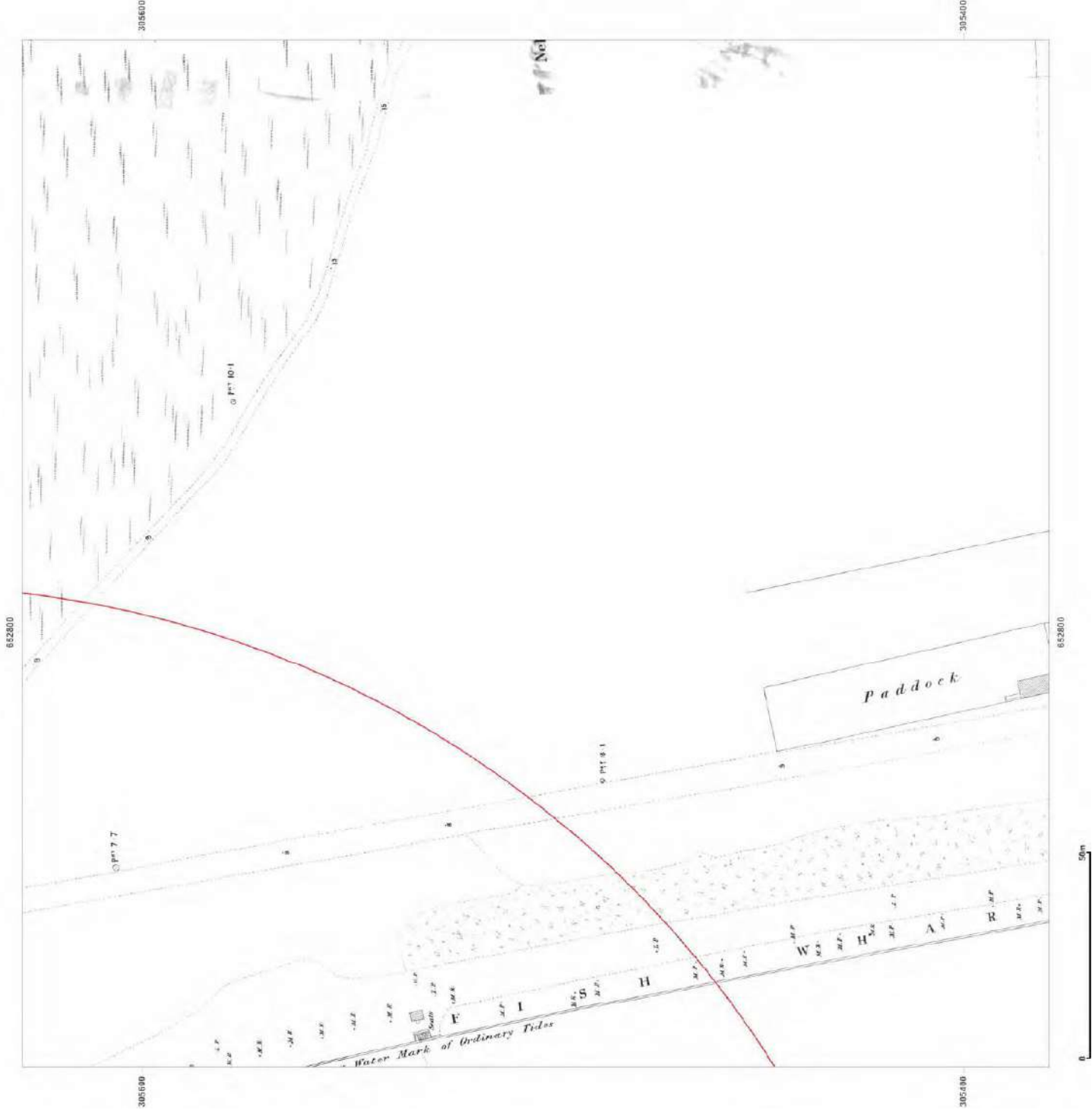


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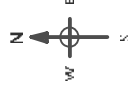
To view map legend click here [Legend](#)



Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652819, 305504

Map Name: National Grid
Map date: 1949
Scale: 1:1,250
Printed at: 1:2,000



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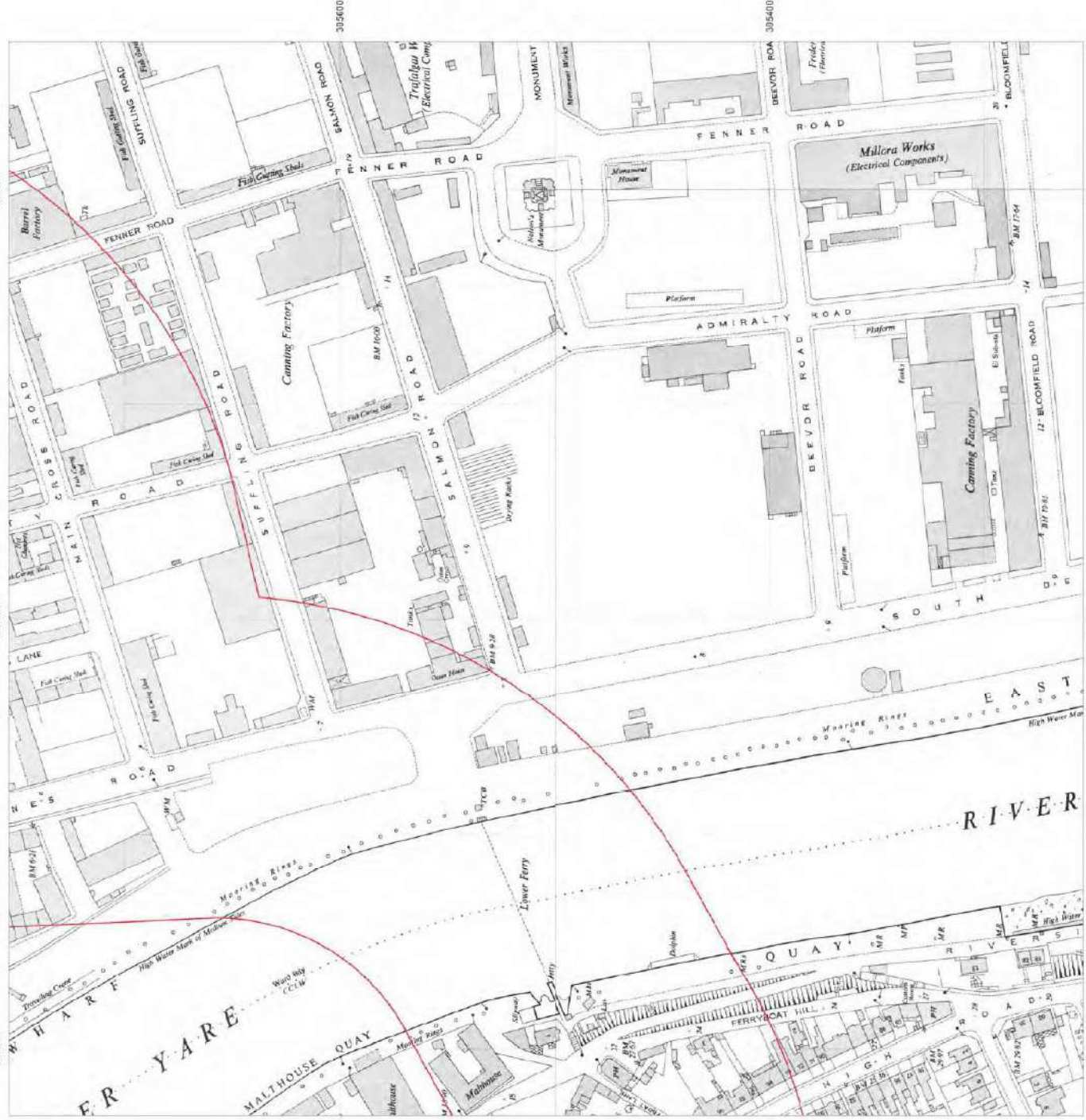


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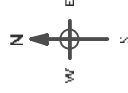


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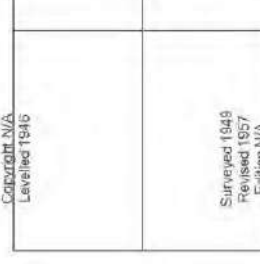
Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 652819, 305504

Map Name: National Grid
Map date: 1957-1958
Scale: 1:1,250
Printed at: 1:2,000



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Edition N/A
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Levelled 1946



Surveyed 1949
Revised 1957
Edition N/A
Copyright 1958
Levelled 1946



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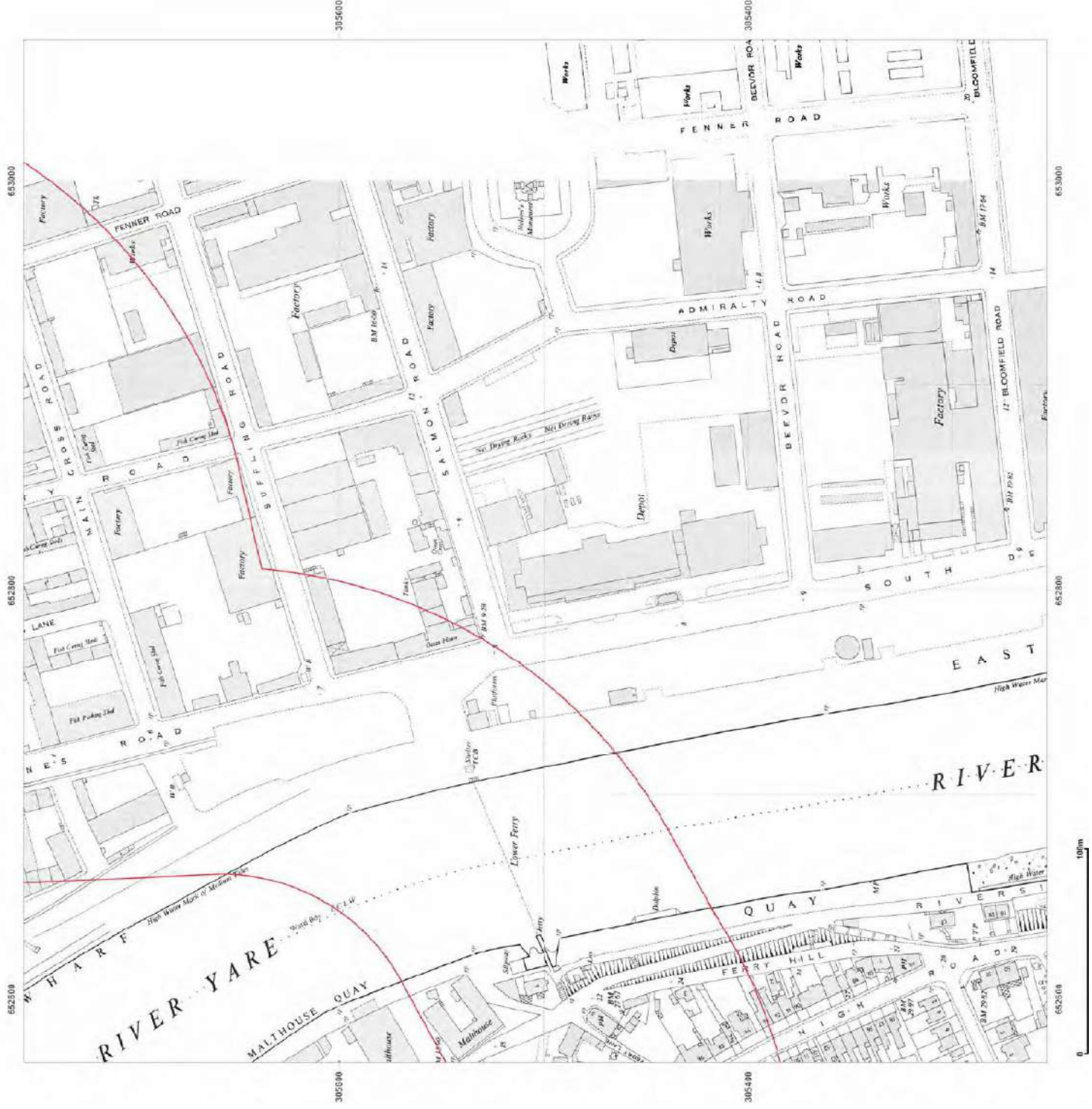


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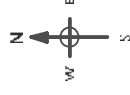
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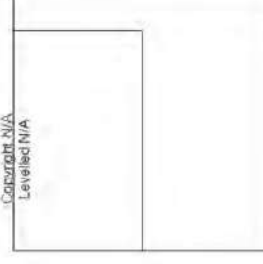
Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 652819, 305504

Map Name: National Grid
Map date: 1958
Scale: 1:1,250
Printed at: 1:2,000



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Revised N/A
Edition N/A
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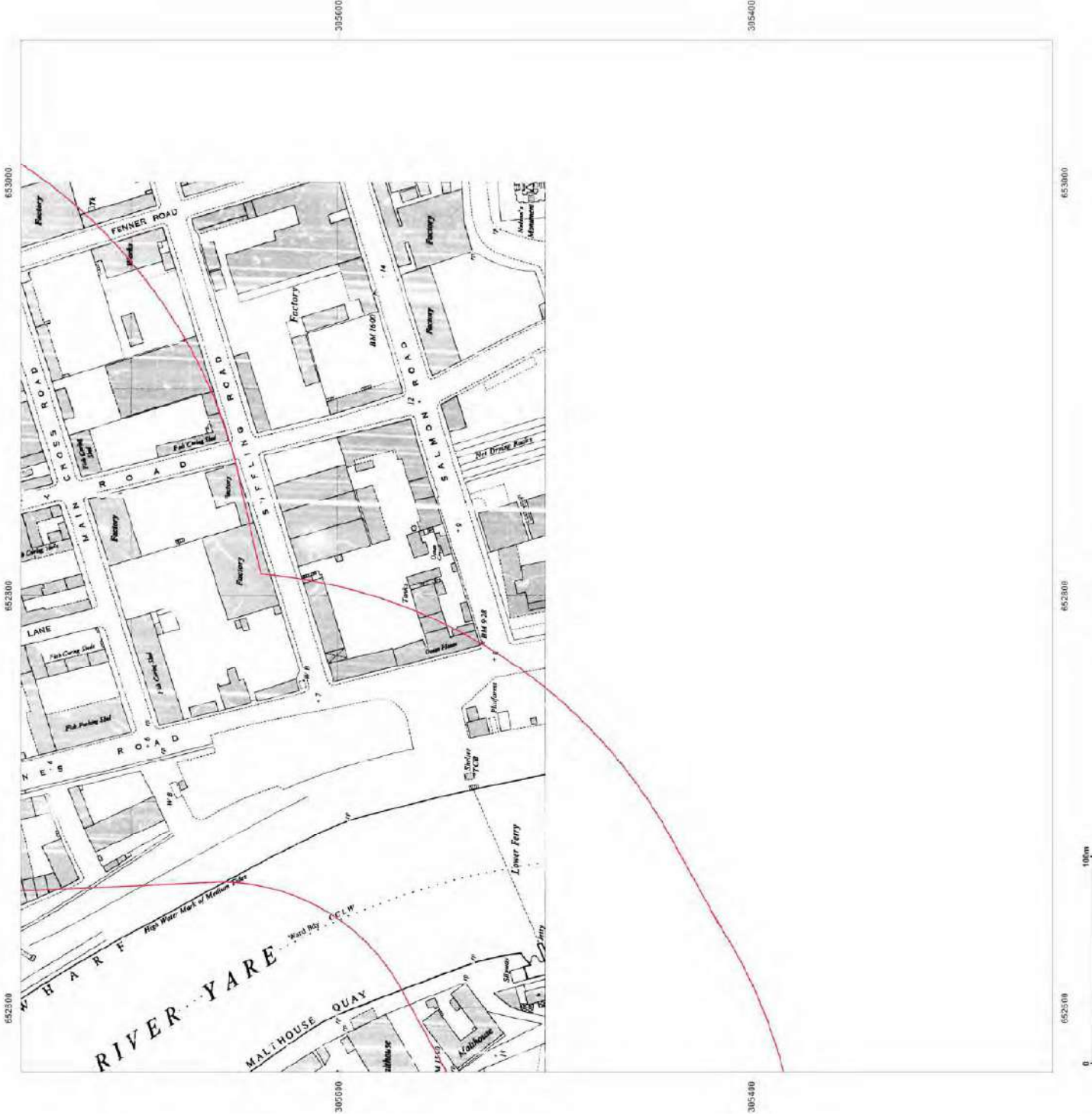


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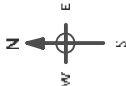
To view map legend click here [Legend](#)



Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 652819, 305504

Map Name: National Grid
Map date: 1964-1968
Scale: 1:1,250
Printed at: 1:2,000



Surveyed 1949
Revised 1967
Edition N/A
Copyright 1964
Levelled 1958



Surveyed 1949
Revised 1967
Edition N/A
Copyright 1967
Levelled 1958



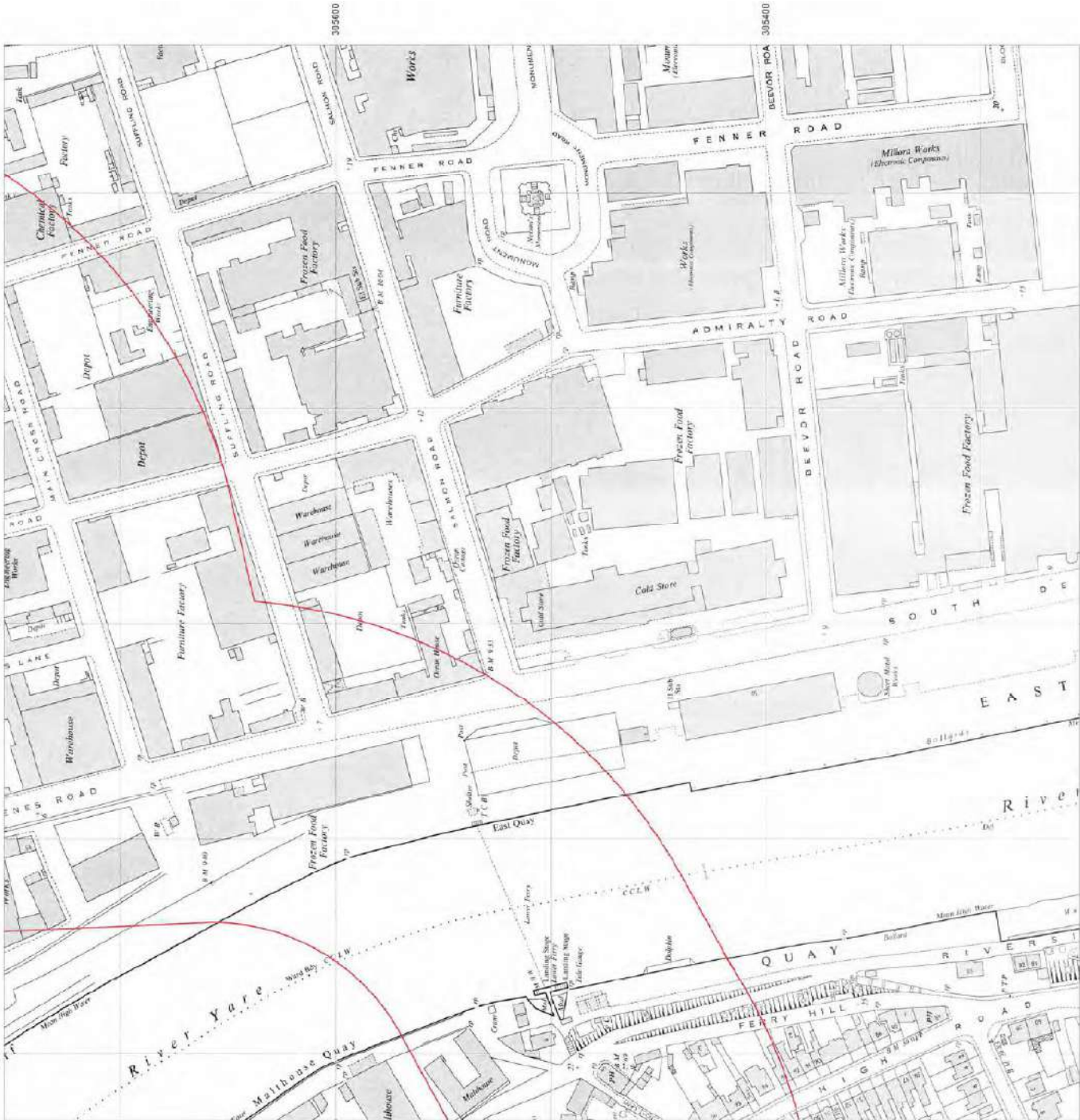
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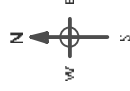
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Grid Ref: 652819, 305504

Map Name: National Grid

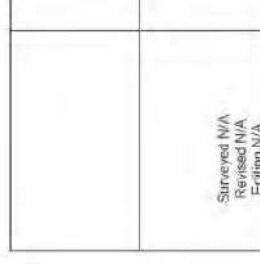
Map date: 1968-1971

Scale: 1:1,250

Printed at: 1:2,000



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Edition N/A
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Revised N/A
Edition N/A
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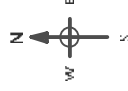
To view map legend click here [Legend](#)



Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652819, 305504

Map Name: National Grid
Map date: 1975-1976
Scale: 1:1,250
Printed at: 1:2,000



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Revised 1975
Edition N/A
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Levelled 1958



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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652819, 305504

Map Name: National Grid

Map date: 1981

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1958
Revised 1981
Edition N/A
Copyright 1981
Levelled 1958



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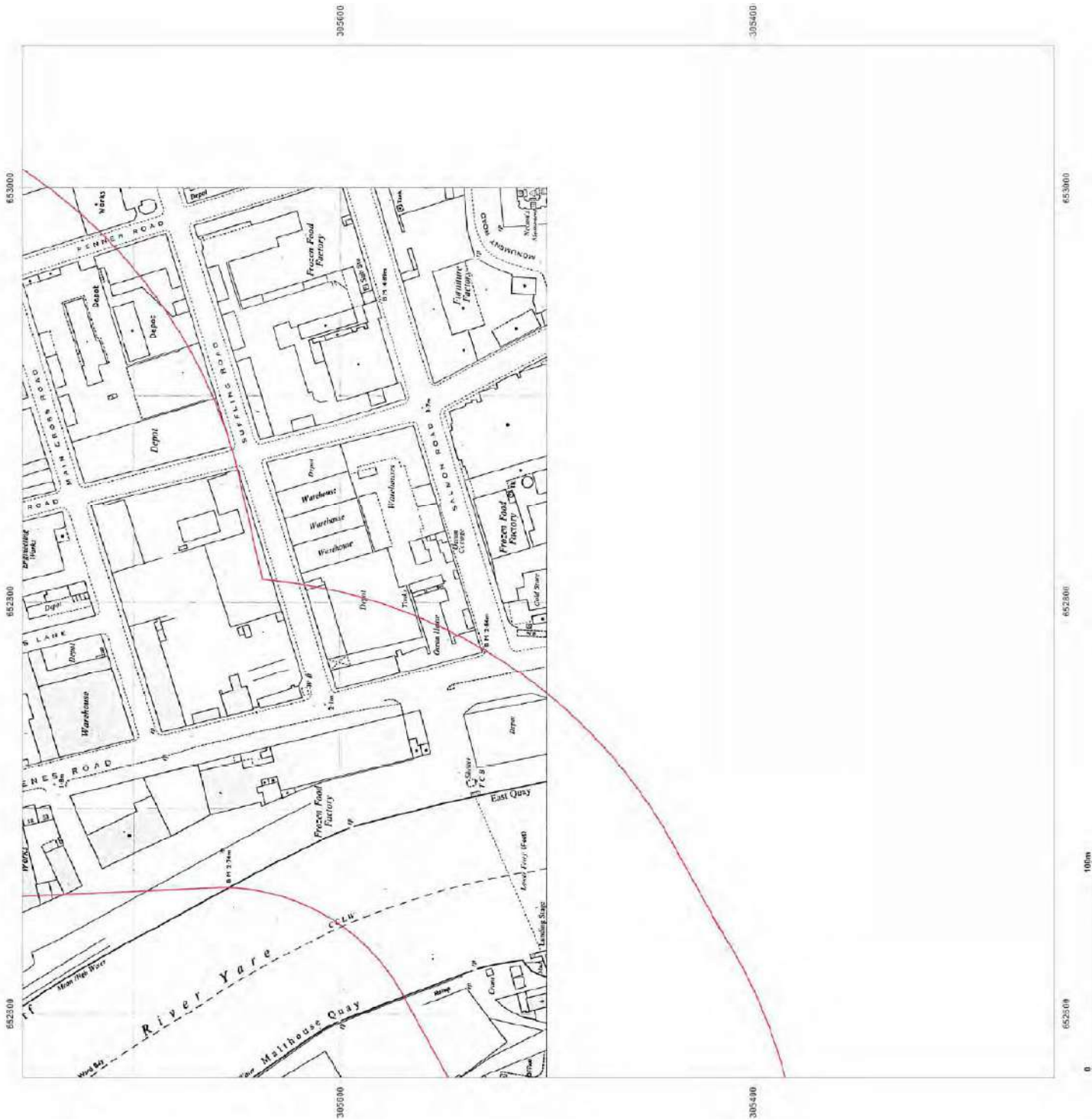


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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 652819, 305504

Map Name: National Grid
Map date: 1984
Scale: 1:1,250
Printed at: 1:2,000



Surveyed 1958
Revised 1984
Edition N/A
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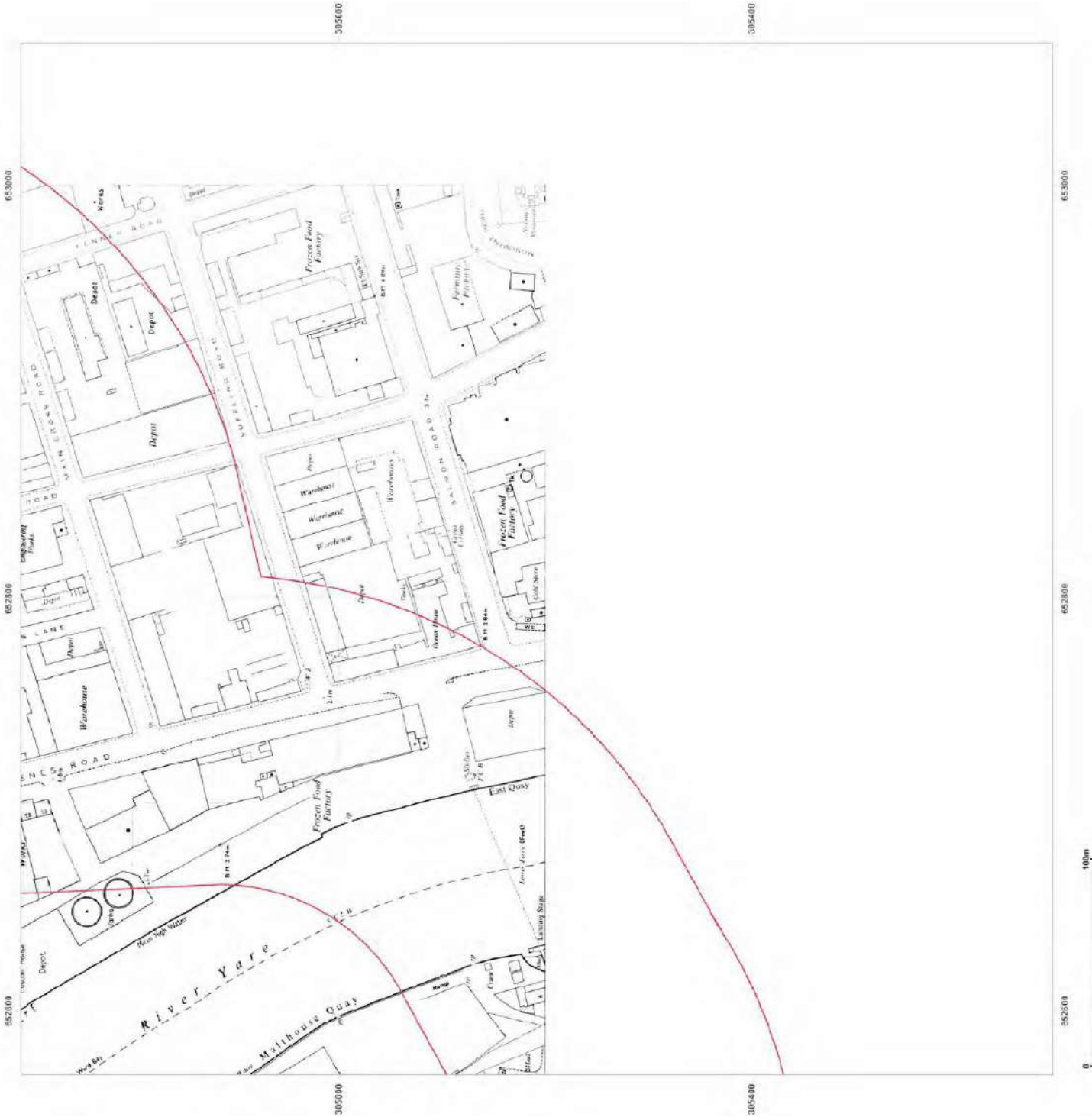


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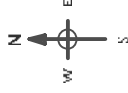
Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652819, 305504

Map Name: National Grid

Map date: 1990

Scale: 1:1,250

Printed at: 1:2,000



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Revised N/A
Edition N/A
Copyright 1990
Levelled 1958

Surveyed 1958
Revised 1990
Edition N/A
Copyright 1990
Levelled 1958

Surveyed 1958
Revised 1990
Edition N/A
Copyright 1990
Levelled 1958

Surveyed 1958
Revised 1990
Edition N/A
Copyright 1990
Levelled 1958



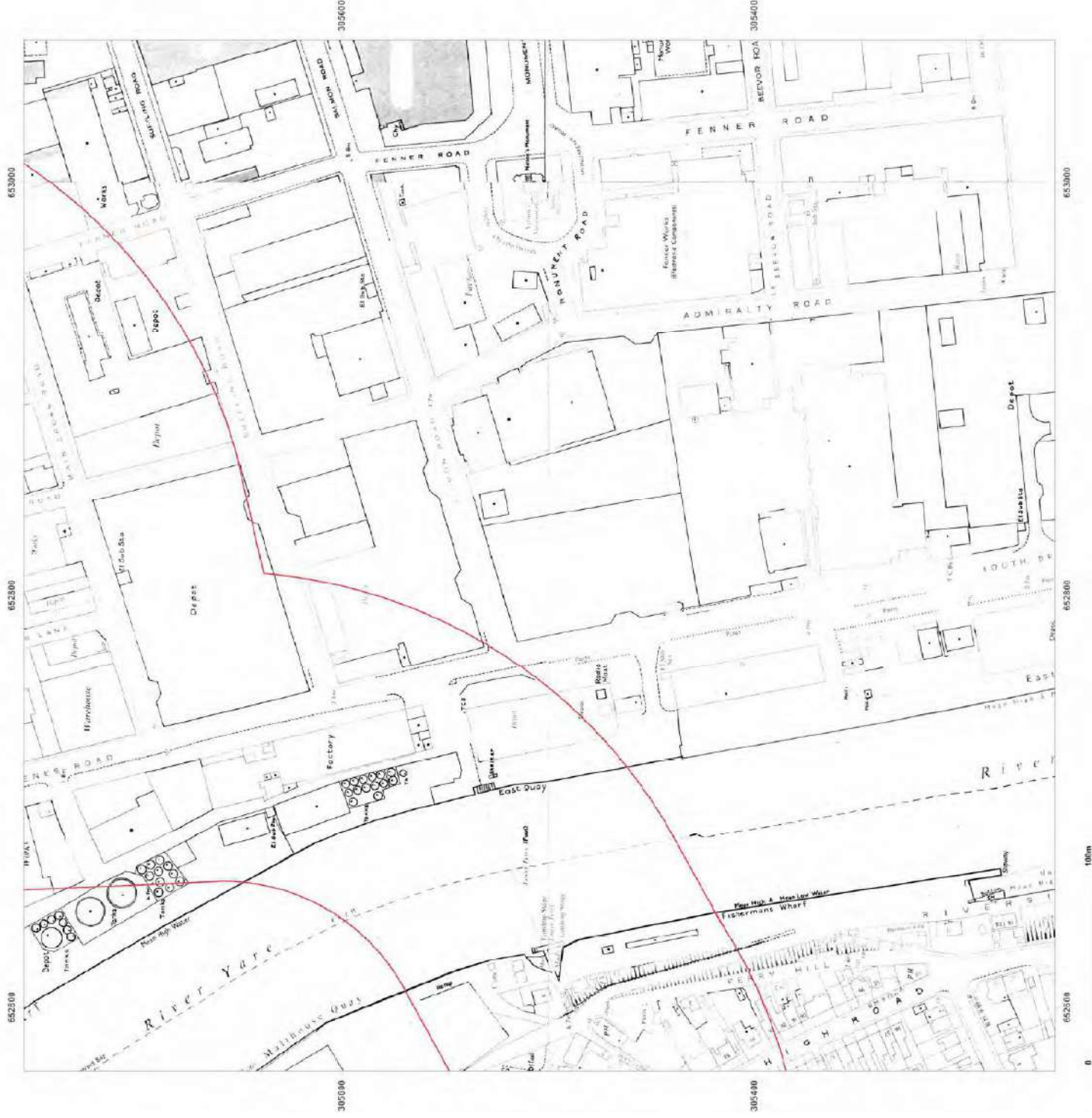
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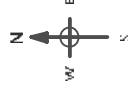
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Grid Ref: 652819, 305504

Map Name: National Grid

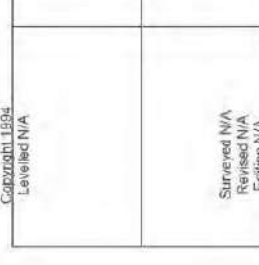
Map date: 1994

Scale: 1:1,250

Printed at: 1:2,000



Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A



Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A



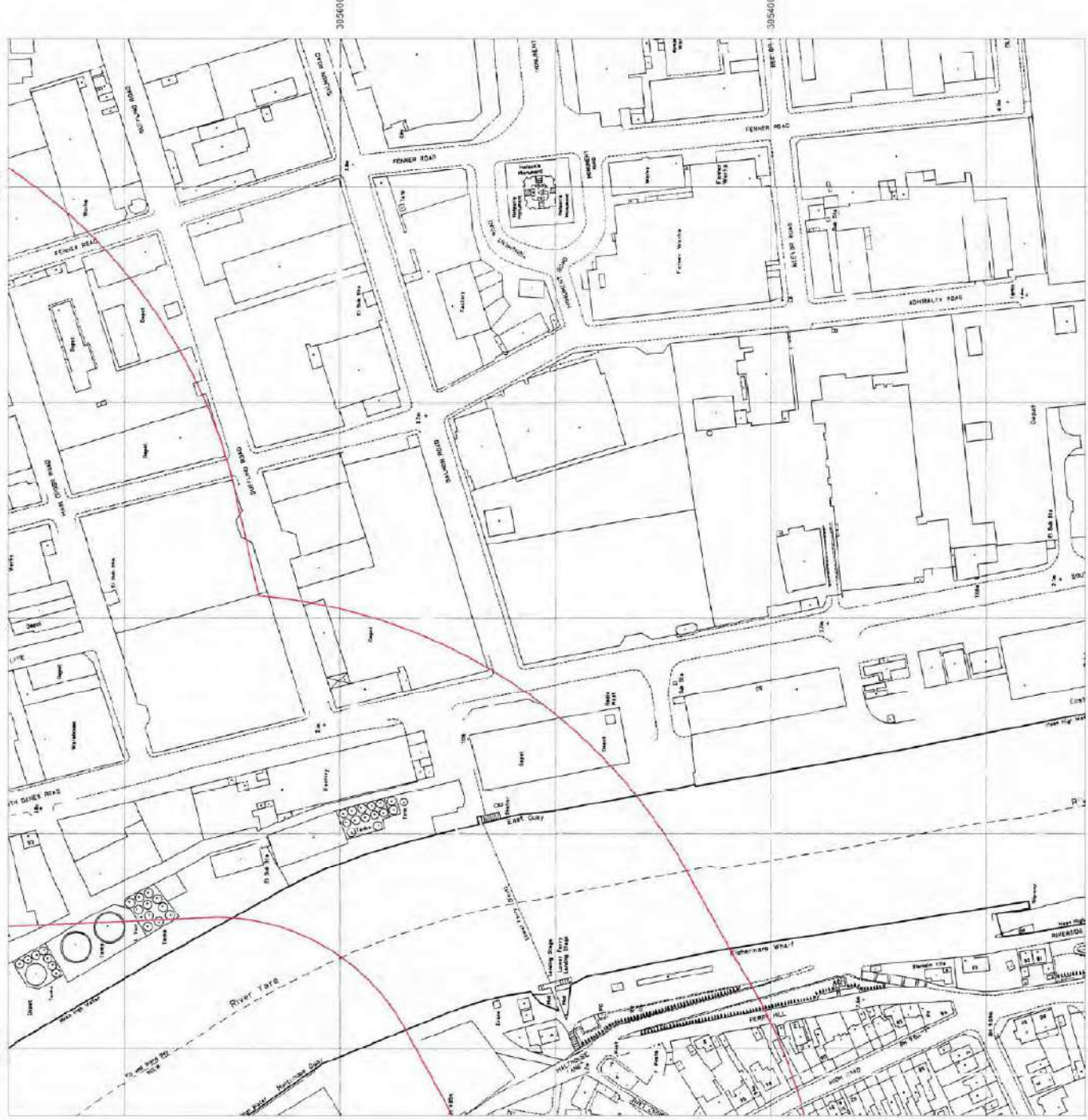
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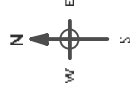
Client Ref: 16287
Report Ref: CMAPS-CM636391-16287-030717HIS_1250scale
Grid Ref: 652819, 306004

Map Name: County Series Town Plan

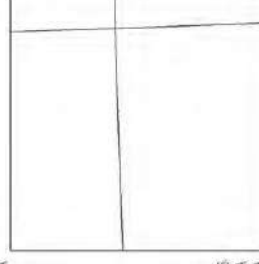
Map date: 1885

Scale: 1:500

Printed at: 1:1,000



Surveyed 1885
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1885
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Edition N/A
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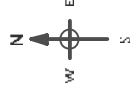
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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_12505scale
Grid Ref: 652819, 306034

Map Name: National Grid
Map date: 1949
Scale: 1:1,250
Printed at: 1:2,000



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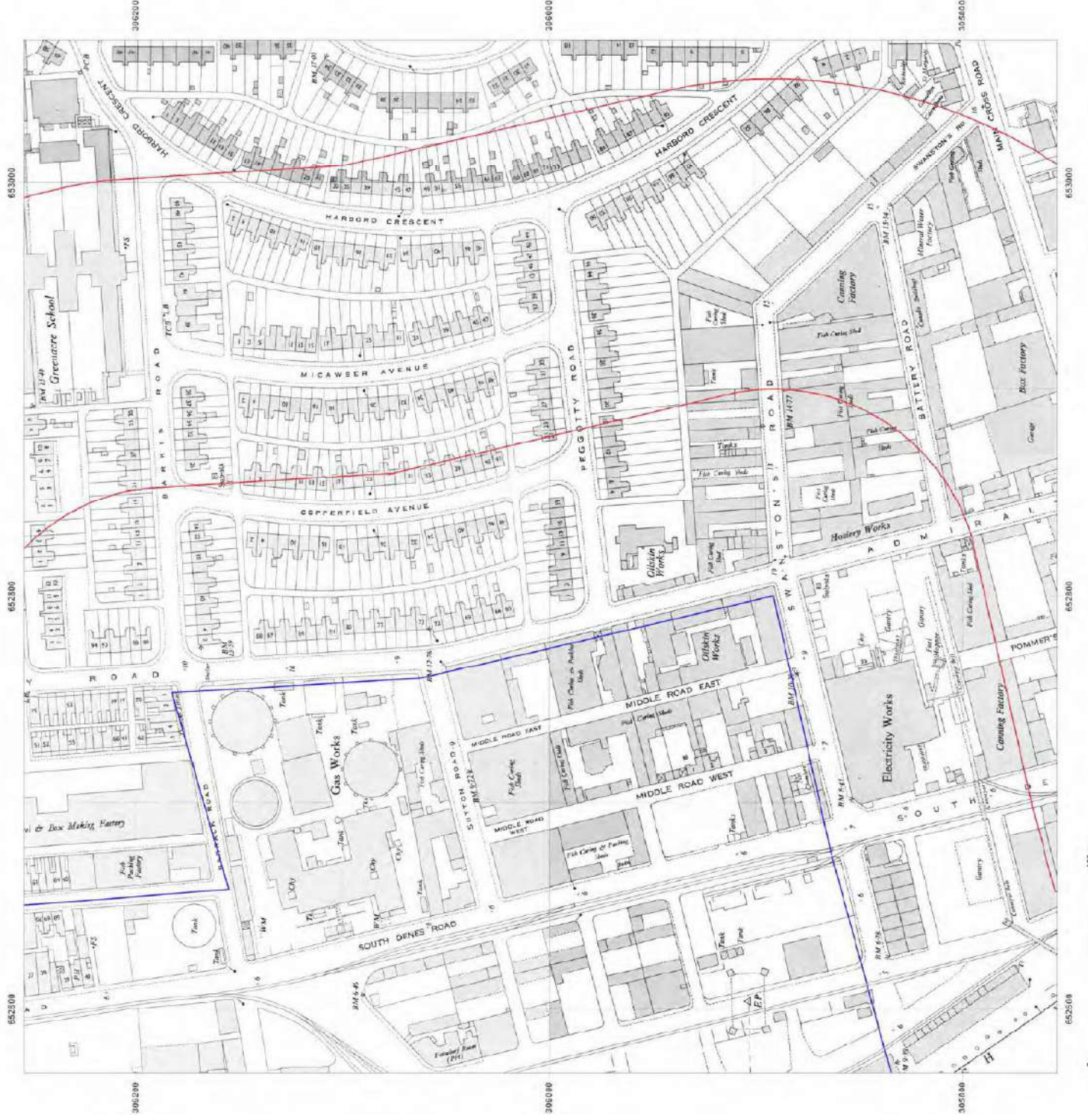
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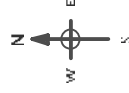
Client Ref: 16287
Report Ref: CMAPS
Grid Ref: 652819

Map Name: National Grid

Map date: 1957

Scale: 1:1,250

Printed at 1:2,000



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Edition N/A	



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Site Details:

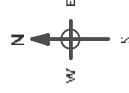
Client Ref: 16287
Report Ref: CMAPS
Grid Ref: 652819

Map Name: National Grid

Map date: 1958

Scale: 1:1,250

Printed at 1:2,000



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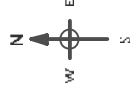
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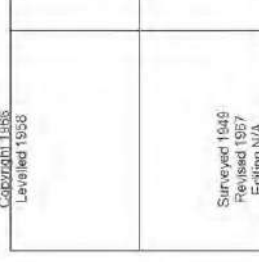
Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652819, 306034

Map Name: National Grid
Map date: 1964-1968
Scale: 1:1,250
Printed at: 1:2,000



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Levelled 1958



Surveyed 1949
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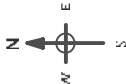
To view map legend click here [Legend](#)



Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 652819, 306004

Map Name: National Grid
Map date: 1970-1971
Scale: 1:1,250
Printed at: 1:2,000



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Edition N/A
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Revised 1970
Edition N/A
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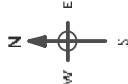
To view map legend click here [Legend](#)



Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652819, 306004

Map Name: National Grid
Map date: 1978-1981
Scale: 1:1,250
Printed at: 1:2,000



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



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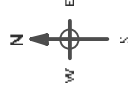
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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_12505scale
Grid Ref: 652819, 306004

Map Name: National Grid
Map date: 1984
Scale: 1:1,250
Printed at: 1:2,000



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Surveyed 1953
Revised 1984
Edition N/A
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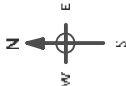
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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652819, 306034

Map Name: National Grid
Map date: 1990
Scale: 1:1,250
Printed at: 1:2,000



Surveyed N/A
Revised N/A
Edition N/A
Copyright 1990
Levelled 1958

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Revised 1980
Edition N/A
Copyright 1990
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0 100m

Site Details:

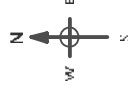
Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 652819, 306004

Map Name: National Grid

Map date: 1994

Scale: 1:1,250

Printed at: 1:2,000



Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
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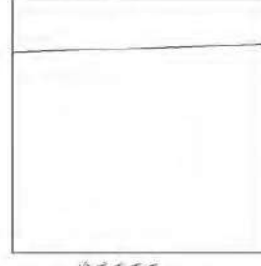
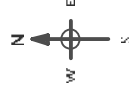
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Grid Ref: 652819, 306504

Map Name: County Series Town Plan

Map date: 1885

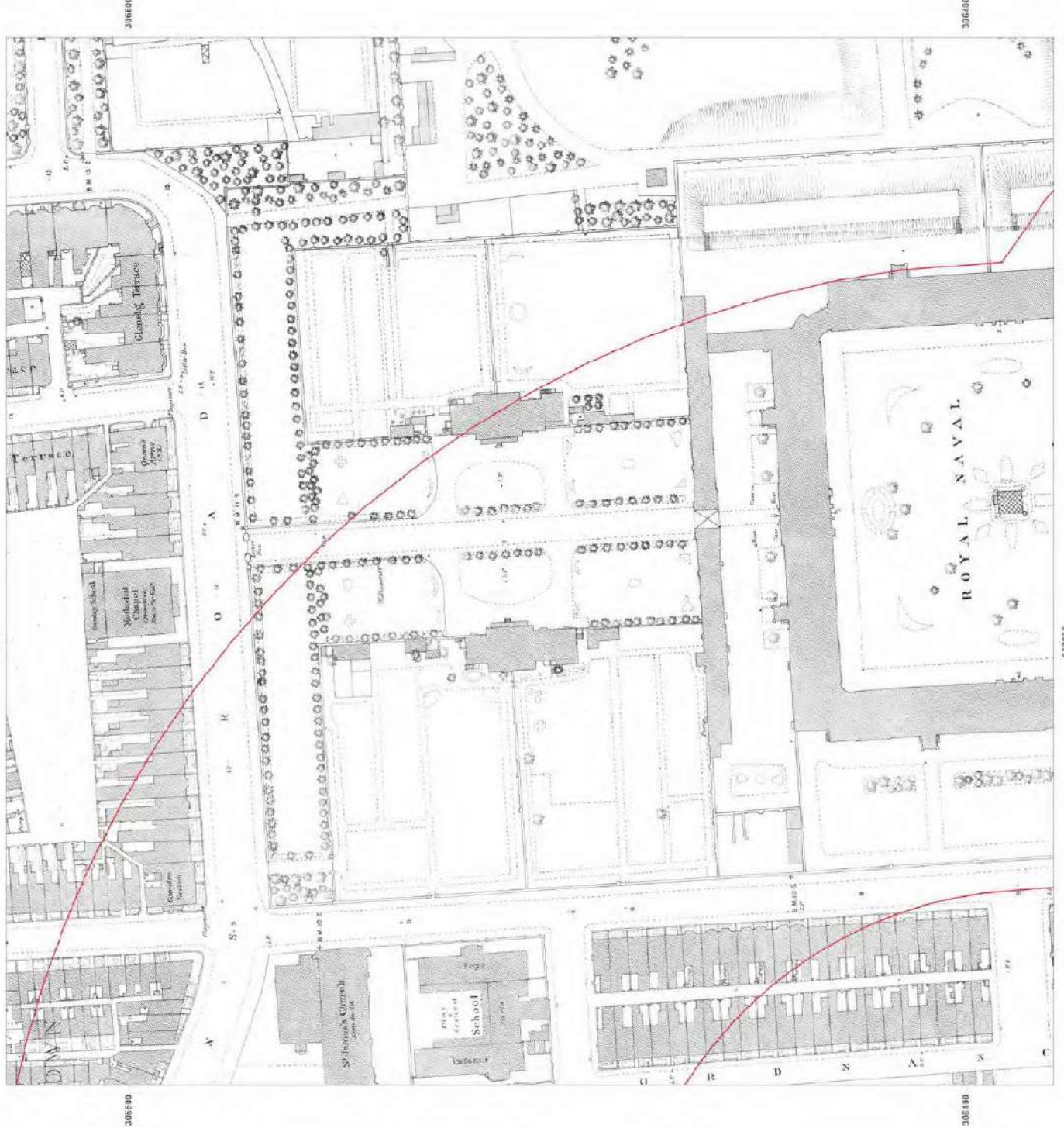
Scale: 1:500

Printed at: 1:1,000



Surveyed 1885
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Edition N/A
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Surveyed 1886
Revised N/A
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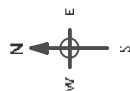
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Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 652819, 306504

Map Name: National Grid

Map date: 1949

Scale: 1:1,250

Printed at: 1:2,000



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Site Details:

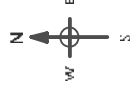
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Grid Ref: 652819, 306504

Map Name: National Grid

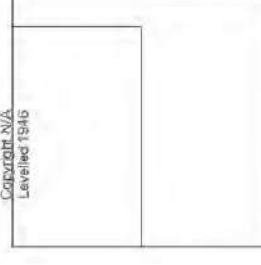
Map date: 1954

Scale: 1:1,250

Printed at: 1:2,000



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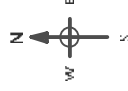
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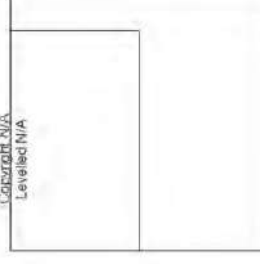
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Grid Ref: 652819, 306504

Map Name: National Grid
Map date: 1955
Scale: 1:1,250
Printed at: 1:2,000



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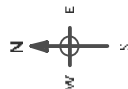
To view map legend click here [Legend](#)



Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 652819, 306504

Map Name: National Grid
Map date: 1964-1966
Scale: 1:1,250
Printed at: 1:2,000



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Surveyed 1949
Revised 1964
Edition N/A
Copyright 1966
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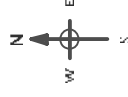
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Grid Ref: 652819, 306504

Map Name: National Grid

Map date: 1970-1973

Scale: 1:1,250

Printed at: 1:2,000



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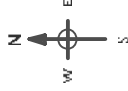
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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 652819, 306504

Map Name: National Grid
Map date: 1975-1978
Scale: 1:1,250
Printed at: 1:2,000



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Edition N/A
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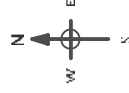
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Grid Ref: 652819, 306504

Map Name: National Grid

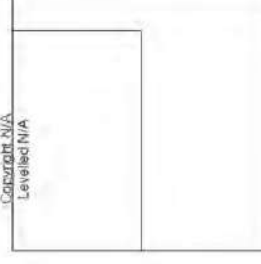
Map date: 1978

Scale: 1:1,250

Printed at: 1:2,000



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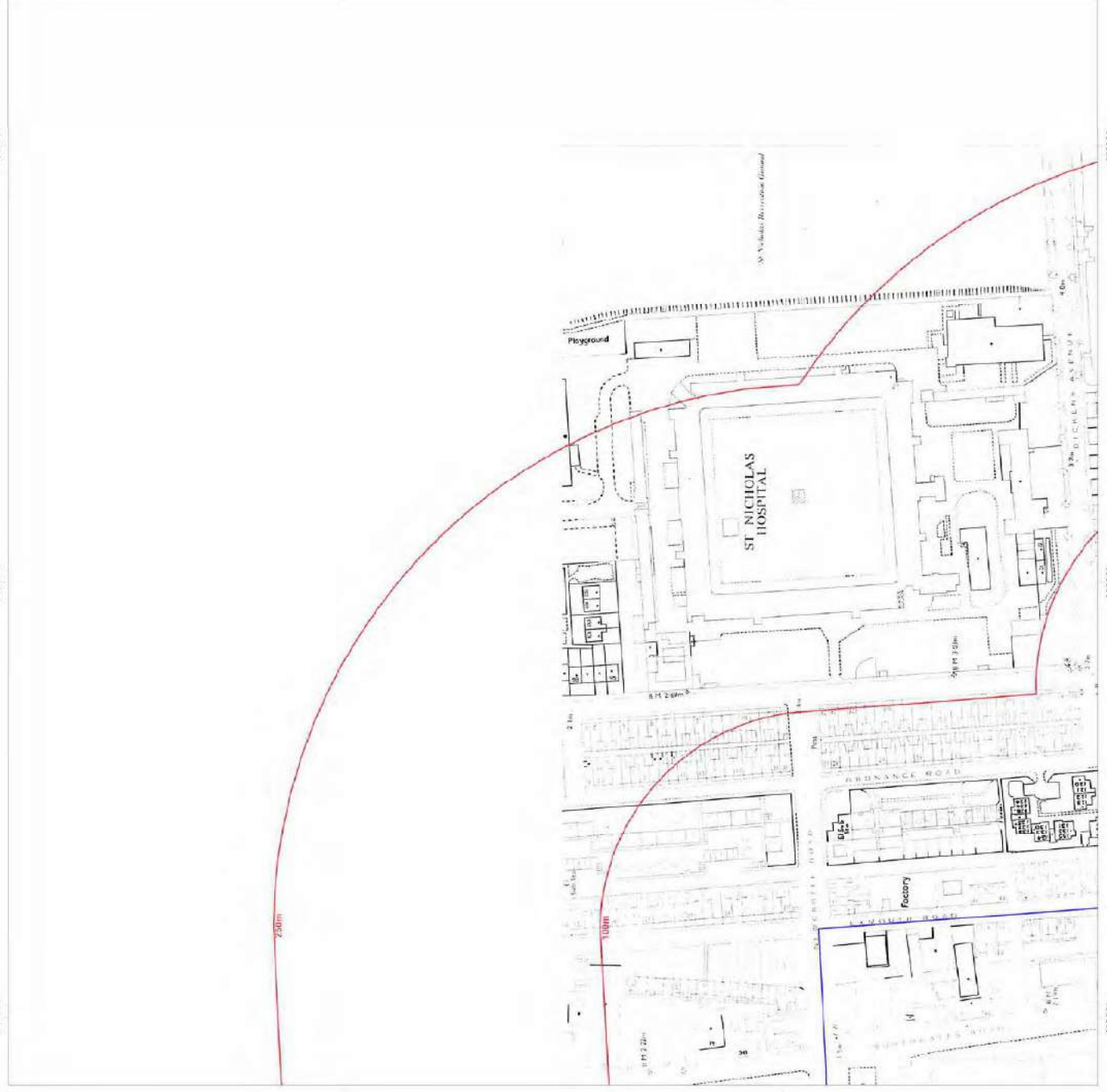
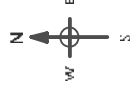
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Report Ref: CMAPS-CM-636391-16287-030717HIS_1250scale
Grid Ref: 652819, 306504

Map Name: National Grid

Map data: 1984

Scale: 1:1,250

Printed at: 1:2,000



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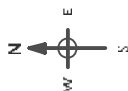
Production date: 03 July 2017

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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_12505cal
Grid Ref: 652819, 306504

Map Name: National Grid
Map date: 1990
Scale: 1:1,250
Printed at: 1:2,000



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Surveyed 1958 Revised N/A Revised 1980 Edition N/A Copyright 1990 Levelled 1958	

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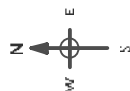
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Ghd Ref: 652819, 3065D4

Map Name: National Grid

Mapdate: 1990-1994

Scale: 1:1,250

Printed at 1:2,000



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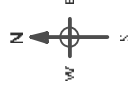
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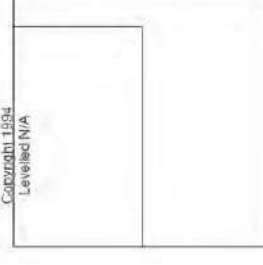
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Grid Ref: 652819, 306504

Map Name: National Grid
Map date: 1994
Scale: 1:1,250
Printed at: 1:2,000



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Edition N/A
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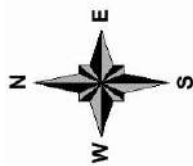
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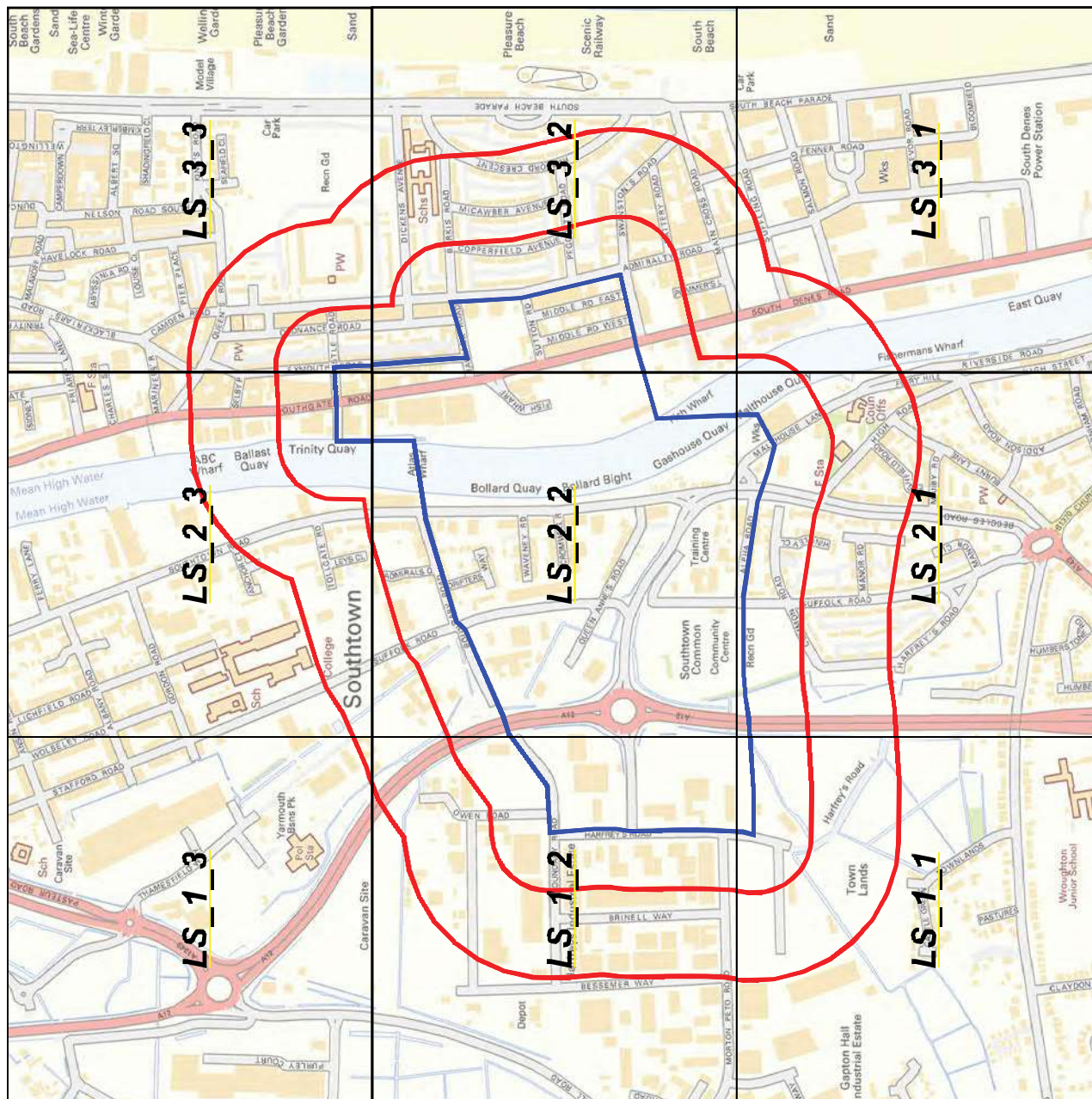
Production date: 03 July 2017

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1:2500 Scale Grid Index



Site Details:

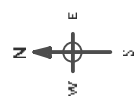
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Grid Ref: 651694, 305379

Map Name: County Series

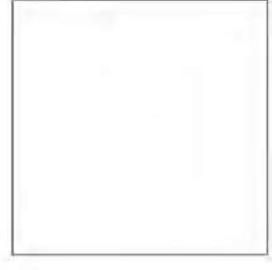
Map date: 1883

Scale: 1:2,500

Printed at: 1:2,500



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Revised 1883
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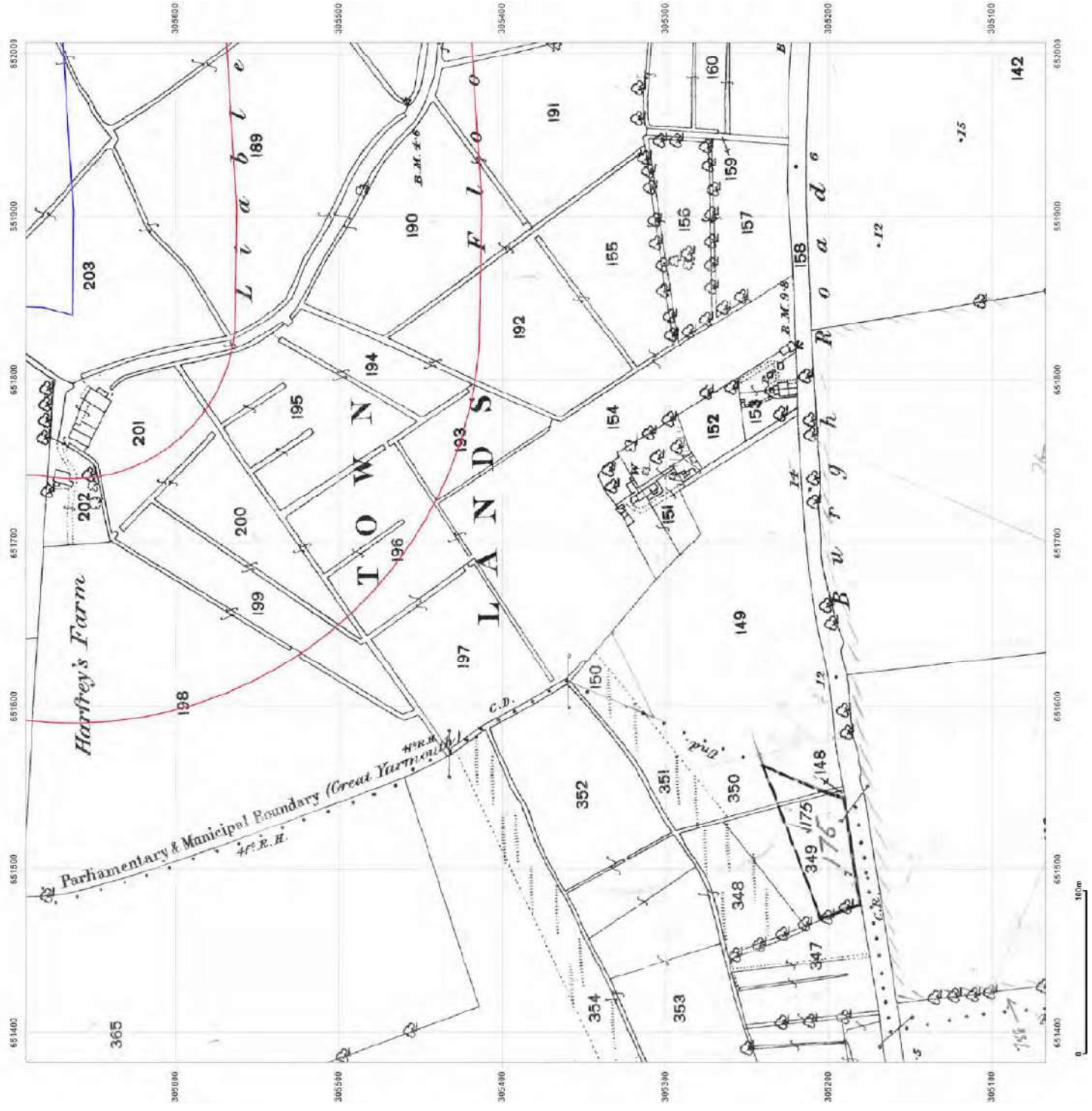


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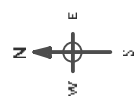
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Grid Ref: 651694, 305379

Map Name: County Series

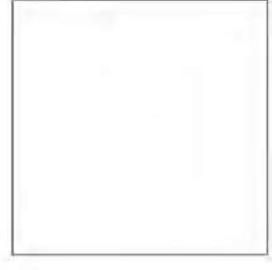
Map date: 1887

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1887
Revised 1887
Edition N/A
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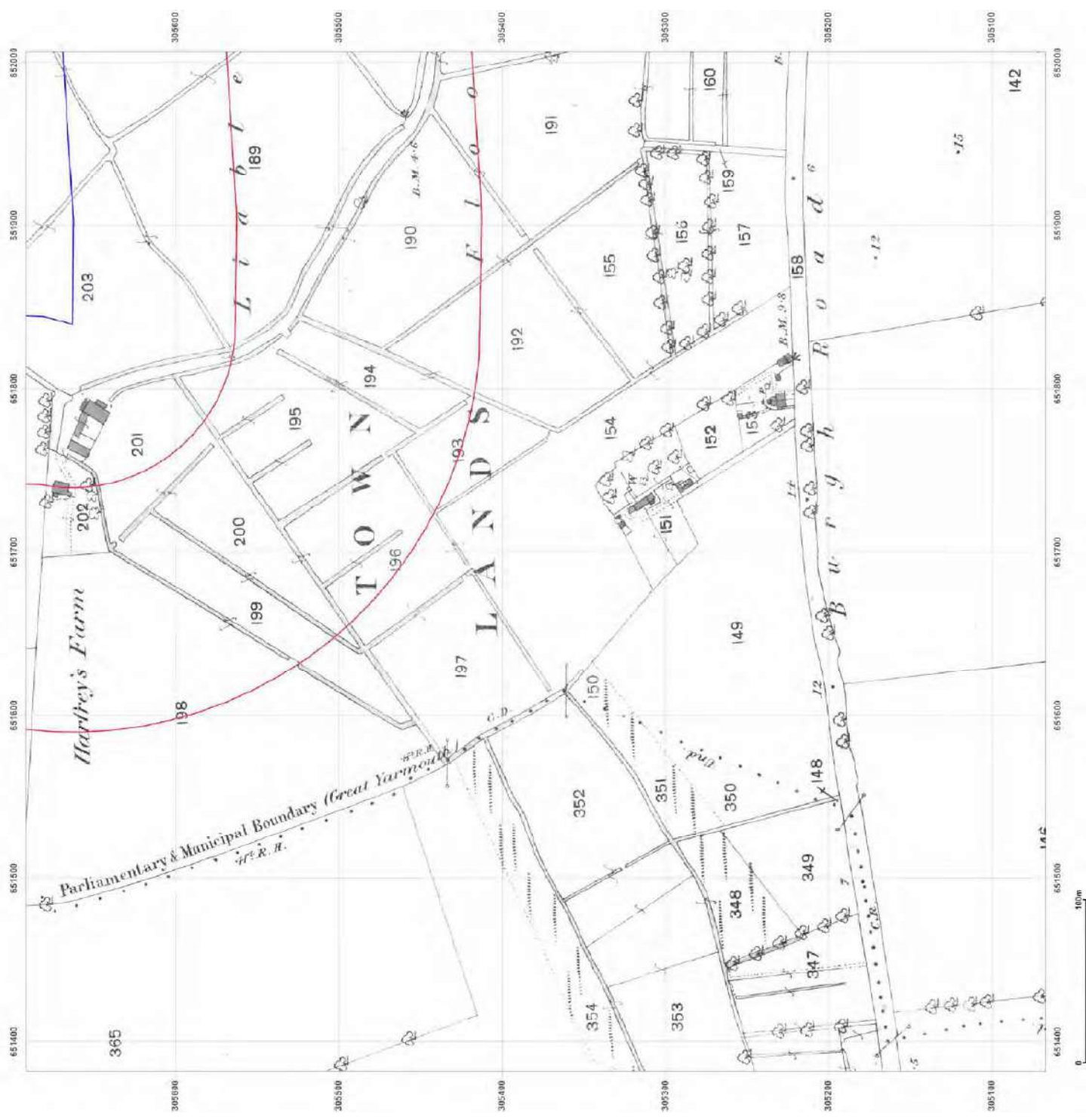


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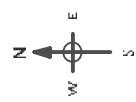
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Grid Ref: 651694, 305379

Map Name: County Series

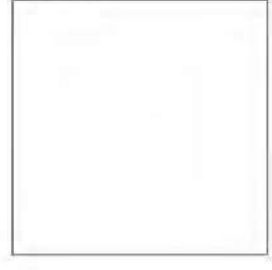
Map date: 1906

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1883
Revised 1904
Edition 1906
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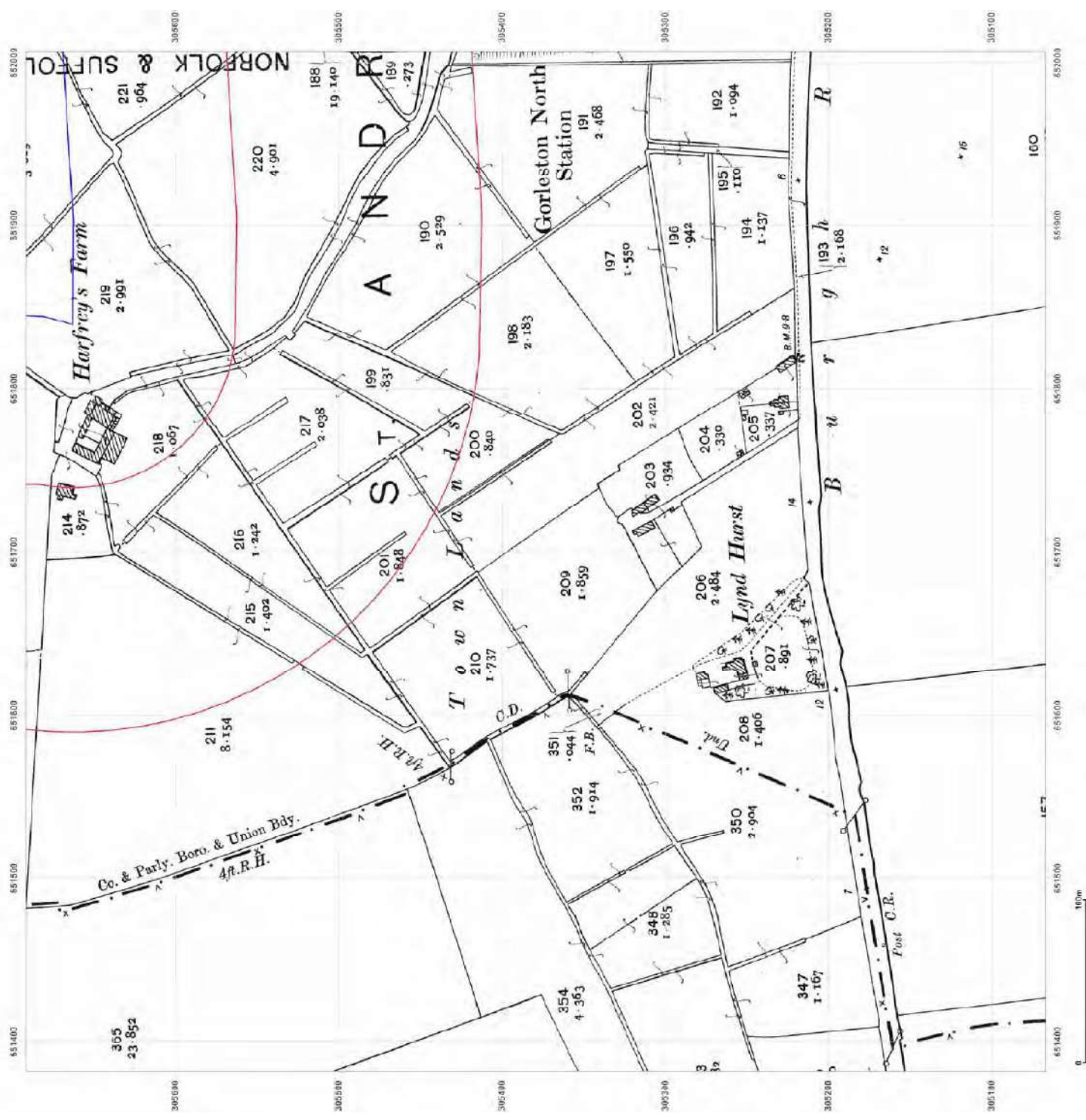


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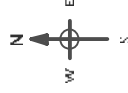
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Grid Ref: 651694, 305379

Map Name: County Series

Map date: 1927

Scale: 1:2,500

Printed at: 1:2,500



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Revised 1927
Edition N/A
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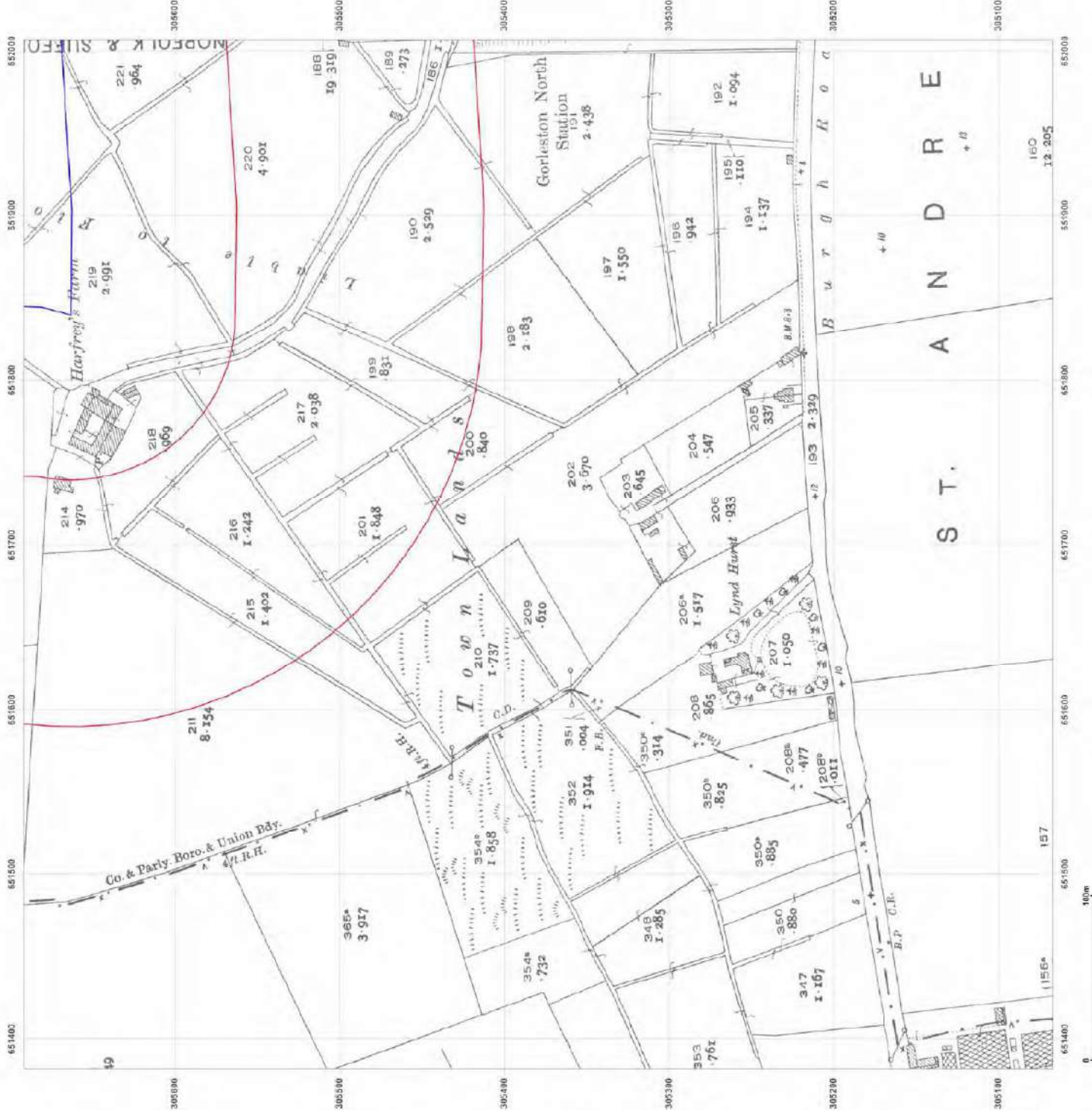


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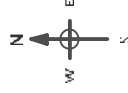
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Grid Ref: 651694, 305379

Map Name: National Grid

Map date: 1951-1955

Scale: 1:2,500

Printed at: 1:2,500



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Revised 1955
Edition 1957
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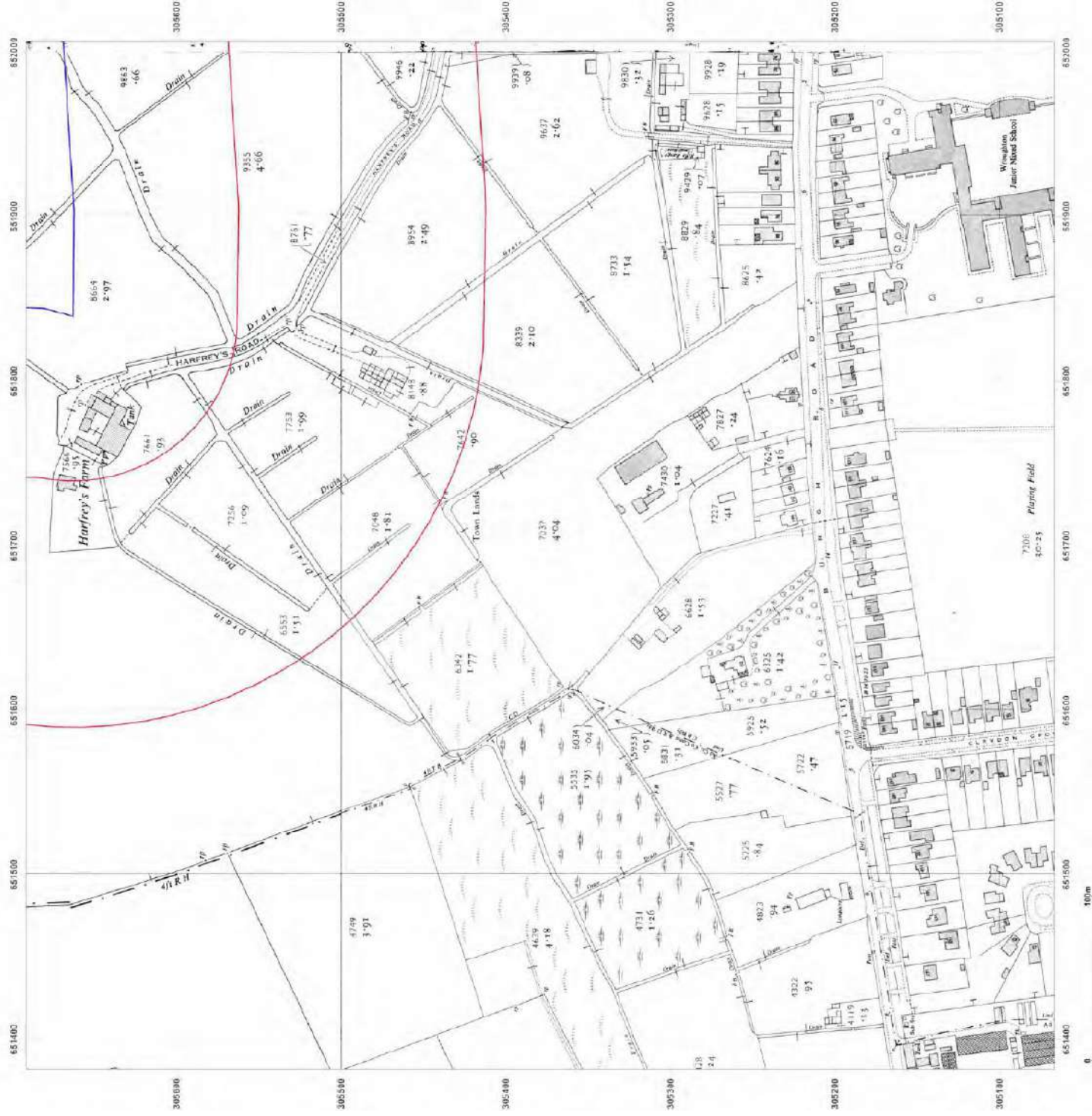


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Grid Ref: 551694, 305379

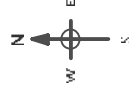
Map Name: National Grid

Map date: 1965

Scale: 1:2,500

Printed at 1:2500

Printed at 1:2,500



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Revised N/A
Edition N/A
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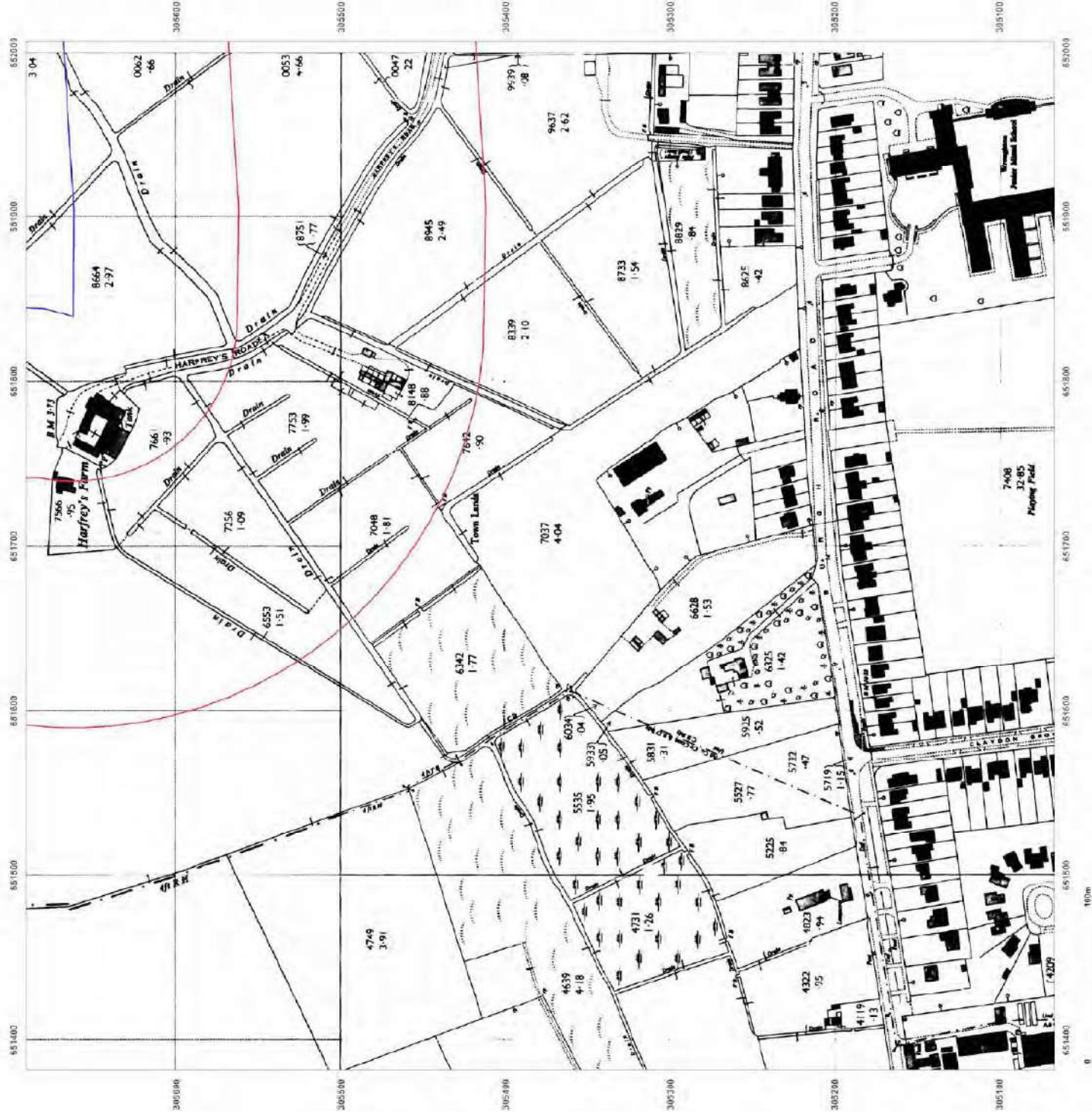


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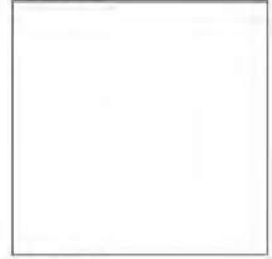
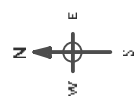
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Grid Ref: 651694, 305379

Map Name: National Grid

Map date: 1964-1968

Scale: 1:2,500

Printed at: 1:2,500



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Revised 1968
Edition N/A
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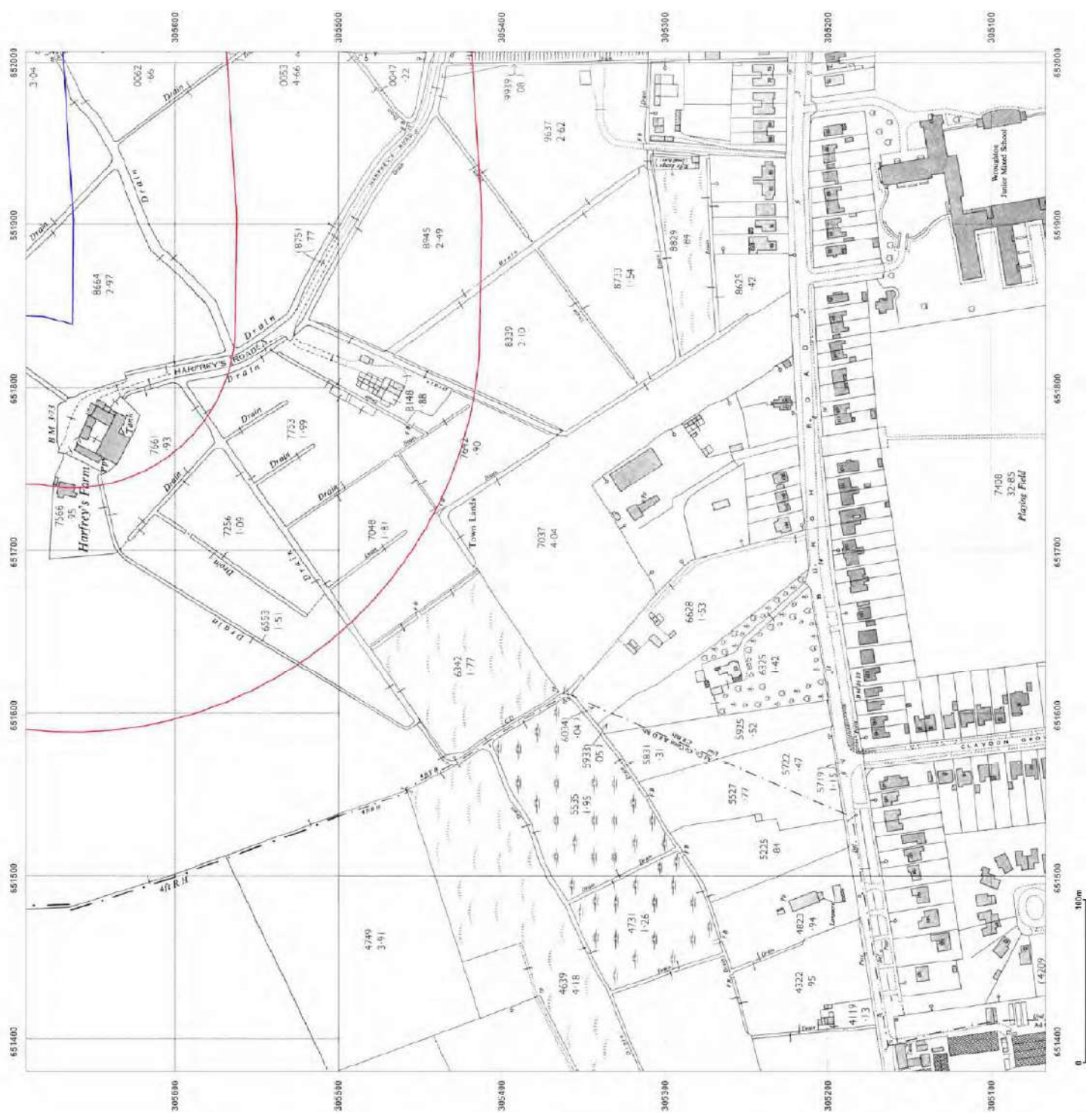


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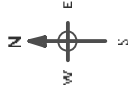
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Map Name: County Series

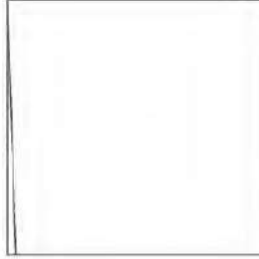
Map date: 1883

Scale: 1:2,500

Printed at: 1:2,500



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Surveyed 1883
 Revised 1883
 Edition N/A
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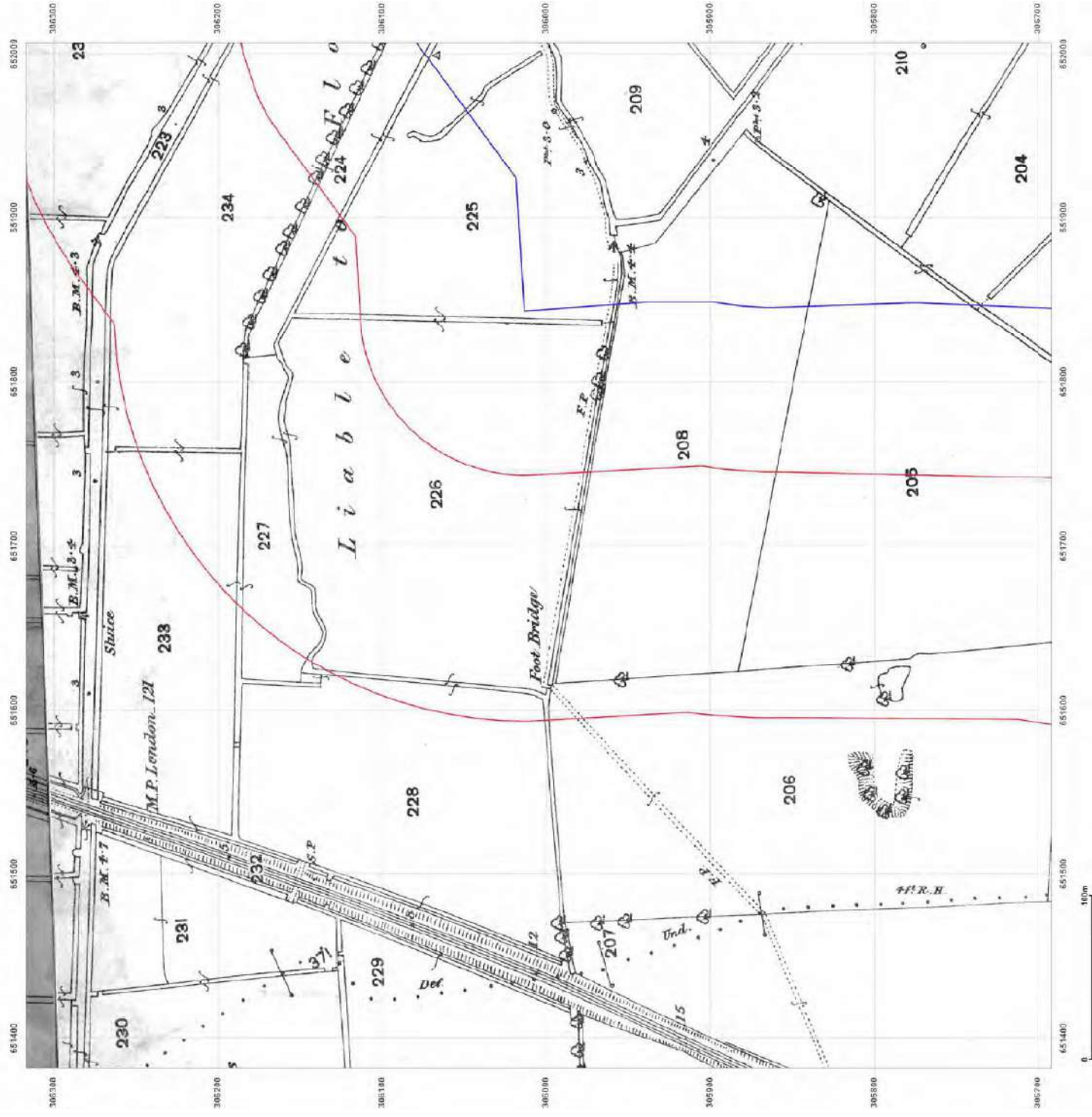


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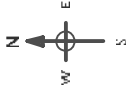
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Map Name: County Series

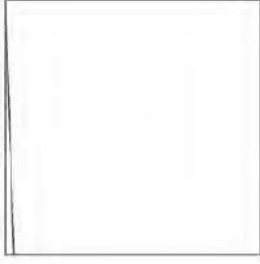
Map date: 1887

Scale: 1:2,500

Printed at: 1:2,500



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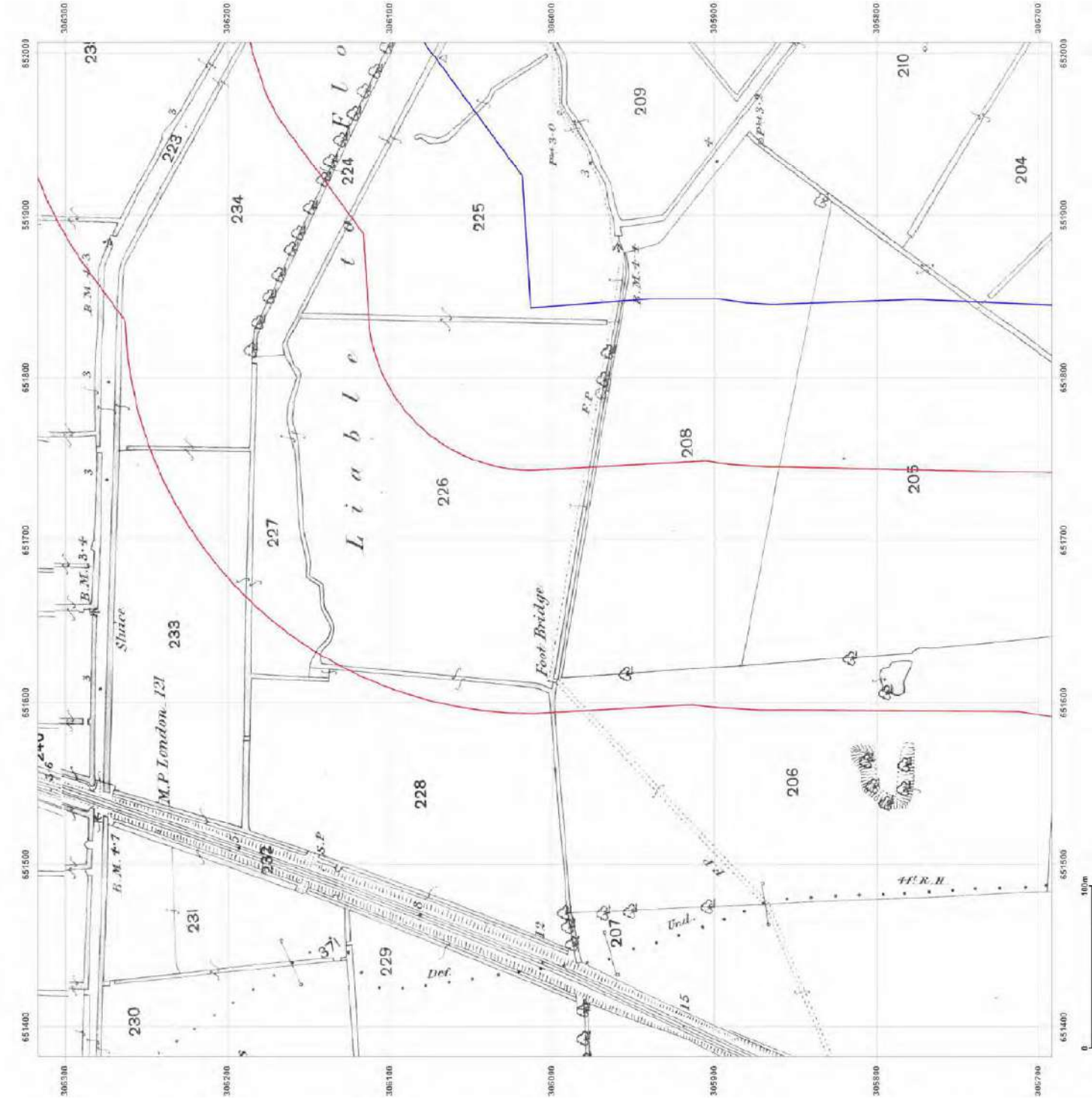


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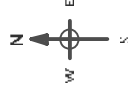
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Grid Ref: 651694, 306004

Map Name: County Series

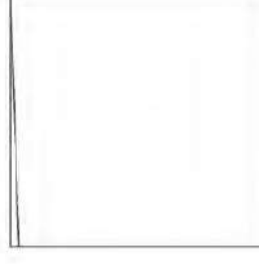
Map date: 1905-1906

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1905
Revised 1905
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1883
Revised 1904
Edition 1905
Copyright N/A
Levelled N/A



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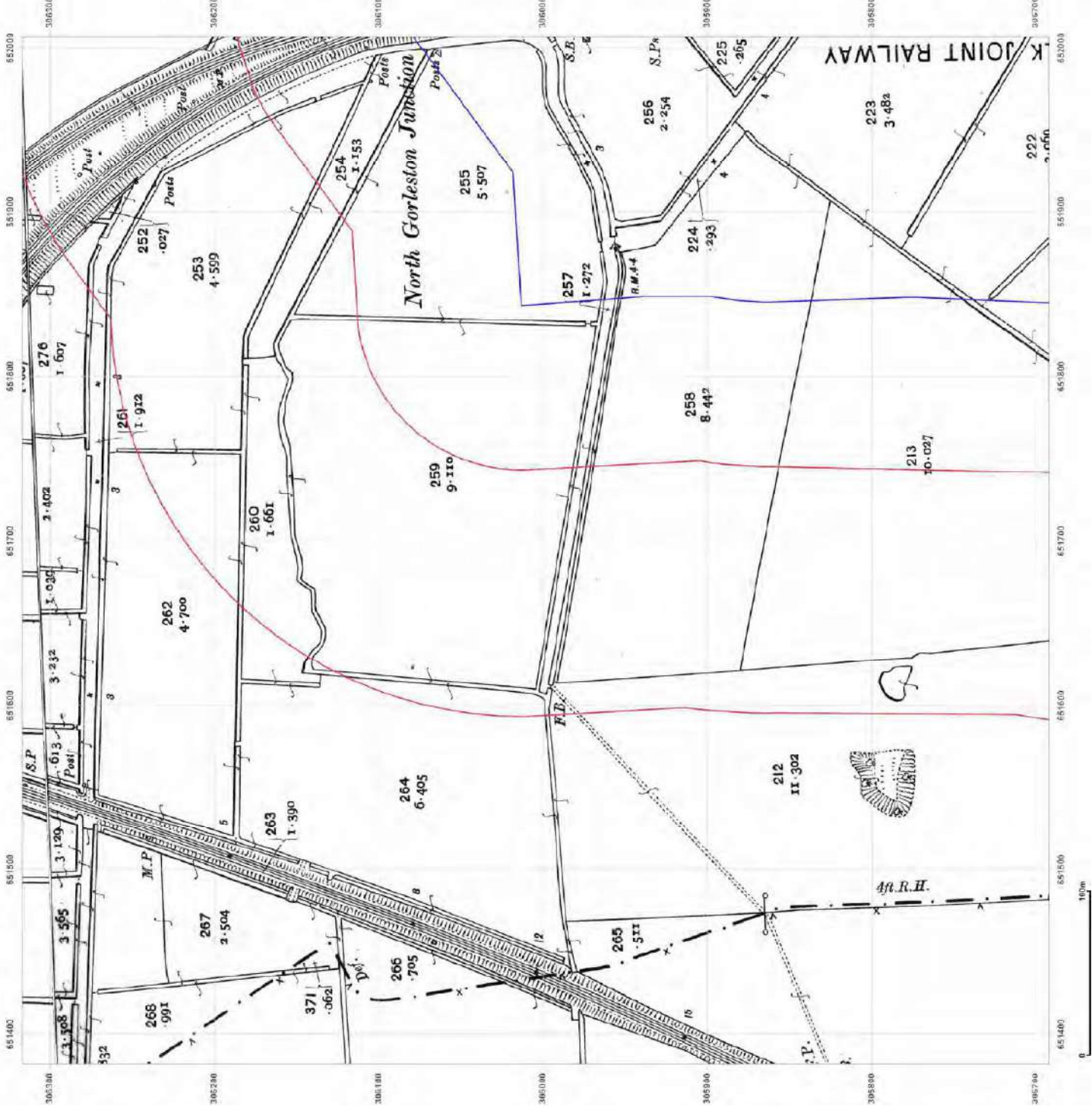


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Production date: 03 July 2017

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Site Details:

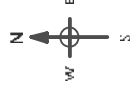
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Map Name: County Series

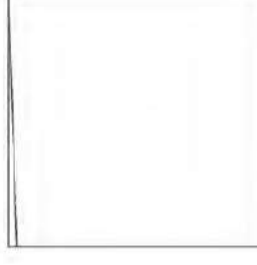
Map date: 1927-1928

Scale: 1:2,500

Printed at: 1:2,500



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



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



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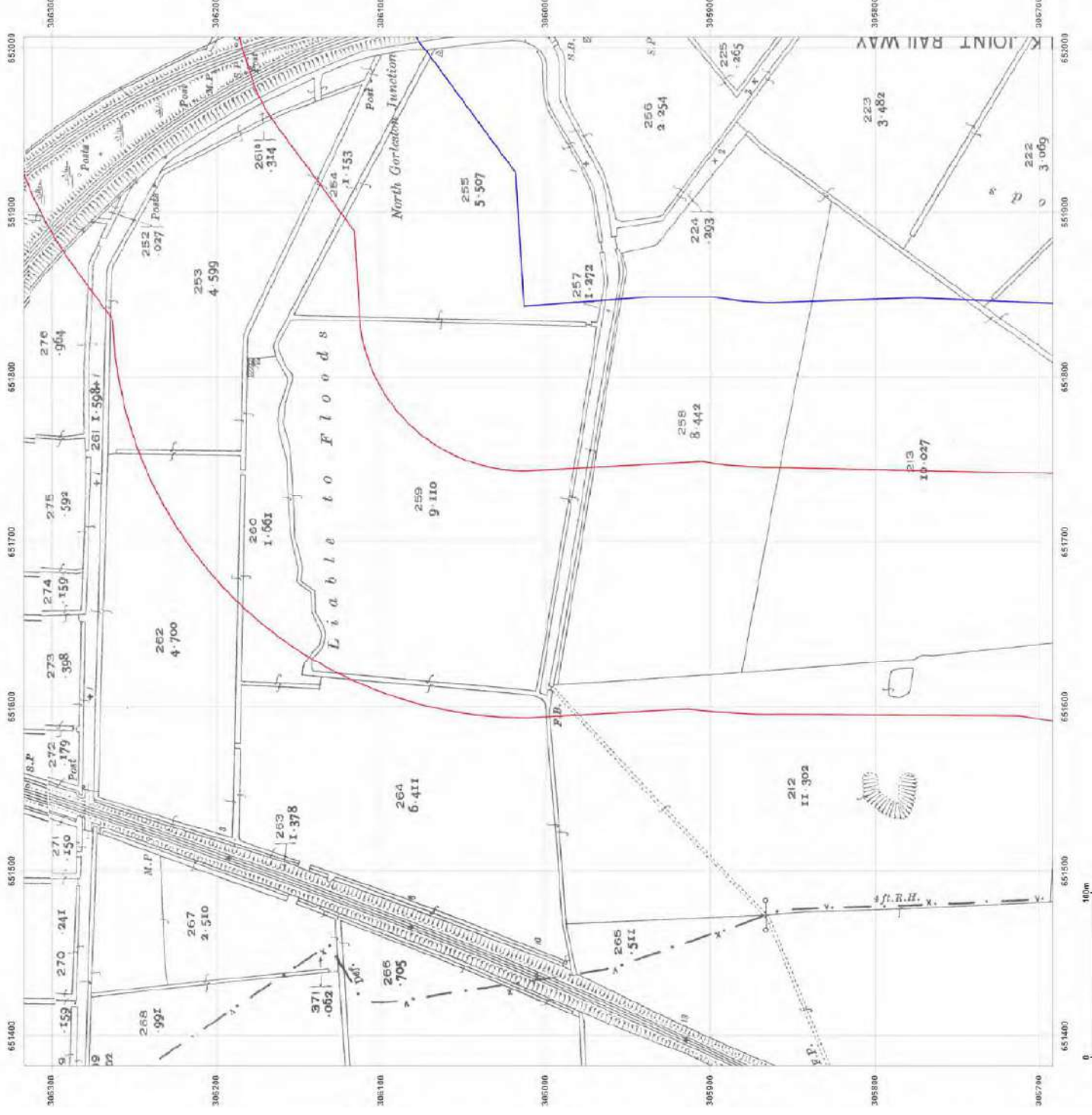


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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_LS_1_2
Grid Ref: 651694, 306004

Map Name: National Grid

Map date: 1951-1955

Scale: 1:2,500

Printed at: 1:2,500



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

Surveyed 1955 Revised 1955 Edition 1957 Copyright N/A Levelled 1946	

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



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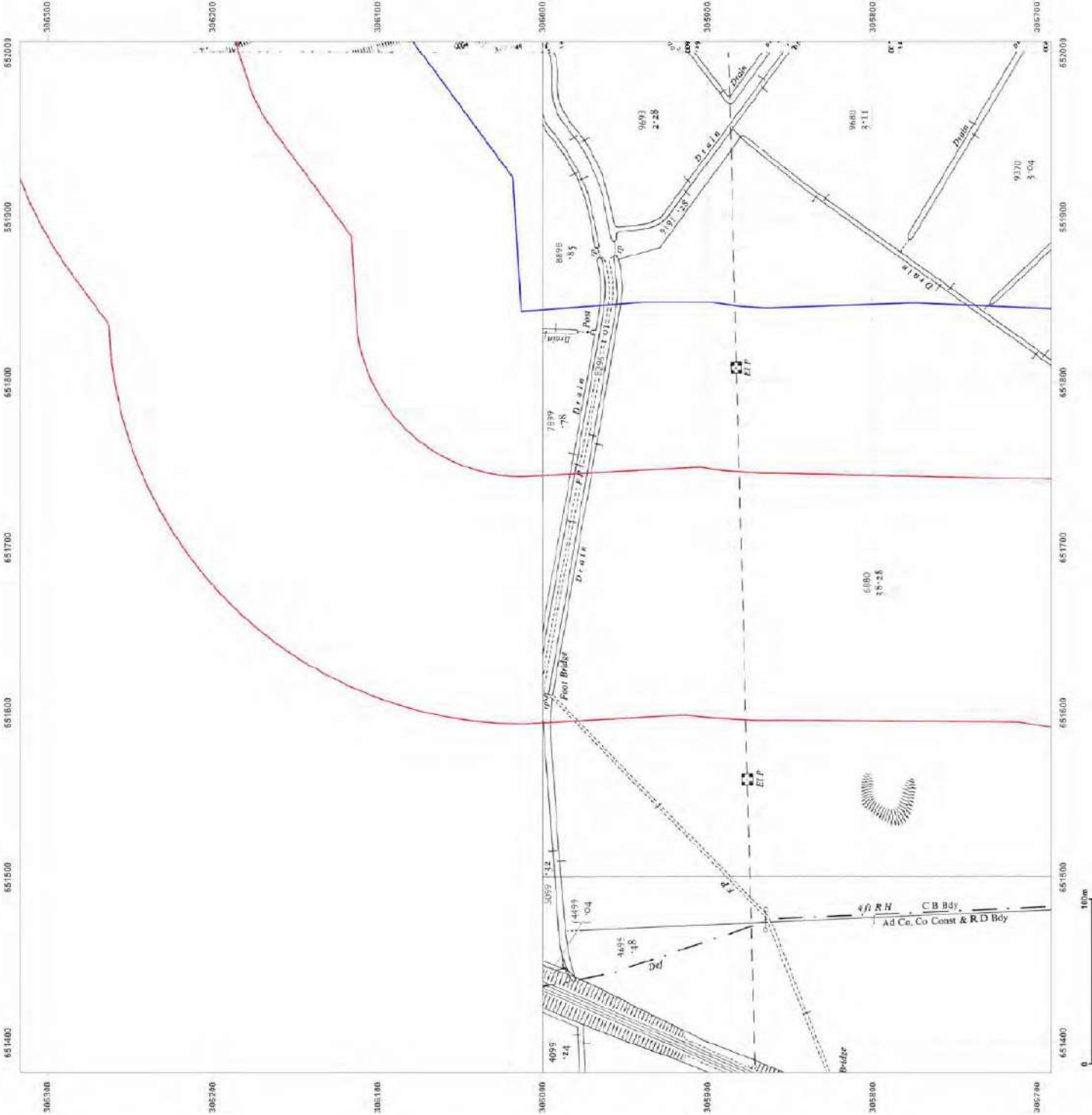


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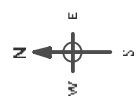
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Grid Ref: 651694, 306004

Map Name: National Grid

Map date: 1958-1963

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1962
Revised 1962
Edition 1964
Copyright 1964
Levelled 1958



Surveyed 1958
Revised 1958
Edition 1960
Copyright 1960
Levelled 1946



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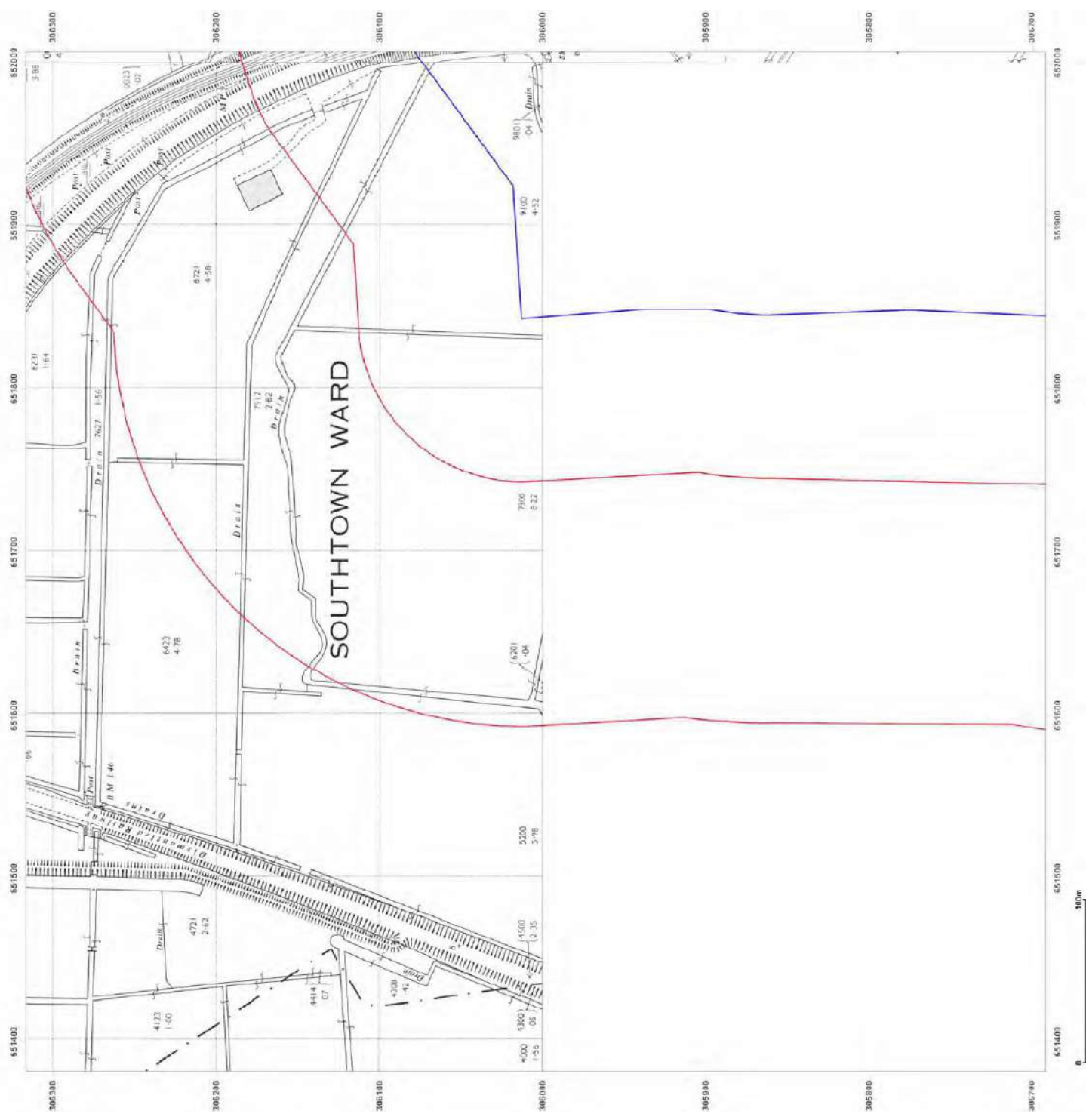


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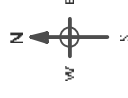
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Grid Ref: 651694, 306004

Map Name: National Grid

Map date: 1965

Scale: 1:2,500

Printed at: 1:2,500



Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
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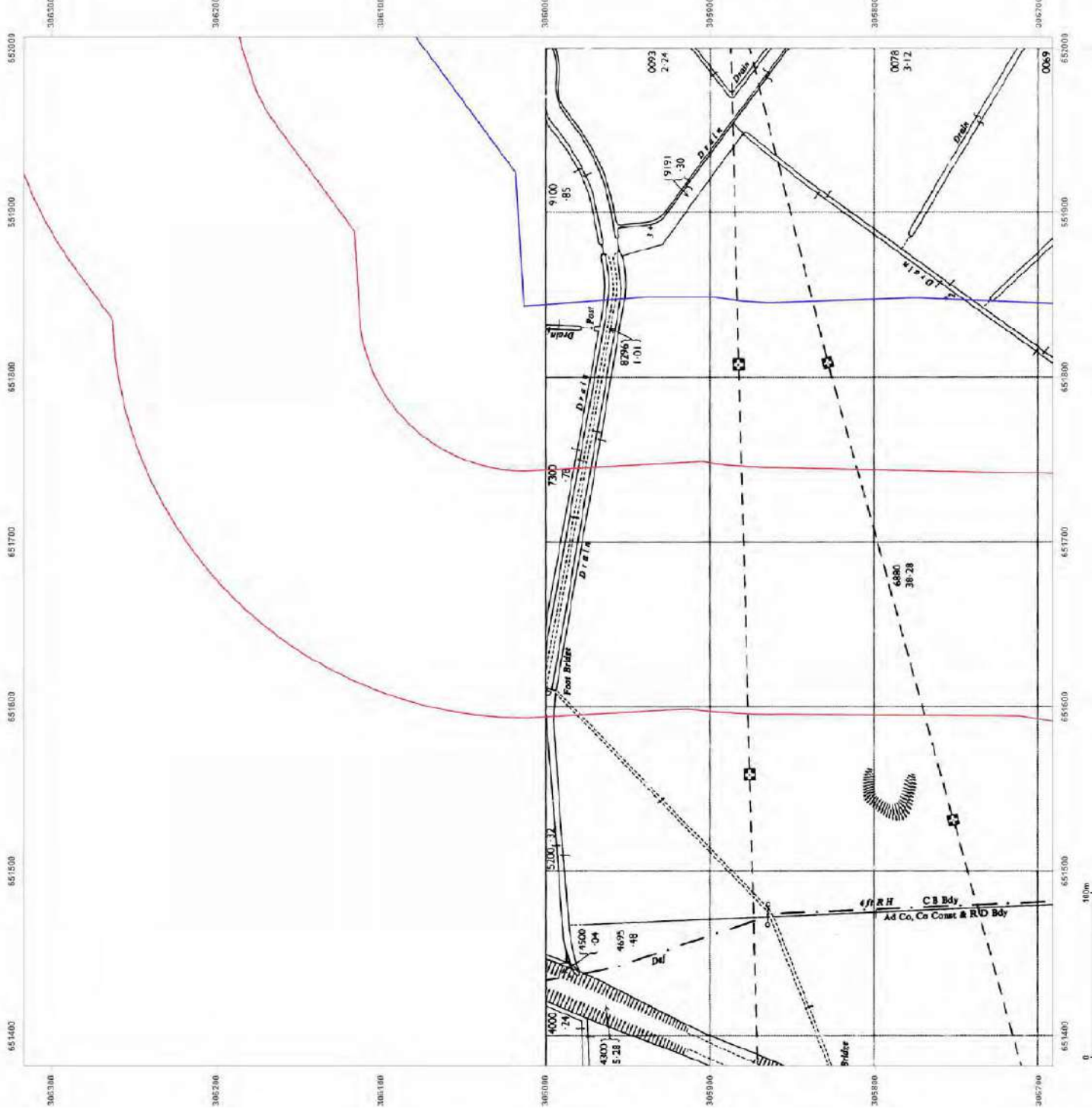


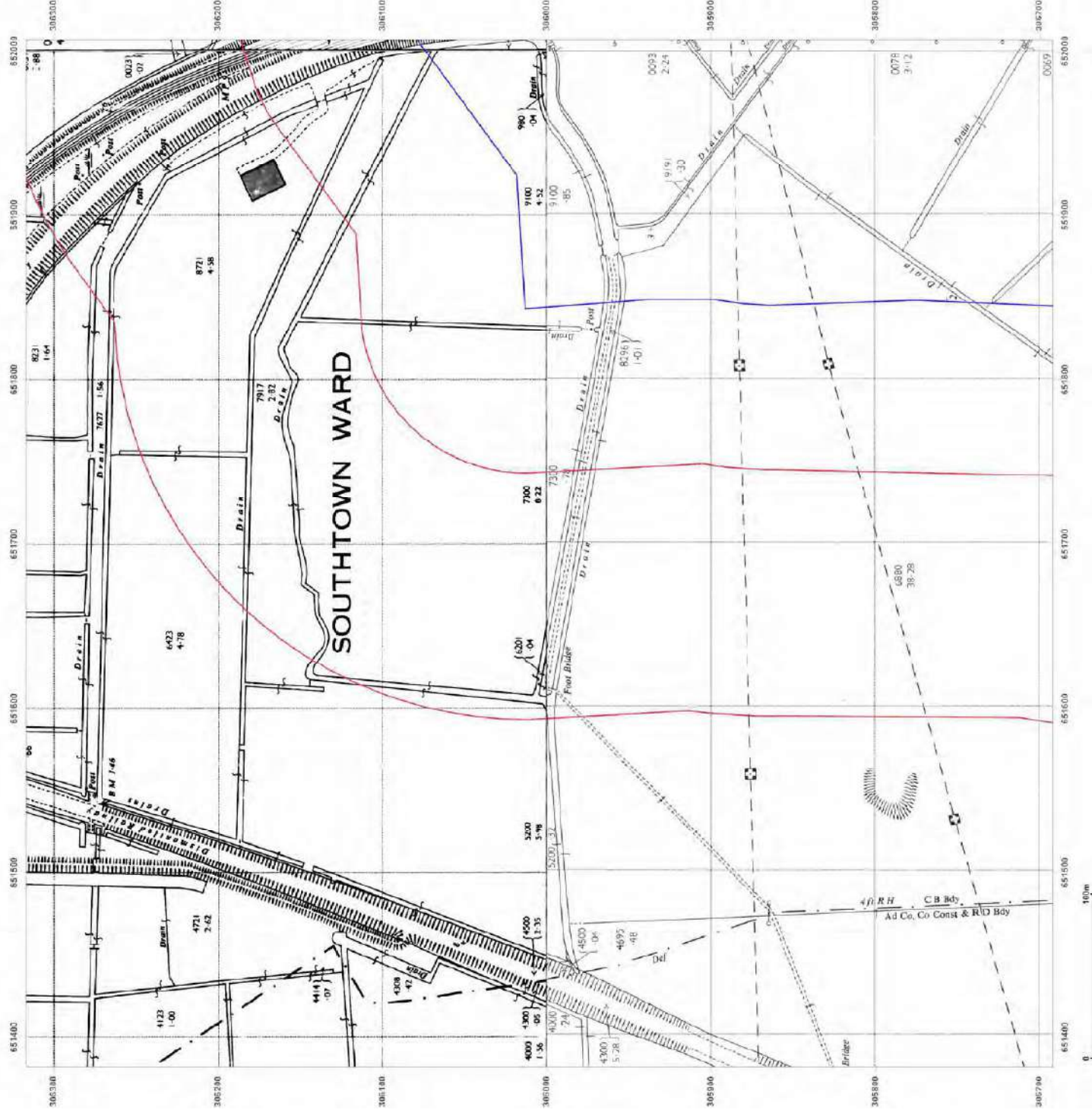
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Site Details:

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Grid Ref: 651694, 306004

Map Name: National Grid

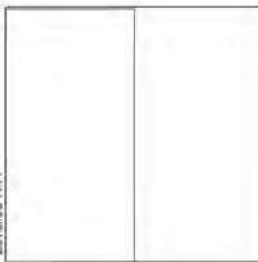
Map date: 1978

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1978
Revised 1978
Edition N/A
Copyright 1978
Levelled N/A



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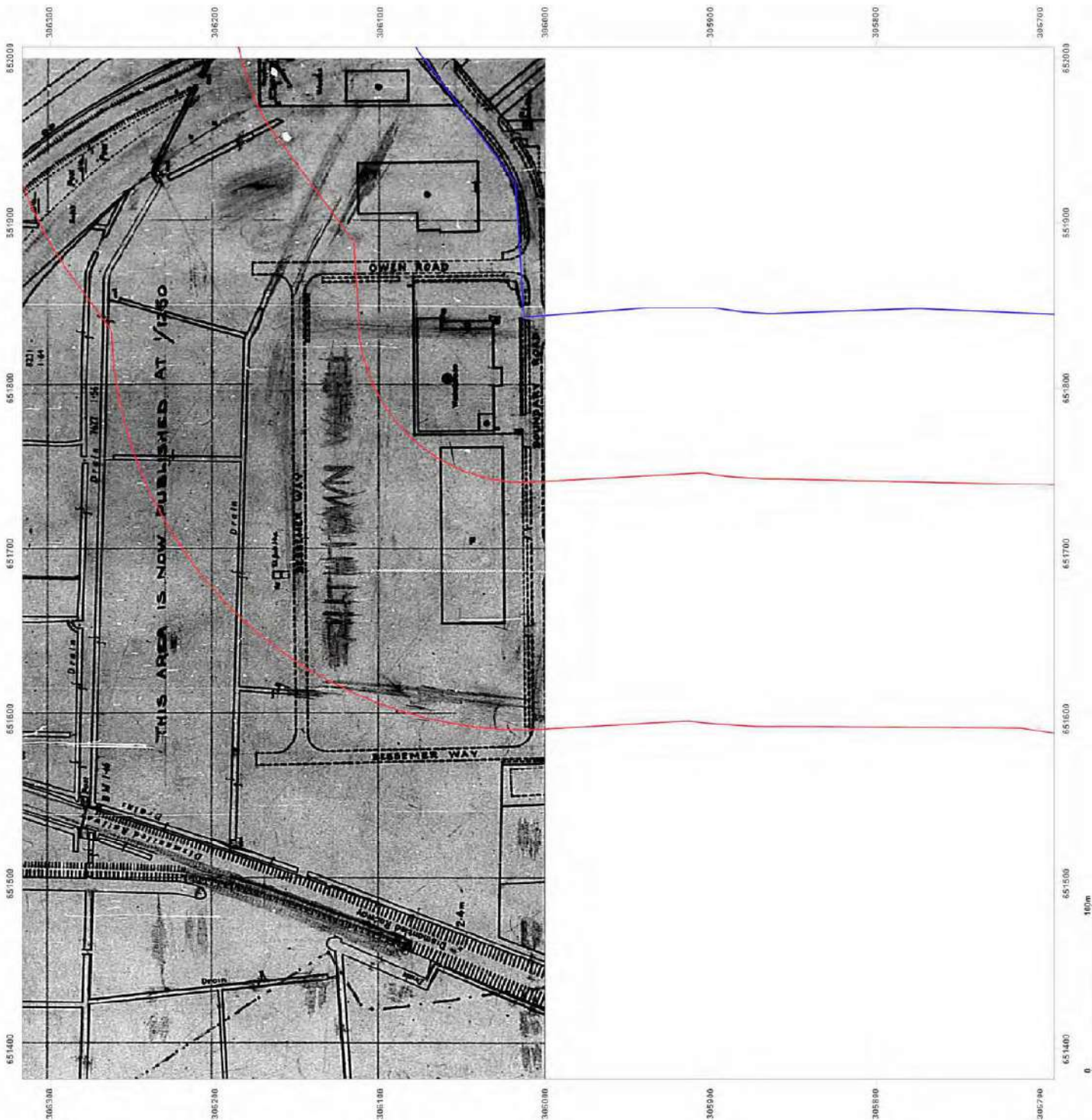


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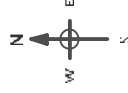
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Map Name: County Series

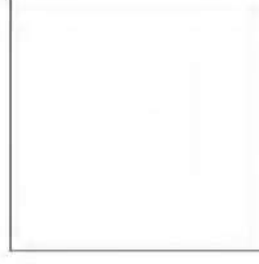
Map date: 1883

Scale: 1:2,500

Printed at: 1:2,500



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



Surveyed 1883
Revised 1883
Edition N/A
Copyright N/A
Levelled N/A



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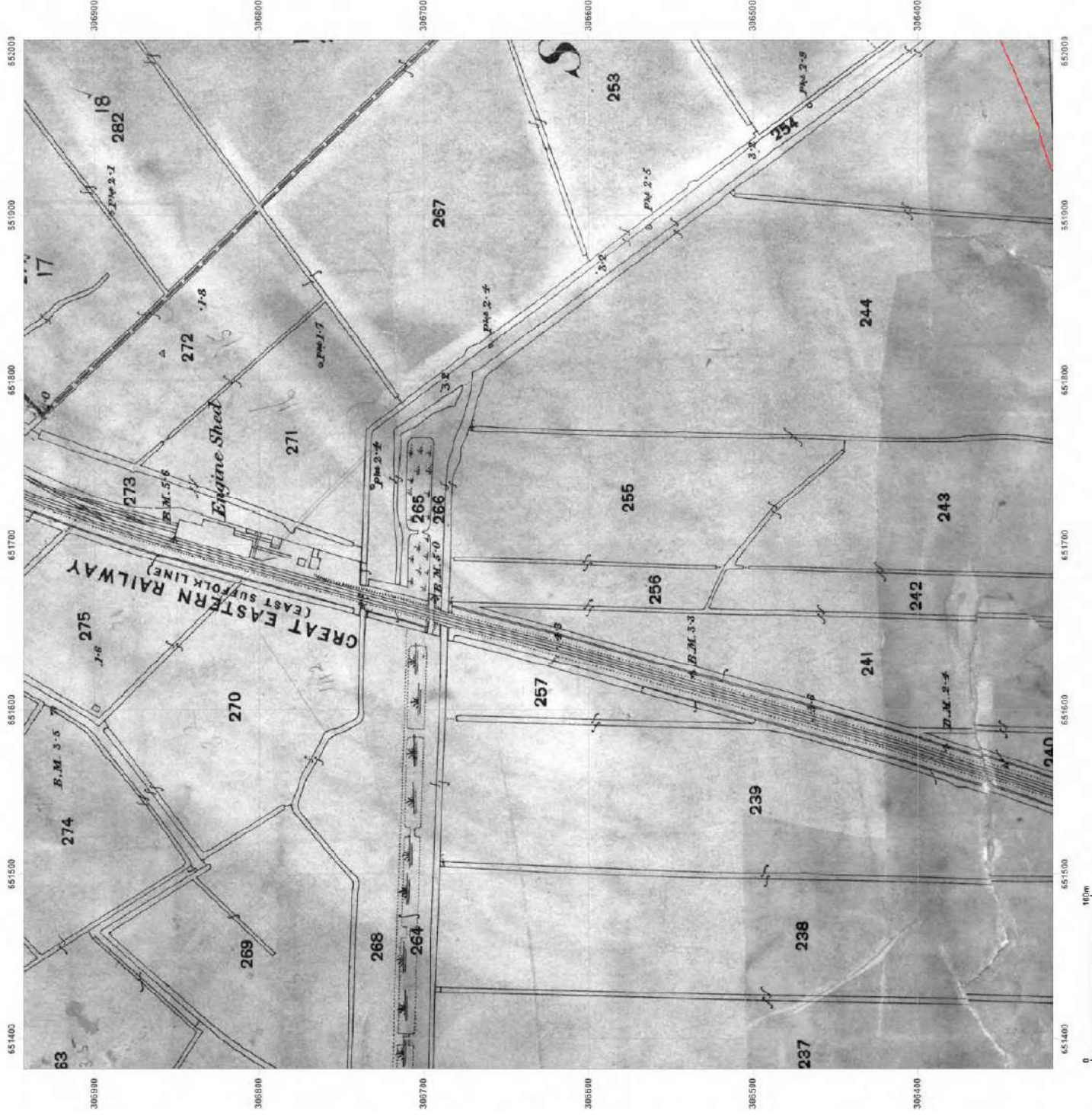


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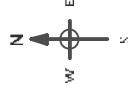
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Grid Ref: 651694, 306630

Map Name: County Series

Map date: 1887

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1887
Revised 1887
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1887
Revised 1887
Edition N/A
Copyright N/A
Levelled N/A



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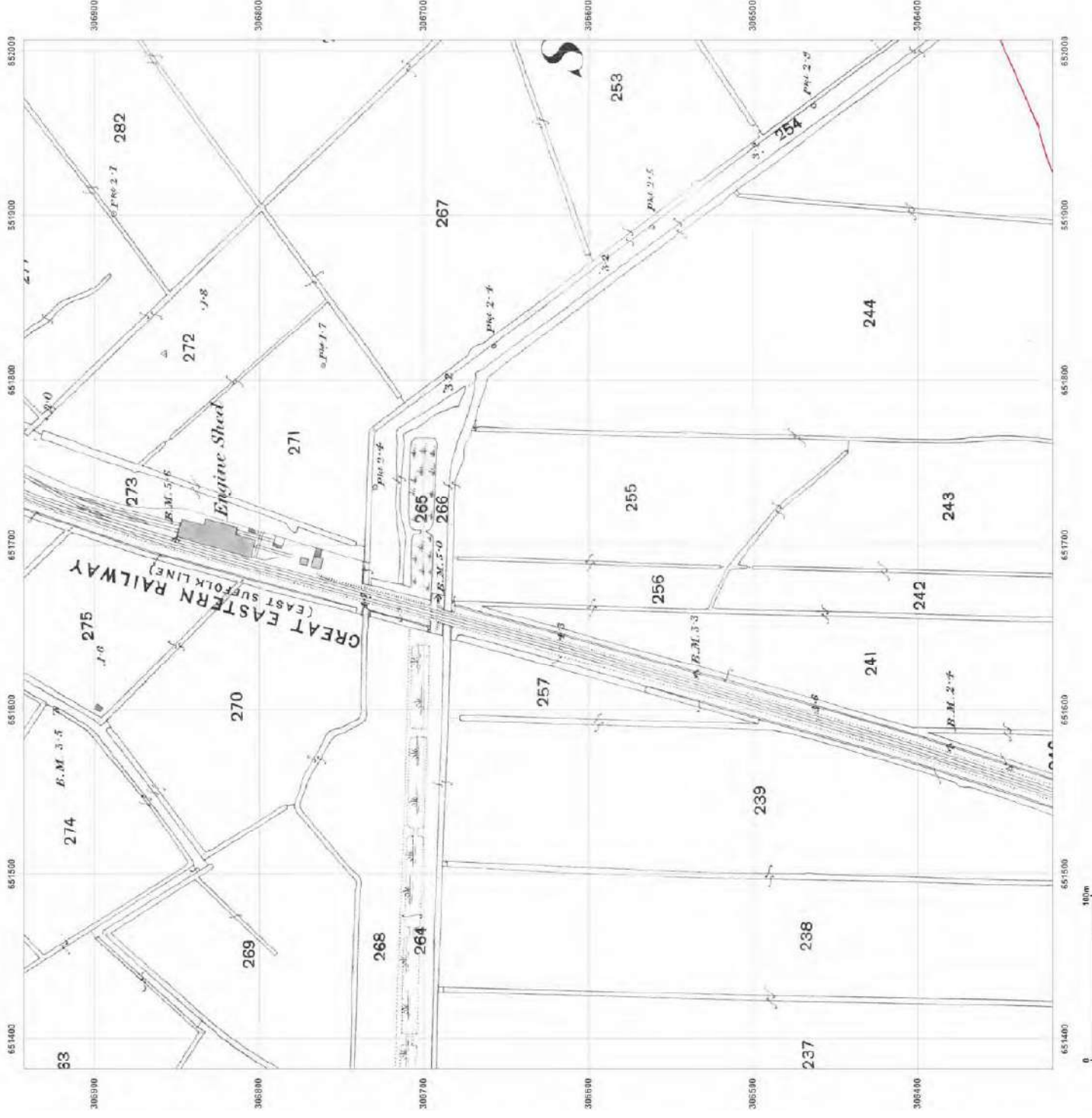


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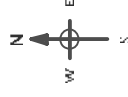
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Grid Ref: 651694, 306630

Map Name: County Series

Map date: 1905-1906

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1905
Revised 1905
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1883
Revised 1904
Edition 1905
Copyright N/A
Levelled N/A



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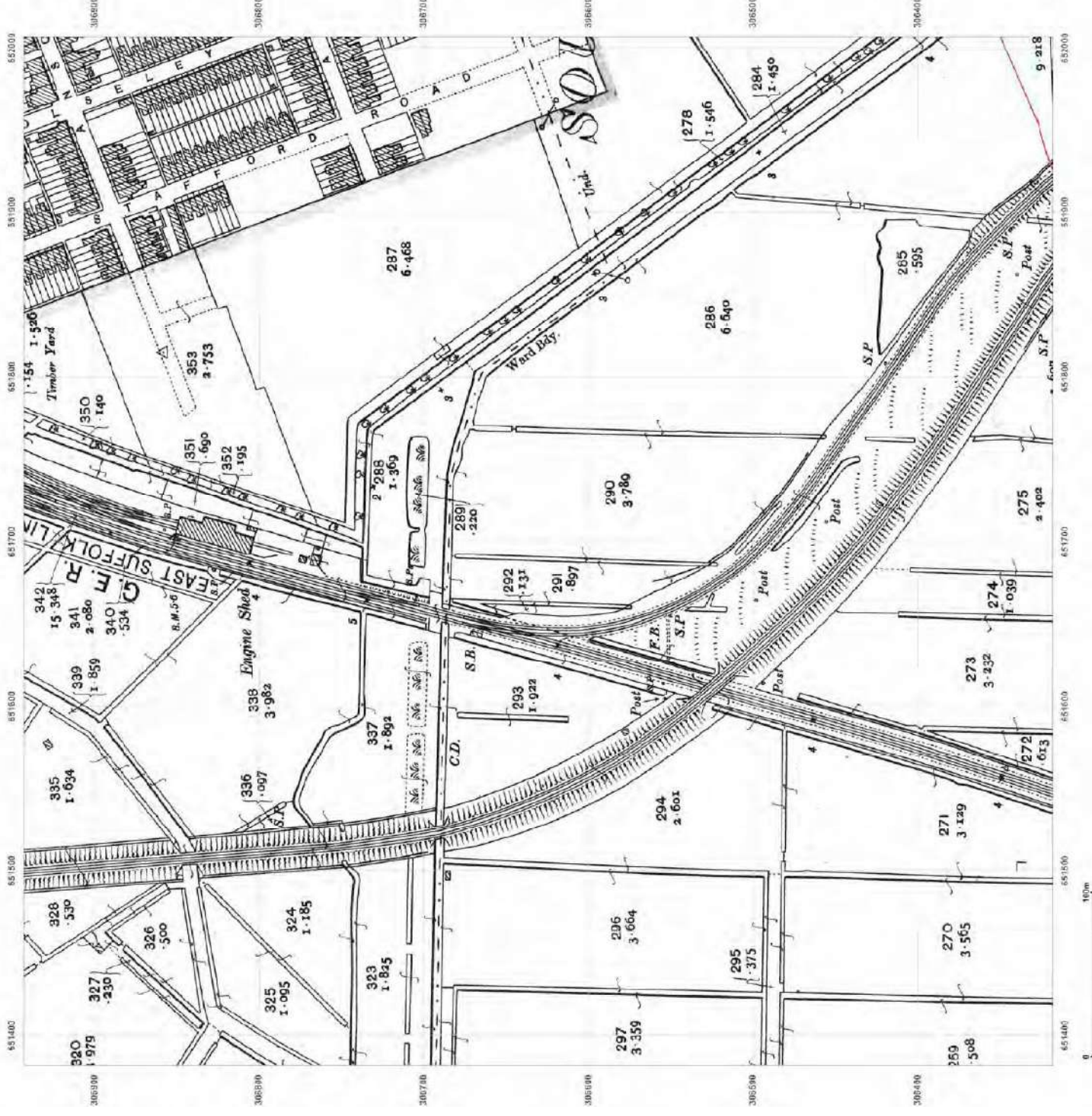


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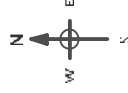
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Grid Ref: 651694, 306630

Map Name: County Series

Map date: 1927-1928

Scale: 1:2,500

Printed at: 1:2,500



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



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



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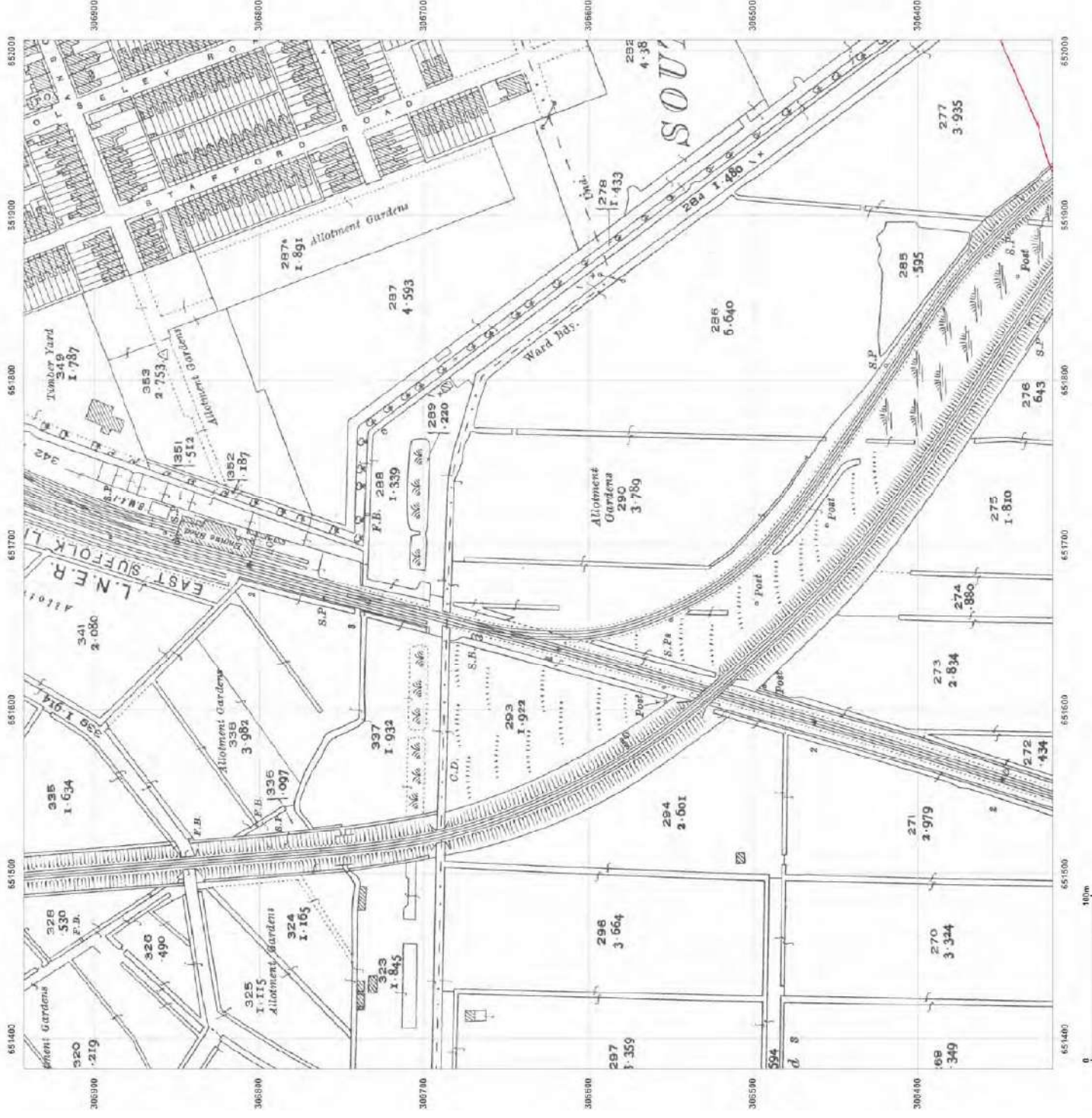


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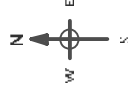
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Grid Ref: 651694, 306630

Map Name: National Grid

Map date: 1962-1963

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1862
Revised 1902
Edition 1964
Copyright 1964
Levelled 1956

Surveyed 1863
Revised 1903
Edition 1965
Copyright 1965
Levelled 1958



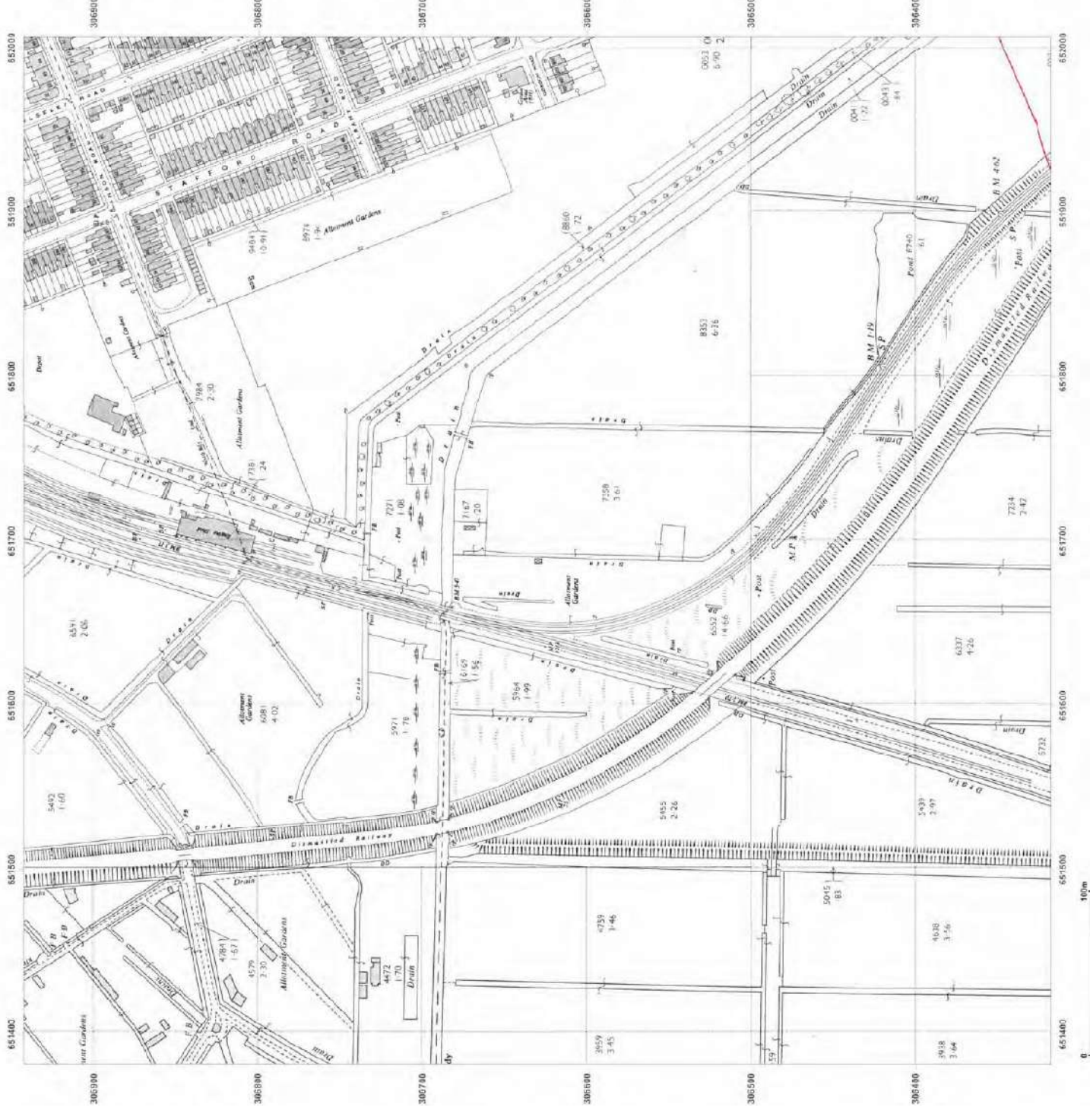
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Site Details:

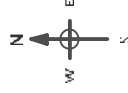
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Grid Ref: 652319, 305379

Map Name: County Series

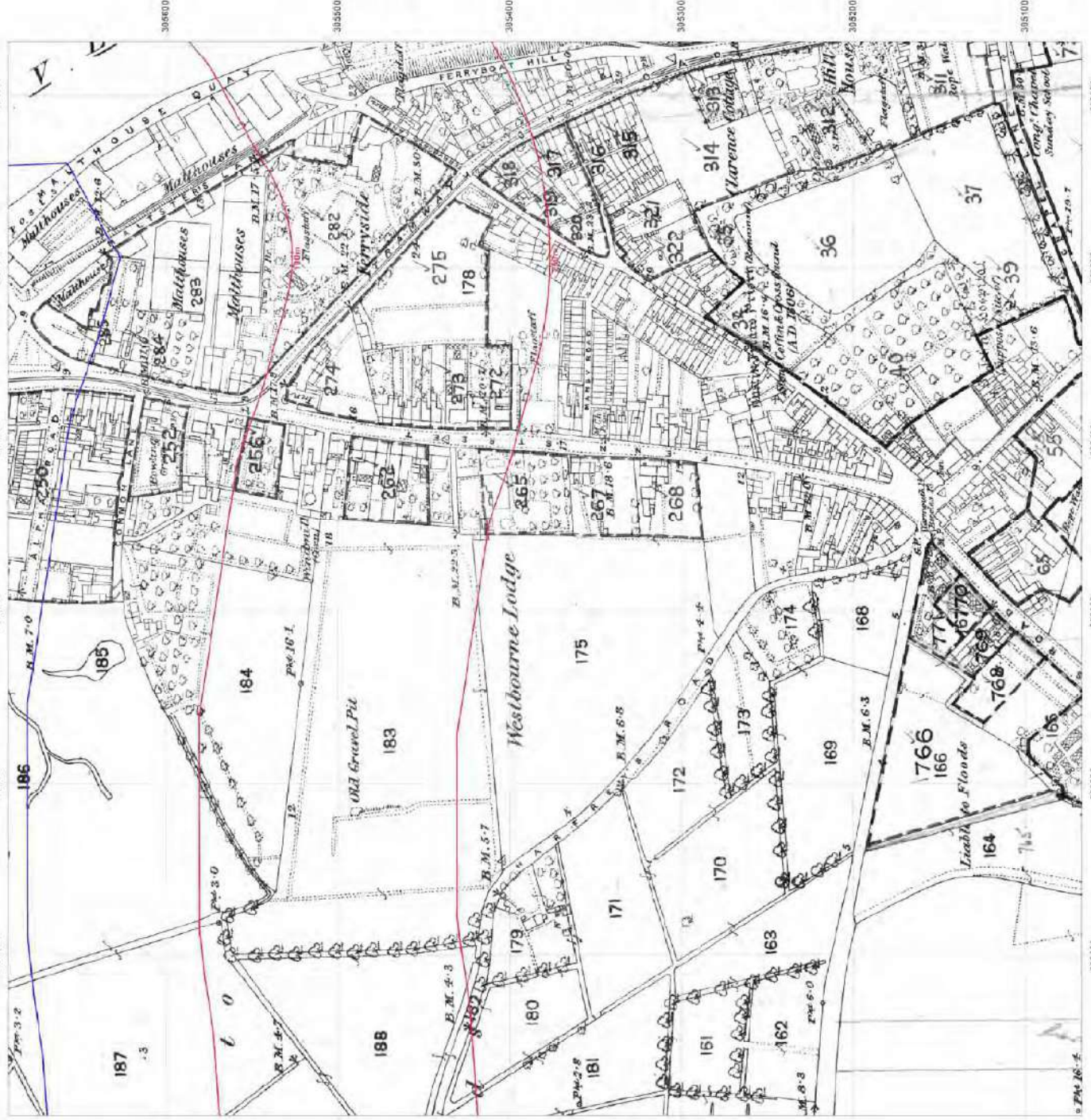
Map date: 1883

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1863
Revised 1883
Edition N/A
Copyright N/A
Levelled N/A



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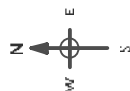
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Grid Ref: 652319, 305379

Map Name: County Series

Map date: 1887

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1887
Revised 1887
Edition N/A
Copyright N/A
Levelled N/A

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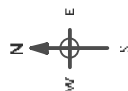
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Report Ref: CMAPS-CM636391-16287-030717HIS_LS_2_1
Grid Ref: 652319, 305379

Map Name: County Series

Map date: 1906

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1863
Revised 1904
Edition 1906
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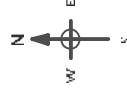
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Grid Ref: 652319, 305379

MapName: County Series

Map date: 1927

Scale: 1:2,500

Printed at 1:2,500



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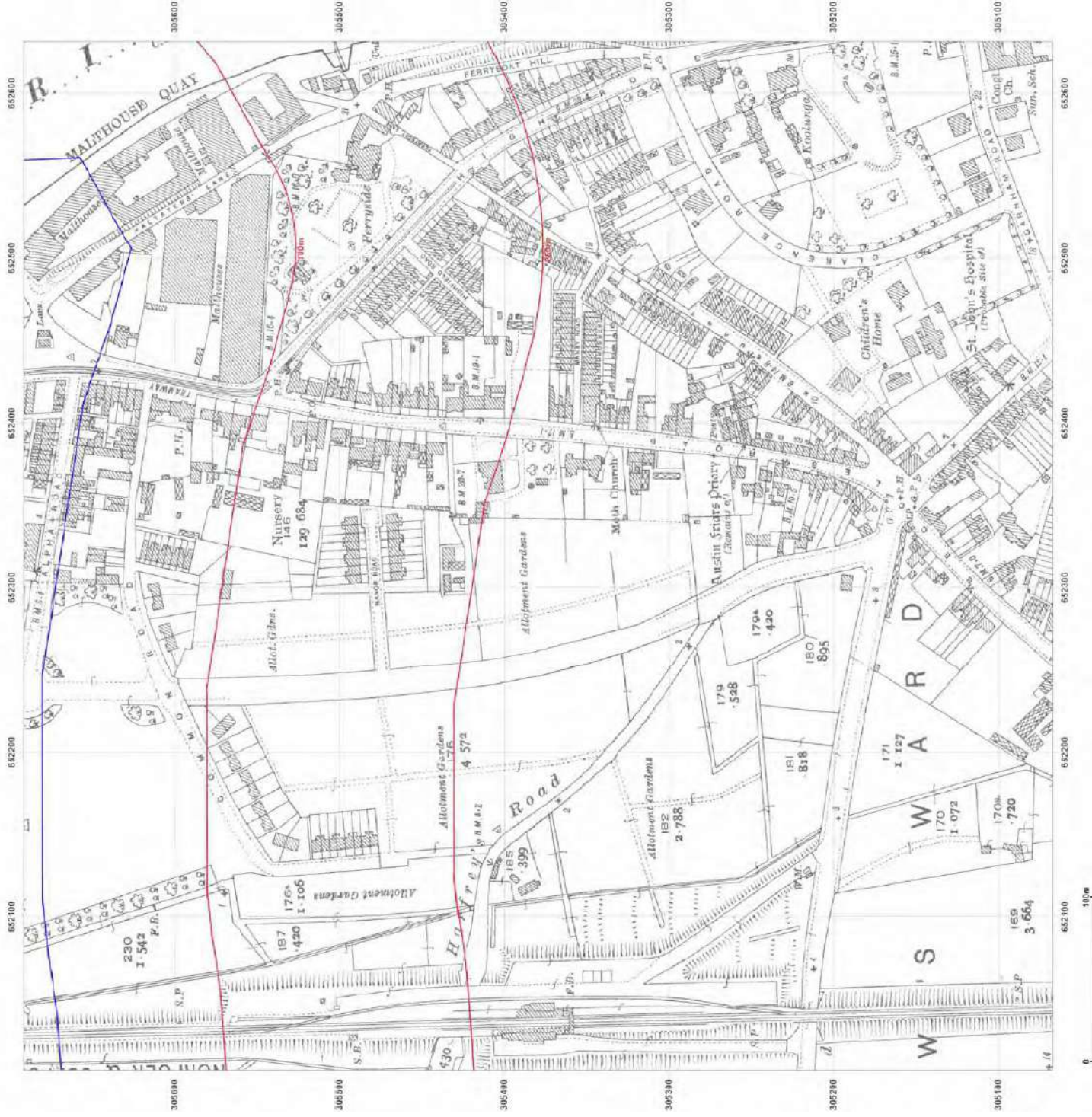


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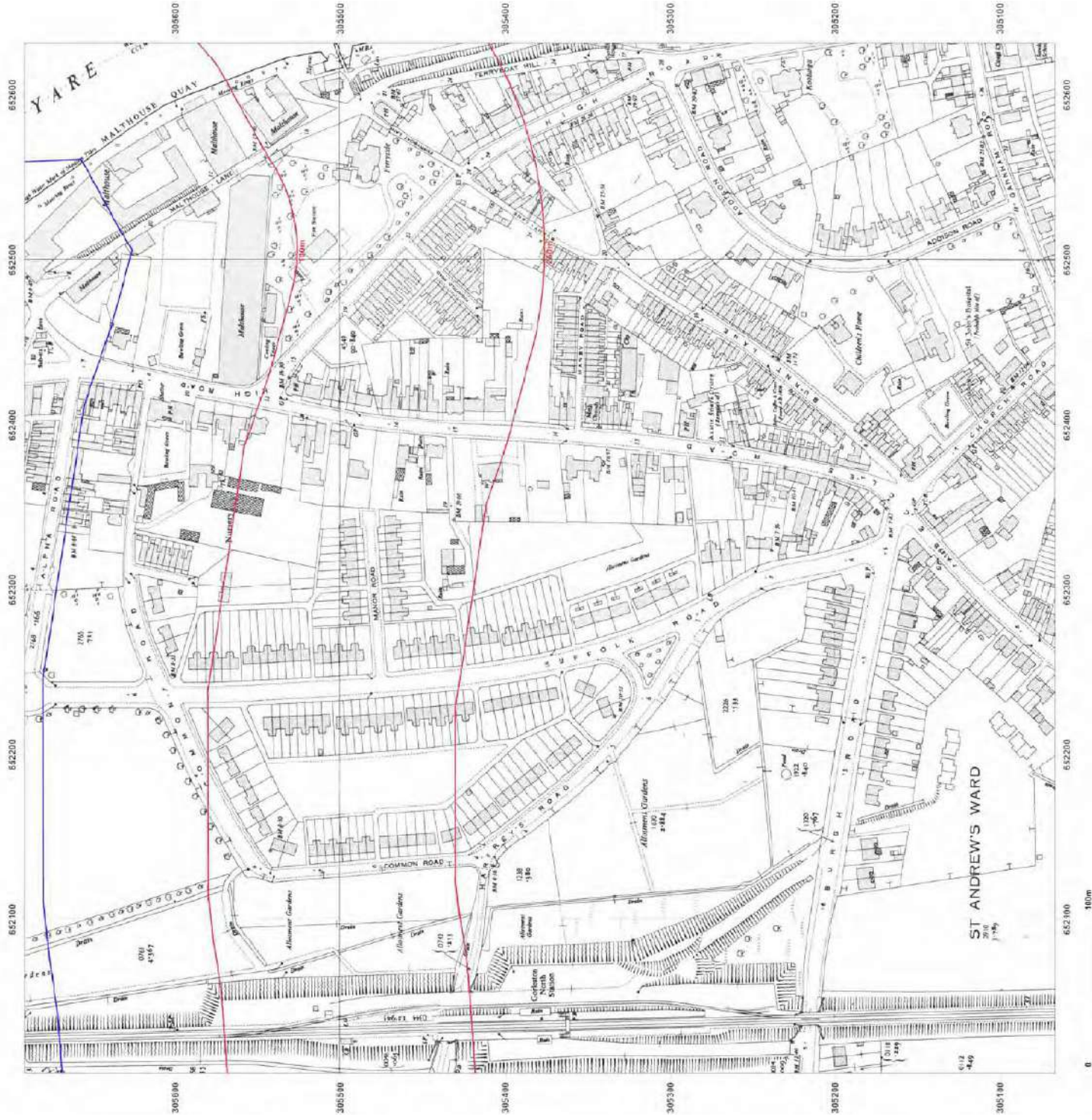
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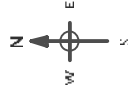
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Grid Ref: 652319, 305379

Map Name: National Grid

Map date: 1951

Scale: 1:2,500

Printed at: 1:2,500



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



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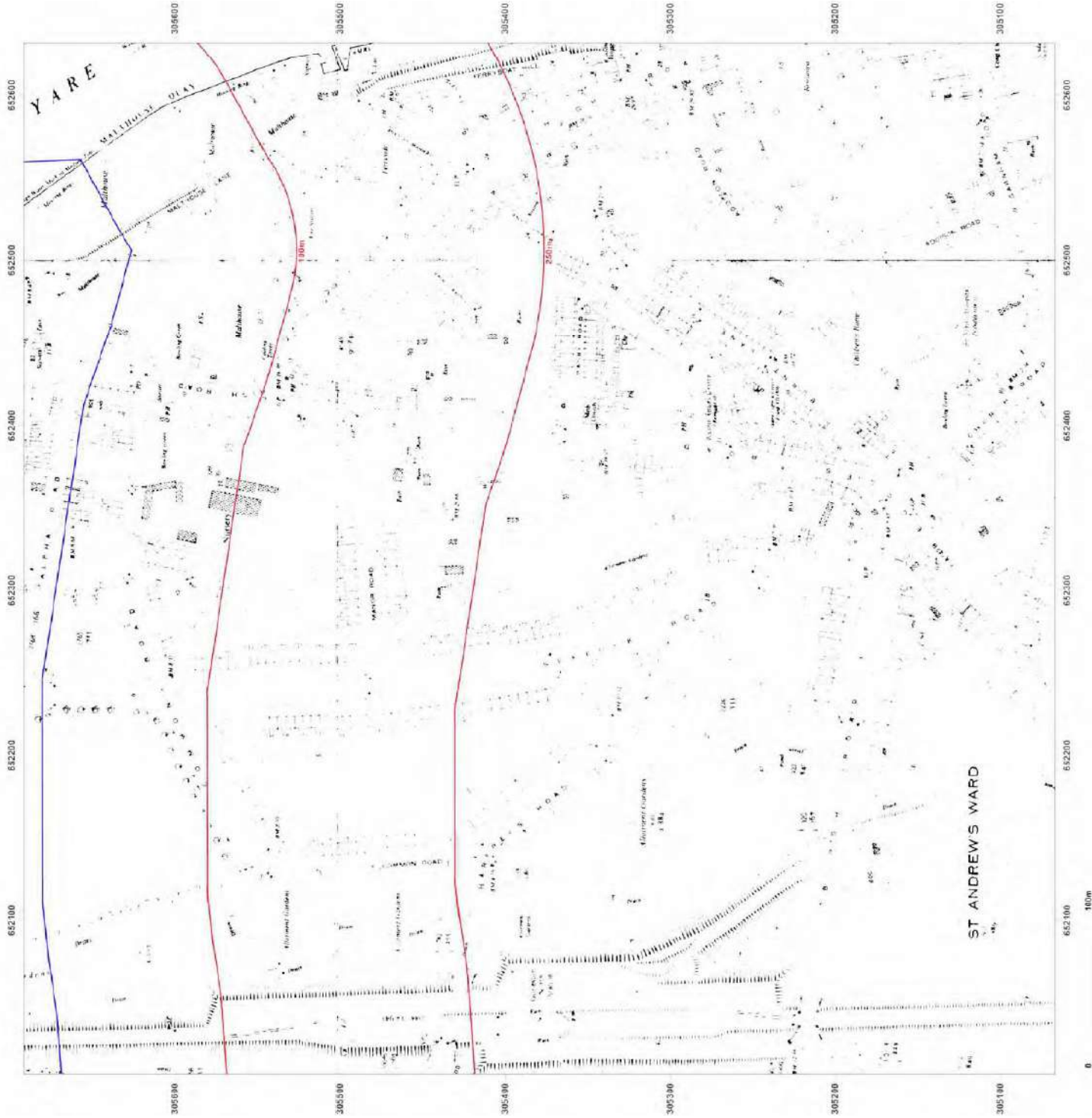


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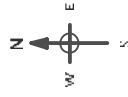
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Grid Ref: 652319, 305379

Map Name: National Grid

Map date: 1958

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1958
Revised 1958
Edition 1960
Copyright 1960
Levelled 1946



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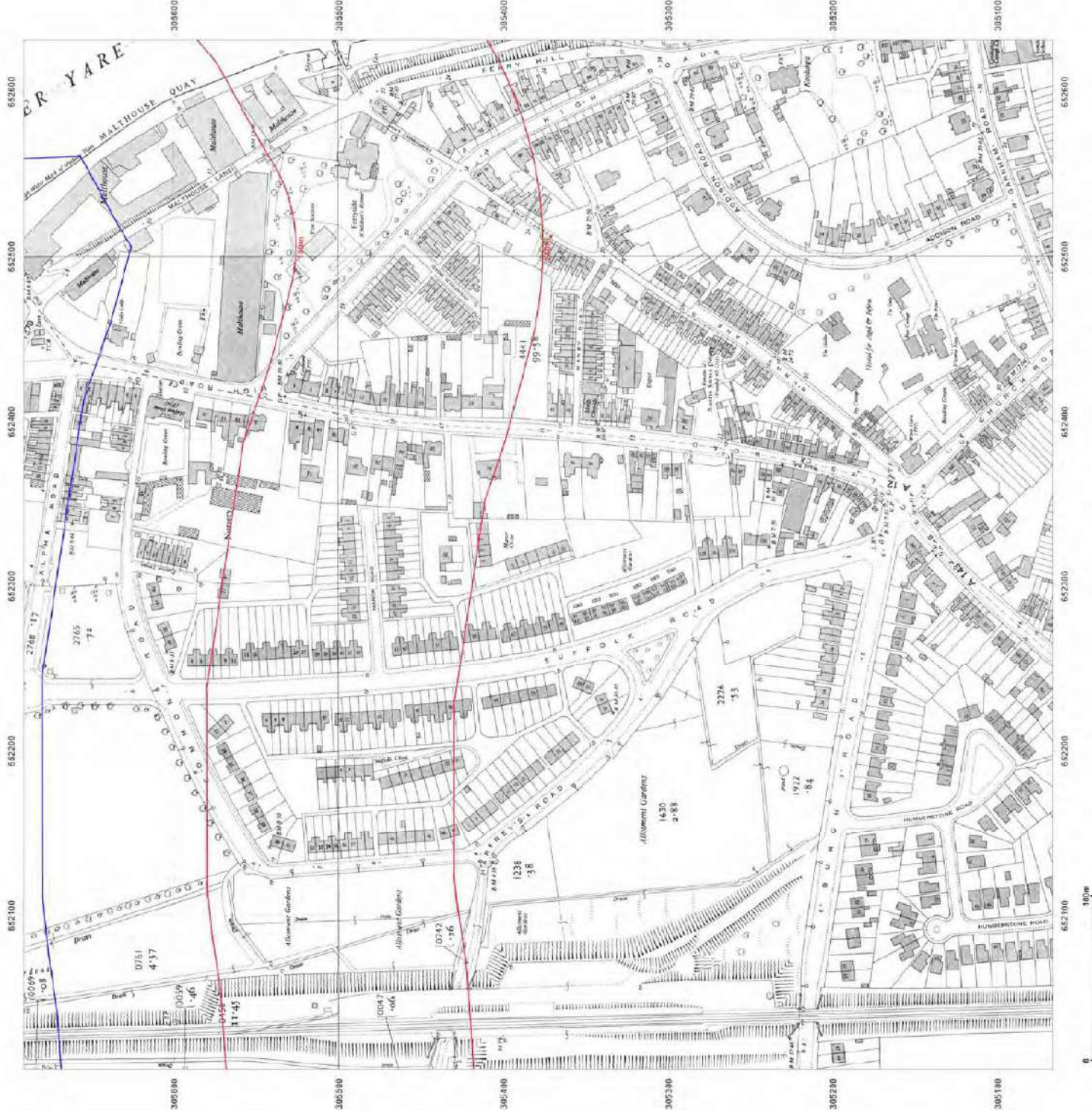


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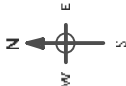
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Map Name: National Grid

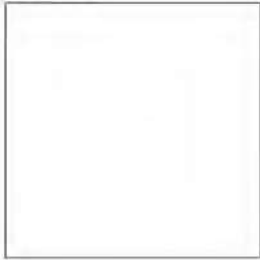
Map date: 1968

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1968
Revised 1968
Edition N/A
Copyright 1989
Levelled 1958



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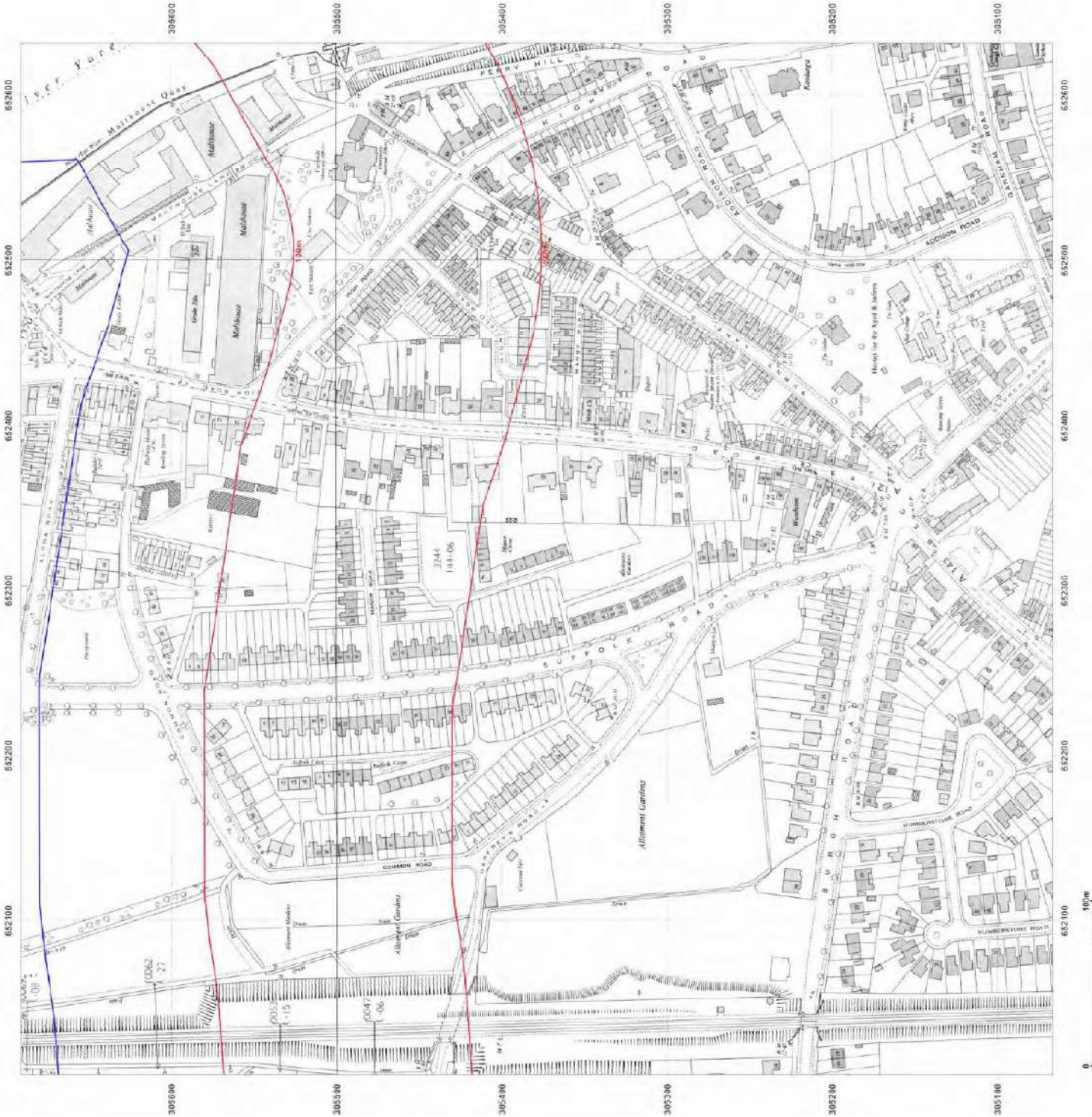


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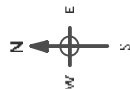
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Grid Ref: 652319, 305004

Map Name: County Series

Map date: 1883

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1883
Revised 1883
Edition N/A
Copyright N/A
Levered N/A

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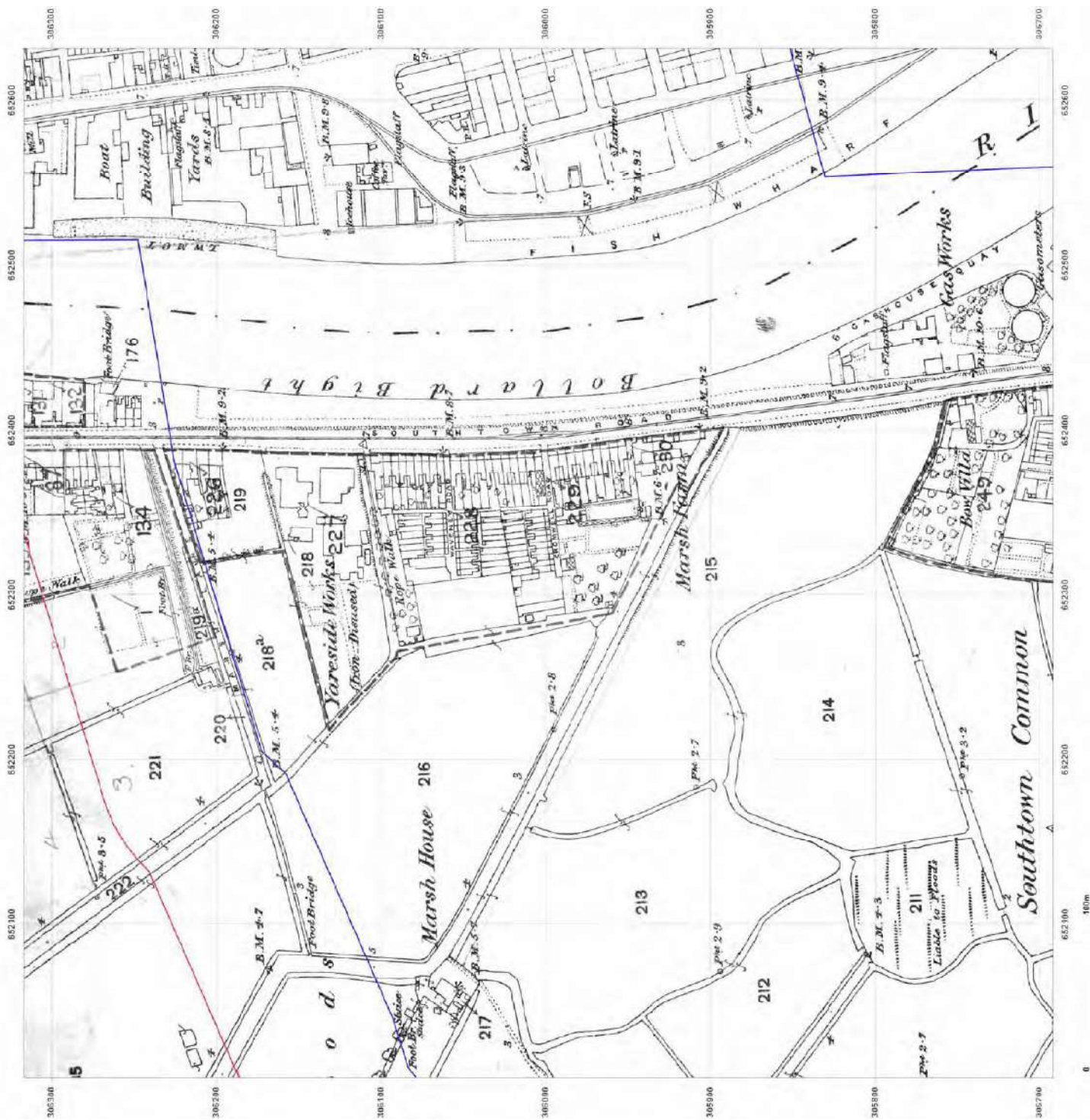


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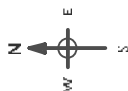
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Grid Ref: 652319, 305004

Map Name: County Series

Map date: 1887

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1887
Revised 1887
Edition N/A
Copyright N/A
Levelled N/A

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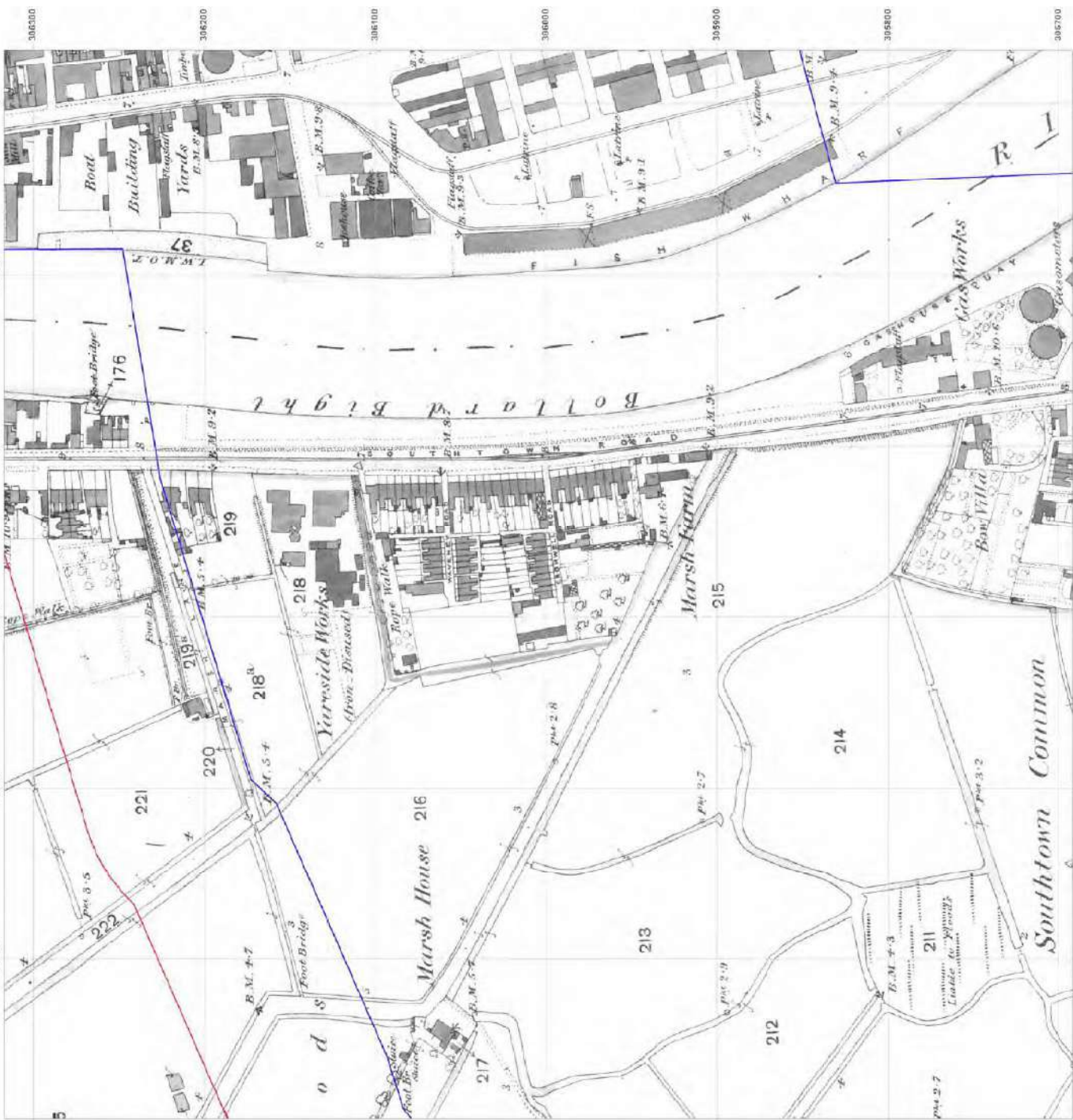


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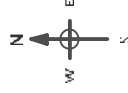
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Grid Ref: 652319, 305004

Map Name: County Series

Map date: 1927

Scale: 1:2,500

Printed at: 1:2,500



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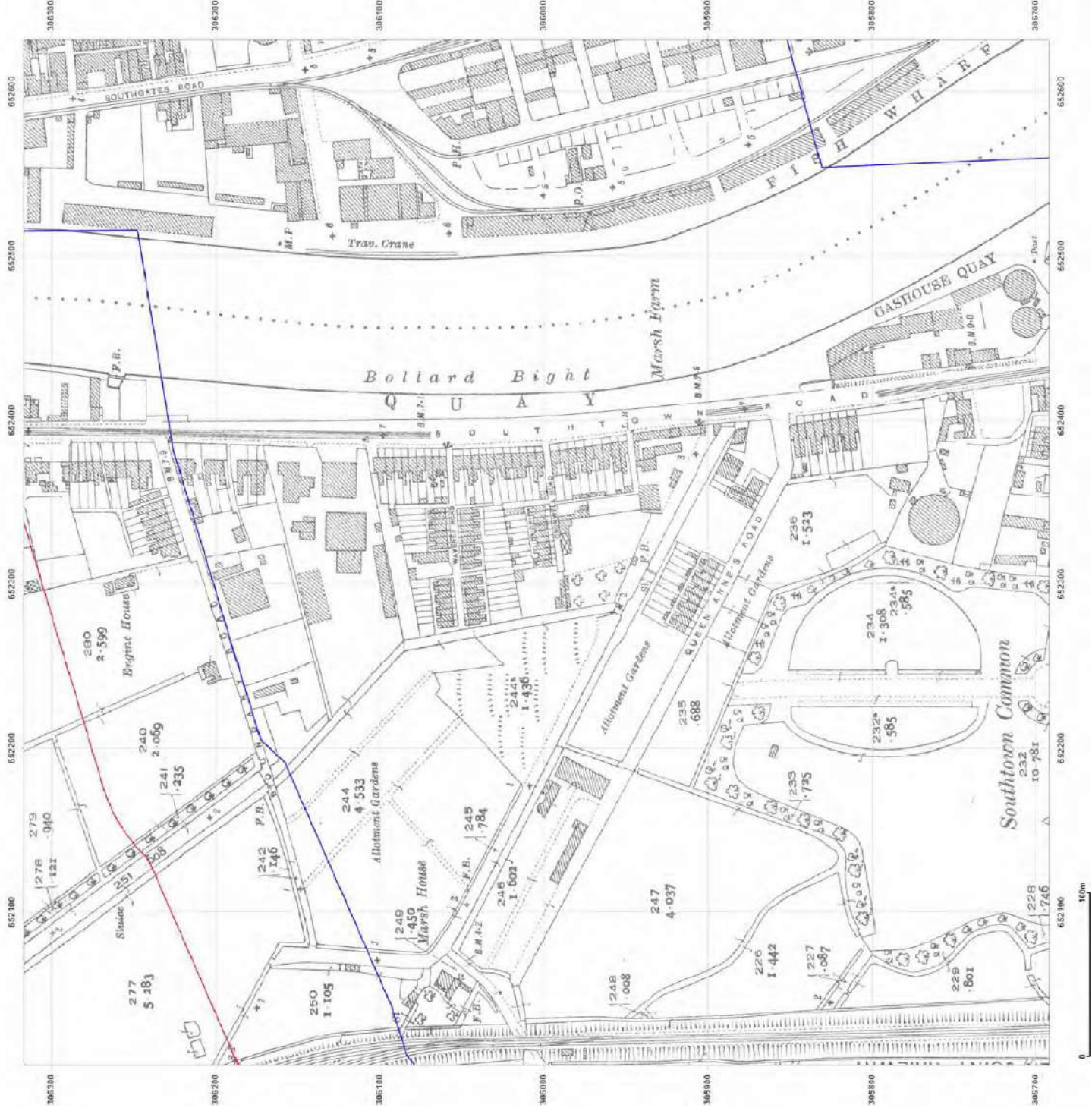


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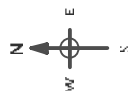
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Grid Ref: 652319, 305004

Map Name: National Grid

Map date: 1949

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1949
Revised 1949
Edition N/A
Copyright N/A
Levelled 1948

Surveyed 1949
Revised 1949
Edition N/A
Copyright N/A
Levelled 1948

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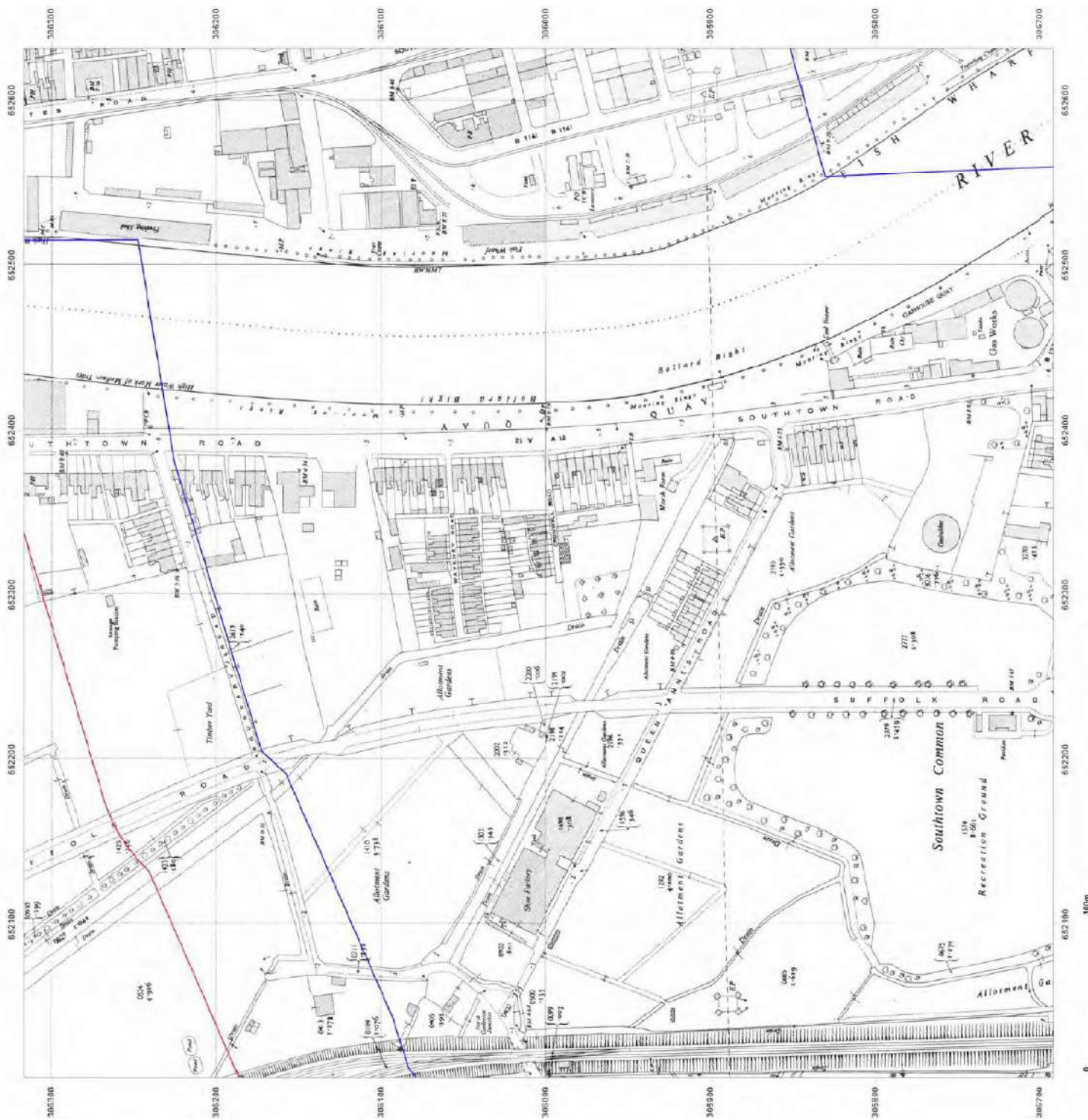


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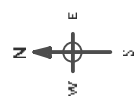
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Report Ref: CMAPS-CM-636391-16287-030717HIS_LS_2_2
Grid Ref: 652319, 305004

Map Name: National Grid

Map date: 1951

Scale: 1:2,500

Printed at: 1:2,500



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

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



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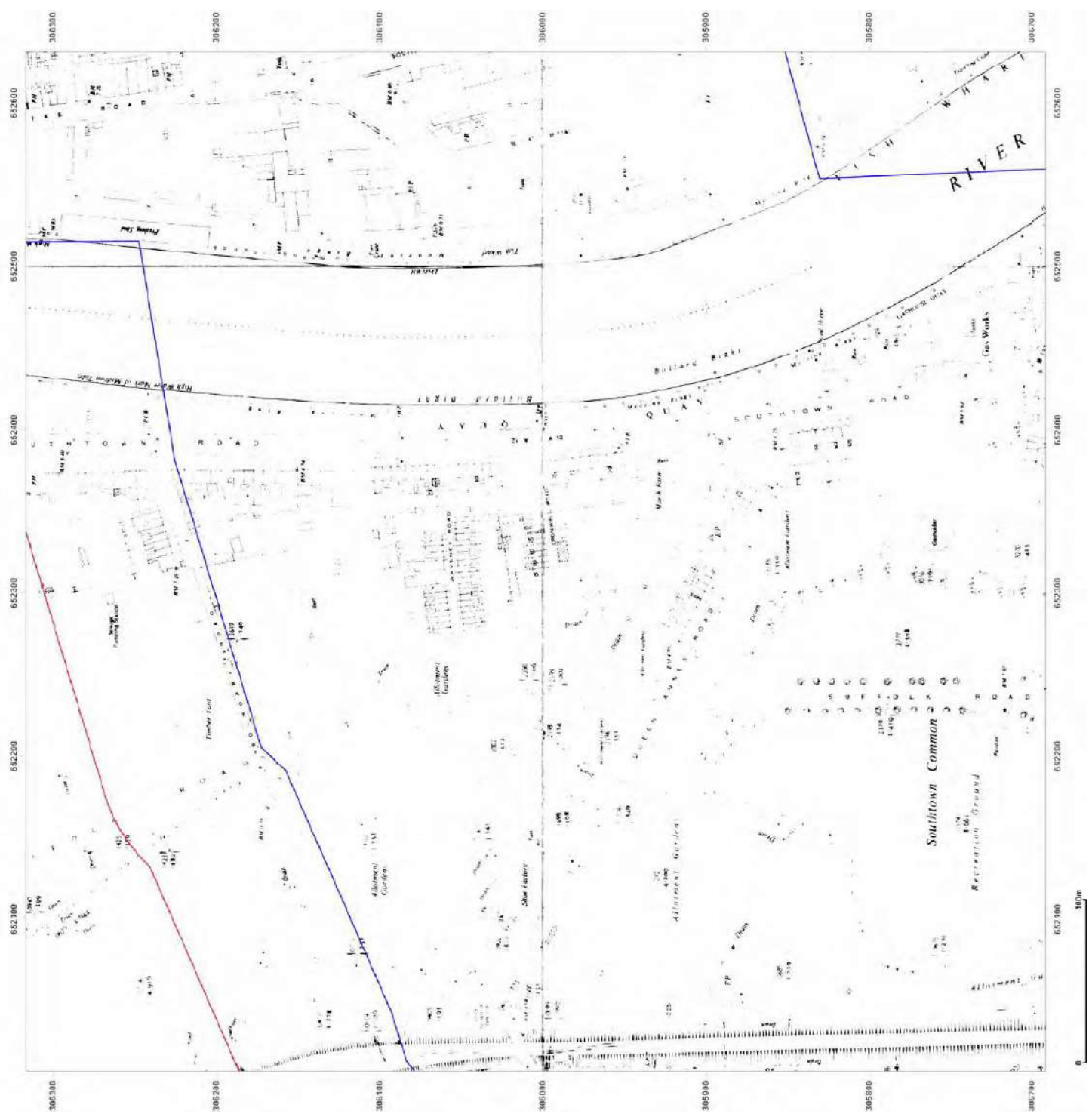


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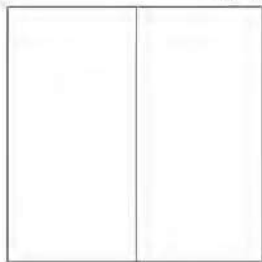
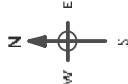
To view map legend click here [Legend](#)



Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_LS_2_2
Grid Ref: 652319, 306004

Map Name: National Grid
Map date: 1958
Scale: 1:2,500
Printed at: 1:2,500



Surveyed 1958
 Revised 1958
 Edition 1960
 Copyright 1960
 Levelled 1968



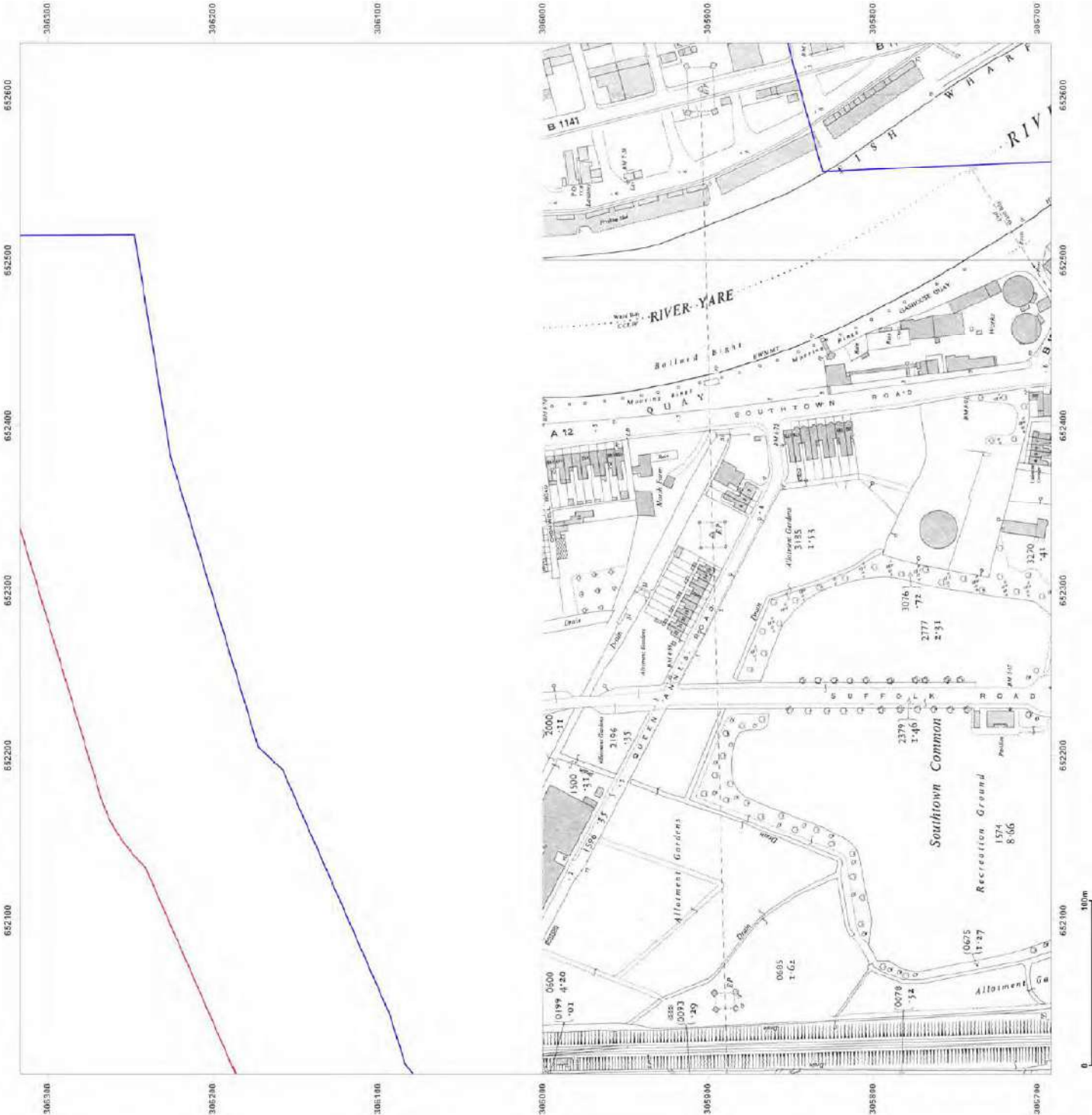
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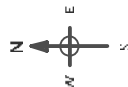
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Report Ref: CMAPS-CM-636391-16287-030717HIS_LS_2_2
Grid Ref: 652319, 3056004

Map Name: National Grid

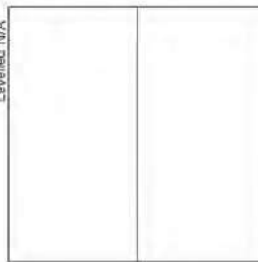
Map date: 1965

Scale: 1:2,500

Printed at: 1:2,500



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



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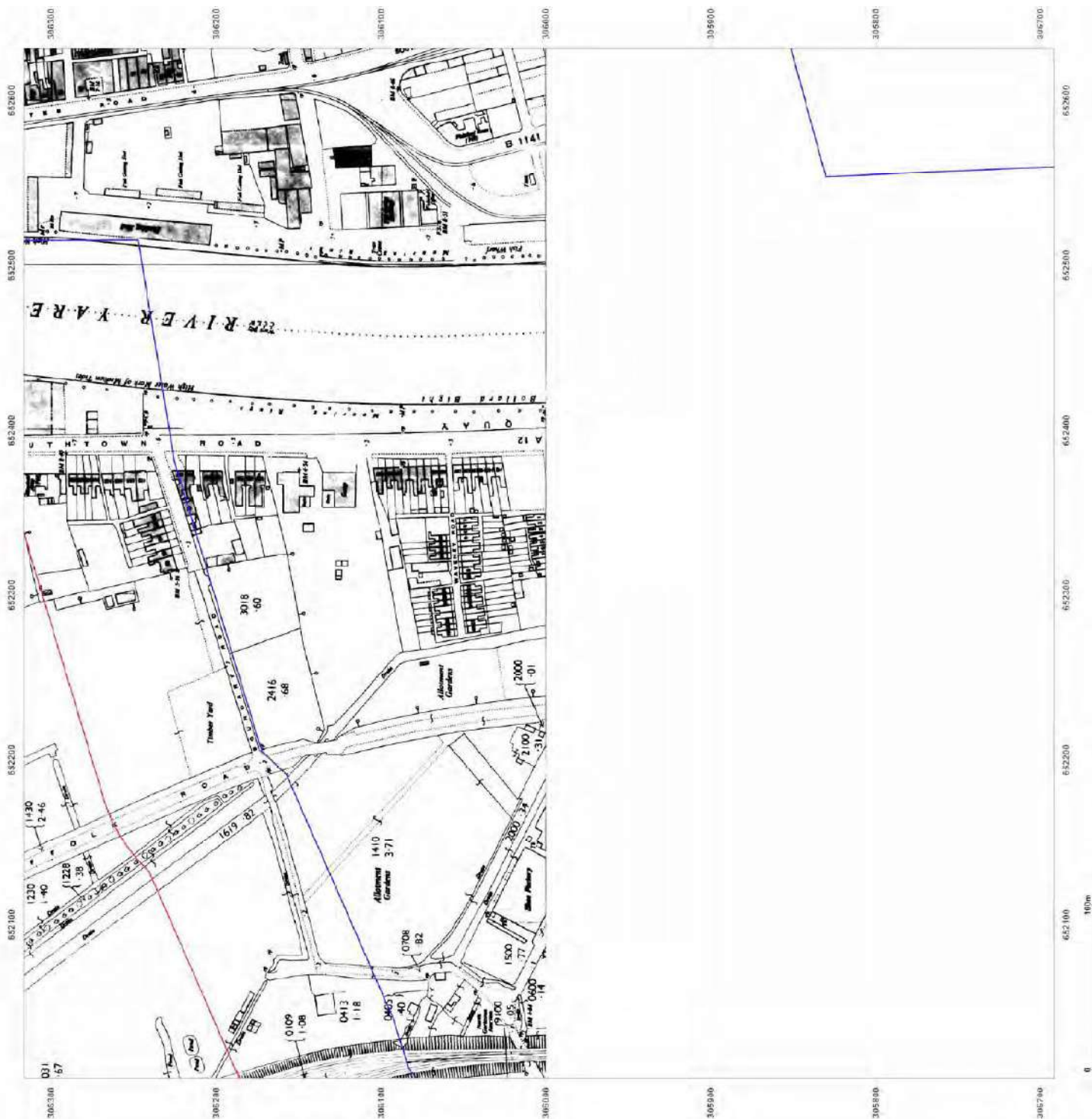


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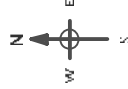
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Grid Ref: 652319, 305004

Map Name: National Grid

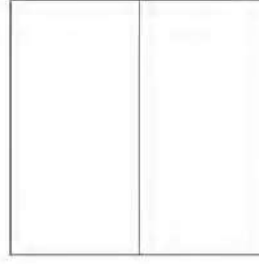
Map date: 1963-1968

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1963
Revised 1963
Edition 1965
Copyright 1965
Levelled 1958



Surveyed 1968
Revised 1968
Edition N/A
Copyright 1969
Levelled 1958



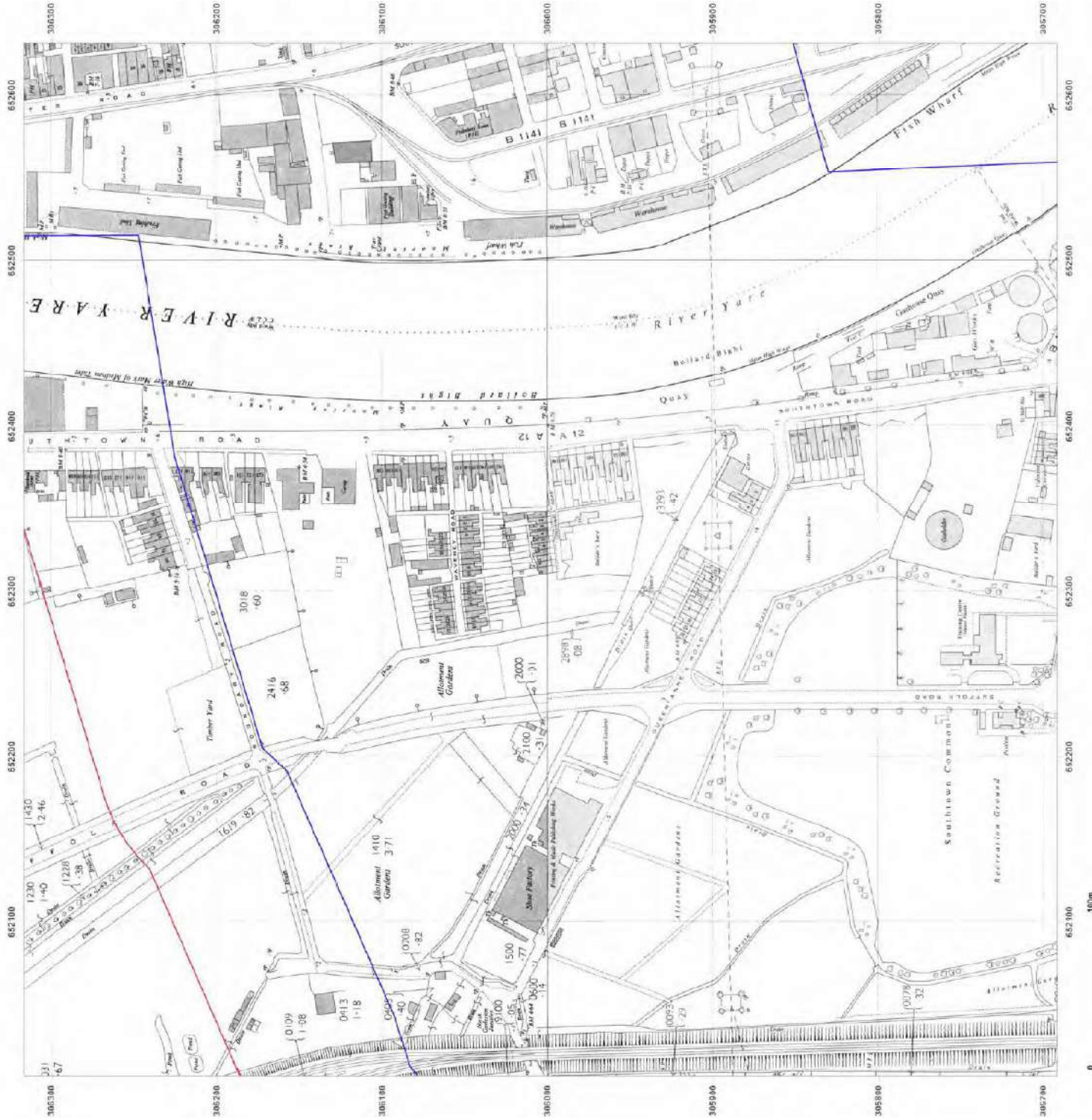
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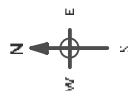
Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_LS_2_3
Gnd Ref: 652319, 306630

Map Name: County Series

Map date: 1883

Scale: 1:2,500

Printed at 1:2,500



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

Surveyed 1883
Revised 1883
Edition N/A
Copyright N/A
Levelled N/A



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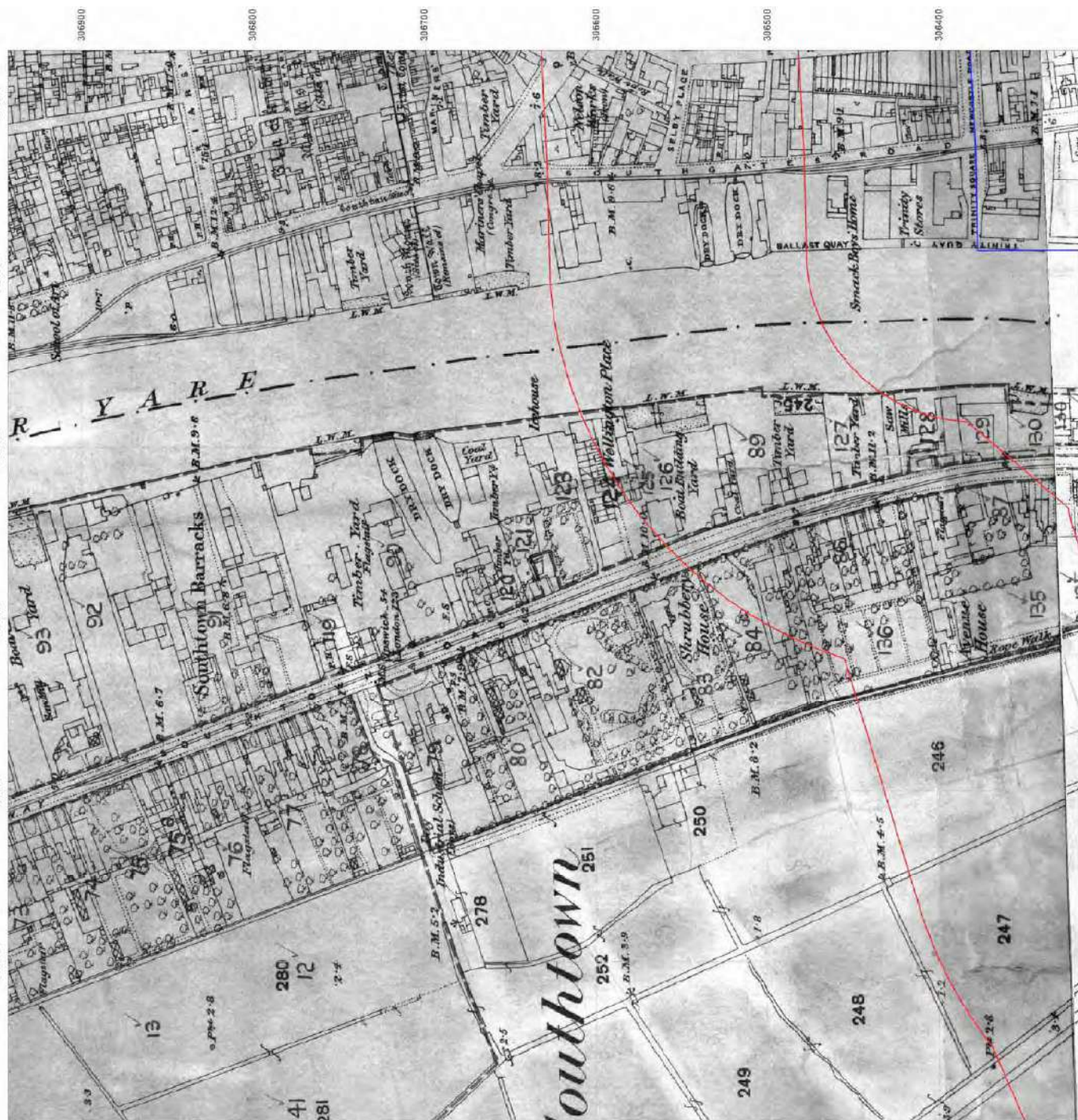


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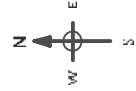
To view map legend click here [Legend](#)



Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_LS_2_3
Grid Ref: 652319, 306630

Map Name: County Series
Map date: 1887
Scale: 1:2,500
Printed at: 1:2,500



Surveyed 1887
Revised 1887
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1887
Revised 1887
Edition N/A
Copyright N/A
Levelled W/A

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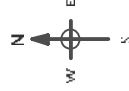
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Report Ref: CMAPS-CM-636391-16287-030717HIS_LS_2_3
Grid Ref: 652319, 306630

Map Name: County Series

Mapdate: 1905-1906

Scale: 1:2,500

Printed at 1:2,500



Surveyed 1905
Revised 1905
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1883	Copyright N/A
Revised 1904	Levelled N/A
Edition 1906	



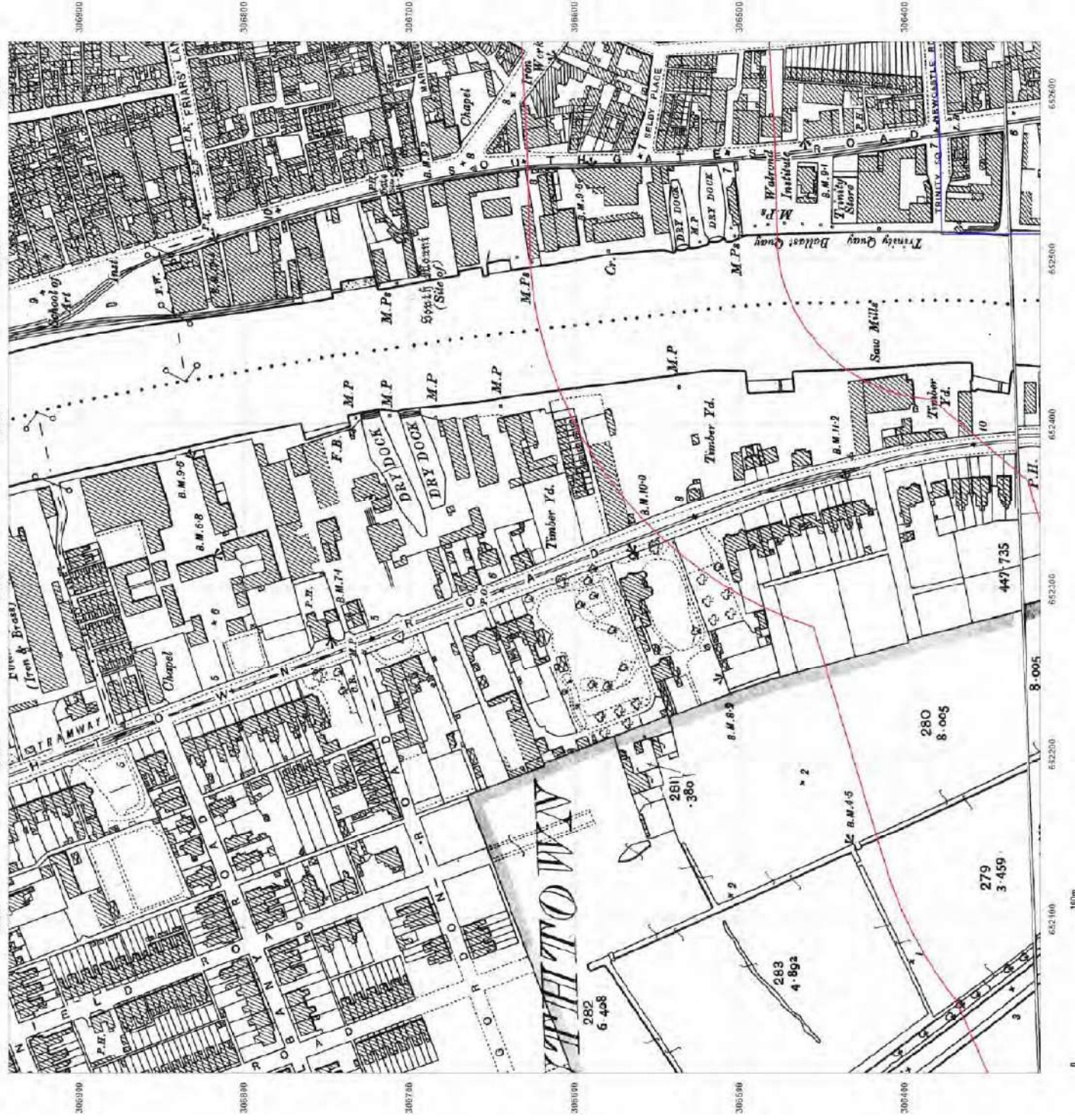
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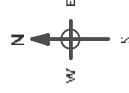
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Report Ref: CMAPS-CM-636391-16287-030717HIS_LS_2_3
Grid Ref: 652319, 306630

Map Name: County Series

Mapdate: 1927-1928

Scale: 1:2,500

Printed at 1:2,500



Surveyed 1928
Revised 1928
Edition N/A
Copyright N/A
Levellled N/A

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



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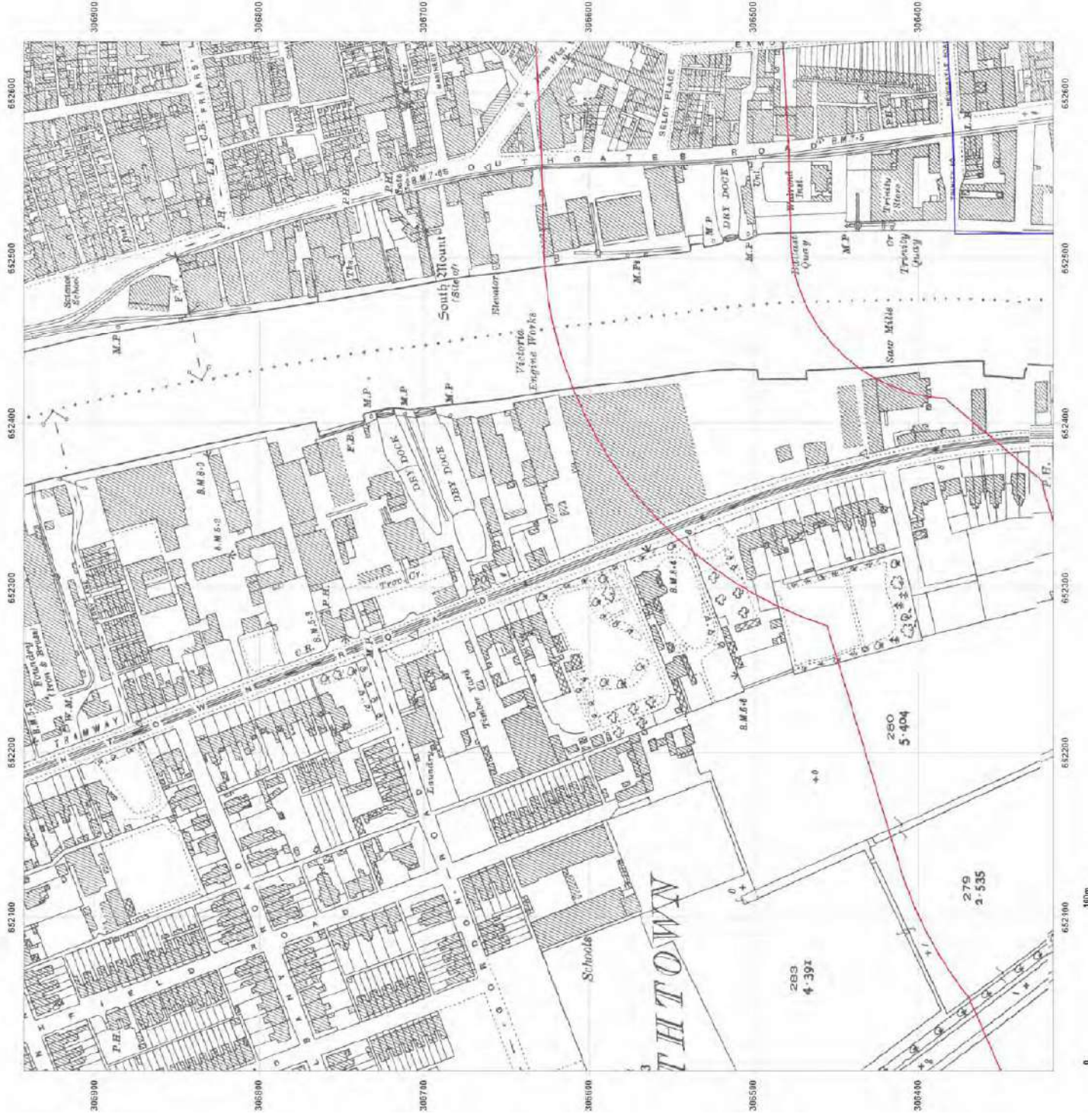


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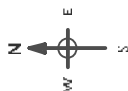
Client Ref: 16287
Report Ref: CMAP5-CM-636391-16287-030717HIS_LS_2_3
GMD Ref: 652319, 306630

Map Name: National Grid

Map date: 1949

Scale: 1:2,500

Printed at 1:2,500



Surveyed 1949
Revised 1949
Edition N/A
Copyright N/A
Levelled 1946



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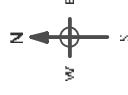
Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_LS_2_3
Grid Ref: 652319, 306630

Map Name: National Grid

Map date: 1951

Scale: 1:2,500

Printed at: 1:2,500



Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Labeled N/A



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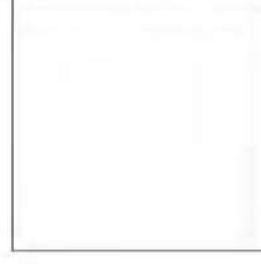
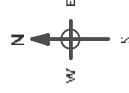
Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_LS_2_3
Ghd Ref: 652319, 306630

Map Name: National Grid

Mapdate: 1963

Scale: 1:2,500

Printed at 1:2,500



Surveyed 1863
Revised 1903
Edition 1965
Copyright 1985
Levelled 1958



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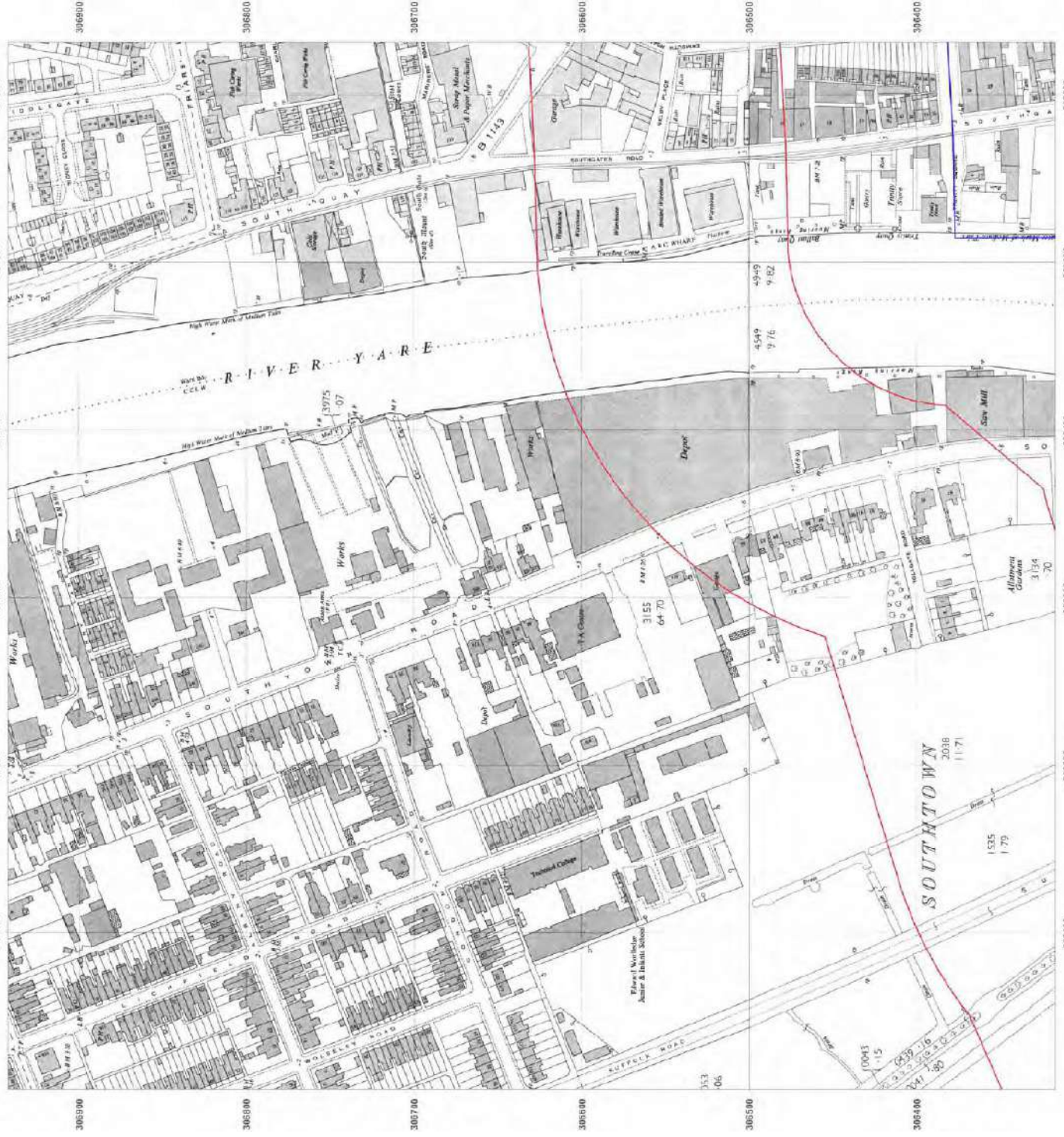


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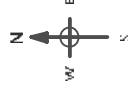
Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS_LS_2_3
Grid Ref: 652319, 306630

Map Name: National Grid

Map date: 1965

Scale: 1:2,500

Printed at: 1:2,500



Survived N/A
Revised N/A
Edition N/A
Copyright N/A
Labeled N/A



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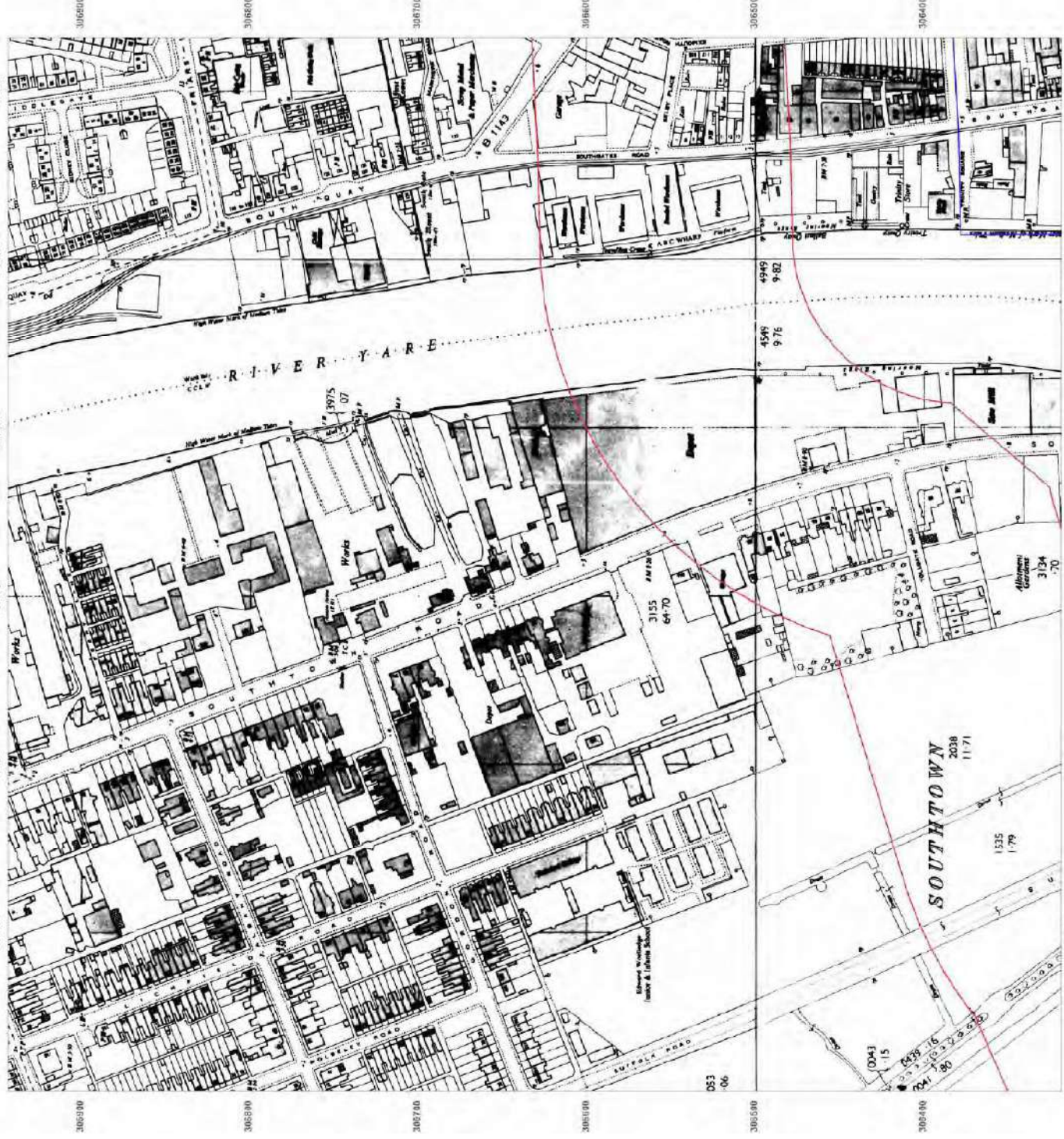


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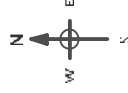
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Report Ref: CMAPS-CM636391-16287-030717HIS_LS_3_1
Ghd Ref: 652945, 305379

Map Name: County Series

Map date: 1883

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1883
Revised 1883
Edition N/A
Copyright N/A
Levelled N/A

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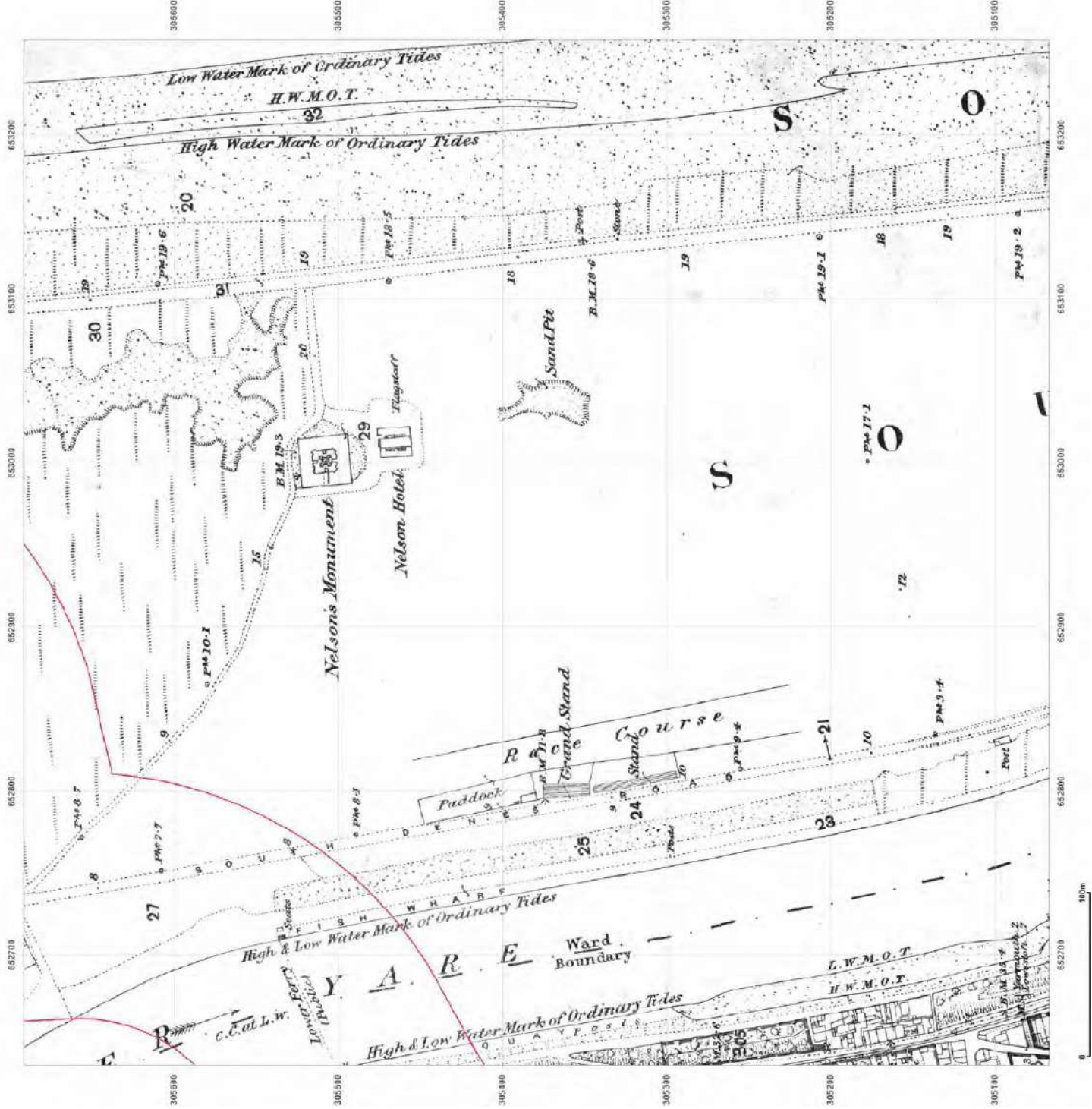


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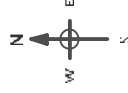
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Report Ref: CMAPS-CM636391-16287-030717HIS_LS_3_1
Grid Ref: 652945, 305379

Map Name: County Series

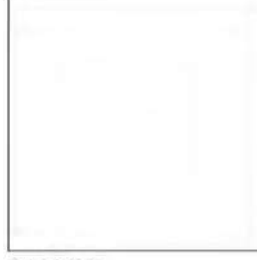
Map date: 1887

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1887
Revised 1887
Edition N/A
Copyright N/A
Levelled N/A



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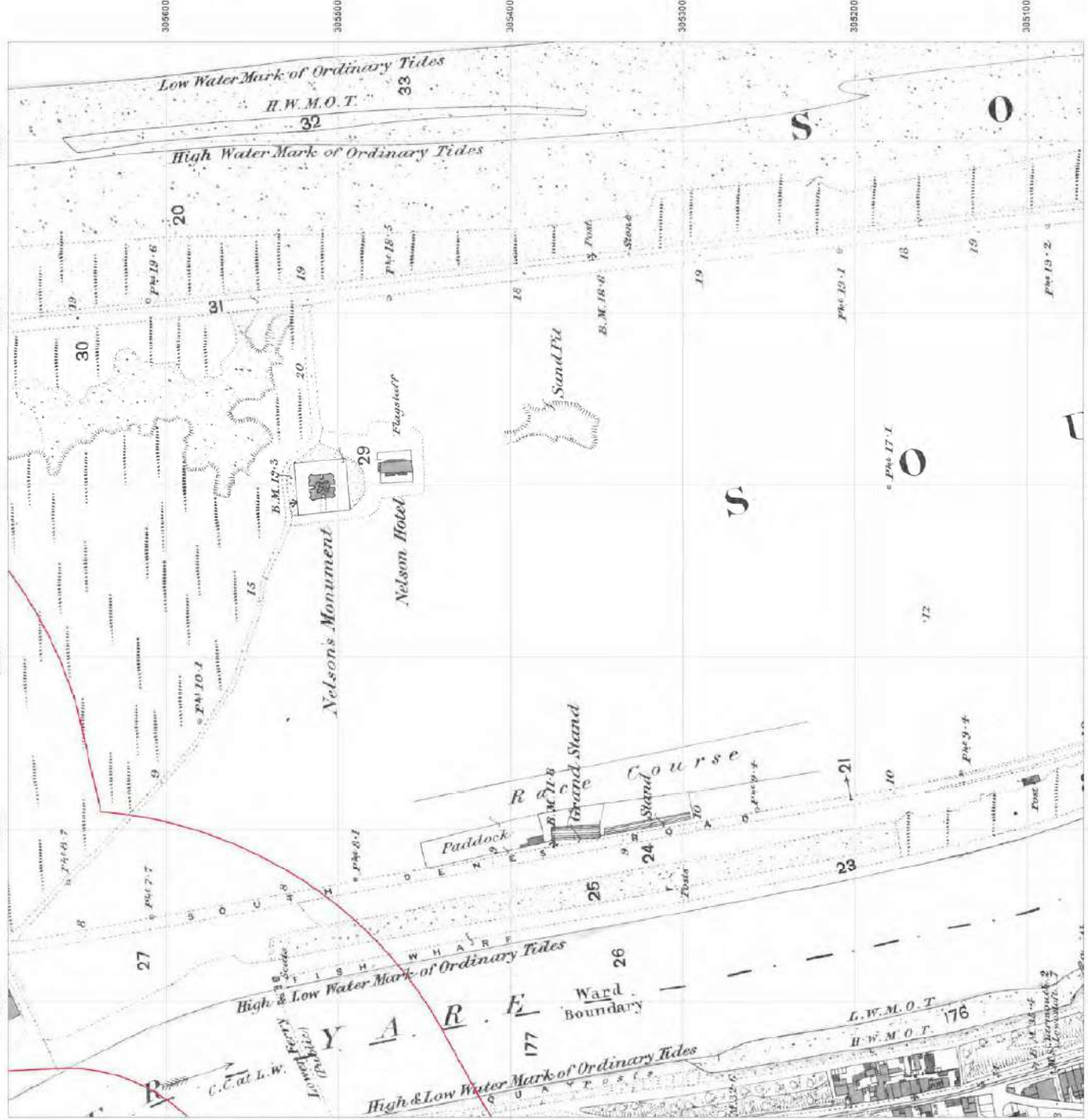


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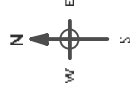
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Report Ref: CMAPS-CM636391-16287-030717HIS_LS_3.1
Grid Ref: 652945, 305379

Map Name: County Series

Map date: 1927

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1927
Revised 1927
Edition N/A
Copyright N/A
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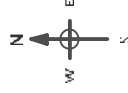
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Report Ref: CMAPS-CM636391-16287-030717HIS_LS_3.1
Grid Ref: 652945, 305379

Map Name: National Grid

Map date: 1949

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1949
Revised 1949
Edition N/A
Copyright N/A
Levelled 1949

Surveyed 1949
Revised 1949
Edition N/A
Copyright N/A
Levelled 1949

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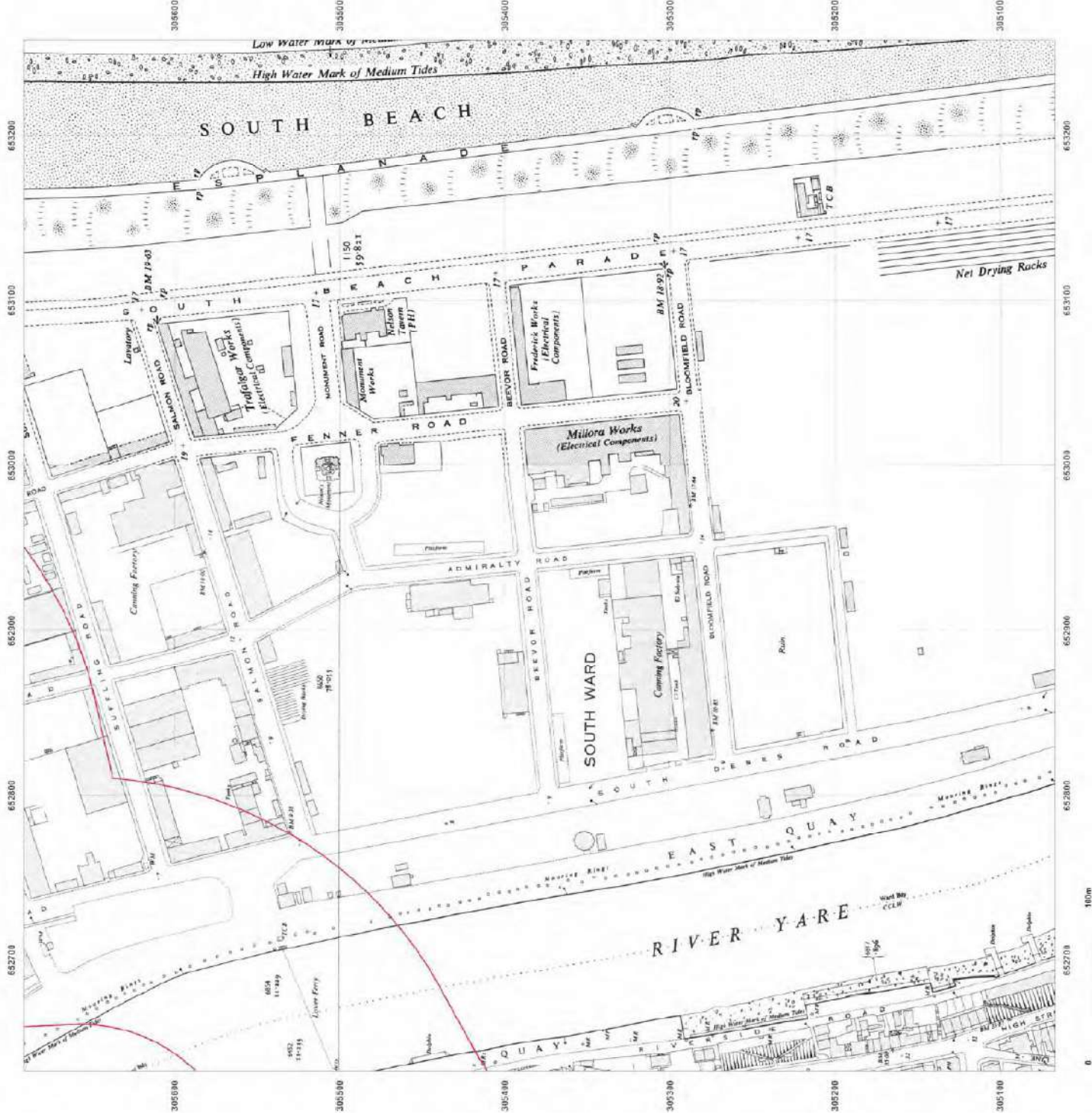


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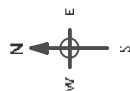
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Grid Ref: 652945, 305379

Map Name: National Grid

Map date: 1950-1951

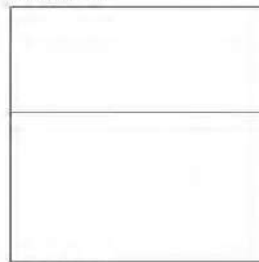
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Printed at: 1:2,500



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

Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
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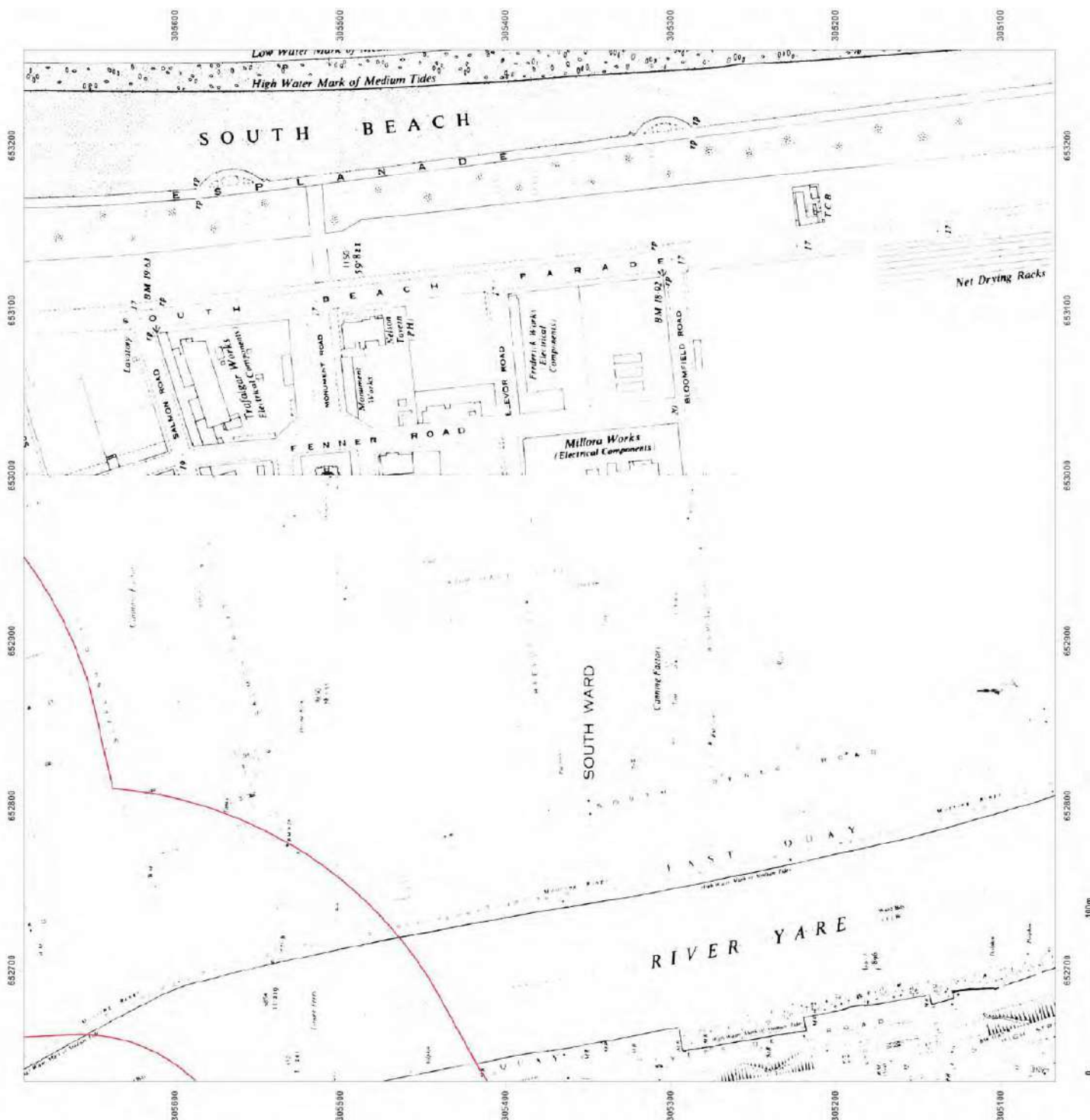


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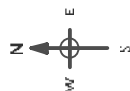
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Report Ref: CMAPS-CM636391-16287-030717HIS_LS_3_1
Grid Ref: 652945, 305379

Map Name: National Grid

Map date: 1958

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1958
Revised 1958
Edition 1960
Copyright 1960
Levelled 1940



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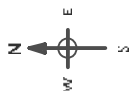
Client Ref: 16287
Report Ref: CMAPS-CM636391-16287-030717HIS_LS_3_1
Grid Ref: 652945, 305379

Map Name: National Grid

Map date: 1968

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1968
Revised 1968
Edition N/A
Copyright 1969
Levelled 1958



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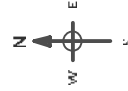
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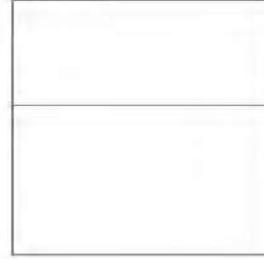
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Grid Ref: 652945, 305379

Map Name: National Grid
Map date: 1969
Scale: 1:2,500
Printed at: 1:2,500



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



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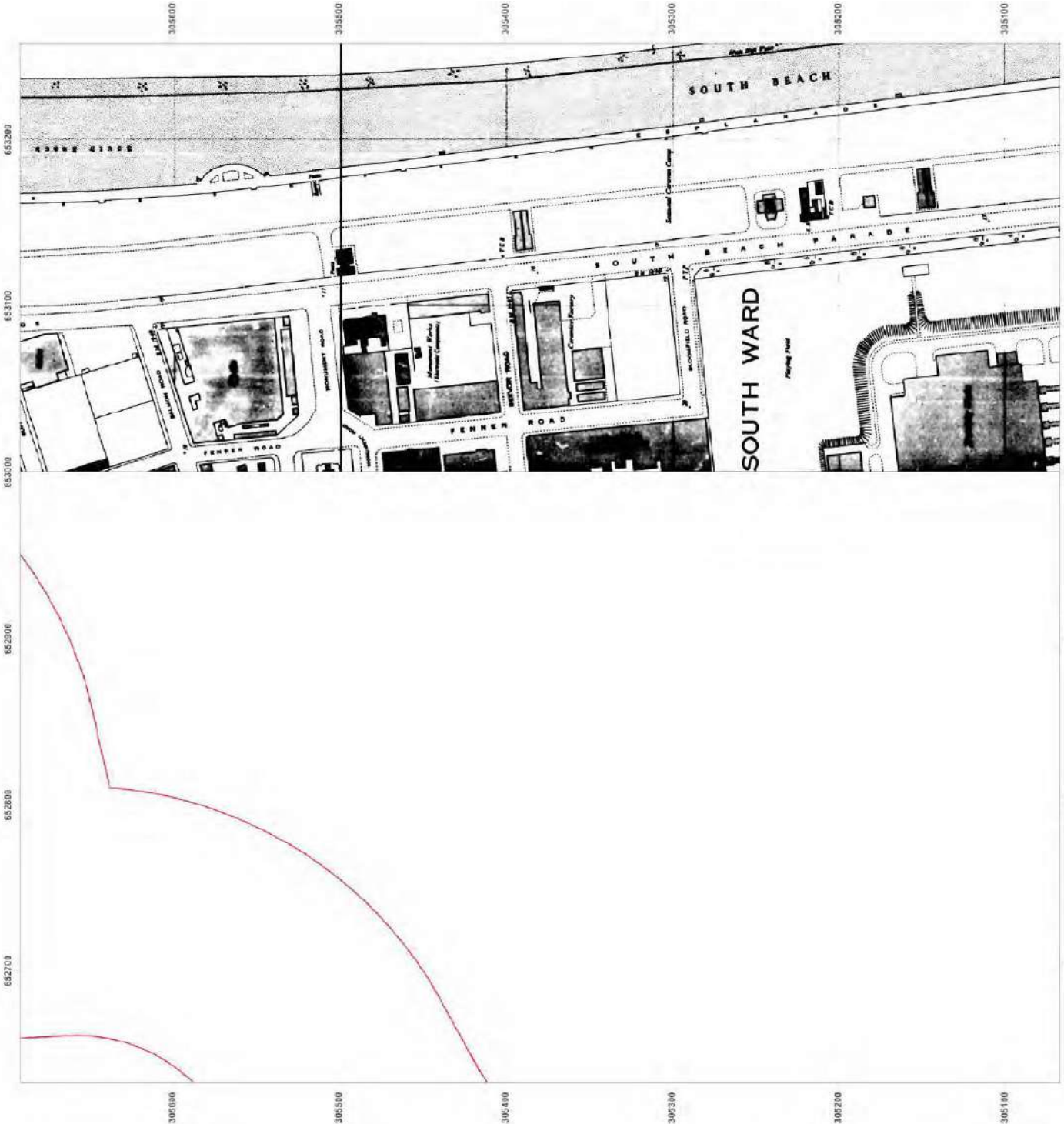


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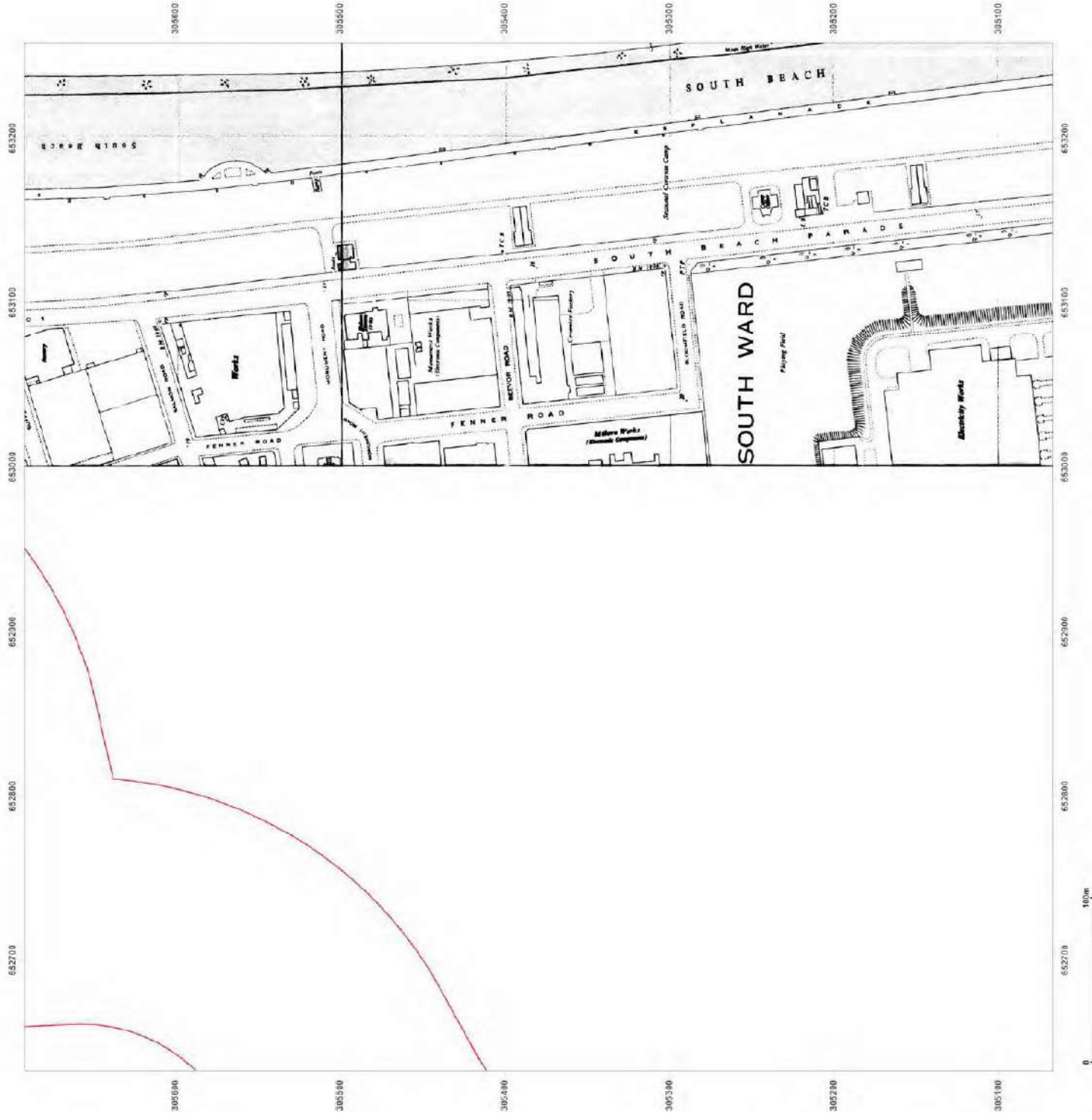
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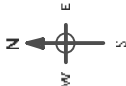
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Report Ref: CMAPS-CM-636391-16287-030717HIS_LS_3_2
Grid Ref: 652945, 306004

Map Name: County Series

Map date: 1883

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1883
Revised 1883
Edition N/A
Copyright N/A
Levelled N/A



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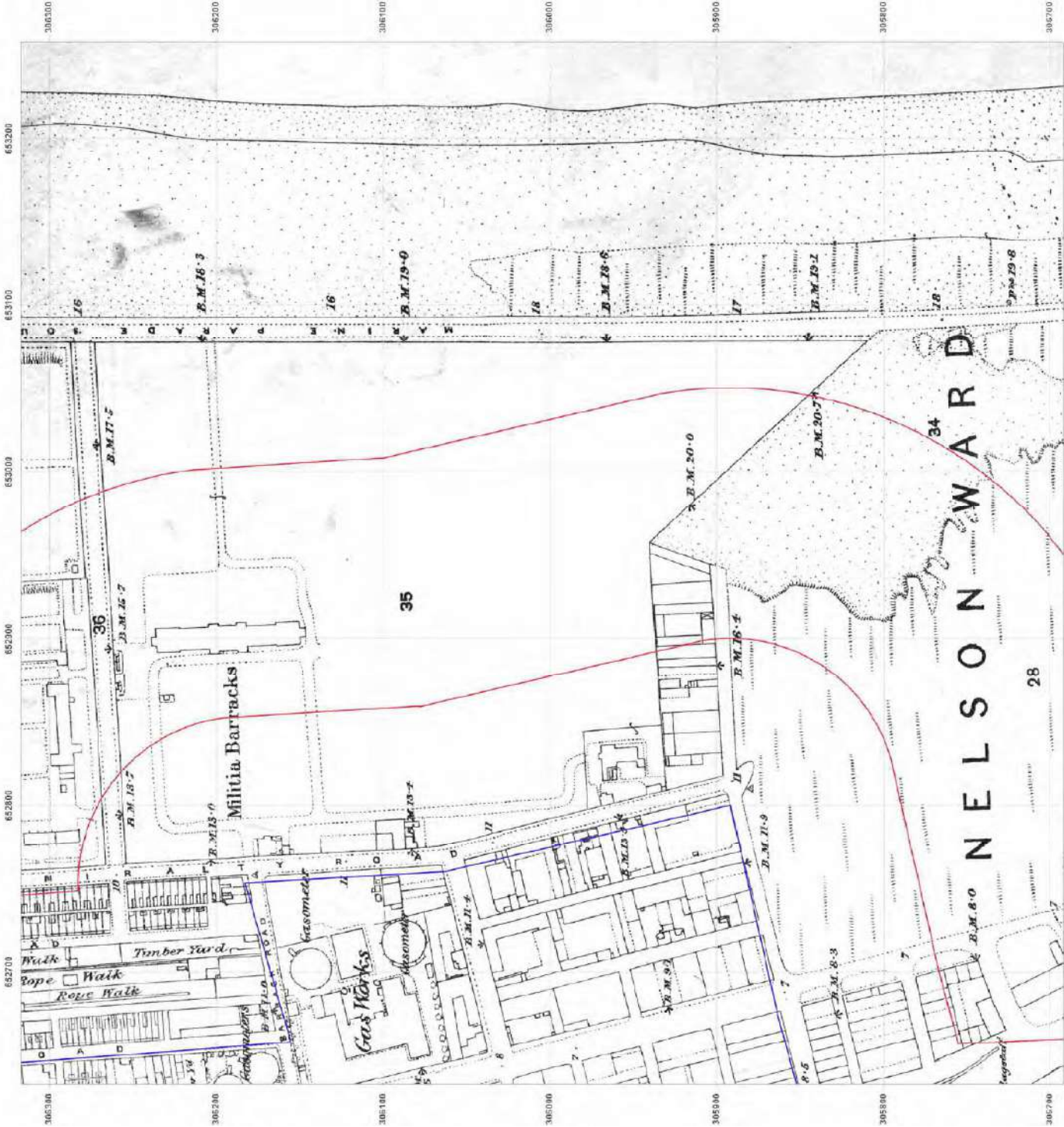


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0 100m

Site Details:

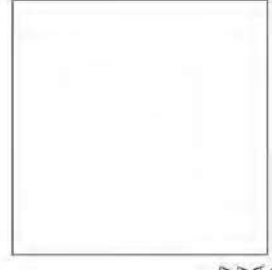
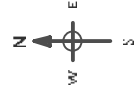
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Report Ref: CMAPS-CM-636391-16287-030717HIS_LS_3_2
Grid Ref: 652945, 306004

Map Name: County Series

Map date: 1887

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1887
Revised 1887
Edition N/A
Copyright N/A
Levelled N/A



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Production date: 03 July 2017

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Site Details:

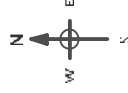
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Grid Ref: 652945, 306004

Map Name: County Series

Map date: 1906

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1883
Revised 1904
Edition 1906
Copyright N/A
Levelled N/A



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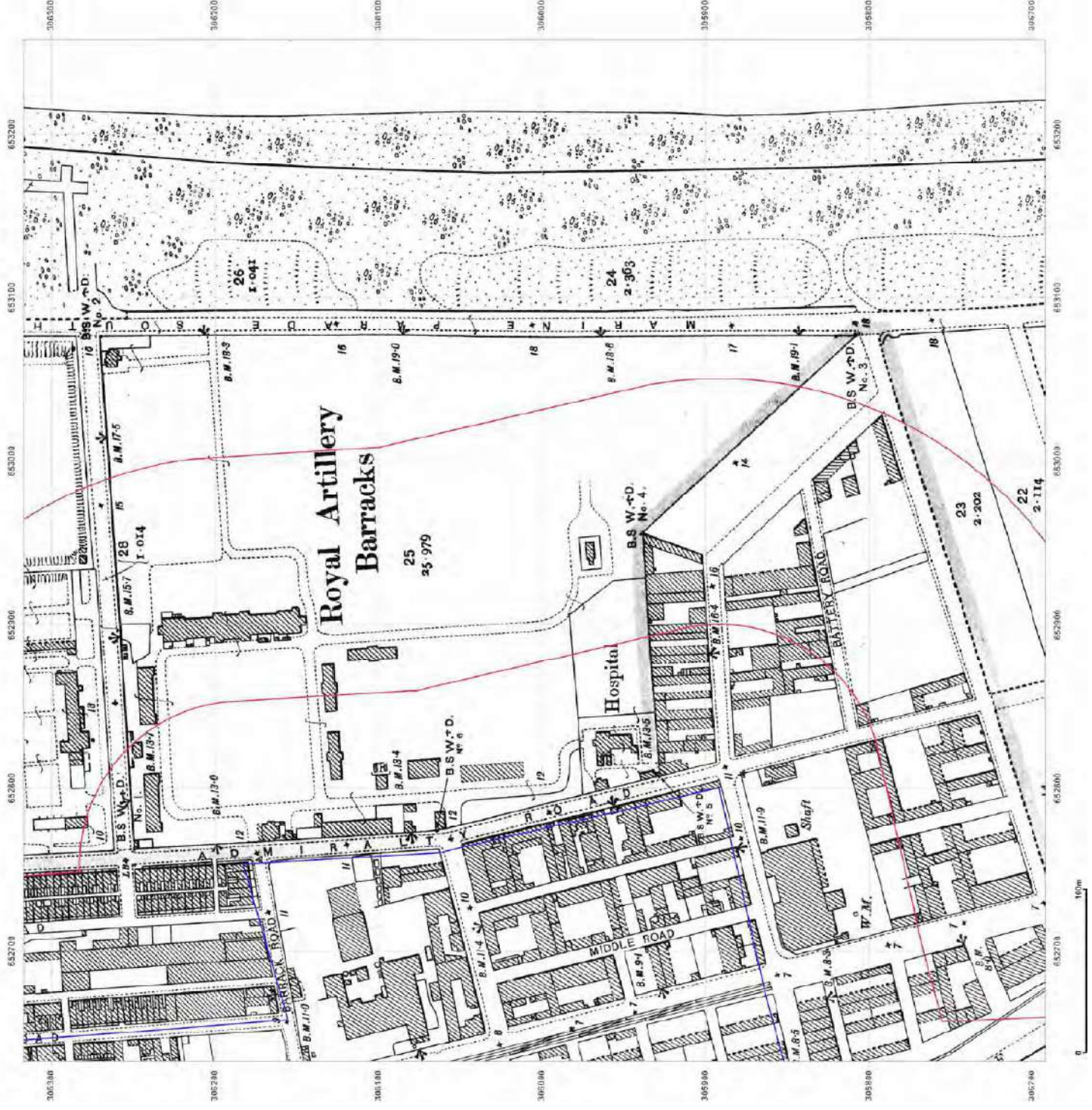


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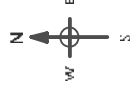
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Grid Ref: 652945, 306004

Map Name: County Series

Map date: 1927

Scale: 1:2,500

Printed at: 1:2,500



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



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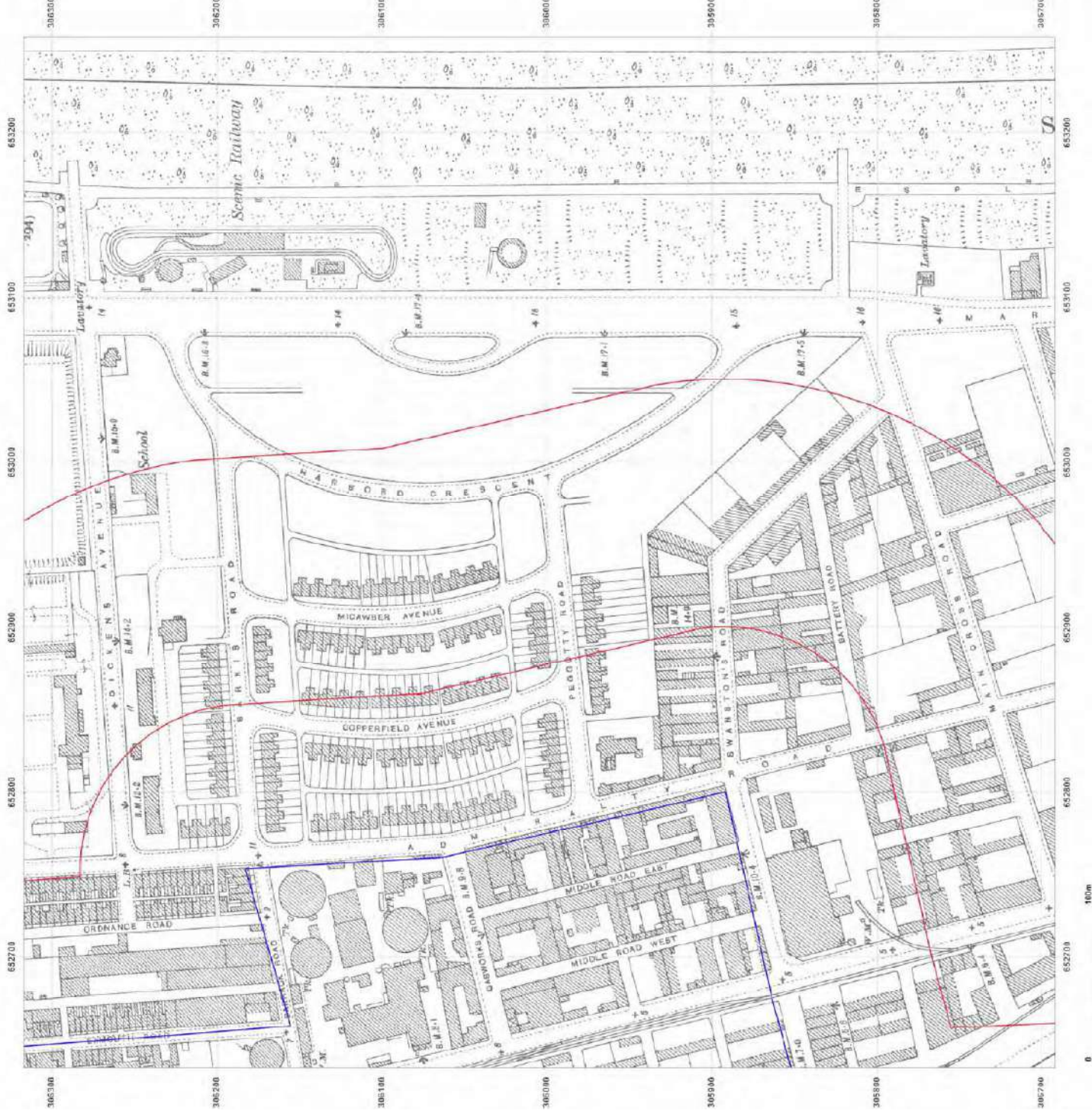


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Site Details:

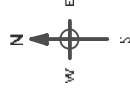
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Map Name: National Grid

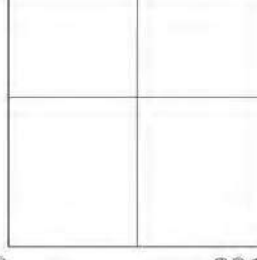
Map date: 1949

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1948
Revised 1949
Edition N/A
Copyright N/A
Levelled 1946



Surveyed 1949
Revised 1949
Edition N/A
Copyright N/A
Levelled 1946



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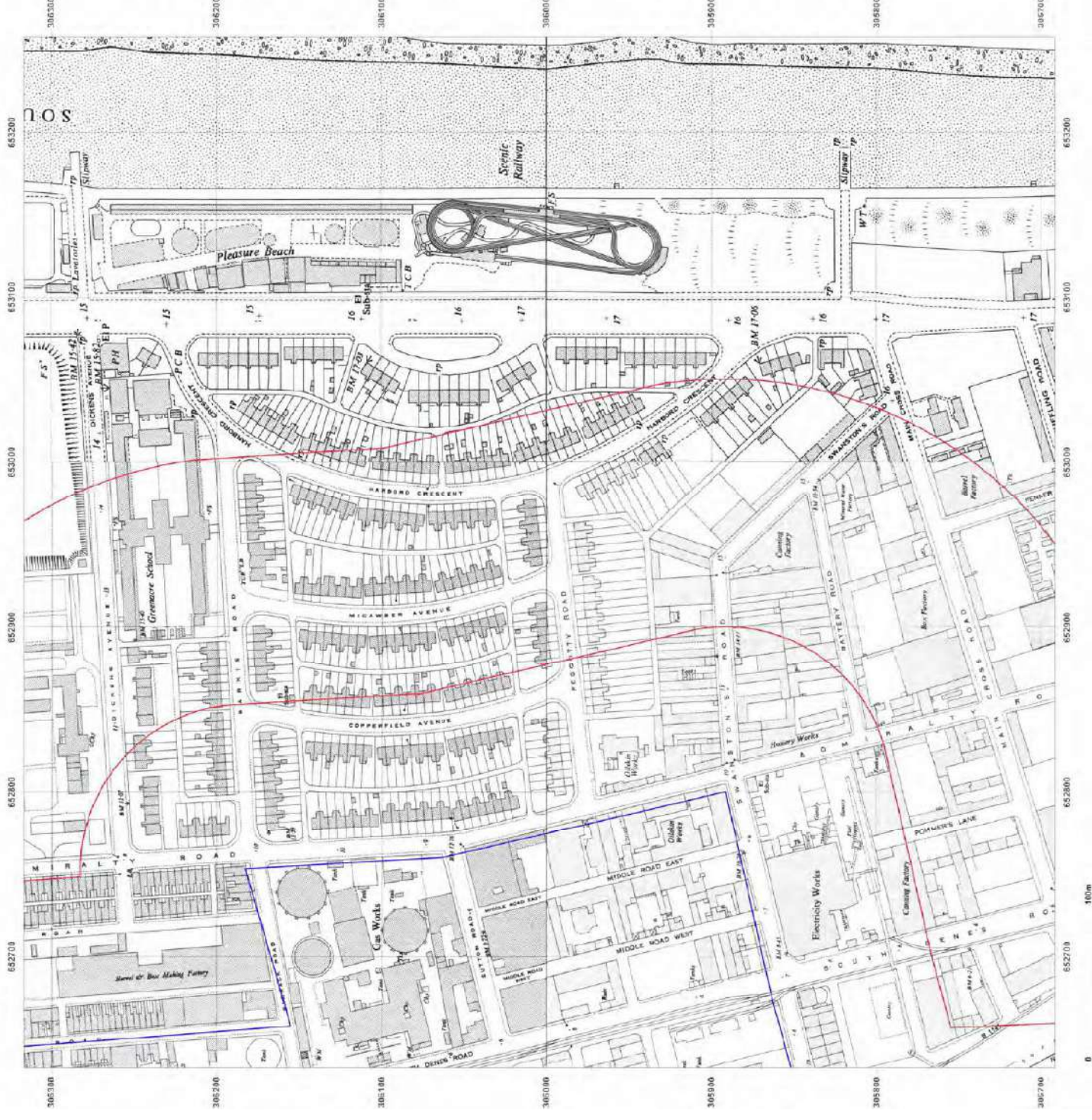


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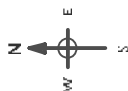
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Grid Ref: 652945, 306004

Map Name: National Grid

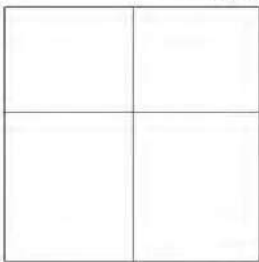
Map date: 1950-1951

Scale: 1:2,500

Printed at: 1:2,500



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



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



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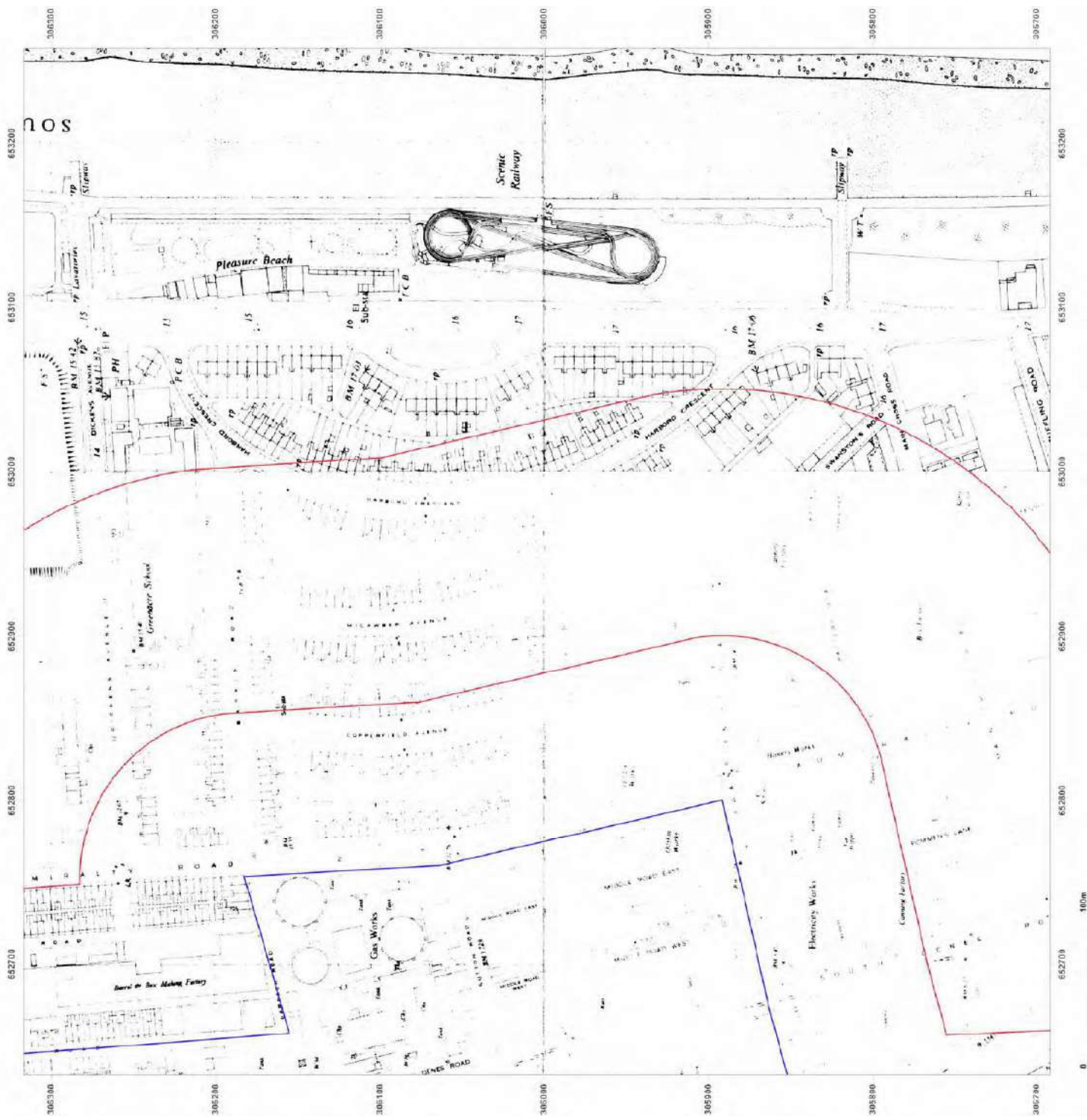


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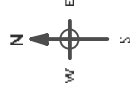
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Grid Ref: 652945, 306004

Map Name: National Grid

Map date: 1958

Scale: 1:2,500

Printed at: 1:2,500



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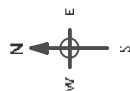
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Grid Ref: 652945, 306004

Map Name: National Grid

Map date: 1963-1968

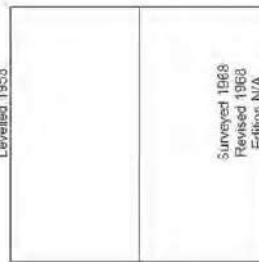
Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1863
Revised 1963
Edition 1965
Copyright 1965
Levelled 1953

Surveyed 1868
Revised 1968
Edition N/A
Copyright 1969
Levelled 1953



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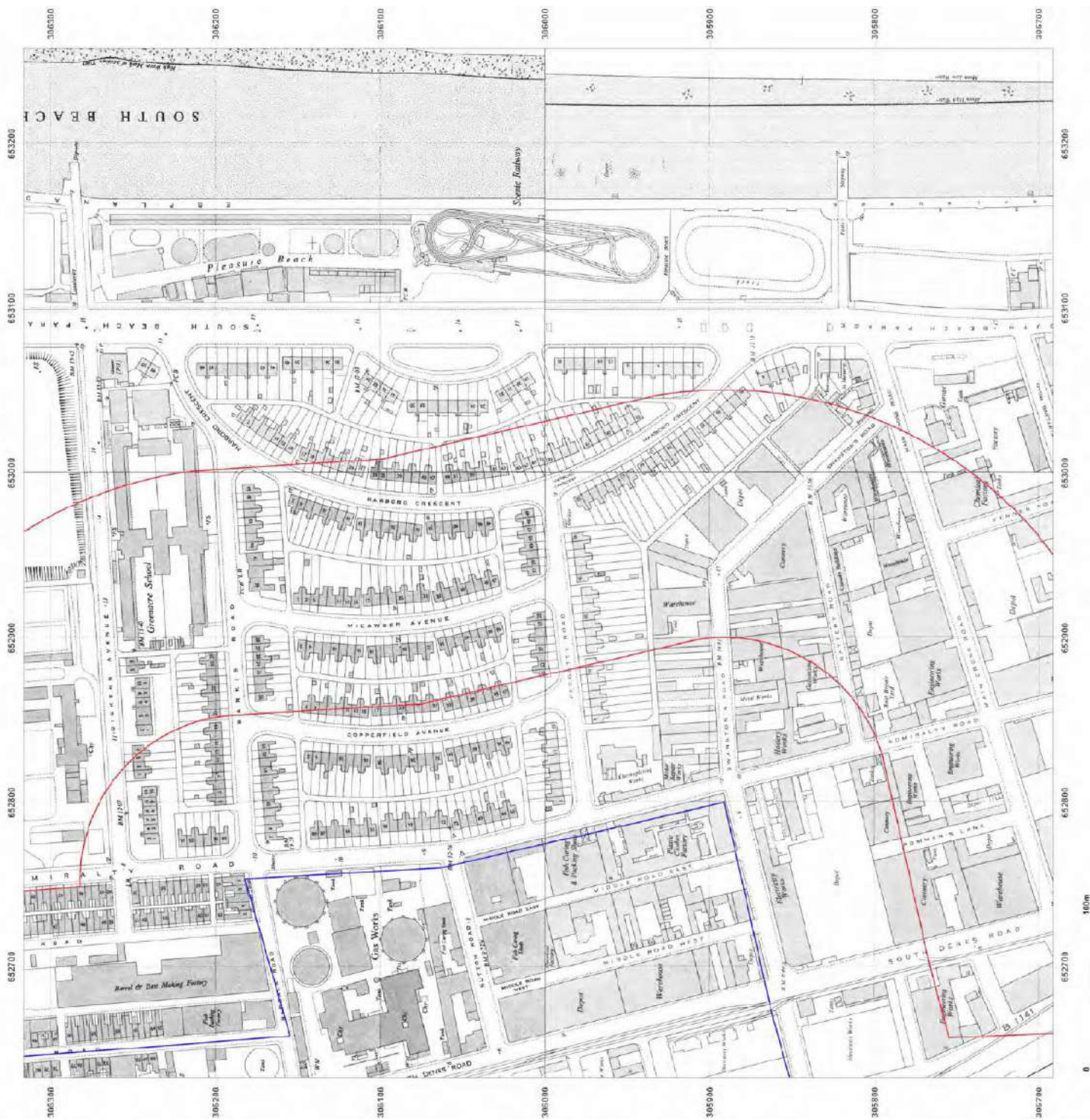


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0 100m

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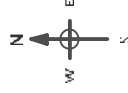
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Grid Ref: 652945, 306004

Map Name: National Grid

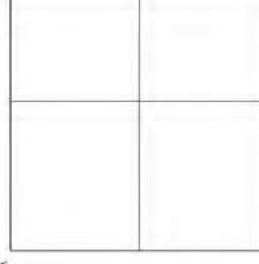
Map date: 1965-1969

Scale: 1:2,500

Printed at: 1:2,500



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



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



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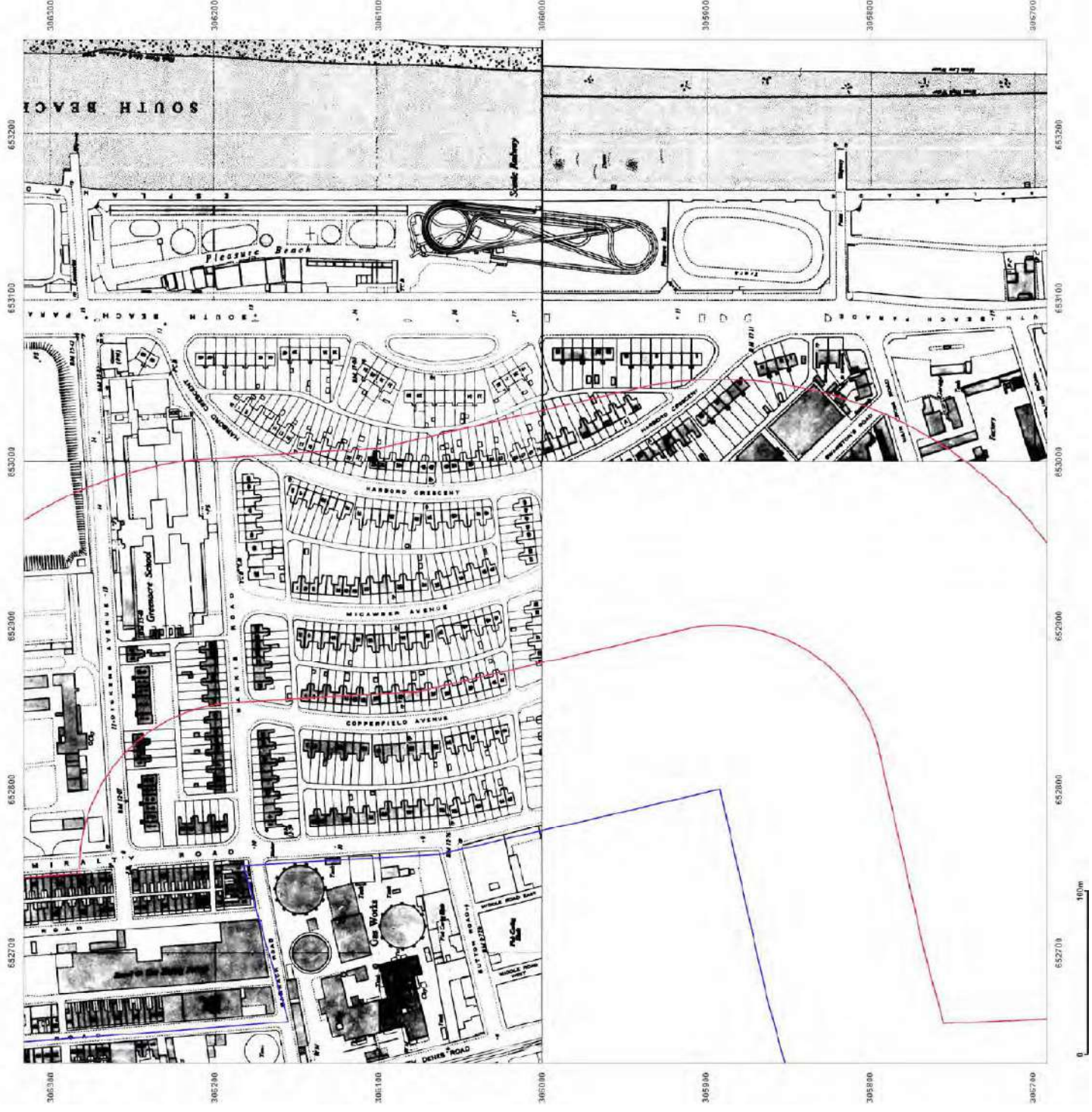


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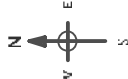




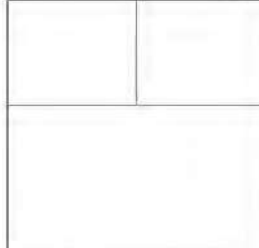
Site Details:

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Report Ref: CMAPS-CM636391-16287-030717HIS_LS_3_2
Grid Ref: 652945, 306004

Map Name: National Grid
Map date: 1965-1969
Scale: 1:2,500
Printed at: 1:2,500



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



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Revised N/A
Edition N/A
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Site Details:

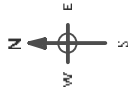
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Grid Ref: 652945, 306630

Map Name: County Series

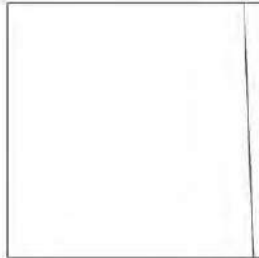
Map date: 1883

Scale: 1:2,500

Printed at: 1:2,500



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



Surveyed 1883
Revised 1883
Edition N/A
Copyright N/A
Levelled N/A

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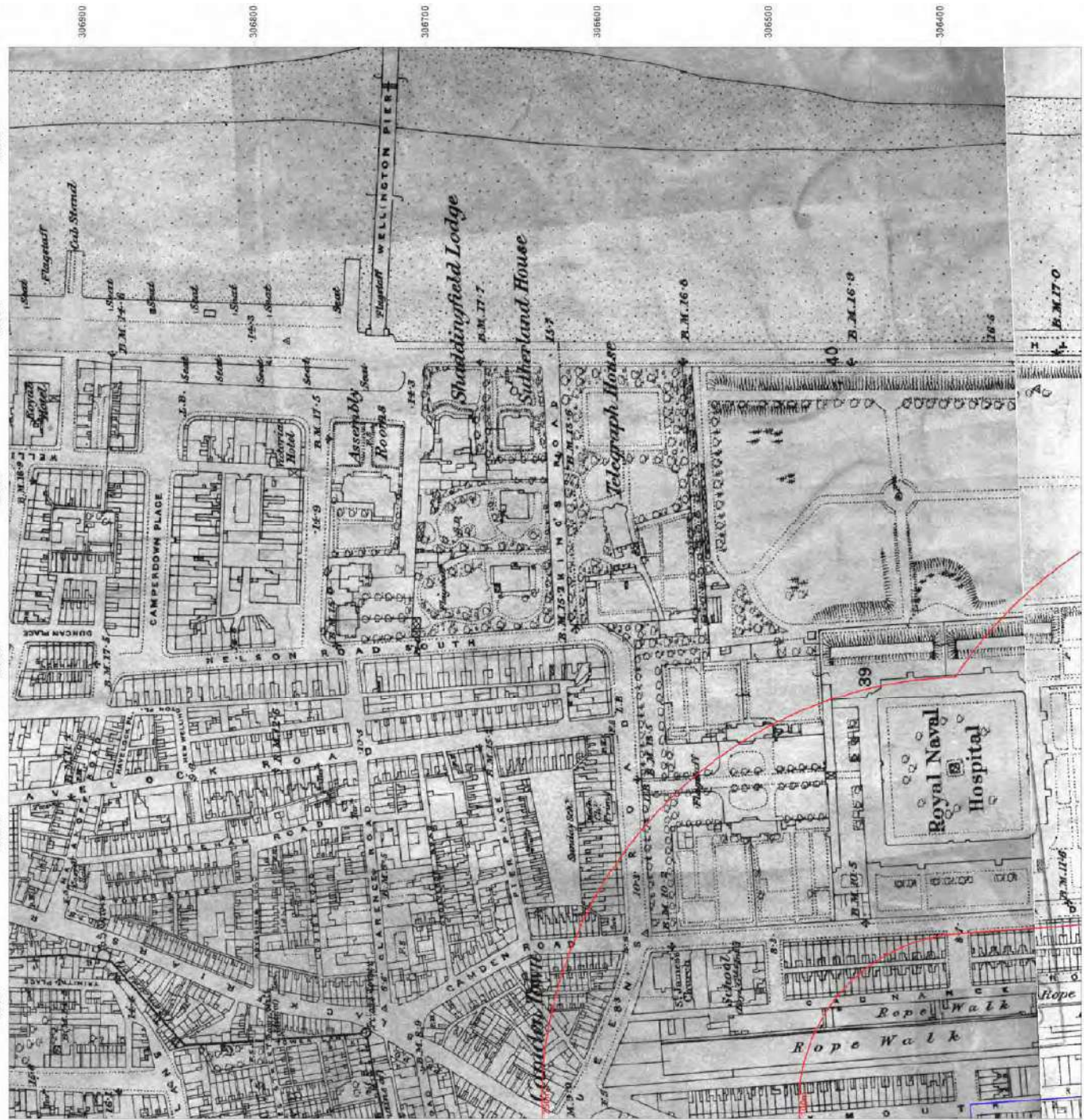


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Site Details:

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Grid Ref: 652945, 306630

Map Name: County Series

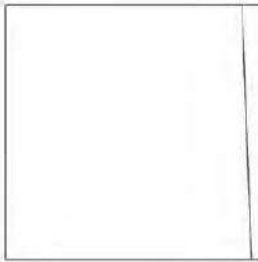
Map date: 1887

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1887
Revised 1887
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1887
Revised 1887
Edition N/A
Copyright N/A
Levelled N/A



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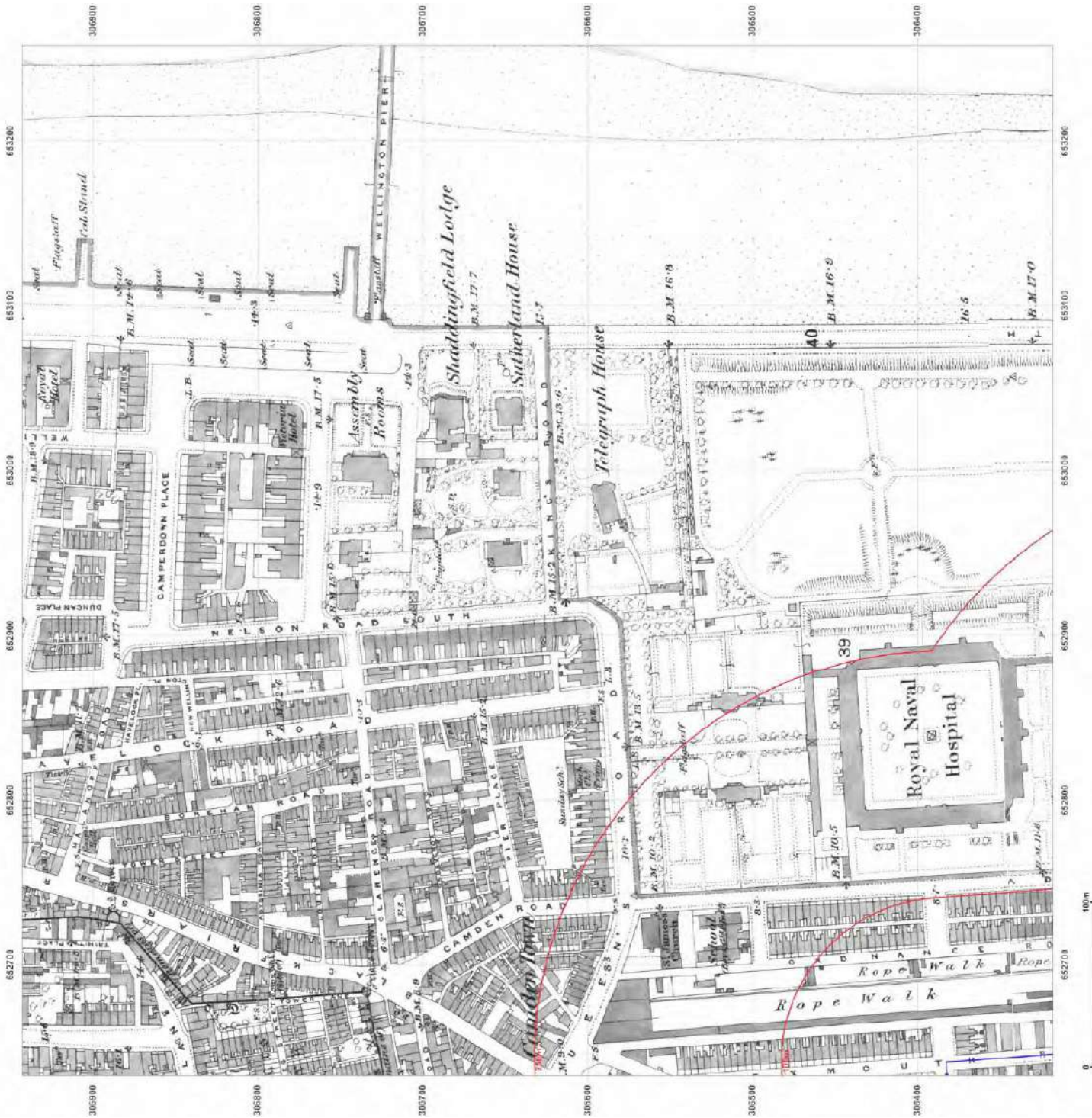


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Site Details:

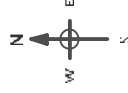
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Grid Ref: 652945, 306630

Map Name: County Series

Map date: 1905-1906

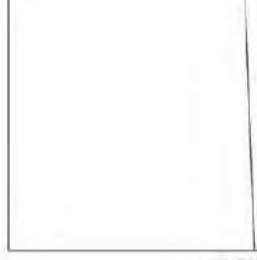
Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1805
Revised 1905
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1883
Revised 1904
Edition 1906
Copyright N/A
Levelled N/A



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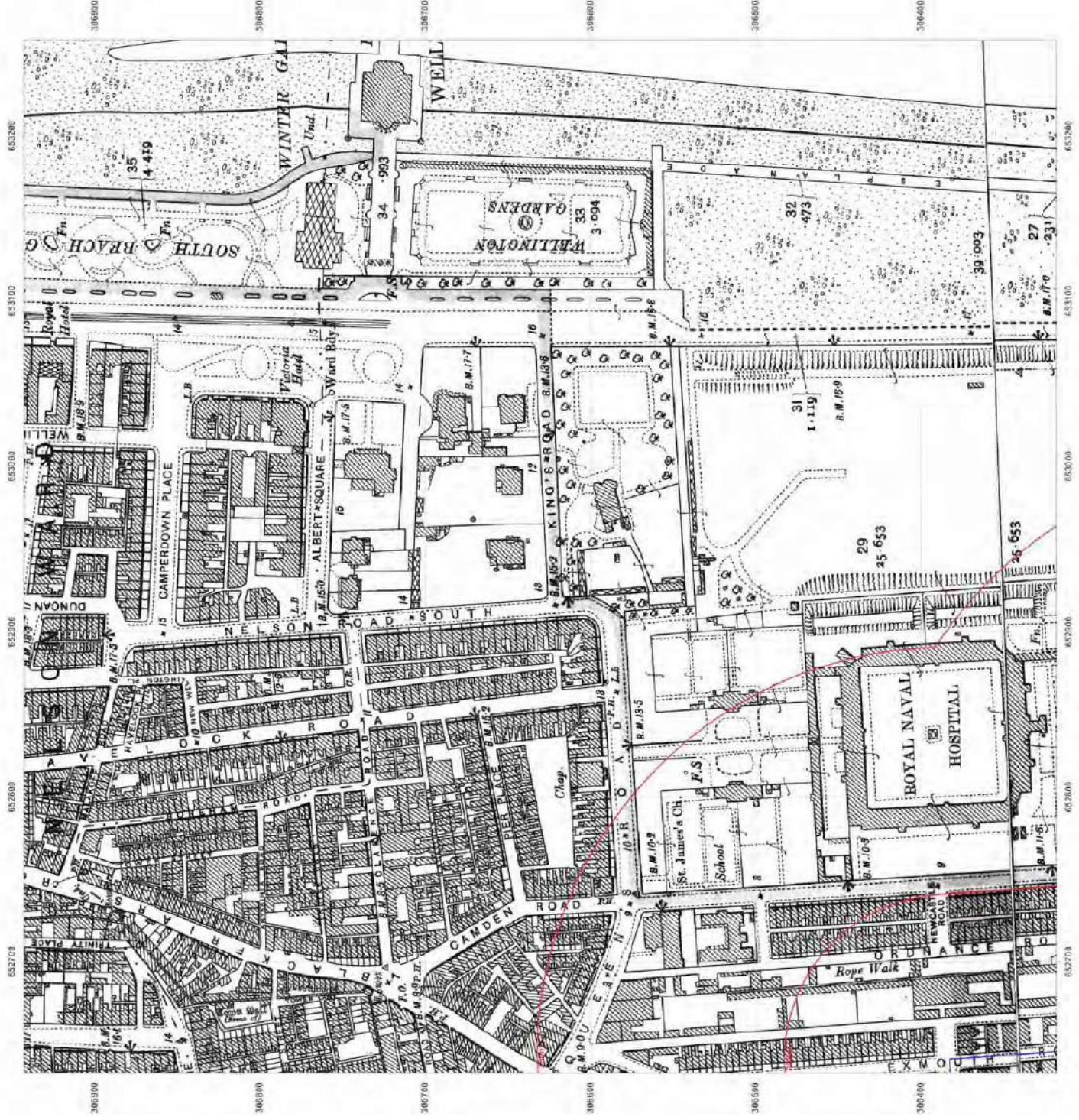


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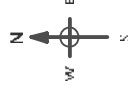
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Grid Ref: 652945, 306630

Map Name: County Series

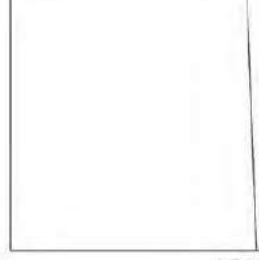
Map date: 1927-1928

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1828
Revised 1828
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1827
Revised 1827
Edition N/A
Copyright N/A
Levelled N/A



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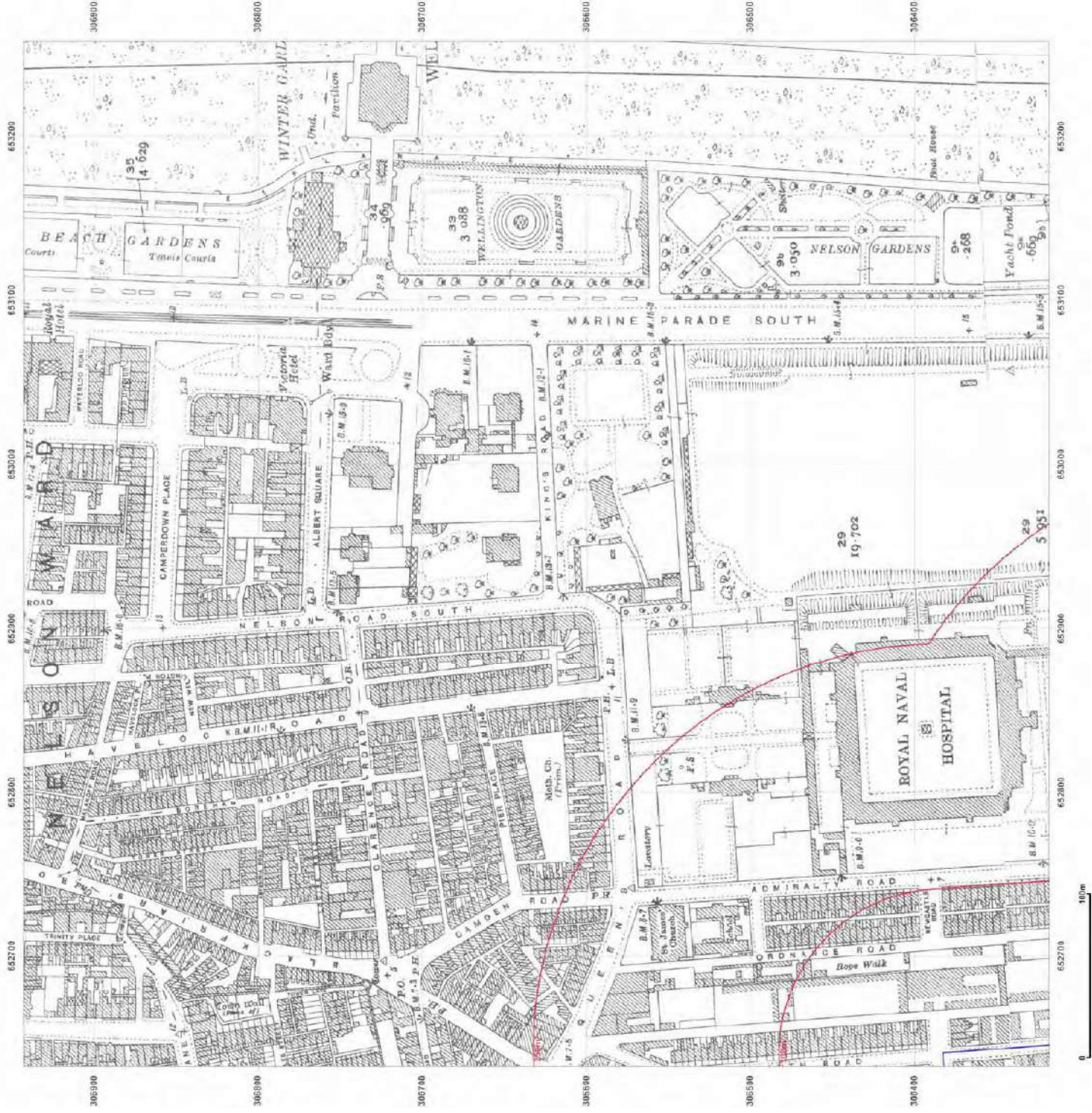


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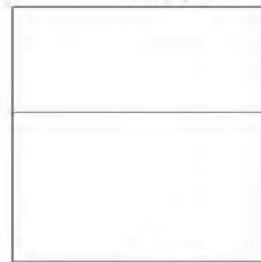
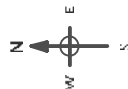
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Report Ref: CMAPS-CM-636391-16287-030717HIS_LS_3_3
Grid Ref: 652945, 306630

Map Name: National Grid

Map date: 1949

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1940
Revised 1949
Edition N/A
Copyright N/A
Levelled 1946

Surveyed 1948
Revised 1949
Edition N/A
Copyright N/A
Levelled 1948



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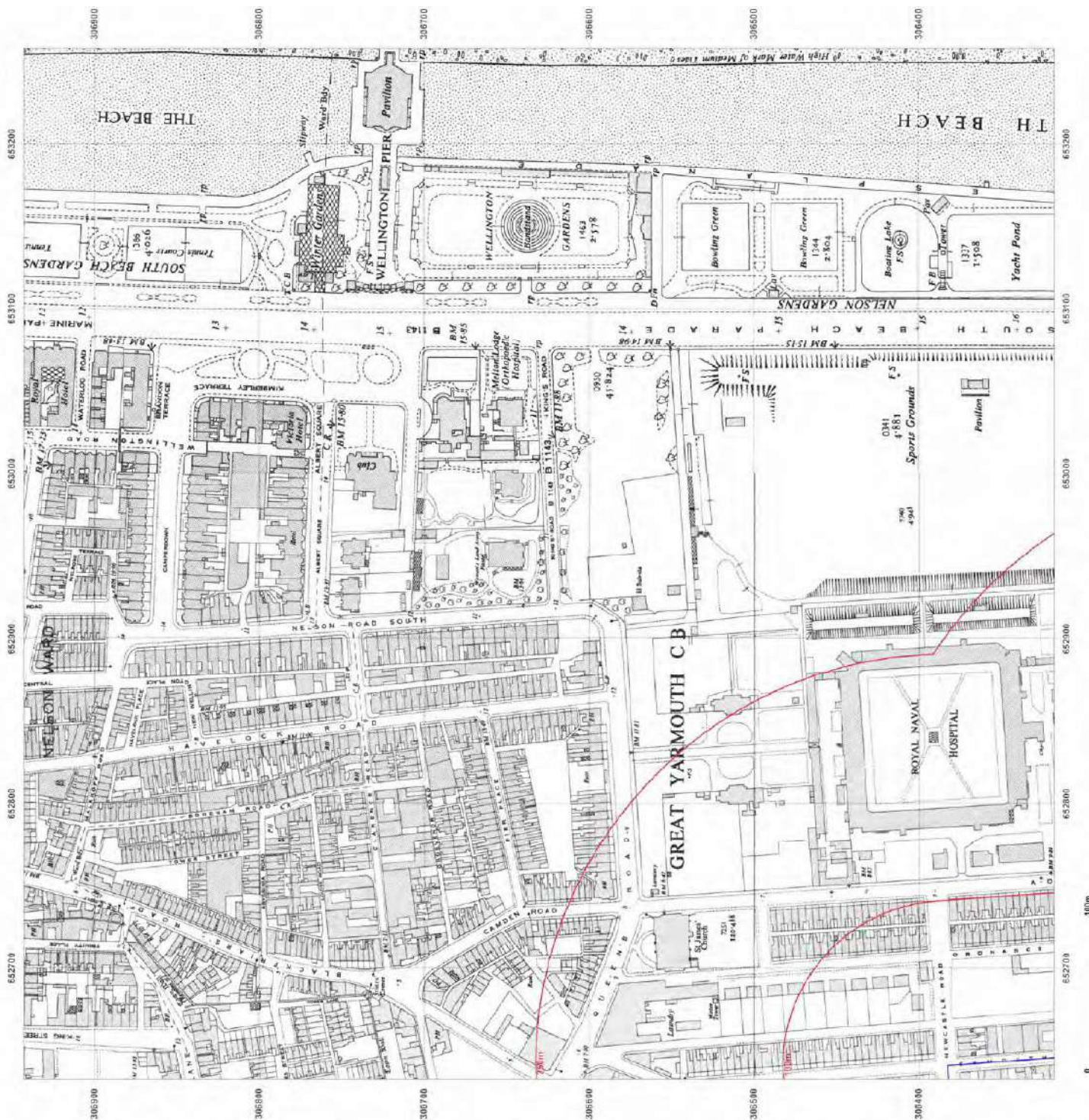


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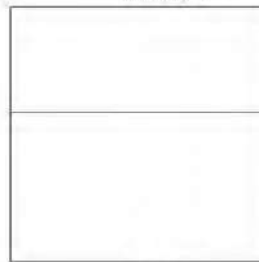
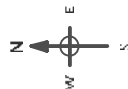
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Grid Ref: 652945, 306630

Map Name: National Grid

Map date: 1950-1951

Scale: 1:2,500

Printed at: 1:2,500



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

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



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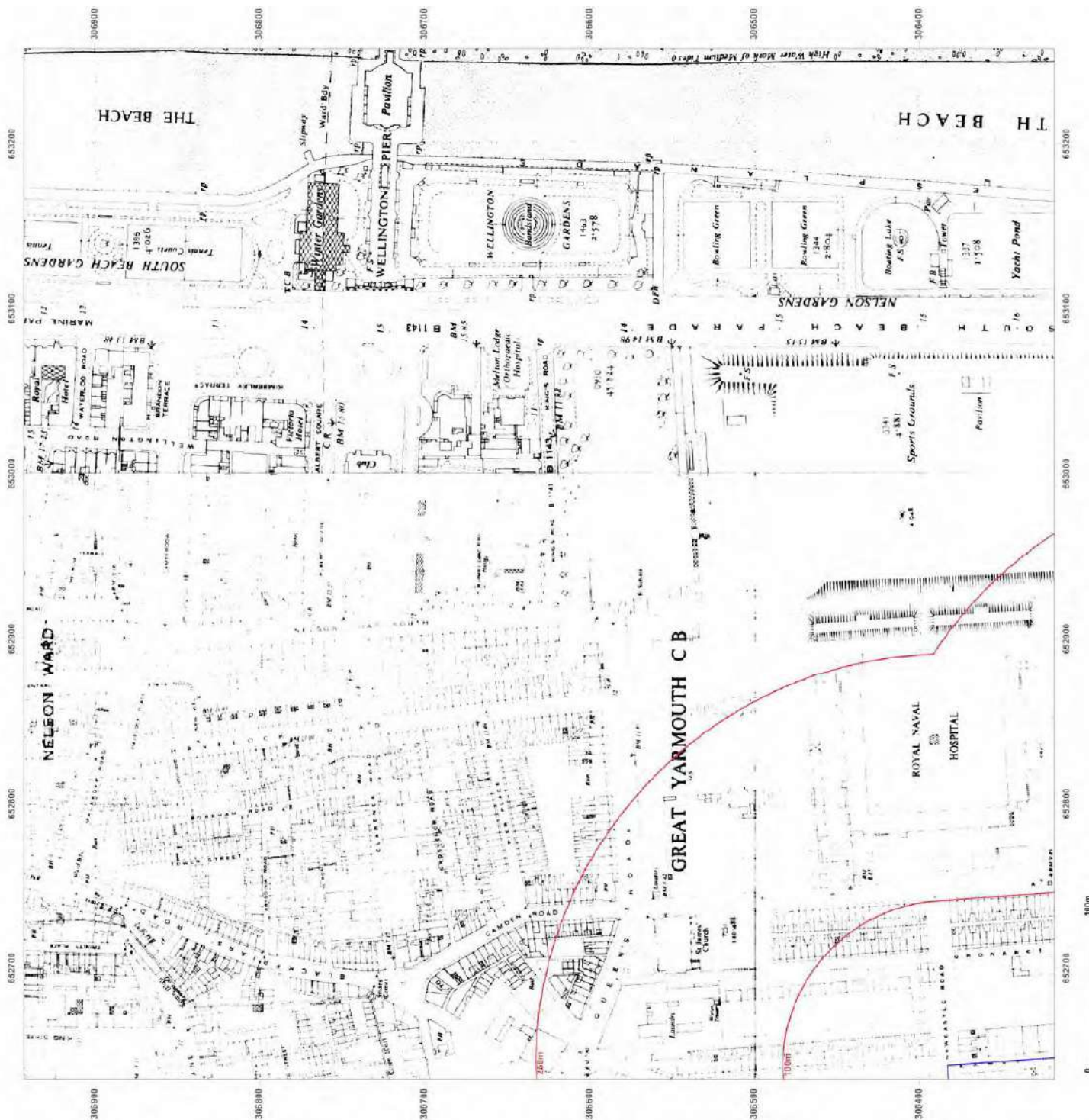


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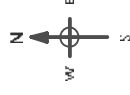
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Grid Ref: 652945, 306630

Map Name: National Grid

Map date: 1963

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1863
Revised 1903
Edition 1965
Copyright 1965
Laserlaid 1968



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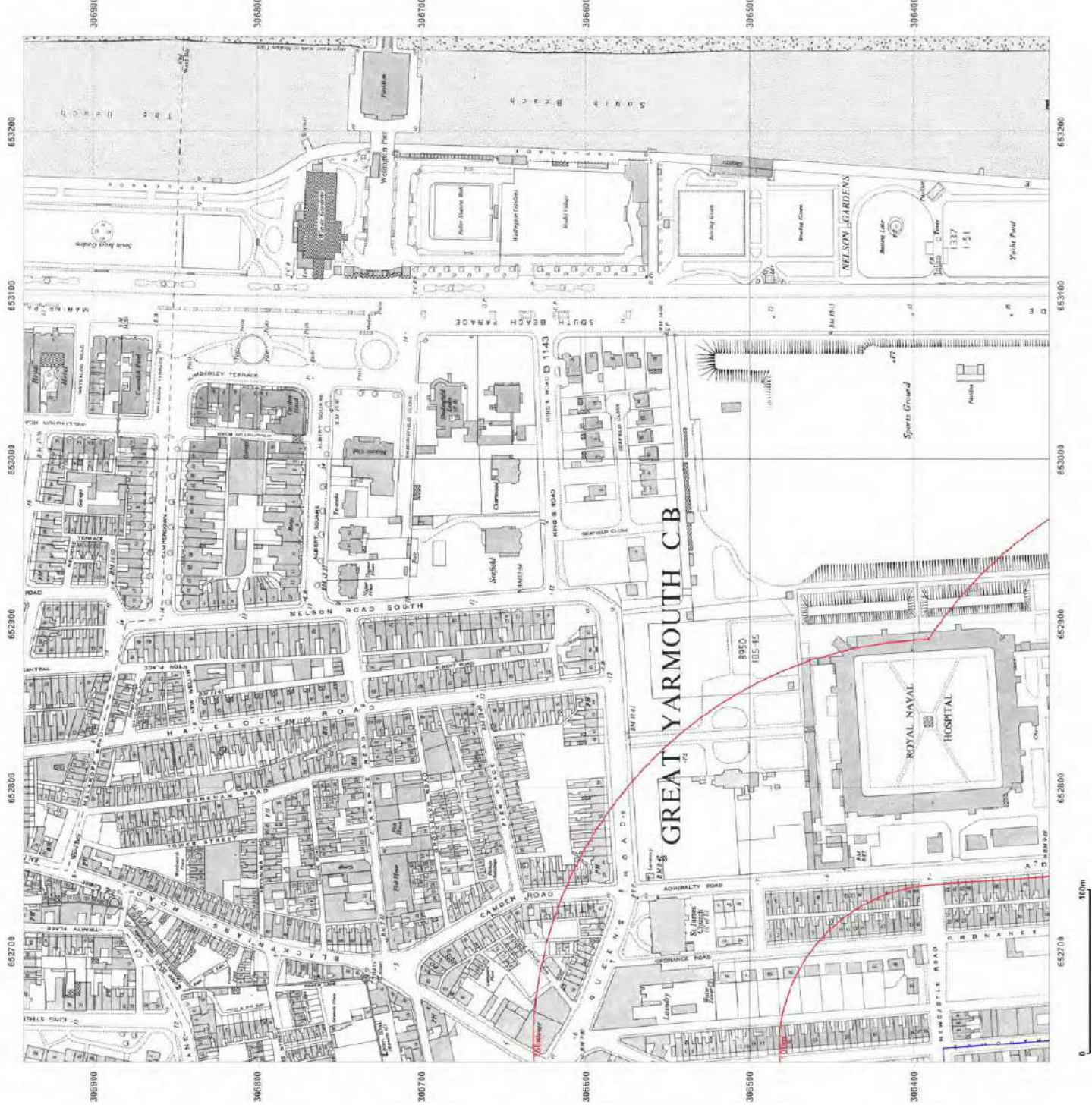


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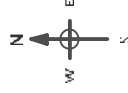
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Grid Ref: 652945, 306630

Map Name: National Grid

Map date: 1965

Scale: 1:2,500

Printed at: 1:2,500



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

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



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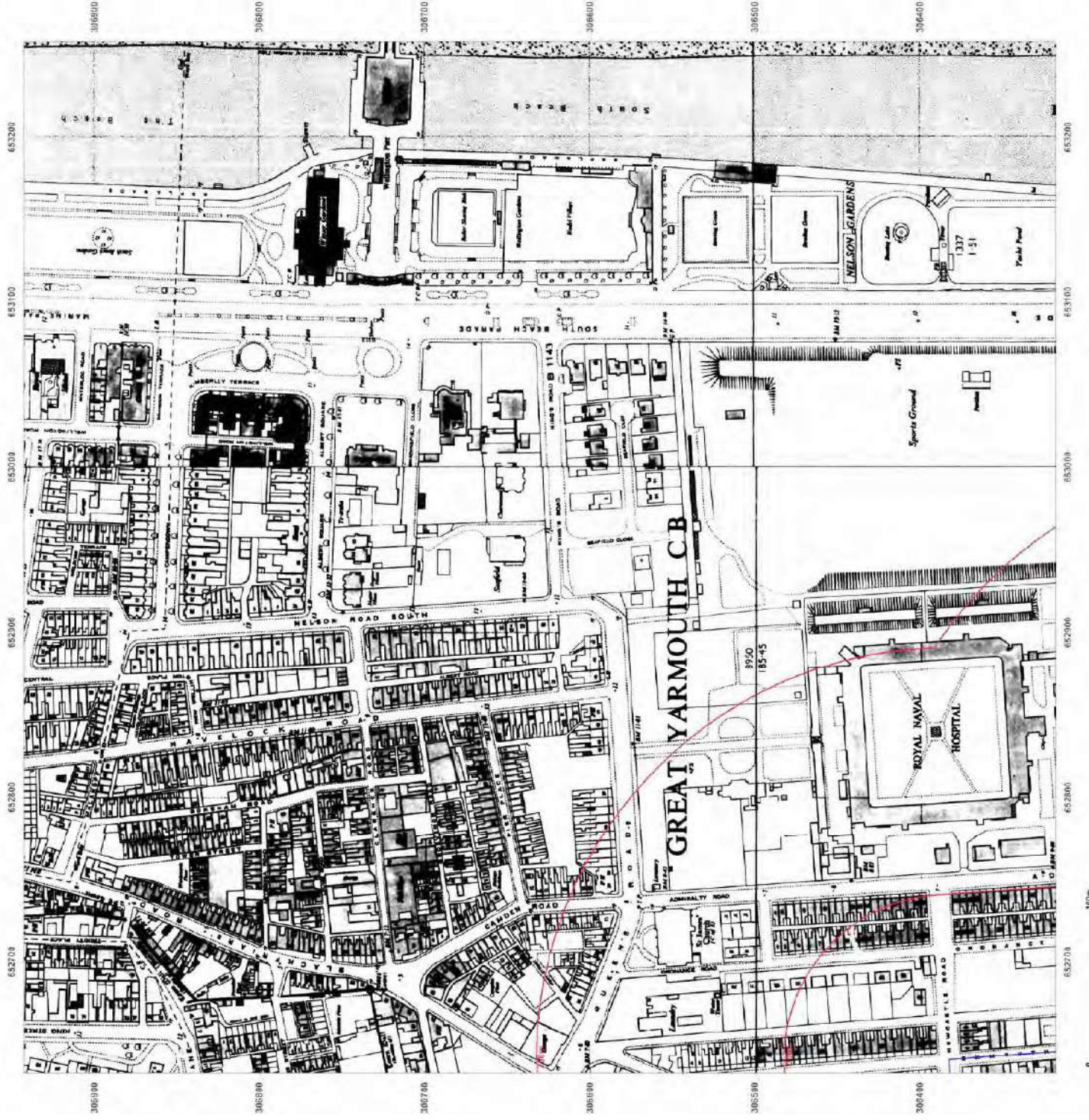


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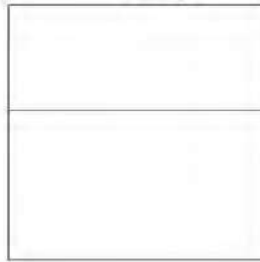
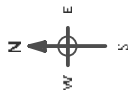
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Report Ref: CMAPS-CM636391-16287-030717HIS_LS_3_3
Grid Ref: 652945, 306630

Map Name: National Grid

Map date: 1965

Scale: 1:2,500

Printed at: 1:2,500



Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelling N/A



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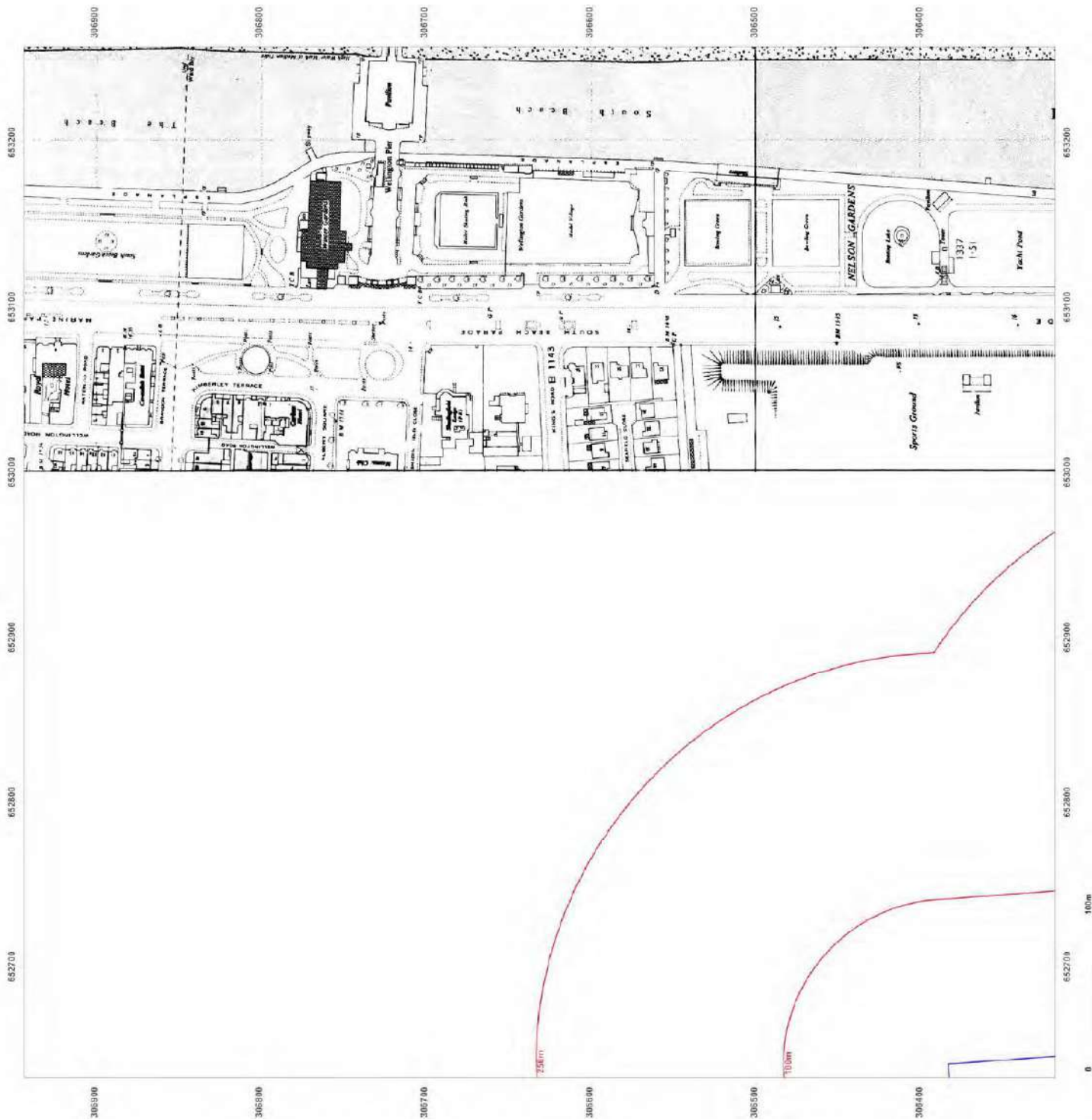


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Site Details:

Client Ref: 16287
Report Ref: CMAPS-CM-636391-16287-030717HIS
Grid Ref: 652320, 306005

Map Name: County Series

Map date: 1883-1886

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1883	Surveyed 1884
Revised 1883	Revised N/A
Edition N/A	Edition 1886
Copyright N/A	Copyright N/A
Levelled N/A	Levelled N/A

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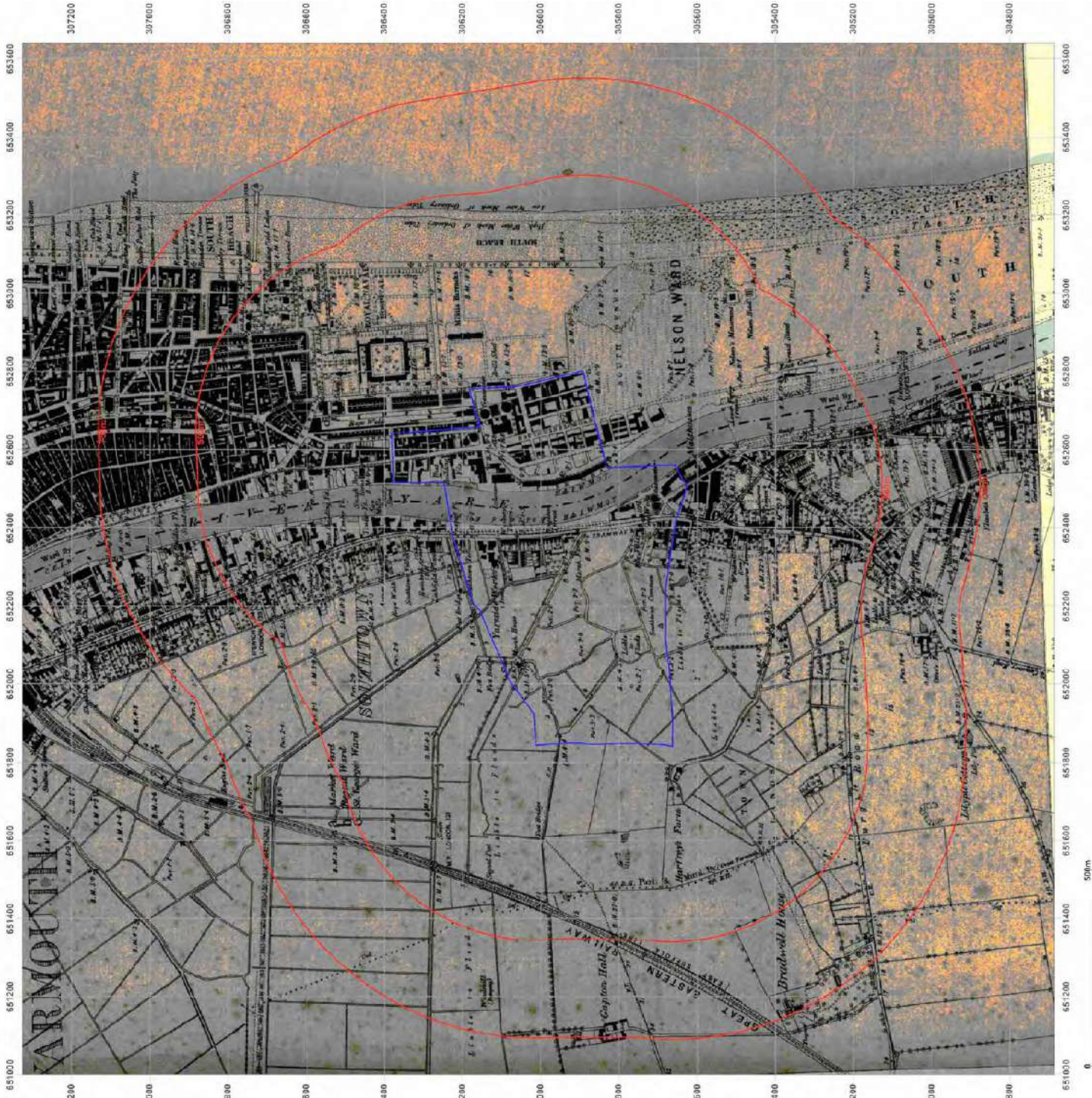


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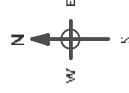
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Report Ref: CMAPS-CM-536391-16287-030717HIS
Grid Ref: 652320, 306005

Map Name: County Series

Mapdate: 1884-1888

Scale: 1:10,560

Printed at 1:10.560



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

Surveyed	1883
Revised	N/A
Edition	885
Copyright	N/A
Revised	N/A



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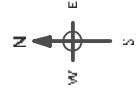
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Grid Ref: 652320, 306005

Map Name: County Series

Map date: 1901-1904

Scale: 1:10,560

Printed at: 1:10,560



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

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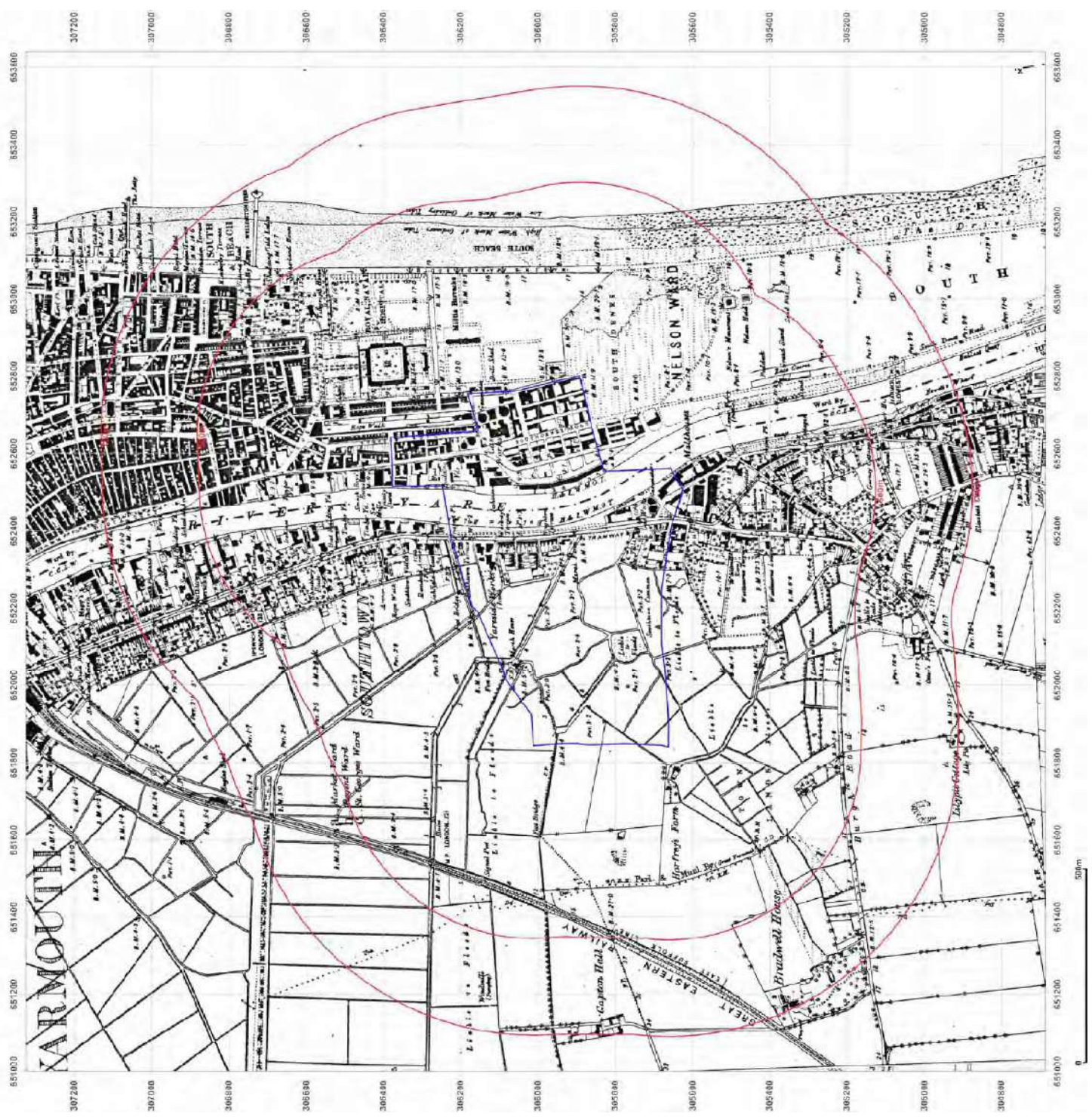


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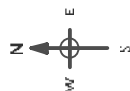
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Grid Ref: 65320, 306005

Map Name: County Series

Map date: 1905

Scale: 1:10,560

Printed at: 1:10,560



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Revised N/A
Edition N/A
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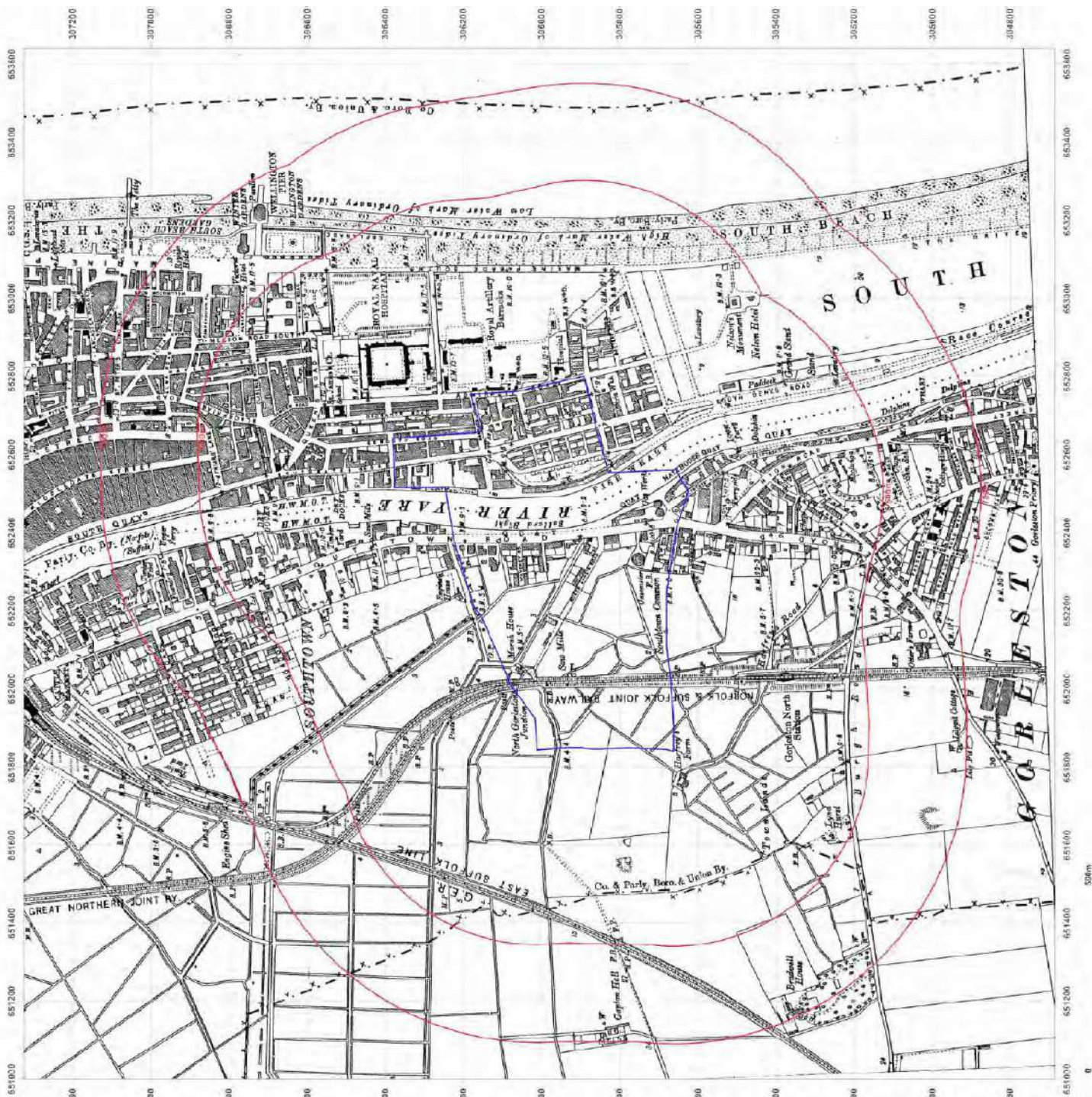


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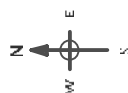
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Map Name: County Series

Map date: 1904-1906

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1883	Surveyed 1883
Revised 1904	Revised 1904
Edition N/A	Edition 1906
Copyright N/A	Copyright N/A
Levelled N/A	Levelled N/A



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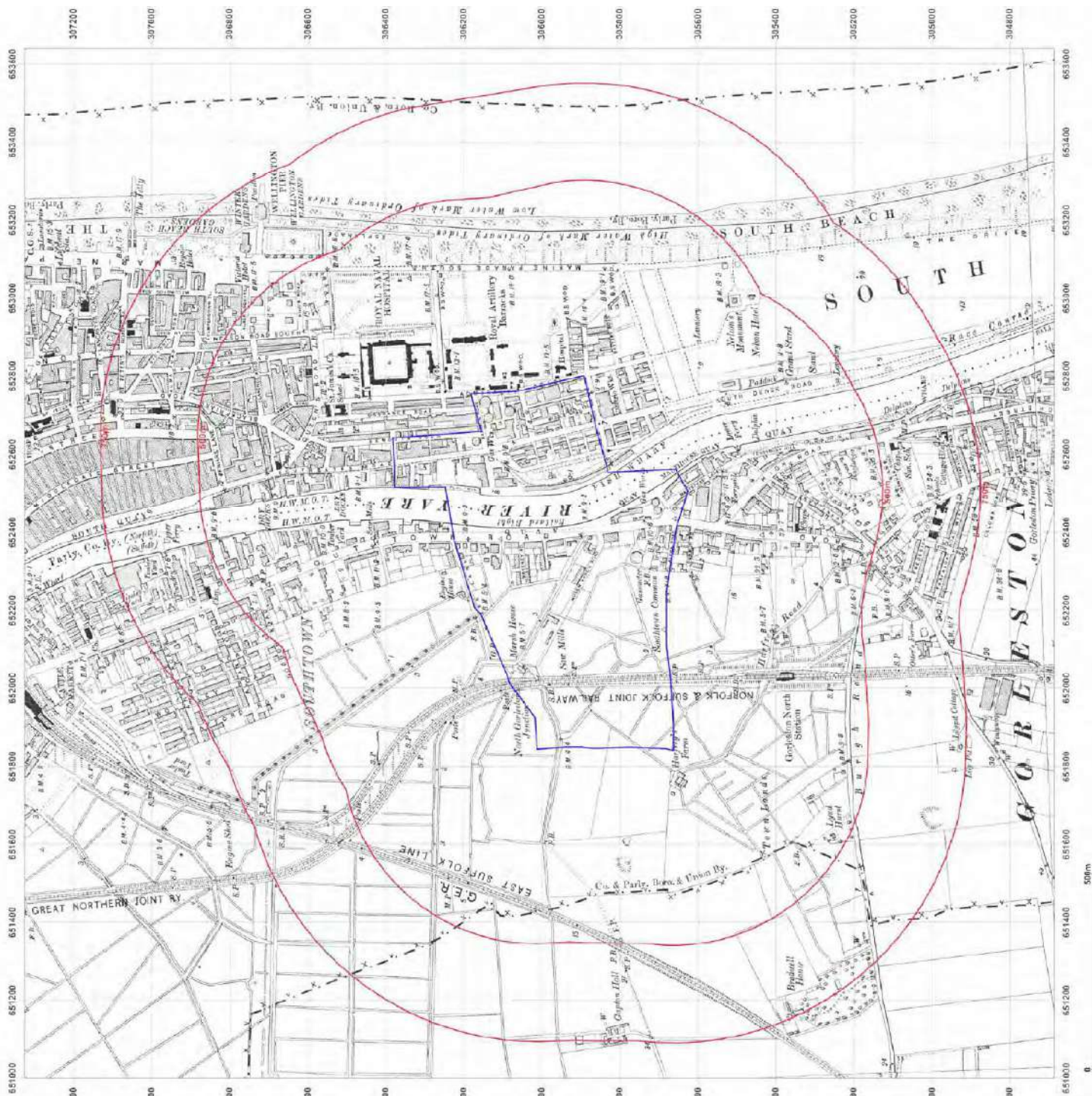


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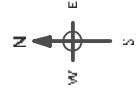
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Map Name: County Series

Map date: 1926-1928

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1883	Surveyed 1883
Revised 1926	Revised 1926
Edition 1928	Edition N/A
Copyright N/A	Copyright N/A
Levelled N/A	Levelled N/A

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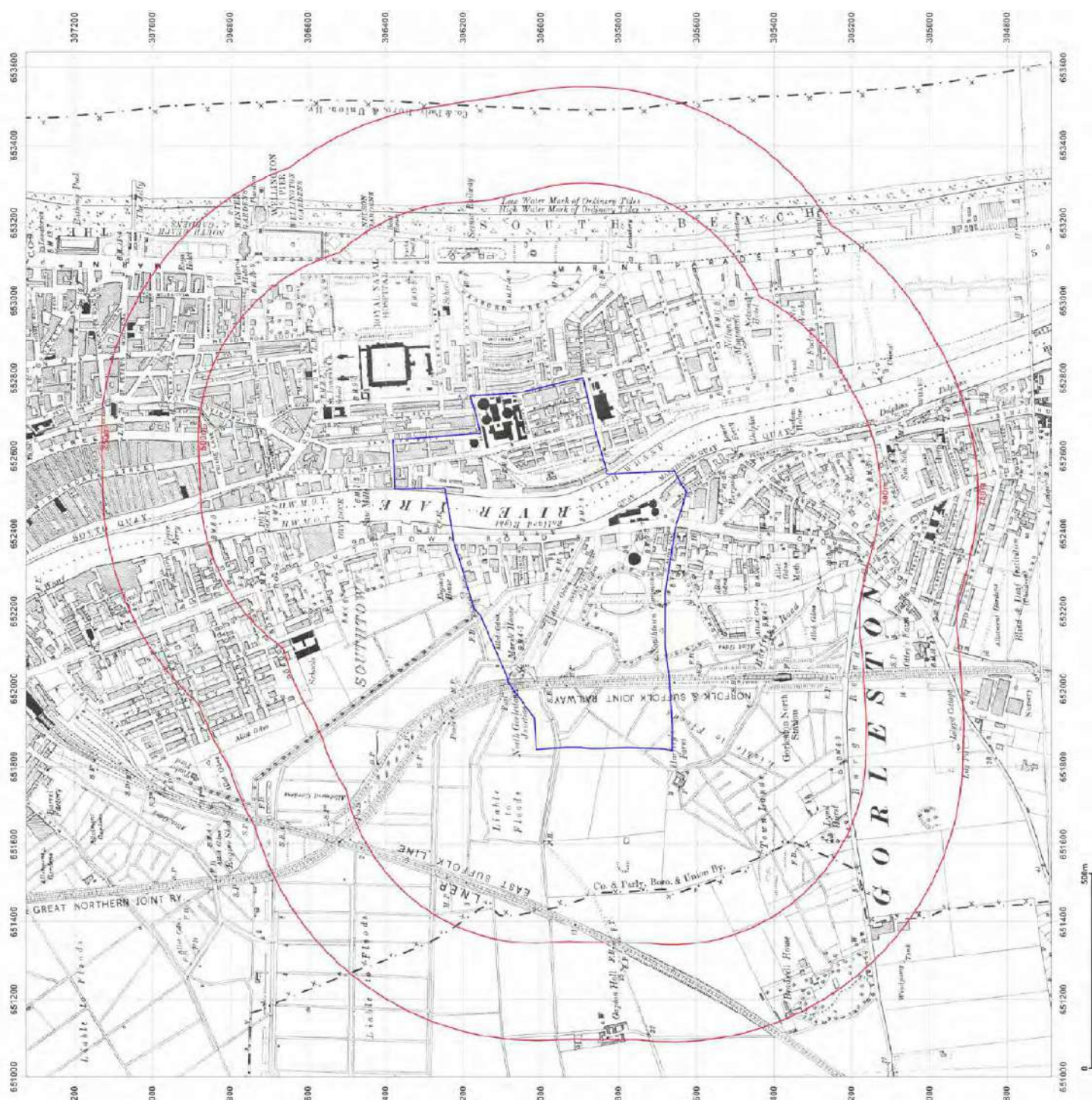


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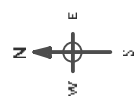
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Grid Ref: 652320, 306005

Map Name: County Series

Map date: 1938

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1883
Revised 1938
Edition N/A
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Surveyed 1883
Revised 1938
Edition 1938
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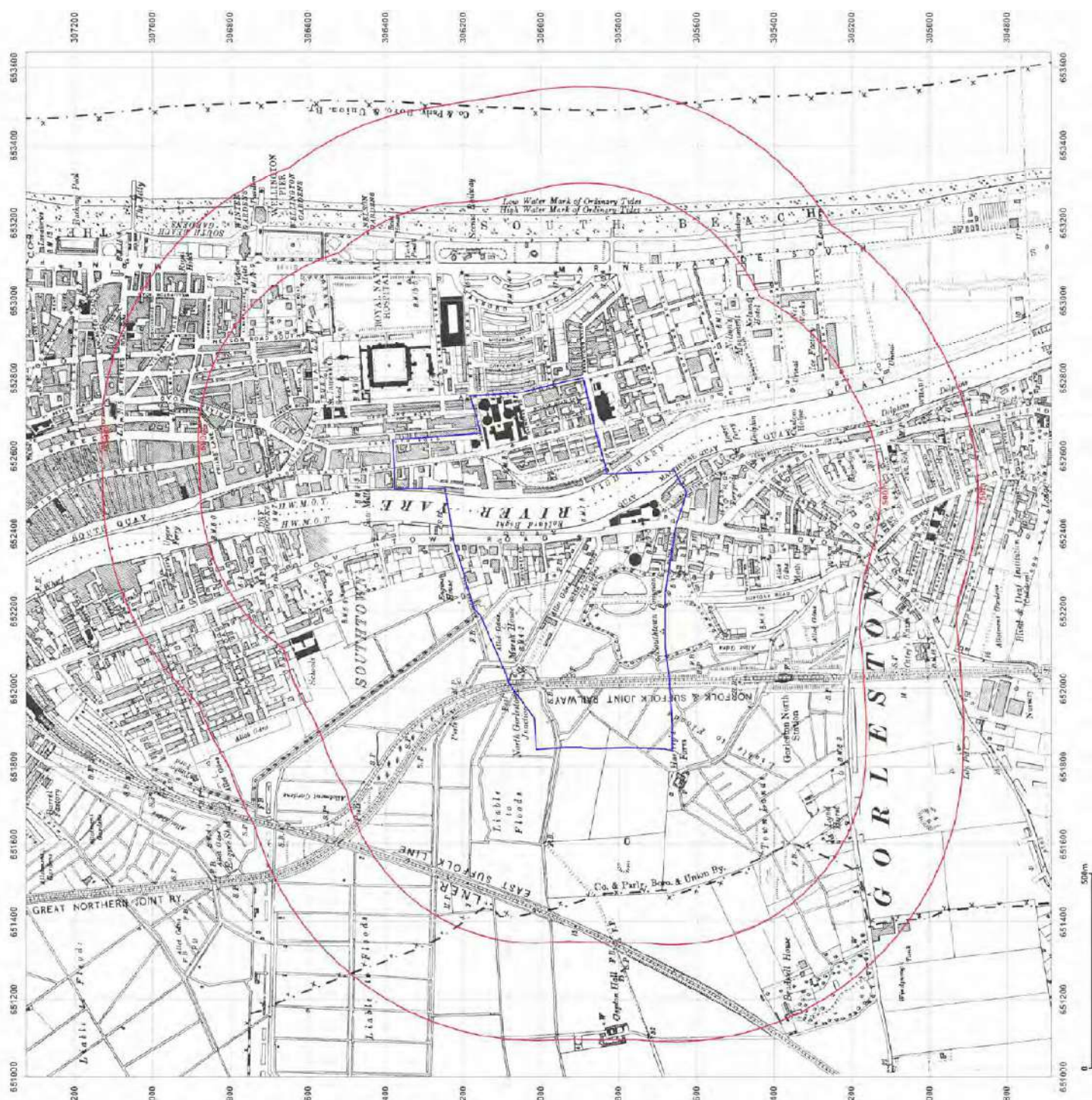


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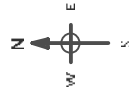
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Map Name: County Series

Map date: 1938

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1883
Revised 1938
Edition 1938
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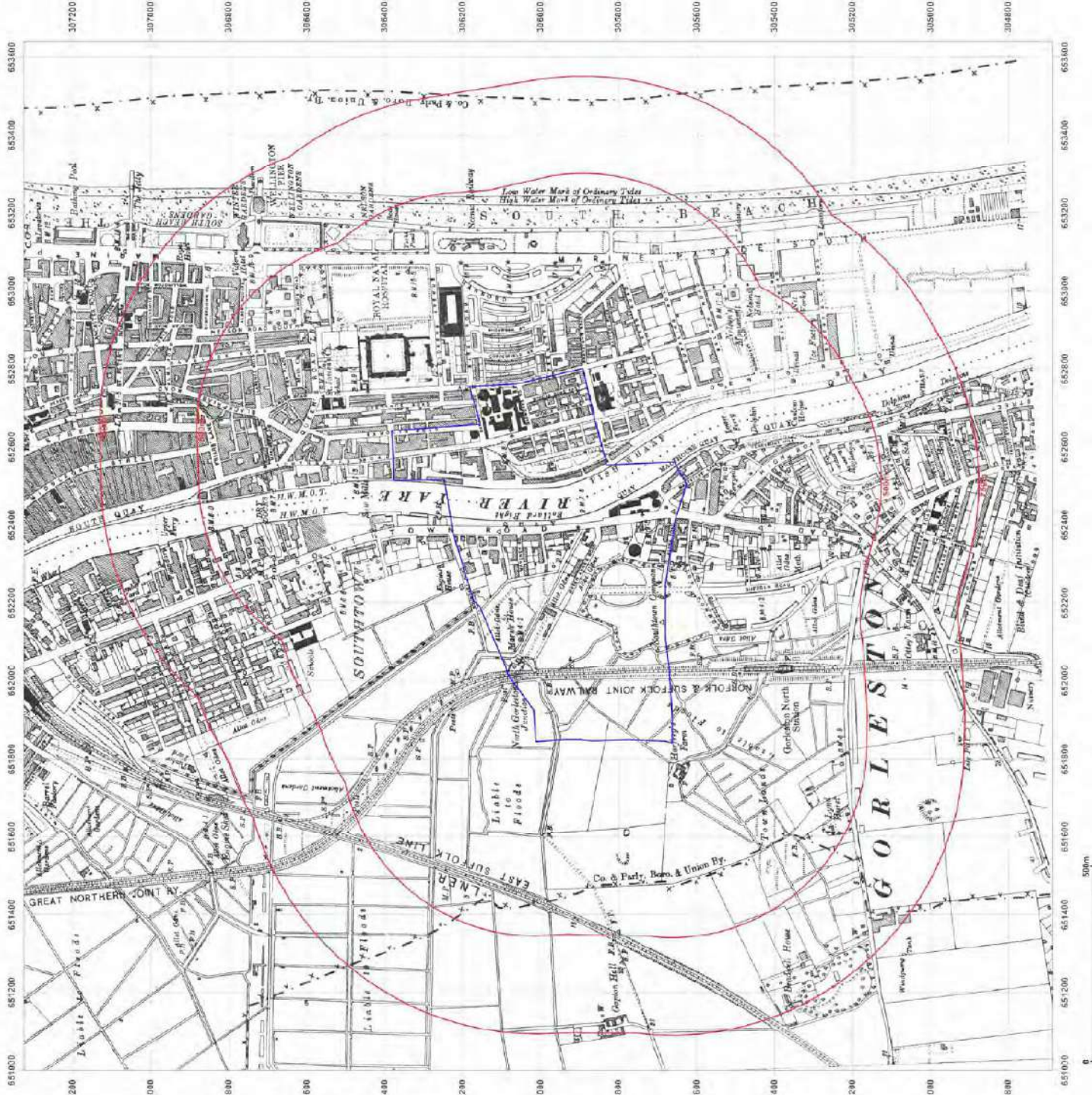


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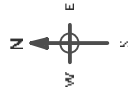
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Map Name: County Series

Map date: 1946

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1883	Surveyed 1883
Revised 1946	Revised 1946
Edition N/A	Edition N/A
Copyright N/A	Copyright N/A
Levelled N/A	Levelled N/A



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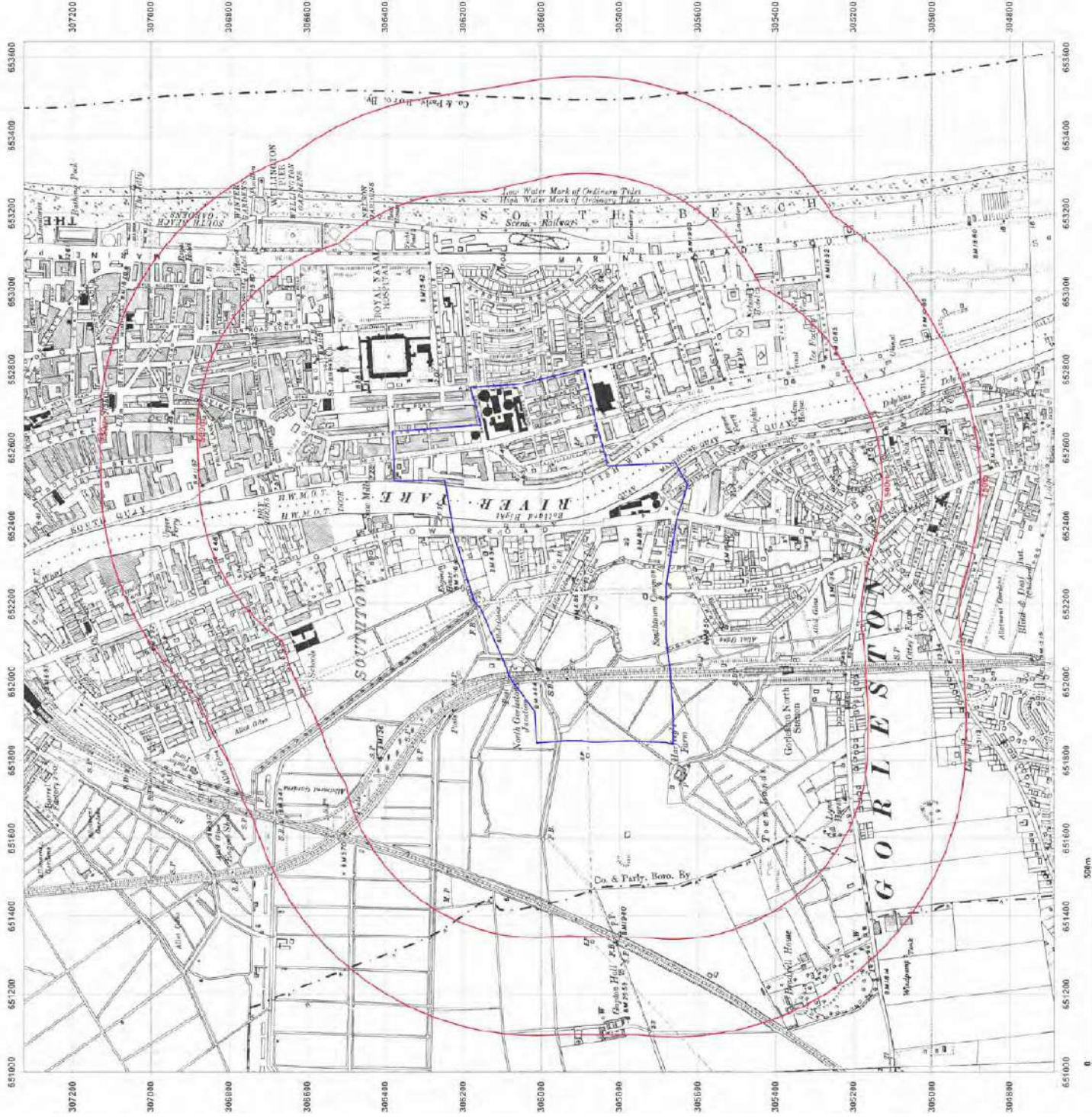


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Site Details:

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Grid Ref: 652320, 306005

Map Name: Provisional
Map date: 1958
Scale: 1:10,560
Printed at: 1:10,560



Surveyed 1958
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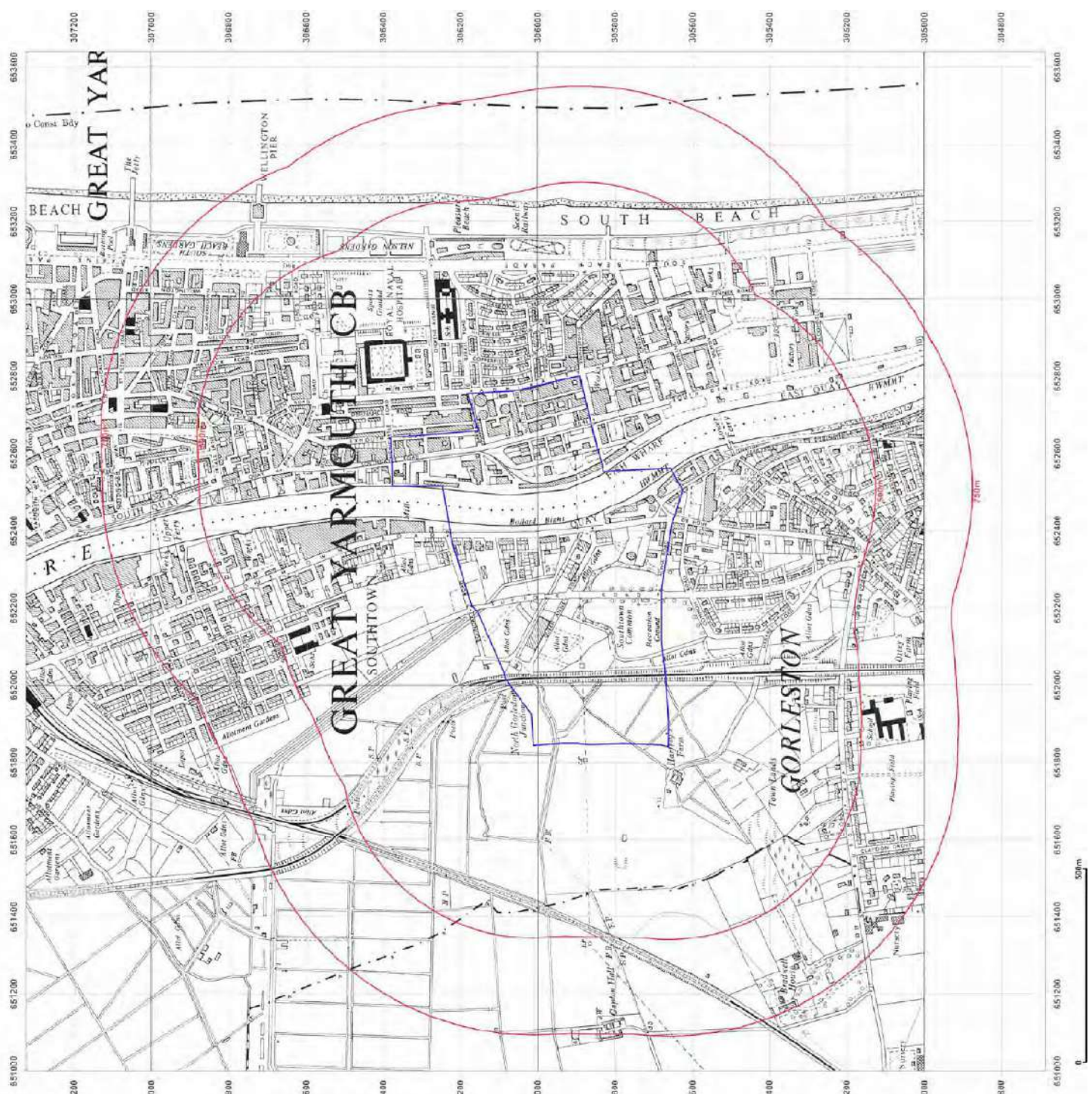


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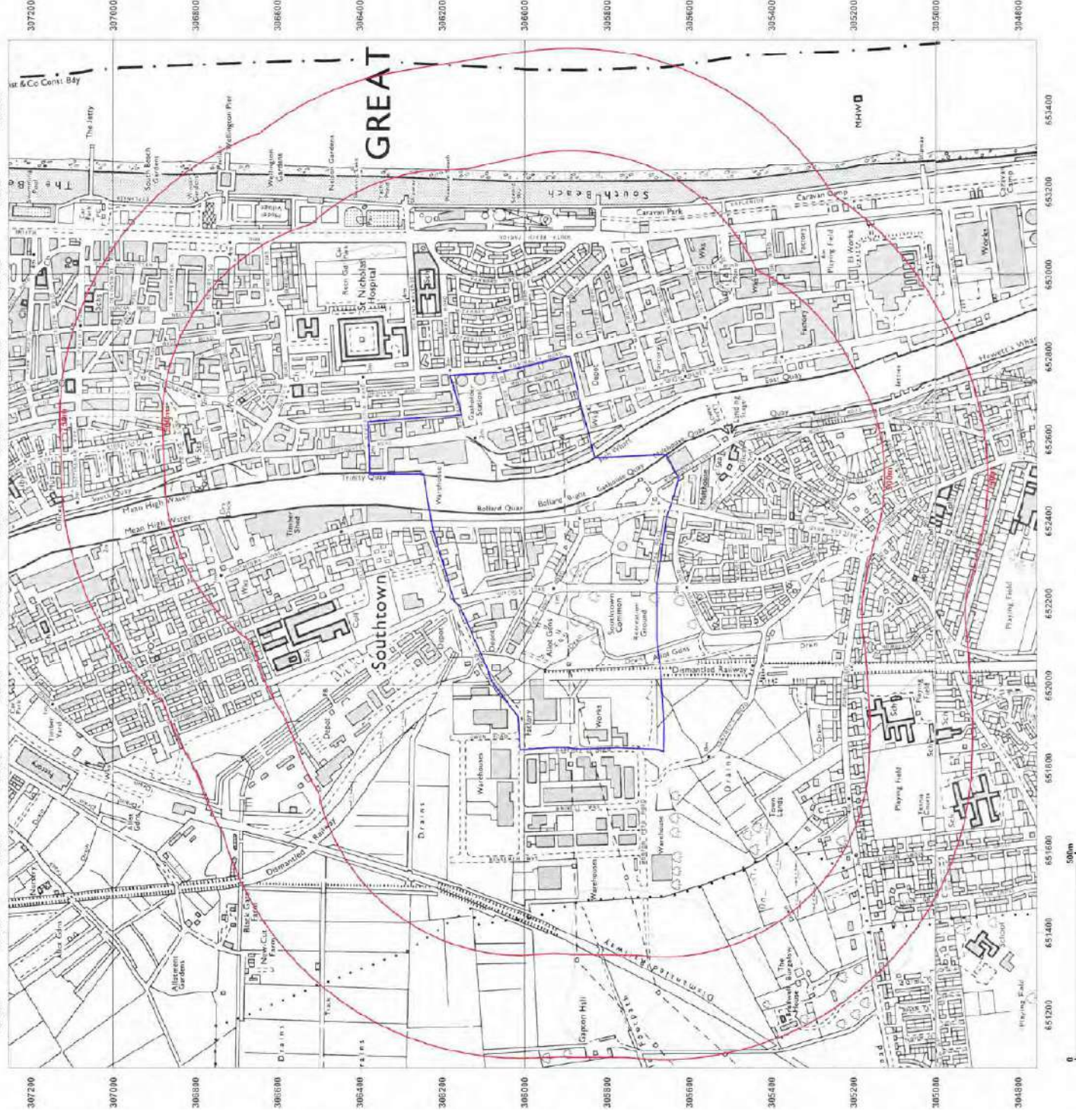
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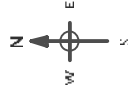
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Map Name: National Grid

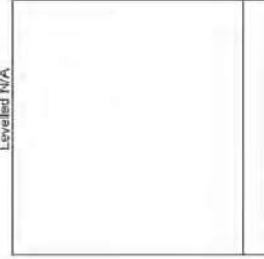
Map date: 1988

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1984
Revised 1988
Edition N/A
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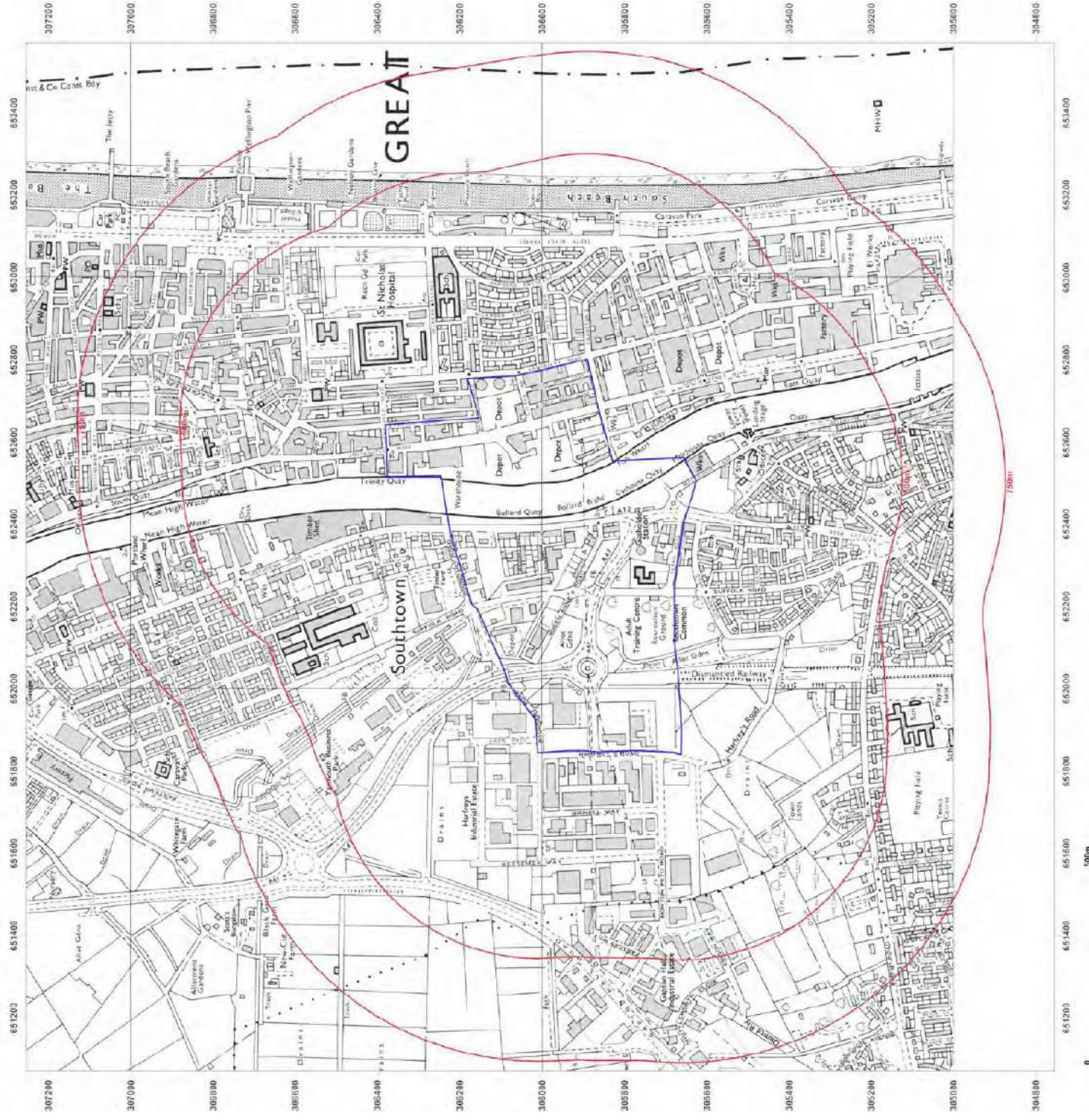


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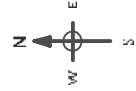
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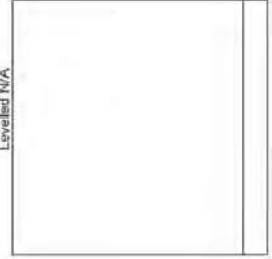
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Grid Ref: 652320, 306005

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Map date: 1988
Scale: 1:10,000
Printed at: 1:10,000



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Edition N/A
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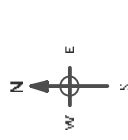
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Grid Ref: 652320, 306005

Map Name: 1:10,000 Raster

Mapdate: 2002

Scale: 1:10,000

Printed at 1:10,000 5



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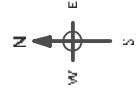
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Grid Ref: 652320, 306005

Map Name: National Grid

Map date: 2010

Scale: 1:10,000

Printed at: 1:10,000



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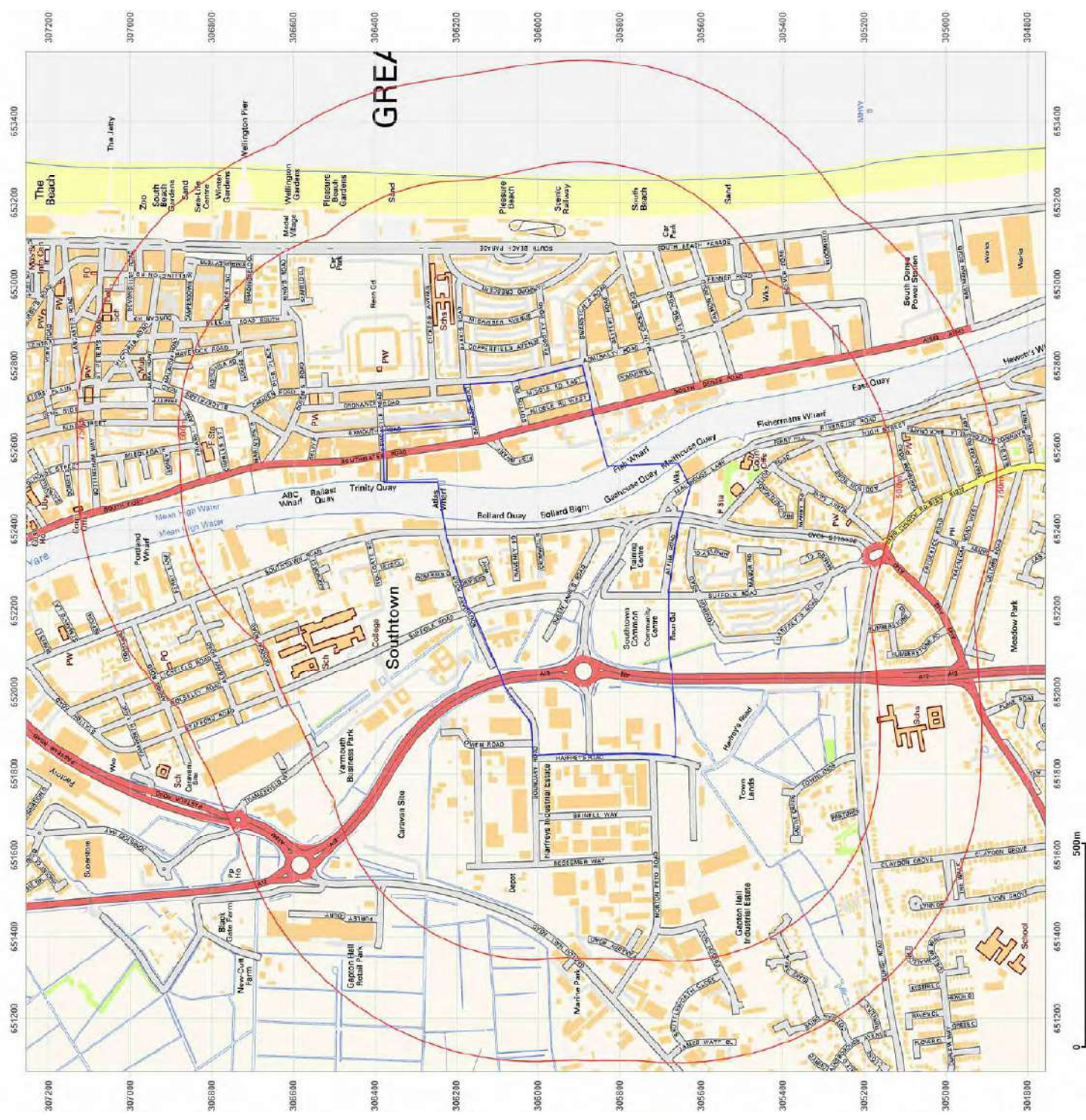


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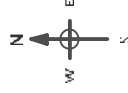
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Grid Ref: 652320, 306005

Map Name: National Grid

Map date: 2014

Scale: 1:10,000

Printed at: 1:10,000



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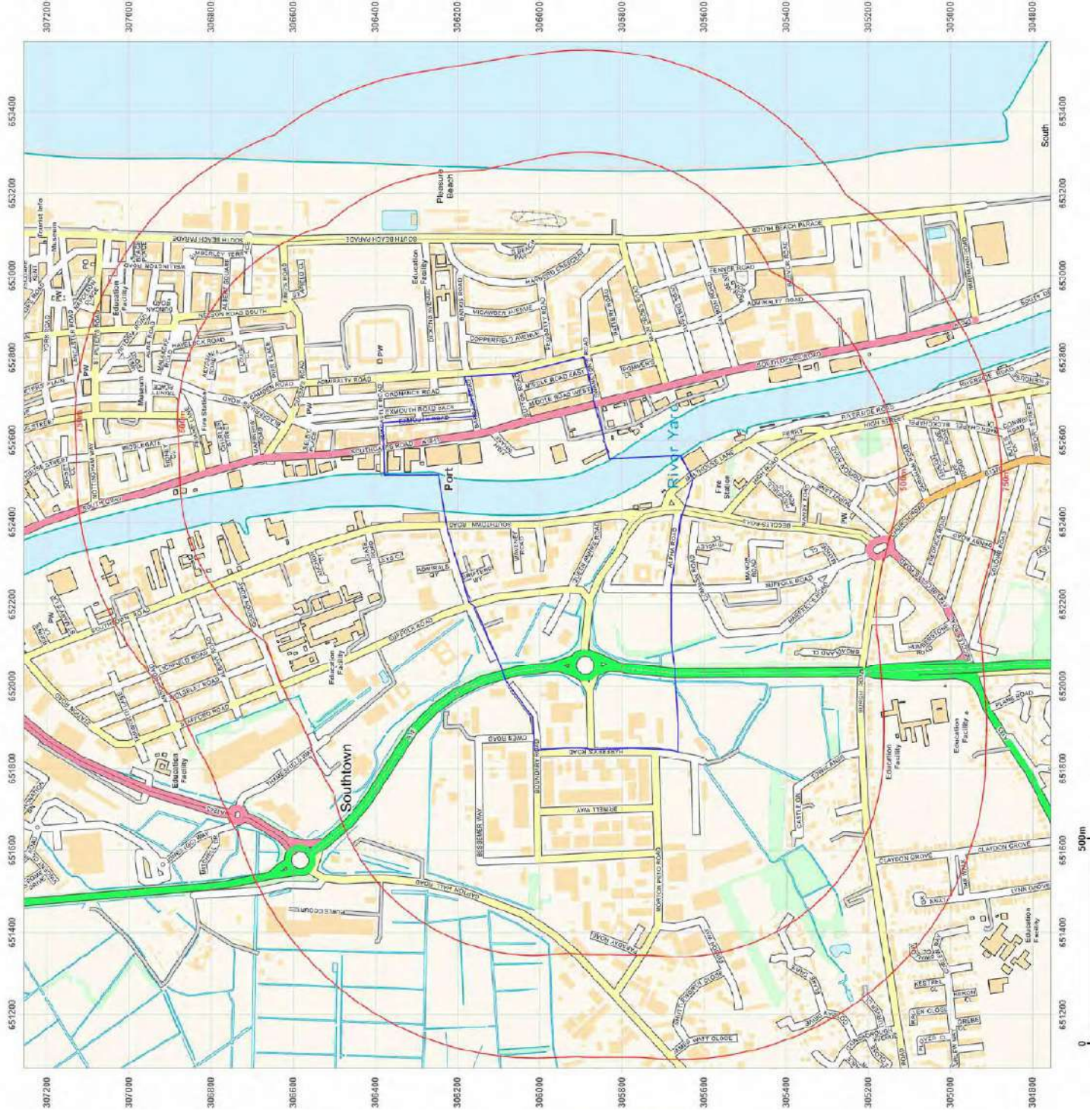


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APPENDIX C - SITE HISTORY

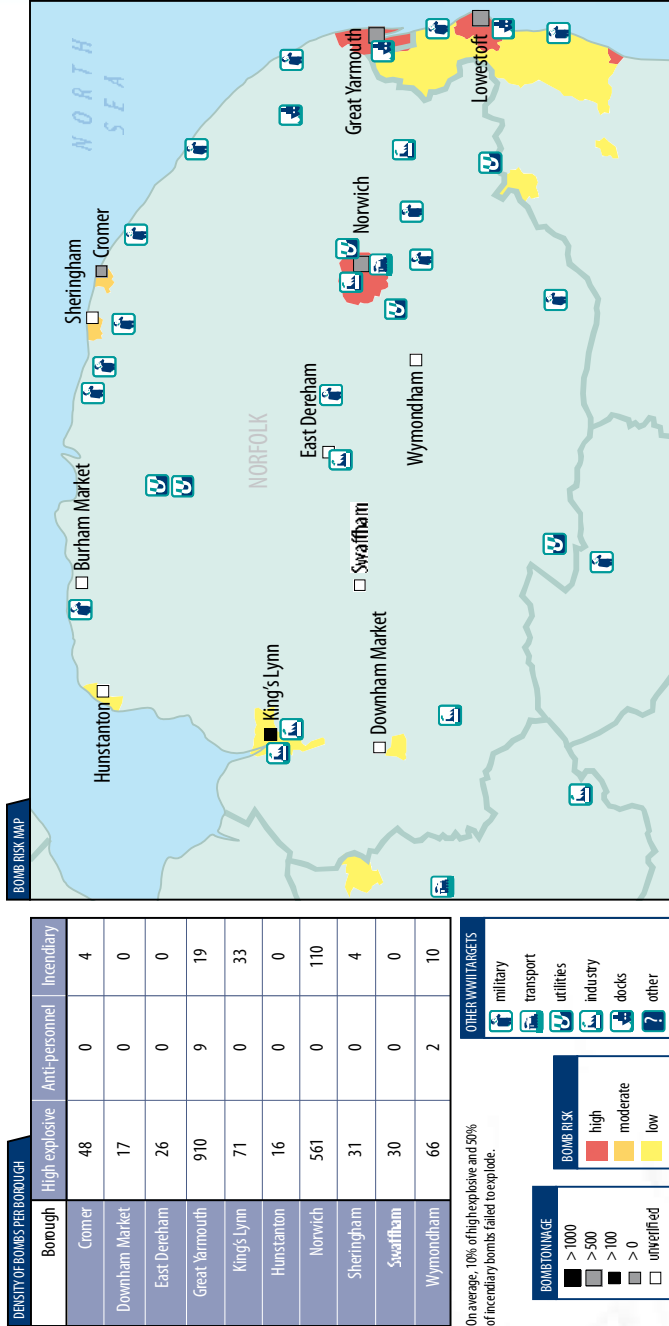
GYTRC Site History

Map	Scale.	On Site	Off Site
1883	1:10,560	<p>The eastern area is fully developed. Labelled buildings includes gasworks, gasometer, boat building yard and icehouse.</p> <p>In the western area, only the land closest to the waterfront is developed. Elsewhere to the west is agricultural land. Site uses in the developed area are labelled as iron works, residential properties, farm, gas works and gasometer.</p>	<p>The surrounding land immediately adjacent to the River Yare is developed with the land closest to the river occupied by industry including saw mills, timber yard, boat building, icehouse and a malthouse. In the eastern area, away from the river towards the sea is the Royal Naval Hospital, militia barracks, a rope walk, residential properties to the north east and open land to the south east. On the western side of the river , the development is less with residential properties and open land beyond.</p>
1883	1:2,500	<p>Rail lines are marked on the eastern area quayside.</p> <p>A number of malthouses are marked on the southern boundary of the western site areas waterfront. A rope walk is marked adjacent to the iron works.</p>	<p>Land uses to the south include malthouses, residential properties, a windmill and an old gravel pit.</p>
1884	1:10,560	No significant changes.	No significant changes.
1887	1:2,500	No significant changes.	No significant changes.
1901	1:10,560	No significant changes.	No significant changes.
1904-1906	1:10,560	No significant changes.	No significant changes.
1905	1:10,560	<p>Railway line marked at the western end of the site running north south. Saw mill labelled towards the site centre. New gasometer marked on the southern boundary. Boat yard, ice house and iron works no longer labelled.</p>	<p>The militia barracks is now labelled as the Royal Artillery Barracks. Some additional development towards the west. The railway line that crosses site continues to the north and south off site.</p>
1906	1:2,500	A travelling crane is labelled on the eastern area waterfront.	
1926	1:10,560	<p>None of the previous industry is labelled but the gasometers are still identified from their outline. Formal gardens are marked on the western central part of the site.</p>	<p>The Barracks are no longer marked and appear to have been replaced by residential properties. Further residential development in all directions except to the west. Allotments are marked to the south.</p>
1927	1:2,500	Allotment gardens are marked within the western area.	No significant changes.
1938	1:10,560	No significant changes.	No significant changes.
1946	1:10,560	No significant changes.	No significant changes.
1949	1:1,250 / 1:2,000	<p>An oilskin works is labelled in the eastern area together with fish canning factories and various tanks on unlabelled sites.</p> <p>In the western area, the gasworks close to the southern boundary includes two gas holders and tanks. The saw mill is now labelled as a shoe factory.</p>	<p>An electricity works is labelled adjacent to the southern boundary of the eastern area. An oilskin works is labelled adjacent to the east boundary and a barrel and box making factory is labelled adjacent to the northern boundary.</p>
1951	1:2,500	No significant changes.	No significant changes.

Map	Scale.	On Site	Off Site
1958	1:10,560	No significant changes.	No significant changes.
1958	1:2,500	No significant changes.	No significant changes.
1965	1:2,500	Partial coverage. Fish canning factories labelled in the eastern area waterfront.	No significant changes.
1963-1968	1:2,500	In the eastern area, a haulage depot is marked adjacent to the gas works and one of the fish curing factories is now labelled as a chemical factory. In the western area, the shoe factory is partly labelled as a printing and music publishing works.	No significant changes.
1966-1968	1:1,250 / 1:2,000	Along the northern boundary, three garages are marked.	No significant changes.
1970-1975	1:1,250 / 1:2,000	A builders merchants is marked towards the north west corner.	An oil pipeline construction depot is marked close to the north west corner.
1975-1977	1:1,250 / 1:2,000	The two gas holders on the southern boundary gasworks are no longer marked and the site is labelled as a depot.	No significant changes.
1976-1981	1:1,250 / 1:2,000	No significant changes.	No significant changes.
1978	1:10,000	Former boat building yard in the east area is now developed as a warehouse. The gasworks in the west area adjacent to the River Yare is no longer marked but one gas holder is marked nearby. Factory and works have been developed on the western boundary. The railway line towards the western boundary is marked as dismantled.	The hospital has been renamed St Nicholas Hospital. Significant development in most directions; – to the south east development appears to be commercial industrial; to the north a school and depots are now marked and the saw mill is now labelled as a timber shed; to the west a large number of commercial / industrial buildings and now marked with three labelled as warehouses. The railway to the north and south is labelled as dismantled.
1975-1978	1:1,250 / 1:1,2000	Precast concrete works labelled in the north west corner of the site.	At this scale, the commercial / industrial buildings are labelled as factory, warehouse, works, store, workshop and depot. No further indication of use is provided. A works adjacent to the north west corner of the site includes a number of tanks.
1984-1986	1:1,250 / 1:1,2000	No significant changes.	Two large tanks are marked close to the southern boundary of the eastern area.
1988	1:10,000	Some layout changes have occurred in the eastern area and three depots are labelled. Two gas holders are still marked. In the western area, the route of the railway is being developed as a dual carriageway and the large roundabout currently in the centre of the site is marked including the spur roads off to the east and west. Formal gardens are now marked as a recreation ground but do also include an adult training centre.	The commercial / industrial buildings to the west are labelled as Harfreys Industrial Estate and the depots to the north are now marked as Yarmouth Business Park. A dual carriageway follows the route of the former railway offsite to the north west.

Map	Scale.	On Site	Off Site
1990	1:1,250 / 1:1,2000	The gas holder towards the southern boundary is no longer marked and the site is labelled as a gas distribution station.	The two large tanks close to the southern boundary of the eastern areas are now surrounded by multiple smaller tanks.
1990-1994	1:1,250 / 1:1,2000	No significant changes.	No significant changes.
1994	1:1,250 / 1:1,2000	No significant changes.	No significant changes.
2002	1:10,000	The dual carriageway on the former railway line is now complete. Some changes to buildings.	The dual carriageway on the former railway now continues offsite to the south.
2010	1:10,000	No significant changes.	No significant changes.
2014	1:10,000	No significant changes.	No significant changes.

NORFOLK



The information in this regional UXO risk map is derived from a number of sources and should be read in conjunction with the "User's Guide" (printed overlay). Zetica cannot guarantee the accuracy or completeness of the information or data.

This map covers regions of coast with beaches, estuaries and all. Further consideration of the bomb risk is required in these areas. The often inaccessible nature and changing ground conditions (e.g. movement of silt that may contain ordnance) means that historical bombing records for these areas are often poor or inaccurate and further assessment of the bomb risk may be required as part of a site specific study.

A FOUR-STEP PROCESS



Risk assessment and method statement from a qualified explosive ordnance clearance (EOC) operative.



Surface geophysical survey to allow shallow groundwork.



MAGCON detects UXBs and obstructions on piling layout to the no-risk depth.



Detected UXBs can be dealt with by our EOC engineers and a Clearance Certificate issued for the site.



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BOMB MAP USERS' GUIDE

Sources of information and explanation of bomb risk

Why?

Unexploded bombs (UXB) still present a risk to construction projects long after the end of the Second World War (WWII). UXBs often entered the ground unnoticed at high velocity and penetrated to a depth of several metres. Here they remain – vulnerable to disturbances from construction work. Beyond the depth of shallow excavation work, the greatest risk is to piling, drilling and probing crews. A piling rig could repeatedly hit a UXBs with considerable force before the crew realises an obstruction has been impacted. It could then be up to 72 hours before the detonator activates.

Who?

The responsibility for avoiding UXB risk usually lies with construction companies or house builders particularly those who are redeveloping urban sites. In addition, project engineering or environmental consultants are expected to advise their clients of a site's history. Other interested parties include those organisations whose employees are physically at most risk from intrusive works, normally piling companies, drillers or probing operators.

How?

UXB risk should be assessed for every site, but especially those in known heavily bombed areas or those situated near war-time strategic installations that were priority targets for enemy aircraft, for example, airfields. Zetica's regional bomb risk map is therefore a first point of reference from which the relative abundance of UXBs can be judged. Consultants then advise their clients that an ordnance-risk desk study is required, which they may obtain from external sources. Construction companies or house builders who assess their own risk could choose to come direct to Zetica.

When?

Do not wait for the piling or drilling company to be on site before thinking about UXB risk – it will inevitably cause delays and higher costs. Request the regional bomb risk map from Zetica as soon as a site is being considered, and then use it to help you or your clients to decide if an ordnance-risk desk study is required.

Where?

Maps can be obtained for any county in England, Scotland, Wales or Northern Ireland – or for any London borough. They can help determine the areas that were most heavily bombed – but no part of the country should be considered 100% safe from UXB risk. Even remote rural areas can have a high risk if, for example, they were locations for decoy airfields or beacons that were lit to fool enemy pilots into thinking they had located a burning city that had been successfully hit by others in the raid.

Information on the regional risk remaining from UXBs in the UK

Zetica has built the largest UXB database of its kind in the UK. It includes a unique digital library of bomb census data, and maps showing key strategic points and bombing densities from the First and Second World Wars. The main sources of information include records from central government (Public Records Office), the Ministry of Defence, and the German Luftwaffe.

Using information from this database, Zetica has published maps of UXB risk on a regional, county and borough scale. The maps indicate relative degrees of UXB risk based on available records for bombing densities and known targeted areas for regions within the UK. The risk is broken down into individual boroughs, towns or cities. The data are based on the historical boroughs and are then overlaid onto the modern map. It is important to note that more-detailed research may be required for individual sites, particularly where proximity to a potential WWII target means the local risk may be higher.

High risk

Areas designated as high risk are those that show a high density of bombing hits (50+ bombs per 1000 acres) and abundant potential WWII targets. In high-risk regions, further action to mitigate UXB risk is considered essential.

Moderate risk

Moderate-risk regions are those that show a bomb density of between 11 and 50 bombs per 1000 acres and that may contain potential WWII targets. Action to mitigate the risk is considered essential, albeit more likely that a reduced scope of work is required compared with that needed for high-risk regions.

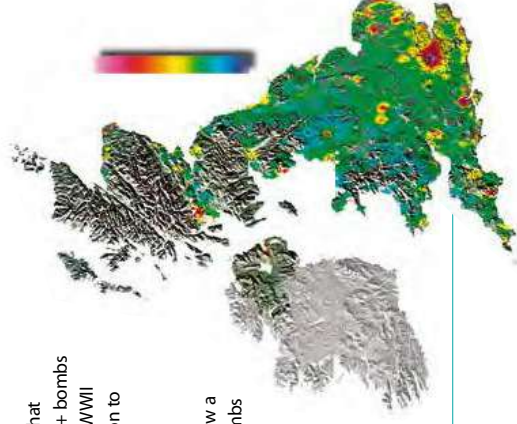
Low risk

Low-risk regions are those with a bombing density of up to 10 bombs per 1000 acres. These areas are considered to have a significant but low UXB risk. In general, further action to mitigate the risk is considered prudent, although not essential. Care is required when assessing the risk for specific sites where the risk may be higher because of local wartime activity.

Other WWII targets

Other regions with the risk of UXBs are key strategic points as defined by the government during WWII as representing potential enemy targets. Where these exist outside areas mapped as high, moderate or low risk, a site-specific assessment of the UXB risk may be required.

Relative UXB risk across UK



What to do if...

...you have a site that has a potential UXB risk In the absence of current legislation requiring you to address the risk from UXBs, your responsibilities under health and safety legislation and regulations such as construction design and management require that you address all identified risks. The first stage is to request further advice from a professional adviser such as Zetica, or to gain more site-specific information by commissioning an ordnance-risk desk study. Then a strategy to deal with the risk can be established that is tailored to your proposed work.

...you find a suspect item or require advice

If during site works you find a suspect (ordnance-related) item, it is very important that you do not touch or move it (even if it has already been moved by an excavator). If it is clearly ordnance related, then dial 999 and ask for the police. Ensure that the area around the item is kept as clear as possible without placing yourself at risk. If you are unsure and do not wish to cause undue alarm, or you just require some advice, then you can call Zetica. We have experienced qualified UXB specialists on hand who can offer support and advice during any site works.

More-detailed procedures should be established in advance if you are in an area where the risk of finding a UXB is shown to be significant (moderate to high).

Site-specific desk-top studies

Zetica is able to provide high-quality, site-specific UXB risk information for any residential, industrial or commercial property in the UK. These desk-top studies provide details of the bombing density within an area and for the site itself, in order to indicate the risks of UXBs still being present. A risk assessment is provided to facilitate informed decision making on whether any further risk mitigation measures are required.

APPENDIX E - RISK CLASSIFICATION MATRICES

Consequence of Risk Being Realised (based on C552 CIRIA, 2001)

Consequence of risk being realised			
Classification	Category	Definition	Examples
Severe short-term (acute) risks only	Humans	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part 2A.	High concentrations of cyanide on the surface of an informal recreation area.
	Controlled Waters	Short-term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource.	Major spillage of contaminants from site into controlled water.
	Property	Catastrophic damage to buildings/property.	Explosion causing building collapse (can also equate to a short-term human health risk if buildings are occupied).
	Ecological System	A short-term risk to a particular ecosystem, or organism forming part of such ecosystem.	
Medium chronic (long-term) risks; "significant harm"	Humans	Chronic damage to Human Health ("significant harm" as defined in Defra 2006).	Concentrations of a contaminant from site exceed the generic, or site-specific assessment criteria
	Controlled Waters	Pollution of sensitive water resources (note: Water Resources Act contains no scope for considering significance of pollution).	Leaching of contaminants from a site into a major or minor aquifer.
	Ecological System	A significant change in a particular ecosystem	Death of a species within a designated nature reserve.
Mild chronic (long-term) risks; less sensitive receptors	Controlled Waters	Pollution of non-sensitive water resources.	Pollution of non-classified groundwater.
	Property	Significant damage to buildings, structures and services ("significant harm" as defined in Circular on Contaminated Land, Defra, 2006). Damage to sensitive buildings/structures/services	Damage to building rendering it unsafe to occupy (e.g., foundation damage resulting in instability)
	Ecological System	Significant damage to crops. Damage to the environment.	
Minor chronic (long-term) risks; mild	Financial / project	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve.	
	Humans	Non-permanent health effects to human health (easily prevented by means such as personal protective clothing, etc).	The presence of contaminants at such concentrations that protective equipment is required during site works.
	Property	Easily repairable effects of damage to buildings, structures and services	The loss of plants in a landscaping scheme. Discolouration of concrete.

Probability of Risk Being Realised (C552 CIRIA, 2001)

Probability of risk being realised	
Classification	Definition
High Likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the sort term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

Risk Classification Matrix (C552 CIRIA, 2001)

Risk classification matrix					
(CIRIA C552, 2001, page 82)		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/Low	Low
	Low Likelihood	Moderate	Moderate/Low	Low	Very Low
	Unlikely	Moderate/Low	Low	Very Low	Very Low

Risk Classification Definitions (C552 CIRIA, 2001)

Risk classification definitions	
Very High	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Moderate / Low	
Low	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very Low	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

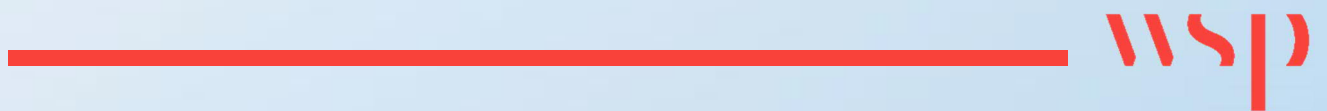


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Appendix 17A

PRELIMINARY TRANSPORT
ASSESSMENT





Norfolk County Council

GREAT YARMOUTH THIRD RIVER CROSSING

Preliminary Transport Impact Assessment





Norfolk County **Council**

GREAT YARMOUTH THIRD RIVER CROSSING

Preliminary Transport Impact Assessment

TYPE OF DOCUMENT (VERSION) CONFIDENTIAL

PROJECT NO. 70046035

OUR REF. NO. GYTRC-WSP-TGN-XX-RP-TP-0001

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QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Draft	PEIR version		
Date	28 January 2018	June 2018		
Prepared by	Rob Surl	Inaki Gaspar		
Signature				
Checked by	Amanda Fogg	Amanda Fogg		
Signature				
Authorised by	Joanna Lyon	Amanda Fogg		
Signature				
Project number	70046035	70046035		
Report number	GYTRC-WSP-TGN-XX-RP-TP-0001	GYTRC-WSP-TGN-XX-RP-TP-0001		
File reference	\\uk.wspgroup.com\central data\Projects\62240xxx\62240375 - GYTRC\02 WIP\EI EIA and flood risk\03 Document\00 PEIR\00 PEIR Vol III - Appendix\Appendix 17 - Traffic and Transport			

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1 INTRODUCTION

1.1 THE SCHEME

- 1.1.1. The Great Yarmouth Third River Crossing (the Proposed Scheme) will provide a new double leaf bascule bridge carrying a new dual carriageway road across the River Yare. The location of the Proposed Scheme is shown in Figure 1 below. It will create a new direct link between the western and eastern parts of the town. Specifically the scheme will provide a connection between the A47, part of the Strategic Road Network (SRN) and the South Denes Business Park, Enterprise Zone, Great Yarmouth Energy Park and Outer Harbour, all of which are located on the South Denes peninsula.



Figure 1 – Location of the scheme

1.2 THE NEED FOR THE SCHEME

- 1.2.1. The Proposed Scheme will provide a third crossing of the River Yare, creating a direct link into the southern part of the peninsula. It will greatly improve access to the port, outer harbour, employment areas (including the Enterprise Zone), the seafront and residential areas. It will connect the peninsula to the strategic road network via the A47 at Harfrey's Roundabout.
- 1.2.2. The national significance and need for the Proposed Scheme derives from the considerable improvement in connectivity and resilience it will deliver to the Great Yarmouth Port ("the Port"), which itself has a nationally significant role in the renewable energy sector and the offshore gas and oil industry. The Proposed Scheme objectives are as follows:

- To support Great Yarmouth as a centre for both offshore renewable energy and the offshore oil and gas industry, enabling the delivery of renewable energy NSIPs and enhancing the port's role as an international gateway;
- To improve access and strategic connectivity between Great Yarmouth port and the national road network thereby supporting and promoting economic and employment growth (particularly in the Enterprise Zone);
- To support the regeneration of Great Yarmouth, including the town centre and seafront, helping the visitor and retail economy;
- To improve regional and local access by enhancing the resilience of the local road network, reducing congestion and improving journey time reliability;
- To improve safety and to reduce road casualties and accidents, in part by reducing heavy traffic from unsuitable routes within the town centre;
- To improve access to and from the Great Yarmouth peninsula for pedestrians, cyclists and buses, encouraging more sustainable modes of transport and also reducing community severance; and
- To protect and enhance the environment by reducing emissions of greenhouse gases and minimising the environmental impact of the Proposed Scheme.

- 1.2.3. The Department for Transport's (DfT) recently published study Transport Infrastructure for our Global Future: A Study of England's Ports Connectivity¹ ("the DfT Study") states that "at present around 95% of all goods entering and leaving the UK are moved by sea and the UK port sector directly contributes £1.7billion to the UK economy". The DfT Study also notes that "if our ports are to continue to thrive then the national, regional and local infrastructure supporting them has to be effective and efficient". The DfT Study further recognises that renewable energy sectors are closely linked to the port industry and that "port access will be an issue for their supply chains and their employees".
- 1.2.4. Great Yarmouth's proximity to the Strategic Road Network (SRN) plays an important role in relation to the Port, and the Proposed Scheme is identified in the DfT Study as a Port Connectivity Project. The Autumn Budget 2017² pledged a contribution of £98 million towards the Proposed Scheme's £120 million programme budget.
- 1.2.5. The Port, South Denes Business Park, Enterprise Zone and Great Yarmouth Energy Park are located towards the southern end of the peninsula. Supporting this area is a key objective of both the New Anglia Strategic Economic Plan (SEP) (2014)³ and Great Yarmouth Local Plan Adopted Core Strategy 2013-2030⁴. Furthermore, the relationship between the provision of essential infrastructure and economic growth is well documented; most notably in the NPS NN⁵, the Department for Business, Energy & Industrial Strategy's White Paper Industrial Strategy: Building a Britain fit for the Future (2017)⁶ and in the DfT Study.

¹ Department for Transport (April 2018), Transport Infrastructure for our Global Future, A Study of England's Port Connectivity <https://www.gov.uk/government/publications/transport-connectivity-to-ports-review-of-the-current-status-and-future-infrastructure-recommendations>

² <https://www.gov.uk/government/publications/autumn-budget-2017-documents>

³ New Anglia new Enterprise Partnership for Norfolk and Suffolk (2014) New-Anglia-Strategic-Economic-Plan. <https://newanglia.co.uk/wp-content/uploads/2017/10/New-Anglia-Strategic-Economic-Plan.pdf>

⁴ Great Yarmouth Borough Council (2015) Great Yarmouth Local Plan: Adopted Core Strategy 2013-2030 <https://www.great-yarmouth.gov.uk/CHttpHandler.ashx?id=1884&p=0>

⁵ Department for Transport (2104) National Policy Statement for National Networks https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387222/npsnn-print.pdf

⁶ Department for Business, Energy & Industrial Strategy (2017) Industrial Strategy: Building a Britain Fit for the Future https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf

- 1.2.6. The Department of Transport's publication Action for Roads⁷ (2013) identifies capacity issues on the A47 past Great Yarmouth to Lowestoft and predicts that congestion will be severe on that entire section of the road by 2040 (also pointed in Appendix A of the NPS NN).
- 1.2.7. This evidence further confirms the need for a third crossing, as under the current situation the only access from the SRN to the Port and employment areas is via the Haven Bridge or Breydon Bridge located at the northern end of the peninsula. Neither bridges are considered suitable to accommodate the Port's on-going use and projected growth.
- 1.2.8. The mix of Port-related and local traffic congestion, particularly on the Haven Bridge, is attributed to delays and unreliable end to end journey times; ultimately Great Yarmouth has become to be perceived as remote, potentially discouraging inward investment. Alternative transport modes such as bus users, cyclists and pedestrians often have long, indirect journeys, discouraging sustainable commuting.
- 1.2.9. In the Outline Business Case⁸, the Proposed Scheme was demonstrated by an adjusted Benefit Cost Ratio (BCR) of 3.5, meaning the proposal shows high value for money.
- 1.2.10. By creating a more efficient connection, the Proposed Scheme will address the congestion and severance within Great Yarmouth, accommodate future growth and improve strategic connectivity between the town, the Port and the Strategic Road Network, which in turn will facilitate the establishment of the Port as a centre for offshore oil and gas industries and its role as an International gateway. Without a new crossing the full potential for growth in the Enterprise Zone and Port may not be fully realised.

1.3 THE NEED FOR A TRANSPORT ASSESSMENT (TA)

- 1.3.1. Paragraph 32 of the National Planning Policy Framework (NPPF), states that all developments that generate significant amounts of movements should be supported by a Transport Assessment (TA). This should be prepared and submitted with a planning application for the development.
- 1.3.2. The scheme has potential to cause significant changes to the pattern of movement in Great Yarmouth. Although this will mainly involve the reassignment of trips to different routes, rather than the generation of new trips, it is considered that the scheme will require a TA.
- 1.3.3. Following a direction from the Secretary of State (SoS) under Section 35 of the Planning Act 2008, the scheme has been categorised as a Nationally Significant Infrastructure project (NSIP). Planning and other consents for a NSIP require an application to the Planning Inspectorate (PINS) for a Development Consent Order (DCO).
- 1.3.4. A full Transport Assessment (TA) will therefore be prepared in support of an application by Norfolk County Council (the applicant) for a Development Consent Order (DCO) for the scheme.

1.4 PRELIMINARY TRANSPORT ASSESSMENT (PTA)

- 1.4.1. This document is a preliminary Transport Assessment (PTA) for the scheme. It accompanies the preliminary Environmental Impact Report (PIER), and should be read in the context of that document.
- 1.4.2. The PTA provides an initial assessment of the expected transport impacts of the scheme, based on the information currently available. Some of this information may change, including updates to the design of the scheme and the transport models used for the assessment, and the full TA will reflect any changes.

⁷ Department for Transport (July 2013), Action for Roads, A Network for the 21st Century
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/212590/action-for-roads.pdf

⁸ Mouchel (2017) Great Yarmouth Third River Crossing: Outline Business Case

1.5 SCOPE OF THE PTA

- 1.5.1. WSP has been commissioned by the applicant to assess the transport impacts of the scheme. The assessment is being undertaken in line with the National Planning Policy Framework (NPPF), National Planning Practice Guidance (NPPG) and national and regional standards and guidelines.

1.6 STRUCTURE OF THE PTA

- 1.6.1. This PTA comprises:

- Chapter 1 Introduction
- Chapter 2 Policy context
- Chapter 3 Existing conditions – Site information
- Chapter 4 Existing conditions - Baseline transport data
- Chapter 5 The Proposed Scheme
- Chapter 6 Assessment methodology
- Chapter 7 Transport Impacts
- Chapter 8 Mitigation of transport impacts
- Chapter 9 Residual and cumulative impacts

2 POLICY CONTEXT

2.1 INTRODUCTION

- 2.1.1. This chapter describes how the scheme aligns with relevant national, sub-national and local strategies and policies.

2.2 NATIONAL POLICY CONTEXT

- 2.2.1. The following national planning and transport policies are relevant to the scheme:

- National Transport Objectives
- National Planning Policy Framework 2012
- Planning Act 2008
- National Policy Statement for National Networks 2015
- National Infrastructure Delivery Plan 2016-2021
- Government's Industrial Strategy
- Action for Roads: A network for the 21st Century
- National Policy Statement for Ports 2012
- UK Marine Policy Statement 2011
- International Gateways and the SRN

NATIONAL TRANSPORT OBJECTIVES

- 2.2.2. The national transport objectives, set by government, are:

- To ease congestion and provide upgrades on important national, regional or local routes
- To unlock economic and job creation opportunities
- To enable the delivery of new housing developments

- 2.2.3. The scheme will contribute to the first and, especially, the second of these objectives.

NATIONAL PLANNING POLICY FRAMEWORK 2012

- 2.2.4. The National Planning Policy Framework (NPPF) replaces all Planning Policy Statement and Planning Policy Guidance documents previously detailing the Government's planning policies for England. The framework has been drafted to reflect the law following the implementation of the Localism Act 2011.

- 2.2.5. Paragraph 32 of the NPPF states:

- "All developments that generate significant amounts of movement should be supported by a Transport Statement or Transport Assessment."

- 2.2.6. The NPPF does not contain specific policies for NSIPs, for which particular considerations apply. These are determined in accordance with the decision-making formula set out in the Planning Act 2008 and relevant national policy statements (NPS) for major infrastructure, as well as any other matters that are considered both important and relevant (which may include the NPPF). National policy statements form part of the overall framework of national planning policy and are a material consideration in decisions on planning applications.

NATIONAL PLANNING POLICY FRAMEWORK: DRAFT TEXT FOR CONSULTATION (MARCH 2018)

- 2.2.7. The National Planning Policy Framework (NPPF) draft text for consultation builds on the first National Planning Policy Framework published in 2012 and is part of the Government's strategy to reform housing and planning policy. In line with the first National Planning Policy Framework, the Draft Text for Consultation continues to have a presumption in terms of sustainable.
- 2.2.8. The National Planning Policy Draft Text for consultation incorporates proposals from previous consultations, changes in planning policy implemented through Written Ministerial Statements since publication of the first Framework in 2012, the effect of case law on the interpretation of planning policy since 2012 and improvements to the text to increase coherence and reduce duplication.
- 2.2.9. The policy changes and amendments in relation to promoting sustainable transport is summarised below:
- Authorities should identify additional development opportunities arising from strategic infrastructure investment;
 - Transport issues should be considered from the earliest stages of plan-making so that:
 - the potential impacts of development on transport networks can be addressed;
 - opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised – for example in relation to the scale, location or density of development that can be accommodated;
 - opportunities to promote walking, cycling and public transport use are identified and pursued;
 - the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for mitigation and for net gains in environmental quality; and
 - patterns of movement, streets, parking and other transport considerations are integral to the design of schemes, and contribute to making high quality places; and
 - Designs should prioritise pedestrian and cycle movements, followed by access to high quality public transport (so far as possible) as well as to reflect the importance of creating well-designed places.

PLANNING ACT 2008

- 2.2.10. Section 104 of the Planning Act 2008 (PA 2008) provides that DCO applications must be determined in accordance with the relevant NPS. For highway schemes, the relevant NPS is the NPS on National Networks (December 2014) (NNNPS). The Secretary of State will use this NPS as the primary basis for the decision on the DCO application.
- 2.2.11. Under section 104, the SoS must also have regard to the appropriate marine policy documents. These include the National Policy Statement for Ports (PNPS) and the UK Marine Policy Statement (MPS) and Marine Plans.
- 2.2.12. Under section 104, the SoS must also have regard to any local impact report, any matters prescribed in relation to development of the description to which the application relates, and any other matters which the SoS thinks are both important and relevant to the decision. These might include relevant policies in the NPPF and in the local development plan documents.

NATIONAL POLICY STATEMENT FOR NATIONAL NETWORKS 2015

- 2.2.13. The National Policy Statement for National Networks (NPSNN) was designated as a NPS by the SoS in January 2015. It sets out the need for, and Government's policies to deliver, NSIPs on the national road networks in England. The NPSNN works to complement the overall strategic aims of the NPPF. However, whilst the NPPF does not contain specific policies for NSIPs, where particular considerations apply, the NPSNN assumes that function, and provides transport policy to guide individual transport schemes.
- 2.2.14. The Government sets out its vision and strategic objectives for the national road network in the NPSNN as follows⁹:
- "The Government will deliver national networks that meet the country's long term needs; supporting a prosperous and competitive economy and improving overall quality of life, as part of a wider transport system.
- This means:
- Networks with the capacity and connectivity and resilience to support national and local economic activity and facilitate growth and create jobs;
 - Networks which support and improve journey quality, reliability and safety;
 - Networks which support the delivery of environmental goals and the move to a low carbon economy; and
 - Networks which join up our communities and link effectively to each other".
- 2.2.15. The NPSNN highlights the need for development of the national road network and delivers the above aims in the context of Government policy for economic performance, environment, safety, technology, sustainable transport, accessibility and journey reliability. The national road network connects towns, cities and regions and there is a critical need to address congestion issues to provide safe and resilient networks. The pressure on this network is predicted to increase as the long term drivers for demand to travel, GDP (Gross Domestic Product) and population, are also forecast to increase. Therefore, integrating improvements into the network via NSIPs is just one step to delivering world class transport infrastructure.
- 2.2.16. The scheme aligns with the aims and objectives of the NPSNN. It will increase capacity and reduce congestion on Great Yarmouth's highway network, and improve its safety, resilience and connectivity to the SRN. It will facilitate economic growth through improved journey reliability, and will reduce community severance by providing an additional east-west link across the River Yare.
- 2.2.17. Section 4 of the NPS sets out the principles of assessment to be followed by NSIP applications. The decision makers should account of a scheme's:
- potential benefits, including the facilitation of economic development, including job creation, housing and environmental improvement, and any long-term or wider benefits
 - potential adverse impacts, including any longer-term and cumulative adverse impacts, as well as any measures to avoid, reduce or compensate for any adverse impacts.
- 2.2.18. A detailed assessment of the expected benefits of the scheme is provided in Chapter 7 of this PTA.

⁹ Department for Transport (January 2015), National Policy Statement for National Networks, page 9, paragraph 2

NATIONAL INFRASTRUCTURE DELIVERY PLAN 2016 – 2021

- 2.2.19. The National Infrastructure Delivery Plan (NIDP), published in March 2016, updates and replaces the previous NIP, outlining details of £483 billion of investment in over 600 infrastructure projects and programmes in all sectors and spread across the UK, to 2020-21 and beyond.
- 2.2.20. The NIDP bring together the government's plans for economic infrastructure over the next 5 years with those to support delivery of housing and social infrastructure based on the principle that investment in infrastructure will drive wider economic benefits, including:
- supporting growth and creating jobs;
 - raising the productive capacity of the economy;
 - driving efficiency; and
 - boosting international competitiveness.
- 2.2.21. The NIDP recognises that the Strategic Road Network (SRN) of motorways and 'A' roads is vital to businesses and the successful functioning of the economy. It states that local roads are a crucial element of the transport system and their maintenance and improvement is the responsibility of Local Authorities. The NIDP emphasises the government's commitment to addressing congestion challenges by building a better network with smarter roads that use technology and modern road building techniques. In this way it can ensure the country has a road network that drives, instead of constrains, growth.
- 2.2.22. The scheme aligns with the key principles of the NIDP. It will relieve congestion on Great Yarmouth's local highway network and the town centre by providing a new east-west link across the River Yare. It will greatly improve access to the port and employment areas. The scheme is expected to stimulate regeneration and economic growth, and help attract inward investment.
- 2.2.23. Support for the scheme was provided in November 2017 when the then Chancellor Phillip Hammond pledged £98m of funding towards the construction of the proposed crossing in the Autumn Budget.

GOVERNMENT'S INDUSTRIAL STRATEGY

- 2.2.24. At the heart of the government's economic agenda is the February 2017 Green Paper "Building our Industrial Strategy"¹⁰. This aims to improve living standards and economic growth by driving productivity and growth across the whole country. The strategy identifies two important areas of priority for energy: affordability and maximising industrial opportunities for UK economy from energy innovations. This includes offshore oil and gas and clusters of excellence such as the east coast.
- 2.2.25. The Industrial Strategy presents an opportunity for Great Yarmouth to develop its offshore energy cluster further, by building on the existing offshore oil, gas and decommissioning activities, while capitalising on the low carbon agenda with continued investment in offshore wind. If Great Yarmouth is to realise this opportunity, transport connectivity improvements will be needed in order to support the growth of the sector and ensure its future success.
- 2.2.26. The government has set up six Centres for Offshore Renewable Engineering (CORE) across the UK, one of which is in Great Yarmouth and Lowestoft. CORE's aim is to maximise the ability of areas to benefit from opportunities in offshore engineering. Support structures that are in place include the establishment of Enterprise Zones with simplified planning regimes and enhanced capital allowances, among other incentives.

¹⁰ Department for Business, Energy & Industrial Strategy (2017) Building our Industrial Strategy: 10 pillars

ACTION FOR ROADS: A NETWORK FOR THE 21ST CENTURY

- 2.2.27. “Action for Roads” was published by the DfT in July 2013 and sets out a vision for the future of the road network. It recognises the growing challenge of making best use of the network whilst planning ahead in order to help the economy grow. In order to achieve this balance, strategic roads must be transformed through investment in improving, upgrading and maintaining the network.
- 2.2.28. The importance of the local road network is also recognised. Preventing local roads from entering a long-term cycle of decline is vital. Decision-making has therefore been decentralised so that local communities and authorities have the freedom, flexibility and capacity to shape that future. This strategy highlights the biggest change to highways management in over 50 years and marks a new era for England’s roads.
- 2.2.29. The scheme aligns with the vision set out in “Action for Roads” by delivering a high quality upgrade to Great Yarmouth’s local highway network, transforming it for future generations. The scheme has the support of the local community, stakeholders and local authorities. The provision of a new bridge across the River Yare represents a significant investment which will encourage economic growth in the town and wider region in the long term.

NATIONAL POLICY STATEMENT FOR PORTS 2012

- 2.2.30. The NPSP, which was designated by the SoS in January 2012, sets out the framework for making decisions on proposals for new port development, recognising the essential role they play in the UK economy and the wider economic benefits that they can bring. In addition, it sets out the vital role that UK ports play in the energy sector in terms of import and export of energy supplies and in the construction and servicing of offshore energy installations and in supporting oil and gas pipelines. It is also noted that port handling needs to energy may change as renewables play an increasingly important part as an energy source.
- 2.2.31. Whilst the application does not propose new port development, the scheme will provide greatly improved accessibility to the recently constructed Outer Harbour, and will enable this important facility to achieve its full potential.

UK MARINE POLICY STATEMENT 2001

- 2.2.32. The UK MPS is the framework for preparing Marine Plans and for taking decisions that affect the marine environment. Marine Plans set out how the MPS will be implemented in specific areas. According to paragraph 1.3.1 of the MPS, the MPS and marine planning systems will sit alongside and interact with existing planning regimes across the UK. These include town and country planning and other legislation, guidance and development plans in each administration. In England and Wales this also includes the development consent order regime for NSIPs.
- 2.2.33. A marine licence will almost certainly be required as part of the development consent, and under section 42 of the PA 2008 (as amended by section 23 of the Marine and Coastal Access Act 2009) there is a statutory duty on applicants to consult the Marine Management Organisation (MMO) on NSIPs which would affect, or would be likely to affect, any relevant areas. In this case, parts of the scheme will be located in “waters in or adjacent to England up to the seaward limits of the territorial sea.”
- 2.2.34. Further information will be provided in the full TA.

INTERNATIONAL GATEWAYS AND THE SRN

- 2.2.35. In 2016, Highways England commissioned a report¹¹ on key international gateways (ports and airports) and their importance to England's economy, and the role of the Strategic Road Network in supporting this critical infrastructure. It noted that:
- Ports serve manufacturing sectors and are key inter-modal points for the logistics and distribution sector.
 - Ports are highly dependent on road connectivity for the inward and outward movement of freight.
 - Ports are significant employment areas.
 - Congestion, causing increased travel times and reduced journey time reliability, can increase freight costs and diminish the competitive advantage of parts of the UK, by reducing the effective catchment area of a port.
- 2.2.36. In 2015, the port of Great Yarmouth handled over 1 million tonnes of traffic, including oil and other bulk liquids (195,000 tonnes), agricultural products and other dry bulk products (726,000 tonnes) and general cargo (174,000 tonnes)¹². Although it is smaller than the major ports on which the HE report focuses, the principles hold true. The port of Great Yarmouth, especially the new deep water outer harbour, does not enjoy good access to the strategic road network. The scheme will greatly improve the port's connectivity to the A47 trunk road and the SRN, helping to improve its efficiency and viability, and stimulate port-related growth.

2.3 SUB-NATIONAL POLICY CONTEXT

- 2.3.1. The following sub-national planning and transport policies are relevant to the scheme:

- New Anglia Strategic Economic Plan 2014
- Lowestoft-Great Yarmouth Enterprise Zone and Local Development Order
- East Inshore and East Offshore Marine Plan (2014)

NEW ANGLIA STRATEGIC ECONOMIC PLAN 2014

- 2.3.2. The New Anglia Strategic Economic Plan (SEP) sets out the ambition of the Local Enterprise Partnership (LEP) to transform the economies of Norfolk and Suffolk and establish the 'New Anglia' area as a centre of global business excellence. It seeks to deliver more jobs, new businesses, new housing, and increased productivity including:
- 95,000 growth in jobs from 2012 to 2026
 - 15,000 new businesses¹³ from 2012 to 2026
 - Increasing GVA by 10% to equal the national average
- 2.3.3. Great Yarmouth is identified as a Growth Location with a strong base in manufacturing and food processing, and strong tourism and leisure industries with potential for growth.
- 2.3.4. The area's main growth opportunity is in the energy sector, for which it has been designated one of six Centres for Offshore Renewable Engineering (CORE). The Port of Great Yarmouth is a major base for the construction, operations and maintenance and servicing of North Sea wind farms and is very important to the offshore energy

¹¹ "International gateways and the strategic road network". Commissioned by Highways England to inform the emerging Strategic Economic Growth Plan. (Atkins, for HE, 2016)

¹² Source: Port Freight Statistics PORT0418 (DfT Statistics, 2015)

¹³ Increased from 10,000 (SEP Impact Report, NCC, September 2016)

industry. Great Yarmouth and Lowestoft are the closest ports to the East Anglia Array Wind Farm, which has up to 1,800 wind turbines, 14km from the coast. Plans are also being developed for the Galloper Wind Farm, 27km from the Suffolk Coast.

- 2.3.5. The SEP identifies eight growth locations – areas which are expected to grow by at least 1,000 jobs and 1,000 dwellings¹⁴, including Lowestoft and Great Yarmouth. Transport performs a pivotal role in connecting and accessing these growth locations, and a programme for New Anglia's strategic transport infrastructure investment is essential to deliver the objectives of the SEP. For this reason, most of the strategic interventions in the SEP are transport-related, and include:
- Improvements on national trunk roads in the area;
 - Schemes to directly unlock employment or housing growth; and
 - Sustainable urban transport packages – public transport, walking and cycling schemes, network management measures and maintenance schemes.
- 2.3.6. The SEP initiatives in Great Yarmouth are focused on parts of the town which are presently isolated with poor accessibility by land. The SEP acknowledges that Great Yarmouth suffers from congestion arising from bottlenecks, including at North Quay and the Haven Bridge, and that the limited river crossings force traffic onto a few congested routes. It specifically supports the preparation of a third river crossing scheme. The SEP, which pre-dates the announcement of the Local Majors Fund, envisaged that this work would lead to the inclusion of the scheme in the (then) Highways Agency's national programme, as this was the expected delivery route for the scheme at the time (2014).
- 2.3.7. Subsequently an Outline Business Case for the scheme was submitted and approved, and will be followed through in the Development Consent Order (DCO) process.
- 2.3.8. A key part of the SEP "offer" is the Enterprise Zone (EZ) which designates two sites in Great Yarmouth for energy businesses, offshore engineering, ports and logistics.

LOWESTOFT-GREAT YARMOUTH ENTERPRISE ZONE AND LOCAL DEVELOPMENT ORDER

- 2.3.9. The Great Yarmouth and Lowestoft Enterprise Zone (EZ) is one of 24 such zones created in England since 2011. The EZ designation applies to two sites in Great Yarmouth, Beacon Park and South Denes totalling 75.5 hectares, for energy businesses, offshore engineering, ports and logistics in Great Yarmouth.
- 2.3.10. The South Denes EZ is centred on the deep water outer harbour on the South Denes peninsula, to the south of Great Yarmouth town centre and northeast of Gorleston-on-Sea on Norfolk's east coast. It is covered by a Local Development Order (LDO) which facilitates energy related development. The LDO also covers the Great Yarmouth Energy Park and South Denes Business Park.
- 2.3.11. The Enterprise Zone and LDO area are discussed in more detail in Paragraphs 3.4.16 to 3.4.20 and are illustrated in Figure 8 on Page 26.
- 2.3.12. The scheme will support economic growth in Great Yarmouth and the wider sub-region and aligns with the aims of the EZ and LDO.

¹⁴ Over the relevant Local Plan period

EAST INSHORE AND EAST OFFSHORE MARINE PLAN (2014)

- 2.3.13. Policy PS3 of the Marine Plan for East (Inshore) states that proposals need to demonstrate, in order of preference:
- that they will not interfere with current activity and future opportunity for expansion of ports and harbours
 - how, if the proposal may interfere with current activity and future opportunities for expansion, they will minimise this
 - how, if the interference cannot be minimised, it will be mitigated
 - the case for proceeding if it is not possible to minimise or mitigate the interference.
- 2.3.14. Policy DD1 states that proposals need to demonstrate, in order of preference:
- that they will not adversely impact dredging and disposal activities
 - how, if there are adverse impacts on dredging and disposal, they will minimise these
 - how, if the adverse impacts cannot be minimised they will be mitigated
 - the case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts.
- 2.3.15. Further information will be provided in the full TA.

2.4 LOCAL POLICY CONTEXT

The following local planning and transport policies are relevant to the scheme:

- Great Yarmouth Local Plan: Core Strategy 2013 – 2030
- Great Yarmouth Waterfront Area Action Plan 2010
- Norfolk Local Transport Plan: Connecting Norfolk
- Great Yarmouth: The Plan 2015 – 2020
- Great Yarmouth Borough Infrastructure Plan 2014
- Great Yarmouth Economic Growth Strategy 2017 – 2021
- Great Yarmouth Town Centre Masterplan (draft) 2016

GREAT YARMOUTH LOCAL PLAN: CORE STRATEGY 2013 – 2030

- 2.4.1. The Great Yarmouth Local Plan Core Strategy is the main document in Great Yarmouth Borough Council's Local Plan (2013 – 2030). It establishes the spatial vision and objectives for how the borough will develop and grow in the future. It also sets out strategic policies and site allocations. Consultation on the publication draft was undertaken in September 2013 before the strategy was submitted and adopted by the Borough Council in December 2015.
- 2.4.2. The Core Strategy envisages that approximately 35% of new development will take place in the borough's main towns at Gorleston-on-Sea and Great Yarmouth (Policy CS2) with a further 30% being allocated in the borough's Key Service Centres at Bradwell and Caister-on-Sea.
- 2.4.3. Provision for at least 7,140 new homes over the plan period (Policy CS3) will be achieved by allocating two strategic Key Sites; at the Great Yarmouth Waterfront Area (Policy CS17) for approximately 1,000 additional new homes (a minimum of 350 of which will be delivered within the plan period) and at the Beacon Park Extension, South Bradwell (Policy CS18) for approximately 1,000 additional new homes (all of which will be delivered within the plan period).

- 2.4.4. A third crossing over the River Yare is envisioned in the Core Strategy, along with improvements to public transport and the creation of attractive walking and cycling routes from the train station to the waterfront, town centre and seafront, which will relieve congestion and provide essential links to key facilities and services, including the outer harbour.

GREAT YARMOUTH WATERFRONT AREA ACTION PLAN 2010

- 2.4.5. The Area Action Plan (AAP) provides a detailed spatial policy framework to deliver the regeneration ambitions of the Borough Council for the waterfront areas of central Great Yarmouth. It covers a total area of approximately 40 ha of predominantly brownfield waterfront land. It seeks to ensure that development within this area comes forward in a coordinated manner by setting out a policy framework to guide the delivery of new housing, employment space, retail, leisure and tourism facilities, community facilities, open space, transport initiatives and environmental enhancements.
- 2.4.6. The AAP has been significantly influenced by a number of consultation events that took place between 2006 and 2011 involving many local people, businesses and organisations.
- 2.4.7. The AAP recognises that all traffic from the south must use one of two bridges that cross the River Yare, Haven Bridge and Breydon Bridge. These routes are frequently congested particularly in the summer, when, as a result of tourism, the population of the town swells to almost double the size.
- 2.4.8. To facilitate development, the AAP acknowledges that a series of road improvements will be required dependant on securing appropriate levels of funding from Central Government and developments within the town. As a long term ambition (10-15 years) for the town a third river crossing has been identified to the south of Haven Bridge. This will provide an alternative route from the SRN (A47) for the traffic associated with the industrial uses in the Port area that currently travels through the town.
- 2.4.9. The scheme falls outside the revised AAP boundary. AAP development is described in Section 3.4 on Page 22

NORFOLK LOCAL TRANSPORT PLAN: CONNECTING NORFOLK

- 2.4.10. DfT guidance on Local Transport Plans (LTPs) required local authorities to develop strategies and implement programmes to achieve five goals originally developed in the DfT's discussion document, 'Towards a Sustainable Transport System':
- Maximising economic growth through competitiveness and productivity;
 - Tackling climate change;
 - Protecting people's safety, security and health;
 - Improving quality of life; and
 - Promoting greater equality of opportunity.
- 2.4.11. In response, Norfolk County Council adopted a strategy intended to deliver first class transport infrastructure in the county. Norfolk's LTP3 sets out the Council's transport objectives, strategies and policy framework for transport up to 2026 and describes its transport vision as:
- 'A transport system that allows residents and visitors a range of low carbon options to meet their transport need and attracts and retains business investment in the county'.*
- 2.4.12. This vision will be achieved by:
- Making the best use of existing infrastructure to facilitate reliable journeys;
 - Reducing the need to travel;
 - Influencing others and ensuring transport is integrated into development plans;

- Working with communities and our partners to seek new solutions and new ways of delivering; and
- Lobbying for and pursuing improvements to Norfolk's strategic transport network.

2.4.13. Six strategic aims underpin the vision, they are: maintaining and managing the highway network; delivering sustainable growth; enhancing strategic connections; reducing emissions; improving road safety; and improving accessibility.

2.4.14. Ten main transport issues are addressed in LTP3. These include:

- Current and future resilience of the transport network
- Poor road and rail connections to other major centres in the UK and the impact this has on business investment
- Connections to Norfolk's international transport gateways
- Poor transport accessibility and isolation

2.4.15. LTP3 recognises that to bring about an improvement in journey time reliability in and around Norfolk, local agencies should work together to enhance the strategic network which includes, among other schemes, a Third River Crossing for Great Yarmouth. The LTP noted that the scheme 'will provide an enhanced link to the port and help remove freight traffic from the town centre'.

2.4.16. The Proposed Scheme will also contribute to the LTP3 goals by reducing congestion and improving connectivity, access to jobs, and journey time reliability for customers, commuters and freight. It would provide an improved crossing for cycles and pedestrians as well as for cars and freight vehicles.

GREAT YARMOUTH: THE PLAN 2015 – 2020

2.4.17. Great Yarmouth Borough Council has approved an updated plan for the borough's future, which will help target investment in public priorities identified in a major consultation.

2.4.18. As a key priority, the plan highlights an ambition for Great Yarmouth to be a fast-growing coastal "Enterprise Town". Efforts will be focused on creating the conditions to ensure the borough and its residents are best placed to benefit from new jobs and investment, including from the next generation of offshore energy developments.

2.4.19. These priorities are:

- Economic growth
- Housing
- Neighbourhoods, communities and the environment
- Tourism, culture and heritage
- Great Yarmouth town centre
- Transport and infrastructure

2.4.20. The Council has already achieved much within each of these six priorities and has a clear plan on what needs to be undertaken up to 2020.

2.4.21. The Plan describes how transport and infrastructure will be joined up and much improved. Residents, businesses and visitors will access and travel throughout the borough with ease. Great Yarmouth will become a smart borough utilising technology to enable all to live with ease and convenience. It highlights the Third River Crossing as:

- 'a strategic priority for Great Yarmouth to unlock future economic growth in the area and ease congestion'

- 2.4.22. The Council will not only continue to support the scheme but champion and lobby with partners including the LEP, Norfolk County Council and others to achieve this.

GREAT YARMOUTH BOROUGH INFRASTRUCTURE PLAN 2014

- 2.4.23. The Borough Council published an Infrastructure Plan in 2014 to identify the physical, social and green infrastructure needed to support the borough's growth ambitions set out in the emerging Local Plan over the plan period (2014 - 2029).
- 2.4.24. The plan describes how the towns of Great Yarmouth and Gorleston-on-Sea suffer from congestion within their built up areas. This is primarily because there are only two crossings over the River Yare (Haven Bridge and Breydon Bridge) and these can become very congested. The South Denes peninsula in Great Yarmouth is particularly inaccessible and problems are exacerbated by industrial and freight traffic needing to access this area.
- 2.4.25. The need for a Third River Crossing is recognised in the plan by the Council, the Norfolk and Suffolk Local Transport Body, New Anglia LEP and the A47 Alliance as a strategic priority for unlocking future economic growth in the area. It will also ease existing congestion problems and improve accessibility in Great Yarmouth, including access to the seafront, South Denes and outer harbour areas.
- 2.4.26. The proposed scheme aligns with the priorities set out within the Infrastructure Plan and will help to mitigate the congestion issues described along with providing new cycling provision for those wishing to access the peninsula from the southern parishes including Gorleston-on-Sea.

GREAT YARMOUTH ECONOMIC GROWTH STRATEGY 2017 – 2021

- 2.4.27. The Great Yarmouth Borough Council's Economic Growth Strategy 2017-2021 has been developed through a review of previous documents, policies and commissioned studies as well as consultations with local stakeholders and sets out the planned approach to support the growth of the local economy over the next four years up to 2021.
- 2.4.28. The strategy is realised through the implementation of the Action Plan which aims to deliver the growth and development in each field. The individual actions are grouped under the four broad aims that encompass the strategy's vision on Place, Key Sectors, Workforce Development and Infrastructure:
- A Destination In Which To Invest, Work, Visit and Live
 - Key Sector Development and Sustainability
 - Developing communities, entrepreneurship and the workforce
 - A Prosperous Physical Environment and Improved Infrastructure
- 2.4.29. One of the key objectives of the strategy to help achieve the above aims is for transport and infrastructure to be joined up and much improved.
- 2.4.30. The strategy lists the Third River Crossing as a key component to support the new development in the Great Yarmouth Local Plan.

GREAT YARMOUTH TOWN CENTRE MASTERPLAN (DRAFT) 2016

- 2.4.31. The Borough Council's draft Town Centre Masterplan covers the area between the seafront, the Yare riverfront, and the old town walls. Its vision is for new investment and employment in the town centre, generating renewed pride in Great Yarmouth and building confidence for the future. The plan aims to deliver this vision by focusing on six interconnected objectives, which have been developed in consultation with stakeholders and the general public:
- Strengthening the heart of the town centre

- Improving the market and the Market Place
- Transforming the Conge
- Creating a sense of arrival at the train station
- Unlocking the potential of Hall Plain
- Linking it all together

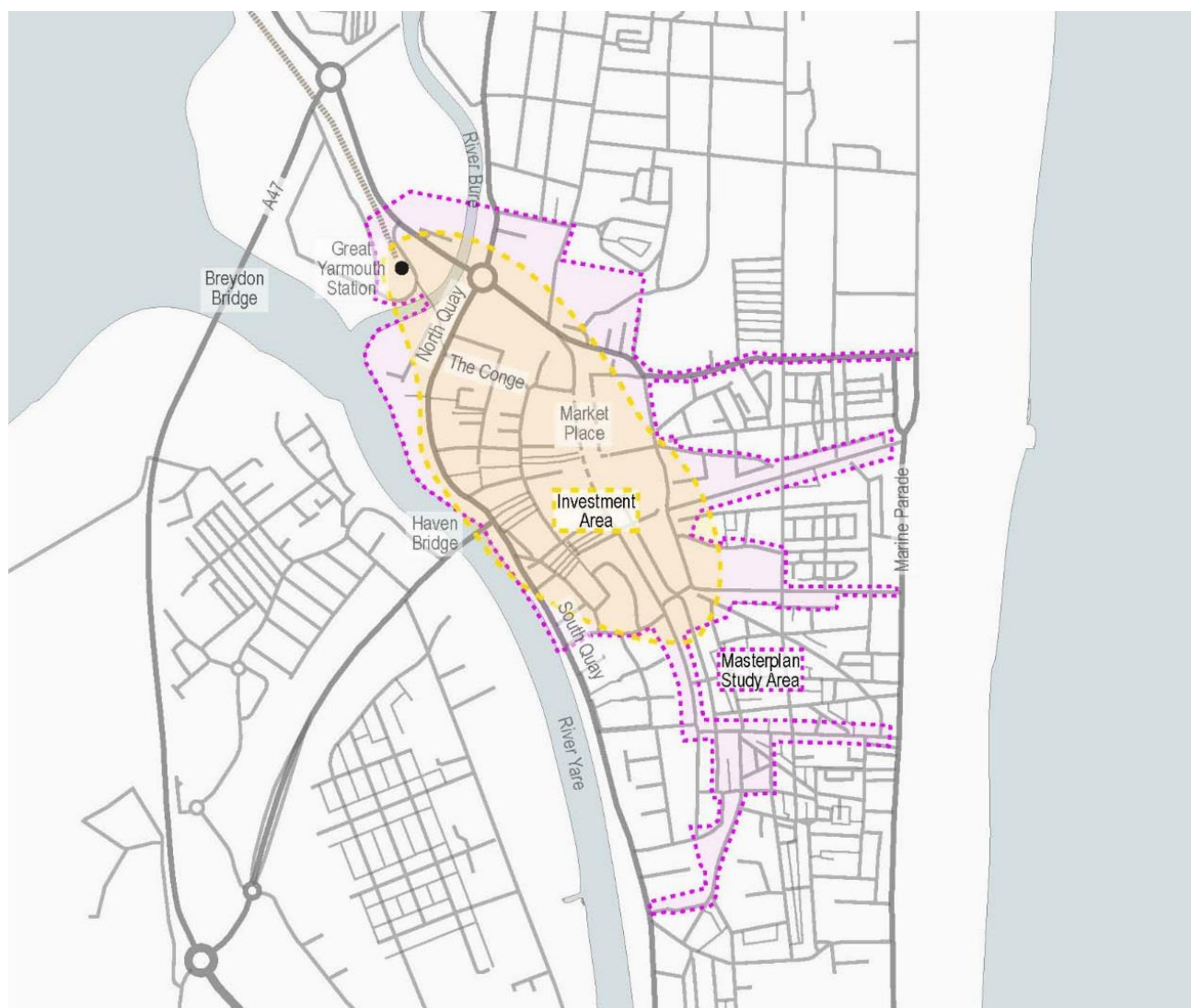


Figure 2 - Town Centre Masterplan investment area (Source: GYBC)

- 2.4.32. The Masterplan envisages three phases of improvement, with the third phase (2021 – 2024) linked to the provision of the Great Yarmouth Third River Crossing. In the short term, the Local Growth Fund allocated £1m in both 2017/18 and 2018/19 to invest in the link from Great Yarmouth's rail station via The Conge to the Market Place. The improvements at The Conge and North Quay were finished in the first half of 2018 and at the time of writing this document the improvements of the Rail Station Forecourt were under construction.
- 2.4.33. In the medium term, the Masterplan concludes that no single investment is likely to do more to boost the regeneration of the town centre than the proposed Great Yarmouth Third River Crossing, as it has the potential to significantly relieve the town centre of port-related traffic. The challenge for the town centre will then be to take the opportunity to reallocate road space and invest in the public realm. This has the potential to unlock the value of what were historically the town's most prosperous areas with its finest buildings, along the riverside from Fullers Hill to Hall Quay and South Quay.

- 2.4.34. Of the six objectives, the regeneration of Hall Quay is most closely linked to the provision of the third river crossing as it will benefit directly from the reduction in traffic using Haven Bridge. It has potential as a focus for leisure uses. The Borough Council will seek consensus among the public and stakeholders on a design concept and development brief which will encourage the refurbishment and regeneration of buildings in the context of the third crossing.

2.5 POLICY CONTEXT – SUMMARY AND CONCLUSIONS

- 2.5.1. Common themes in the above policies are:

- The need, and opportunities, for economic regeneration in Great Yarmouth
- The potential for growth associated with the offshore energy industry, especially in the Enterprise Zone and outer harbour
- The lack of adequate links between potential development areas on the peninsula and the strategic road network, especially to the A47 (south)
- The problem of heavy traffic on the existing bridges, and congestion in adjacent parts of the town centre
- The need for a third crossing of the River Yare to provide traffic relief, and better access to strategic routes, supporting regeneration and growth on the peninsula and the town centre

- 2.5.2. In essence, the vision for Great Yarmouth is for a once prosperous town to take advantage of the new opportunities for growth and regeneration afforded by offshore energy, commercial and port-related development and tourism, by dramatically improving accessibility and by providing traffic relief to the historic centre: a more prosperous town, and a better place in which to live.

- 2.5.3. The scheme will support this vision.

3 EXISTING CONDITIONS – SITE INFORMATION

3.1.1. This chapter describes the location of the scheme in relation to:

- The surrounding area
- The local transport system
- Existing land uses
- Planned or potential future land uses
- Air Quality Management Areas
- Abnormal load routes

3.2 THE SURROUNDING AREA

3.2.1. The scheme is located in Great Yarmouth, on Norfolk's North Sea coast, about 30 km east of the County town, Norwich. It is further east than any other town in Britain, apart from Lowestoft, as shown in Figure 3 below. The Great Yarmouth urban area has a population of about 68,000¹⁵ people, and the wider Borough of Great Yarmouth a population of about 97,000¹⁶.

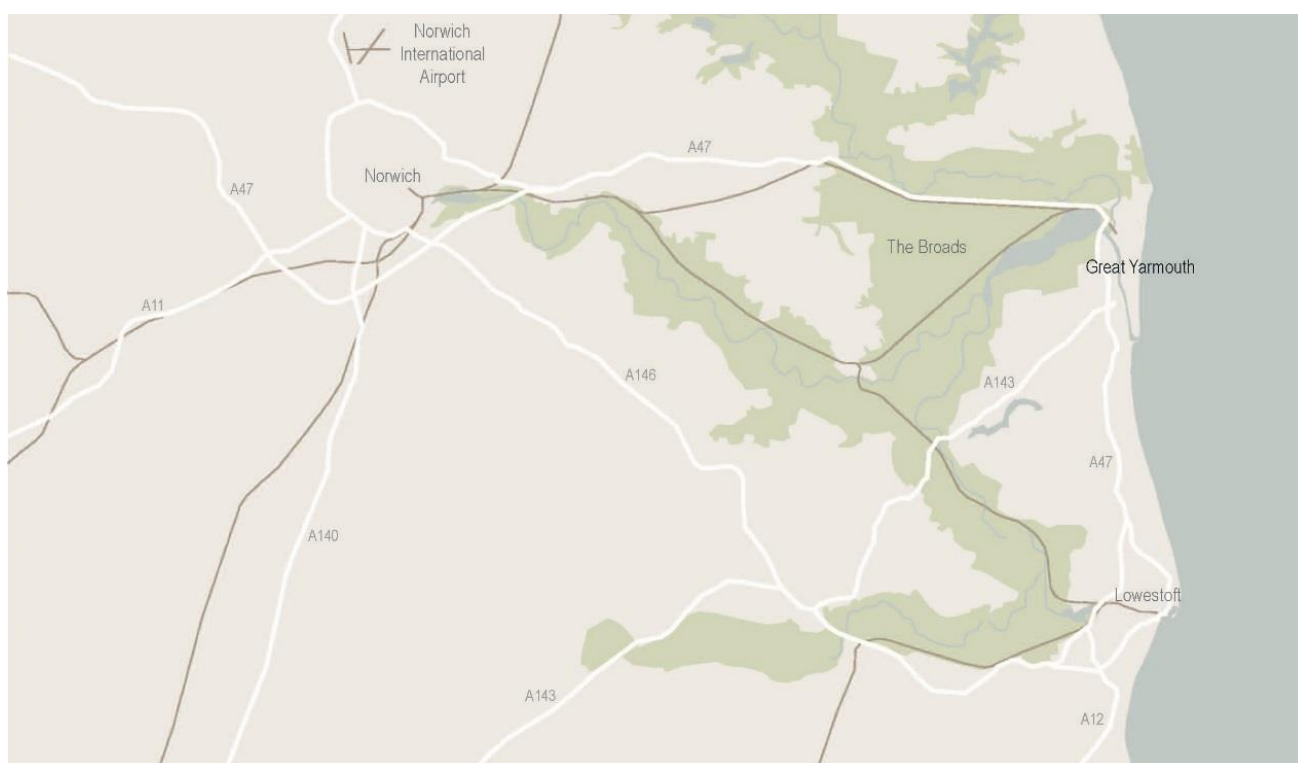


Figure 3 – Location of Great Yarmouth

3.2.2. Great Yarmouth is located at the mouth of the River Yare, one of the main waterways providing access to the Norfolk Broads. As illustrated in Figure 4 below, the river divides Great Yarmouth in two, with the town centre, seafront, industrial areas and outer harbour located on the narrow, 4 km long, South Denes peninsula between

¹⁵ Population 68,317 (ONS, 2002)

¹⁶ Population 97,277 (2011 Census)

the river and the sea, isolated from the rest of the town. To the west of the River Yare, Gorleston-on-Sea is just a few hundred metres away as the crow flies, but over 7km distant by road.

- 3.2.3. By virtue of its location, Great Yarmouth is relatively isolated. Despite this, it is an important employment centre and tourist destination, with over 1 million staying visitors and about 4 million visitor trips each year, generating a direct and indirect spend of £532 million¹⁷.
- 3.2.4. The scheme will provide a new crossing of the River Yare, creating a direct link into the southern part of the peninsula. It will greatly improve access to the port, outer harbour, employment areas, the seafront and residential areas.



Figure 4 – Location of the scheme

¹⁷ Source: Great Yarmouth Borough Council

3.3 THE LOCAL TRANSPORT SYSTEM

- 3.3.1. As shown in Figure 3 above, Great Yarmouth is connected to Norwich by rail, and by the A47 road which is part of the Strategic Road Network (SRN). It is linked to Lowestoft by rail, and by the A47 road (formerly the A12) also part of the SRN. Figure 4 above shows the scheme in relation to the town's road network

MAIN ROADS

- 3.3.2. Figure 5 below shows the location of the scheme in relation to the main roads into and through Great Yarmouth.

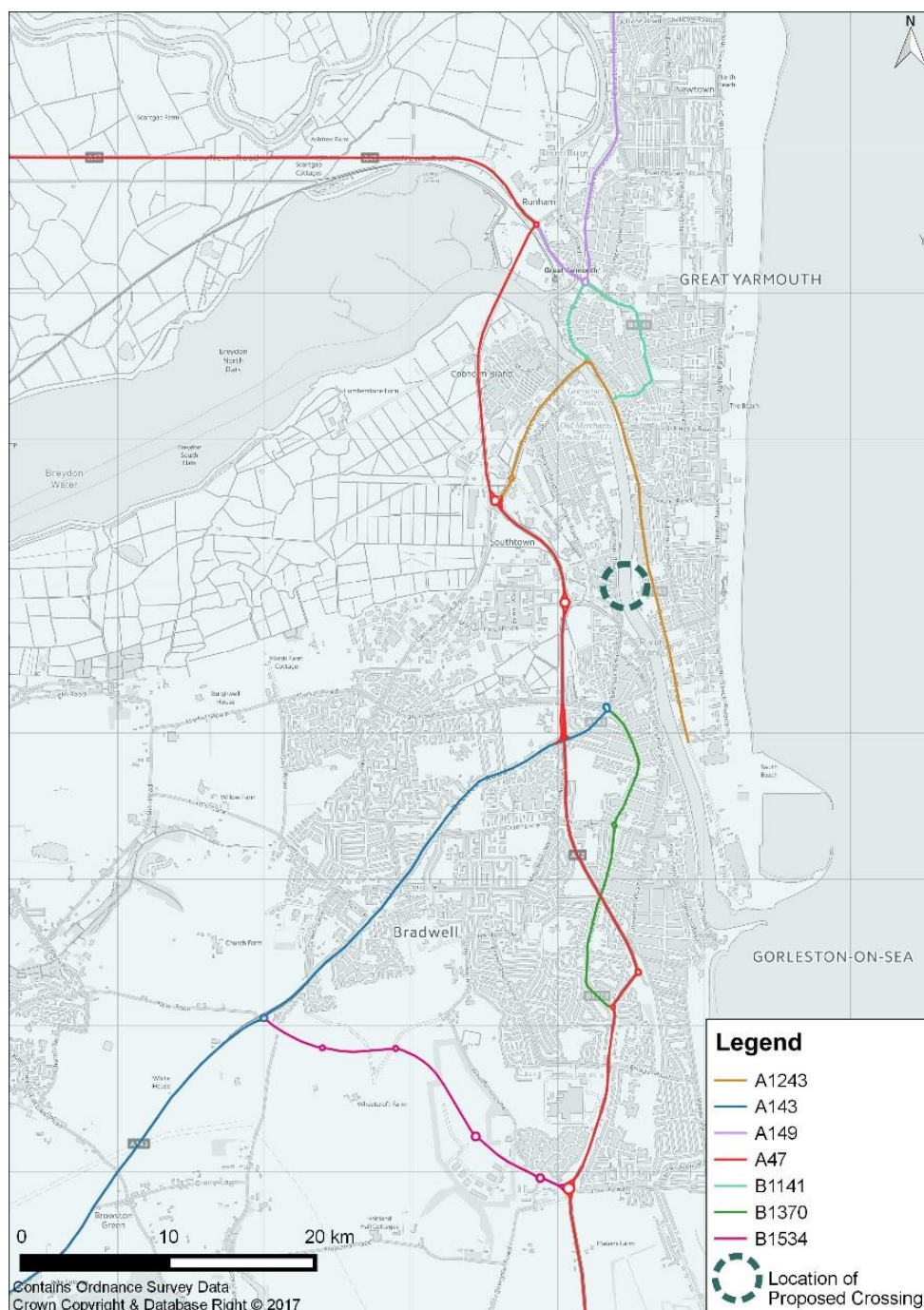


Figure 5 - Main roads, Great Yarmouth

A47 (formerly A47/A12)

- 3.3.3. The A12 trunk road between Lowestoft and Great Yarmouth was re-numbered A47 in March 2017. This means that the A47 is now a continuous trunk road from Peterborough to Lowestoft via Great Yarmouth, part of the SRN. The A12 designation now only applies to the trunk road between Ipswich and London.
- 3.3.4. The A47 runs due east from Norwich to Great Yarmouth, does not enter the town centre, but crosses the River Yare on a north-south alignment on the Breydon Bridge. Breydon Bridge is a single carriageway lifting bridge with one lane in each direction. It is opened frequently, but irregularly to allow passage of river traffic.
- 3.3.5. South of Breydon Bridge, the A47 skirts the western side of Great Yarmouth. It is a modern, single carriageway road with 1m margins and is subject to a 50 mph speed limit. There are no frontage accesses. It intersects with A1243 Pasteur Road (which leads into the town centre, Haven Bridge, sea front and port area) at a large at-grade roundabout.
- 3.3.6. The A47 continues as a two-lane dual carriageway and intersects with William Adams Way at another large at-grade roundabout known as Harfreys Roundabout.
- 3.3.7. It continues southwards as a two lane dual carriageway with a north-facing grade-separated intersection with A143 Beccles Road and bridges over local roads through Gorleston-on-sea before connecting to local roads Victoria Road and Middleton Road at a pair of large at-grade roundabouts junctions.
- 3.3.8. South of Middleton Road the A47 is a four-lane single carriageway with frontage access, an at-grade signal controlled junction with B1141 Brazenose Avenue and Bridge Road (the bridge in this case being a former railway bridge). It continues south as A47 Lowestoft Road, and eventually narrows to a single carriageway before intersecting with B1534 Beaufort Way and Links Road at the southern edge of the built-up area.

A1243

- 3.3.9. The A1243 Pasteur Road/ Bridge Road starts at the A47 roundabout in Southtown before crossing the Haven Bridge into Great Yarmouth itself where it joins the B1141 North Quay to the north and runs alongside the River Yare on Hall Quay and South Quay to the south before terminating at the Hartmann Road junction.

A143

- 3.3.10. The A143 from Bury St Edmunds is the primary route from Great Yarmouth to Haverhill in Suffolk. It ties in with the A47 just south of the scheme location before terminating at the Beccles Road roundabout. The A143 provides the main route to the area south west of Great Yarmouth, joining up with the A146 at Gillingham and the A140 at Scole.

A149

- 3.3.11. The A149 runs along the North Norfolk coast from Great Yarmouth to King's Lynn. It is a single carriageway road and provides direct access to Great Yarmouth railway station via Breydon Bridge at the Fuller's Hill roundabout. The route expands north towards Caister-on-Sea and on towards Cromer making it the main north-south route within the town of Great Yarmouth.

B1141

- 3.3.12. The B1141 is a circuitous route starting at the eastern end of the Haven Bridge. The road heads north along North Quay to cannon off the A149 at the Fuller's Hill roundabout. It skirts the eastern edge of the town centre before terminating at Yarmouth Way. B1370

B1370

- 3.3.13. The B1370 starts at the A47 / Middleton Road roundabout in Gorleston and heads generally northwards along the residential Middleton Road before terminating at the A47 / Beccles Road roundabout.

B1534

- 3.3.14. The B1534, opened in 2015, runs between the A143 and A47, to the south-west of Great Yarmouth. It is a single carriageway road with at-grade roundabout junctions.

RIVER CROSSINGS AND TOWN CENTRE ROADS

- 3.3.15. Great Yarmouth lies at the mouth of the River Yare, which separates the town from the other parts of the Borough. The River Yare is navigable to small coastal vessels between Norwich and the North Sea. The historic town centre and sea front lie on a narrow peninsula, sandwiched between the river and the sea. It is linked to Gorleston-on Sea and other parts of the Borough by two bridges over the river:
- The A1243 Haven Bridge (two lanes in each direction, single carriageway)
 - The A47 Breydon Bridge (one lane in each direction, single carriageway) as described in Paragraph 3.3.4 above.
- 3.3.16. These are the only routes into and out of the peninsula. Both are lifting bridges, to enable boats and ships to pass through. To the west of Breydon Bridge lies Breydon Water, a large, sheltered estuary which forms the gateway to the Norfolk Broads.
- 3.3.17. The Breydon Bridge, constructed in 1985, enables A47 traffic to bypass the centre. The Haven Bridge provides access into the northern part of the town centre. There are, however, no bridges further south than this. As a result, the southern part of Great Yarmouth, which is built on the peninsula, is effectively isolated from the rest of the Borough.
- 3.3.18. The existing river crossings do not provide adequate access to the port and employment areas in the southern part of the peninsula. The lack of a direct bridge means that traffic is forced onto unsuitable routes within the town centre, including the historic South Quay. Congestion, especially on the Haven Bridge, causes delays and makes journey times unreliable. The mixture of port-related and local traffic makes it more difficult for people to access the town centre, seafront, and leisure facilities.
- 3.3.19. Breydon Bridge and Haven Bridge are subject to high traffic flows and become severely congested during peak hours. Great Yarmouth and Gorleston also experience a dramatic increase in traffic flows during the holiday season. This extra traffic conflicts with town centre, port and commercial traffic, creating congestion problems on the town centre road network, particularly on the A47, South Quay, North Quay, Fullers Hill and Lawn Avenue.
- 3.3.20. The lack of a direct river crossing into the peninsula makes Great Yarmouth seem remote, and discourages inward investment. Bus users, cyclists and pedestrians have long, indirect journeys into the peninsula, which discourages commuting to work by more sustainable modes.

3.4 EXISTING, PLANNED AND POTENTIAL LAND USES

- 3.4.1. The existing land uses in the area surrounding the River Yare consist mainly of employment (business and retail) and the port and marine industries, extending from the Norfolk Broads in the west to the Outer Harbour in the east, as shown in Figure 6 below.

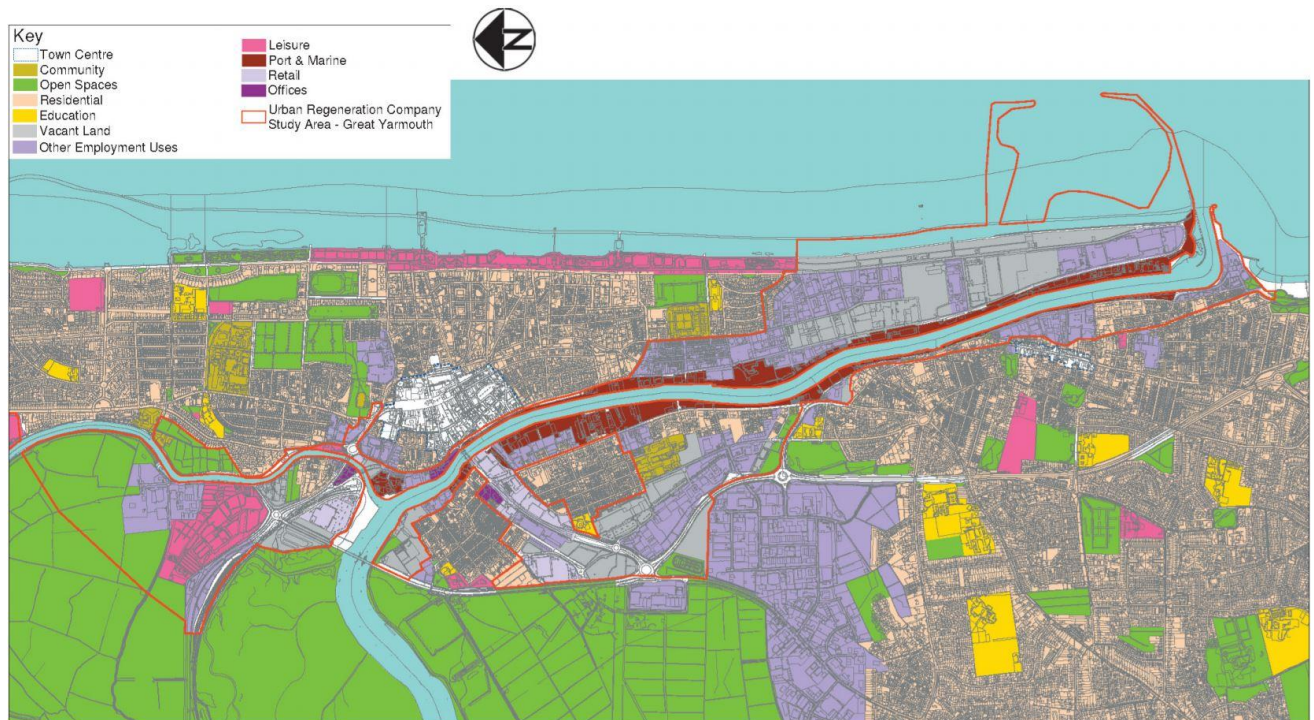


Figure 6 – Existing land use

- 3.4.2. Both the eastern and western edge of the River Yare are flanked by the prominent port and marine industries, including major offshore energy companies and maritime operations.
- 3.4.3. Beyond the immediate environments associated with the banks of the river, land use on the western side quickly reverts to residential development which extends to the north and south. To the south are the large tight knit communities of Gorleston and Bradwell which are regular in pattern. This type of housing breaks down to the north where pockets of smaller scale housing can be found. Besides housing, the land to the west of the River Yare is largely characterised by industrial land use with both Harfreys Industrial Estate and Yarmouth Business Park dominating large sections of the land.
- 3.4.4. On the eastern side of the river, the southern section of the Peninsula is partly designated as an EZ and is dominated by industrial use and the outer harbour. In contrast, land to the north of the Peninsula, including the town centre, consists mainly of residential, retail and open space. The seafront has a more recreational character and includes leisure facilities such as the Pleasure Beach and the Sea Life Centre.

AREA ACTION PLAN (AAP) ALLOCATIONS

- 3.4.5. The AAP identifies specific site allocations within the area which need to be developed to support the regeneration of Great Yarmouth. The sites surrounding the River Yare in vicinity of the proposed Third River Crossing are illustrated in Figure 7 and listed below:
- North Quay
 - The Conge
 - Runham Vauxhall
 - Bure Harbour Quay
 - Ice House Quay

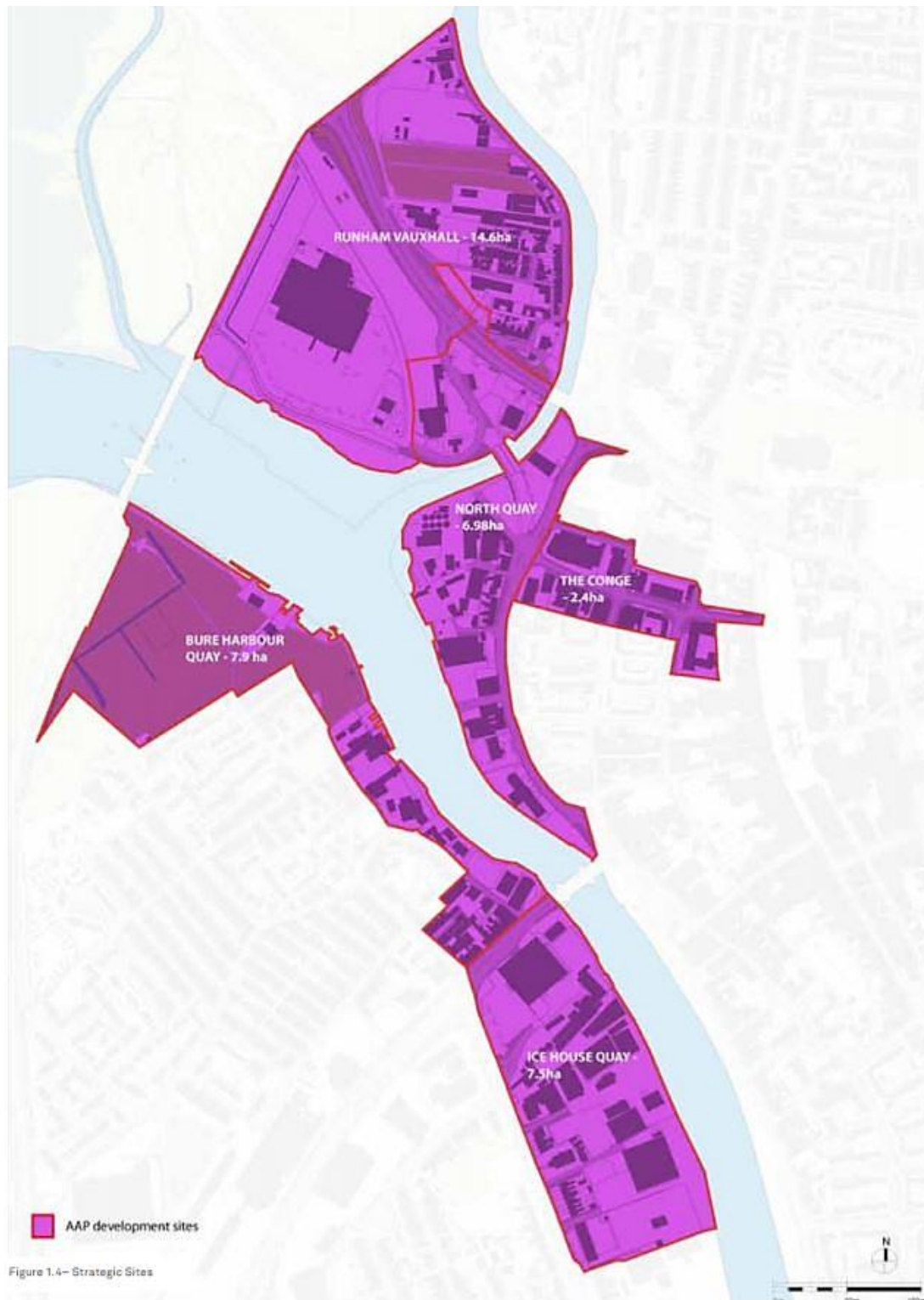


Figure 7 – Area Action Plan site allocations

North Quay

- 3.4.6. North Quay is the area located north west of the Peninsula bounded by both the River Yare and the River Bure and is an important gateway to the town. It is currently dominated by traffic from the A47 crossing over the Acle Bridge. Much of the site is occupied primarily by retail and commercial businesses with a small number of houses toward the northern end. There is a lack of frontage along the waterfront and the estate is poorly maintained with an ageing building stock. The site is also home to the newly refurbished Havenbridge House, a large office building occupied by a number of businesses and Norfolk County Council.

The Conge

- 3.4.7. The Conge is a key strategic link from Great Yarmouth Station to the Town Centre and the seafront. It is currently occupied by a number of retail businesses and Great Yarmouth Police Station.
- 3.4.8. The Conge is part of the Town Centre Masterplan and has been identified by Great Yarmouth Borough Council as a potential addition to the AAP area due to its development potential and linkage between the town centre, station and North Quay intervention area. The Conge has been earmarked as the most appropriate location for new mixed-uses, including retail, commercial and leisure uses.

Runham Vauxhall

- 3.4.9. Runham Vauxhall is another key gateway to Great Yarmouth with which it is immediately joined via the Acle Bridge and Vauxhall Suspension Bridge, on the western bank of the River Bure. The area is characterised by the terminus of the Norwich and Yarmouth railway with Great Yarmouth Station located on the western side of Acle New Road.
- 3.4.10. Whilst the area is largely residential, there is also a large supermarket and hotel along with allotment space and several commercial businesses. The area, a former site of fish-offices and manure-works, lacks any landscaping to screen traffic on the A47 and Acle New Road which can become very busy during the peak periods.

Bure Harbour Quay

- 3.4.11. Bure Harbour Quay is a waterfront location in Cobholm on the western bank of the River Yare and is predominantly characterised by energy industries and other businesses. It acts as the primary vehicular western gateway into the town and has been earmarked for mixed use development.
- 3.4.12. Development proposals for Bure Harbour Quay include reconnecting Cobholm with Great Yarmouth's waterfront and providing improved frontage to Bridge Road. Large residential developments are proposed along with a series of open spaces to provide amenity new and existing residents. The existing mill building may provide scope for provision of small scale employment units.

Ice House Quay

- 3.4.13. Ice House Quay is a strategic gateway site located at the setting of the historic grade II listed Ice House building on the western bank of the River Yare and is accessed via Southtown Road. A number of offshore and energy companies are located within Ice House Quay including EnerMech and Seatrax along with retail businesses to the north of the site.
- 3.4.14. Residential development has been identified as the dominant land use within Ice House Quay is also along with retail and office development on the northern fringe. The former site of the blue Bunns warehouses which were demolished in 2013 has been allocated for offshore firms and light engineering plants.
- 3.4.15. The proposed Third River Crossing will span the River Yare approximately 1km south of the Ice House Quay site.

GREAT YARMOUTH AND LOWESTOFT LOCAL DEVELOPMENT ORDER AND ENTERPRISE ZONE

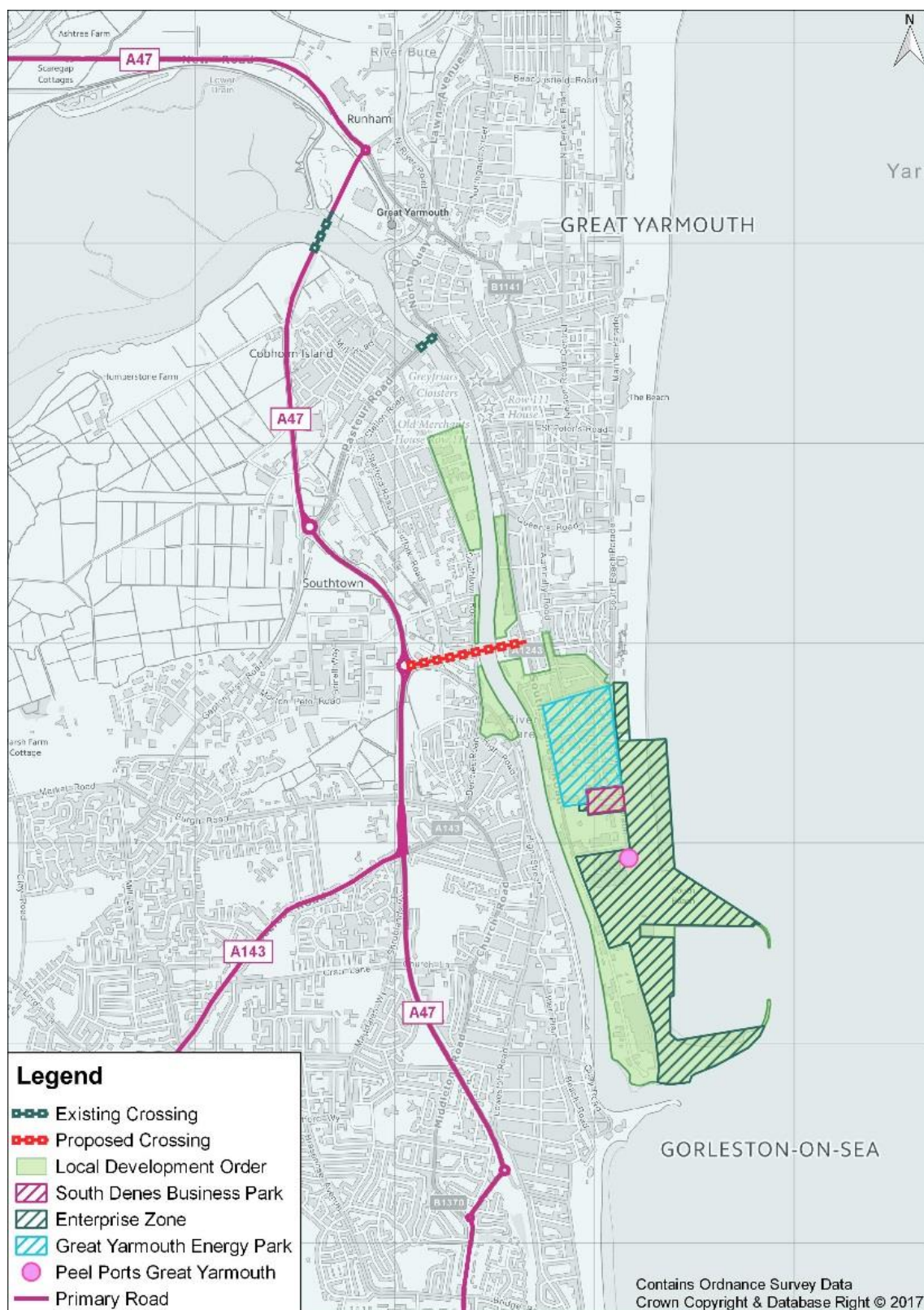


Figure 8 - Local Development Order and Enterprise Zone, South Denes

- 3.4.16. The Great Yarmouth and Lowestoft Enterprise Zone (EZ) is one of 24 such zones created in England since 2011. It aims to stimulate growth by providing a portfolio of strategic sites, with concessions/incentives offered to businesses locating there. It is covered by a Local Development Order (LDO) which facilitates energy related development. Incentives include business rates relief worth up to £275,000 over five years; simplified planning regulations; and Government support for the provision of super-fast broadband. Business rates growth within the Zone will be retained by the LEP to support economic priorities for at least 25 years. The Enterprise Zone as a whole is expected to create up to 9,000 direct jobs and 4,500 indirect jobs by 2025.
- 3.4.17. The Enterprise Zone (EZ) designates two sites in Great Yarmouth, Beacon Park and South Denes totalling 75.5 hectares, for energy businesses, offshore engineering, ports and logistics in Great Yarmouth. Both sites have been allocated for B1 (light industrial / business), B2 (general industrial) and B8 (storage and distribution uses).
- 3.4.18. The South Denes EZ is centred on the deep water outer harbour on the South Denes peninsula, to the south of Great Yarmouth town centre and northeast of Gorleston-on-Sea on Norfolk's east coast. The area is characterised by the activities of the Port and related industries. There is significant land for development within the site, most of which is in the ownership of Peel Ports. GYBC has recently sought to expand the EZ at South Denes with the inclusion of three additional sites. The outer harbour is discussed in more detail in Paragraphs 3.4.21 to 3.4.26 below.
- 3.4.19. The LDO also covers the Great Yarmouth Energy Park and South Denes Business Park. The South Denes area is especially relevant to the scheme as it is very close to the proposed crossing location and will benefit from the improved accessibility to the A47 (part of the SRN) which the scheme will provide. The area is illustrated in Figure 8 on Page on page 26 above.
- 3.4.20. The Beacon Park site lies to the south of the town, adjacent to the A12 corridor between Great Yarmouth and Lowestoft. The scheme will improve connectivity between the two EZ sites in Great Yarmouth.

THE OUTER HARBOUR

- 3.4.21. Great Yarmouth is considered to be England's premier offshore support port. The deep water outer harbour at the southern end of the peninsula is strategically located to serve the oil and gas fields of the southern North Sea, as well as existing and planned offshore wind developments off the UK east coast. It provides state-of-the-art facilities for the larger offshore vessels, complementing the long established facilities for offshore operations and maintenance in the river port. Great Yarmouth is also an established general and cargo port, offering the shortest North Sea crossing between Great Britain and continental Europe. It is owned and operated by Peel Ports who began operations in December 2015.
- 3.4.22. Over the last 50 years, the port has had a pivotal role in the offshore and renewable energy sectors. The decline in the fishing industry led to a decline in related employment, and many sites around the port fell vacant. However the advent of North Sea oil and gas exploration, extraction and servicing brought new industry to the town in the 1960s.
- 3.4.23. In recent years, the offshore wind power industry has provided a further stimulus. Several energy related firms (BH Bus, STATOIL, Petersons and Seajacks) have recently located to the peninsula and others are considering moving there. The County and Borough Councils are actively pursuing the regeneration of the area, establishing the Enterprise Zone, Local Development Order and Energy Park.
- 3.4.24. The new outer harbour, completed in 2010, has the potential to further stimulate growth on the eastern side of the town. It has transformed Great Yarmouth from a declining river port into a modern deep water port.
- 3.4.25. The decision by Scottish Power Renewables to use the new harbour as their construction and marshalling point for North Sea operations has been highly significant. A £7 million investment by Siemens, their main contractor, means that the port is now very busy with contractors' vehicles, and further growth is expected. Norfolk County Council is in discussion with a number of offshore wind component manufacturing businesses who are considering locating in Great Yarmouth. They need deep water access and there are sites close to the outer

harbour which are ready to accommodate them. Each component – towers, foundations, blades, cables, or turbines – involves a substantial supply chain and this requires good transport links.

- 3.4.26. Existing transport links into the new deep water harbour are inadequate. The lack of a direct bridge in to the outer harbour area makes Great Yarmouth seem remote and discourages inward investment. Currently, port-related traffic is forced to use one of the existing bridges to the north of the town before navigating along unsuitable routes within the Town Centre including the historic South Quay. The addition of local traffic leads to congestion, especially on the Haven Bridge, causing delays and making journey times unreliable.

AIR QUALITY MANAGEMENT AREAS

- 3.4.27. Great Yarmouth does not have any air quality management areas.

ABNORMAL LOAD USES

- 3.4.28. At present, the road delivery route for large wind turbine blades to the outer harbour is via the Haven Bridge. The scheme is being designed to provide an alternative route for these abnormal loads, removing them from the town centre.

4 EXISTING CONDITIONS - BASELINE TRANSPORT DATA

4.1 INTRODUCTION

- 4.1.1. This chapter describes the data which have been used to determine the existing conditions on Great Yarmouth's transport network.
- 4.1.2. It includes:
- Description and functional classification of the local road network
 - Current traffic flows
 - Existing public transport facilities
 - Existing pedestrian and cycle facilities
 - Existing parking facilities
 - Accident record
 - Critical links and junctions
 - Other planned transport improvements
 - Current peak periods
 - Current noise and air quality issues
 - Baseline carbon emissions, my mode
- 4.1.3. Further detail and analysis will be provided in the full TA.

4.2 DESCRIPTION AND FUNCTIONAL CLASSIFICATION OF THE LOCAL ROAD NETWORK

- 4.2.1. The local road network is illustrated in Figure 4 and Figure 5 above and has been described in Section 3.3 on Page 20.

4.3 CURRENT TRAFFIC FLOWS

TRAFFIC SURVEYS 2018

- 4.3.1. Automatic traffic counts (ATC) were undertaken at 20 locations within Great Yarmouth town centre. Each recorded data for at least two weeks from the Monday 5 July 2018. Data was classified according to ARX classification.
- 4.3.2. The ATC survey locations are listed in below and illustrated Table 1 and in Figure 9.

Table 1 – Automatic traffic count locations 2018

Ref. No.	Location	Ref. No.	Location
1	A47 - Breydon Bridge	11	S Denes Rd
2	Haven Bridge	12	S Beach Parade
3	Lawn Avenue	13	A47 New Rd
4	Northgate Street	14	Caister Rd

Ref. No.	Location	Ref. No.	Location
5	N Denes Road	15	A149 Caister By-Pass
6	North Drive	16	B1370 Middleton Rd
7	Gapton Hall Rd	17	Southtown Rd
8	Burgh Rd	18	B1141 Priory Plain
9	Beccles Rd	19	Euston Rd
10	A47/Beccles Rd	20	Acle New Rd

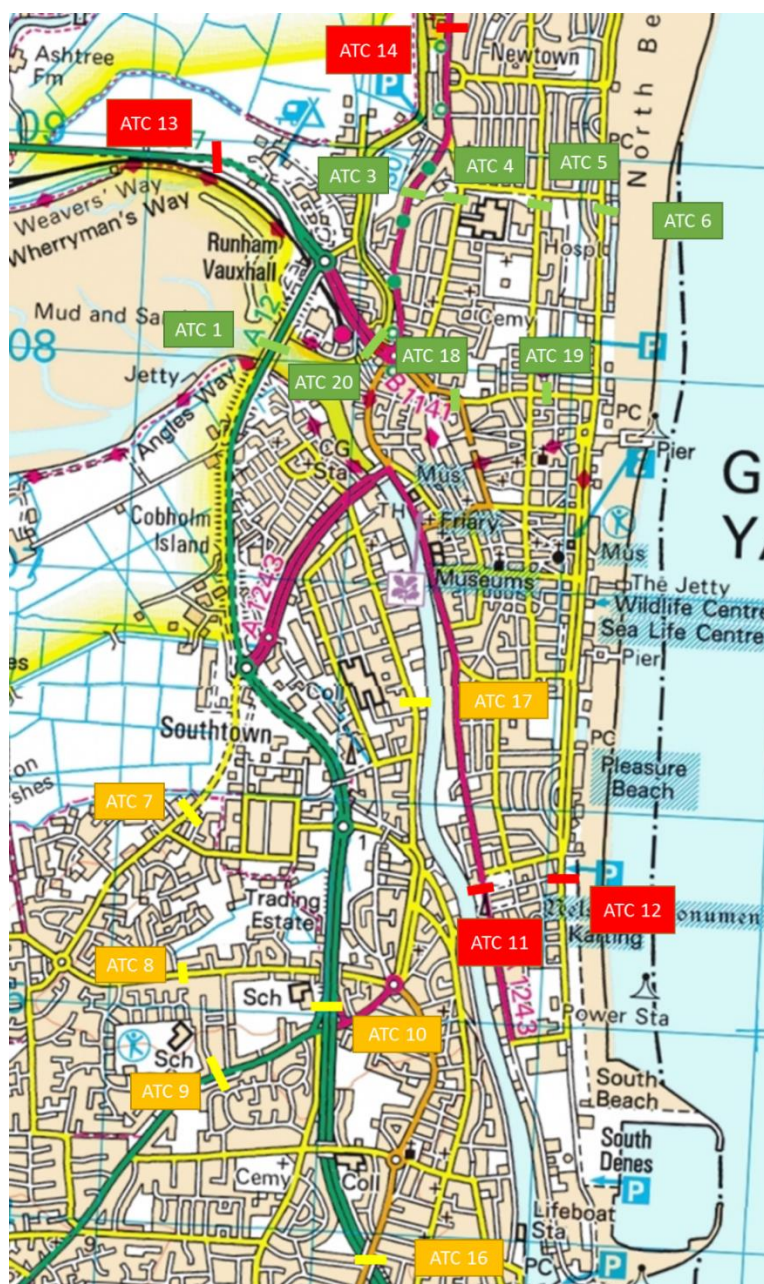


Figure 9 – Automatic traffic count locations 2018

4.3.3. Manual classified traffic counts (MCC) were undertaken at 15 junctions within Great Yarmouth town centre. Each covered twelve hours (07:00 – 19:00) on Thursday 8 March 2018. Data was classified according to six vehicle types:

- Pedal cycle / motorcycle
- Car
- LGV
- OGV1
- OGV2
- PSV.

4.3.4. The MCC survey locations are listed in Table 2 below and illustrated in

4.3.5. Figure 10.

Table 2 – Manual classified count locations 2018

Ref No.	Junction
1	Fuller's Hill roundabout
2	Vauxhall roundabout
3	Gapton Hall roundabout
4	Harfreys roundabout
5	Hall Quay
6	A149 Acle New Rd / Great Yarmouth Station access
7	Beccles Rd / Burgh Rd roundabout
8	Beccles Rd / William Adams Way / Southtown Rd
9	Southtown Rd / Pasteur Rd / Bridge Rd / Mill Rd
10	Fuller's Hill / Priory Plain / Northgate St / Market Place
11	Nicholas Rd / Nelson Rd / Euston Rd
12	North Dr / Car Park Access / Euston Rd / Marine Parade
13	South Quay / Yarmouth Way
14	Alexandra Rd / Dene Side / King St / Yarmouth Way
15	Alexandra Rd / Trafalgar Rd

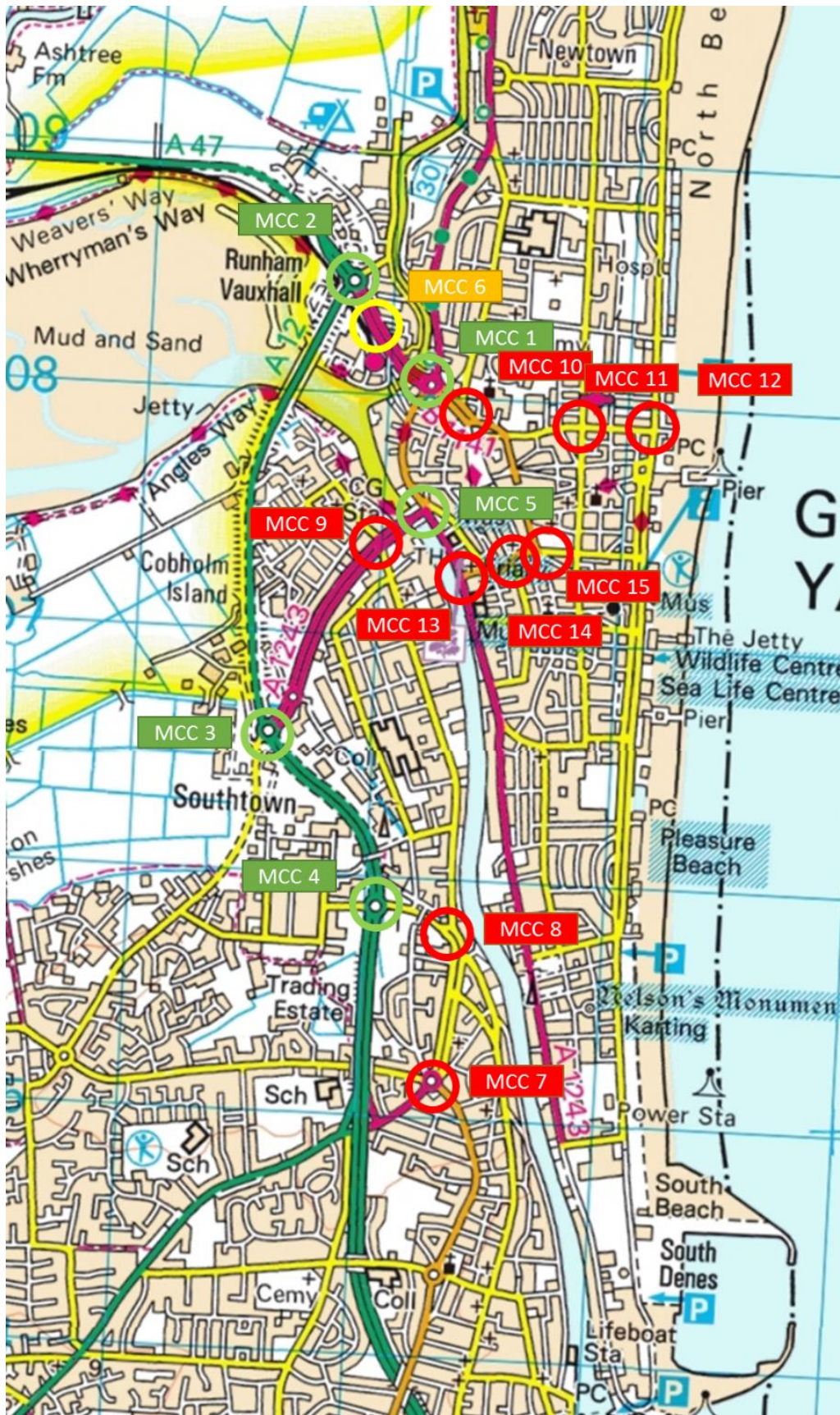


Figure 10 – Manual classified count locations 2018

TRAFFIC SURVEYS 2016

4.3.6. Manual classified traffic counts (MCC) were undertaken at 41 junctions within Great Yarmouth town centre, Gorleston, Bradwell and Caister. Each covered twelve hours (07:00 – 19:00) on Tuesday 4 October 2016 and Wednesday 5 October 2016. Data was classified according to six vehicle types:

- Pedal cycle / motorcycle
- Car
- LGV
- OGV1
- OGV2
- PSV.

4.3.7. The MCC survey locations are listed in Table 3 below and illustrated in Figure 11.

Table 3 – Manual classified count locations 2016

Location	Surveyed Area No.	Junction I.D.
Euston Rd / North Dr Roundabout	1	Junction 1
Euston Rd / Marine Parade	1	Junction 2
Euston Rd / Wellesley Rd	1	Junction 3
St Nicholas Rd / Nelson Rd	1	Junction 4
St Nicholas Rd (Sainsbury's)	1	Junction 5
The Conge / Fuller's Hill / King St / Car Park	1	Junction 6
Alexandra Rd / Trafalgar Rd	1	Junction 7/8
Yarmouth Way / King St	1	Junction 7/8
N quay/Aldi	1	Junction 9/10
Brewery Street /Aldi	1	Junction 9/10
The Conge / Howards St N/Northern road	1	Junction 11
Howard Street South Car Park	1	Howard St Car Park
King Street Car Park	1	King Street Car Park
Norwich Rd / Caister By-Pass Roundabout	2	Junction 1
Yarmouth Rd / Caister By-Pass Roundabout	2	Junction 2
Marine Parade / North Dr	2	Junction 3
S Beach Parade / Kings Rd Roundabout	2	Junction 4
S Beach Parade / Harbord Cres (north junction)	2	Junction 5
S Beach Parade / Harbord Cres (south junction)	2	Junction 6
S Denes Rd / Salmon Rd	2	Junction 7
S Denes Rd / Suffling Rd	2	Junction 8
S Denes Rd / Main Cross Rd	2	Junction 9

Location	Surveyed Area No.	Junction I.D.
S Denes Rd / Swanston's Rd	2	Junction 10
South Beach Parade Car Park	2	South Beach Car Park
A12 (Rugby Club)	3	Junction 12
Pasteur Rd / Jones Way Roundabout	3	Junction 13
A12 / Beccles Rd	3	Junction 14
Beccles Rd / High Rd	3	Junction 15
Beccles Rd / Malthouse Ln / Alpha Rd	3	Junction 16
William Admas Way / Suffolk Rd	3	Junction 17
Southtown Rd / Boundary Rd	3	Junction 18
Southtown Rd / Tollgate Rd	3	Junction 19
Southtown Rd / Gordon Rd	3	Junction 20
Pasteur Road/GC Way road (Pasta Foods/API Capacitors)	3	Junction 21
Beccles Rd / New Rd Roundabout	3	Junction 22
Beccles Rd / Church Ln / Long Ln	3	Junction 23
A12 / Links Rd / Beaufort Way Roundabout	3	Junction 24
A12 / Brasenose Ave / Bridge Rd	3	Junction 25
A12 / Victoria Rd Roundabout	3	Junction 26
Lidl Car Park	3	Lidl Car Park
James Paget University Hospital	3	James Paget Hospital



Figure 11 – Manual classified count locations 2016

HISTORICAL TRAFFIC SURVEYS 2012 - 2016

- 4.3.8. The Department for Transport (DfT) conducts traffic counts to determine traffic volumes for major routes. The DfT Traffic Count database provides a historical insight of traffic volumes for several count sites in close proximity to the location of the scheme, including a permanent traffic count site on the approach to the Breydon Bridge in Great Yarmouth. There is no DfT traffic count data for the Haven Bridge. The traffic count locations are illustrated Figure 12 below.

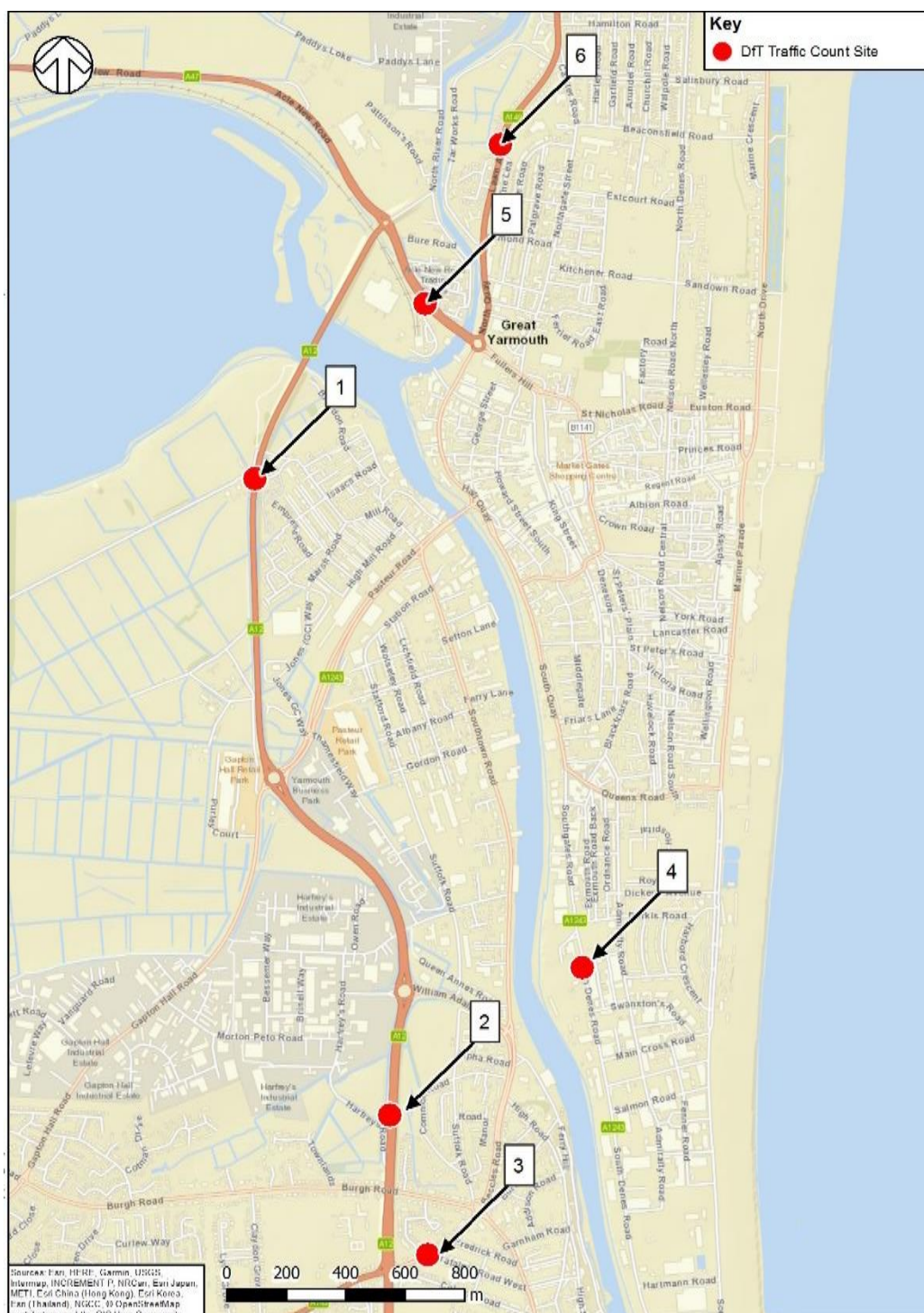


Figure 12 – DfT traffic count sites

4.3.9. The traffic flows for each site over the six years to 2017 are set out in Table 4 below.

Table 4 – Traffic flows at DfT count sites 2012 - 2017

DfT Traffic Count Site	Average Annual Daily Traffic (AADT) Flow					
	2012	2013	2014	2015	2016	2017
1 – A47 Breydon Bridge (Approach)	33,069	32,973	33,464	33,788	33,423	33,293
2 – A47 (South of Harfreys Roundabout)	32,426	32,306	32,693	36,532	36,172	38,239
3 – A143 Beccles Road	4,945	4,940	5,091	5,200	5,354	5,330
4 – A1243 South Denes Road	5,554	5,595	5,781	5,904	6,148	6,183
5 – A149 Acle New Road Bridge	33,793	34,327	34,631	34,323	33,968	32,034
6 – A149 Lawn Avenue	17,323	17,312	17,860	18,250	18,804	18,750

4.3.10. In addition, traffic data was obtained from:

- Roadside interview surveys in 2016
- Automatic traffic counts at 30 locations in 2016
- Journey time surveys on 8 routes in 2016
- Data collected prior to 2016, including ANPR, MCC, ATC, queue surveys and Trafficmaster data.

4.3.11. The collection and processing of this data is detailed in the Data Collection Report, (submitted with the OBC as Supporting document 3)

4.3.12. The use of this data in the development of the strategic and microsimulation models for the assessment of the scheme is described in Chapter 6 below. This will include re-basing the models to 2018, with some additional traffic surveys to be undertaken in March 2018.

4.3.13. The full TA will include an assessment of traffic conditions in Great Yarmouth based on the most up-to-date data.

4.4 EXISTING PUBLIC TRANSPORT FACILITIES

BUS NETWORK

4.4.1. Bus services cover the main corridors through the town, with all routes from outlying areas serving the town centre and Market Gates bus station. The majority of bus services in Great Yarmouth are operated by First in Norfolk and Suffolk, with a small number operated by other local bus operators.

4.4.2. The majority of bus services in the town run in north / south direction connecting Great Yarmouth with the Caister-on-Sea to the north and / or Gorleston-on-Sea to the south. Notable exceptions to this this are bus service 2, a circular route serving the town centre and peninsular only, and bus service 74 between Great Yarmouth Town Centre and Little Plumstead to the west.

4.4.3. Great Yarmouth Market Gates bus station is located in the town centre, 2 km north of the scheme, and is approximately 550m from the sea front, or a 5 to 7 minute walk. Public realm improvements are currently being undertaken at Market Hill Bus Station, this includes new Real Time Passenger Information (RTPI) displays along, new lighting and new railings.

- 4.4.4. There are a number of bus stops within the immediate vicinity of the proposed scheme and are illustrated in Figure 12 below.

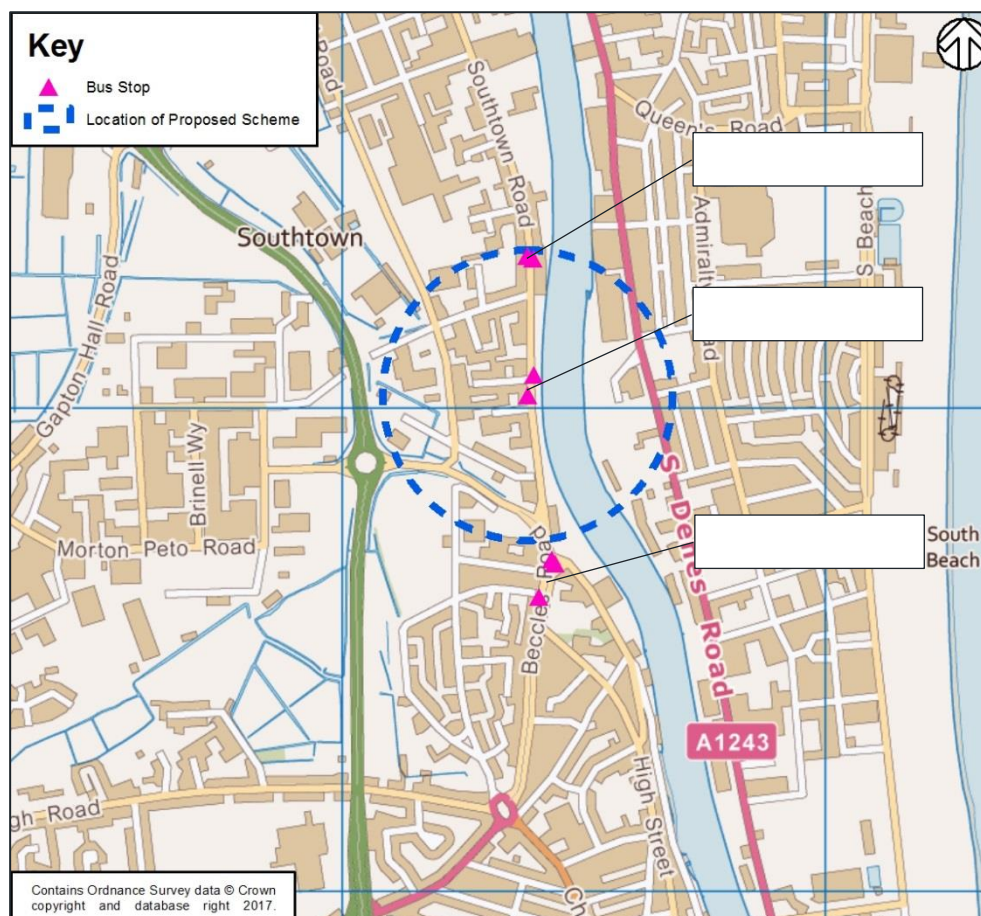


Figure 13 – Bus stops close to the scheme

- 4.4.5. Figure 12 above shows that all of the bus stops within the immediate vicinity of the proposed scheme are situated on Southtown Road and Beccles Road to the west of the River Yare. The most central of these are Waveney Road bus stops and are comprised of a flag and pole only.
- 4.4.6. To the east of the River Yare there are no bus stops within the immediate vicinity of the proposed scheme. The closest bus stop on the east side of the River Yare is Battery Road bus stop on Admiralty Road. This is the southernmost bus stop on the peninsula and is served by service 2 only. This is a circular route that connects the peninsula with Great Yarmouth town Centre. There are no bus stops along the A1243 South Denes Road.
- 4.4.7. A summary of the bus services operating along Southtown Road and Beccles Road to the west of the River Yare is detailed below:

■ **Coastal Clipper 1**

The Coastal Clipper 1, operated by First in Norfolk and Suffolk, is a coastal route between Martham and Lowestoft. The service operates at hourly intervals during the morning and afternoon before running at 30 minute intervals during the evening, Monday to Friday. Saturday services are no different and run at hourly intervals throughout the morning and afternoon and then at 30 minute intervals in the evening. Services are reduced on Sundays, running at 2 hour intervals in the morning and afternoon and at hourly intervals in the evening.

- Coastal Clipper 1A

The Coastal Clipper 1A is also operated by First in Norfolk and Suffolk and operates a similar route to that of Coastal Clipper 1, with an hourly service during the morning and afternoon. Together the Coastal Clipper 1 and 1A services offer passengers a half hourly service, Monday to Friday between Martham and Lowestoft. The Coastal Clipper 1 A operates no weekday evening service and is replaced instead by the Coastal Clipper 1 service. The Saturday is the same as the weekday service, with an hourly frequency during the morning and afternoon, running concurrently with Coastal Clipper 1. Buses run at 2 hour intervals on Sundays, running concurrently with Coastal Clipper 1, offering passengers an hourly service during the morning and afternoon. The Coastal Clipper 1A service operates no evening services at weekends.

- Bus route X1

The X1 service, operated by First in Norfolk and Suffolk, is an express bus service that runs between Norwich and Lowestoft via Great Yarmouth. Services run twice per hour, Monday to Saturday, reduced to once per hour on Sundays.

- Bus route X11

The X11, operated by First in Norfolk and Suffolk, is an express bus service that runs between Norwich and Belton via Great Yarmouth. Between Norwich and Great Yarmouth it follows the same route as the X1 service. It operates a half hourly service, Monday to Saturday, and hourly service on Sundays.

- Bus route 5

Bus Route 5, operated by First in Norfolk and Suffolk, is a circular service running between Great Yarmouth and Burgh Castle via Gorleston and Burgh Castle. There are 10 hourly services Monday to Saturday, with no early morning or late evening services. The service runs on Sundays but is very limited with 4 buses per day.

- Bus route 6

Bus Route 6, operated by Sanders Coaches, is a local stopping service that runs between Bradwell and Great Yarmouth via Gorleston. Buses run every 30 minutes during the morning and afternoon Monday to Saturday. There are also 3 hourly services running afterwards in to the evening. Sunday services are reduced to hourly intervals but still provide evening buses up until after 9pm.

- Bus route 7

Bus Route 7, operated by First in Norfolk and Suffolk, runs between Belton and Great Yarmouth. The service follows a similar to the X11, but with an additional stop in Bradwell and no stop at James Paget Hospital. This service operates in the morning and evening only. Monday to Friday there are 3 buses per day towards Belton and 4 buses per day towards Great Yarmouth. On Saturdays there are 2 buses a day towards Belton and 4 buses per day towards Great Yarmouth. On Sundays there are two buses per day in both directions in the evening.

- Bus route 8

Bus Route 8, operated by First in Norfolk and Suffolk, provides over 50 services per day Monday to Saturday between James Paget Hospital in Gorleston and Caister-on-Sea. These run approximately every 15 minutes and offer early morning and late evening services. Sunday services are reduced to 30 minute intervals but still run from early morning to late evening, offering over 30 services throughout the day.

- Bus route 9

Bus Route 9, operated by First in Norfolk and Suffolk, runs between Great Yarmouth and James Paget Hospital. Services are generally provided every 30 minutes Monday to Saturday. There are no evening or Sunday services.

- Bus route 271

Bus Route 271, operated by Our Bus, runs between Hemsby and Great Yarmouth. The service runs 2 buses per day Monday to Friday in both directions (mid-morning and early afternoon) with first bus of the day continuing towards / originating from Bradwell. There are no weekend services.

- Bus route 580

Bus Route 580, operated by Boarder Bus, runs between Bungay and Great Yarmouth. The service operates 1 bus per hour Monday to Saturday and no service on Sundays. The earliest service from Bungay is just after 8am and the latest service to depart Great Yarmouth towards Bungay is just before 4pm. The last service to Beccles departs Great Yarmouth just after 5pm.

- Bus route 922

Bus Route 922, operated by First in Norfolk and Suffolk, is a school service that runs between Great Yarmouth and Cliff Park Ormiston Academy. This operates 1 service per day Monday to Friday in each direction and no service at the weekends.

- 4.4.8. As noted above, no bus services operate close to the proposed scheme on the east side of the River Yare. The nearest bus stop on the east side of the River Yare is Battery Road bus stop on Admiralty Road. It is approximately 300m to the east of the River Yare and served by Route 2 only. This is a circular route, operated by First in Norfolk and Suffolk, between Market Gates bus station and the Pleasure Beach. This is the only route that serves the south of the peninsula. Buses run approximately every 10 minutes Monday to Saturday, with a reduced service in the early morning and late evening. On Sundays buses run approximately every 20 minutes, with no early morning service and reduced late evening service.

RAILWAY SERVICES

- 4.4.9. Great Yarmouth Station is one of two terminuses on the Wherry Line from Norwich. The station is located approximately 1.5 miles, or a 30-minute walk, from the proposed scheme. No bus services currently serve Great Yarmouth station forecourt bus stop, however it is approximately 1km from the town centre, or a 10 to 15 minute walk via Vauxhall Bridge where a number of bus services can be accessed.
- 4.4.10. All train services from Great Yarmouth Station are operated by Abellio Greater Anglia. According to the Office of Rail Regulation usage figures for 2016-2017, Great Yarmouth was the fifth-busiest railway station in Norfolk, after Norwich, King's Lynn, Diss and Downham Market.
- 4.4.11. The majority of services from Great Yarmouth run direct to Norwich via Acle, however two trains per day run direct to Norwich via Berny Arms. On both routes, the majority of services call at all intermittent stations. The approximate journey time between Great Yarmouth and Norwich is 35 minutes.
- 4.4.12. During the AM peak period (07:00-10:00), four services depart from Great Yarmouth to Norwich. In the PM peak period (16:00-19:00), there are five services to Norwich. The Monday to Friday services from Great Yarmouth to Norwich are summarised in 5.

Table 5 – Summary of weekday rail services from Great Yarmouth to Norwich

Destinat ion	Weekday Frequency (trains/hr)							Number of trains per day	First to Depart	Last to Depart
	AM Peak			Inter- Peak	PM Peak					
	0700- 0800	0800- 0900	0900- 1000		1000- 1600	1600- 1700	1700- 1800			
Norwich	1	2	1	1	1	2	2	23	05:34	23:34

- 4.4.13. On Mondays and Fridays between 20 May and 9 September four additional direct non-stopping services operate between Great Yarmouth and Norwich, of which 1 is in the AM Peak and 3 are in the inter-peak.
- 4.4.14. At weekends, the Saturday timetables to Norwich operate similarly to weekdays. However, there are a reduced number of Sunday services, whereby services operate only every other hour to Norwich. Weekend rail services to Norwich from Great Yarmouth are summarised in 6.

Table 6 – Summary of weekend rail services from Great Yarmouth to Norwich

Destination	Saturday			Sunday		
	Total Daily No. of Trains	First to Depart	Last to Depart	Total Daily No. of Trains	First to Depart	Last to Depart
Norwich	22	06:15	23:34	16	08:17	23:17

4.5 EXISTING PEDESTRIAN AND CYCLE FACILITIES

- 4.5.1. The River Yare divides the western side of Great Yarmouth from the town centre, sea front, harbour and other destinations on the South Denes peninsula. To access these facilities, all pedestrian and cycle journeys between east and west have to cross the existing bridges. For pedestrians this means using Haven Bridge, as the Breydon Bridge has no footways.
- 4.5.2. For many trips, the time and distance involved is significant when compared with the equivalent “crow fly” distance. An example is shown in Figure 14 below in which the shortest distance between two population centroids, a distance of less than 1 km ‘as the crow flies’, is more than 4 km via the Haven Bridge. For a pedestrian, this means a journey of nearly an hour. By cycle, it would take about 15 minutes.



Figure 14 – Example pedestrian or cycle journey

- 4.5.3. The impact of the limited opportunities to cross the River Yare on walking and cycling accessibility from the location of the Proposed Scheme on the west side of the River Yare is provided in Figure 15 and 16 below.

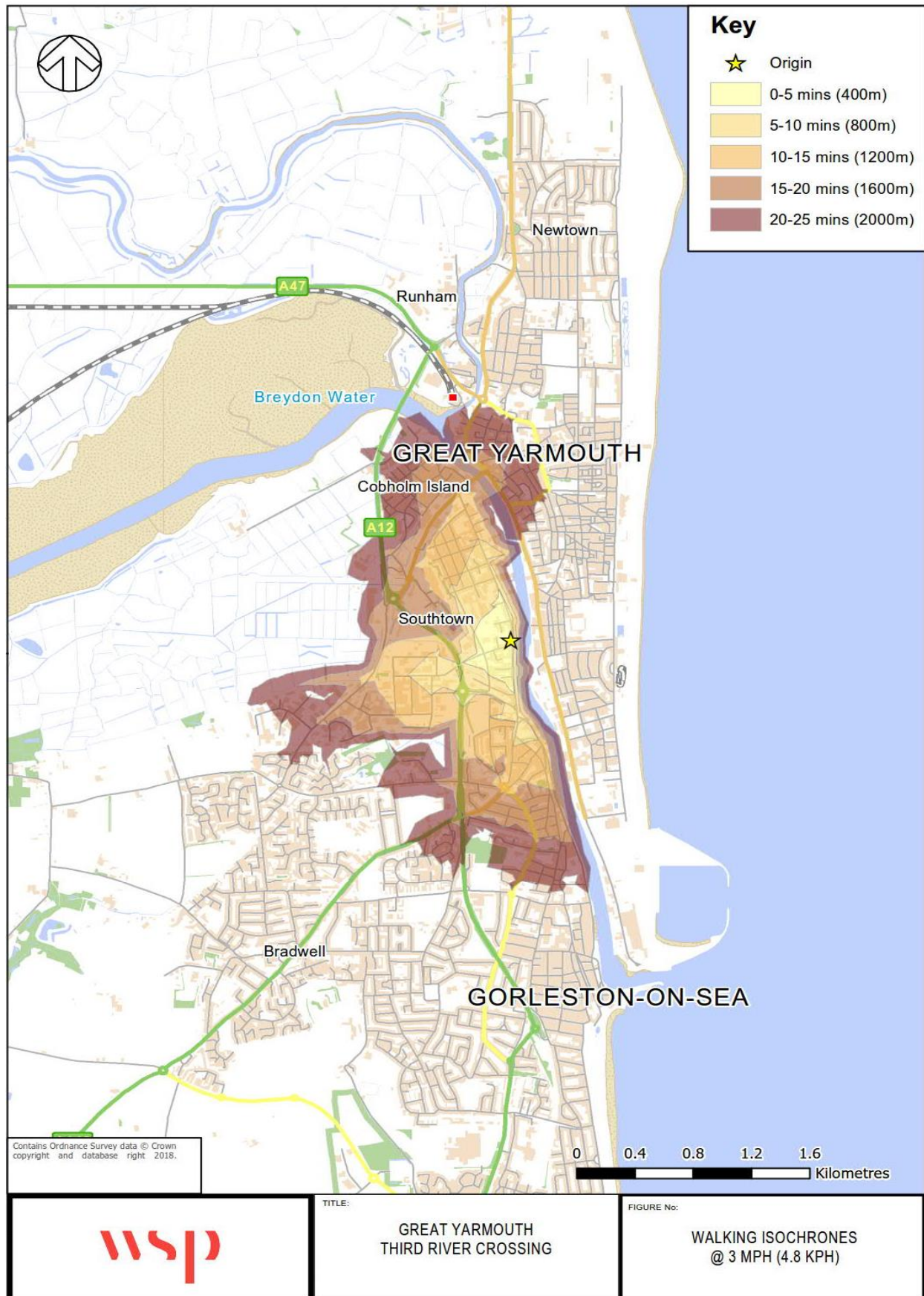


Figure 15 – Walking Isochrones

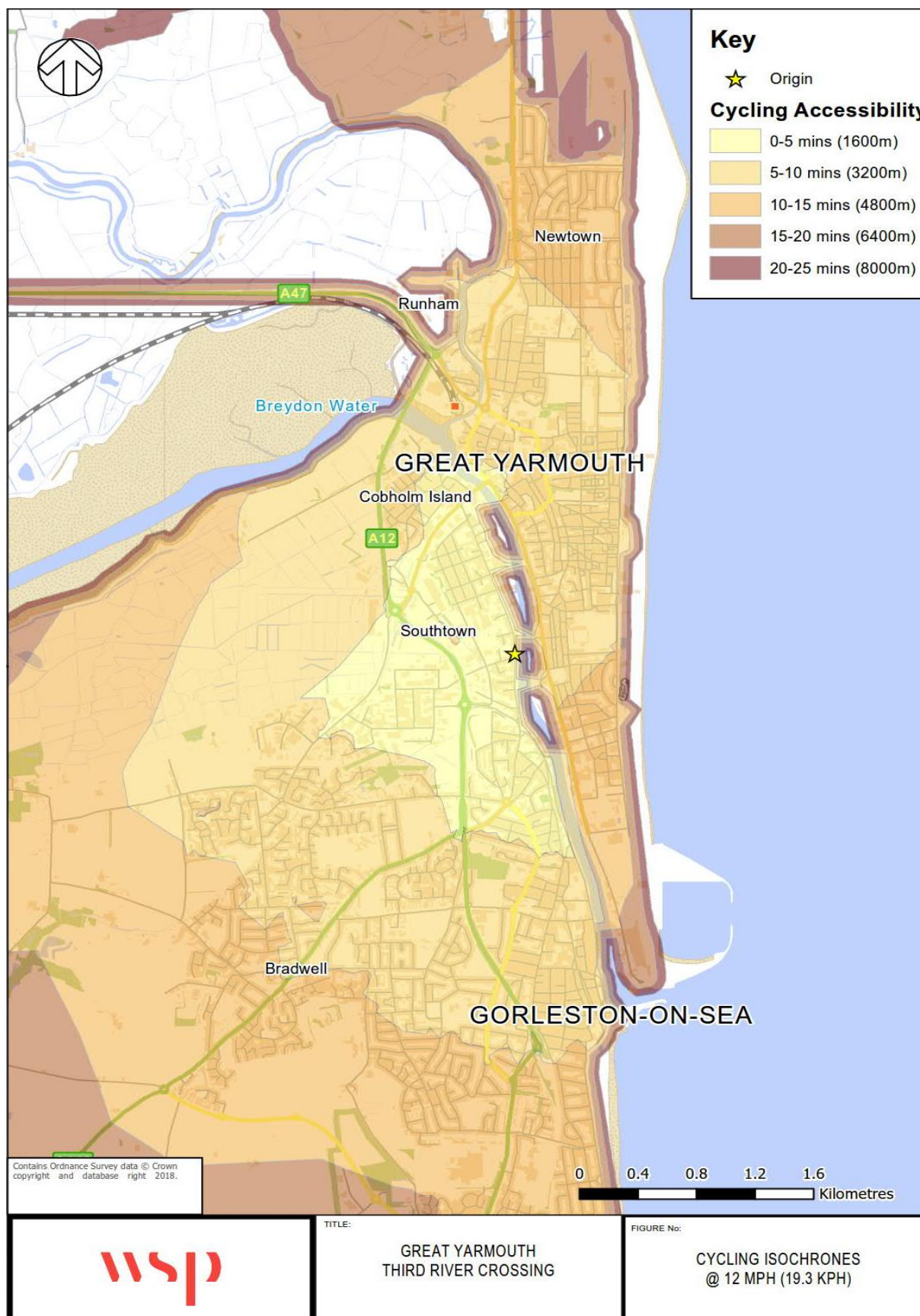


Figure 16 – Cycling Isochrones

- 4.5.4. Figure 15 above shows that despite the relatively short “crow fly” distance to the South Denes Peninsular, Great Yarmouth Town Centre is only just accessible within a 25 minute walk. Figure 17 above shows that despite the relatively short “crow fly” distance between the east and west sides of the River Yare at the location of the proposed scheme, the current cycle time is approximately 15 to 20 minutes.

PEDESTRIAN NETWORK

- 4.5.5. The pedestrian network along the eastern bank of the River Yare is adequate, with footways generally provided on both sides of the A1243. Along South Quays Road the footways are generally between 1.5m and 2.0m in width, however as you travel further south these become very narrow, with footways of between 1.0 and 1.5m in width on both sides of Southgates Road and South Denes Road. South of Hartman Road there is also large stretches South Denes with no footway provision.
- 4.5.6. On the western side of the river, the pedestrian network is less comprehensive with no public realm space or footway directly alongside the river due to the existing industrial units that occupy this space.
- 4.5.7. On Southtown Road, which runs parallel to the River Yare, there are footways of between 1.2 to 1.5m on both sides the carriageway and at the signalised junction of William Adams Way / Beccles Road / Southtown Road there are pedestrian crossing facilities. To the south of Southtown Road there is limited footway provision along Malthouse Lane and Riverside Road.
- 4.5.8. Footways of about 2m in width are provided along the south side of William Adams Way, however at the A47 / William Adams Way roundabout, only informal pedestrian crossing facilities are provided. There is a ramped pedestrian and cycle bridge on William Adams Way which provides access to Suffolk Road and Queen Anne’s Road.
- 4.5.9. Haven Bridge is the main crossing for pedestrians travelling between Gorleston and Great Yarmouth. Footways of approximately 2m in width are provided on Bridge Road on approach and across the River Yare on both sides of the carriageway. Breydon Bridge to the north has no footways and is not considered suitable for use by non-motorised users due to the 50mph speed limit.
- 4.5.10. To understand existing pedestrian use of Haven Bridge a Non-Motorised User Audit Survey was undertaken in 2016, this found that there is typically 4,700 pedestrian crossing movements across Haven Bridge each day. The typical weekday pedestrian flow across Haven Bridge is summarised in Table 7 below.

Table 7 – Pedestrian trips over Haven Bridge (typical weekday from 7 AM to 7 PM)

	Haven Bridge
	Pedestrian Trips
Eastbound	2,443
Westbound	2,299
Total	4,742

- 4.5.11. Surveys undertaken as part of the Non-Motorised User Audit Survey in Great Yarmouth found that a significant proportion of home to work journeys within the town are short trips undertaken at morning peak times with return journeys at evening peak times. The busiest time for pedestrian activity at Haven Bridge is during the evening peak period, reflecting its use for journeys to and from work.

Table 8 – Pedestrian trips at peak periods, Haven Bridge

	Haven Bridge	
	Pedestrians Trips	Percentage of Daily Trips
07:00-09:00	581	9%
16:00-18:00	848	16%

CYCLE NETWORK

- 4.5.12. Great Yarmouth's cycle network, as shown in Figure 17, comprises sections of National Cycle Network (Routes 30 and 517) and the Regional Cycle Network, as well as other signposted on-road cycle routes (referred to as pedalways), advisory cycling routes and some traffic free cycle routes.
- 4.5.13. Exiting opportunities for cyclists to cross the River Yare is limited. The Breydon Bridge has designated cycle lanes on either side of the carriageway, however, these are unsegregated and pose a risk to cycle users due to the nature of the road (50mph speed limit). The Haven Bridge has a shared use path leading up to it on either side of the river as part of the National Cycle Network Route 517, however, there is no provision on the crossing itself and cycle users have to dismount.

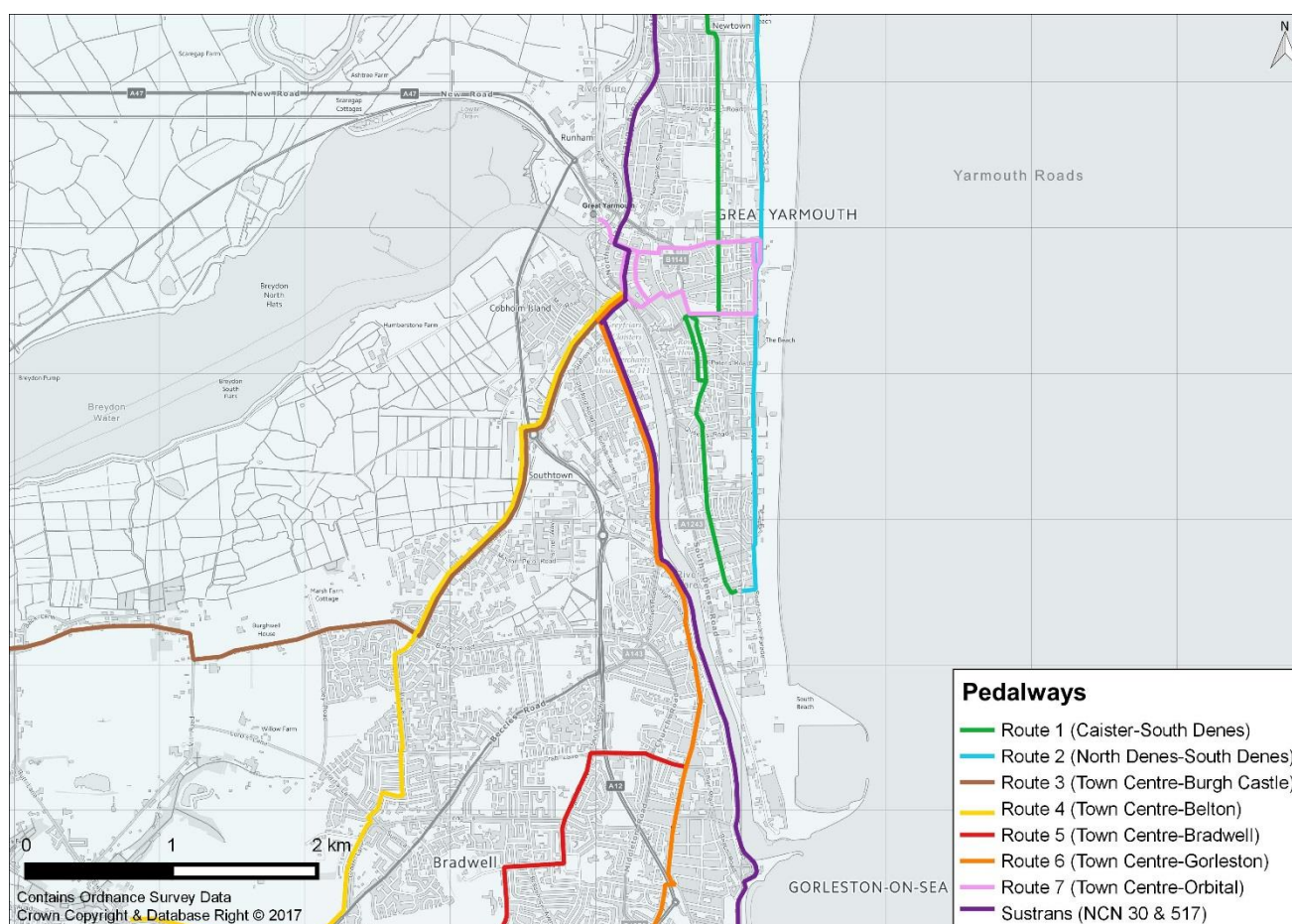


Figure 17 – Cycle network

- 4.5.14. Along the east bank of the River Yare, there is a wide segregated footway/cycleway along the western side of A13243 South Quay between Haven Bridge and Nottingham Way. South of Nottingham Way and towards the location of the proposed scheme there is no designed cycle route or infrastructure along the A1243. Pedalway Route 1 runs parallel to the A1243 along Blackfriars Road, Camden Road and Admiralty Road and connects with Pedalway Route 2 which runs along the beach front. This route is principally on-street along quieter residential with limited provision for cyclists.
- 4.5.15. Opposite the Haven Bridge, there is a dedicated cycle lane on Regent Street (Pedalway Route 7) which provides cycle access to the town centre. To the north of Haven Bridge, an on-road cycle route starts at Stonecutters Way and runs through to George Street, and The Conge, before linking in with National Cycle Route 30 at the North Quay junction.
- 4.5.16. On the western side of the River Yare, Southtown Road is designated as National Cycle Network Route 517, it is non-segregated apart from a section close to the Pasteur Road junction. The route continues on to Malthouse Lane and Riverside Road before reaching Gorleston. Pedalway Routes 5 and 6 follow the same route before turning on to Ferry Hill at the Riverside Road junction towards Bradwell and Gorleston respectively. Pedalways Routes 3 and 4 follow Pasteur Road on an off-carriageway footway/cycleway from Haven Bridge before continuing on to Gapton Hall Road towards Burgh Castle and Belton.
- 4.5.17. A non-motorised user survey of Haven Bridge found that on a typical weekday, there are 1,056 cycle crossing movements across Haven Bridge each day. The typical flow of cyclists across Haven Bridge on weekday is summarised in Table 9 below.

Table 9 – Cycle trips over Haven Bridge (typical weekday from 7AM to 7PM)

	Haven Bridge
	Cycle Trips
Eastbound	533
Westbound	523
Total	1,056

- 4.5.18. Surveys undertaken as part of the Non-Motorised User Audit Survey in Great Yarmouth found that a significant proportion of home to work journeys within the town are short trips undertaken at morning peak times with return journeys at evening peak times. The busiest time for cycle activity at Haven Bridge is during the evening peak period, reflecting its use for journeys to and from work.

Table 10 – Cycle trips at peak periods, Haven Bridge

	Haven Bridge	
	Cycle Trips	Percentage of Daily Trips
07:00-09:00	206	17%
16:00-18:00	261	21%

4.6 EXISTING PARKING FACILITIES

- 4.6.1. Great Yarmouth Borough Council operates 36 car parks, of which 22 are pay and display. In the car parks located in the town centre, long-term parking is discouraged in order to maximise usage.
- 4.6.2. There are 955 free and 2,549 charged off-street parking spaces within the borough. The locations of these car parks are shown in Figure 18 below.

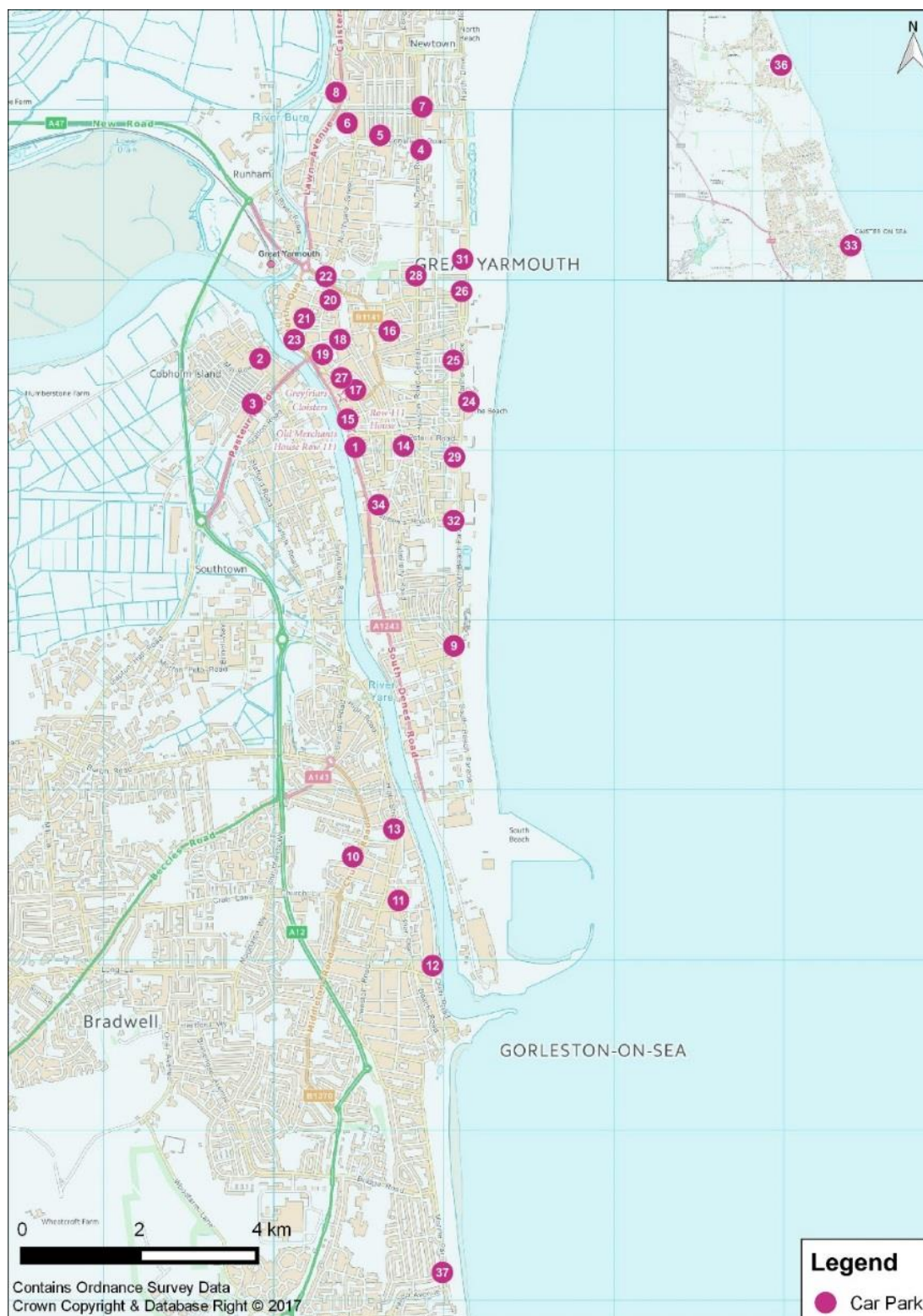


Figure 18 – Car parks

- 4.6.3. An audit of car parking spaces of Great Yarmouth Controlled Parking Enforcement Area was undertaken by Great Yarmouth Borough Council Car Parking Strategy Steering Group in 2013. This identified a total of 3,098 spaces in car parks and 3,051 spaces on street. The Great Yarmouth CPE area is shown in Figure 19 below and a breakdown of the total number of car parking spaces in the CPE area is provided in Table 11 below.

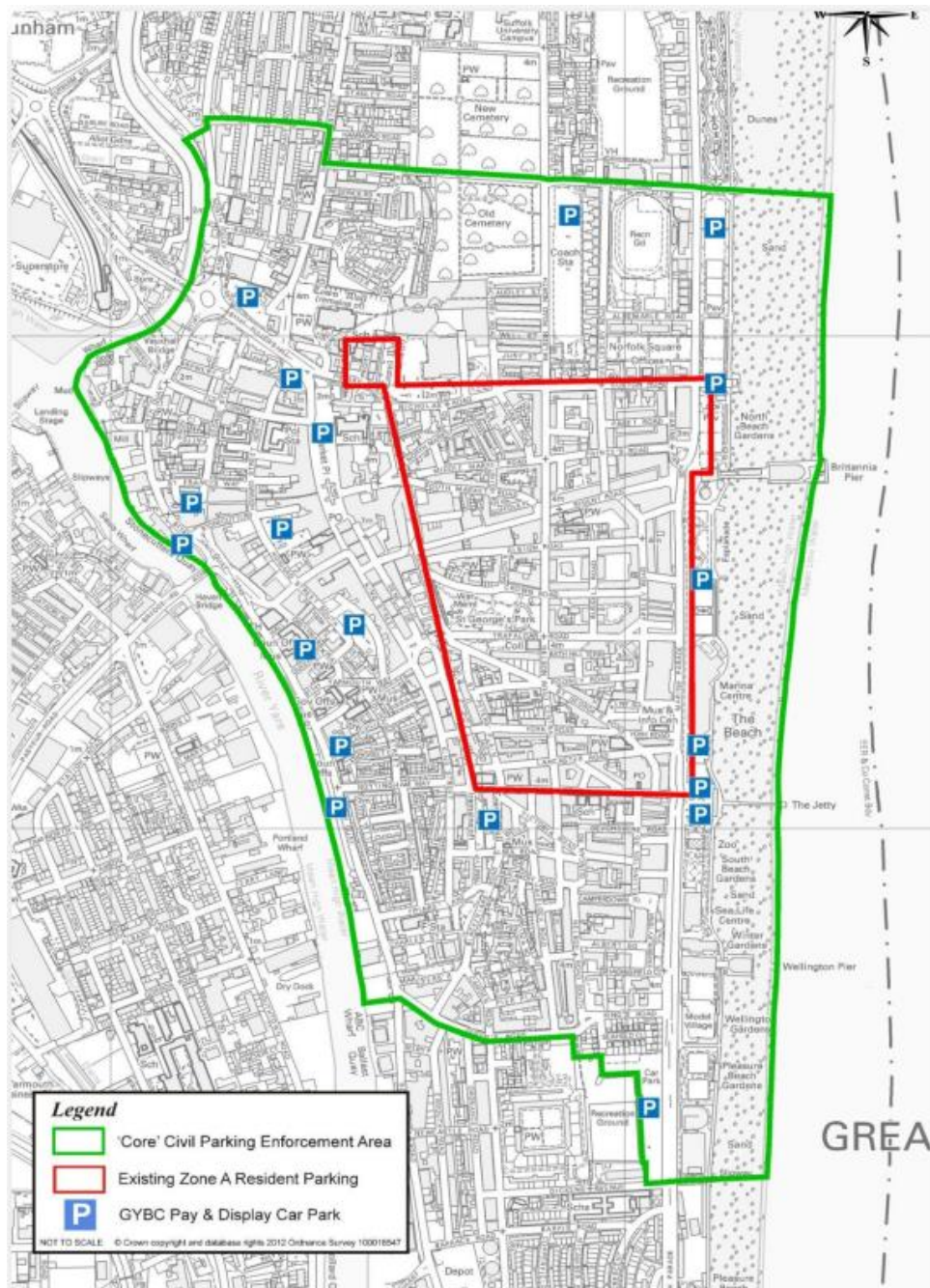


Figure 19 – Car parks

Table 11 – Car Parking Audit

Car Parking Audit Results (Core CPE Area)	
Pay and Display	
Town Centre	881
Sea Front	945
Free Parking	
Town Centre	57
Private Parking	3,098

Car Parking Audit Results (Core CPE Area)	
On Street Parking	
Town Centre	1,265
Sea Front	1,786

- 4.6.4. A residents parking scheme is in place by Great Yarmouth Borough Council to help residents in Great Yarmouth park within close proximity to their homes. It only applies to residents of certain streets and designated areas in the town centre and permits are provided for an annual fee with only one permit per household allowed. Non-residents can buy vouchers that allow them to park in shared use parking bays between 9am and 4pm.
- 4.6.5. Car parking is prohibited along the majority of Southtown Road, enforced by double yellow lines, with the exception of a small stretch (approximately 100m) of space for on street residential parking between the Waveney Road and Queen Anne's Road junctions.
- 4.6.6. On South Denes Road, there are designated bays for residential parking to the north of the Friar's Lane junction. There is also a stretch of approximately 150m south of the Newcastle Road junction which allows free on-street parking on the eastern side of South Denes Road without a residents permit, however, for the most part, on-street parking is prohibited along South Denes Road and is enforced by double yellow lines.

4.7 ACCIDENT RECORD

- 4.7.1. In the five years from 2011 to 2015, there were 394 recorded collisions in the Great Yarmouth area, involving 489 casualties.
- 4.7.2. Of the 489 casualties, 99 (20%) were pedestrians and 50 (10%) were cyclists with 72 casualties (15%) involving motorcycle accidents. There are clusters of accidents on the approaches to the existing bridges, including at North Quay.
- 4.7.3. Figure 20 below shows the locations of all injury collisions in the study area in the five year period 2011 to 2015. Table 12 below details the collisions on key links and junction during the six years to the end of October 2016.

Table 12 – Collisions (Nov 2010 – Oct 2016)

Location	Fatal	Serious	Slight	TOTAL	Peds	Cyclists
Links						
Pasteur Road and Bridge Road	1	4	6	11	4	4
Southtown Road	0	5	21	26	4	8
South Quay and Southgates Road	0	0	14	14	2	2
William Adams Way	0	0	1	1	0	0
A47 (Formally A12)	0	0	6	6	0	0
Junctions						
A47 / Pasteur Road	0	0	9	9	0	0
A47 William Adams Way	0	0	16	16	0	0
Pasteur Road / Southtown Road	0	0	2	2	1	0
Bridge Road / Hall Quay	0	0	6	6	2	0
Southtown Road / William Adams Way	0	1	1	2	0	1

- 4.7.4. On Pasteur Road and Bridge Road, accidents are grouped around the Pasteur Road/Thamesfield Way roundabout and the Bridge Road link between Southtown Road and Hall Quay signals. Of most concern is the prevalence of accidents on Bridge Road. Six of these involved vulnerable road users suggesting problems in this motor vehicle dominated environment around the existing crossing of the River Yare.
- 4.7.5. The accident rate on Southtown Road is around three times the national average for 'other urban roads'. Accidents are scattered but tend to occur at junctions (Gordon Road and Bridge Station Road). The accident rate on South Quay and Southgates is just under twice the national average for urban A roads. Accidents are generally scattered, with clusters on Nottingham Way and Queen's Road, which are more heavily trafficked side roads.

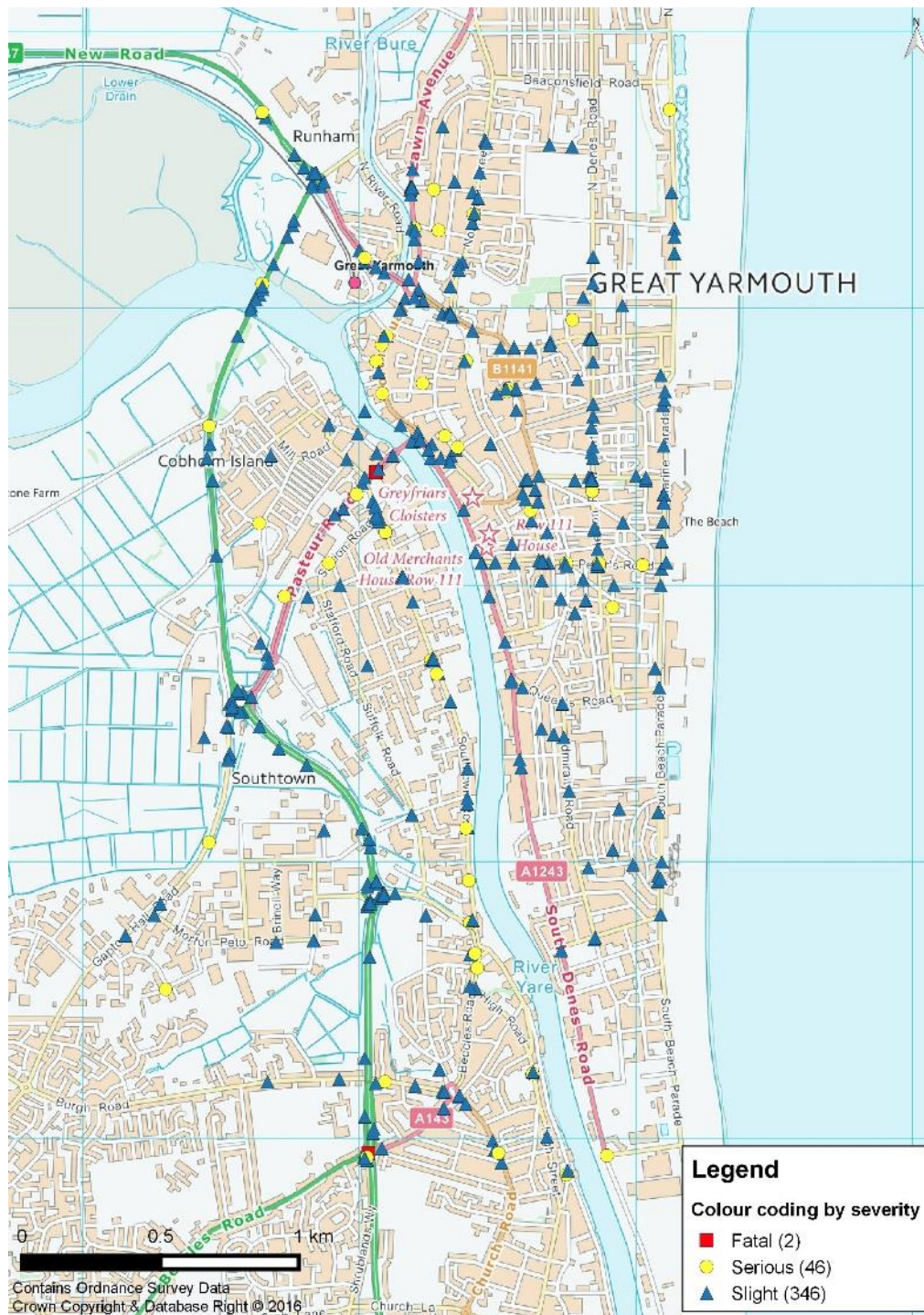


Figure 20 – Collisions 2011-2015

4.8 CRITICAL LINKS AND JUNCTIONS

4.8.1. The OBC (2017) identified the main transport-related problems which the scheme is designed to address:

- Inadequate access to employment areas and the harbour
- Traffic congestion, resulting in queuing and delays to journeys
- Difficulty in accessing the town centre, seafront and leisure facilities
- Inefficient and indirect bus services into the southern part of the peninsula
- Lack of direct walking and cycle routes into the southern part of the peninsula
- Community severance
- Impact of traffic on historic areas
- Impact of traffic on local air quality and CO2 and greenhouse gas emissions
- Road accidents
- Lack of resilience in the local road network.

4.8.2. As noted in the OBC, a survey of local residents had identified traffic congestion as the most serious transport problem to be tackled, by a considerable margin, as illustrated in

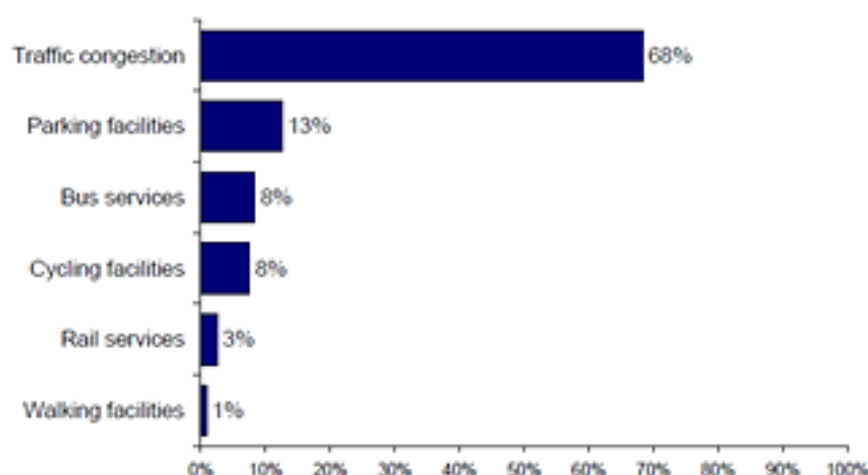


Figure 21 - Residents' survey on aspects of transport most important to improve

As it can be quite difficult to measure congestion in absolute terms, a range of survey results, open source data, and model investigations were used to illustrate the severity of queuing and delay on town centre roads. Taken together in the OBC, these provided evidence that congestion is a very real problem for people in Great Yarmouth, not just a perception.



Figure 22 - Traffic counts and queue survey locations, 2015

Detailed classified traffic counts and queue length surveys were undertaken at key locations in the vicinity of the Haven Bridge and town centre on Thursday 15 October 2015 and 8 March 2018. The survey locations are shown in Figure 22 above and the observed maximum queue lengths are set out in Table 13.

Table 13 - Maximum queue lengths observed (metres)

Location	Direction	October 2015	March 2018
1A	From Pasteur Road	>150	>150
1A	From Bridge Road	>150	124
1A	From Southtown Road	100	110
2	From North Quay	127	73
2	From South Quay	>150	74
2	From Bridge Road	142	>150
3	From the north	137	>150
3	From the south	92	68
8	From Acle New Road	>150	88
8	From North Quay (north)	>150	>150
8	From Fullers Hill	40	39
8	From North Quay (south)	>150	72

- 4.8.3. This queuing is associated with the high volumes of traffic using the Haven Bridge and nearby roads, as shown in Table 14 below.

Table 14 – Two-way traffic volumes of 12 hrs (7 am – 7 pm)

Location	October 2015	March 2018
A1243 Haven Bridge (across River Yare)	22,513	22,354
South Quay, south of Haven Bridge	19,697	23,308
North Quay, north of Haven Bridge	11,709	13,436
Acle New Road (across River Bure)	22,226	24,746
Fullers Hill	9,316	9,392
Temple Road	21,816	No data

4.8.4. Journey times are significantly longer in peak periods than in the off-peak. Open access mapping data was used to compare journey times on various routes at different times of the day in November 2016. The start and end points of these routes, all of which cross Haven Bridge, are illustrated in Figure 23 and the difference between peak and off-peak journey times is set out in Table 15.



Figure 23 - Journey time start/finish locations

Table 15 - Journey times (from open source data)

	To:	To E			To F			To G			To H		
From:		AM	OP	PM	AM	OP	PM	AM	OP	PM	AM	OP	PM
E	Minutes				14	10	12	10	7	8	14	12	14
	% over OP				40%		20%	43%		14%	17%		17%
F	Minutes	7	7	8				6	6	7	5	5	5
	% over OP	0%		14%				0%		17%	0%		0%
G	Minutes	6	6	7	6	6	7				8	8	9
	% over OP	0%		17%	0%		17%				0%		13%
H	Minutes	9	9	10	6	5	9	10	9	14			
	% of OP	0%		11%	20%		80%	11%		56%			

- 4.8.5. A similar exercise was undertaken for routes using the Breydon Bridge and the results were set out in the 2016 Options Assessment Report¹⁸.
- 4.8.6. The microsimulation model of Great Yarmouth, developed for the final phase of option assessment provides, a further insight into the location of congestion hotspots in and around the town centre. Figure 24 is a congestion “heat map” for the calibrated base year (2016) model, providing a snapshot of the locations and intensity of congestion on the local road network in the morning peak period.

¹⁸ OBC supporting document 1

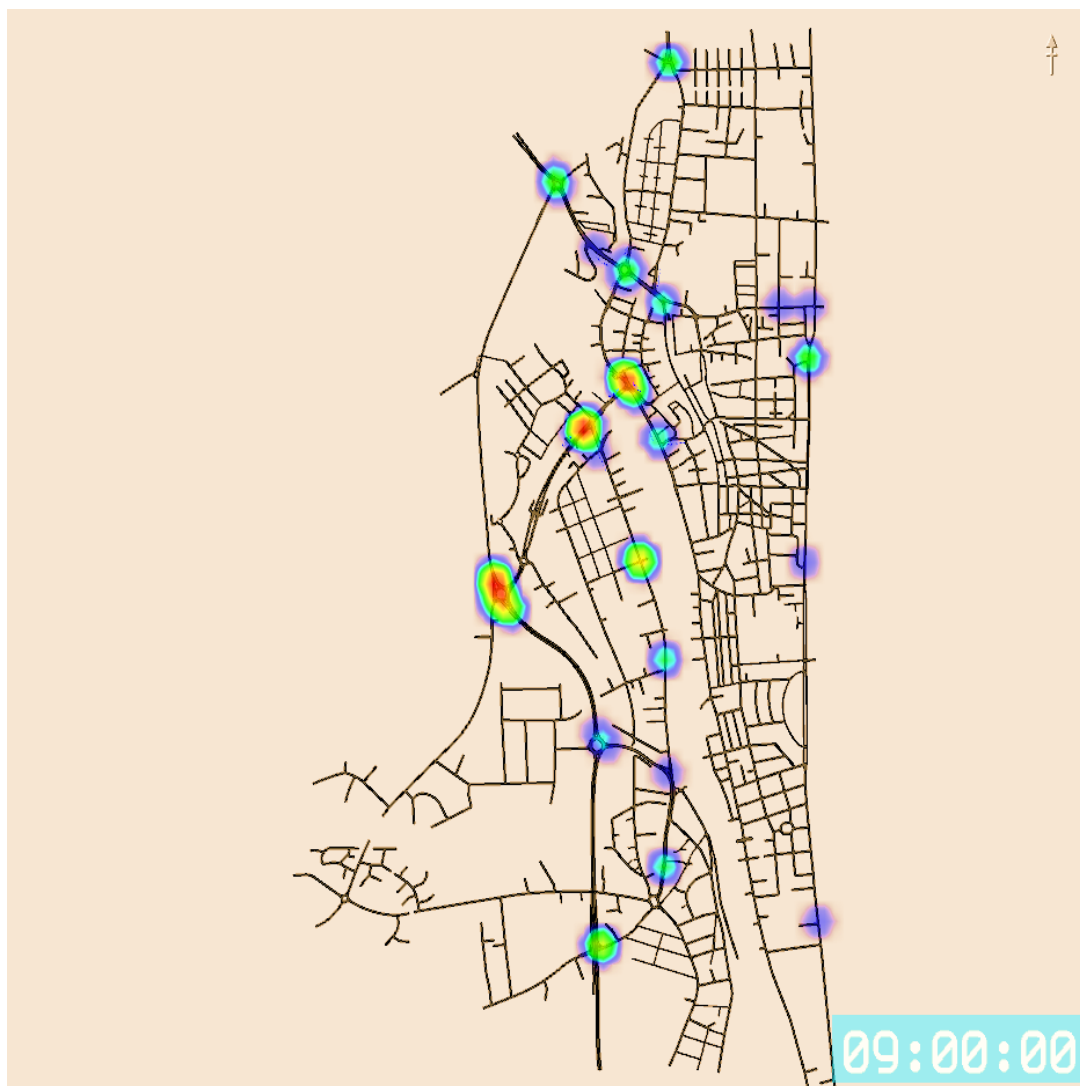


Figure 24 - Congestion "heat map" AM peak 2016 (from PARAMICS microsimulation model)

- 4.8.7. Because the heat map can only represent an instant of time, it should be seen as illustrative only, but it does give a further insight into which parts of the network are affected most by congestion. The results from the microsimulation model generally correspond with other surveys and anecdotal reports of congestion.



Figure 25 - Congestion on approach to Haven Bridge

- 4.8.8. Congestion is a problem in peak periods throughout the year, but also occurs during the summer when many tourists visit the town centre, pleasure beach and seafront attractions. An estimated 4 million people visit the resort every year, including about 1 million staying visitors per year with an estimated visitor spend of £398 million¹⁹. Seasonal events, such as festivals, fireworks displays and horse races are all associated with increased congestion and traffic delay. On days with especially fine weather, increased numbers of day trippers add to the traffic demand and congestion. The raising of the bridges to allow shipping to pass through creates further significant delays and long queues which can take a very long time to clear. The proposed third crossing, whilst also a lifting bridge, will provide additional network capacity, reducing overall traffic on Haven Bridge and the build-up of queues – in effect increasing resilience.
- 4.8.9. Critically, congestion at the bridges makes it difficult to provide adequate access to the important employment areas in the South Denes Enterprise Zone, including the new deep water outer harbour.
- 4.8.10. Congestion affects bus users and cyclists, as well as car users. Pedestrians are also affected by the long traffic signal cycle times needed to handle demand at junctions.

FURTHER WORK TO BE UNDERTAKEN FOR THE FINAL TA

- 4.8.11. The above section describes existing problems. The final TA will provide more detail on critical links and junctions, in particular those which are likely to experience increases in traffic as a result of the scheme. This will provide the basis for the assessment – using the transport models which are being updated in 2018 and the final scheme design – of the full impacts of the scheme and the identification of any mitigation needed.

¹⁹ 2011 Statistics, Local Plan Core Strategy, Great Yarmouth Borough Council

4.9 CURRENT PEAK PERIODS

4.9.1. Peak hours have been determined from a review of all survey data:

- Morning peak 08:00 – 09:00;
- Inter-peak 13:00 – 14:00;
- Evening peak 16:30 – 17:30

4.10 OTHER PLANNED TRANSPORT IMPROVEMENTS

4.10.1. This section is based on information available at the time the OBC was submitted and will be updated for the final TA.

4.10.2. The County Council is aware that Highways England (HE) is consulting on possible improvements to junctions on the A47 Trunk Road (formerly the A47/A12 junction enhancements scheme) as part of the government's Road Investment Strategy for 2015-2020 (RIS 1). Two locations in Great Yarmouth (Illustrated in Figure 26) are being considered:

A47 Vauxhall Roundabout and station approach.

- Enlarged roundabout
- Widening and realignment of approaches
- Possible improvements for non-motorised users
- Minor improvements to existing layout and signals, and reinstated right turn at Station Approach (now complete and expected to be open to traffic ###)

A47 Gapton Roundabout

- Signalisation of roundabout
- Possible improvements for non-motorised users

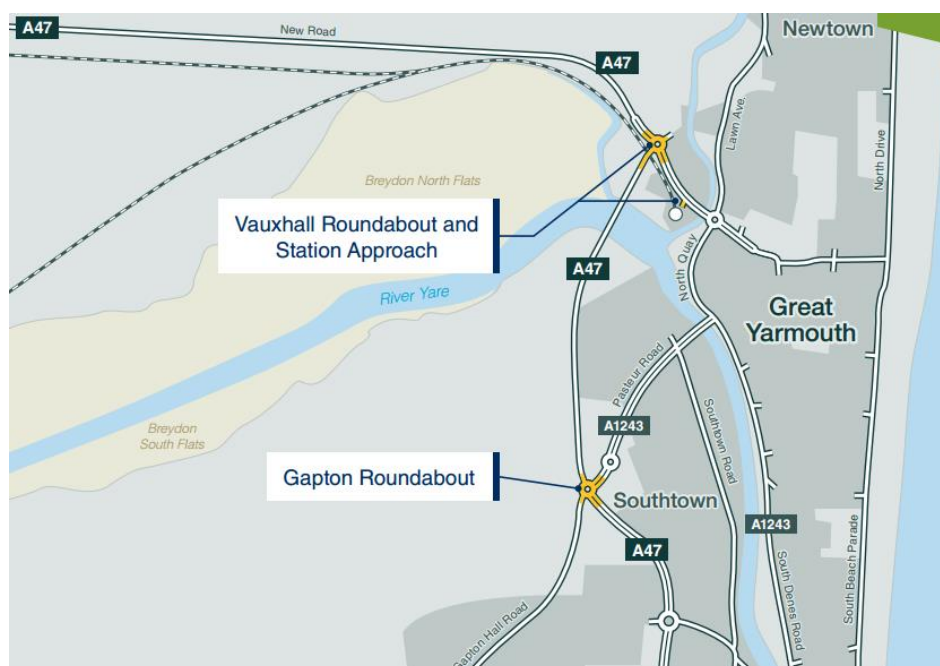


Figure 26 - Planned RIS - 2 junction improvements (Source: HE)

- 4.10.3. Subject to the consultation and further work to determine whether there is a compelling case for improvement, HE could announce a preferred route for these improvements in late 2017 and start the pre-application stage of the development consent process, leading to a start of construction in 2020.
- 4.10.4. Although there is no inter-dependence between these RIS 1 schemes and the proposed Third River Crossing, the County Council will liaise very closely with HE as their respective projects are developed and taken forward.

A47 HARFREY'S ROUNDABOUT

- 4.10.5. Highways England had also been considering improvements to Harfreys, Bridge Road and James Paget junctions on the A47, but their assessments have not identified improvements at these locations that would offer good value for money. HE have therefore removed these junctions from the current consultations but is keeping them under review²⁰.

LEP FUNDED ENHANCEMENTS

- 4.10.6. The New Anglia Local Enterprise Partnership Growth Deal allocation for 2016 to 2021 includes £9m funding for Great Yarmouth to help tackle congestion and create attractive alternatives to the car by improving facilities for public transport users, walking and cycling.
- 4.10.7. NCC, working with partners, is leading the development of these enhancement projects. Improvement schemes for Fuller's Hill roundabout, The Conge and access to the railway station are finished or currently under construction, and an evaluation of improvement packages for sustainable transport schemes is currently underway.
- 4.10.8. The development of all schemes has involved widespread consultation and engagement with local stakeholders and wherever possible this has been combined with the consultation and engagement activities undertaken on the third river crossing.
- 4.10.9. These schemes will, however, be delivered independently of the Great Yarmouth Third River Crossing, and have been included where appropriate in the "Do Minimum" scenarios.

4.11 CURRENT NOISE AND AIR QUALITY ISSUES

- 4.11.1. Refer to the Preliminary Environmental Impact Report (PEIR)

4.12 BASELINE CARBON EMISSIONS

- 4.12.1. Refer to the Preliminary Environmental Impact Report (PEIR)

²⁰ Improving the A47 – Great Yarmouth junction improvements: Public consultation. (Highways England, March 2017)

5 THE PROPOSED SCHEME

- 5.1.1. For details of the proposed scheme, to which this assessment applies, please see Chapter 2 of the PEIR. This section will be updated within the full Transport Assessment.

6 ASSESSMENT METHODOLOGY

6.1 INTRODUCTION

- 6.1.1. This section describes the methodology which will be used to assess the transport impacts of the scheme for the full Transport Assessment.
- 6.1.2. For details of the proposed scheme, to which this assessment applies, please see Chapter 2 of the PEIR.
- 6.1.3. The methodology has been discussed and agreed in principle with NCC Development Control, and takes into account feedback received from DfT on the modelling and appraisal work submitted with the OBC.
- 6.1.4. At the time of writing this PTA the agreed updates to the modelling work have not yet been completed, and the results of the new assessment are not available. For this reason, the PTA makes reference to the key conclusions drawn from the modelling undertaken at the OBC stage. It is considered unlikely that the new modelling work will lead to significantly different conclusions, but it will enable a more detailed assessment to be presented in the full Transport Assessment.

6.2 OVERVIEW OF AGREED METHODOLOGY

- 6.2.1. To support the OBC, extensive transport modelling and appraisal work was undertaken in order to select a preferred option, forecast the likely scheme impact and quantify its benefits.
- 6.2.2. This included the development of a tiered modelling approach, including
- a SATURN model (used for strategic analysis and to feed into the economic appraisal)
 - a Paramics Discovery model (used in the option selection process and to forecast operational performance in more detail).
- 6.2.3. It has been agreed with NCC Development Control that a similar approach should be taken for the full Transport Assessment. Both models will be updated and re-run with some refinements including:
- Update the modelling with a 2018 base year (the OBC modelling used a 2016 base year)
 - Review and update assumptions on committed developments and infrastructure
 - Review and update the bridge opening schedule for the scheme in both models to ensure consistency
 - Use the updated SATURN model to update the economic appraisal and calculate an updated BCR
 - Input flows from the updated SATURN model into an updated Paramics Discovery model
 - Make further refinements to the Paramics Discovery model to ensure good validation against additional traffic flow data to be collected in March 2018
- 6.2.4. The updated Paramics Discovery Model will then be used to assess the impact of the scheme on the local highway network, focussing on the anticipated opening year of 2023 and covering the area shown in Figure 27 below:

On the evidence of the earlier work, the overall impact of the scheme will be to reduce traffic on existing roads. The main exception will be roads in the immediate vicinity of the scheme, where traffic could increase, and

where physical changes will have been made to the existing roads and junctions to accommodate the scheme. Careful consideration has been given to the design of these tie-ins to minimise the risk of excessive queuing and delay. These parts of the network will be examined in greatest detail in the full TA. If required, detailed modelling will be undertaken using specialist tools such as LinSig and detailed junction models.

6.3 DETAILED METHODOLOGY: STRATEGIC MODELLING

THE SATURN MODEL

- 6.3.1. The Great Yarmouth Traffic Model (GYTM) is based on a SATURN model originally built by Mott MacDonald in 2008. This was recalibrated to create a new 2016 base model for the OBC. Subsequently, it was updated to represent the 2018 traffic conditions.
- 6.3.2. The first updating of the model included:
- Reviewing the network structure, taking account of changes to the highway infrastructure
 - Refining the zone structure and zone connectors, especially close to the proposed scheme
 - Updating traffic signal timings
 - Adding development sites introduced between 2008 and 2016
 - Updating demand matrices using new RSI survey and traffic count data
- 6.3.3. The development, validation and use of the new SATURN model are described in the following reports, provided as supporting documents to the OBC:
- Document 3: Data collection report
 - Document 5: Local Model Validation Report (LMVR) (SATURN)
 - Document 6: Demand Model Report
 - Document 8: Forecasting Report (SATURN)
- 6.3.4. In order to carry out the most recent update to a 2018 base, changes from 2016 to 2018 in network, land use and traffic flows were analysed. Network and land use changes were provided by NCC. Again this showed minimal changes from 2016. Traffic counts from 2018 were compared to 2016 and the results showed that flows had not increased from 2016 levels. As a result the 2016 network was updated to 2018 and the 2016 demand assigned on it. This was considered to accurately represent the traffic conditions of 2018.

FEATURES OF THE MODEL

- 6.3.5. The SATURN software employs an iterative process of assigning flows and simulating delay. Within the simulated model area, capacity is restrained at junctions. In line with TAG Unit M2, variable demand modelling (VDM) has been used.

STUDY AREA

- 6.3.6. The simulation model area covers the whole of the Great Yarmouth conurbation, as shown in **Error! Reference source not found.**
- 6.3.7. The simulation area is considered large enough to capture the biggest impacts expected with the scheme, and also includes an area where impacts are quite likely to occur, but are expected to be relatively small.

ZONING

- 6.3.8. The model comprises 240 zones, with the greatest level of detail being in the town centre and close to the proposed scheme. The zoning structure is illustrated in **Error! Reference source not found.** and is described in more detail in the LMVR.

HIGHWAY NETWORK

- 6.3.9. The simulation area of the model network is also shown in **Error! Reference source not found.** and described in more detail in the LMVR. All roads outside the core model area are coded as buffer links.

TRAFFIC DATA

- 6.3.10. Traffic data was obtained from:
- Existing data, including: ANPR, MCC, ATC, queue surveys, Trafficmaster.
 - Roadside interview surveys in 2016
 - Manual classified counts at over 40 locations in 2016 and at 15 locations in 2018
 - Automatic traffic counts at 30 locations in 2016 and at 20 locations in 2018
 - Journey time surveys on 8 routes in 2016
- 6.3.11. The collection and processing of this data is detailed in the Data Collection Report (Supporting document 3).

JUNCTION MODELLING

- 6.3.12. In order to represent the effects of traffic delay and queues at junctions, junction operation has been modelled in detail within the study (simulation) area.

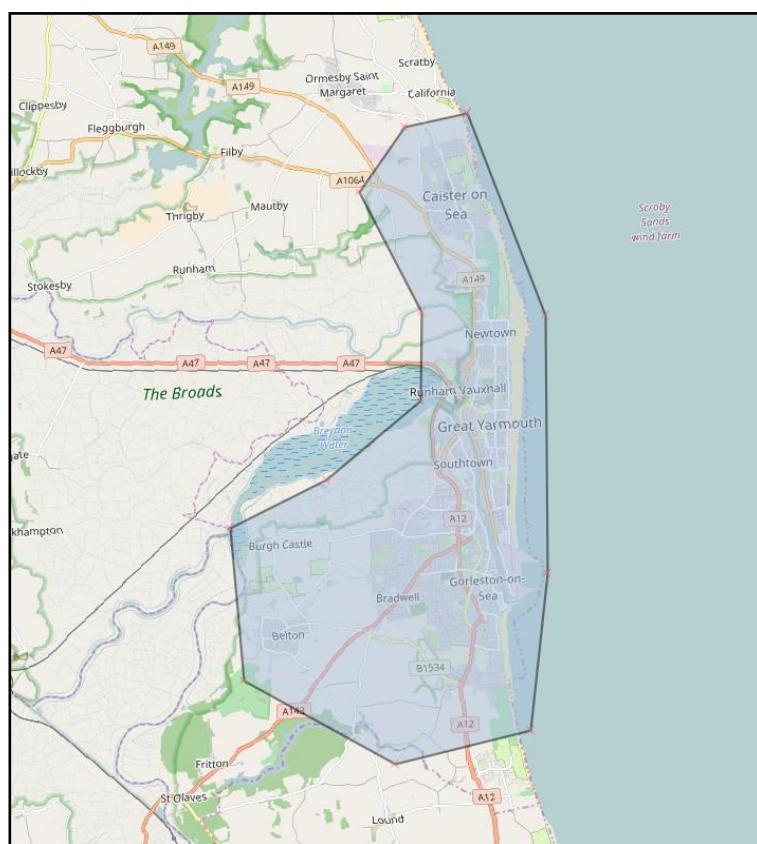


Figure 27 – SATURN model: detailed simulation area

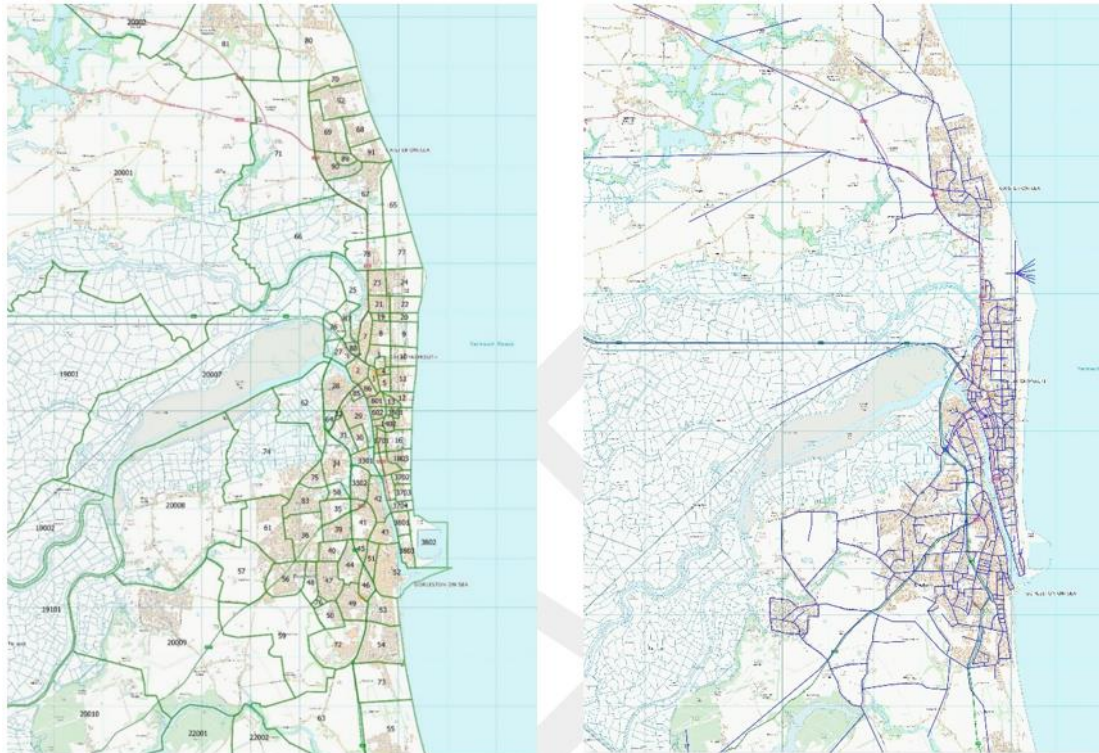


Figure 28 – SATURN model: zoning and highway network

MATRIX DEVELOPMENT

6.3.13. Base year trip matrices were originally developed for 2016. Three time periods were modelled in order to replicate trip patterns over a typical weekday:

- AM Peak hour (08:00 – 09:00)
- PM Peak hour (16:30 – 17:30)
- Average Inter-Peak hour (10:00 – 15:30).

Five user classes have been modelled:

- Cars: employer business
- Cars: commute
- Cars: other
- Light Goods Vehicles
- Heavy Goods Vehicles (OGV1, OGV2 and Coaches).

VALIDATION AND CALIBRATION

6.3.14. The SATURN model used to forecast future travel demand and traffic flows has been constructed in line with WebTAG and has been calibrated and validated to WebTAG criteria.

6.3.15. The development of the base year (2016) traffic model and its validation against observed traffic flows and journey times is fully documented in the LMVR. As described in 6.3.4 above these matrices are deemed to also represent traffic demand in 2018. The changes to the network (updating from 2016 to 2018) will cause some minor changes to the calibration and validation performance. An addendum to the LMVR will be produced in due course.

ADDITIONAL UPDATES TO THE SATURN MODEL

6.3.16. In response to comments received from DfT relating to the model produced for the OBC, an initial review process will be undertaken to increase the level of assurance. This will include:

- Undertaking sector analysis to compare unused RSI movements with SLA from model
- Comparing JTW census data with modelled commute matrices
- Considering recent updates to WebTAG
- Producing a specification for data collection

Also, to update the model for the TA and DCO, the following tasks will be undertaken:

- Verify land use changes
- Identify AADT growth and establish growth factors
- Collect and process survey data
- Update assignment model time and distance parameters
- Update networks and infill matrix with developments
- Process count data
- Compare new 2018 base model against counts to ensure adequate assurance
- Project model based on forecast update
- Iterate through demand model
- Provide data to enable a quantified assessment to be made of the impact of the proposed Scheme on noise and air quality
- Updated economic appraisal

6.4 DETAILED METHODOLOGY: MICROSIMULATION MODEL

- 6.4.1. The development of the microsimulation model for the scheme builds on previous work undertaken by Mouchel (now WSP) who were appointed by NCC to develop a Paramics Discovery model of Great Yarmouth Town Centre. The aim of the initial model was to test various local congestion relief schemes in the town centre.
- 6.4.2. In order to provide a model fit for the purpose of assessing the scheme, the initial town centre model was enlarged to include the area shown in Figure 29:

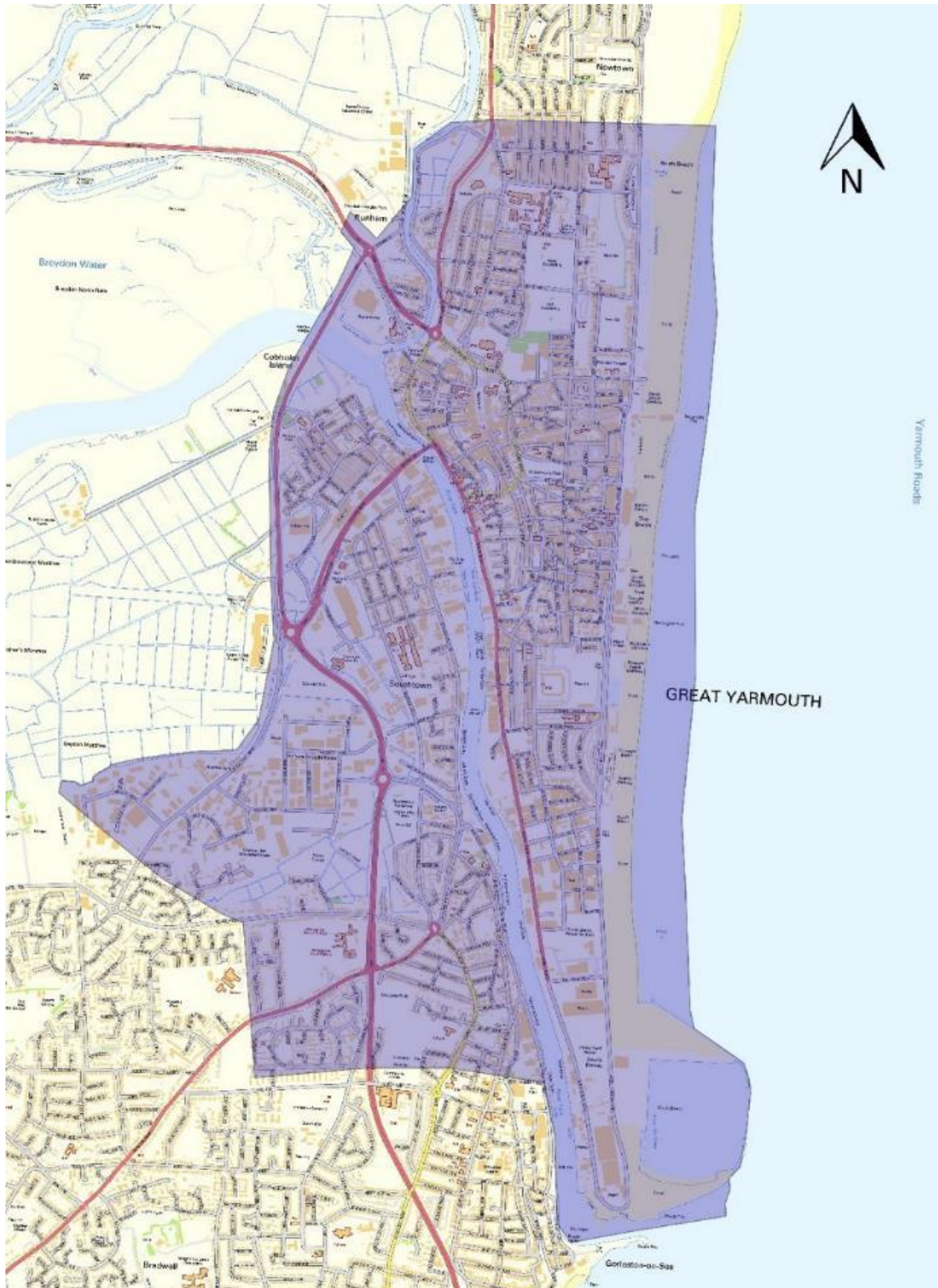


Figure 29 – Microsimulation model: study area

6.4.3. The development of this model is described in detail in the following documents which were submitted with the OBC:

- Document 3: Data collection report
- Document 4: Local Model Validation Report (Paramics)
- Document 7: Forecasting Report (Paramics)

DATA SOURCES

6.4.4. Existing traffic data from a variety of sources was collated and reviewed and this was supplemented by additional data collection commissioned by Mouchel. The final set of data used is shown in Figure 30.



Figure 30 – Final set of traffic counts for modelling and matrix manipulation

6.4.5. Journey time data was also collected from the Highways England Open data website.

PEAK PERIODS

6.4.6. Peak hours were determined from a review of all survey data:

- Morning peak 08:00 – 09:00;
- Inter-peak 13:00 – 14:00;
- Evening peak 16:30 – 17:30

TRAFFIC RELEASE PROFILES

- 6.4.7. It is important to replicate how traffic demand changes within the modelled period. Paramics Discovery allows replication of the proportion of vehicles released onto the network at 15 minute intervals. This makes it possible to reproduce the demand variation during the simulation, the 'peak within the peak' as well as the build-up and dissipation of queues.
- 6.4.8. In addition, depending on the land use, the peak demand at each zone may be reached at different hours, for instance, a school zone will be busiest in the 20 minutes before lessons commence. Therefore, where diverse land uses are expected, different release profiles must be built in order to replicate the behaviour of traffic.
- 6.4.9. The available surveys were used to calculate the release profiles of certain zones located near the junction or roads where the counts were carried out. However, it is impossible to create as many profiles as zones modelled due to the amount of data required to do so, and accordingly, some assumptions must be considered. Thus, the zones without enough traffic data to estimate their profile use one of the 34 existing profiles. These profiles were allocated depending on the land use of the zone and their proximity to the reference zone.

NORMALISATION OF TRAFFIC COUNT DATA

- 6.4.10. Because the surveys were carried out in different months and years, it was necessary to adjust the traffic data in order to represent a neutral month in 2016.
- 6.4.11. As a consequence, normalisation factors have been calculated in order to convert the traffic data to a neutral weekday. These factors were calculated using trustworthy, long-term traffic data within, or as near as possible to the study area. Highway England WebTRIS provided the necessary information to carry out the calculation of these factors by means of three permanent traffic counts locations. The factors were calculated for the day of the week, month and year allowing to change the traffic counts from different traffic surveys into an average weekday of 2016.

ROAD NETWORK

- 6.4.12. The model network was created with reference to Ordnance Survey AutoCAD mapping and as-built drawings provided by NCC. Both sources provide information regarding the physical features of Great Yarmouth highways, and the junction layouts allow accurate replication of stop line positions, signal staging phasing and timing.
- 6.4.13. Additional information such as speed limits, give-way priorities, banned movements, lane configuration, bus stop locations and vehicle behaviour were gathered from the CAD drawings, satellite and street images.
- 6.4.14. Paramics Discovery allows different road categories to be modelled which improves the accuracy of route choice. The main link categories are 'Major' and 'Minor' roads. These link types determine the road importance and likely utilisation depending on whether the drivers are familiar or not with the network.
- 6.4.15. NCC provided traffic signal controller specifications and as-built drawings where the data was available, for twenty-five signal controlled junctions and pedestrian crossings within the study area network. Signal timings for junctions and pedestrian crossings during the modelled periods were calculated using the controller specifications provided. NCC confirmed that most of the junctions run under SCOOT control and timing logs were provided for most junctions

MODELLING THE HAVEN BRIDGE

- 6.4.16. NCC provided historical data from 2014/15/16 for the number of Haven Bridge lifts per month. A more detailed log from June 16 provides the precise times when the bridge was opened and closed to traffic. It was closed to traffic for durations of between 5 to 10 minutes. The timings in the log file indicate that bridge lifts appear to be concentrated outside the peak hour period, and is likely to be dominated by tidal times.
- 6.4.17. Table 16 shows the frequency of bridge lifts varies significantly from one month to another. During summer 2015 the frequency was over 40 times per month with a peak of 61 in May. During the winter it was less than 20 times per month.

Table 16 – Haven Bridge: monthly number of lifts in 2015

Month	Total Lifts	Weekday	Weekend
January	13	12	1
February	17	15	2
March	26	21	5
April	41	30	11
May	61	42	19
June	49	32	17
July	49	27	13
August	39	26	13
September	28	19	9
October	20	11	9
November	14	13	1
December	9	8	1

- 6.4.18. Due to the limited number of bridge openings, and the fact that the port authority generally avoid bridge openings during peak times, Haven Bridge opening was not included in the base year model.

ZONING

- 6.4.19. The zone system represents specific areas within the model from which trips start and end. Each individual zone has access and egress points where vehicles are 'released' into the network or leave the model. Vehicles make their trip choice through the network based on the driver's perception of cost and then leave the network at their destination zone.
- 6.4.20. In order to optimise working flows and reduce the differences between the macroscopic and microscopic model, the SATURN model zone plan has been adapted to fulfil the microsimulation level of detail requirements. Therefore, to reach the desired level of detail at this stage of the study, several SATURN zones were split taking account of the following considerations:

- Land use of the SATURN zone:

When different land uses categories were contained in the same zone, the aim was to split it into as many zones as land uses the main zone contained. The zone analysis was carried out according to TRICS categories.

- Most likely access/egress routes:

When different access and egress points could be reached using different although, not complementary routes, the zone was split in order to avoid reproducing unlikely route choices.

- The proximity of the zone to the future bridge location:

The closer to the proposed location of the bridge, the more detailed the zones are. Thus, it is possible to replicate in a more realistic and appropriate manner the impacts of the new infrastructure in local movements.

6.4.21. The resulting zone plan is shown in Figure 31:



Figure 31 – Paramics model: zone plan

PUBLIC TRANSPORT

- 6.4.22. The main bus routes in Great Yarmouth have been included in the model. Information regarding the timetables and routes followed by the different services was obtained from the official sites of public transport operators in Norfolk such as FIRST and Anglian Bus. The location of the bus stop and public transport vehicle types was collected by visual inspection of both Google street view and maps.
- 6.4.23. After careful examination of the available information, twelve public transport services were modelled along with their complete timetables and bus stops within the study area. The modelled PT routes are shown in Figure 32.

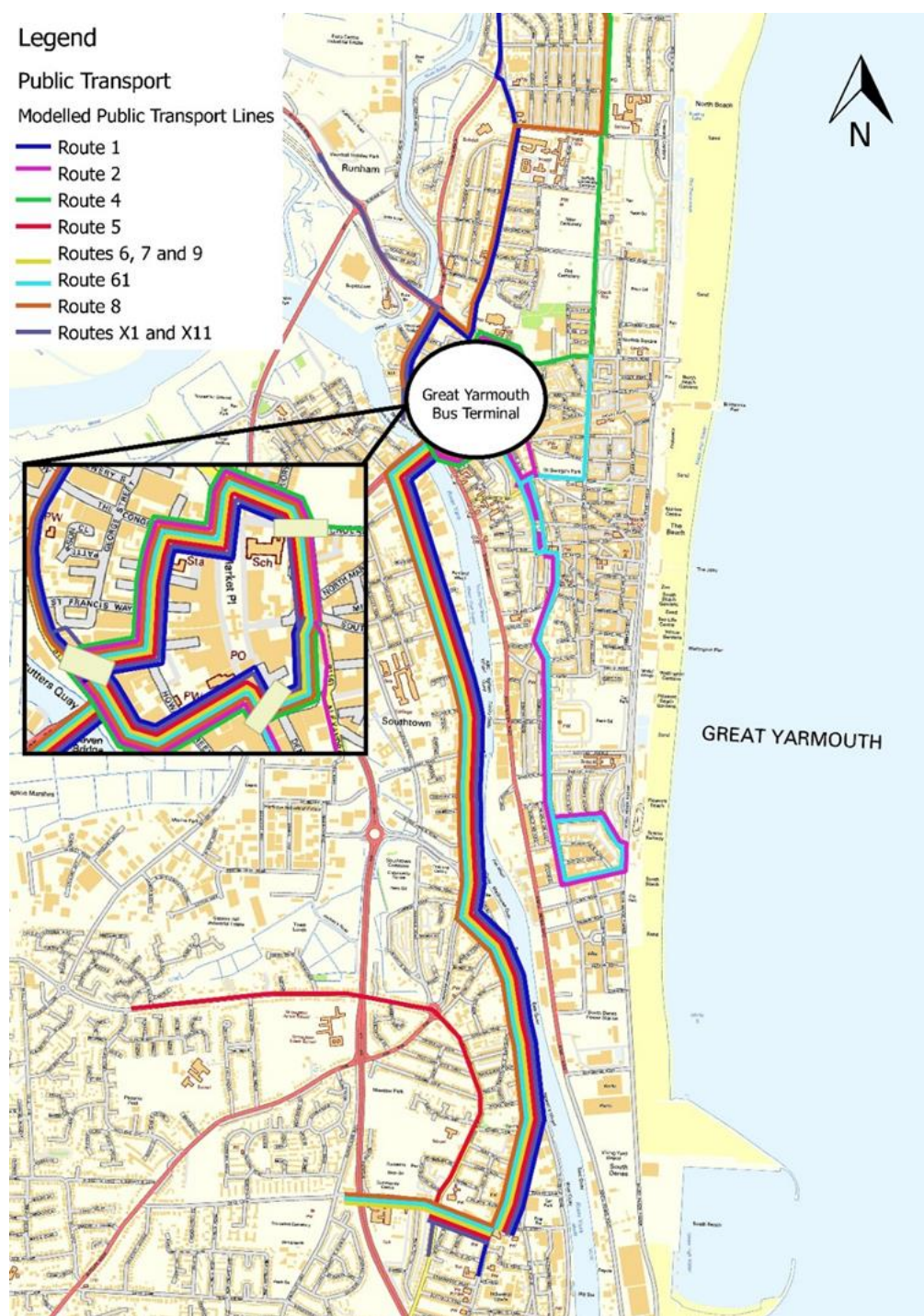


Figure 32 – Public transport lines modelled

Table 17 - Allocated vehicle types

Bus Line	Vehicle Type
2	Single Decker Bus
4	Double Decker Bus
5	Single Decker Bus
6	Double Decker Bus
7	Double Decker Bus
8	Double Decker Bus
9	Double Decker Bus
X1	Double Decker Bus
X11	Double Decker Bus
1	Double Decker Bus
1A	Double Decker Bus

MATRIX DEVELOPMENT

- 6.4.24. For the OBC, a version of the SATURN model developed by Mott MacDonald was cordoned around the boundaries of the Paramics Discovery model network and the morning and evening peaks, as well as the interpeak matrices, were extracted for all of the user types included in the SATURN model.
- 6.4.25. The SATURN zone plan was adapted to the requirements of the Paramics Discovery model as described in Chapter 3. It was necessary to estimate the proportion of trips that the split zones represent from the main SATURN zone. This estimation considered the land use of the microsimulation zones and made reference to trip rates derived from the input parameters from the TRICS database (Gross floor area, dwellings, parking lots, etc.).
- 6.4.26. The SATURN model has 5 user classes. The first three correspond to different purpose car trips. These three matrices were aggregated into one car matrix in order to keep the calibration and validation as simple as possible. The other two SATURN matrices correspond to LGV and HGV traffic.
- 6.4.27. Where traffic counts were available on boundary links of the microsimulation network, the O-D demand at the zone was factored up to the observed count. The cordoned SATURN matrices were only for one hour, so it was necessary to extend them in order to include the warm-up and cool-down periods. To do so, the traffic surveys are used to estimate the proportion of traffic between the peak hour and the previous and next hour. Next, the warm-up and cool-down matrices were added to the cordon matrix, thus creating the prior matrices for the full three hour period.
- 6.4.28. The prior matrix was run on the base network to check and adjust network coding. An initial test of validation with the prior matrix was undertaken and the results are set out in Table 18.
- 6.4.29. This was considered a good result for a prior matrix, nonetheless, in order to improve the accuracy of the model, it was considered necessary to use matrix estimation.
- 6.4.30. The Matrix Estimation (ME) tool has been used to complete the calibration and validation of the microsimulation model. The traffic surveys have been normalised and included in this process, in order to enhance the estimation results.

Table 18 - Prior Matrix Validation

Matrix	Vehicle type	Count Percentage within 5 GEH	Count Percentage within 10 GEH
AM Prior	CAR	73%	95%
	LGV	94%	100%
	HGV	97%	100%
IP Prior	CAR	68%	92%
	LGV	94%	100%
	HGV	99%	100%
PM Prior	CAR	64%	89%
	LGV	96%	100%
	HGV	100%	100%

- 6.4.31. The simulation of the prior matrices produced good results in terms of GEH. Nevertheless, the network experienced significant congestion which caused drivers to start using less desirable secondary routes or take long detours instead of the obvious routes along the main roads. An analysis of the prior matrices was undertaken and it was deemed that the demand was too large. The usual practice to produce better matrices in large and/or congested networks is to reduce the prior matrix demand by a percentage and use these matrices in the matrix estimation process. A reduction of 20% was applied to the prior matrices and then, the model was run again in order to generate routeing information which was fed into the matrix estimation process. This method reduces the likelihood of the prior matrix causing unrealistic delays which could then skew the matrix estimation process.
- 6.4.32. Changes made by matrix estimation to OD zone totals were reviewed after every round of ME in order to check the trips were reasonable for the zones land use and size. The final trip matrices were obtained through the matrix estimation tool of Paramics Discovery using a maximum of one hundred iterations per round of ME.
- 6.4.33. The ME settings such as the number of iterations, traffic surveys, network delay and constraints were adjusted in order to achieve the optimum balance between changing the prior matrix and matching the traffic counts.
- 6.4.34. After carrying out the matrix estimation an analysis of the results was conducted through the Data Analysis Tool (DAT), comparing the traffic flows within the network and checking inconsistencies in flow distributions. In addition, the trip length distributions were calculated in order to better understand the variation between the prior and the estimated matrices of the short and long trips.

VALIDATION – MODEL STABILITY

- 6.4.35. The test for stability for the model was conducted in accordance with the methodology recommended by SYSTRA (formerly SIAS), calculating the confidence interval to estimate the number of runs required. To calculate the confidence interval from a number (N) of randomly seeded runs the t statistic, as well as the Standard Error will be required.
- 6.4.36. In addition, a confidence level is needed to undertake the calculation; a typical value is 95% which means a significant level of 0.05 (p). Therefore, 95% of the time, the interval constructed would contain the true underlying population mean.
- 6.4.37. In summary, to demonstrate the stability of the model, the maximum and the minimum of the averages of journey times of each path and run must be included between the upper and lower limits of journey time values of the confidence interval.

- 6.4.38. The analysis was performed using a confidence level of 95% and 5 model runs. The stability of the model was carried out for AM, PM and IP periods.
- 6.4.39. Based on the log of 5 model runs, the journey time (JT) statistics along 14 routes were gathered. The average, maximum, minimum and the standard deviation of the journey times were calculated for each route and period.
- 6.4.40. 81% (34 of 42) of the journey time samples were within their corresponding confidence interval. For the samples which are not within the limits, the differences are all within 0.1 min which means maximum differences of 6 seconds.

PROPOSED UPDATES TO MICROSIMULATION MODELLING

- 6.4.41. The following tasks will be undertaken to update the Paramics Discovery model for the PTA:
- Update the public transport data in the model to reflect the 2018 conditions
 - Process the additional traffic counts and normalise the old and new data to a neutral day of 2018
 - Code in network change relating to local schemes which have come forward since 2016
 - Update the zone system to ensure consistency with the Saturn model
 - Update the release profiles for each zone
 - Cordon the updated Saturn model to extract the matrices for the Paramics Discovery model
 - Convert the 1 hour matrices of Saturn to the 3 hour matrices needed for Paramics Discovery
 - Check the validation of the prior matrices
 - If needed recalibrate the model to try to replicate the real conditions
 - If needed use matrix estimation to improve the performance of the prior matrices
 - If needed refine the recalibration of the model to try to replicate the real conditions.

7 TRANSPORT IMPACTS

7.1 INTRODUCTION

- 7.1.1. This section describes the expected transport impacts of the scheme.
- 7.1.2. Because the modelling updates described in Chapter 6 have not yet been completed, and because the design of the scheme is still being refined, this section of the PTA is based on information available from the versions of the models used to produce the OBC in 2017. The full TA will review and if necessary update this information.
- 7.1.3. The full TA will also present the results of a more detailed assessment of the impacts of the scheme itself, including the performance of links and junctions which are likely to experience significant changes in traffic demand as a result of traffic reassignment. This in turn will form the basis of any proposed mitigation.
- 7.1.4. Notwithstanding the above requirements, which apply to highway schemes as much as to other major developments, it is important to emphasise that all the work done to date indicates that the scheme will produce a very significant net benefit to the transport network. The scheme will reduce traffic flows and congestion over much of the study area and in particular at the existing Haven Bridge Crossing and in the town centre. This will contribute to the economic benefits (as measures by the BCR) and to the achievement of the schemes objectives.

7.2 SUMMARY OF TRANSPORT RELATED IMPACTS (FROM OBC)

TRAFFIC VOLUMES

- 7.2.1. The Great Yarmouth Third River Crossing will have a significant and beneficial impact on traffic in the town, and this will give rise to a range of benefits, helping to deliver the scheme's objectives.
- 7.2.2. The existing bridges will both experience a reduction in traffic – one of the key objectives of the scheme. Table 19 shows the impact of the scheme on bridge crossing flows in 2023.

Table 19 - Forecast traffic changes on all bridges Bridge AADT (from SATURN model)

Traffic flow (2 way) AADT	2023 DM	2023 DS	Difference %
A47 Breydon Bridge	34,846	32,208	-8%
A4123 Haven Bridge	26,186	13,458	-49%
Third River Crossing	-	20,114	-

- 7.2.3. The most dramatic reduction is in the traffic on Haven Bridge, where there will be a 49% reduction upon the opening of the Third River Crossing – a large beneficial impact which will be felt immediately by people in the town. Of the three bridges, Haven Bridge will in future be the least busy by a significant margin.
- 7.2.4. Traffic levels will be reduced on key links. **Error! Reference source not found.** shows the forecast changes in traffic flow in the local road network – comparing “Do Something” (DS) and “Do Minimum” (DM) flows on key links in the opening year 2023 (pm peak).
- 7.2.5. Whilst there are some increases on the approaches to the new bridge, the general effect is to redistribute traffic between three, instead of two, river crossings, reducing the pressure of traffic in sensitive areas. This will contribute to the achievement of the schemes objectives.

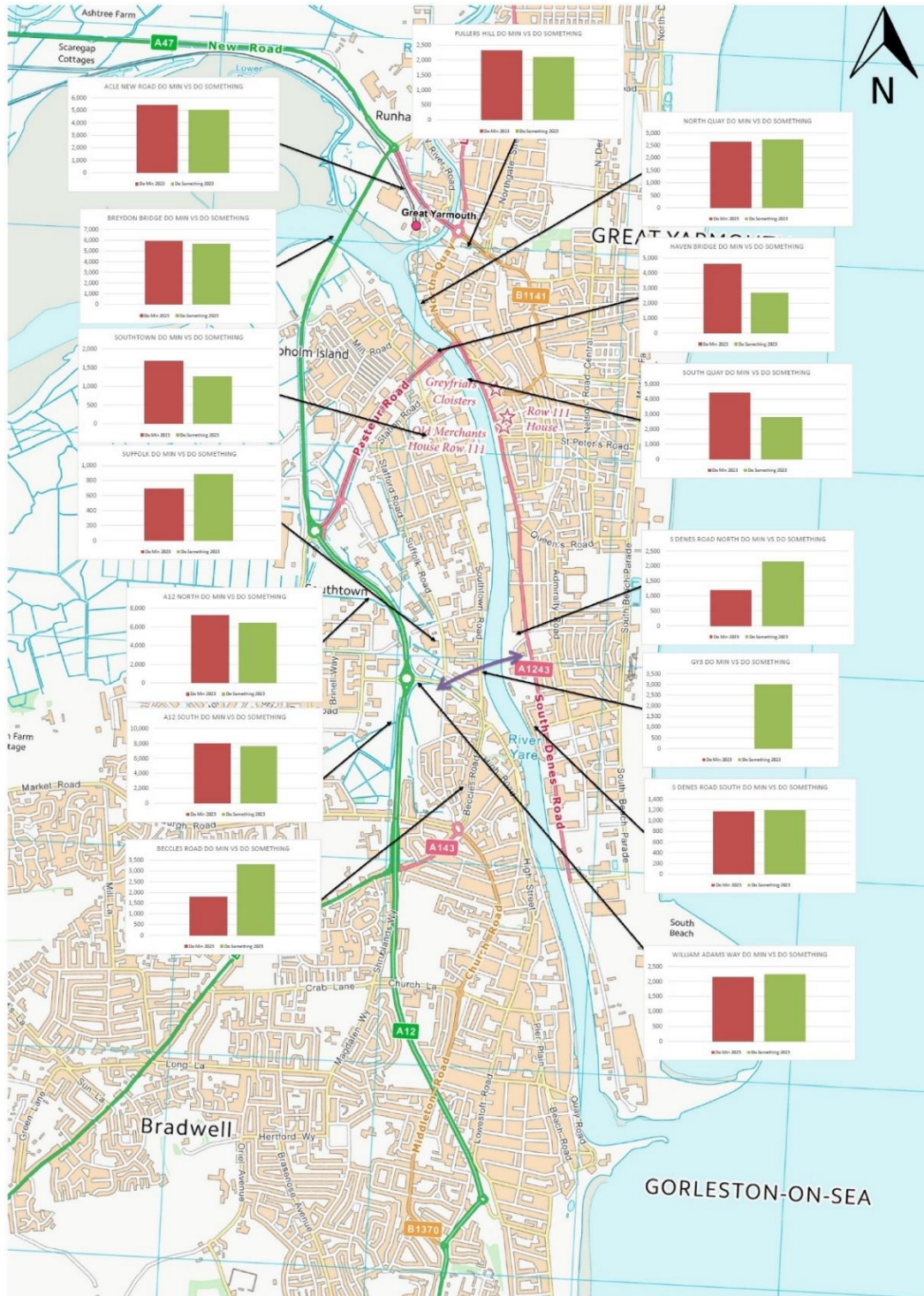


Figure 33 - Traffic flow changes due to the scheme 2023 pm peak

CONGESTION

- 7.2.6. Congestion will reduce. Figure 34 shows visual representations (heat maps) of predicted congestion in 2038 (PM peak), showing the reduced intensity of congestion hotspots as a result of the Third River Crossing.

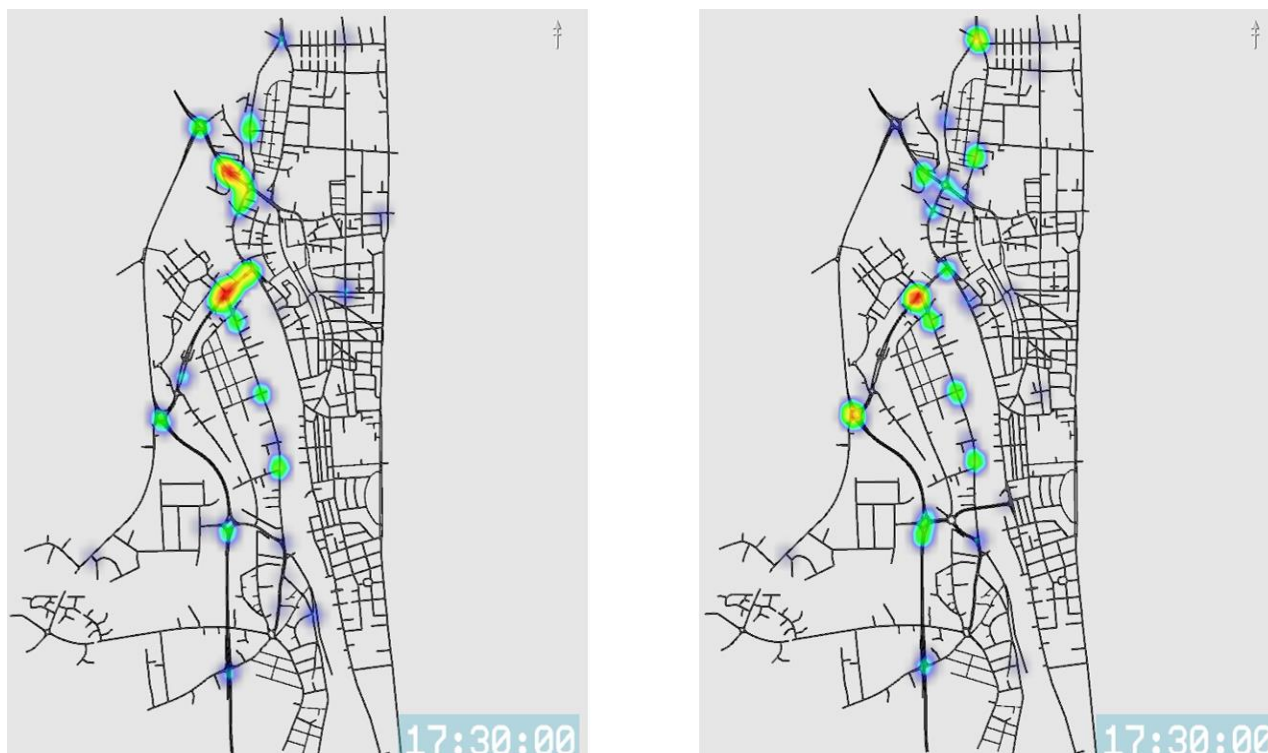


Figure 34 - Congestion hotspots 2038 PM peak in DM (left) and DS (right)

JOURNEY TIMES

- 7.2.7. Journey times on key routes will be reduced. Table 20 and Table 21 show the dramatic impact that the Great Yarmouth Third River Crossing will have on the times for journeys into the South Denes peninsula.

Table 20 - Forecast journey time savings (Gorleston to South Denes peninsula) 2023 AM peak

	Without scheme 2023 PM	With scheme 2023 PM	Time saving (minutes)
Gorleston to South Denes	16.00	8.06	7.54
South Denes to Gorleston	10.56	8.30	2.26

Table 21 - Forecast journey time savings (Gorleston to South Denes peninsula) 2023 PM peak

	Without scheme 2023 PM	With scheme 2023 PM	Time saving (minutes)
Gorleston to South Denes	15.27	8.01	7.26
South Denes to Gorleston	11.31	8.32	2.59

- 7.2.8. Journey time reliability will also be improved, as demonstrated in the OBC Economic Case, as a result of these changes in traffic flow.

TRAFFIC IN HISTORIC AREAS

- 7.2.9. Historic areas of the town will experience less traffic. Forecast changes in traffic on Haven Bridge and North and South Quay are set out in Table 22. Traffic will reduce significantly on the historic South Quay.

Table 22 - Forecast traffic changes near Haven Bridge PM peak (from SATURN model)

Traffic flow (2 way) PM peak	2023 DM	2023 DS	Difference %
North Quay	12,748	13,612	+7%
Haven Bridge	26,186	13,458	-49%
South Quay	26,610	15,332	-42%

ACCESSIBILITY

- 7.2.10. Vehicular access to South Denes and the Outer Harbour will be greatly improved, as the Third River Crossing will provide a much shorter route into the South Denes area for traffic from the SRN (A47).
- 7.2.11. Access for pedestrians and cyclists will be improved. The Third Crossing will provide a much more direct route for many trips. It will also be provided with excellent facilities for non-motorised modes
- 7.2.12. Accessibility plots (Figure 35 and Figure 36) show the significant improvement in accessibility for pedestrians and cyclists respectively.

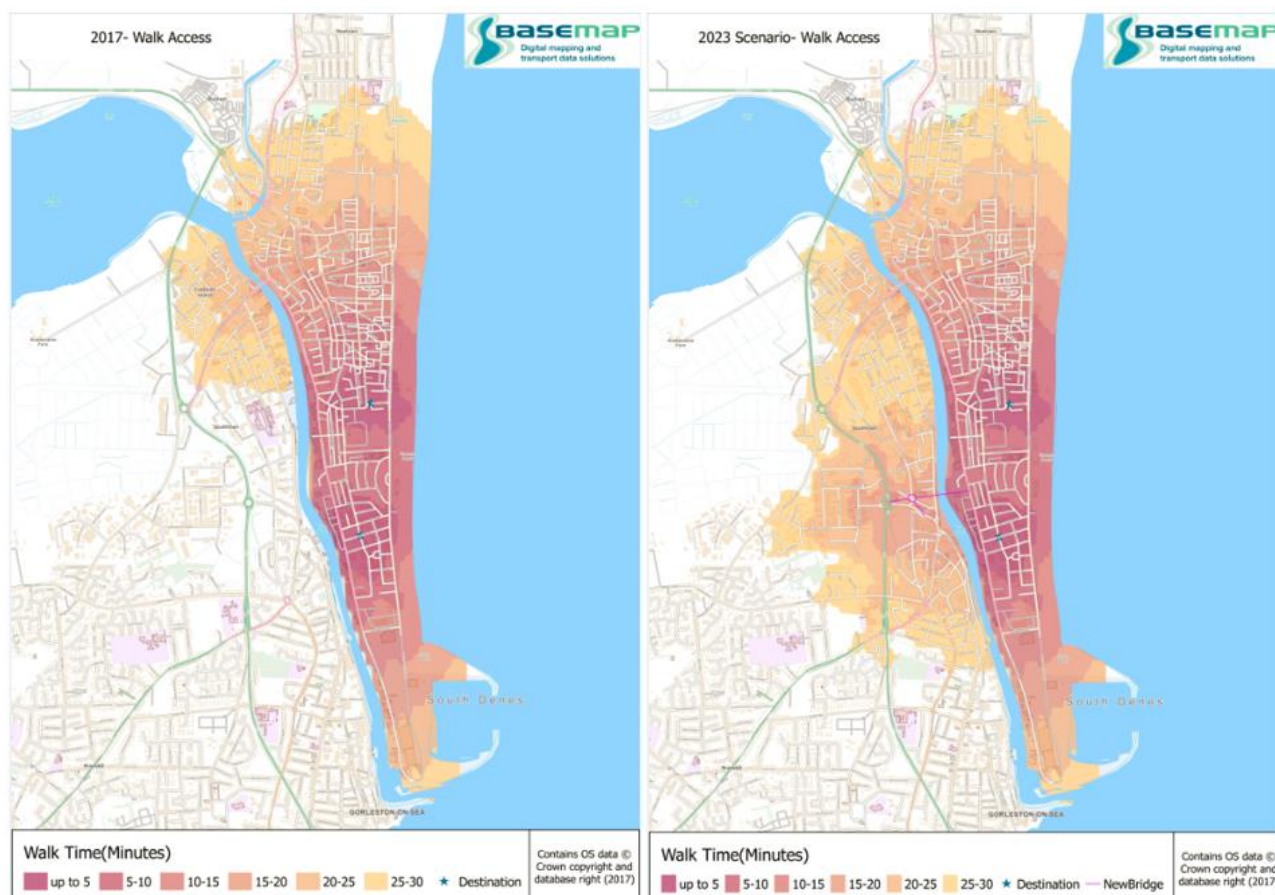


Figure 35 - Accessibility for pedestrians 2023 DM (left) and DS (right)

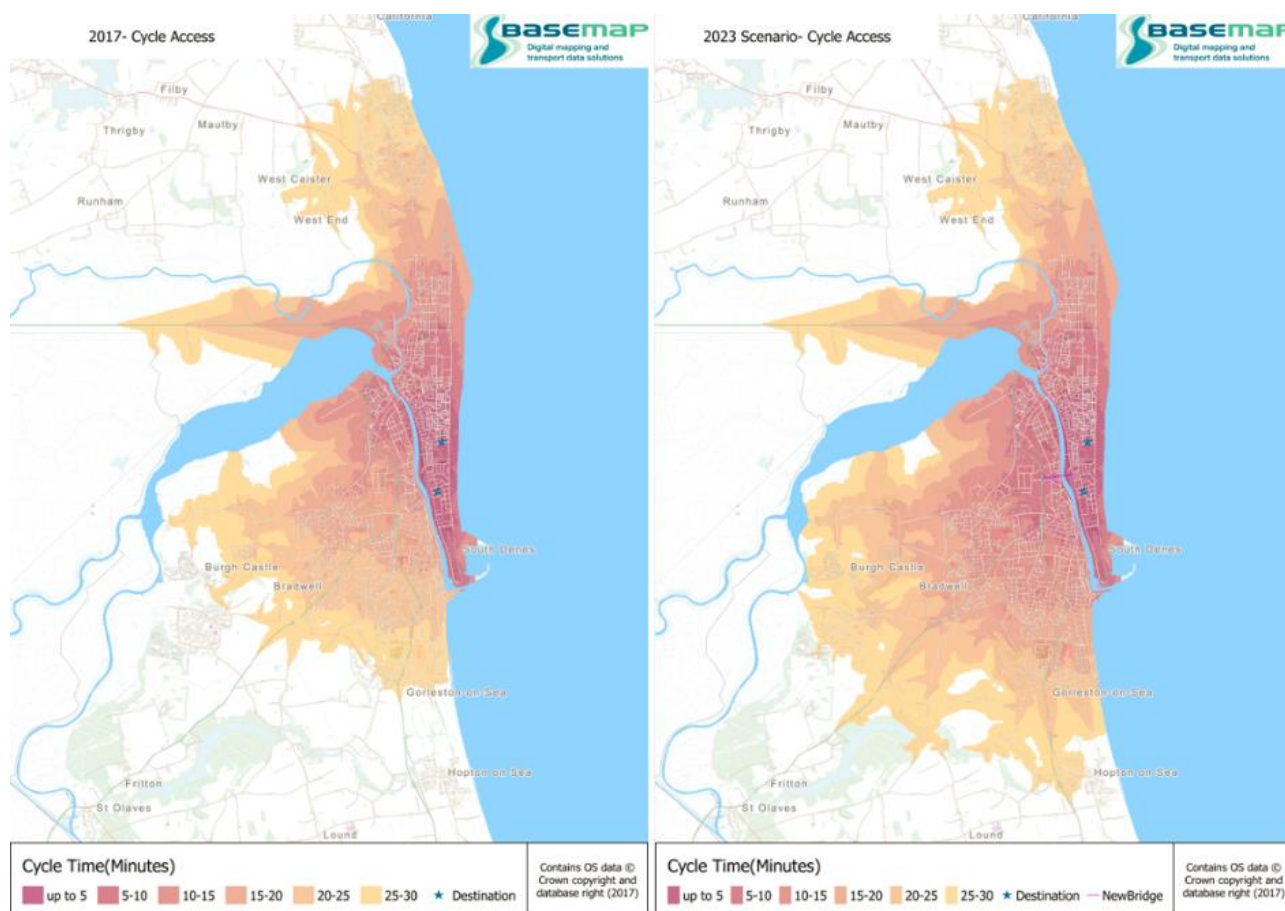


Figure 36 - Accessibility for cyclists 2023, DM (left), DS (right)

ACTIVE MODES IMPACTS

- 7.2.13. An Active Modes Appraisal (AMA) was undertaken as part of the work on the OBC. This used a DfT approved economic appraisal methodology to determine the changes in walking and cycling caused by the scheme, together with an assessment of the economic benefits, including health benefits.
- 7.2.14. The results are set out in detail in the Active Modes Appraisal Report (OBC Supporting document 10).
- 7.2.15. The AMA, which was based on the 2016 traffic model, estimated that 4,607 and 1,201 cyclists would use the scheme, including newly generated trips by active modes as a result of the new facility.
- 7.2.16. More information will be given in the full TA.

PUBLIC TRANSPORT IMPACTS

- 7.2.17. Bus users will benefit from:
- Less congestion on existing routes
 - New waiting facilities near the Third River Crossing
 - The opportunity to introduce new, more direct routes into the South Denes area

Road safety impacts

- 7.2.18. Road accidents will be reduced. In the OBC, this reduction was demonstrated using the DfT assessment tool, COBALT, which indicated that 269 casualties would be avoided by 2082 as a result of the scheme:
- 7.2.19. This calculation will be revised using the new modelling, but this is expected to show a similar level of benefits.

GREENHOUSE GASES

- 7.2.20. Greenhouse gas emissions will be reduced. In the OBC it was calculated that the present value of benefits associated with greenhouse gas reductions for the scheme over a 60 year assessment period would be £1.827 million (2010 prices discounted to 2010).
- 7.2.21. This calculation will be revised for the full TA using the new modelling, but this is expected to show a similar level of benefits.

RESILIENCE OF THE TRANSPORT NETWORK

- 7.2.22. The resilience of the local road network will be enhanced by the provision of additional capacity overall, reduced congestion and additional route options (for example when roads are closed due to incidents).

SUMMARY OF TRANSPORT RELATED IMPACTS: CONCLUSION

- 7.2.23. In summary, the scheme is expected to deliver on all of its specific objectives, in some cases with very large positive impacts.

8 MITIGATION OF TRANSPORT IMPACTS

- 8.1.1. Mitigation of any adverse impacts will be covered in the full TA.

9 RESIDUAL AND CUMULATIVE IMPACTS

- 9.1.1. Any residual and cumulative impacts will be identified in the full TA.



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