

R. CARR GEOTECHNICAL SERVICES

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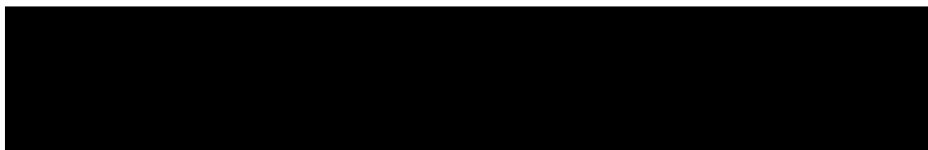
**PROPOSED REDEVELOPMENT AT
SALEM YARD, SALEM PLACE,
NORTHFLEET, KENT DA11 9QA.**

**PHASE I GEO ENVIRONMENTAL DESK STUDY
AND PRELIMINARY RISK ASSESSMENT**



December 2016

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Fig 1

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Appendix A Site History

Appendix B Environmental Information Search

Salem Yard, Salem Place, Northfleet, Kent DA11 9QA.

1. Introduction

- 1.1 This report has been prepared following receipt of instructions from Mr G Robinson representing Creatside Ltd, prospective developers of the site known as Salem Yard, Salem Place, Northfleet.
- 1.2 The proposed development comprises a detached dwelling with associated areas of garden and vehicular parking(Fig 1).
- 1.3 The purpose of this report is to identify and quantify contaminative and environment-related issues that 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.

2. Topography

- 2.1 The site comprises a roughly rectangular area of land located to the north of Salem Place (OS Land Ranger map reference TQ 625 739).
- 2.2 At this point, ground surface 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 upon an area of the Seaford Chalk member of the White Chalk subgroup (formerly referred to as the Upper Chalk).
- 3.2 The White 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 overlying

tertiary deposits.

4. Hydrology and Hydrogeology

- 4.1 A flooded former quarry is located approximately 300m to the southwest of the site.
- 4.2 The Chalk is the Major Aquifer of the area. A Major 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 on historical Ordnance Survey Maps obtained from Kent County Council Archives and Landmark websites. The following maps have been studied for sources of potential on and off-site contamination, extracts of which are contained in Appendix A:
- 5.2 OS map scale 1:1250 1871-1890:
On site: The site comprises the rear garden of a semi-detached dwelling. A rectangular outbuilding is located in its northwest corner.
Off site: The site is located within a residential area and is enclosed by the gardens of neighbouring properties. A chalk quarry containing a rifle range is located within 250m to the north and a railway is in evidence within 500m to the south.
- 5.3 OS map scale 1:1250 1897-1900:
On site: No significant change.
Off site: Additional residential development has taken place within 50m to the north of the site. A brewery is denoted within 250m to the southeast. Brickworks are denoted within the chalk quarry to the north. An additional chalk pit is in evidence to the west.

5.4 OS map scale 1:1250 1907-1923:

On site: No significant change.

Off site: The brewery remains to the southeast. The quarry to the west has fallen into disuse.

5.5 OS map scale 1:1250 1929-1952:

On site: No significant change.

Off site: The brewery has been converted to use as a hall. The former quarry to the west now supports allotment gardens. An additional chalk pit is in evidence within 500m to the southeast.

5.6 OS map scale 1:1250 1960-1972:

On site: No significant change.

Off site: Industrial buildings and railways have been constructed within the former quarry to the north and at the north end of the quarry to the west.

5.7 OS map scale 1:10000 1980:

On site: The building previously located within the site's northwest corner is no longer in evidence.

Off site: The railway within the former quarry to the north has been dismantled. Industrial buildings remain within the quarries to the north and the northwest.

5.8 It is understood that the site was acquired by the current owners during February 2016, since when it has been used for storage prior to confirmation of planning consent. Information regarding the recent history of the site is rather unclear, though it is understood that an amateur boat-builder had previously occupied the site.

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 B:

Waste Management/Landfill Sites

- 6.2 One BGS Recorded Landfill Site has been identified between 250m and 500m to the south of the site (Springhead Road).
- 6.3 Three Registered Landfill Sites have been identified between 250m and 500m to the southeast and south of the site, one of which refers to the above site at Springhead Road site and two of which refer to the same site at Dudley Road).

Discharge Consents

- 6.4 One Discharge Consent has been identified between 0m and 250m to the northwest of the site (sewage discharge).

Industrial Processes

- 6.5 Two Integrated Pollution Controls have been identified between 250m and 500m to the north of the site (paper & pulp manufacturing [2]).
- 6.6 Seven Environmental Permitting Regulations have been identified between 250m and 500m to the north and northeast of the site (Integrated Pollution Prevention & Controls [7]).

Potentially Contaminative Uses

- 6.7 Twenty potentially contaminative uses have been identified from current published surveys between 0m and 250m to the north, east, southeast, east and northwest of the site (hygiene & cleansing services; car engine tuning & diagnostic services; car dealers [8]; wrought ironwork; carpet, curtain & upholstery cleaners [2]; art restoration & picture cleaning; car body repairs [2]; garage services [3] car customisation & conversion specialists).
- 6.8 Fifteen potentially contaminative uses have been identified from current published surveys between 250m and 500m to the east, northwest and southeast of the site

(scaffolding & work platforms; garage services [4]; car breakers & dismantlers [2]; commercial vehicle servicing; office furniture & equipment; mirrors & decorative glass; commercial vehicle dealers [2]; waste disposal services; car body repairs; gas suppliers)..

BGS Recorded Mineral Sites

- 6.9 Two BGS Recorded Mineral Sites have been identified between 0m and 250m to the north and west of the site (The Hill Brick Works; Northfleet Chalk Pit – both ceased).
- 6.10 Five BGS Recorded Mineral Sites have been identified between 250m and 500m to the south, northwest, southeast, southwest and west of the site (Northfleet Chalk Pit [5] – all ceased).

Historical Tanks & Energy Facilities

- 6.11 Four electrical sub-station facilities and tanks have been identified from analysis of historical Ordnance Survey maps between 0m and 250m to the northeast, north and south of the site (1953-1973).
- 6.12 Twenty-one electrical substation facilities, potential tanks and tanks have been identified from analysis of historical Ordnance Survey maps between 250m and 500m to the south, northwest, southwest, north, southeast, west, and northeast of the site (1953-1975).

Potentially Contaminative Uses (Past Land Use)

- 6.13 Seven potentially contaminative industrial uses have been identified from analysis of historical Ordnance Survey maps between 0m and 250m to the west, north northwest and northeast east of the site (quarrying of sand & clay, operation of sand & gravel pits [2]: 1869-1946: clay bricks & tiles [manufacture]: 1898-1910; paper packaging products [manufacture]: 1991; railways [2]: 1946-1991; military land: 1869).

- 6.14 Twenty-two potentially contaminative industrial uses have been identified from analysis of historical Ordnance Survey maps between 250m and 500m to the northwest, southwest, northeast, west, southeast, north and east of the site (quarrying of sand & clay, operation of sand & gravel pits [7]: 1869-1946: railways [4]: 1872-1991; factory or works: 1991 [3]; mineral railway [2]: 1923 & 1961; cement, lime & plaster products [2]: 1898-1946; clay bricks & tiles [manufacture]; paper packaging products [manufacture]: 1946-1961; transport manufacturing & repair: 1869; heap, unknown constituents: 1991).

Potentially Infilled Land (Non-water)

- 6.15 One area of potentially infilled land has been identified from analysis of historical Ordnance survey maps between 0m and 250m to the north of the site (pit, quarry etc. 1991).
- 6.16 Five areas of potentially infilled land have been identified from analysis of historical Ordnance survey maps between 250m and 500m to the northwest, southeast and east of the site (pit, quarry etc. 1991).

Pathways and Receptors

- 6.17 The site is located within an Area of Groundwater Vulnerability.

Flooding

- 6.18 The site is located within 250m of an area susceptible to Extreme Flooding from Rivers or Sea without Defences.
- 6.19 The site is located within 250m of an area Benefiting from Flood Defences.

Environmentally Sensitive Receptors

- 6.20 A surface water feature has been identified 323m to the south west of the site.

- 6.21 The site is located within Source Protection Zones Type: Zone I (Inner Protection Zone), Zone II (Outer Protection Zone) and Zone III (Total Catchment).
- 6.22 One water abstraction has been identified between 0m and 250m to the northeast of the site (industrial abstractions).
- 6.23 Twenty-four water abstractions have been identified between 250m and 500m to the northeast, south, southwest and northeast of the site (industrial and agricultural abstractions).

Other Factors

- 6.24 The site is located within an area of conclusive Rock Mining.
- 6.25 Man-made cavities have been identified between 250m and 500m to the north and northeast of the site.
- 6.26 The site is within a lower probability radon area, therefore radon protection measures are not considered necessary within the development.
- 6.27 The site is within an area where there is a very low potential for collapsible ground stability hazards.
- 6.28 The site is within an area where there is a moderate potential for ground dissolution stability hazards.
- 6.29 The site is within 250m of an area where there is a very low potential for landslide ground stability hazards.
- 6.30 The site is within 250m an area where there is a moderate potential for running sand ground stability hazards.

7. **Site Inspection**

- 7.1 An inspection of the site was undertaken on 15th December 2016 in the company of Mr Robinson.
- 7.2 Access into the site was gained via a pair of padlocked wooden gates located on the southwest corner of the site (Plate 1).
- 7.3 The site comprised a relatively small, rectangular parcel of land measuring approximately 190m² in surface area. Brick and block walls varying between 1.5m and 2.5m in height enclosed the site, the gardens of neighbouring dwellings being located beyond the north and east boundaries. Various trees and shrubs including Cherry and Holly were present within the neighbouring garden to the north. Several corrugated asbestos-cement sheets were stacked alongside the north boundary wall. A concrete drive providing vehicular access to the private garages of neighbouring dwellings passed alongside the site's west boundary, whereas a public footpath was located alongside the south boundary of the site.
- 7.4 The site surface consisted entirely of concrete. A single storey brick building divided into two sections under a corrugated steel roof occupied the east section of the site (Plate 2). A small kitchen area was located at the rear of the structure. The building was currently being utilised for the storage of hand tools, timber sheets, plastic pipes and a portable scaffolding tower (Plate 3 & Plate 4).
- 7.5 The central area of the site supported a lean-to constructed from timber and corrugated plastic sheeting. Two waste bins, plastic water pipes and a pile of logs were stored within the structure (Plate 5).
- 7.6 A motor vehicle belonging to one of the site's current owners was parked on the west section of the site, to the rear of which was located a covered inspection pit (Plate 6). Mr Robinson confirmed that the sides and base of the pit were constructed from concrete and that it had been partially infilled with rubbish.
- 7.7 No evidence of significant hydrocarbon staining was observed on the exposed areas

of concrete surfacing at the time of the inspection.

- 7.8 The site was located within a mainly residential area containing residential properties of varying age. A private car park serving adjacent self-contained flats was present to the south of the adjacent public footpath. To the north of the site a historic public house was situated within 150m, beyond which an extensive industrial complex occupied the base of the former quarry.

8. Conceptual Site Model

- 8.1 Based upon the available information, the site would appear to have comprised a domestic garden from the mid-nineteenth century until the latter part of the twentieth century, when it was apparently occupied by an amateur boat-builder. The presence of a vehicle inspection pit on the west section of the site implies that vehicle servicing may have been undertaken at some point in the more recent history of the site, though if this was indeed the case the size of the existing buildings is indicative that it was only likely to have been on a small scale, or simply for private use. Twenty-five water abstractions have been identified within 500m of the site, though these relate to industrial and agricultural abstractions rather than potable water supplies.
- 8.2 On-site sources of potential contamination identified to the site include:
- Petroleum hydrocarbon contamination (TPH) as a result of leakages and accidental spillages of fuel and lubricants during vehicle servicing
 - Metals and polynuclear aromatic hydrocarbons (PAH) as a result of repairs to boats and vehicles and possibly occurring within sub-base material present beneath the existing site surfacing
 - Volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) resulting from accidental spillages of paints and solvents used in boat-building
 - Asbestos from previously demolished buildings and possibly present within sub-base materials

As the site is covered with concrete surfacing which would provide a barrier to the migration of pollutants, a moderate risk to human health, plant life and groundwater has been identified from on-site sources of potential contamination.

- 8.3 A large number of potentially contaminative contemporary businesses have been identified within 250m of the site, the nearest comprising an inactive environmental & cleansing service and an inactive car tuning business. An active car sales business is located within 250m to the east. Many historic industrial processes and installations mainly associated with past quarrying activities have been identified within 500m of the site. Given the site's enclosed setting and its topographical isolation from surrounding contemporary and historic contaminative activities it is considered unlikely that these have exerted a direct impact. A low risk has therefore been identified to the site from off-site sources of potential contamination.
- 8.4 Two landfills have been identified within 500m to the south and southeast of the site. Information obtained from Gravesham Borough Council indicates that the Springhead Road site was utilised for the purposes domestic landfill during the 1970's but had closed by 1991, gas venting trenches being installed the following year. The site has since been utilised as a country park. Planning report reference 20110059 dated 27th July 2011 for the recontouring and enhancement of the existing open space refers to previous gas risk assessment as determining "no significant landfill gas migrating from the site". The Dudley Road landfill had also been infilled by 1991 and has recently undergone residential development. CIRIA report c665 states that that gas generation in former landfill sites would be insignificant by thirty years and minimal by fifty years, therefore any gas generated during decomposition would have peaked and be in decline. Infilling of the extensive former quarries located to the north and west of the site has been very limited and is unlikely to contain biodegradable material as the former still supports a large industrial complex whereas a link road has been constructed within the latter. Given that the two landfills exceed a distance in excess of 250m from the site and that other nearby quarries are likely to contain only limited quantities of non-biodegradable material, no credible off-site sources of gas migration have been identified, therefore the risk to the site from ground gas emissions is considered to be low. The topography of the site is indicative that excessive quantities of made ground are unlikely to occur

beneath the site itself, though a reappraisal of gas risk would become necessary in the event that extensive infill material was discovered beneath the existing surfacing.

9. Preliminary Risk Assessment

- 9.1 A preliminary risk assessment has been defined utilising the available information. The risk from possible sources of contamination to receptors including the public, workers, future users and environment has been analysed using the Source – Pathway – Receptor model approach.
- 9.2 The proposed development comprises a detached dwelling with associated areas of garden and vehicular parking.
- 9.3 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 resulting from spillages and leakages of fuel, lubricants, and solvents and possibly present within sub-base materials e.g. PAH, TPH, VOCs, SVOCs.	Toxic and carcinogenic	Future Users	Inhalation, ingestion and skin contact	Serious	Moderate	Site investigation to confirm degree of risk. Removal of contaminated soil, if necessary.
		Adjoining site occupiers	Ditto	Negligible	Low	Minimise dust, avoid spillages.
		Site workers	Ditto	Serious	Low	Provision of protective clothing, equipment and washing facilities. Minimise dust.
		Groundwater Drains & surface water	Leaching, permeable strata, drainage	Serious	Moderate	Removal of contaminated soil, if necessary. Appropriate storage of fuels and lubricants utilised by contractors' plant during development.
Toxic metals associated with vehicle repairs and possibly present in sub-base materials e.g. arsenic, lead etc	Attack on plastic or rubber	Building Services and Fabric	Leaching and diffusion	Serious	Moderate	Use of upgraded pipes if contamination discovered by site investigation. Consult local water authority if doubt arises over suitability of materials.
		Future users	Inhalation, ingestion and skin contact	Serious	Moderate	Site investigation to confirm degree of risk. Removal of contaminated soil, if necessary.
		Local residents	Ditto	Moderate	Low	Minimise dust where possible
		Site Workers	Ditto	Moderate	Low	Provision of protective clothing, equipment and washing facilities. Minimise dust.
Phytotoxic metals e.g. copper, zinc	Phytotoxic	Groundwater	Leaching, permeable strata, groundwater	Serious	Moderate	Appropriate precautions within design of surface water drainage in areas of vehicular parking.
		Plants	Uptake	Serious	Moderate	Removal of contaminated soil in proposed garden areas, if discovered by site investigation.
		Groundwater	Leaching, permeable strata, groundwater	Serious	Low	Appropriate precautions within design of surface water drainage in areas of parking.
		Future Users	Air inhalation	Serious	Low	Removal from site by experienced contractor to licensed depository.
Asbestos from demolished buildings	Carcinogenic and Respiratory Irritant	Adjoining site occupiers	Ditto		Low	
Ground gases e.g. methane, carbon dioxide.	Asphyxiant, explosive	Site workers			Low	
		Future Users	Service ducts	Serious	Low	No credible source of gas generation identified. Reappraisal of gas risk if excessive quantities of made ground discovered by site investigation.
		Adjoining site occupiers	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:

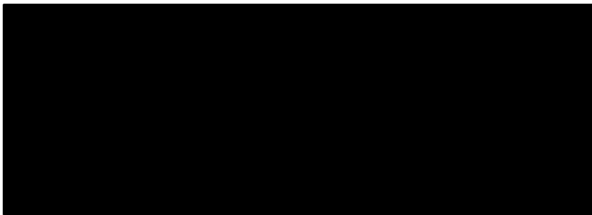
- 1) Identification of a “contaminant”, a “pathway” (or pathways) and a “receptor” with respect to the land in question.
- 2) Identification of a pollutant linkage and that the pollutant linkage:
 - a) is resulting in significant harm being caused to the receptor in the pollutant linkage.
 - b) presents 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 upon the available information, the findings of the Desk Study indicate that in its current condition the site poses a moderate risk to human health, groundwater and plant life. It is therefore recommended that a limited intrusive investigation comprising shallow boreholes or trial pits is undertaken followed by laboratory testing of soil samples in order to ascertain whether contamination exists beneath

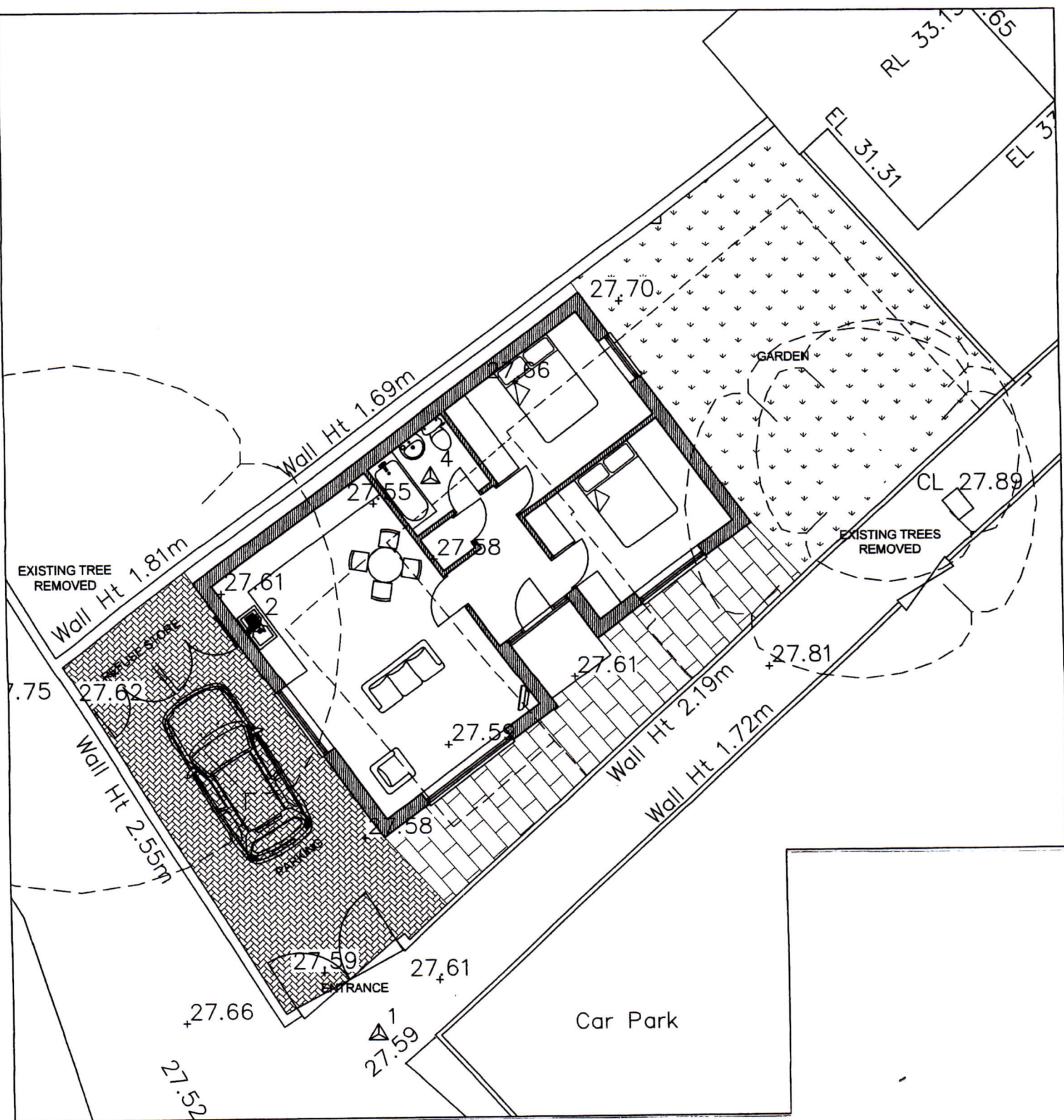
the site surface. Areas of the site which should be particularly targeted include the proposed garden and in the vicinity of the inspection pit. Samples of soil obtained from the excavations should be tested for a suite of common metals, speciated PAH, TPH fractions, VOC, SVOC and asbestos.

- 10.5 In the event that contamination is discovered remediation involving the excavation of contaminated soil may become necessary, followed by its removal from the site.
- 10.6 Asbestos-containing materials present upon the site should be removed by an experienced contractor and disposed of at an appropriately licensed waste depository.
- 10.7 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.



Mr. Sam EA (Name) FCS

December 2016



Salem Yard, Salem Place, Northfleet.
Fig 1 Plan of Proposed Development.



Plate 1



Plate 2



Plate 3



Plate 4



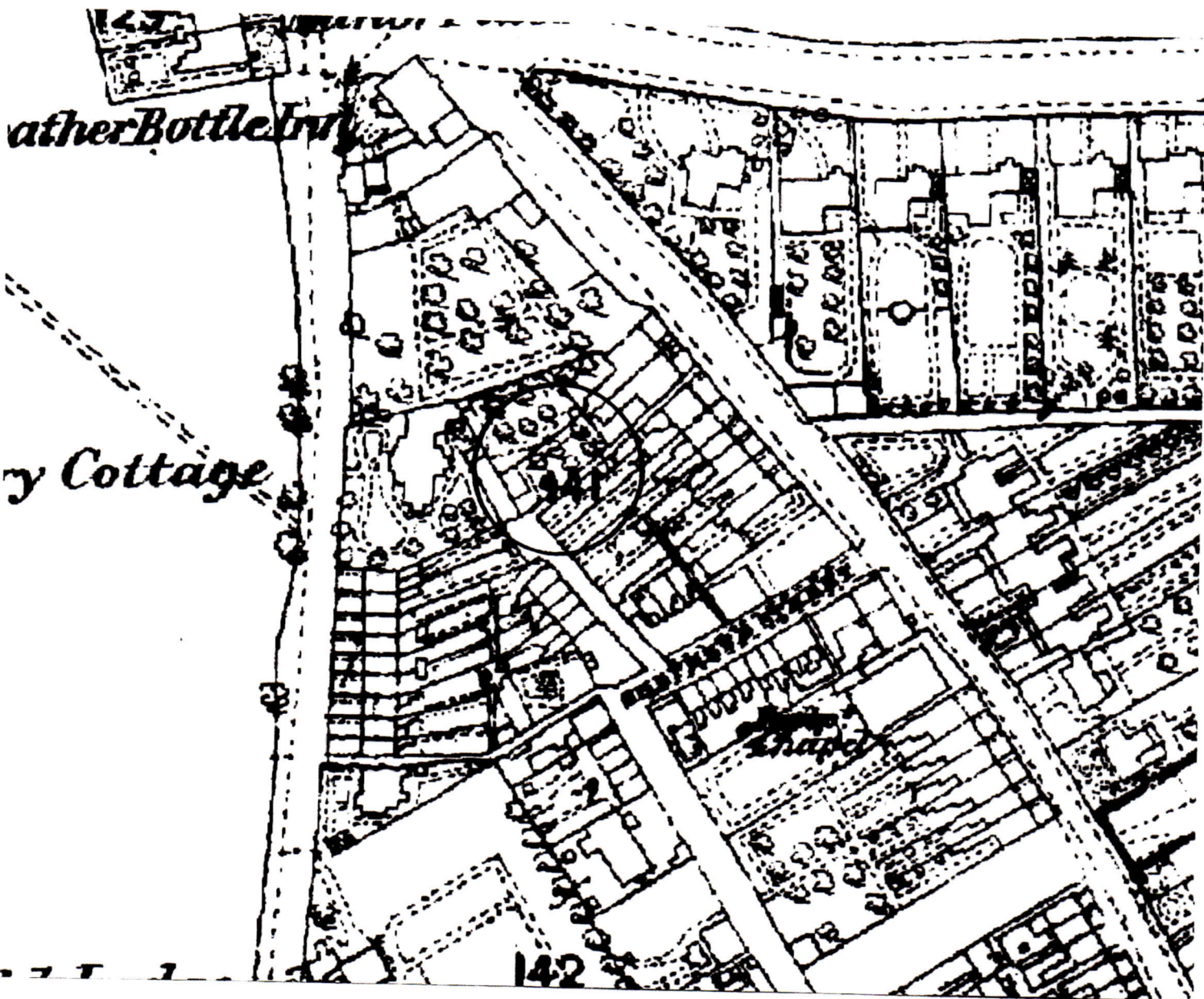
Plate 5



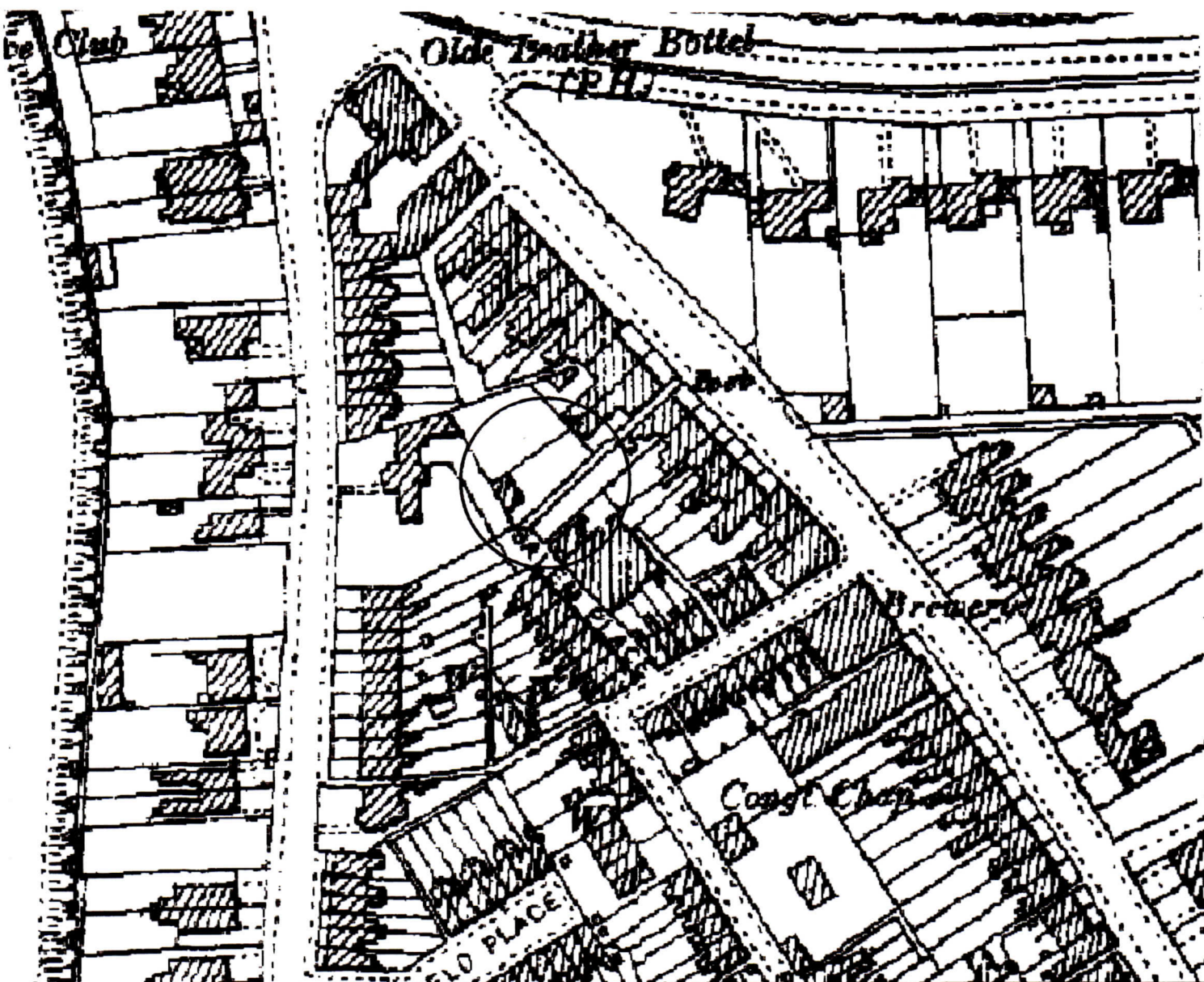
Plate 6

Appendix A

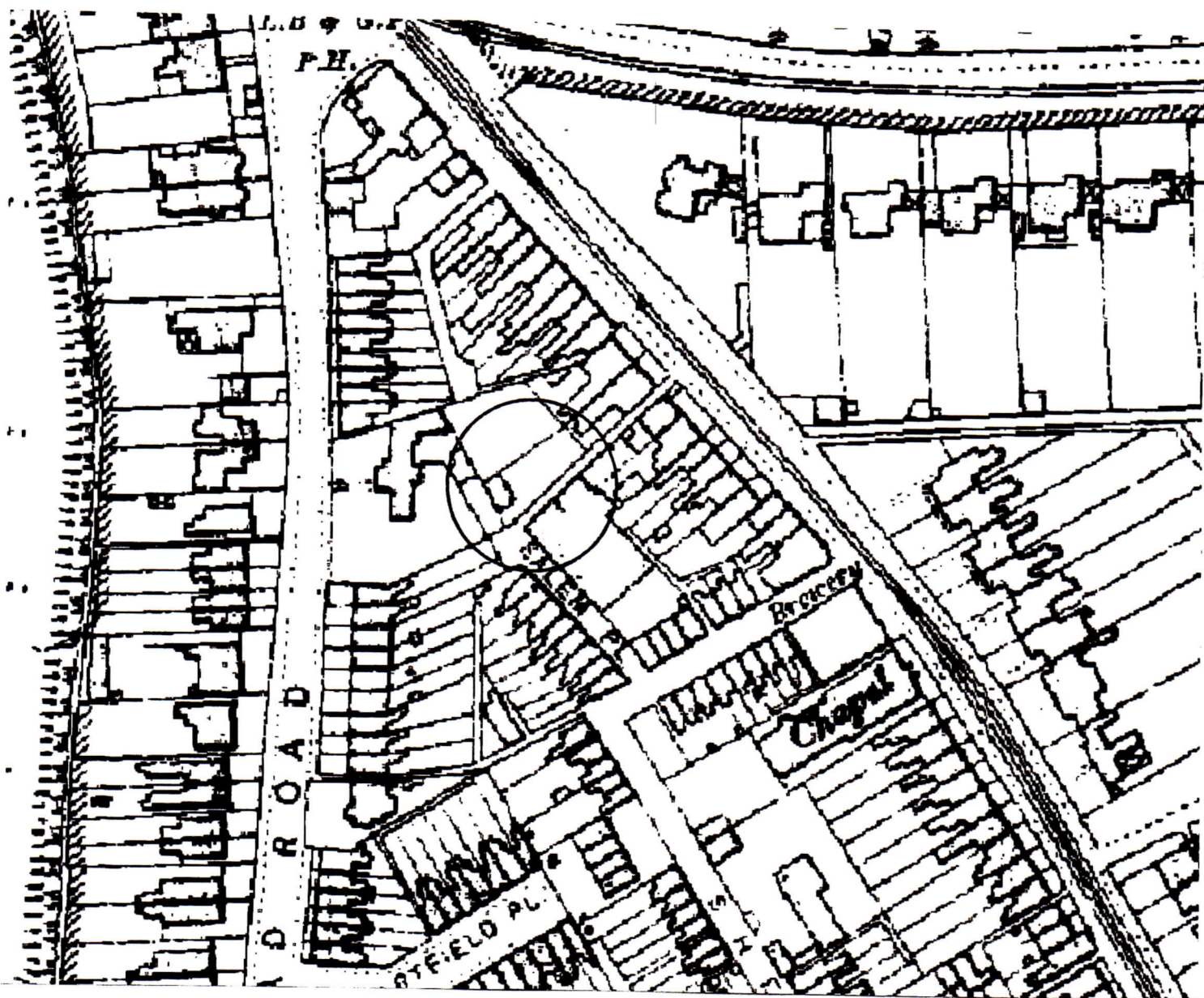
Site History



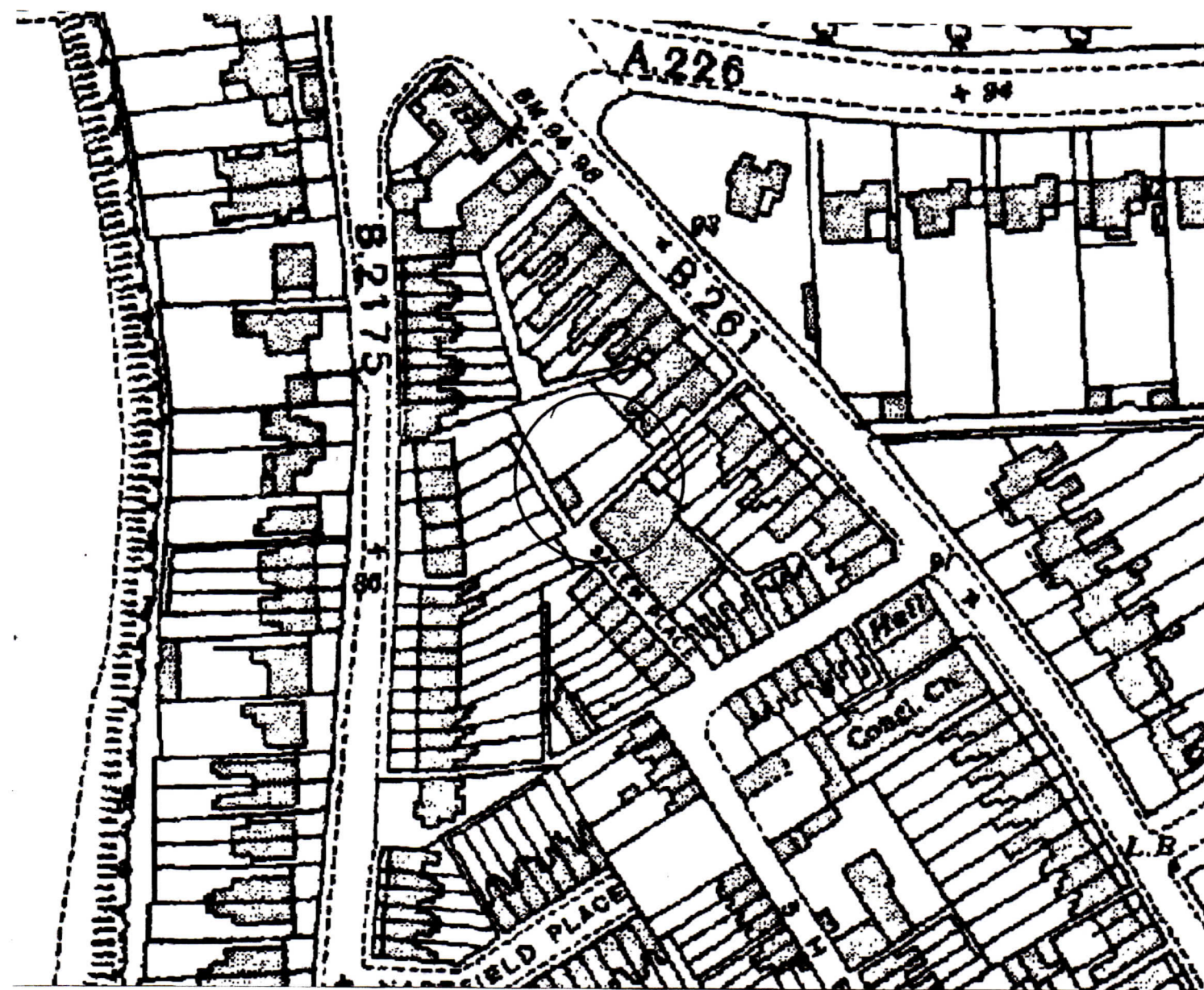
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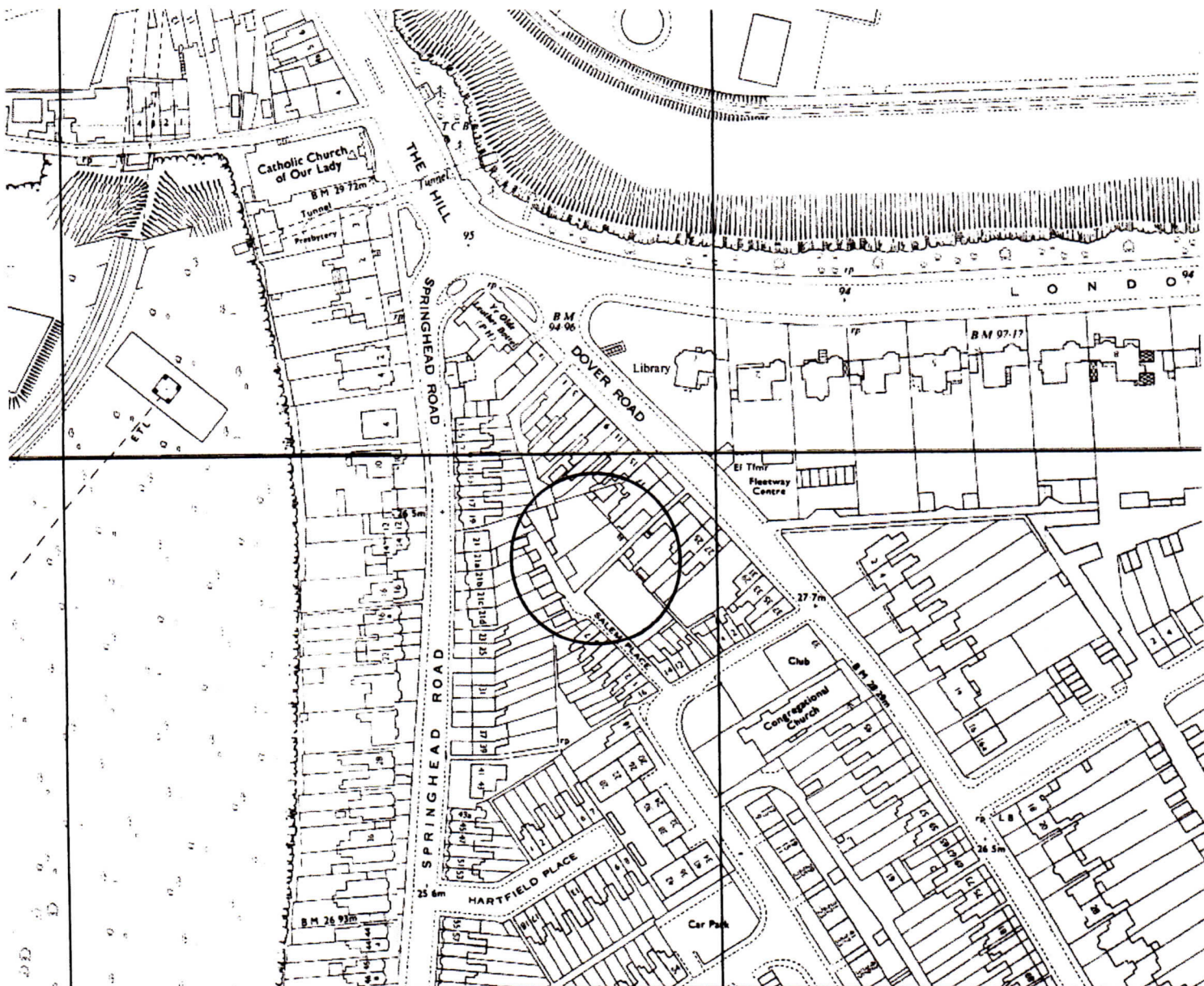
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Salem Yard, Salem Place, Northfleet.
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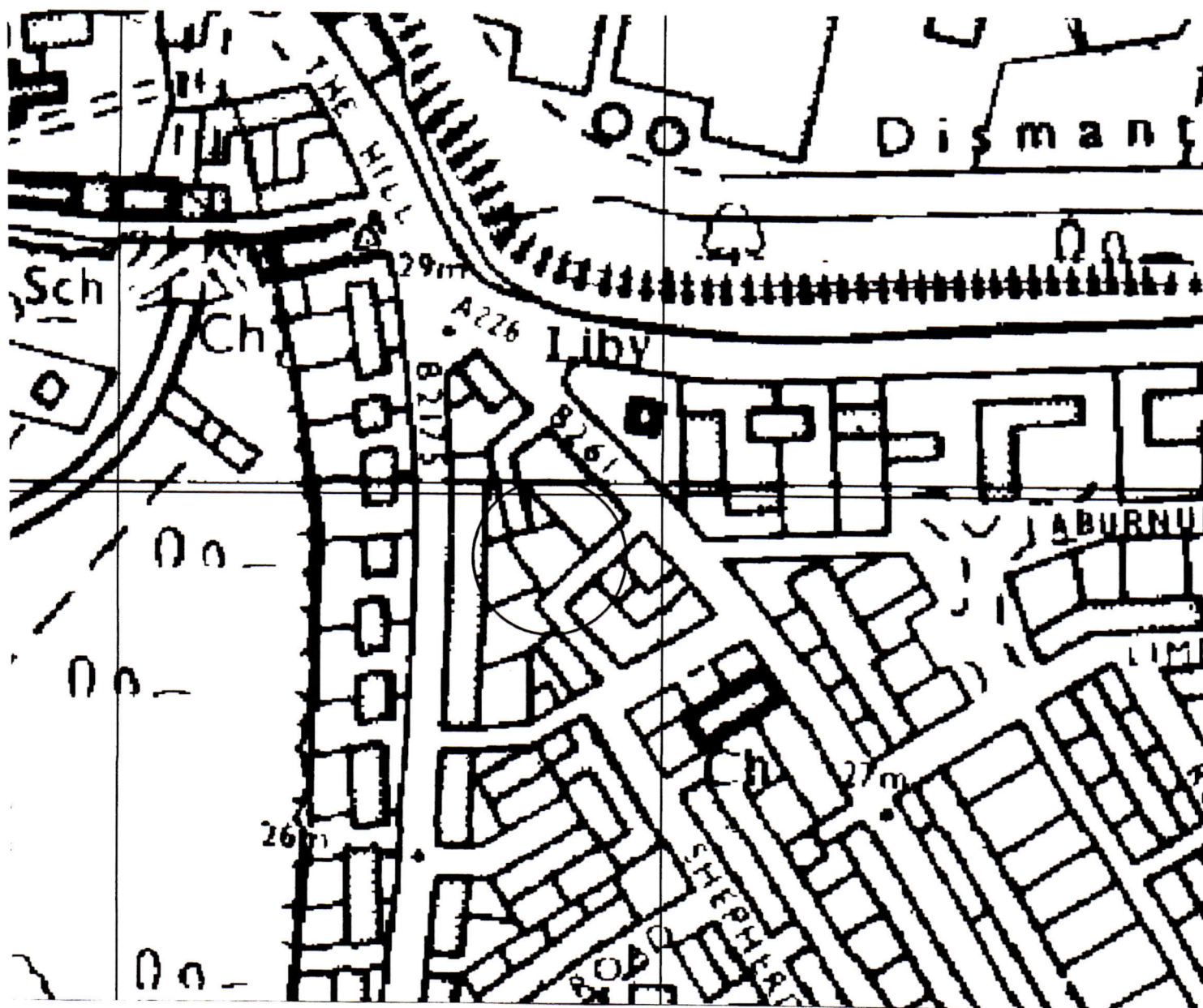


Salem Yard, Salem Place, Northfleet.
OS map scale 1:1250 1925-1952.



Salem Yard, Salem Place, Northfleet.

OS map scale 1:1250 1960-1972.



Salem Yard, Salem Place, Northfleet.
OS map scale 1:10000 1980.