R. CARR GEOTECHNICAL SERVICES

Ref: 3822/20

PROPOSED DEVELOPMENT ON LAND AT OLD MANOR DRIVE, GRAVESEND, KENT DA12 1NP.

PHASE I GEO ENVIRONMENTAL DESK STUDY AND PRELIMINARY RISK ASSESSMENT

November 2020

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Land at Old Manor Drive, Gravesend, Kent DA12 1NP.

1. Introduction

1.1 This report has been prepared following receipt of instructions from Mr G Simpkin of Graham Simpkin Planning Ltd, representing the prospective developers of the site located at Old Manor Drive, Gravesend.

1.2 It is understood that the site is being considered for residential development. Plans for the proposed development have not been examined. A location plan of the site is provided 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 situated to the southeast of Old Manor Drive at OS Land Ranger map reference TQ 653 731.

2.2 At this point, the general topography of the local area 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 underlain by the Thanet Beds formation, with a narrow strip of overlying Head Deposits being denoted in close proximity to the southeast. The Thanet Beds are in turn underlain by the White Chalk subgroup (formerly referred to as the Upper Chalk).

3.2 The Thanet Beds comprise silty, fine-grained sands becoming clayey and silty toward the base of the formation, where they rest unconformably on an eroded chalk surface.

3.3 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 more recent deposits such as the Thanet Beds.

4. Hydrology and Hydrogeology

4.1 No surface waterbodies have been identified within 500m of the site.

4.2 The Thanet Beds are classified as a Secondary A 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). The Thanet Beds are in hydraulic conductivity with the underlying Chalk but in the local district generally form part of the vadose zone above the Chalk water table.

4.3 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 1:1250 1871-1890:

On site: The site comprises vacant land located within the grounds of Parrock Manor.

Off site: The surrounding area comprises mainly undeveloped land with scattered dwellings, intersected by Parrock Road to the west and Old London Road to the south. A pond is in evidence alongside the site's north boundary and a rectangular building is located adjacent to its northeast corner. An additional building is present within 50m to the northwest.

5.3 OS map scale 1:1250 1897-1900:

On site: No significant change.

Off site: The building to the northeast has been enlarged at its north end, the building to the west also having been enlarged at its south end. Residential development in the form of terraced dwellings together with a public house has occurred on the south side of Old London Road, within 200m from the southeast corner of the site.

5.4 OS map scale 1:1250 1907-1923:

On site: No significant change.

Off site: Additional terraced dwellings have been constructed on the south side of Old London Road.

5.5 OS map scale 1:1250 1929-1952:

On site: No significant change.

Off site: The former pond to the north has been infilled. Two ponds and a building of residential appearance are denoted adjacent to the site's southeast corner. A church has been constructed within 150m to the east of the site.

5.6 OS map scale 1:10560 1961-1962:

On site: The site remains undeveloped though its north end now forms part of two neighbouring plots.

Off site: Extensive residential development has occurred within the area surrounding the site, a narrow track having been developed along the west boundary of the site. The ponds to the southeast have been infilled and developed with buildings. A school has been constructed within 250m to the southeast.

5.7 OS map scale 1:10000 1980-1982:

On site: No significant change.

Off Site: A building of residential appearance has been constructed adjacent to the site's west corner. Further residential development has occurred within 400m to the north, south and northwest of 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 C:

6.2 Potentially Contaminative Industrial Uses (Past Land Use)

None identified within 250m of the site.

6.3 Historical Tanks & Energy Facilities

Electrical Industry Facilities. Map published date: 1974	159mS
Tanks. Map published date: 1961	233mNW
Electrical Sub Station Facilities Map published date: 1974	242mW

6.4 **Potentially Infilled Land (Water)**

Unknown Filled Ground (pond, marsh, stream, river, dock etc) Map published date: 1869	164mS

6.5 **Incidents & Enforcements**

Pollution Incident – Environmental Impact – Water: Significant	235mNW

6.6 **Registered Landfill Sites & Historic Landfill**

None identified within 250m of the site.

6.7 **Local Authority Pollution Prevention & Controls**

None identified within 250m of the site.

6.8 **Contemporary Trade Directory Entries**

Boilers – Servicing, Replacements & Repairs	90mS
Concrete Pumping Services	101mS
Engineers – General	103mS
Car Breakers & Dismantlers	115mW
Damp & Dry Rot Control	148mS
Garage Services	208mSE
Garage Services	200mSE

6.9 **Flooding**

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

6.10 **Energy & Infrastructure Screen**

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

6.11 **Radon**

Radon Potential	Intermediate Probability
Radon Protection Measures	None required

6.12 **Environmental Constraints**

None identified within 250m of the site.

7. Site Inspection

7.1 An inspection of the site was undertaken on 12th November 2020 during dry, sunny weather conditions following overnight rain.

7.2 Old Manor Drive consisted of an unsurfaced, narrow private road located to the northeast of Echo Square. Access into the west end of the site was gained through a timber farm gate of apparent recent installation.

7.3 The site comprised an L-shaped area of land which appeared to have previously comprised two adjoining domestic gardens. The north section of the site consisted of rather uneven ground overgrown with emergent weeds and Elder saplings (Plate 1). A boundary wall approximately 1.5m in height passed along its north boundary and a panelled timber fence of similar height formed its south side, the gardens of neighbouring dwellings being present beyond the site boundaries.

7.4 A heap of domestic rubbish and discarded timber was situated at the west end of the site, adjacent to the site entrance (Plate 2).

7.5 The north boundary of the site deviated around a block and timber shed under a corrugated steel roof which was situated within the garden of a neighbouring dwelling to the northeast corner of the site (Plate 3). A derelict, steel-framed

greenhouse set on brick walls was present within the site at its east end (Plate 4).

7.6 The site's south section comprised a relatively level area of former garden enclosed on its east and west sides by panelled timber fences and overgrown at its south end with Elder and Sycamore saplings (Plate 5). The site surface at the north end of the garden consisted mainly of exposed soil with mature Cherry and Yew trees being present in its northeast corner (Plate 6).

7.7 A boundary fence formerly separating the two sections of garden had been removed. Domestic gardens were situated beyond the boundary fences with mature *Leylandii* conifers and a Birch tree being present in the neighbouring site to the east. Several mature Beech trees occupied the site to the west.

7.8 A brick wall approximately 1m in height formed the site's south boundary, alongside which passed a concrete drive which provided rear access into retail premises located on Old Road East to the south.

7.9 The site was situated within a predominantly residential area. Retail premises with first floor residential accommodation were located on Echo Square and Old Road East within 25m to the south and a church was situated within 150m to the southwest. A graveyard was not contained within the grounds of the church.

7.10 No visual or olfactory evidence of significant contamination was observed either on or in the vicinity of the site at the time of the inspection.

8. Conceptual Site Model

8.1 Based upon the available information the site would appear to have supported areas of garden from the commencement of Ordnance Survey mapping until the present day. The site originally comprised land contained within a local estate but following the onset of residential development has been subdivided and incorporated into sections of residential garden. There is no evidence to suggest that commercial activity or vehicle maintenance has been undertaken on the site. The site is

therefore considered to pose a low risk to receptors including human health, plant life, underground plastic water supply pipes and groundwater.

8.2 Several contemporary potentially contaminative activities have been identified by the Landmark report within the local area, the nearest being a boiler servicing business located 90m to the south. The identified activities are however considered sufficiently remote or inconsequential to have exerted any impact upon the site, which topographically is relatively isolated. No historic, potentially contaminative activities have been identified within 250m of the site. A low risk has therefore been identified to the site from off-site sources of potential contamination.

8.3 No registered landfill sites have been identified within 250m of the site and the topography of the site does not imply the presence of significant quantities of made ground beneath its surface. The pond formerly adjacent to the site's north boundary had been infilled by 1952 and the ponds to the southeast infilled by 1961. An additional pond identified by the Landmark report 186m to the south had been infilled by 1869. 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. In any event infilled ponds do not generally pose a risk of significant gas migration (CIEH, 2008). Radon protection measures are not required within the development. Consequently the risk to the development from both on and off-site emissions of ground gas is considered to be low.

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 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 associated with made ground and vehicle maintenance e.g. TPH, PAH & VOC	Toxic and carcinogenic	Future Users	Inhalation, ingestion and skin contact	Serious	Low	No evidence of vehicle servicing or significant made ground on or around site.
		Adjoining site occupiers	Ditto	Moderate	Low	Minimise dust, avoid spillages.
		Site workers	Ditto	Serious	Low	Provision of protective clothing and equipment.
		Groundwater Drains & surface water	Leaching, permeable strata, drainage	Serious	Low	No evidence of vehicle servicing or made ground on site. 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	Low	No evidence of vehicle servicing, made ground or industrial processes on or around site.
Inorganic contaminants possibly present in made ground and industrial processes e.g. arsenic, lead, etc	Zootoxic	Future users	Inhalation, ingestion and skin contact	Serious	Low	No evidence of industrial processes or significant made ground on or around site.
		Local residents	Ditto	Moderate	Low	Minimise dust where possible
		Site Workers	Ditto	Moderate	Low	Provision of protective clothing/equipment. Minimise dust.
		Groundwater	Leaching, permeable strata, groundwater	Serious	Low	Appropriate precautions with surface water drainage in areas of vehicular parking. Groundwater unlikely to occur for some considerable depth.
Phytotoxic metals e.g. copper, zinc	Phytotoxic	Plants	Uptake	Serious	Low	No evidence of vehicle servicing or industrial processes on or around site.
		Groundwater	Leaching, permeable strata, groundwater	Serious	Low	Appropriate precautions with surface water drainage in areas of vehicular parking.
Asbestos	Carcinogenic and Respiratory Irritant	Future Users	Air inhalation	Serious	Low	Removal by experienced contractor and appropriate disposal at licensed waste facility if discovered on site
		Adjoining site occupiers	Ditto			
		Site workers			Low	
Ground gases e.g. methane, carbon dioxide.	Asphixiant, explosive	Future Users	Service ducts	Serious	Low	No areas of landfill identified within 250m of site and significant made ground not indicated by site topography. Infilling of nearby ponds exceeds fifty years. No radon protection measures necessary.
		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 available information there is little evidence to suggest that the site has been impacted by either on or off-site activities. No significant pollutant linkages have been identified, therefore a Category 4 classification as proposed by DEFRA publication SP1010 (March 2014) is considered applicable (i.e. level of risk posed acceptably low). Further action is therefore considered unnecessary other than the appropriate removal and disposal of rubbish present near the site entrance.

10.5 Site workers should be provided with appropriate protective clothing and washing facilities. Dust emissions should be minimised as far as possible.

10.6 It should be noted that that the site is underlain by a Secondary Aquifer which in turn overlies the Principal Aquifer of the chalk. Every precaution should therefore be taken during the course of the development in order to prevent the escape and subsequent migration of pollutants into the nearby pond. Fuel and/or lubricants utilised by contractors' plant should be stored in a secure, preferably bunded area of the site.

10.7 Plastic water services utilised within the development should be laid in trenches and surrounded with clean material. The advice of the local water authority should be sought in the event that doubt exists over the suitability of materials.

10.8 Any topsoil that may be brought onto the site for use in garden areas should be tested for contamination in order to ensure that it is suitable for its proposed use.

10.9 In the event that contamination not detected by the Desk Study is encountered during the course of the development, the nature of the contamination should be adequately assessed and dealt with in an appropriate manner. Evidence of potential contamination may include discoloured and malodorous soil or foreign debris such as ash, clinker or asbestos.

10.10 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

November 2020

Land at Old Manor Drive, Gravesend.

Fig 1 Location Plan of Site.

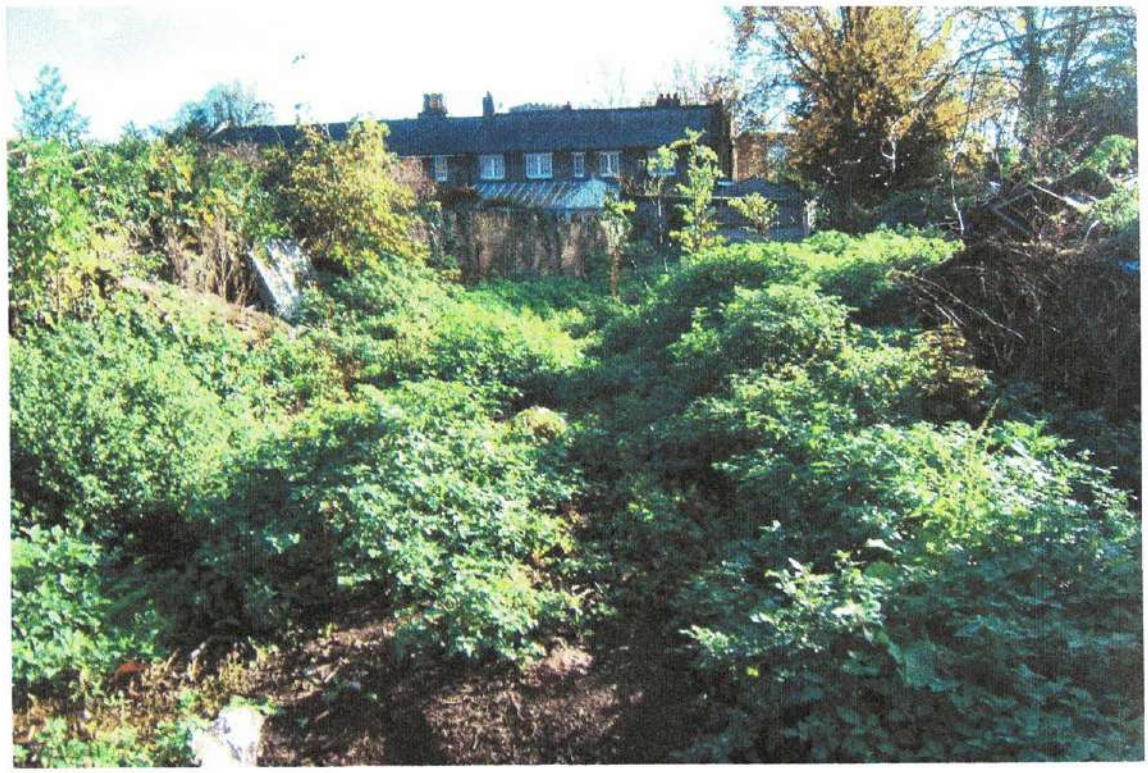


Plate 1

Plate 2

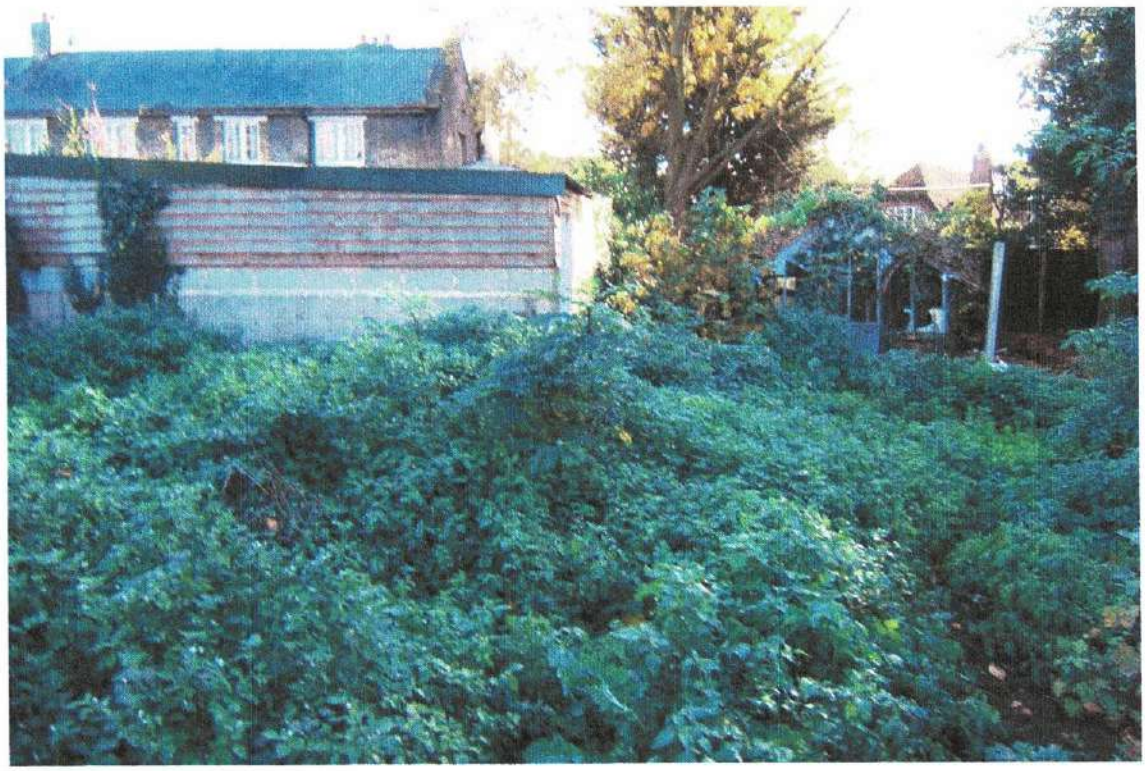


Plate 3

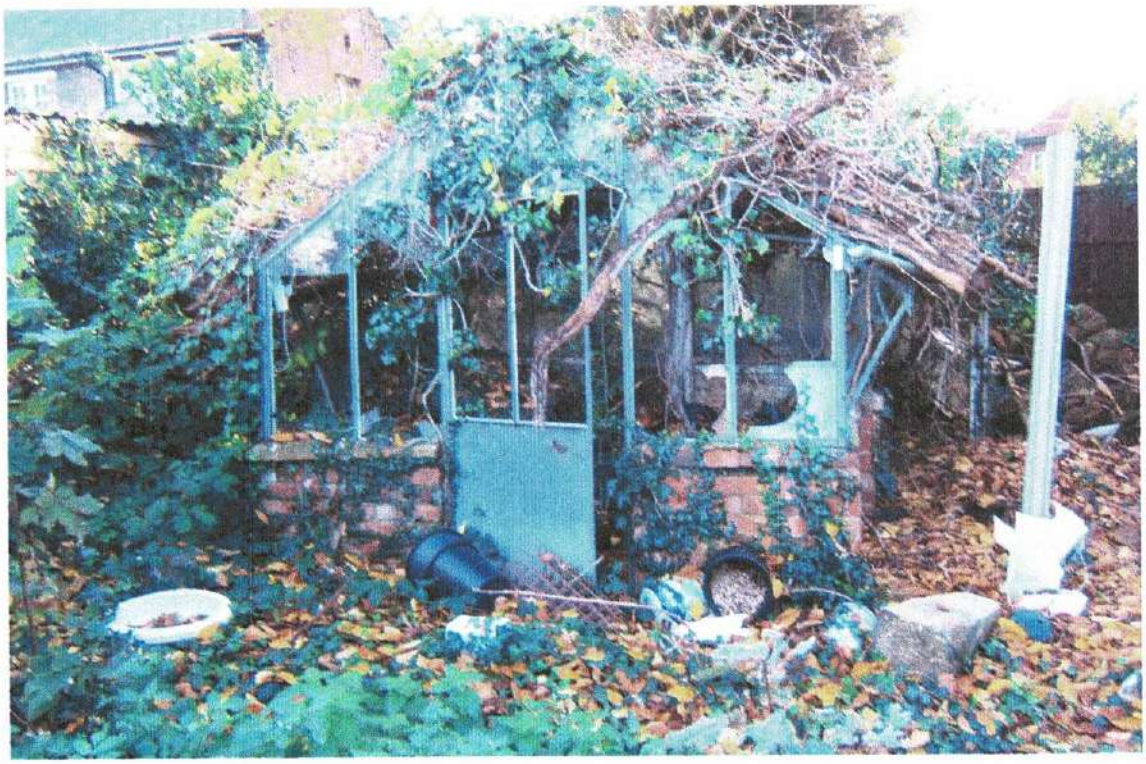


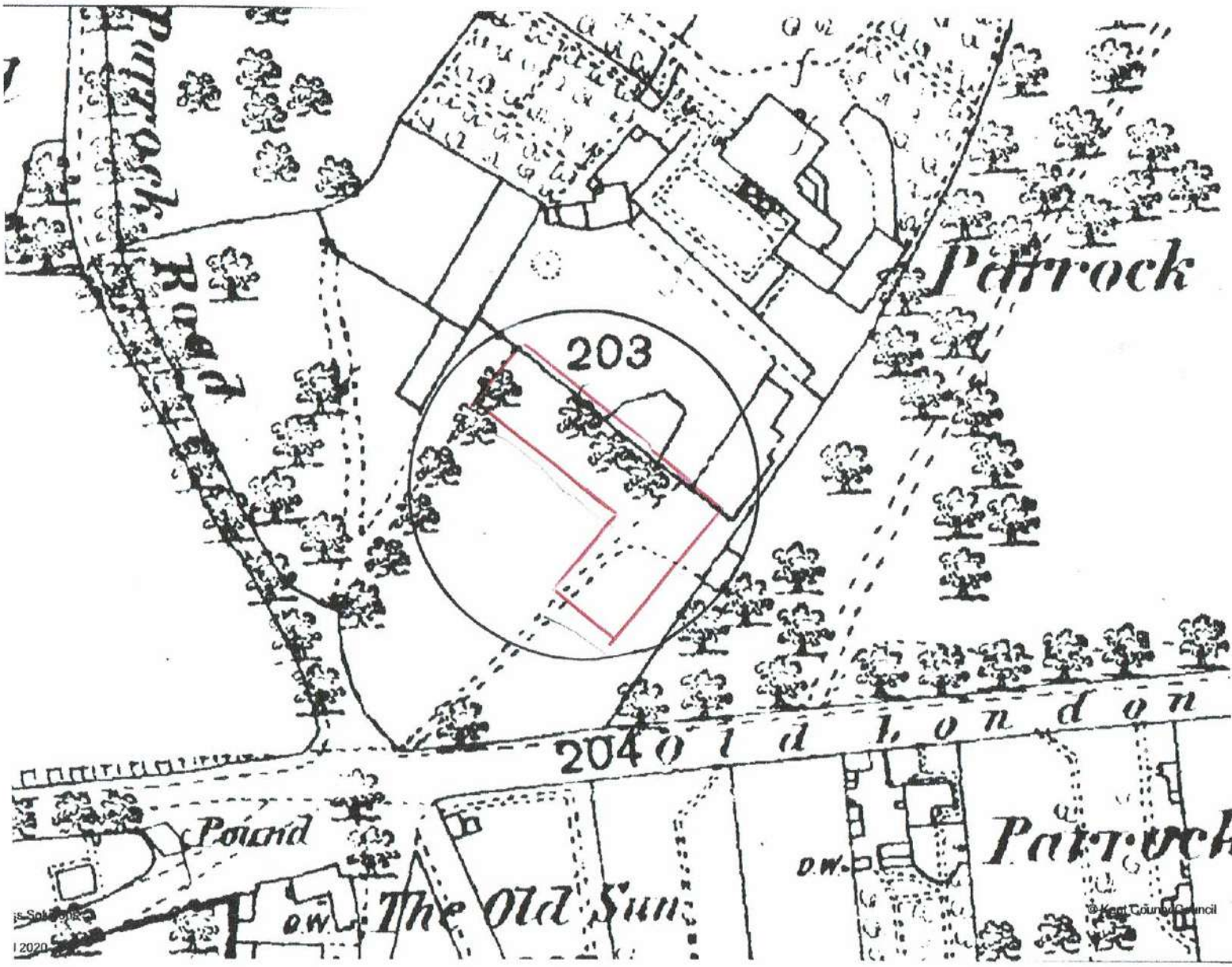
Plate 4

Plate 5

Plate 6

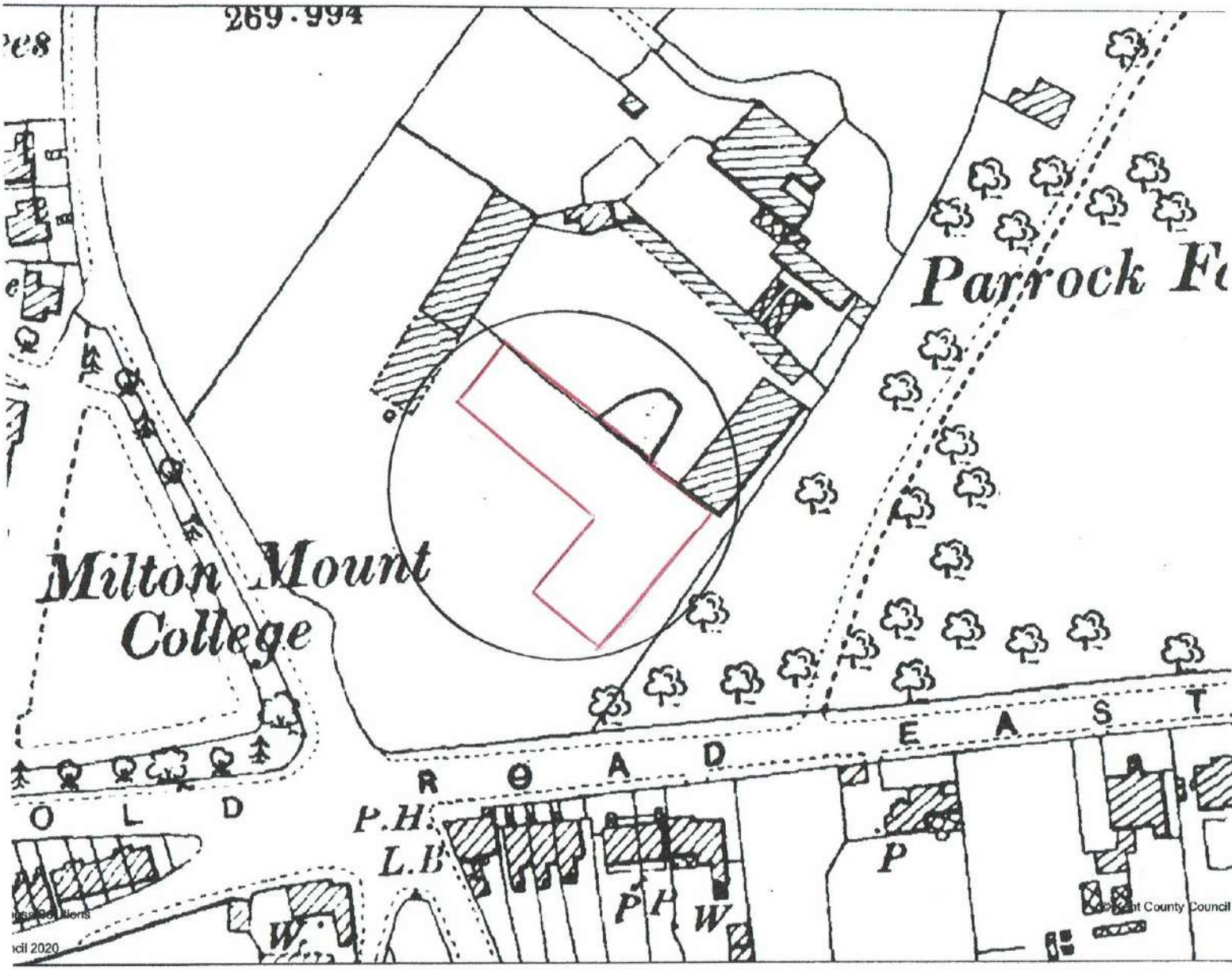
Appendix A

Site History



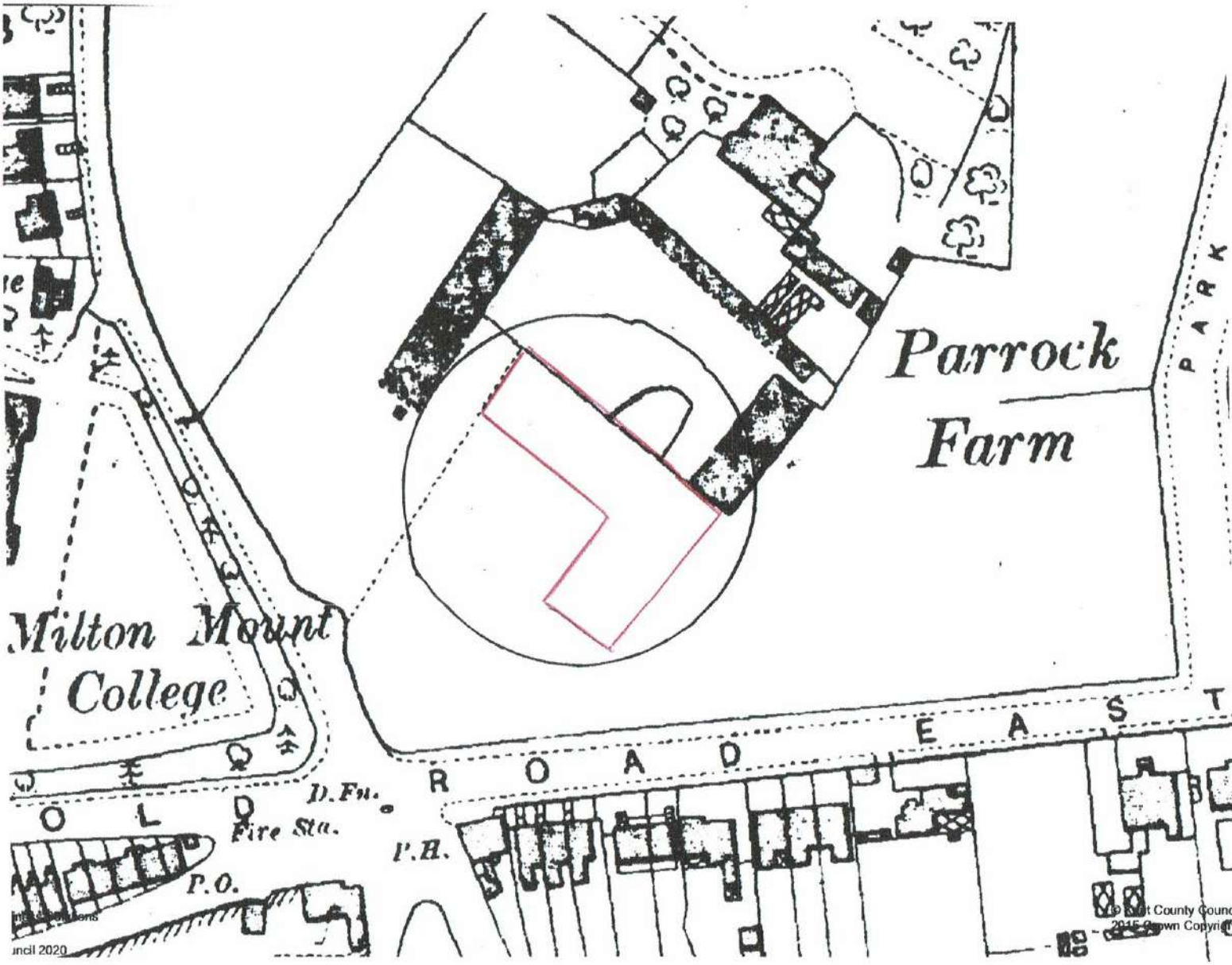
Land at Old Manor Drive, Gravesend.

OS map scale 1:1250: 1871-1890.



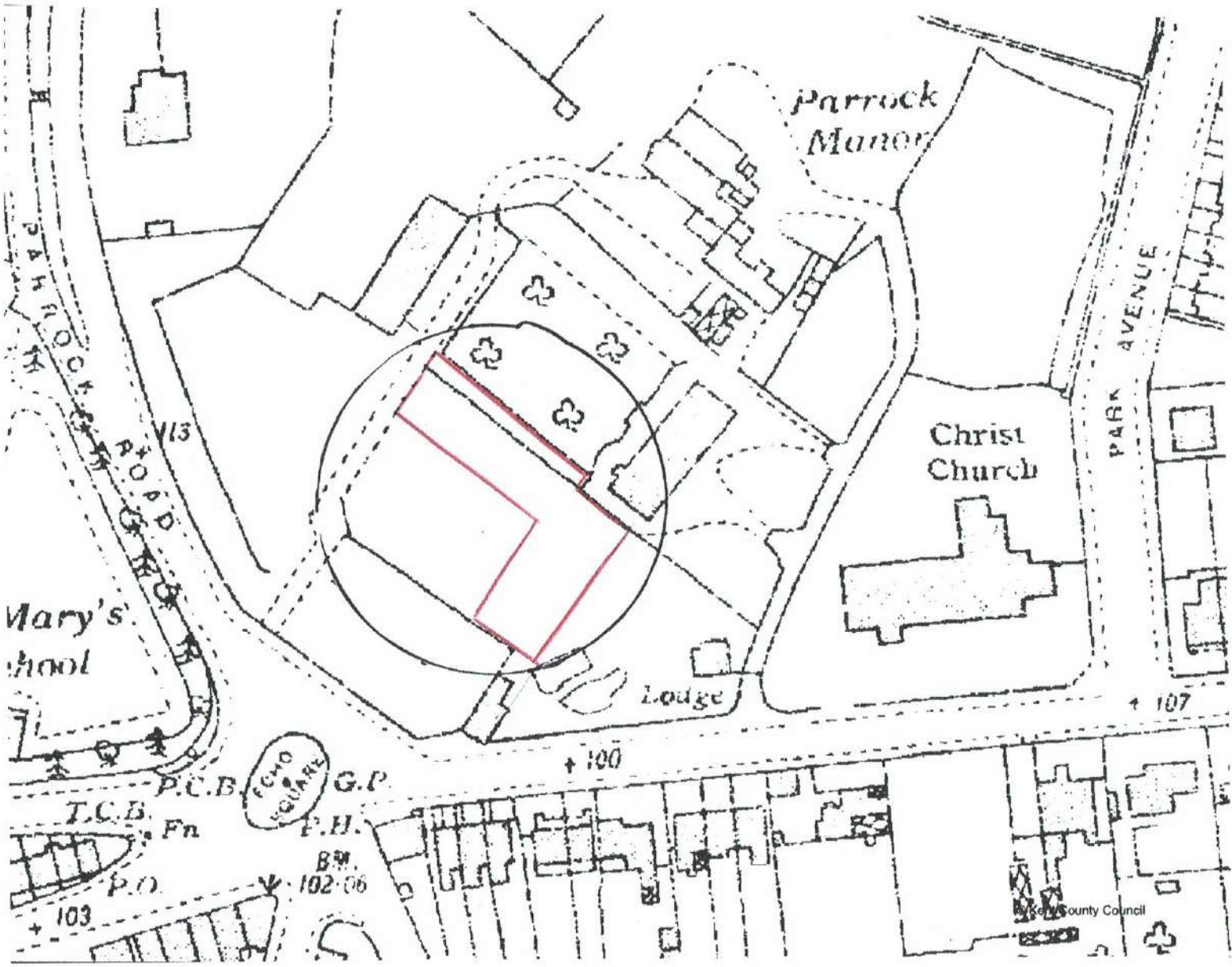
Land at Old Manor Drive, Gravesend.

OS map scale 1:1250: 1897-1900.



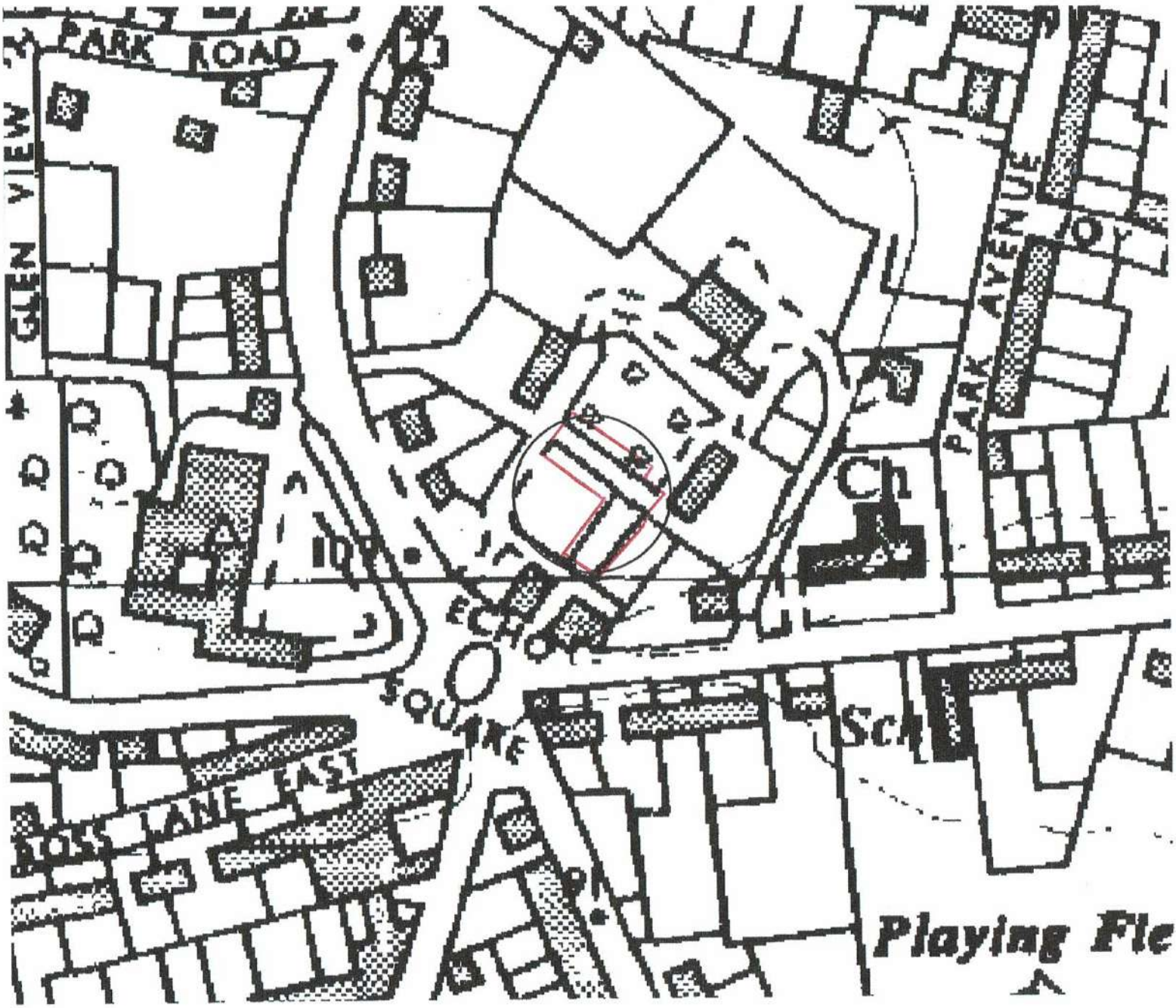
Land at Old Manor Drive, Gravesend.

OS map scale 1:1250: 1907-1923.



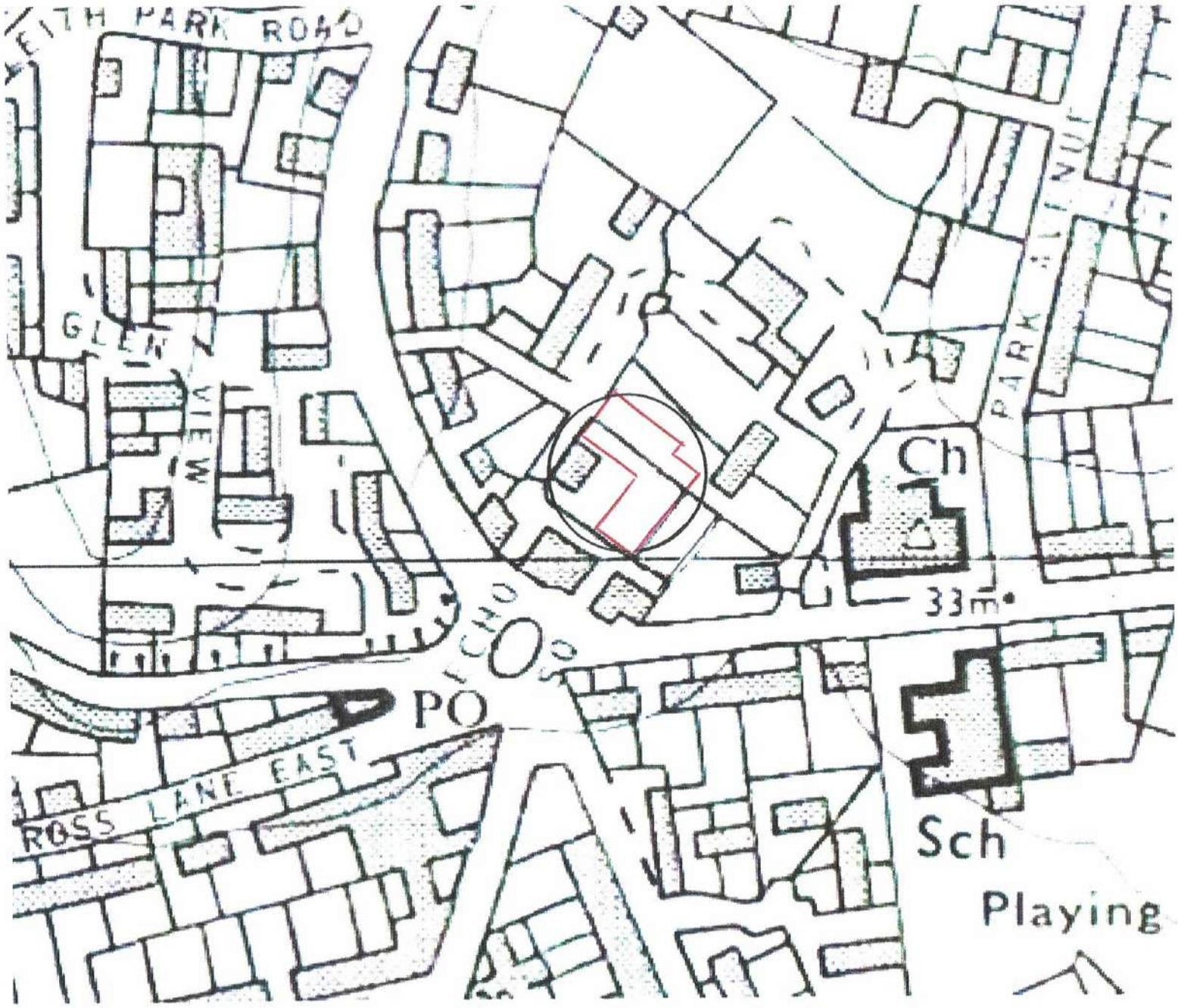
Land at Old Manor Drive, Gravesend.

OS map scale 1:1250: 1929-1952.



Land at Old Manor Drive, Gravesend.

OS map scale 1:10560: 1961-1962.



Land at Old Manor Drive, Gravesend.

OS map scale 1:10000: 1980-1982.

Appendix B

Environmental Information Search