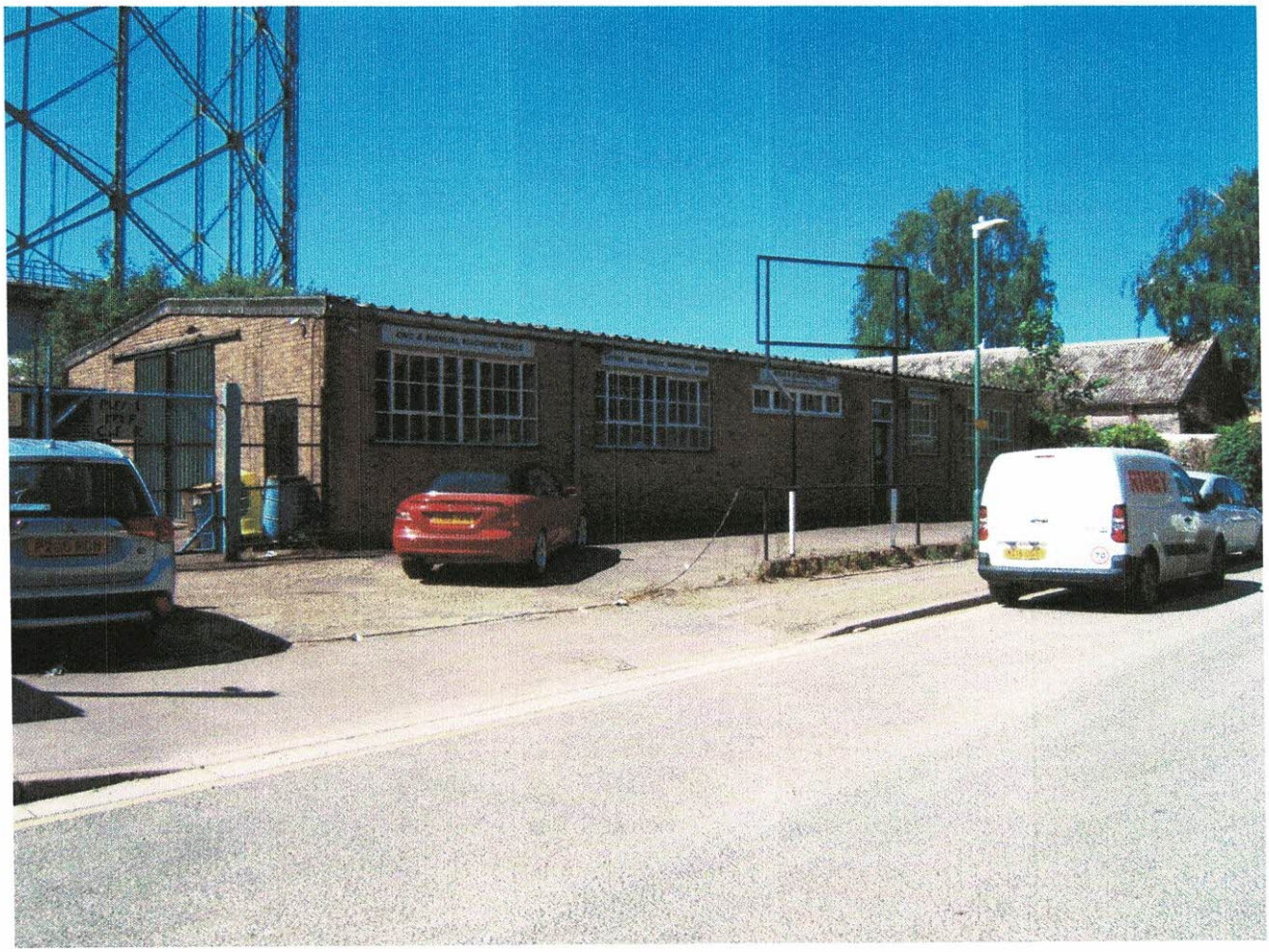
R. CARR GEOTECHNICAL SERVICES

Ref: 3771/20

PROPOSED REDEVELOPMENT AT 114-128 HYTHE STREET, DARTFORD, KENT DA1 1BN.

PHASE I GEO ENVIRONMENTAL DESK STUDY AND PRELIMINARY RISK ASSESSMENT



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Contents

114-128 Hythe Street, Dartford, Kent DA1 1BN.

1. Introduction

1.1 This report has been prepared on behalf of Skillcrown Homes Ltd, prospective developers of the site located at 114-128 Hythe Street, Dartford.

1.2 The proposed development comprises the demolition of existing buildings and the construction of one and two-bedroomed apartments with associated areas of vehicular parking. Marginal landscaping is scheduled along the south, east and west boundaries of the site and undercroft parking is proposed at ground floor level. A plan of the proposed development is shown in Fig 1.

1.3 The purpose of this report is to identify and quantify contaminative and environment related issues which could affect the development, site workers and future users of the site.

1.4 This report provides a review of the history of the site and its surrounding area together with an environmental risk check and preliminary risk assessment in general compliance with the following guidelines:

- Model Procedures for the Management of Land Contamination. Environment Agency Contaminated Land Report 11 (CLR 11)
- GPLC1- Guiding Principles for Land Contamination. Environment Agency 2010
- National Planning Policy Framework (NPPF) (2012)

2. Topography

2.1 The site is located to the west of Hythe Street at OS Land Ranger map reference TQ 542 745.

2.2 Ground surface at the site is of a relatively level contour.

3. Geology

3.1 Reference to the local Geological Survey sheet (no. 271, Dartford) has indicated that the site is located on an area of Alluvium. The Alluvium is in turn underlain by Taplow Gravel which overlies the Seaford member of the White Chalk subgroup (formerly referred to as the Upper Chalk).

3.2 Alluvial deposits typically comprise fine-grained sediments of geologically recent origin. Occupying river valleys and coastal flats, they are characterised by a high moisture content and may contain layers of highly compressible peat.

3.3 The Taplow Gravel comprises part of the post-diversionary Thames River Terrace sequence, being sandy and clayey in part.

3.4 The Seaford Chalk consists of soft, white, friable limestone that is 95% calcium carbonate and contains scattered nodular and tabular flint. The upper surface of the Chalk is often deeply convoluted and may contain solution pipes filled with more recent deposits.

4. Hydrology and Hydrogeology

4.1 The River Darent flows from southeast to northwest, approximately 100m to the northeast of the site.

4.2 Subject to its constituents the Alluvium is generally classified as a Non Aquifer. Such formations are generally regarded as containing insignificant quantities of groundwater.

4.3 The Taplow Gravel is classified as a Secondary Aquifer (Variably permeable). These can be fractured or potentially fractured rocks that do not have a high primary permeability, or other formations of variable permeability including unconsolidated deposits. Although not producing large quantities of water for abstraction, they are important for local supplies and supplying base flows to rivers. Soil Classification: Soils of High Leaching Potential (H1).

4.4 The Chalk is the Principal Aquifer of the area with high groundwater vulnerability. A Principal Aquifer is defined by the Environment Agency as a "highly permeable formation with known or possible presence of significant fracturing". These tend to be highly productive and capable of supporting public supply and other abstractions. Soil Classification: Soils of High Leaching Potential (U).

5. Site History

5.1 A search has been undertaken of historical Ordnance Survey Maps provided by the Kent County Archives and Promap websites. The following maps have been examined for the presence of on and off-site contamination, extracts of which are contained in Appendix A:

5.2 OS map scale 1:2500 1871-1890:

On site: The site is located close to Dartford town centre, being occupied by a row of terraced houses with rear gardens.

Off site: A public house is located adjacent to the south end of the site. Gas works with three gas holders are located within 25m to the west of the site. A railway passes roughly southeast to west, approximately 100m to the south. Wharfs are located alongside the River Darent, within 150m to the east and on an associated tributary, a similar distance to the northwest.

5.3 OS map scale 1:2500 1897--1902:

On site: No significant change.

Off site: The three gas holders to the west have been renewed and industrial buildings have been constructed at the northwest end of the works. Additional gas works containing one gas holder are denoted within 100m to the east of the site. A corn mill and associated mill pond are in evidence within 150m to the southeast.

5.4 OS map scale 1:2500 1907-1923:

On site: No significant change.

Off site: A tramway leading from Topia Road into into Hythe Street has been constructed within 50m to the south of the site. Two additional gas holders have been erected at the gas works to the east. A chimney is denoted on the north side of

the railway, approximately 100m to the south of the site.

5.5 OS map scale 1:2500 1929-1952

On Site: Houses formerly present at the north end of the site have been demolished, two buildings of commercial appearance having been constructed in its northwest corner.

Off Site: The tramway to the south has been removed. A large gas holder has replaced one of the smaller holders to the west and a tank is now in evidence in the northwest corner of the works. One of the gas holders formerly present within the works to the east has been removed, tanks being denoted at the north and south ends of the works.

5.6 OS map scale 1:10560 1966-1967:

On site: No significant change.

Off site: Buildings of commercial appearance have been constructed alongside the west boundary of the site. The gas works formerly present to the east of the site are no longer in evidence. Works are denoted within 50m to the east. Extensive works are also in evidence to the northwest and along the south side of the railway, within 200m from the site.

5.7 OS map scale 1:10000 1983-1995:

On site: No significant change.

Off site: Buildings of commercial appearance have been constructed on the adjacent land to the north of the site. Extensive commercial and industrial development has occurred within the area surrounding the site including on previously undeveloped land adjacent to the river approximately 200m to the north. The gas holders remain to the west, as does the mill pond to the southeast.

5.8 The site was purchased by the current owner in 1985 and has since been used for precision engineering and tool-making.

6. Environmental Information Search

6.1 A search of environmental information has been carried out for the site by Landmark

Information Group, who provide a database of environmental data. A summary of relevant information is provided as follows, full details of which are contained in Appendix C:

6.2 Potentially Contaminative Industrial Uses (Past Land Use)

Oil, petroleum, & gas refining & storage Map published date: 1898-1983	On site
Factory or works Map published date: 1949-1983	9m
Factory or works Map published date: 1949-1983	90m
Factory or works Map published date: 1949-1983	98m
Metal Casting /Foundries Map published date: 1898	126m
Machinery engines, building & general industrial [manufacture] Map published date: 1938	145m
Factory or works Map published date: 1961	156m
Machinery engines, building & general industrial [manufacture] Map published date: 1938	156m
Metal Casting /Foundries Map published date: 1898-1910	157m
Road Haulage Map published date: 1983	163m
Factory or works Map published date: 1949-1983	205m
Chemical Manufacturing General Map published date: 1910-1938	209m

6.3 Historical Tanks & Energy Facilities

Tanks Map published date: 1975	4m
Electrical Sub-Station Facilities Map published date: 1975	24m
Potential Tanks Map published date: 1975	45m
Potential Tanks Map published date: 1962	49m
Potential Tanks Map published date: 1961-1982	50m
Gas Industry Facilities Map published date: 1975	50m
Tanks Map published date: 1982	66m
Tanks Map published date: 1975	152m
Electrical Sub-Station Facilities Map published date: 1975	214m
Tanks Map published date: 1975	242m

6.4 Potentially Infilled Land (Water)

Unknown Flled Ground (Pond, marsh, river, stream, dock etc) Map published date:1961	200m
Unknown Flled Ground (Pond, marsh, river, stream, dock etc) Map published date:1961	224m

6.5 Incidents and Enforcements

Prosecution Relating to Authorised processes: 2004	111m
Enforcement and Prohibition Notice	68m

6.6 Landfill Sites

None identified within 250m of the site.

6.7 Registered Waste Treatment or Disposal Sites

Scrapyard with Transfer Station	49m

6.8 Environmental Permitting Regulations

Metal Recycling Site	181m

6.9 Local Authority Pollution Prevention and Controls

Waste Oil Burner	48m

6.10 Planning Hazardous Substance Consents

Storage of flammable substances (British Gas)	29m

6.11 Notification of Installations Handling Hazardous Substances (NIHS)

Transco	206m

6.12 Contemporary Trade Directory Entries

A large number of Contemporary Trade Directory Entries have been identified within the local area, those located within 100m of the site being listed below:

Machinery – Industrial & Commercial	On site
Precision Engineers	On site
Carpet, Curtain & Upholstery Cleaners	20m

Car Breakdown & Recovery Services	27m
Precision Engineers	22m
Concrete Contractors	22m
Air Conditioning Equipment & Systems	45m
Garage Services	46m
Concrete & Mortar Ready Mixed	49m
Builders' Merchants	38m
Pumps – Sales, Servicing & Repairs	38m
Exhaust & Shock Absorber Centres	50m
Garage Services-	52m
Garage Services	51m
Ceramic Manufacturers, Supplies and Services	82m
Scrap Metal Merchants	84m
Nuts, Bolts & Fixings	84m
Precision Engineers	96m
Chemical Engineers	90m
Metal Products – Fabricated	96m
Precision Engineers	96m

6.13 **Flooding**

A potential risk of surface water flooding has been identified to the site.

6.14 **Energy & Infrastructure**

The site is located within 4km of existing or proposed wind farms or wind turbines.

6.15 **Radon**

Radon Potential	Intermediate Probability
Radon Protection Measures	None required

7. Site Inspection

7.1 An inspection of the site was undertaken on 5th May 2020 during dry, sunny weather conditions.

7.2 The site was located on the west side of Hyuthe Street within an industrial setting to the north of Dartford town centre. A former gas works was situated within the adjacent site to the west, where the steel frame of a gas holder remained. The Hufflers Arms public house was located adjacent to the south end of the site and a timber yard was present to the north, being separated from the site by a narrow strip of waste ground which had previously formed an entrance into the gas works. Extensive residential development in the form of apartment blocks was in progress on former industrial land along the opposite east side of Hythe Road.

7.3 The site was roughly rectangular in shape, steel railings set in a dwarf brick wall forming its front boundary alongside Hythe Street (Plate 1). The west side of the site was occupied by a single storey brick building under a corrugated asbestos-cement roof. Ground surface along the front of the building comprised a 4m wide strip of tarmac coated concrete which provided limited parking, vehicular access into the site being gained via a padlocked chain in between the steel railings.

7.4 A pair of padlocked steel gates located in the southwest corner of the site secured the entrance of a small concrete-surfaced yard at the south end of the building (Plate 2).

7.5 Entry into the building was gained via the former customer entrance located half-way along its front elevation, a small office and reception area being present to the north of the entrance corridor.

7.6 The building comprised a former precision-engineering workshop which was in the process of being cleared out. A small store was located in its northeast corner, staff toilets being situated centrally on its east side. Timber work benches and shelves were positioned alongside the east elevation at the south end of the building. The building was underlain by a concrete floor of a rather greasy appearance but with no

observed evidence of significant staining in its exposed areas. Numerous boxes of machine parts, hand tools, disconnected electrical machinery and trolley jacks were present on the floor of the building and on the work benches (Plate 3 and Plate 4).

7.7 A strip of overgrown land approximately 1m in width was present along the west elevation of the building a brick wall approximately 1.5m in height forming the site's west boundary (Plate 5). A discarded timber pallet was leaning against the wall.

7.8 The north boundary of the site was formed partly by the end of the building and a 2m high section of chain-link fencing with adhering vegetation.

7.9 The small yard was accessed via a pair of timber doors located at the south end of the building, a partially filled skip being present in its central area and three empty oil drums being present near the steel gates (Plate 6). A small timber lean-to under a corrugated steel roof was located at the west end of the yard, discarded pieces of timber and steel trestles being stored within the structure.

7.10 The south section of the site supported a smaller, single-storey rectangular building of brick, block and steel frame construction under a corrugated steel roof. Access into the building was gained from its north elevation via the yard. The building similarly comprised a former tool-making workshop which was also in the process of being cleared out. A small toilet facility was located within the southwest corner of the building and timber workbenches and shelves were positioned along its north elevation. Office chairs, hand tools and disconnected electrical machinery remained within the building, together with a fork-lift vehicle (Plate 7 and Plate 8). The concrete floor of the building also displayed a slightly greasy appearance with no evidence of significant spillages.

7.11 The south elevation of the building formed the site boundary, alongside the grounds of the adjacent public house.

7.12 The site has been used for the purpose of precision engineering though no visual or olfactory evidence of significant contamination was observed at the time of the site inspection.

8. Conceptual Site Model

8.1 Base upon the available information the site would appear to have contained terraced houses from the commencement of Ordnance Survey mapping until its redevelopment for commercial purposes around the middle of the twentieth century. The site currently has until recently contained a precision engineering business and an industrial tool maker. Extensive industrial activity including adjacent gas works has occurred within the surrounding area. The gas works have been identified by the Landmark report as formerly encroaching onto the site itself though this is not apparent on the examined historical maps and may be due to some confusion over the site boundary. An area of compressible Alluvium underlies the site. The Alluvium is underlain by a Secondary Aquifer and underlying Major Aquifer. A risk of surface water flooding has been identified to the site. The site itself is therefore considered to pose a moderate risk to human health, groundwater and plants from the following on-site sources of potential contamination:

- Residual inorganic and organic contamination resulting from the site's industrial use e.g. toxic metals, polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons (PAH),volatile organic compounds (VOC), semi-volatile organic compounds (SVOC)
- Made ground present beneath existing site surfacing possibly containing metals, polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons (PAH) and asbestos
- Localised TPH contamination due to leakages of lubricants from parked vehicles
- Asbestos-containing materials present within the fabric of the existing buildings

8.2 A large number of contemporary and historic industrial activities and installations have been identified within 250m of the site, the most significant being the gas works within the adjacent site to the west. A moderate to high risk has therefore been identified to the site from off-site sources of potential contamination and in particular the gas works. Typical contaminants associated with gas works include:

- Various metals, PAH and phenols

8.3 No domestic landfill sites containing bio-degradable material have been identified within 250m of the site and radon protection measures are not required within the design of the proposed development. Infilling of watercourses adjacent to the river to the north of the site during the 1960's prior to commercial development is unlikely to have comprised significant quantities of bio-degradable material. CIRIA report c665 states that gas generation on infilled land would be insignificant by thirty years and minimal by fifty years therefore any gas generated during decomposition would have peaked and be in decline. A low to moderate risk has therefore been identified from both on and off-site emissions of ground gases.

9. Preliminary Risk Assessment

9.1 A preliminary risk assessment has been defined utilising the available information. The risk from possible sources of contamination identified in section 8 to receptors including the public, workers, future users and environment has been analysed using the Source – Pathway – Receptor model approach. The main receptors considered in the following assessment are:

- Future users
- Occupants of surrounding buildings
- Groundwater and associated abstractions
- Site workers
- Building fabric
- Plants

Source	Hazard	Receptor	Pathway	Severity of impact	Risk	Action required to clarify and define mitigation, if necessary
Organic contaminants as a result of on-site engineering processes, surrounding industries and made ground e.g. PAH, TPH, VOC, SVOC, Phenols	Toxic and carcinogenic	Future Users	Inhalation, ingestion and skin contact	Serious	Moderate to high	Site investigation to clarify degree of risk. Removal of contaminated soil, if necessary.
		Adjoining site occupiers	Ditto	Moderate	Low	Minimise dust, avoid spillages.
		Site workers	Ditto	Serious	Low to moderate	Provision of appropriate protective clothing and equipment.
		Groundwater Drains & surface water	Leaching, permeable strata, drainage	Serious	Moderate to high	Site investigation to determine proximity of groundwater. Appropriate precautions with storage of contractor's fuel and lubricants during development.
	Attack on plastic or rubber	Building Services and Fabric	Leaching and diffusion	Serious	Moderate to high	Soil testing to confirm degree of risk. Use of upgraded services if necessary.
Inorganic contaminants as a result of on-site engineering processes, surrounding industries and made ground e.g. arsenic, lead, etc.	Zootoxic	Future users	Inhalation, ingestion and skin contact	Serious	Moderate to high	Site investigation to clarify degree of risk. Removal of contaminated soil, if necessary.
		Local residents	Ditto	Moderate	Low	Minimise dust where possible
		Site Workers	Ditto	Moderate	Low to moderate	Provision of protective clothing/equipment. Minimise dust.
		Groundwater	Leaching, permeable strata, groundwater	Serious	Moderate to high	Appropriate precautions with surface water drainage in areas of vehicular parking to safeguard groundwater.
Phytotoxic metals e.g. copper, zinc.	Phytotoxic	Plants	Uptake	Serious	Moderate to high	Removal of contaminated soil in garden areas and replacement with clean topsoil
		Groundwater	Leaching, permeable strata, groundwater	Serious	Low	Appropriate precautions with surface water drainage in areas of vehicular parking to safeguard groundwater.
Asbestos	Carcinogenic and Respiratory Irritant	Future Users	Air inhalation	Serious	Low to moderate	Removal and disposal by experienced contractor if found to be present within existing buildings.
		Adjoining site occupiers	Ditto			
		Site workers			Low	
Ground gases e.g. methane, carbon dioxide.	Asphixiant, explosive	Future Users	Service ducts	Serious	Low to moderate	No biodegradable landfill sites identified within 250m No radon protection measures necessary within development. Period of monitoring to define characteristic situation of site.
		Adjoining site occupiers Site workers	Air inhalation			

10. Discussion/Recommendations

10.1 Part IIA of the Environment Protection Act 1990 defines contaminated land as: "any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land that:-

a) significant harm is being caused or there is a significant possibility of such harm being caused, or;

b) pollution of controlled waters is being, or is likely to be, caused

"Harm" means harm to the health of living organisms or other interference with the ecological systems of which they form part, and in the case of man, includes harm to his property.

10.2 There are two steps in applying the definition of contaminated land:

1) Identification of a "contaminant", a "pathway" (or pathways) and a "receptor" with respect to the land in question.
2) Identification of a pollutant linkage and that the pollutant linkage:
    a) is resulting in significant harm being caused to the receptor in the pollutant linkage.
    b) presents a significant possibility of significant harm being caused to that receptor.
    c) Is resulting in the pollution of controlled waters
    d) Is likely to result in such pollution.

10.3 Under the Groundwater Regulations Act 1998, it is an offence to allow List I substances to enter groundwater. It is also an offence to allow List II substances to enter groundwater without prior consultation with the local authority.

10.4 Based on the information currently available a moderate risk has been identified to the site from sources of contamination resulting from the site's previous use. A moderate to high risk is considered applicable from off-site sources of contamination, particularly the adjacent gas works. An intrusive investigation involving trial pits or boreholes carried out with a window sampler is therefore recommended followed by laboratory testing of soil samples for the presence of metals, hydrocarbon fractions, speciated polyaromatic hydrocarbons (PAH), volatile

and semi-volatile organic compounds (VOC and SVOC), phenols and presence of asbestos. The investigations should include areas of proposed landscaping within the development. Deeper boreholes should also be undertaken for geotechnical purposes as piled foundations are likely to be necessary for the development together with a period of gas monitoring in order to characterise the site.

10.5 Any asbestos-containing material discovered within the existing buildings should be removed by an experienced contractor and disposed of at an appropriately licensed waste facility.

10.6 This report should be made available to the Contaminated Land Officer of the Local Planning Authority for due consideration prior to the commencement of the development.

R. Carr BA (Hons) FGS
May 2020

114-128 Hythe Street, Dartford.

Fig 1. Plan of Proposed Development.

Plate 1

Plate 2

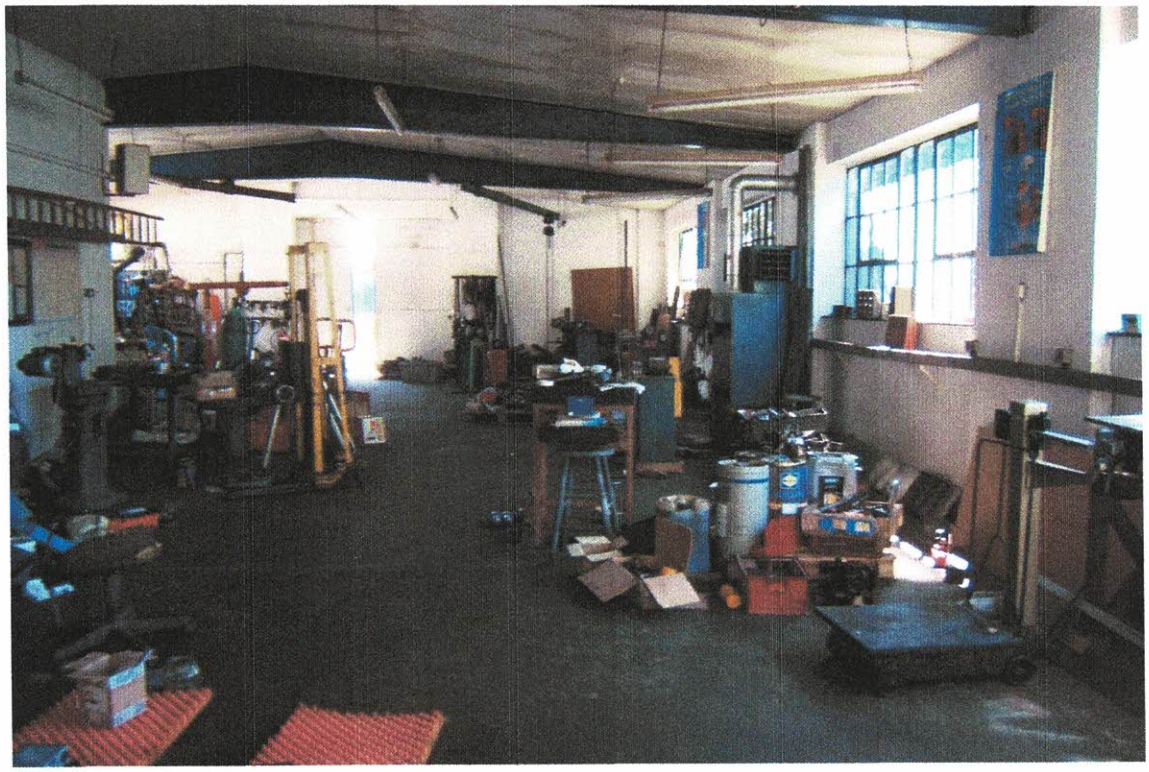


Plate 3

Plate 4

Plate 5

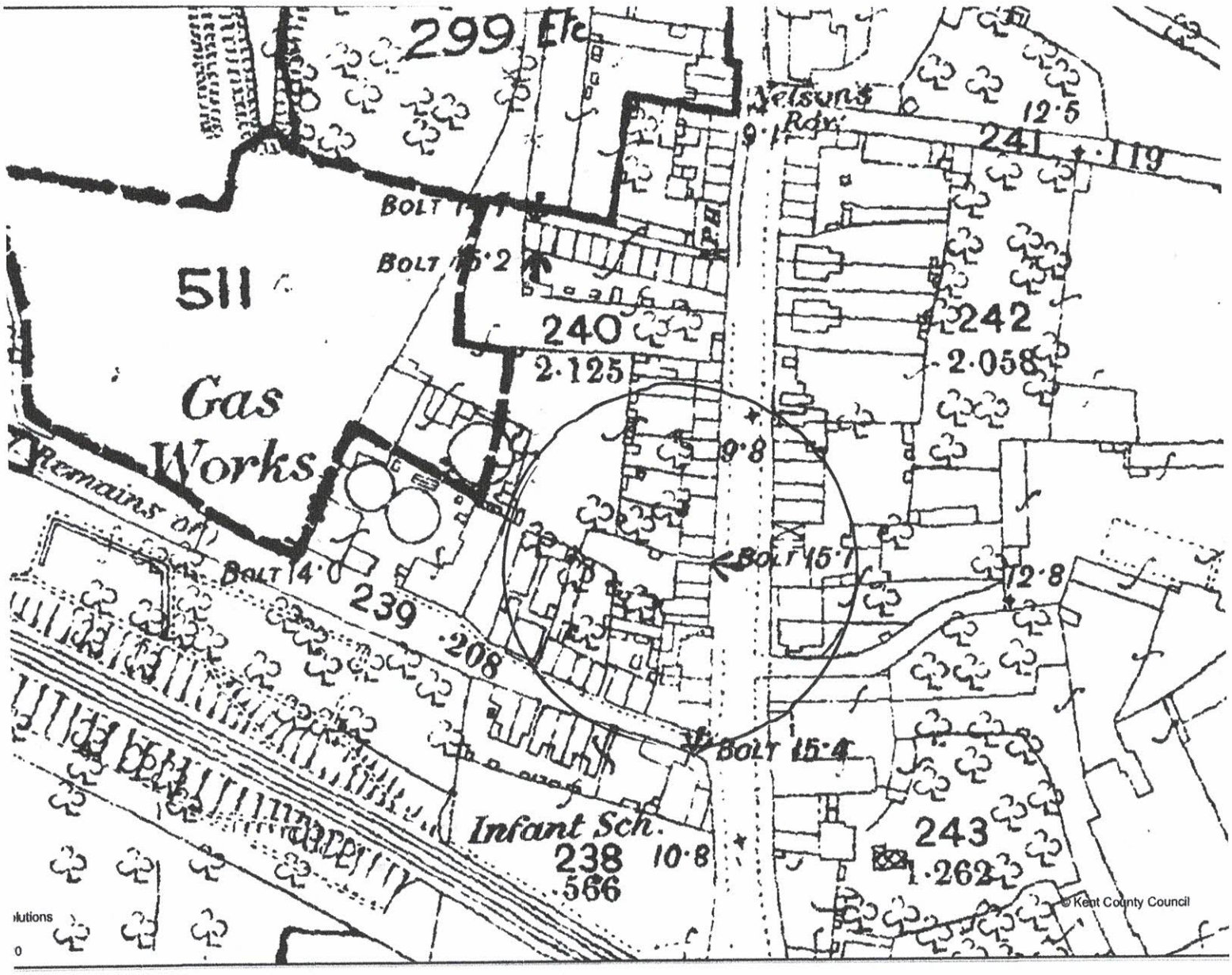
Plate 6

Plate 7

Plate 8

Appendix A

Site History



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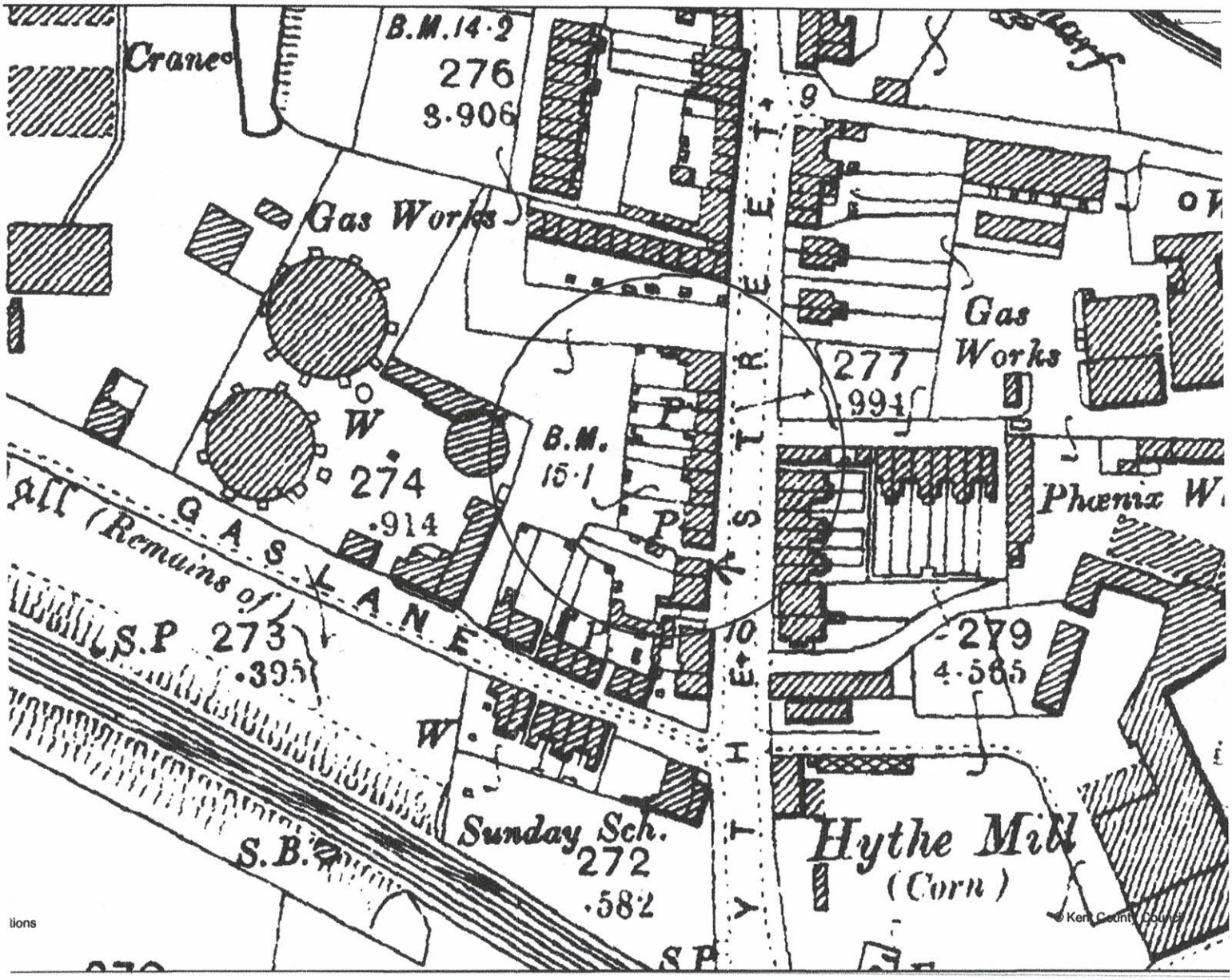

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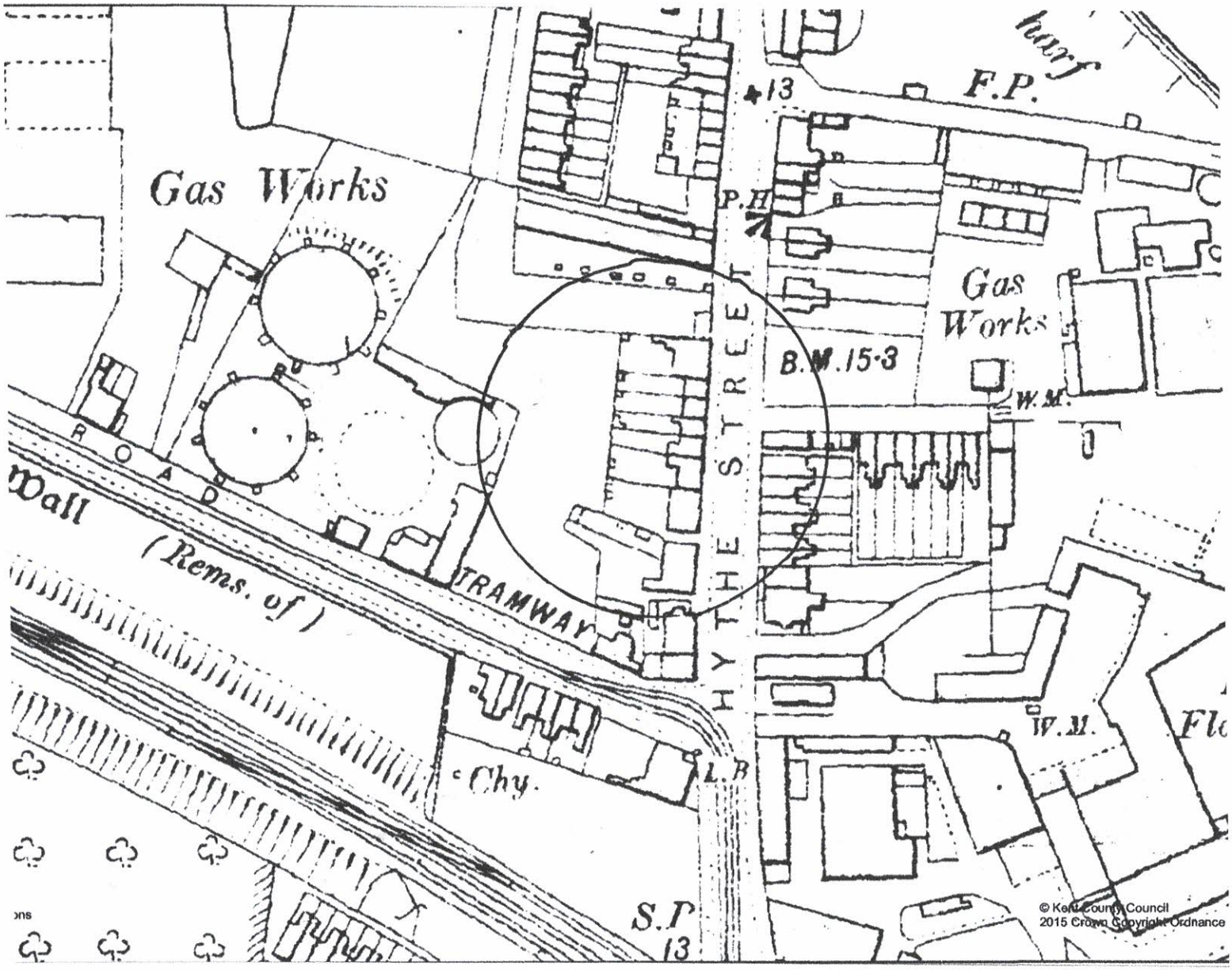

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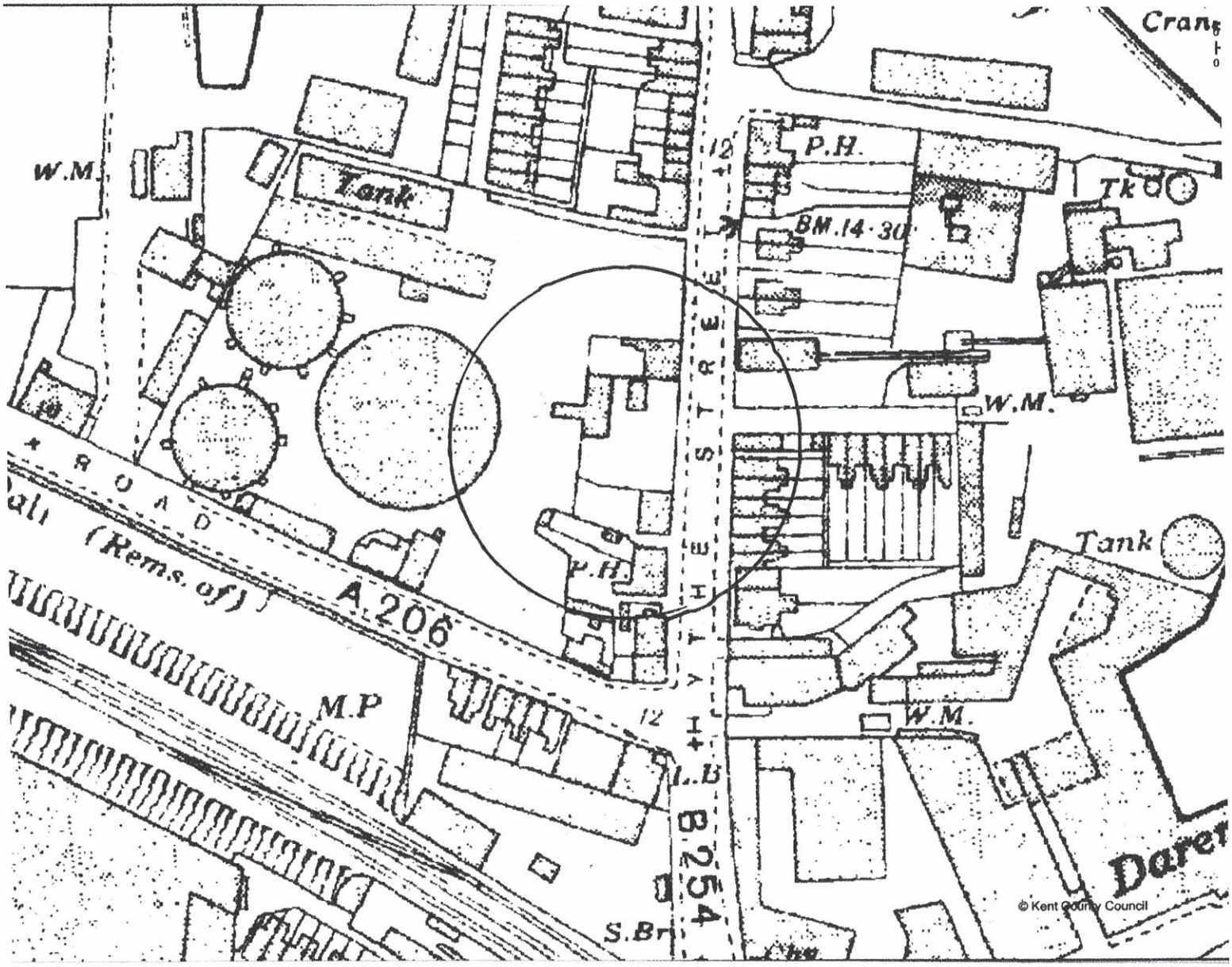

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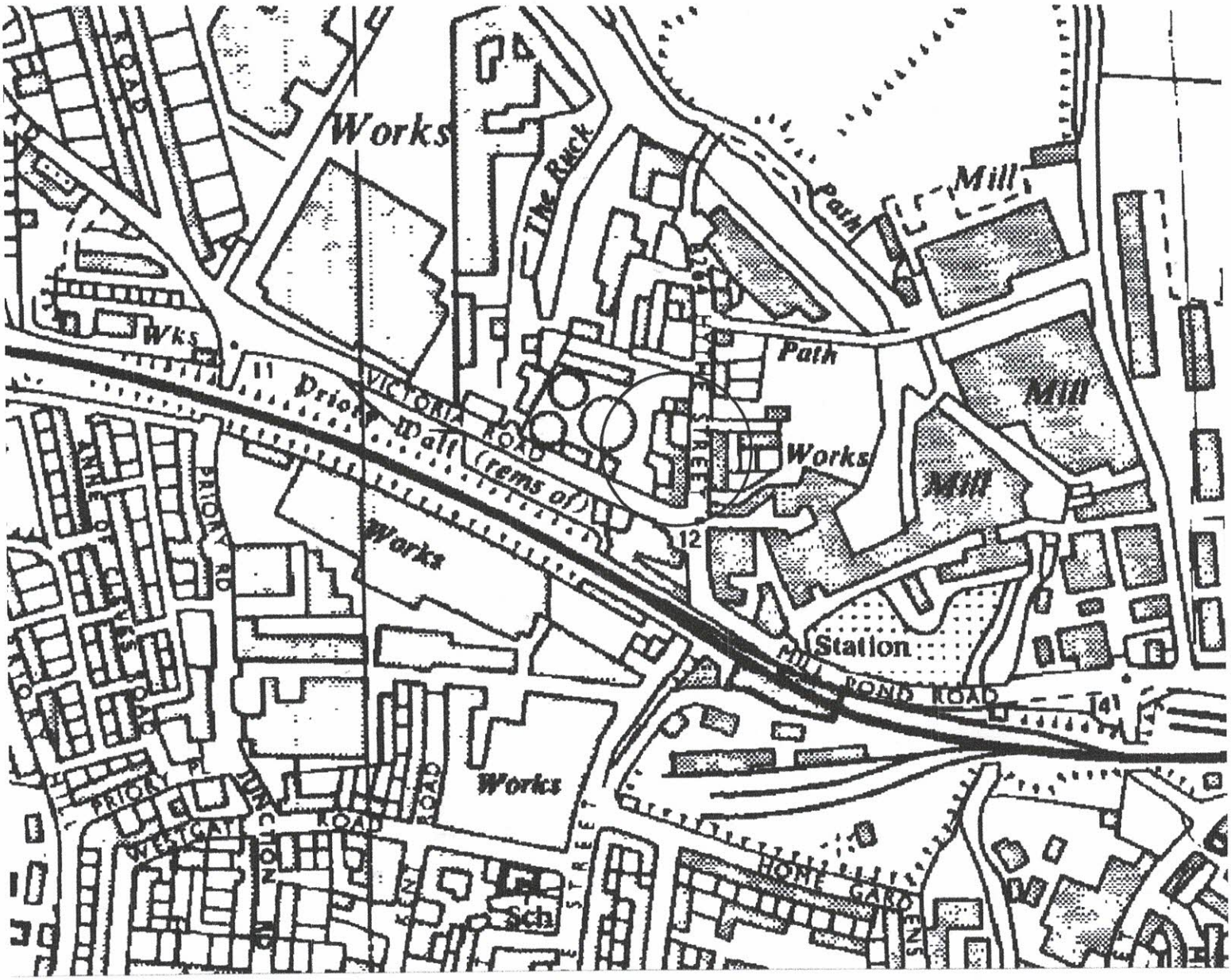

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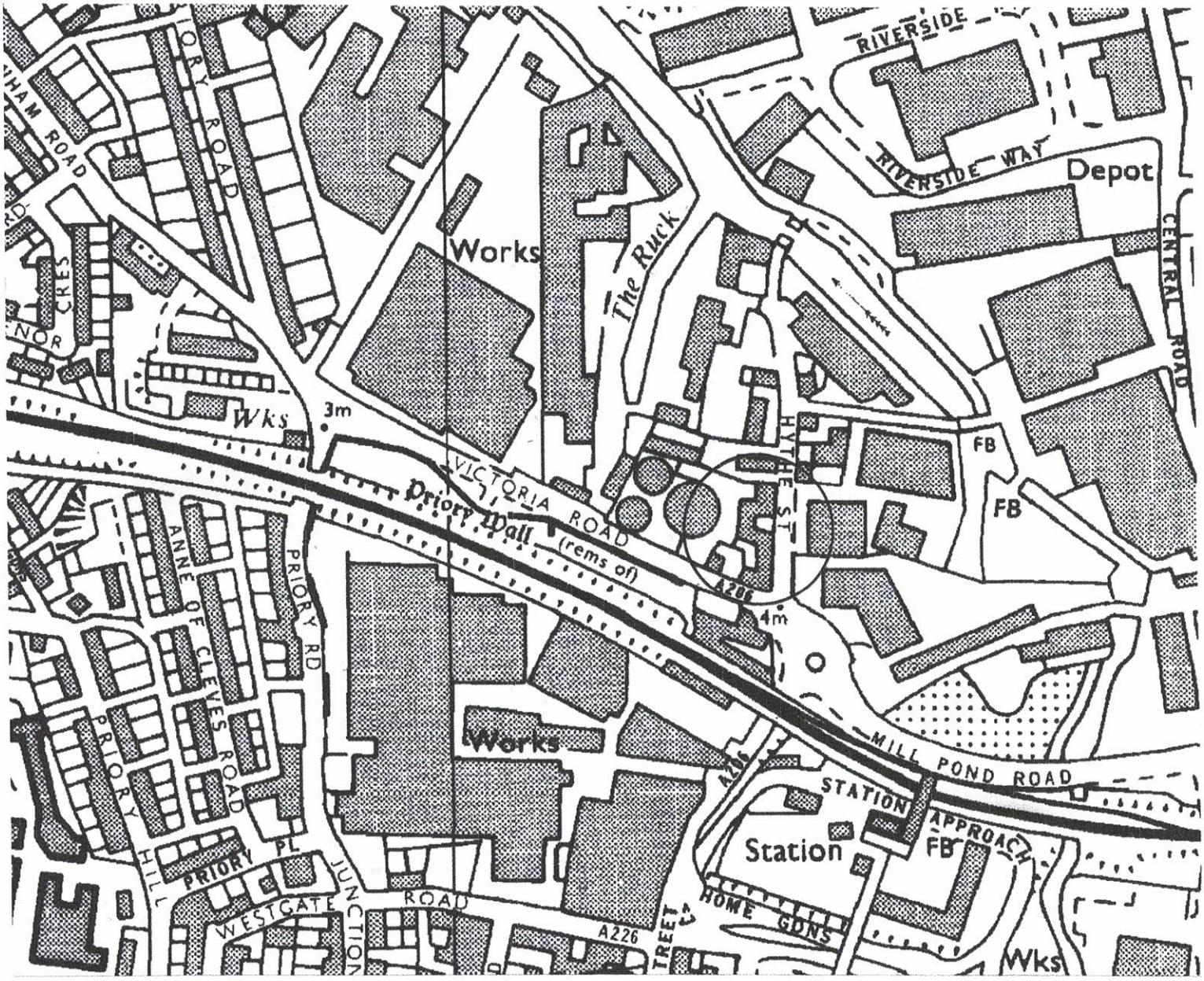

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