4.3 Findings

Soil Contamination

4.3.1 Concentrations of a number of determinands analysed in the soil samples on the site are compared to Dutch Intervention Values (DIV) and Dutch Human Toxicological Values (DHTV) in Table 4.1. The comparison is intended as a screening process to identify areas of possible contamination.

Table 4.1: Summary of Analytical Results for Soils

Determinand	No. of Tests	Max. Concentration (mg/kg) Made Ground[A] Natural Ground[B]		Dutch Intervention Value Made Ground[A] Natural Ground[B]		Dutch Human Tox. Value Made Ground[A] Natural Ground[B]	
		Min	Max.	Value (mg/kg)	No > Value	Value (mg/kg)	No > Value
pH	7	4.0[A]	7.3[A]	-	-	-	
Arsenic	7	8.5[A]	19.5[B]	39[A] 33[B]	0 0	483[A] 408[B]	0 0
Cadmium	7	<0.5[A/B]	<0.5[A/B]	8[A] 7[B]	0 0	23[A] 20[B]	0 0
Chromium	7	9[A]	30[B]	281[A] 228[B]	0 0	1665[A] 1350[B]	0 0
Copper	7	5[B]	27[A]	124[A] 98[B]	0 0	10400[A] 8267[B]	0 0
Nickel	7	14[A]	24[B]	132[A] 90[B]	0 0	4149[A] 2829[B]	0 0
Lead	7	4[B]	101[A]	399[A] 349[B]	0 0	226[A] 198[B]	0 0
Mercury	7	<0.2[A/B]	0.3[A]	8[A] 7[B]	0 0	162[A] 145[B]	0 0
Zinc	7	24[A]	41[B]	342[A] 458[B]	0 0	35600[A] 26600[B]	0 0
Total PAH[C]	7	<0.5[B]	1864[B]	8[A] 8[B]	**2** **2**	- -	- -
Cresols	7	<0.1[A/B]	<0.1[A/B]	1[A] 1[B]	0 0	10[A] 10[B]	0 0
Phenol	7	<0.5[A/B]	<0.5[A/B]	8[A] 8[B]	0 0	12[A] 12[B]	0 0
Easily Liberated Cyanide	7	<1[A/B]	32.4[A]	20[A] 20[B]	1 0	- -	- -
Complex Cyanide	7	<1[B]	418.1[A]	50[A] 50[B]	**2** 0	- -	- -

[A] Dutch Values for Made Ground calculated for a 12 % clay and 2 % organic matter content, with a pH of 5.75.
[B] Dutch Values for Natural Ground calculated for a 5 % clay and 1 % organic matter content, with a pH of 5.03.
[C] For 10 priority PAHs.
[D] Checked against individual Dutch Human Toxicological Values for 10 PAH.

4.3.2 Dutch Intervention Values and Dutch Human Toxicological values have been adjusted for two different soil types identified during the site investigation: Made Ground comprising a variety of soil types and Natural Ground consisting of clays and sands. Clay and organic carbon

percentages used in the adjustment of the Dutch Values for different soil types are given in the subscript to Table 4.1.

4.3.3 It can be seen in Table 4.1 that the concentrations of most determinands were below the relevant Dutch Intervention Value or the detection limit of the method of analysis. Exceedences of Dutch Intervention Values were, however, found for PAH and free and complex cyanide.

4.3.4 Concentrations of PAH in exceedence of Intervention Values were found in soil samples from the Made Ground in borehole BH1 and trial pit TP2. Concentrations in borehole BH1 were associated with fragments of clinker, while PAH concentrations in the Made Ground in trial pit TP2 were associated with a tarry odour.

4.3.5 Concentrations of cyanide in exceedence of Dutch Intervention Values were identified in borehole BH1 and trial pit TP2 and were associated with the occurrence of spent oxide and clinker. Visual observations made during the site investigation suggest that spent oxide contamination is likely to be relatively continuous across the site. Therefore, there exists the potential for higher concentrations of cyanides than those identified above. There is also the potential that underground tanks containing significant concentrations of cyanides, phenols and PAHs (as identified in a previous investigation) extend across the southern boundary of the site. Investigation of this area was prohibited as described in Section 3.1.3

4.3.6 Concentrations of PAH in exceedence of Intervention Values in the Natural Ground were encountered in borehole BH1 and trial pit TP2 within the sand and gravel (possible Folkestone Beds Formation). The concentrations were not associated with the occurrence of olfactory or visual evidence of contamination in the soil sample and are not considered to be associated with PAH concentrations in the shallow Made Ground.

Leachability Tests

4.3.7 A soil sample considered representative of contamination encountered in the Made Ground (visual/olfactory) was subjected to a leachability test, using standard Mayflower protocol.

4.3.8 The results of these analyses are compared to relevant guidelines in Table 4.2 below.

Table 4.2: Summary of Analytical Results for Leachability Test.

Determinand	Measured Concentration (µg/l)	DWS (µg/l)	No > DWS	EQS (µg/l)	No > EQS
	TP2 0.9m				
pH	7.0	-	-	6.0 – 9.0[BC]	0
Arsenic	<10	50[A]	0	50[B]	0
Cadmium	<1.0	5[A]	0	5.0[B]	0
Chromium	<10	50[A]	0	50[B]	0
Copper	<10	3000[A]	0	28[B]	0
Nickel	<10	50[A]	0	200[B]	0
Lead	<10	50[A]	0	20[B]	0
Mercury	<0.2	1[A]	0	1[B]	0

Determinand	Measured Concentration (µg/l) TP2 0.9m	DWS (µg/l)	No > DWS	EQS (µg/l)	No > EQS
Zinc	173.0	5000[A]	0	125[B]	1
Benzene	<1	10	0	30	0
Toluene	<1	10	0	50	0
Ethyl Benzene	<1	10	0	30[F]	0
Xylene	<1	10	0	30	0
Cresols	2.6	0.5[A,D]	1	30[B,D]	0
Phenol	<0.1	0.5[A]	0	30[B]	0
Total PAH[G] (Naphthalene)	<1	0.2 -	1[E] -	- (10[B])	- 0
Easily Liberated (free) Cyanide	3200	-	-	1[B]	1
Complex Cyanide	2200	-	-	-	-
Total Cyanide	5400	50[A]	1	-	-
Sulphate	437,000	250,000[A]	1	-	-
Total Ammonium	<100	500[A]	0	-	-

[A] Drinking Water standard taken from the EC Drinking Water Standards (80/778/EEC)
[B] DoE Circular 7/89 EQS value for the protection of (salmonid) aquatic life; some values adjusted to take account of total hardness. Total Hardness taken as 50 – 100 mg/L
[C] Dimensionless.
[D] For comparison purposes the EQS for cresols were assumed to be equal to the EQS for phenol
[E] Number of exceedences not known as detection limit is higher than the EQS value
[F] For comparison purposes the EQS values for ethyl benzene and complex cyanide were assumed to be equal to the EQS for benzene and free cyanide, respectively.
[G] For 10 priority PAHs.

4.3.9 Table 4.2 shows that total cyanide, cresol and sulphate were present in the leachate at concentrations exceeding DWS. In addition, concentrations of free cyanide and zinc were noted to be in exceedence of EQS.

4.3.10 The occurrence of cyanide indicates that concentrations encountered in the soil potentially pose a risk to underlying water resources. Concentrations of sulphate in the leachate indicate the presence of aggressive ground conditions and are recommended to be taken into account for the development of future foundation structures.

4.3.11 The leachability tests also showed that elevated concentrations of PAH in the Made Ground were found to be relatively immobile, with the most mobile fraction, naphthalene, not identified in the leachate above the detection limits.

4.3.12 It should be emphasised that leachability tests usually overestimate actual concentrations mobilised by the infiltrating soil water under field conditions due to the rigorous nature of the test. The test, therefore, reveals more about the inability of contaminants to leach from the soil rather than quantifying those contaminants that do leach to some extent. For this reason the actual leaching behaviour of contaminants under field conditions is better assessed by analysing contaminant concentrations in the groundwater beneath the site.

Groundwater Quality

4.3.13 One groundwater sample was recovered from borehole BH1 during monitoring on 12 of March 2001. The sample was analysed according to quality standards described above, with detailed analytical results being provided in Appendix C.

Table 4.3: Summary of Analytical Results for Groundwater

Determinand	Measured Concentration (µg/l)	DWS (µg/l)	No > DWS	EQS (µg/l)	No > EQS
	BH1				
pH	5.8	-	-	6.0 – 9.0[BC]	1
Arsenic	<10	50[A]	0	50[B]	0
Cadmium	<1.0	5[A]	0	5.0[B]	0
Chromium	<10	50[A]	0	175[B]	0
Copper	<10	3000[A]	0	6[B]	1[E]
Nickel	<10	50[A]	0	100[B]	0
Lead	<10	50[A]	0	125[B]	0
Mercury	<0.2	1[A]	0	1.0[B]	0
Zinc	2039	5000[A]	0	175[B]	1
TPH	<100	10	1[E,E]	-	-
Benzene	<1	10	0	30	0
Toluene	<1	10	0	50	0
Ethyl Benzene	<1	10	0	30[F]	0
Xylene	0.5	10	0	30	0
Cresols	<0.1	0.5[A,D]	0	30[B,D]	0
Phenol	<0.1	0.5[A]	0	30[B]	0
Total PAH[G] (Naphthalene)	57	-	-	-	0
	(<1)	-	-	(10[B])	0
Easily Liberated (free) Cyanide	<500	-		1[B]	1[E]
Complex Cyanide	1400	-	-	-	-
Total Cyanide	1400	50[A]	1	-	-
Ammonium	4200	500[A]	1	-	-

[A] Drinking Water standard taken from the EC Drinking Water Standards (80/778/EEC)
[B] DoE Circular 7/89 EQS value for the protection of aquatic life; some values adjusted to take account of total hardness. Total Hardness taken as +250 mg/L
[C] Dimensionless.
[D] For comparison purposes the EQS for cresols were assumed to be equal to the EQS for phenol
[E] Number of exceedences not known as detection limit is higher than the EQS value
[F] For comparison purposes the EQS values for ethyl benzene and complex cyanide were assumed to be equal to the EQS for benzene and free cyanide, respectively.
[G] For 10 priority PAHs.

4.3.14 Results from groundwater analyses are compared in Table 4.3 against EQS for a freshwater environment and DWS in order to assess the risk (statutory) to the environment.

4.3.15 Results form the analysis of groundwater given in Table 4.3 show that concentrations of contaminants in the groundwater exceeding DWS and EQS were identified for free and total cyanide, total ammonium and zinc.

4.3.16 Concentrations of cyanide identified in the groundwater are considered to reflect the results from the leachability tests, showing that cyanide concentrations in the Made Ground were potentially leaching at concentrations exceeding relevant quality standards.

4.3.17 Concentrations of PAH identified in the groundwater are considered to be associated with elevated PAH concentrations analysed in soil samples from the sands and gravel (possibly of the Folkestone Beds Formation). As no significant source of PAH contamination was identified within the Made Ground on site, it is considered likely that contaminant concentrations in soil samples from the Natural Ground and groundwater on site derive from cross boundary migration of contaminants from the adjacent part of the gasworks site, most notably from possible underground purifier tanks immediately to the south of the study site.

4.3.18 It should be noted, however, that there remains the possibility that the underground tanks (with associated contamination) to the south of the site (assuming that they have not been remediated) extend beyond the southern boundary of the site. Therefore, identified groundwater contamination could result, in part, from the presence of these structures within the site boundary.

Gas Emissions

4.3.19 The results of land gas monitoring are attached in Appendix B. The measured concentrations of carbon dioxide and methane are not considered to pose a significant risk to the development of the site.

Contamination Sources

4.3.20 The following contaminant Sources have been identified in the previous sections and are referred to as follows:

- **Source 1**: General Shallow Made Ground – elevated concentrations of PAH and cyanide.

Source, Pathway, Receptor Assessment

4.3.21 The following table lists all potential receptors and assesses likely risks according to a "Source-Pathway-Receptor" approach. Risks are classified as low, moderate or high, with the individual risk categories defined as follows:

- **Low risk** – it is considered unlikely those issues within the category will arise as a liability/cost for the owner of the site.
- **Moderate risk** – it is possible but not certain that issues within the category will arise as a liability/cost for the owner of the site.
- **High risk** – there is a high potential that issues within the category will arise as a liability/cost for the owner of the site.

4.3.22 Pollutant linkages (i.e. the relationships between source, pathway and receptor) are also placed in a priority order with a score of 1 representing the most significance. For each pollutant linkage, where a source, pathway or receptor does not exist, then there is considered to be no unacceptable risk.

4.3.23 Within the following table comment is also made on whether each pollutant linkage is a statutory or non-statutory (development) issue.

Table 4.4: Contamination Related Risks

Priority of Linkage	Source	Receptor	Pathway	Current Risk Assessment	Proposed Remedial Action	Residual Risk
1	**Source 1** General Made Ground	Groundwater and surface water (Statutory)	Potential for migration of aqueous phase contamination into the underlying groundwater and surface water.	**Moderate** Identified concentrations of PAH and cyanide within the Made Ground can potentially pose a risk to the underlying groundwater through leaching in the dissolved phase. Leachability studies have shown that total PAH is immobile and is unlikely to leach from the Made Ground in concentrations exceeding DWS and EQS. Cyanides were identified within the Made Ground at the site and there exists the potential for significant concentrations of cyanides, phenols and PAHs within underground structures that may extend under the southern boundary of the site. Cyanide was shown to leach at levels in excess of DWS and EQS. In addition free and total cyanide were found to be in exceedence of DWS and EQS in the groundwater indicating the potential mobilisation of cyanide form the Made Ground on site.	Removal of Made Ground with elevated cyanide concentrations together with removal of underground tanks if encountered during development works.	**Low**
2	**Source 1** General Made Ground	Construction Workers (Non-Statutory)	Ingestion, inhalation or direct contact with contaminated soil	**Low to Moderate** Possibility of ingestion or inhalation of soils contaminated with PAH and cyanide during construction.	Use of appropriate PPE and good housekeeping during site works will mitigate the risk to site workers during the construction phase. Soil excavated during the construction phase should be stockpiled (sheeted and bunded) and tested pending disposal to a suitably licensed landfill.	**Low**

Priority of Linkage	Source	Receptor	Pathway	Current Risk Assessment	Proposed Remedial Action	Residual Risk
2	**Source 1** General Made Ground	Future Site Users **Commercial End Use** (Non-Statutory)	Ingestion, inhalation or direct contact with contaminated soil	**Low** Possibility of ingestion or inhalation of soils contaminated with PAH and cyanide for site users.	Removal of Made Ground and any encountered underground structures with elevated cyanide concentrations will mitigate potential liabilities associated with cyanide contamination. To mitigate residual risk deriving from PAH concentrations in the Made Ground the installation of hardstanding or a layer of gravel is recommended in accessible areas.	**Low**
3	**Source 1** General Made Ground	Concrete Foundations	Direct contact of structures with soils and/or possible pore water	**Moderate to High** The analysis of soil samples and results from the leachability study have indicated aggressive ground conditions and high levels of sulphate.	Depending on the development design the use of up to Class 5 concrete might be required during later development stages (see BRE Digest 363).	**Low**

4.4. Risks from Off-Site Sources

4.4.1 The review of historical information has identified several storage and purifier tanks, gas holders and other production facilities in the immediate vicinity of the site. It is likely that grossly contaminated material is still present on the adjacent site and potentially leaching into sand and gravel aquifer.

4.4.2 It is, therefore, considered likely that contamination identified in the sand and gravel aquifer and associated groundwater is derived, in part, from cross boundary migration of contaminants from the adjacent part of the gasworks.

4.4.3 The former tanks at the southern boundary of the greenline area were not encountered during the investigation and are not thought to pose a significant risk to the proposed development of the site. However, it would be considered prudent to bear in mind that the tank foundations may remain (as shown in trial pit TP1), and these should be removed as part of the construction phase.

5 REMEDIATION

5.1 Remedial Measures with Respect to Statutory Liability (Tadco Environmental Issue)

5.1.1 Concentrations of cyanide identified in the shallow Made Ground on site are considered to potentially pose a significant risk to the environment and human health. It is, therefore, recommended that areas of soil contamination with elevated cyanide concentrations are removed and exchanged for clean material.

5.1.2 In addition, there is the potential that underground structures contaminated with cyanides, phenols and PAHs, extend underneath the southern boundary of the site. If encountered during development excavation works, underground structures will likely need to be removed in order to mitigate possible statutory risks.

5.1.3 Due to the limited number of trial pits excavated during the investigation it is difficult at this stage of the investigation to give accurate estimates of the total volume of soils contaminated with cyanide. However, based on the findings of this investigation soil volumes for remediation of contaminated soils are as follows:-

- Assuming a soil strip of 0.5x12x12 = 72m^3;
- Minus the soil to be removed due to the foundation 0.5x6x6 = 18m^3; and
- Total to be removed and replaced = 54 m^3.

5.1.4 During development of the site and the duration of remedial works it is recommended that site workers use appropriate PPE for the level of contamination and that good house-keeping practices are observed. The excavated soil material shall be disposed off to a suitable landfill facility. It is also recommended that the site be covered with hardstanding in accessible areas following the remediation to reduce the risks associated with elevated PAH concentrations in the Made Ground. This will also to reduce rainwater infiltration and the potential for mobilisation of soluble contamination.

Estimated Costs

5.1.5 The costs for remediation of the soils not to be removed as part of the construction of the mast foundation are as follows:-

• Volume of soil to be remediated = 54 m^3 @ £50/m^3	£2,700
• Replacement with inert fill = 54m^3 @ £30/m^3	£1,800
• **Total**	**£4,500**

5.1.6 These costs do not include landfill tax duty, contractors set up, supervision, and validation, overhead and profit and they can only be regarded as provisional estimates based on currently available data obtained from the ground investigation.

5.1.7 It is important to note that remedial costs may vary if underground structures (tank foundations) are identified during the development phase.

5.2 Remedial Measures in Respect to Non-Statutory (Development) Issues (Transco/Spectrasite JV Issue)

5.2.1 Remedial measures with regard to statutory issues are considered to automatically mitigate the site from non-statutory liabilities associated with the site. Special care should be taken to the construction and location of future foundations due to the aggressive ground conditions encountered on site.

5.2.2 In order to reduce residual risks associated with elevated PAH concentrations in the Made Ground it is recommended that hardstanding is installed in accessible areas on the site to reduce human contact with contaminated soil.

Estimated Costs

5.2.3 Budget costs for future development of the site are as follows:-

Table 5.1: Budget Development Costs for Statutory and Non-Statutory Development.

	Cost £	Item
Remediation (see Section 5.1.5)	4,500	Removal and Disposal of Made Ground with Elevated Cyanide Concentrations
Construction	3,000-4,000	Removal of contaminated soils and instatement of gravel cover
Borehole Decommissioning	1,500	Decommissioning and Closure

5.2.4 Again, the above costs are not inclusive of contractors set up, supervision, overhead and profit and they can only be regarded as provisional estimates based on currently available data obtained from the ground investigation.

5.3 Geotechnical Considerations

Natural and Artificial Cavities Database Search

5.2.5 A search of the natural cavities database compiled by Parsons Brinckerhoff Ltd's predecessor's (Applied Geology Limited) for the Department of the Environment has identified 1 No record within a 2km radius of the site centre. These recorded a feature - at NGR TQ 521 566, approximately 750m south-west of the site - is made up of an unknown number of fissures encountered during excavation works in a former quarry within the Folkestone Beds. A search of an artificial cavities database also compiled at that time by Parsons Brinckerhoff Ltd's predecessors has identified nil records for the 2km search radius.

Strata Encountered

5.3.1 Borehole BH1 has confirmed the general anticipated geology with Made Ground proven to 1.8m depth overlying the Lower Cretaceous aged Folkestone Beds. The Made Ground sequence comprised an upper sequence of brown gravelly sandy silt with a thin layer of broken slates overlying buried brickwork and concrete which was present from 0.92m to 1.35m depth. Beneath this old foundation dark coloured gravelly sand fill was present to 1.85m depth.

5.3.2 Natural ground was encountered in BH1 at 1.85m depth and comprised a sequence of brown slightly silty fine and fine to medium sands consistent with the Folkestone Beds. These sands were proven to 7.3m depth. The sands were assessed as moderately compact to compact.

5.3.3 Trial pit TP1 proved Made Ground to 1.6m depth where the presence of a buried pipe resulted in the abandonment of the test pit. TP2 again proved Made Ground to 1.8m depth overlying a buried dark fine sand topsoil / subsoil horizon of some 800mm total thickness. Beneath the topsoil/ subsoil horizon, at 2.6m depth, light brown very silty fine sand was present. The logging engineer again assessed these sands to be moderately compact.

5.3.4 Earlier trial pits by others (circa 1992) in this area had indicated slightly greater depths of Made Ground with up to 2.2m depth of fill locally identified

5.3.5 Both of the trial pits were dry during excavation and no discernible groundwater strikes was noted during the sinking of BH1. The use of water flush to assist casing installation and advancement of the bore below 5.7m will, however, have masked any such strikes. Limited subsequent groundwater monitoring of the standpipe installed in BH1 has shown groundwater standing at 3.345m depth on completion of the installation of the standpipe.

Foundation Considerations

5.3.6 The presence of surface Made Ground to some 1.8m to 2.2m depth, together with the presence of old footings extending to 1.35m depth and the underlying presence locally of topsoil / subsoil extending to some 2.8m depth, makes prevailing ground conditions unsuitable at this particular location for the proposed raft slab to be simply placed in the near surface soils. As such there are essentially two options at this location, as follows:

(a). construct the raft slab on a granular (or stone) mattress; or

(b). Resort to a piled foundation

5.3.7 (a).Use of a Granular (Stone) Mattress

This option will entail:

- Excavation of the existing Made Ground and underlying topsoil / subsoil to expose the underlying Folkestone Beds over an extended footprint of the mast foundation (i.e. excavation to a depth in the order of 2.8m)

- Inspection of the exposed Folkestone Beds surface by an experienced geotechnical specialist to confirm suitability of the foundation stratum and to check for the possible presence of natural solution related fissuring.

- Placement then of suitable, imported, granular fill placed and compacted in a controlled exercise to required formation level.

- Construction of the raft foundation slab directly onto the compacted stone.

For design purposes, it is recommended that the allowable bearing pressure assigned to the upper weathered horizons of the Folkestone Beds be limited to 100 kPa. Based on this loading, resultant total and differential settlements should be small (i.e. less than 25mm).

With this option, disposal of excavated arisings will be required. Also, borehole BH1 has identified the presence of old foundations relating to some former gas works building / structure. Available historical information from circa 1959 indicates a possible former building extending into the southeastern corner of the site. In the same location, an earlier plan of circa 1936 indicates the presence of above ground tanks.

The likely requirement to excavate and remove materials to 2.6m depth may well render this option impractical. Consequently, resort to the alternate piled foundation scheme option may be required.

5.3.8 (b). Piled Foundation option

This alternate foundation option would entail sinking piles into the Folkestone Beds. Further investigation would be required to confirm design parameters if this option was to be considered further. The close proximity of residential properties may preclude the use of a driven form of pile on environmental considerations. Consequently, resort to a bored form of pile construction may be required. Consideration could be given to the suitability of the chd (continuous helical displacement) [or screw pile] technique from which essentially 'no spoil arisings occur.

However, irrespective of the piling technique utilised, the presence of buried foundations will likely necessitate advance excavation at proposed pile positions to check for and remove these potential obstructions.

During pile construction, a careful watch should be maintained for any anomalous conditions which may potentially be indicative of the presence of dissolution related fissuring (e.g. Increased concrete takes where bored piles

are used or increased pile lengths required in the case of driven piles). If encountered, specialist geotechnical advice should be sought.

5.4 Borehole Closure

5.4.1 Following completion of ground water monitoring, it is recommended that borehole BH1 is decommissioned in accordance with the Project Mayflower Guidance Document (August 2000 V6). The estimated cost for this work is £1,500.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

6.1.1 An intrusive ground investigation was undertaken on part of the former gas works site at Sevenoaks Holder Station, Cramptons Road, Sevenoaks, Kent. The investigation comprised the excavation of 2 No. trial pits and 1 No. borehole with associated soil and groundwater sampling.

6.1.2 Following analysis of soil samples obtained during the investigation and comparison of the results with relevant screening criteria it is considered that concentrations of cyanide identified in the shallow Made Ground on site potentially pose a significant risk to human health and the environment. It is, therefore, concluded that there is a moderate statutory risk arising from the site to the SpectraSite-Transco joint venture. However, associated risks could be mitigated as recommended below.

6.1.3 The former tanks at the southern boundary of the greenline area were not encountered during the investigation and are not thought to pose a significant risk to the proposed development of the site. However, it would be considered prudent to bear in mind that the tank foundations may remain (as shown in trial pit TP1), and this should be taken into account during the construction of the mast.

6.1.4 Following the analysis of soil samples from the Natural Ground and the analysis of a groundwater sample obtained during the investigation, it is considered that identified contamination in the groundwater and sand and gravel aquifer derives from a combination of off and on site sources. The potential risk of a liability to Tadco with regard to statutory risks from contamination encountered in the Natural Ground and groundwater is, therefore, considered to be moderate.

6.1.5 Additional constraints to the development of the site might be posed by aggressive ground conditions encountered during the site investigation. It is recommended that this be taken into consideration during the design of future foundation structures.

6.2 Recommendations

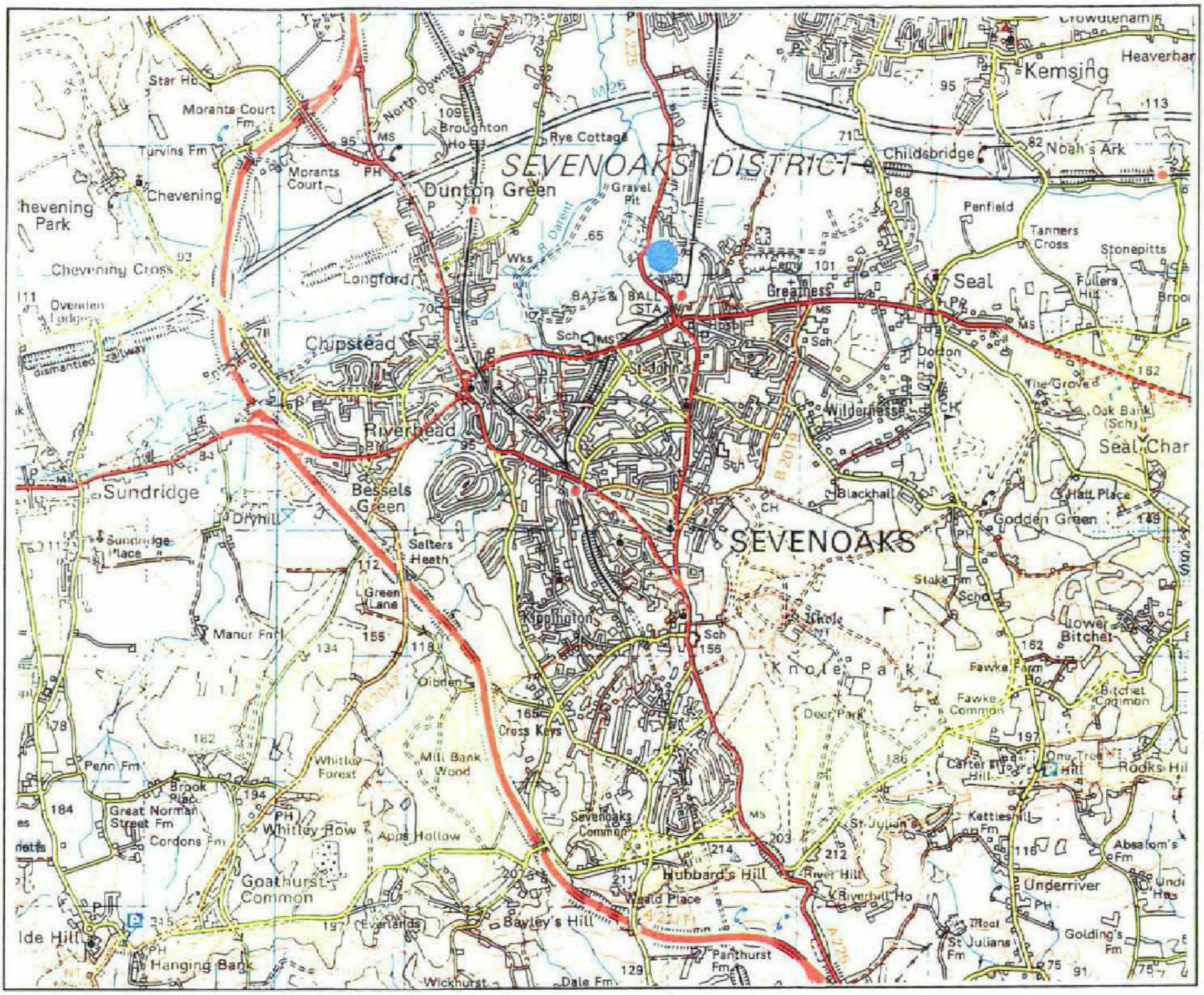
6.2.1 In order to mitigate the site from statutory liabilities associated with significant cyanide concentrations in the shallow Made Ground, it is recommended that areas of cyanide contamination in the soil are removed and replaced with inert material to a depth of 0.5m below ground level. In addition it is recommended that a layer of gravel be placed in accessible areas to minimise human contact with elevated PAH concentrations in the Made Ground.

6.2.2 Budget costs for the recommended remedial works are estimated at approximately £4,500. Construction costs (removal of soils and instatement of a layer of gravel) would be in the region of £3,000-4,000. The above costs do not include for contractors set up, overhead and profit and can only be

regarded as provisional estimates based on currently available data obtained from the ground investigation.

6.2.3 Following completion of ground water monitoring, it is recommended that borehole BH1 is decommissioned in accordance with the Project Mayflower Guidance Document (August 2000 V6). The estimated cost for this work is £1,500.

FIGURES



Key:-

Site Location

Parsons Brinckerhoff

Spectrasite Transco Communications Ltd

Former Gasworks

Cramptons Road

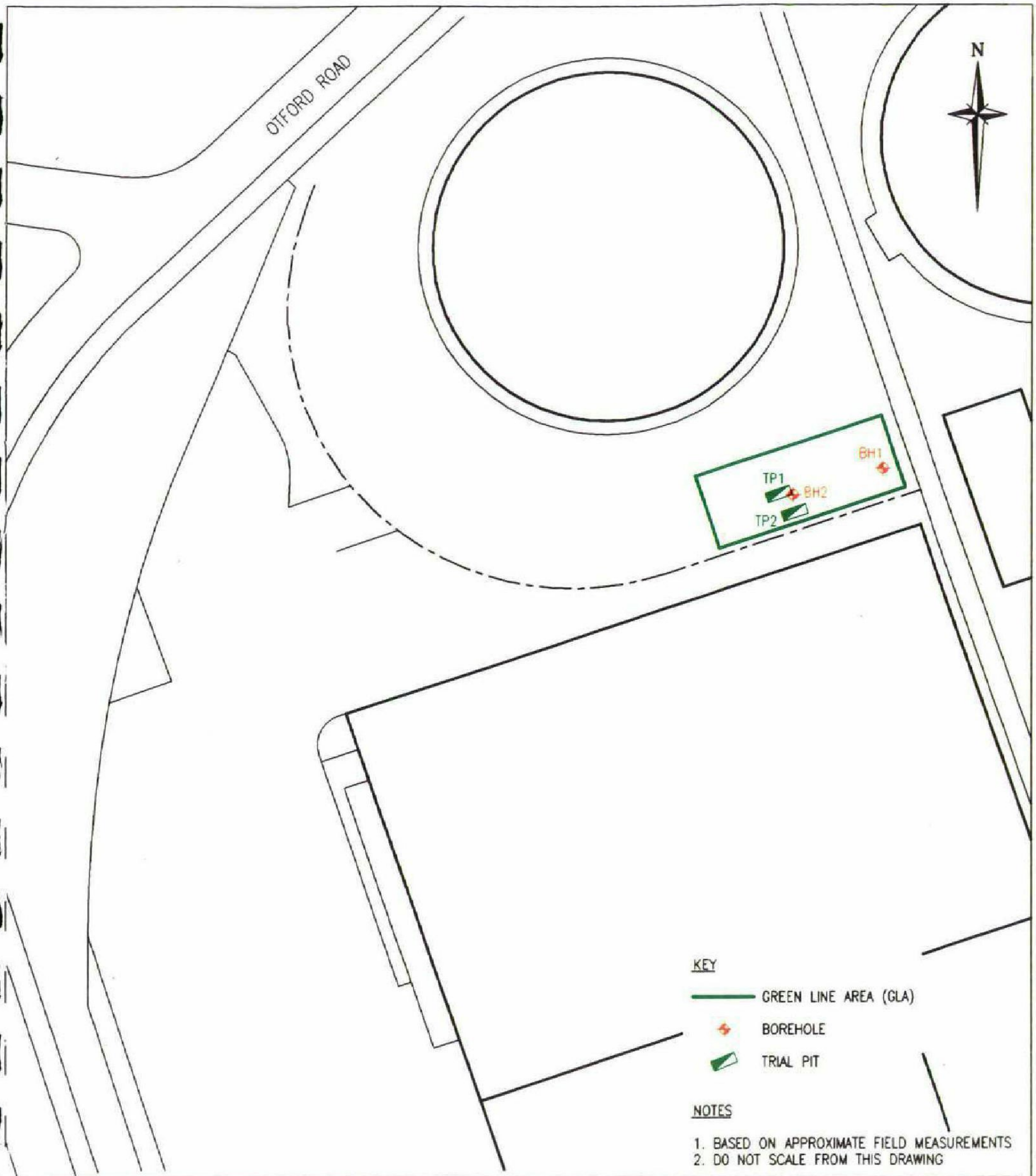
Sevenoaks

Kent

Figure 1: Site Location Plan

Project No: BEN45066	Scale:1:50 000
	Drawn By: EB

Reproduced from the Ordnance Survey Map with the permission of the Controller of Her Majesty's Stationary Office Crown Copyright Reserved Licence No. LA549150



PB PARSONS BRINCKERHOFF

Parsons Brinckerhoff Ltd
Queen Victoria House, Redland Hill, Bristol, United Kingdom, BS6 6US
Tel: 44-(0)117 9739090 Fax: 44-(0)117 9237479

- CLIENT/PROJECT

SPECTRASITE TRANSCO COMMUNICATIONS LTD
107 CRAMPTONS ROAD, SEVENOAKS, KENT

- TITLE

SITE PLAN SHOWING EXPLORATORY HOLE LOCATIONS

- DATE 17/01/01
- SCALE 1:500
- CAD REF \BEN\450\66\Z\1\SEVENOAKS-F02

DRAWN BY BRG
PRODUCED BY BRG
CHECKED
APPROVED

- DRAWING NUMBER

FIGURE 2 | —

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THIS DRAWING WAS PRODUCED USING AUTOCAD AND SHOULD ON NO ACCOUNT BE AMENDED BY HAND

APPENDIX A

PHOTOGRAPHS

Photo 1a

Sevenoaks Holder Station – Trial Pit TP1 – View West

Photo 1b

Sevenoaks Holder Station – Arisings Trial Pit TP1 – View South East

Photo 2a

Sevenoaks Holder Station – Trial Pit TP2 – View South

Photo 2b

Sevenoaks Holder Station – Trial Pit TP2 – View ENE of trial pit

Photo 3a

Sevenoaks Holder Station – Bore Hole BH1 – Borehole Arisings

APPENDIX B

SITE INVESTIGATION LOGS

SITE MONITORING REPORTS

Parsons Brinckerhoff Ltd, Queen Victoria House, Redland Hill, Redland, Bristol BS6 6US Tel. 0117-973-9090 Fax. 0117-923-7479

PARSONS BRINCKERHOFF

Record of Trial Pit TP1

Easting		Start date	12/03/2001
Northing		End date	12/03/2001
Ground level		Backfill date	12/03/2001
Final depth	1.60m	Page	1 of 1

Job No. : BEN45066
Site Name : Cramptons Road, Sevenoaks
Client : EnvirosAspinwall

Samples & Testing					Strata			
Average Vane Strength	Water	Depths From	Depths To	Type	Legend	Depth (Thickness)	Level m AOD	Strata Descriptions
						(0.10)		Concrete hard standing
		0.35	0.35	D		0.10 (0.35)		MADE GROUND comprising (loose) brown gravelly very silty sand. Gravel sub-rounded and medium to coarse. Thin parting of sand at 0.3m
						0.45 (0.05)		MADE GROUND comprising (loose) purple black clinker gravel
		0.70	0.70	D		0.50 (0.40)		MADE GROUND comprising (loose) yellow brown locally, streaked blue (sand) with occasional broken & intact bricks. Spent oxide odour noted.
						0.90		
		1.40	1.40	D		(0.70)		MADE GROUND comprising (loose) yellow brown sand becoming slightly gravelly. Pit abandoned at 1.6m bgl due to presence of unknown pipe.
						1.60		

General remarks

1. Concrete broken out using pnumatic tools then starter pit hand dug to 1.2m bgl.
2. No groundwater encountered.
3. Pit abandoned at 1.6m bgl due to presence of buried pipe. 2cm diameter.
4. Pit backfilled with materials arising. 50mm HDPE slotted standpipe incorporated. Gas valve and surface cover installed (referenced BH2)

Plant: JCB 3CX

Shoring: NONE

Stability: GOOD

Pit dimensions:
Width: 0.7m
Length: 2.5m

Groundwater:

Orientation: 90deg.

Checked by: [redacted]

Logged by: TG

Notes:
1. Relative densities by visual assessment only
2. All dimensions in metres unless otherwise stated

Parsons Brinckerhoff Ltd, Queen Victoria House, Redland Hill, Redland, Bristol BS6 6US Tel. 0117-973-9090 Fax. 0117-923-7479

PARSONS BRINCKERHOFF

Record of Trial Pit TP2

Job No. : BEN45066
Site Name : Cramptons Road, Sevenoaks
Client : EnvirosAspinwall

Easting		Start date	12/03/2001
Northing		End date	12/03/2001
Ground level		Backfill date	12/03/2001
Final depth	3.60m	Page	1 of 1

Samples & Testing					Strata			
Average Vane Strength	Water	Depths From	Depths To	Type	Legend	Depth (Thickness)	Level m AOD	Strata Descriptions
						(0.10) 0.10		Concrete hard standing
		0.35	0.35	D		(0.10) 0.20		MADE GROUND comprising (loose) brown gravelly very silty sand
						(0.22) 0.42		MADE GROUND comprising (moderately compact) blue-black very gravelly coarse sand with broken & whole bricks. Gravel composed of purple-black clinker
						(0.23) 0.65		MADE GROUND comprising (moderate compact) brown-black slightly silty very gravelly sand.
		0.90	0.90	D		(0.45) 1.10		MADE GROUND comprising black & brown very gravelly sand. Tar/bituminous odour noted
		1.60	1.60	D		(0.70) 1.80		MADE GROUND comprising (loose to moderately compact) brown black gravelly very silty sand
		2.80	2.80	D		(0.80) 2.60		(loose) dark brown very silty fine SAND with many fine rootlets (buried topsoil/subsoil).
						(1.00) 3.60		(loose to moderately compact) light brown very silty fine SAND

General remarks

1. Concrete broken out using pnumatic tools then starter pit hand dug to 1.2m bgl.
2. No groundwater encountered.
3. Pit backfilled with materials arising.

Plant: JCB 3CX

Shoring: NONE

Stability: GOOD

Pit dimensions:
Width: 0.7m
Length: 1.9m

Groundwater:

Orientation: 90deg.

Checked by: [redacted]

Logged by: TG

Notes:
1. Relative densities by visual assessment only
2. All dimensions in metres unless otherwise stated

Parsons Brinckerhoff Ltd, Queen Victoria House, Redland Hill, Redland, Bristol BS6 6US Tel. 0117-973-9090 Fax. 0117-923-7479

PARSONS BRINCKERHOFF

Record of Borehole BH1

Job No. : BEN45066
Site Name : Cramptons Road, Sevenoaks
Client : EnvirosAspinwall

Easting		Start date	12/03/2001
Northing		End date	12/03/2001
Ground level		Backfill date	12/03/2001
Final depth	7.50m	Page	1 of 2

Progress				Samples & Testing				Strata				
Date	Hole	Casing	Water	Depths From	Depths To	Type	Field Record	Legend	Depth (Thickness)	Level m AOD	Strata Descriptions	Standpipe
									(0.45)		MADE GROUND comprising (loose moderate dense) brown sandy, gravelly silt. Gravel is medium large sub-rounded to angular.	
									0.45		Bricks appearing at 0.25mbgl.	
									(0.25)		MADE GROUND comprising (loose) purple black broken slates with iron nails. Old roofing material. Bitumious odour	
				0.75	0.75	D			0.70			
									(0.22)		MADE GROUND comprising (loose) black occasionally gravelly sandy silt. Moderate gas works odour (spent oxide)	
									0.92			
									(0.43)		MADE GROUND comprising concrete and brick base.	
				1.35	1.55	D			1.35			
									(0.30)		MADE GROUND comprising (moderate dense) black-grey very coarse sand.	
				1.60	1.80	D			1.65			
									(0.20)		MADE GROUND comprising (moderate dense - dense) brown - with black pockets silty sand. No strong odour	
									1.85			
									(0.15)		MADE GROUND comprising (moderate dense), dark brown slightly gravelly sand. Gravel is small sub angular clinker.	
									2.00			
				2.20	2.40	D					(moderate dense) brown slightly silty fine SAND	
				2.40	2.50	B			(0.80)			
									2.80			
				2.80	3.20	B			(0.30)		(dense) brown silty very fine SAND	
									3.10			
									(0.60)		(dense to very dense) brown silightly silty fine to medium SAND	
				3.34								
				3.3								
				3.50	3.70	D			3.70			
									(0.45)		Bands of lighter grey brown SAND at 3.5m & 4.05m	
				4.00	4.20	D			4.15			
									(0.15)		(Dense to very dense) brown slightly gravelly silty SAND	
									4.30			
									(0.40)		(Moderate dense) brown to orange slightly silty fine to medium SAND	
									4.70			
											(moderate dense) brown fine to medium SAND.	

Diameters		
Depth (m)	Hole (mm)	Casing (mm)

Groundwater		
Depth struck	After 20 mins	Depth sealed
3.34	3.34	

General remarks

1. Hand dug starter pit to 0.92m bgl then advanced by dynamic sampling
2. Concrete and brick base at 0.92m CORED with drill rig.
3. No recovery from 5.7m to 7.5m bgl due to use of water flush to assist drilling.
4. Installation Details
Gravel annulus from 7.5m to 2.5m bgl.
Bentionite seal from 2.5m to 0.0m bgl.
50mm "slotted" HDPE pipe with geotextile sock from 7.5m to 3.0m bgl.
50mm "plain" HDPE pipe from 3.0m to 0.0m bgl.
Gas monitoring well head installed.

Notes:
All dimensions in metres unless otherwise stated

Equipment and Methods

PIONEER

Drilled by: GEOTECH
Logged by: TG
Checked by: [redacted]

Parsons Brinckerhoff Ltd, Queen Victoria House, Redland Hill, Redland, Bristol BS6 6US Tel. 0117-973-9090 Fax. 0117-923-7479

PARSONS BRINCKERHOFF

Record of Borehole BH1

Job No. : BEN45066
Site Name : Cramptons Road, Sevenoaks
Client : EnvirosAspinwall

Easting		Start date	12/03/2001
Northing		End date	12/03/2001
Ground level		Backfill date	12/03/2001
Final depth	7.50m	Page	2 of 2

Progress				Samples & Testing				Strata				
Date	Hole	Casing	Water	Depths From	Depths To	Type	Field Record	Legend	Depth (Thickness)	Level m AOD	Strata Descriptions	Standpipe
				5.10	5.30	D			(2.80)	7.50	Hole terminated at 7.5m	

Diameters		
Depth (m)	Hole (mm)	Casing (mm)

Groundwater		
Depth struck	After 20 mins	Depth sealed

General remarks

Notes:
All dimensions in metres unless otherwise stated

Checked by: [redacted]

Equipment and Methods

PIONEER

Drilled by: GEOTECH
Logged by: TG

Issue 1 01/01

Site Name:	Sevenoaks
Date of visit:	12/03/01
Pressure (mb):	988

BH	Flow Rate (l/m)	Gas monitoring (%)			H_2O Monitoring (m)			Purge Vol (x3) (l)	Recovery Time (mins)	pH	Temp (°C)	Dissolved O_2 (%)	Conductivity (µs)	Comments
		CH_4	O_2	CO_2	Surface	Base	Product							
BH 2	0.01	0.0	19.5	0.0										DRY
BH 1	0.0	0.0	19.5	0.0	3.345	7.75	-			5.8	6.4	68.6	176	Very weak tarry odour ???

Samples Taken BH1

Meters Calibrated -Y

Notes:

[1] A trip blank must be taken for each site visit. (This should be provided by the laboratory carrying out the analysis)

[2] A duplicate of ONE borehole is needed for each site visit.

[3] Testing- BG suite, TPH, VOCs, Nitrate, Total Hardness as $CaCO_3$.

SAMPLES MUST BE KEPT COOL AND DISPATCHED ON DAY OF SAMPLING WITH SCHEDULING

NB do not forget to take field meters

Geotechnical Engineering Limited

DRILLER'S DAILY REPORT

CRAMPTONS RD. SEVE...

CLIENT Parsons Brinckerhoff DATE 12th March 01 CONTRACT No. 12220

SITE ~~6 Sevenoaks Rd St Mary Cray~~, Kent. SHEET 1 of 1 BOREHOLE 1

TIME AND PRODUCTION RECORD

from	0800	rig move	no	hr	dynamic sampling	m	hr
to	1900	rig up	no	hr	core drilling	m	hr
hrs	11 hr	rig down	no	hr	CFA	m	hr
transport to and from site				hr	HSFA	m	hr
awaiting access/instructions				hr	penetration testing	no	hr
TRAVEL TO NEXT				hr	undisturbed sampling	no	hr
SITE				1 hr	installing	m	hr

PIEZOMETER / STANDPIPE RECORD

TYPE	SCREEN (m)			CASING (m)			RESPONSE ZONE/SEAL	No. USED	COVER TYPE		WELL HEAD	
	1.0	1.5	3.0	1.0	1.5	3.0	washed sand	25kg bags	helmet		push on cap	no
HDPE	3		1			1	gravel	25kg bags	stopcock		gas valve	no
UPVC							bentonite pellets	25kg bags	traffic rated			no
Triloc							bentonite powder	25kg bags	manhole		WATER LEVELS	
19mm							cement	25kg bags	padlocks		before am/pm	m
							ballast	25kg bags			after am/pm	m

DRILLING AND SAMPLING RECORD

sample no.	type	depth (m bgl) from	to	drilled (m)	recov'd (m)	casing size (mm)	casing depth (m bgl)	water depth (m bgl)	penetration test seating		test drive				strata description	installation / backfilling	depth (m bgl)	installation description
	INSPECTION PIT	TO	1.00m												000m TO 1.00m	GL	000m	
1x	116	1.00	1.35	0.35	0.35										CLAY GRAVEL FILL +		0.60m	
-	SPTc	1.35	1.80	0.45	0.00	-	-	dry	4	5	1	1	1	1	CONCRETE			
REAM	113mm	CASING TO 1.35m													1.00m TO 1.35m			BENTONITE SEAL
2x	98	1.35	2.80	1.45	1.45										BRICK			
FLUSH	113mm	CASING TO 2.80m													1.35m TO 1.50m			
3D	SPT	2.50	3.25	0.45	0.35	113	2.80	0.50	2	3	6	7	10	10	SANDY CLAY FILL		3.00m	
4x	98	2.80	4.10	1.30	1.30										1.50m TO 7.30m			
5D	SPT	4.10	4.55	0.45	0.35	113	2.80	2.30	4	4	6	9	9	10	DENSE LIGHT BROWN			2.5mm GRAVEL
FLUSH	113mm	CASING TO 4.10m													SAND			
6x	98	4.10	5.20	1.20	1.20													
7D	SPT	5.20	5.65	0.45	0.35	113	4.10	3.20	7	9	10	10	12	14				
8x	98	5.20	5.70	0.50	0.50												7.00m	
9D	SPT	5.70	6.15	0.45	0.35	113	5.20	3.60	9	16	16	17	17	20			7.30m	
-	101	5.70	7.30	1.60	NIR													

WATER DEPTHS (m bgl)

NOTE

a.m.	p.m.		struck at		settled at
after striking	5	10	15	20	
sample taken at			before water flush		
before pulling casing			after pulling casing		

REMARKS

S.P.T / 7.30m TO 7.49m 10/15/5d for 4cm (19cm TOTAL)

* 2m LENGTH OF SLOTTED PIPE INSTALL IN TRIAL PIT DUG BY JCB

weather	driller	assistant driller	landrover	rig
Overcast	M Stevens	D Sievony	WS21 JAE	Comacchio

APPENDIX C

ANALYTICAL RESULTS

NEW PROFORMA FOR REPORTING ANALYTICAL RESULTS (SOIL)

All analytical results to be reported as mg/kg ONLY

R54976

Site Name: Sevenoaks
Date: 12/04/01
Laboratory: Environmental Analysis Laboratories

Date Sampled:	12/03/01	12/03/01	12/03/01	12/03/01	12/03/01	12/03/01	12/03/01
Laboratory Sample Reference	94285	94288	94289	94292	94293	94294	94296
Trial Pit/Borehole No.	BH1	BH1	BH1	TP1	TP2	TP2	TP2
Sampling Depth (m)	1.60-1.80	4.00-4.20	5.10-5.30	1.40	0.35	0.90	2.80
Hardstanding at Surface (Y/N)							
pH	4.5	4.3	4.3	4.0	7.3	7.2	6.5
% Loss on Ignition	5.31	1.20	1.08	1.56	3.86	5.95	1.88
% Moisture	13.26	8.09	8.44	7.00	7.72	7.68	9.91
% Stones	4	0	0	0	41	46	0
Cresols	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Xylenols & Ethylphenols	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthols	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Trimethylphenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Phenols	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.8
Acenaphthylene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	11.7
Acenaphthene	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	10.8
Fluorene	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	50.9
Phenanthrene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	386.7
Anthracene	1.8	<0.5	4.2	<0.5	<0.5	203.7	375.4
Fluoranthene	2.9	<0.5	17.7	<0.5	<0.5	95.8	404.8
Pyrene	3.8	<0.5	15.7	<0.5	<0.5	91.2	326.1
Benzo(a)anthracene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	18.1
Chrysene	2.0	<0.5	15.1	<0.5	<0.5	61.9	219.1
Benzo(b)fluoranthene & Benzo(k)fluoranthene	1.5	<0.5	11.5	<0.5	<0.5	59.6	170.3
Benzo(a)pyrene	2.7	<0.5	10.1	<0.5	<0.5	38.0	116.7
Indeno(1,2,3-cd)pyrene & Di-benzo(a.h.)anthracene	1.7	<0.5	6.2	<0.5	<0.5	19.9	94.3
Benzo(g.h.i.) Perylene	1.6	<0.5	4.4	<0.5	<0.5	11.8	74.5
Total PAH	21.1	<0.5	96.3	<0.5	<0.5	604.5	2398.8
Easily Liberatable Cyanide	6.9	<1	<1	<1	32.4	2.7	6.9
Complex Cyanide	182.6	<1	1.6	1.8	418.1	4.5	9.1
Total Cyanide	189.5	<1	1.6	1.8	450.4	7.2	16.0
Elemental Sulphur	49	<10	<10	80	939	655	<10
Water Soluble Sulphate	4431	480	520	4169	4263	2275	1180
Water Soluble Chloride	25	28	334	23	19	13	27
Exchangeable Ammonium	16.1	18.7	6.9	12.4	5.2	<5	24.7
Arsenic	14.7	16.4	19.5	10.4	18.6	8.5	13.5
Cadmium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	19	15	23	17	11	9	30
Lead	86	7	4	35	101	22	8
Mercury	0.3	<0.2	<0.2	<0.2	0.3	<0.2	<0.2
Selenium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Copper	25	5	5	7	27	14	5
Nickel	14	17	24	14	16	14	22
Zinc	36	29	41	33	34	24	37
Boron	1.5	2.4	1.3	1.5	2.2	2.4	1.5

ANALYTES TO BE DETERMINED ONLY IF THEIR PRESENCE IS SUSPECTED

Cobalt							
Vanadium							
Molybdenum							
Germanium							
Hexavalent Chromium							
Benzene							
Toluene							
Ethylbenzene							
Xylene							
Mineral Oil (%)							
Asbestos (%)							
ADDITIONAL ANALYTES							
Anthanthrene	1.2	<0.5	6.1	<0.5	<0.5	<0.5	41.7
Benzo(e)pyrene	<0.5	<0.5	5.3	<0.5	<0.5	22.6	92.9
Catechol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Resorcinol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Petroleum Hydrocarbons						<5	

ENVIRONMENTAL ANALYSIS LABORATORIES

15 Burgess Road, Ivyhouse Lane Industrial Estate, Hastings, East Sussex. TN35 4NR
Fax: 01424 442299 Tel: 01424 444433 info@environmentalanalysis.com

ANALYTICAL REPORT No. R54976

Location: Sevenoaks

CLIENT: Parsons Brinckerhoff Ltd

Queen Victoria House, Redland Hill
Redhill, Bristol BS6 6US

F.A.O: Tim Graves

Your Job No: BEN45066
Sampling Date: 12/03/01
Reporting Date: 12/04/01

Soil (VOC suite)			TP/BH	TP2
			Depth (m)	0.90
			Our ref	94294
1,1-Dichloroethylene	(mg/kg)	N		<0.02
Dichloromethane	(mg/kg)	N		<0.02
Hexane	(mg/kg)	N		<0.02
trans-1,2-Dichloroethylene	(mg/kg)	N		<0.02
1,1-Dichloroethane	(mg/kg)	N		<0.02
2,2-Dichloropropane	(mg/kg)	N		<0.02
cis-1,2-Dichloroethylene	(mg/kg)	N		<0.02
Chloroform	(mg/kg)	N		<0.02
Bromochloromethane	(mg/kg)	N		<0.02
1,1,1-Trichloroethane	(mg/kg)	N		<0.02
1,2-Dichloropropene	(mg/kg)	N		<0.02
Carbon Tetrachloride	(mg/kg)	N		<0.02
1,2-Dichloroethane	(mg/kg)	N		<0.02
Benzene	(mg/kg)	N		<0.02
Trichloroethylene	(mg/kg)	N		<0.02
1,2-Dichloropropane	(mg/kg)	N		<0.02
Bromodichloromethane	(mg/kg)	N		<0.02
Dibromomethane	(mg/kg)	N		<0.02
cis-1,3-Dichloropropene	(mg/kg)	N		<0.02
Toluene	(mg/kg)	N		<0.02
trans-1,3-Dichloropropene	(mg/kg)	N		<0.02
1,1,2-Trichloroethane	(mg/kg)	N		<0.02
1,3-Dichloropropane	(mg/kg)	N		<0.02
Tetrachloroethylene	(mg/kg)	N		<0.02
Chlorodibromomethane	(mg/kg)	N		<0.02
Dibromoethane	(mg/kg)	N		<0.02
Chlorobenzene	(mg/kg)	N		<0.02
Ethylbenzene	(mg/kg)	N		<0.02
meta & para Xylene	(mg/kg)	N		<0.02
ortho Xylene	(mg/kg)	N		<0.02
Styrene	(mg/kg)	N		0.08
1,2,3-Trimethylbenzene	(mg/kg)	N		<0.02
Bromoform	(mg/kg)	N		<0.02
1,1,2,2-Tetrachloroethane	(mg/kg)	N		<0.02
1,2,3-Trichloropropane	(mg/kg)	N		<0.02
n Propylbenzene	(mg/kg)	N		<0.02
Bromobenzene	(mg/kg)	N		<0.02
1,2,4-Trimethylbenzene	(mg/kg)	N		<0.02
1-Chlorotoluene	(mg/kg)	N		<0.02
2-Chlorotoluene	(mg/kg)	N		<0.02
tert Butylbenzene	(mg/kg)	N		<0.02
1,3,5-Trimethylbenzene	(mg/kg)	N		<0.02
1-Methylpropylbenzene	(mg/kg)	N		<0.02
Methyl-isopropylbenzene	(mg/kg)	N		<0.02
1,4-Dichlorobenzene	(mg/kg)	N		<0.02
1,3-Dichlorobenzene	(mg/kg)	N		<0.02
n Butylbenzene	(mg/kg)	N		<0.02
1,2-Dichlorobenzene	(mg/kg)	N		<0.02
1,2-Dibromo-3-Chloropropane	(mg/kg)	N		<0.02
1,3,5-Trichlorobenzene	(mg/kg)	N		<0.02
Hexachlorobutadiene	(mg/kg)	N		<0.02
Naphthalene	(mg/kg)	N		<0.02
1,2,4-Trichlorobenzene	(mg/kg)	N		<0.02

Descriptions of methods & performance data available on request.
N = NAMAS accredited test

Checked by: [redacted]

[redacted]
M.J. Vaney
Technical Manager

V8

www.environmentalanalysis.com

RECEIVED 17 APR 2001

NEW PROFORMA FOR REPORTING ANALYTICAL RESULTS (WATER)

All analytical results to be reported as mg/l ONLY

R54979

Site Name: Sevenoaks
Date: 11/04/01
Laboratory: Environmental Analysis Laboratories

Date Sampled:	12/03/01
Laboratory Sample Reference	94306
Trial Pit/Borehole No.	BH1
Sampling Depth (m)	---
Hardstanding at Surface (Y/N)	
pH	5.8
TOC	7.1
Suspended Solids	23496
Conductivity (µS/cm)	738
Cresols	<0.0001
Xylenols & Ethylphenols	<0.0001
Naphthols	<0.0001
Phenol	<0.0001
Trimethylphenol	<0.0001
Total Phenols	<0.0005
Naphthalene	<0.001
Acenaphthylene	<0.001
Acenaphthene	<0.001
Fluorene	<0.001
Phenanthrene	0.003
Anthracene	0.004
Fluoranthene	0.012
Pyrene	0.010
Benzo(a)anthracene	0.010
Chrysene	0.010
Benzo(b)fluoranthene	0.006
Benzo(k)fluoranthene	0.006
Benzo(a)pyrene	0.004
Indeno(1,2,3-cd)pyrene	0.003
Di-benzo(a.h.)anthracene	<0.001
Benzo(g.h.i.) Perylene	0.003
Total PAH	0.071
Easily Liberatable Cyanide	<0.5
Complex Cyanide	1.4
Total Cyanide	1.4
Thiocyanate	0.3
Elemental Sulphur	<0.1
Sulphate	775
Sulphide	<0.1
Chloride	35
Total Ammonium	4.2
Arsenic	<0.01
Cadmium	<0.001
Chromium	<0.01
Lead	<0.01
Mercury	<0.0002
Selenium	<0.02
Copper	<0.01
Nickel	<0.01
Zinc	2.039
Iron	5.661

ANALYTES TO BE DETERMINED ONLY IF THEIR PRESENCE IS SUSPECTED

Cobalt	
Vanadium	
Molybdenum	
Germanium	
Hexavalent Chromium	
Benzene	
Toluene	
Ethylbenzene	
Xylene	
Total Petroleum Hydrocarbons	<0.1
ADDITIONAL ANALYTES	
Anthanthrene	<0.001
Benzo(e)pyrene	<0.001
Catechol	<0.0001
Resorcinol	<0.0001
Total Hardness	937

ENVIRONMENTAL ANALYSIS LABORATORIES

15 Burgess Road, Ivyhouse Lane Industrial Estate, Hastings, East Sussex. TN35 4NR
Fax: 01424 442299 Tel: 01424 444433 info@environmentalanalysis.com

ANALYTICAL REPORT No. R54979

Location: Sevenoaks

CLIENT: Parsons Brinckerhoff Ltd

Queen Victoria House, Redland Hill
Redhill, Bristol BS6 6US

Reporting Date: 11/04/01

Water (VOC suite)		TP/BH	BH1
		Our ref	94306
1,1-Dichloroethylene	(mg/l)	N	<0.001
Dichloromethane	(mg/l)	N	<0.001
Hexane	(mg/l)	N	<0.001
trans-1,2-Dichloroethylene	(mg/l)	N	<0.001
1,1-Dichloroethane	(mg/l)	N	<0.001
2,2-Dichloropropane	(mg/l)	N	<0.001
cis-1,2-Dichloroethylene	(mg/l)	N	<0.001
Chloroform	(mg/l)	N	<0.001
Bromochloromethane	(mg/l)	N	<0.001
1,1,1-Trichloroethane	(mg/l)	N	<0.001
1,2-Dichloropropene	(mg/l)	N	<0.001
Carbon Tetrachloride	(mg/l)	N	<0.001
1,2-Dichloroethane	(mg/l)	N	<0.001
Benzene	(mg/l)	N	<0.001
Trichloroethylene	(mg/l)	N	<0.001
1,2-Dichloropropane	(mg/l)	N	<0.001
Bromodichloromethane	(mg/l)	N	<0.001
Dibromomethane	(mg/l)	N	<0.001
cis-1,3-Dichloropropene	(mg/l)	N	<0.001
Toluene	(mg/l)	N	<0.001
trans-1,3-Dichloropropene	(mg/l)	N	<0.001
1,1,2-Trichloroethane	(mg/l)	N	<0.001
1,3-Dichloropropane	(mg/l)	N	<0.001
Tetrachloroethylene	(mg/l)	N	<0.001
Chlorodibromomethane	(mg/l)	N	<0.001
Dibromoethane	(mg/l)	N	<0.001
Chlorobenzene	(mg/l)	N	<0.001
Ethylbenzene	(mg/l)	N	<0.001
meta & para Xylene	(mg/l)	N	0.004
ortho Xylene	(mg/l)	N	0.001
Styrene	(mg/l)	N	<0.001
1,2,3-Trimethylbenzene	(mg/l)	N	<0.001
Bromoform	(mg/l)	N	<0.001
1,1,2,2-Tetrachloroethane	(mg/l)	N	<0.001
1,2,3-Trichloropropane	(mg/l)	N	<0.001
n Propylbenzene	(mg/l)	N	<0.001
Bromobenzene	(mg/l)	N	<0.001
1,2,4-Trimethylbenzene	(mg/l)	N	<0.001
1-Chlorotoluene	(mg/l)	N	<0.001
2-Chlorotoluene	(mg/l)	N	<0.001
tert Butylbenzene	(mg/l)	N	<0.001
1,3,5-Trimethylbenzene	(mg/l)	N	<0.001
1-Methylpropylbenzene	(mg/l)	N	<0.001
Methyl-isopropylbenzene	(mg/l)	N	<0.001
1,4-Dichlorobenzene	(mg/l)	N	<0.001
1,3-Dichlorobenzene	(mg/l)	N	<0.001
n Butylbenzene	(mg/l)	N	<0.001
1,2-Dichlorobenzene	(mg/l)	N	<0.001
1,2-Dibromo-3-Chloropropane	(mg/l)	N	<0.001
1,3,5-Trichlorobenzene	(mg/l)	N	<0.001
Hexachlorobutadiene	(mg/l)	N	<0.001
Naphthalene	(mg/l)	N	<0.001
1,2,4-Trichlorobenzene	(mg/l)	N	<0.001

Descriptions of methods & performance data available on request.
N = NAMAS accredited test

Checked by: [redacted]

[redacted]
M.J. Valley
Technical Manager

V8
PRB

www.environmentalanalysis.com

NEW PROFORMA FOR REPORTING
ANALYTICAL RESULTS (LEACHATE)
All analytical results to be reported as mg/l ONLY
R54976

Site Name: Sevenoaks
Date: 12/04/01
Laboratory: Environmental Analysis Laboratories

Date Sampled:	12/03/01
Laboratory Sample Reference	94294
Trial Pit/Borehole No.	TP2
Sampling Depth (m)	0.90
Hardstanding at Surface (Y/N)	
pH	7.0
TOC	5.9
Conductivity (µS/cm)	879
Cresols	0.0026
Xylenols & Ethylphenols	<0.0001
Naphthols	<0.0001
Phenol	<0.0001
Trimethylphenol	<0.0001
Total Phenols	0.0026
Naphthalene	<0.001
Acenaphthylene	<0.001
Acenaphthene	<0.001
Fluorene	<0.001
Phenanthrene	<0.001
Anthracene	<0.001
Fluoranthene	<0.001
Pyrene	<0.001
Benzo(a)anthracene	<0.001
Chrysene	<0.001
Benzo(b)fluoranthene	<0.001
Benzo(k)fluoranthene	<0.001
Benzo(a)pyrene	<0.001
Indeno(1,2,3-cd)pyrene	<0.001
Di-benzo(a.h.)anthracene	<0.001
Benzo(g.h.i.) Perylene	<0.001
Total PAH	
Easily Liberatable Cyanide	3.2
Complex Cyanide	2.2
Total Cyanide	5.4
Sulphate	437
Ammonium	<0.1
Arsenic	<0.01
Cadmium	<0.001
Chromium	<0.01
Lead	<0.01
Mercury	<0.0002
Selenium	<0.02
Copper	<0.01
Nickel	<0.01
Zinc	0.173
Iron	0.977

ANALYTES TO BE DETERMINED ONLY IF THEIR PRESENCE IS SUSPECTED

Cobalt	
Vanadium	
Molybdenum	
Germanium	
Uranium	
Benzene	
Toluene	
Ethylbenzene	
Xylene	
Total Petroleum Hydrocarbons	

ADDITIONAL ANALYTES

Anthanthrene	<0.001
Benzo(e)pyrene	<0.001
Catechol	<0.0001
Resorcinol	<0.0001

NEW PROFORMA FOR REPORTING
ANALYTICAL RESULTS (LEACHATE)
All analytical results to be reported as mg/kg ONLY
R54976

Site Name: Sevenoaks
Date: 12/04/01
Laboratory: Environmental Analysis Laboratories

Date Sampled:	12/03/01
Laboratory Sample Reference	94294
Trial Pit/Borehole No.	TP2
Sampling Depth (m)	0.90
Hardstanding at Surface (Y/N)	
pH	7.0
TOC	59
Conductivity (µS/cm)	879
Cresols	0.026
Xylenols & Ethylphenols	<0.001
Naphthols	<0.001
Phenol	<0.001
Trimethylphenol	<0.001
Total Phenols	0.030
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benzo(a)anthracene	<0.01
Chrysene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Benzo(a)pyrene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Di-benzo(a.h.)anthracene	<0.01
Benzo(g.h.i.) Perylene	<0.01
Total PAH	<0.01
Easily Liberatable Cyanide	32
Complex Cyanide	22
Total Cyanide	54
Sulphate	4369
Ammonium	<1
Arsenic	<0.1
Cadmium	<0.01
Chromium	<0.1
Lead	<0.1
Mercury	<0.002
Selenium	<0.2
Copper	<0.1
Nickel	<0.1
Zinc	1.73
Iron	9.77

ANALYTES TO BE DETERMINED ONLY IF THEIR PRESENCE IS SUSPECTED

Cobalt	
Vanadium	
Molybdenum	
Germanium	
Uranium	
Benzene	
Toluene	
Ethylbenzene	
Xylene	
Total Petroleum Hydrocarbons	

ADDITIONAL ANALYTES

Anthanthrene	<0.01
Benzo(e)pyrene	<0.01
Catechol	<0.001
Resorcinol	<0.001

APPENDIX D

GEOTECHNICAL RESULTS

Geotechnical Engineering Limited

PARTICLE SIZE DISTRIBUTION

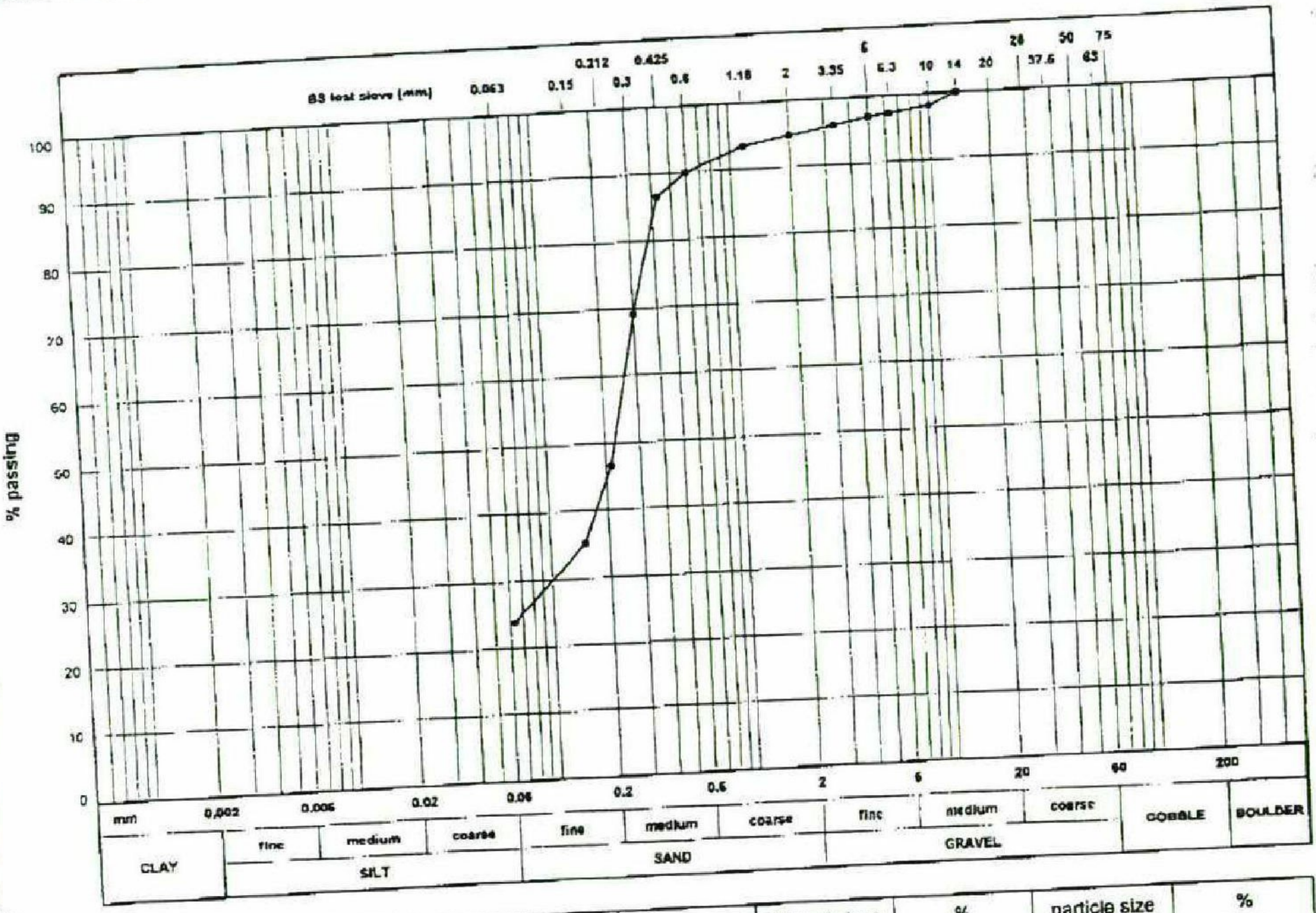
BS.1377 : Part 2 : 1990 : 9

CLIENT PB

SITE SEVENOAKS

DESCRIPTION Yellow-brown very clayey SAND with a little f-m gravel.

BH/TP No.	BH01
SAMPLE No./TYPE	B
SAMPLE DEPTH (m)	2.80
SPECIMEN DEPTH (m)	2.80



soil type	% fraction
SILT & CLAY	24
SAND	71
GRAVEL	5
COBBLE & BOULDER	
test method(s)	9.2

BS test sieve (mm)	% passing
75	
63	
50	
37.5	
28	
20	
14	100
10	98
6.3	97
5	97

BS test sieve (mm)	% passing
3.35	96
2	95
1.18	93
0.6	90
0.425	87
0.3	69
0.212	47
0.15	35
0.063	24

particle size (μm)	% finer
20	
6	
2	

test method:
9.2 - wet sieving
9.3 - dry sieving
9.4 - sedimentation by pipette
9.5 - sedimentation by hydrometer

remarks:

CONTRACT 12220

CHECKED

Geotechnical Engineering Ltd. Tel. 01452 521743 12220.GIF\Sieve_01

APPENDIX E

DESK TOP ASSESSMENT

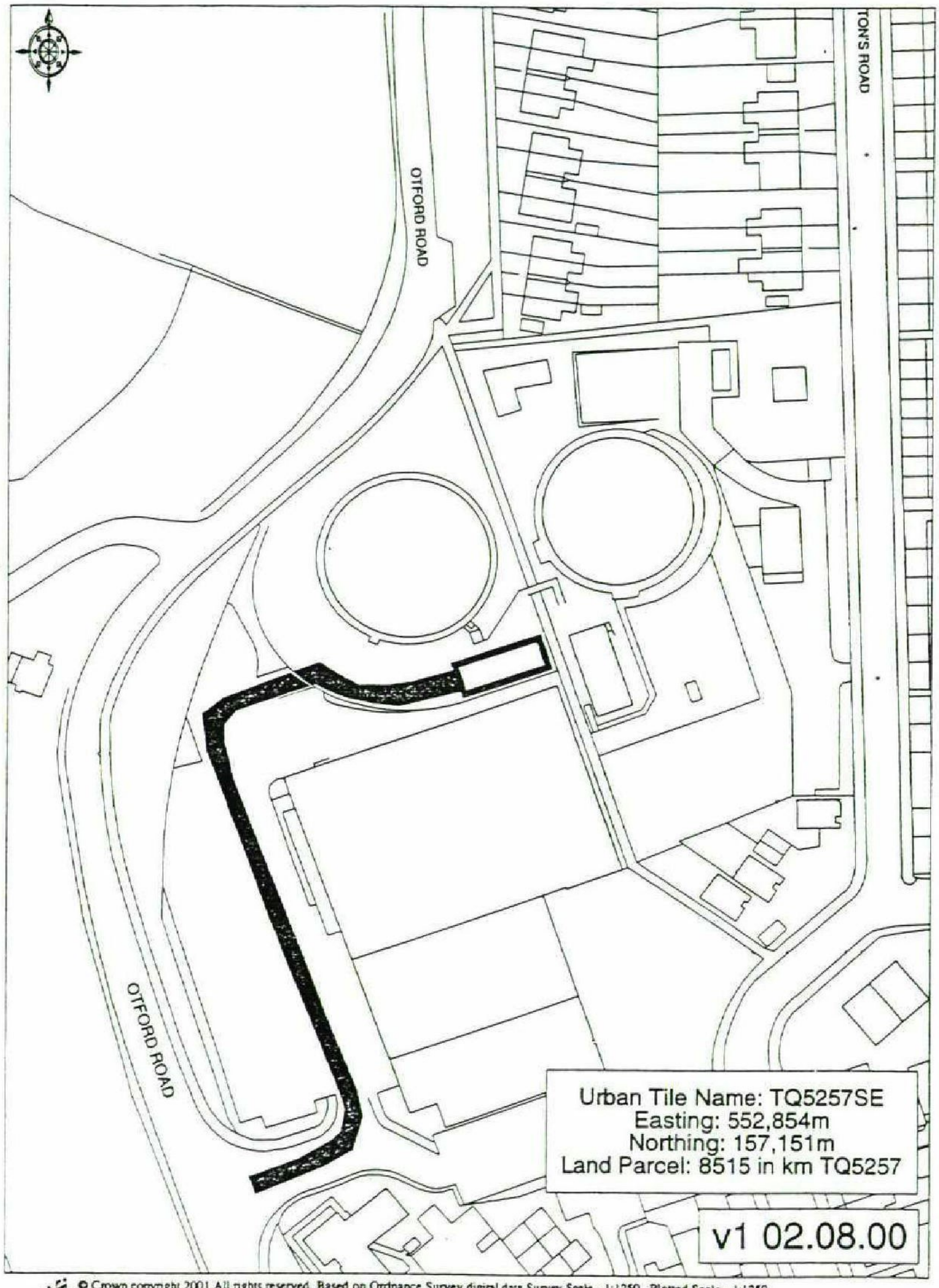
TRANSCO SERVICES PLAN

ORIGINAL GREENLINE PLAN

TRANSCO/SPECTRASITE COMMUNICATION TOWERS SITE REVIEW
GROUND CONTAMINATION RISK EVALUATION SUMMARY SHEET

SITE REFERENCE & LOCATION **Site Address** Number of identified mast sites Site OS NGR Reference Loc Code (Mentor No. if known)	**910547 FORMER GAS WORKS, SEVENOAKS RADIO MAST** Former Gas Works, Cramptons Road, Sevenoaks, Kent, TN14 5DY 1 Preferred (MP) 20m x 8m. MP: TQ 529 571 11090
Current Use/Site History *Mast Area(s)* *Overall Transco Site* *General Area/Surrounding Land Uses*	 MP: Part of old Gas Works Site. Based up on the 1997 site survey, the new MP mast site proposed lies within an area formerly used as gas purifying, below ground tanks. The area is currently un-used (1999) and partially covered in concrete and tarmac. The site is adjacent to an existing Gas Holder (1999) with Transco ground surrounding the site, except for a retail ware house and car park to the south. The overall site is bound to the west by road and open ground, and elsewhere by mixed residential and light industrial properties.
Site Setting *Geology* *Hydrogeology* *Hydrology* *General*	 Site MP consists of made ground (0.5m to 2m thick) predominantly of sandy materials with varying amounts of gravel, brick and ash, overlying sands with gravel belonging to the Folkestone Beds Formation. The sand and gravels of the Folkestone Beds are classified as a major aquifer. Two extraction points are active within 500m, to the north of the site, and used for public water supply. The site has two local field drains within 100m draining in a westerly direction towards the river Darent some 650m to the west, and is classified as D or fair water quality. There is also a wildfowl reserve lake within 300m of the site to the south. Groundwater on the site was not detected in the 1992 investigations. Drainage is to surface water sewers with oil inteceptors. From historical maps the proposed area lies on the southern boundary of the retained Transco Gas Holder site. The site, has active gas holders (1999), the mast location is in an un-used area of the site and covered by gravel and concrete paths.
Available Desk Top Reports	Stanger, December 1997 (8440/BGAST7/jz)
Available Ground Investigation Reports	Boundary Survey, Harrison, November 1992, (C1935/22)
Test Result Summary	Two trial pits TP6 (and TP7) carried out in 1992, indicate that the MP site, has significant concentrations in Total Cyanides (900 to 10,000 mg/kg), Phenols (1,200 mg/kg) and PAH (1,000 to 5,000 mg/kg).
Ground Contamination Discussion including Remediation Strategy If Available	The desk study concluded that significant levels of contamination had been identified (1992) from below ground tanks and purifier boxes, Remediation will be necessary with regards to the re-use of excavated materials and work-force will require protection (full PPE), with elevated cost for disposal of excavation materials.
Ground Contamination Risk Rating *Land Ownership* *Construction/Operation*	 **MEDIUM** on the basis of potential contaminant sources and limited pathways and receptors. **MEDIUM to HIGH** due to possibility of high concentration PAH and cyanides contaminants being encountered. Likely elevated disposal cost of excavated materials.
Proposed Contamination Investigation/Testing (Land ownership issues only)	One Trial Pit at MP location to confirm contaminants and pre-classify excavation materials for disposal.
Mast Relocation	Not proposed.
Discussion/Other Factors including Initial Geotechnical Comments and Key Site Features (For information purposes only)	Spread foundations likely to be appropriate.
This sheet is intended to provide a summary only of the initial indicative assessment study of the site in relation to contamination. It does not provide a definitive engineering analysis for the purposes of costing or construction, and is subject to the limitation of the agreed brief. ** Note all depths given as below ground level. (BGL)	

107, Cramptons Road,
Sevenoaks, Kent



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(Scales other than at Survey Scale should not be used for accurate measurement). Business occupancy data ©2001 Thomson Directories Ltd.

Ordnance Survey
Value Added Reseller

Reference 910547
Master Lease/Site Licence/Underlease

APPENDIX F

HISTORICAL INFORMATION

HARRISON & COMPANY

(Soils and Foundation Engineers) Limited.
117 Beulah Road, Thornton Heath, Surrey CR7 8JJ.
Telephone 081 653 9168 Fax 081 768 0628

Directors: David Harrison B.Sc.(Eng), F.G.S., Allen Davis M.Sc., Ph.D., D.Sc., Malcolm Price M.Sc., C.Eng., M.I.C.E., F.G.S., Pauline Clarke (Secretary), Associate: Michael Hoar B.Sc., C.Geol., F.G.S.
Consultant: Eric Steger B.Sc., C.Eng., F.I.C.E., F.I. Struct.E., F.G.S.

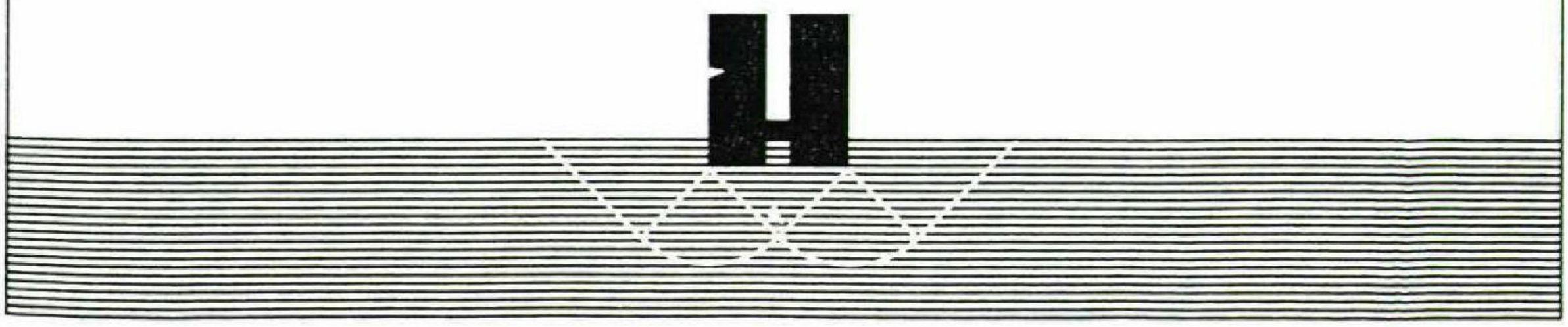
Registered in England No. 1306165. Registered Office: 50 Unthank Road, Norwich.

REPORT No. : **C1935 / 22**

DATE : **November 1992**

LOCATION : **Otford Road, Sevenoaks, Kent.**

CLIENT : **British Gas (South Eastern) plc.**



FOREWORD

General Conditions Relating To Site Investigation

The information provided in this report is based on the ground conditions revealed by the site works, together with an assessment of the site and of laboratory test results. Whilst opinions may be expressed relating to sub-soil conditions in parts of the site not investigated, for example, between trial hole and borehole positions, these are only for guidance and no liability can be accepted for their accuracy.

Unless otherwise stated in this report sampling was undertaken using a J.C.B. type mechanical excavator and, in places of restricted access, hand portable, drive-in-sampler boring techniques was used. Whilst these methods are regarded as being one of the most reliable and practical for such an investigation, a certain amount of mixing of soils is inevitable.

The groundwater conditions entered on the trial pit and borehole records are those observed at the time of the investigation. The normal rates of excavation, or boring, usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions.

Excavation, boring and sampling procedures were undertaken in accordance with the British Gas's 'Technical Specification for Assessing Soil Contamination", (April 1992). Likewise laboratory testing complies with the guidelines given in British Gas's Technical Specification (April 1992) unless stated otherwise in the text. All testing was carried out by Messrs. Applied Environmental Research Centre Limited, a British Gas accredited laboratory.

This report is produced for the benefit of the Client alone. No responsibility can be accepted for any consequences of this information being passed to a third party who may act upon its contents.

CONTENTS

FACTUAL REPORT

ON A

CONTAMINATED LAND BOUNDARY SURVEY

AT

OTFORD ROAD, SEVENOAKS, KENT

FOR

BRITISH GAS (South Eastern) plc

1 INTRODUCTION

The work covered by this report was carried out by Harrison & Company (Soils and Foundation Engineers) Limited, to the instructions of the Client, British Gas (South Eastern) plc., under their Order No. CA2054, dated 26th May 1992.

The site under consideration was located at Otford Road, Sevenoaks, Kent. The investigation was required to provide factual information on the sub-soil characteristics of the site and to assess any potential for soil contamination.

This report presents the work carried out and outlines the findings.

2 DESK STUDY

A small desk study has been undertaken by Harrison & Company at this site in order to ascertain past and more recent land use purposes. In addition, former site boundaries and whether the site had contained other buildings or structures together with their approximate locations has been investigated.

The desk study involved the collection and review of the limited historic information available concerning the site. In particular, the map room of the Kent Record Office was visited and old Ordnance Survey maps studied.

Included in the appendix to this report are copies of four Ordnance Survey County Series Sheets together with the most recent map obtained from the archives at British Gas of the site. Between the period of 1871 to present the maps revealed the following information :

2.1 **O.S. County Series Map, Kent Sheet XXIX (Published 1871), 1st. Edition. (Scale 1:10560)**

Due to the small scale of the map details of the site cannot be clearly distinguished. However, the map does indicate that the gas works was established at this time and it would appear that three unspecified buildings together with two holders occupy the central and southern areas of the site. In addition, the site is shown to be bounded by open fields. (Drawing No. C1935/22/1).

2.2 **O.S. County Series Map, Kent Sheet XXIX - S.W. (Published 1897), 2nd. Edition. (Scale 1:10560)**

Similarly, due to the small scale of the map it is difficult to clearly define the boundary of the gas works site. However, it can now be seen that there are at least five unspecified buildings occupying the southern area of the site together with three holders located in the central and northern areas of the site. (Drawing No. C1935/22/2).

2.3 **O.S. County Series Map, Kent Sheet XXIX.13 (Published 1909), 3rd. Edition. (Scale 1:2500)**

The site is shown to be roughly rectangular in outline and still mainly bounded by open fields. The two northernmost holders are shown to have been removed and a tramway line now enters the site via the southern boundary. (Drawing No. C1935/22/3).

2.4 **O.S. County Series Map, Kent Sheet XXIX.13, Revision of 1936. (Scale 1:2500)**

The site has increased in size extending southwards along the tramway / railway siding. A number of unspecified buildings and tanks together with a crane system have developed. Three new holders are now shown to occupy the northern area of the site with the holder formerly sited roughly in the centre of the site having been removed. An open plot of land remains adjacent to part of the eastern boundary but, generally, residential properties have now developed along the southern and eastern boundaries while the northern and western boundaries remain open land. (Drawing No. C1935/22/4).

2.5 Map Supplied by British Gas, May 1935.

The area of the site is now shown to have reduced considerably in size and moved to the previously vacant plot of land adjacent to the gas work site as described in O.S. Kent Sheet Revision of 1936, Drawing No. C1935/22/4. Only one holder remains in the north eastern corner of the 'old' gas works site with an additional holder now shown on the 'new' site. Further, a number of unspecified buildings are also shown to occupy the 'new' site. (Drawing No. C1935/22/5).

2.6 Existing Site

At the time of writing this report the existing site, which was approximately 1.00 hectares in area, was an operational gas works site with a small office and secure stores together with two gas holder compound areas and a pressure reducing station. A plan showing the layout of the gas works in 1949is shown in Drawing No. C1935/22/6. The most recent map showing the layout of the site is indicated in Drawing No. C1935/22/5.

The site sloped gently from the south east to the north west and the surface topography varied across the site consisting of a car park and access road with tarmacadam cover, occasional small buildings, two gas holders and a gravel covered pressure reducing station to the northern area of the site and booster unit in the central area of the site with, in parts, grass and paving slab cover.

The gas holder compound to the west was divided from the main gas works site by security fencing together with a public footpath. However, access can be obtained via a footbridge over the public footpath. This holder compound area was slightly raised, being sited on a gentle hill, with a retaining wall, approximately 1.50m to 2.00m in height, along the boundary fronting Otford Road. Surface topography varied, with tarmac and concrete cover in parts, but generally composed of made ground with patches of overgrown vegetation.

In addition, there was an area of relatively flat made ground to the south of the site used by local contractors for material storage.

2.7 Services

At the time of writing this report it was believed that the site was underlain by limited gas, electricity and water main services together with a drainage system.

Limited service drawings provided by the Client reveal a number of gas mains to underlie the site. Some gas mains are believed to be redundant but presently used gas mains include two eighteen inch and one eight inch district gas mains running adjacent to the public footpath which dissects the site. These gas mains are connected to the booster unit and pressure reducing station. In addition, a twelve inch high pressure gas main runs parallel to the northern boundary with an additional twelve inch gas main linking the pressure reducing station to the booster unit. Copies of the service drawings showing the approximate gas main locations are appended to this report.

In addition, a service drawing showing the extent of electricity supplies on the site is also appended to this report. An electricity cable is shown to enter the site at the main gates on The Hill / St. David's Bridge and linking up to the Segas office building.

No service drawings were provided by British Gas for electricity, water or drainage, although these services are known to exist in parts of the site. An electricity sub-station is located along the eastern boundary, near to the entrance gate on Crampton's Road, although it was believed that electricity supply cables left the site and ran along Crampton's Road. However, there was an electricity supply cable recently laid which was shown to enter the site near to the entrance gate on Crampton's Road and was believed to link up to the office building and an electric meter kiosk by the side of the electricity sub-station.

At present, there is no surface drainage, such as streams or rivers, on site. However, it may be that perched water tables occur in the made ground encountered across the site.

3 FIELDWORK

Prior to any site works a site visit and site appraisal was carried out. All trial pit locations were checked with a cable avoidance tool, together with the study of any available drawings indicating possible nearby services. Once the location was agreed the trial pit position was marked out. The site visit was carried out on the 31st July 1992.

The site investigation was undertaken over a two day period on the 6th and 7th August 1992. A total of twenty trial pits were mechanically excavated around the boundary of the site to depths of up to 3.00m. However, in some cases the nature of the fill material encountered or the presence of below ground service pipes meant some of the trial pits had to be terminated at depths of less than 3.00m.

Approximately two trial pit locations required surface hardstanding tarmac and concrete to be broken out.

The location of the trial pits were based on an approximate twenty metre spacings around the site boundary. The position of the trial pits are shown on the appended site plan, Drawing No. C1935/22/7.

Photographs were taken of each trial pit, together with the spoil, and copies of these are included under separate cover with this report.

Three soil samples , (approximately 5 kg in weight), were taken from each trial pit at intervals of 0.50m-1.00m, 1.50m-2.00m and 2.50m-3.00m unless early termination prevented otherwise. In addition, a small amount of soil sample, (approximately 50g to 100g in weight), was added to a prepared phenol sample jar and shaken. These samples subsequently underwent contamination testing to British Gas's "Technical Specification for Assessing Potential Soil Contamination", dated April 1992.

Soil samples were also taken from any characteristic horizon / strata that occurred outside these identified ranges.

Methane sampling and groundwater samples were not required by the Client. However, any distinct odours were noted and if groundwater was encountered then this too was noted and the depth recorded on the accompanying trial pit record sheets.

The results of the contamination tests are appended to this report and are also included under separate cover on a disc in Lotus 123 spreadsheet format.

The material encountered in each trial pit have been drawn up as trial pit records, which are presented in the appendix.

On completion of the trial pits simple backfilling, compaction and making relatively level of each trial pit location was carried out. If excess spoil remained this was left proud of the trial pit. Approximately two trial pit locations may require special reinstating at this site. Further, it was understood that should any special reinstating be required then this was to be carried out by British Gas.

Ground levels at the trial pit positions were not required by the Client.

4 FINDINGS

4.1 Regional Geology

The regional geology, as mapped by the British Geological Survey, consists of the Folkstone Beds (Lower Greensand) of the Cretaceous Period. The Folkstone Beds consist predominantly of poorly consolidated sands with seams of pebbles and clay, and veins and 'doggers' (large concretion) of hard ferruginous sandstone. The sands are generally fine to medium grained and stained yellow to reddish brown in colour, although white sands ('silversands') also occur.

4.2 Ground Conditions

Full details of the trial pit findings are given on the accompanying trial pit records. It should be noted that the purpose of the current work was purely to provide an assessment of contamination around the boundary of the site. No geotechnical information other than what appears on the trial pit and borehole records, has been obtained.

5 CONTAMINATION TESTING

A total of 59 samples were collected from the twenty trial pits. All samples were sent to an accredited laboratory for analysis for a range of contaminants. Testing for the full suite of contaminants was carried out in accordance with the British Gas's "Technical Specification for Assessing Soil Contamination", (April 1992).

The full results are tabulated in the appendix and are included on disc in Lotus 123 format as requested in the Specification.

The full details of the contamination results appended are in factual format only and it is understood that 'staff' within British Gas will assess these with regard to any potential problems.

In addition, it should be noted that the current work provides no direct information with regard to the geotechnical aspects of the site.

[redacted]

Trevor Pearson B.Sc. (Hons).
Project Engineer

[redacted]

Malcolm S[redacted] Price M.Sc., C. Eng., M.I.C.E., F.G.S.
Director

APPENDIX

O.S. Kent Sheet XXIX, 1st. Edition (Drawing No. C1935/22/1)

O.S. Kent Sheet XXIX - S.W., 2nd. Edition (Drawing No. C1935/22/2)

O.S. Kent Sheet XXIX.13, 3rd. Edition (Drawing No. C1935/22/3)

O.S. Kent Sheet XXIX.13, Revision of 1936 (Drawing No. C1935/22/4)

Map supplied by British Gas, May 1985 (Drawing No. C1935/22/5)

Gas Works Layout Plan, 1949 (Drawing No. C1935/22/6)

Trial Pit Records

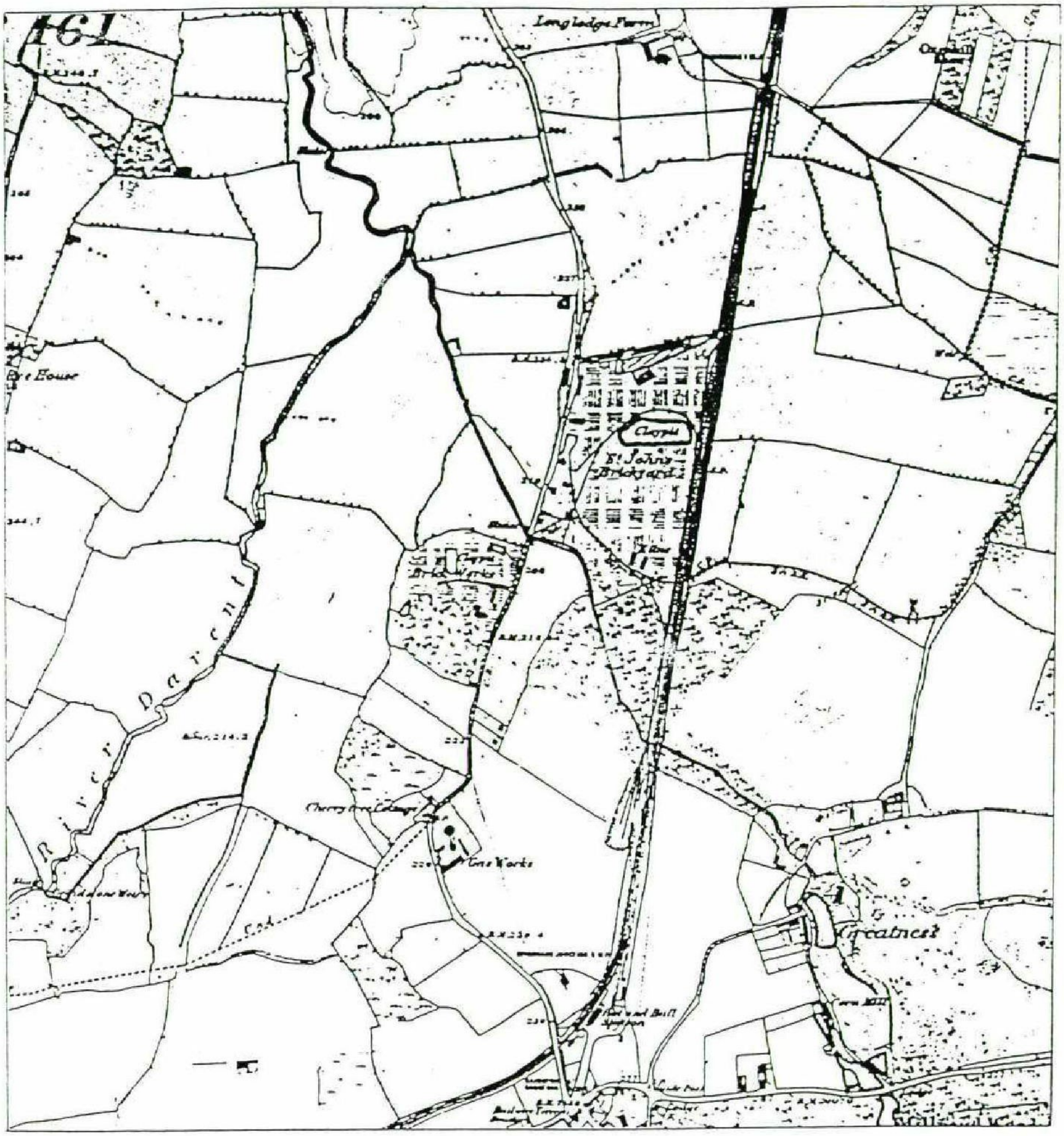
Contamination Test Results

Trial Pit Location Plan (Drawing No. C1935/22/7)

British Gas Service Drawings

Contamination Test Results Disc (Lotus 123)

Trial Pit Photographs



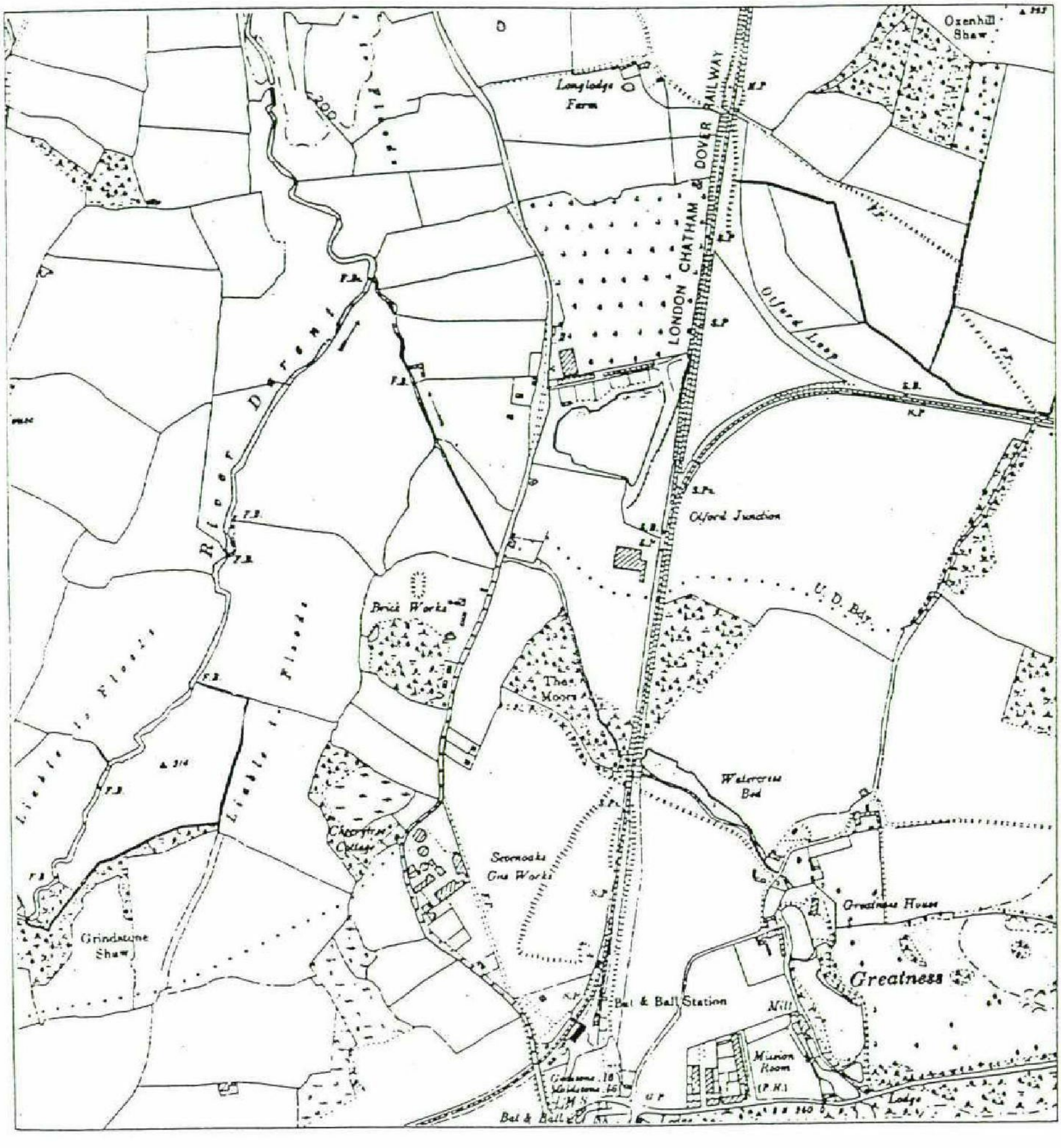
Otford Road, Sevenoaks, Kent.

O.S. County Series Map : Drawing No. C1935/22/1

O.S. Kent Sheet XXIX (Published 1871), 1st. Edition

Scale : 1 : 10560

November 1992



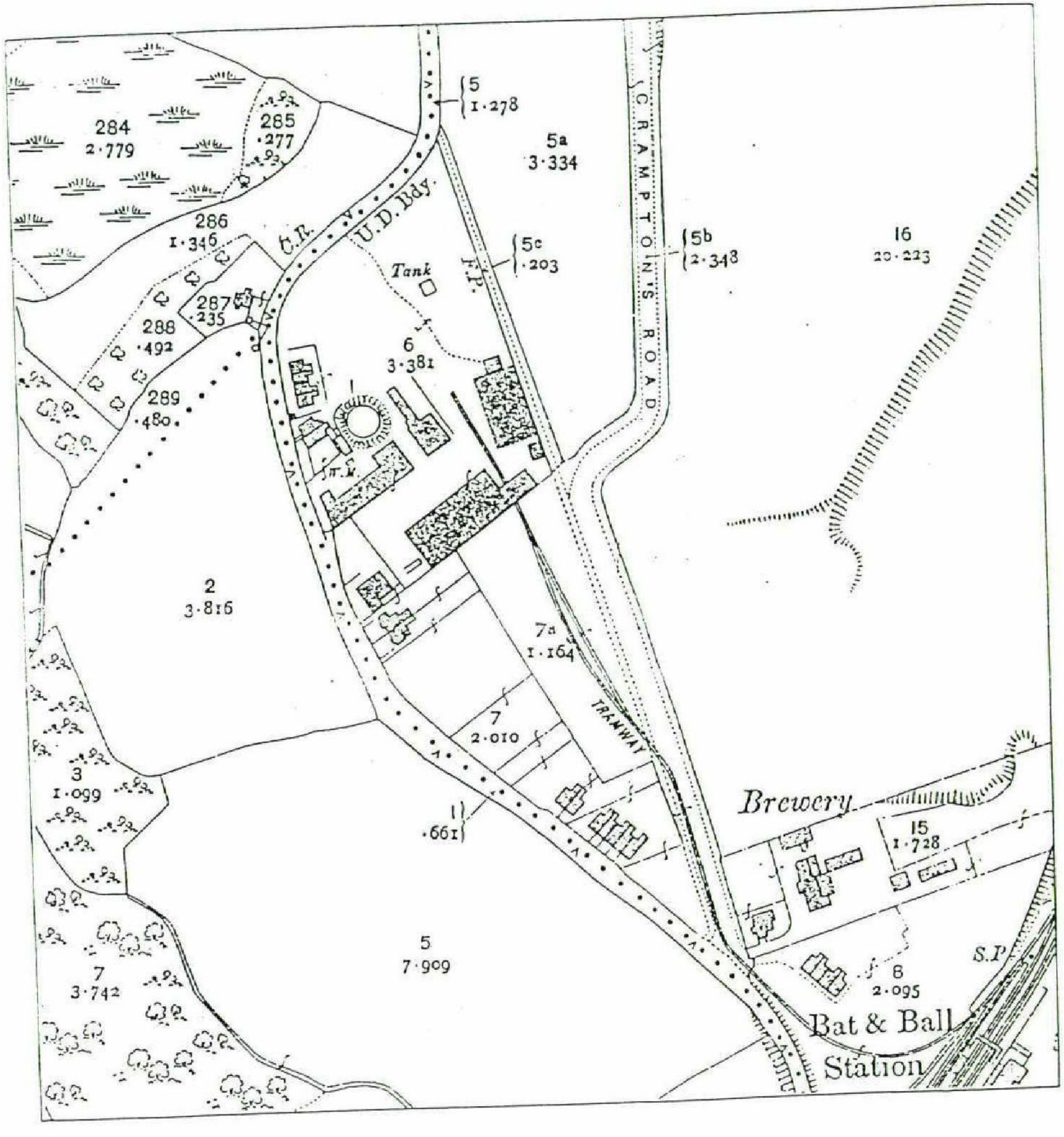
Otford Road, Sevenoaks, Kent.

O.S. County Series Map : Drawing No. C1935/22/2

O.S. Kent Sheet XXIX - S.W. (Published 1897), **2nd. Edition**

Scale : 1 : 10560

November 1992



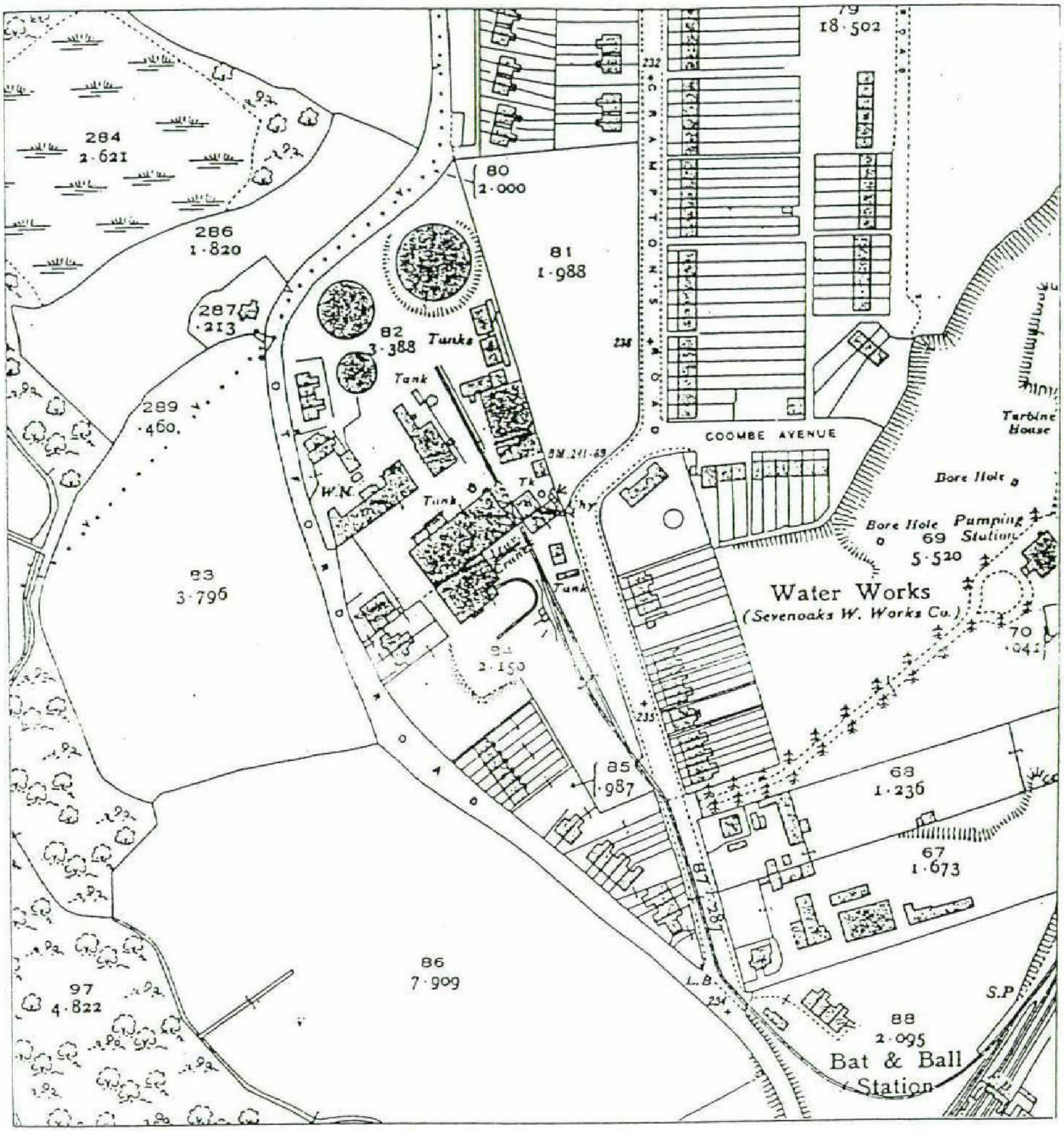
Otford Road, Sevenoaks, Kent.

O.S. County Series Map : Drawing No. C1935/22/3

O.S. Kent Sheet XXIX.13 (Published 1909), **3rd. Edition**

Scale : 1 : 2500

November 1992



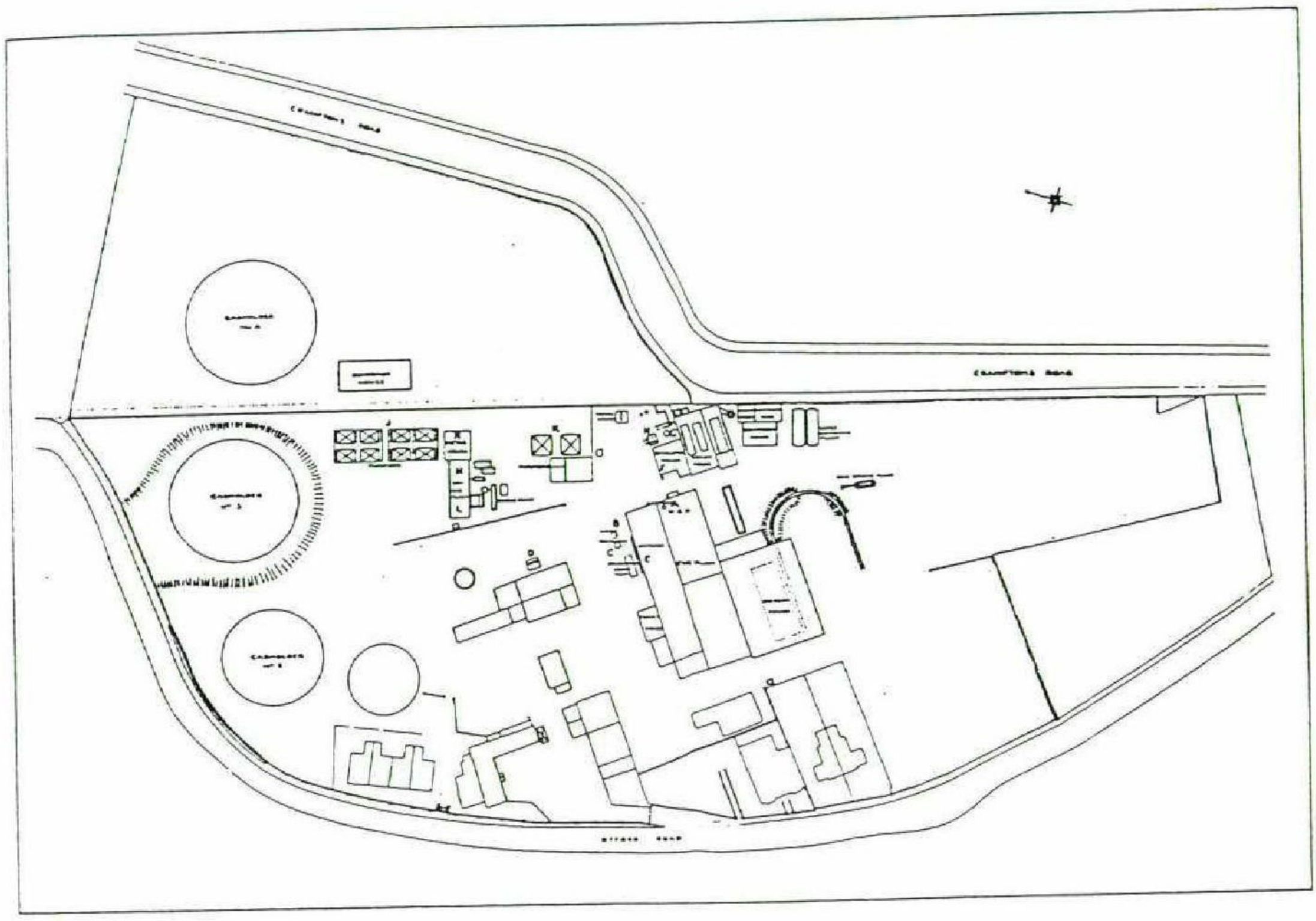
Otford Road, Sevenoaks, Kent.

O.S. County Series Map : Drawing No. C1935/22/4

O.S. Kent Sheet XXIX.13 (Published 1936), Revision of 1936

Scale : 1 : 2500

November 1992

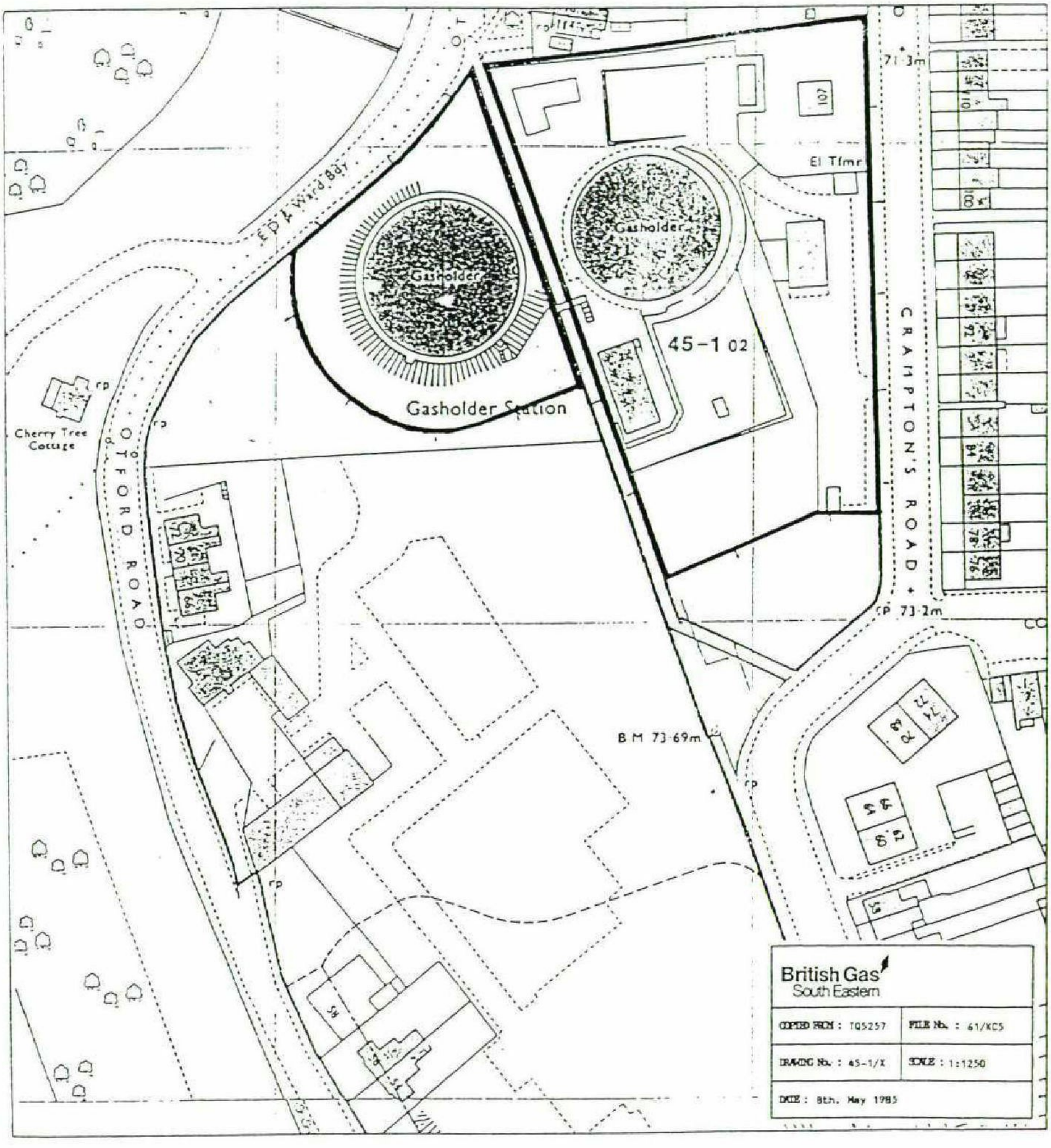


Drawing No. C1935/22/6

Site Plan : Sevenoaks Gasworks (1949)

Scale : Not to Scale

November 1992



Otford Road, Sevenoaks, Kent.

Drawing No. C1935/22/5

Map Supplied by British Gas, May 1985

Scale : As shown.

November 1992

HARRISON & COMPANY

Trial Pit Record

Location : Otford Road, Sevenoaks, Kent.

Client : British Gas (South Eastern).

Date : 6/8/92

Job No. : C1935/22

Plant : J.C.B. Excavator

Diameter : 0.70m x 1.50m

Trial Pit No. : 1

Soil Description	Depth below Ground Level (m)	Sample Type	Sample Depth (m)	Notes (e.g. Colour, Smell)
Gravel and vegetation over soft to firm brown fine sandy silty CLAY containing frequent roots. (Possibly FILL?).	0.0	D1/J1	0.5-1.0	
		D2/J2	1.5-2.0	
Yellow-brown silty fine to coarse SAND. (Possibly FILL?).	2.0	D3/J3	2.5-3.0	
Trial Pit Complete at 3.0m.	3.0			

Remarks :

Groundwater was not encountered.

Trial pit relatively stable on completion.

Key :

D : Disturbed Sample

J : Jar Sample

W : Water Sample

HARRISON & COMPANY

Trial Pit Record

Location : Otford Road, Sevenoaks, Kent.

Client : British Gas (South Eastern).

Date : 6/8/92

Job No. : C1935/22

Plant : J.C.B. Excavator

Diameter : 0.70m x 1.50m

Trial Pit No. : 2

Soil Description	Depth below Ground Level (m)	Sample Type	Sample Depth (m)	Notes (e.g. Colour, Smell)
	0.0			
Vegetation over TOPSOIL (Grey-brown silty CLAY containing frequent roots).	0.5	D1/J1	0.5-1.0	
Orange-brown silty fine to medium SAND. (Possibly FILL?).		D2/J2	1.5-2.0	
	2.2			
Green-grey silty fine to coarse SAND. (Possibly FILL?).		D3/J3	2.5-3.0	1 : There was a slight oil / diesel (?) smell between 2.2m and 3.0m depth.
	3.0			
Trial Pit Complete at 3.0m.				

Remarks :

Groundwater was not encountered.

Trial pit relatively stable on completion.

Key :

D : Disturbed Sample

J : Jar Sample

W : Water Sample

HARRISON & COMPANY

Trial Pit Record

Location : Otford Road, Sevenoaks, Kent.

Client : British Gas (South Eastern).

Date : 6/8/92

Job No. : C1935/22

Plant : J.C.B. Excavator

Diameter : 0.70m x 1.50m

Trial Pit No. : 3

Soil Description	Depth below Ground Level (m)	Sample		Notes (e.g. Colour, Smell)
		Type	Depth (m)	
Vegetation over TOPSOIL (Grey-brown silty clay containing frequent roots).	0.0			
	0.2			
Orange-brown very clayey silty fine to coarse SAND, becoming brown and less clayey with depth. (Possibly FILL?).		D1/J1	0.5-1.0	
		D2/J2	1.5-2.0	
	1.7			
Orange-brown silty fine to coarse SAND. (Possibly FILL?).		D3/J3	2.5-3.0	
	3.0			
Trial Pit Complete at 3.0m.				

Remarks :

Groundwater was not encountered.

Trial pit relatively stable on completion.

Key :

D : Disturbed Sample

J : Jar Sample

W : Water Sample

HARRISON & COMPANY

Trial Pit Record

Location : Otford Road, Sevenoaks, Kent.

Client : British Gas (South Eastern).

Date : 6/8/92

Job No. : C1935/22

Plant : J.C.B. Excavator

Diameter : 0.70m x 1.50m

Trial Pit No. : 4

Soil Description	Depth below Ground Level (m)	Sample		Notes
		Type	Depth (m)	(e.g. Colour, Smell)
	0.0			
TARMAC.	0.05			
Soft to firm brown silty CLAY. (Possibly FILL?).	0.6	D1/J1	0.5-1.0	
Orange-brown silty fine to coarse SAND and fine GRAVEL. (Possibly FILL?).	1.2			
Firm orange-brown very fine sandy silty CLAY. (Possibly FILL?).	1.7	D2/J2	1.5-2.0	
Firm grey-brown silty CLAY. (Possibly FILL?).	2.3			
White-brown silty fine to coarse SAND. (Possibly FILL?).	3.0	D3/J3	2.5-3.0	
Trial Pit Complete at 3.0m.				

Remarks :

Groundwater was not encountered.

Trial pit relatively stable on completion.

Key :

D : Disturbed Sample

J : Jar Sample

W : Water Sample

Gasholder

Gasholder

Gasholder Station

Warehouse

Warehouse

TQ5257S3

TQ5257S2

24 to 32

36

33

SEV

BERWI

ree
e

SCALE: 1 : 500

USER ID: st092

DATE: 28/02/2001

PSWA RESPONSE

GRID REFERENCE
552825, 157102

*As examples of Plant Items

LP MAINS
MP MAINS
IP MAINS
LHP MAINS
NHP MAINS

This plan shows only those pipes owned by Transco plc in its role as a Licensed Public Gas Transporter (PGT). Gas pipes owned by other PGTs and also privately owned may be present in this area. Information with regard to such pipes should be obtained from the owners. The information shown on this plan is given without obligation, or warranty, the accuracy thereof cannot be guaranteed. Service pipes, valves, syphons, stub connections, etc., are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Transco plc, its agents or servants for any error or omission. Safe digging practices, in accordance with HS(G)47, must be used to verify and establish the actual position of mains, pipes, services and other apparatus on site before any mechanical plant is used. It is your responsibility to ensure that this information is provided to all persons (either direct labour or contractors) working for you on or near gas apparatus. The information included on this plan should not be referred to beyond a period of 28 days from the date of issue.

Desktop MAPS Version 2.0.1

Transco

St Mary Cray

This plan is reproduced from or based on the OS map by Transco plc, with the sanction

HARRISON & COMPANY

Trial Pit Record

Location : Otford Road, Sevenoaks, Kent.

Client : British Gas (South Eastern).

Date : 6/8/92

Job No. : C1935/22

Plant : J.C.B. Excavator

Diameter : 0.70m x 1.50m

Trial Pit No. : 5

Soil Description	Depth below Ground Level (m)	Sample Type	Sample Depth (m)	Notes (e.g. Colour, Smell)
	0.0			
FILL (Grey slightly clayey silt with frequent fine shale fragments).	0.2			
Soft to firm brown very sandy silty CLAY. (Possibly FILL?).	0.6	D1/J1	0.5-1.0	
Orange-brown silty fine to coarse SAND and fine GRAVEL. (Possibly FILL?).	1.1			
		D2/J2	1.5-2.0	
Orange-brown silty fine to coarse SAND. (Possibly FILL?).		D3/J3	2.5-3.0	
	3.0			
Trial Pit Complete at 3.0m.				

Remarks :

Groundwater was not encountered.

Trial pit relatively stable on completion.

Key :

D : Disturbed Sample

J : Jar Sample

W : Water Sample

HARRISON & COMPANY

Trial Pit Record

Location : Otford Road, Sevenoaks, Kent.

Client : British Gas (South Eastern).

Date : 7/8/92

Job No. : C1935/22

Plant : J.C.B. Excavator

Diameter : 0.70m x 1.50m

Trial Pit No. : 6

Soil Description	Depth below Ground Level (m)	Sample		Notes
		Type	Depth (m)	(e.g. Colour, Smell)
	0.0			
FILL (Brown slightly sandy silty clay containing frequent concrete, timber and brick fragments).		D1/J1	0.5-1.0	
		D2/J2	1.5-2.0	
Firm blue-grey, black in parts, silty CLAY. (Possibly FILL?).	1.8			1 : There was a strong organic/tar (?) smell and occasional black staining below 1.8m depth.
Trial Pit Complete at 2.0m.	2.0			

Remarks :

Groundwater was not encountered.

Trial pit relatively stable on completion.

Trial pit terminated at 2.0m due to an obstruction (?).

Key :

D : Disturbed Sample

J : Jar Sample

W : Water Sample

HARRISON & COMPANY

Trial Pit Record

Location : Otford Road, Sevenoaks, Kent.

Client : British Gas (South Eastern).

Date : 7/8/92

Job No. : C1935/22

Plant : J.C.B. Excavator

Diameter : 0.70m x 1.50m

Trial Pit No. : 7

Soil Description	Depth below Ground Level (m)	Sample Type	Sample Depth (m)	Notes (e.g. Colour. Smell)
	0.0			
FILL (Grey-brown slightly sandy silty clay with frequent brick, coke and concrete fragments).		D1/J1	0.5-1.0	
FILL (Yellow-brown silty fine to coarse sand).	0.7			
FILL (Black silty fine to coarse sand. Stained with black tar (?) in parts).	0.8			1 : There was a strong tar (?) smell below 0.8m depth.
FILL (Black-grey silty clay).	1.3	D2/J2	1.5-2.0	
FILL (Black silty ash).	1.7			
Black to brown silty fine to coarse SAND. (Possibly FILL?).	2.2	D3/J3	2.5-3.0	
Trial Pit Complete at 3.0m.	3.0			

Remarks :

Groundwater was not encountered.

Trial pit relatively stable on completion.

Key :

D : Disturbed Sample

J : Jar Sample

W : Water Sample

HARRISON & COMPANY

Trial Pit Record

Location : Otford Road, Sevenoaks. Kent.

Client : British Gas (South Eastern).

Date : 7/8/92

Job No. : C1935/22

Plant : J.C.B. Excavator

Diameter : 0.70m x 1.50m

Trial Pit No. : 8

Soil Description	Depth below Ground Level (m)	Sample Type	Sample Depth (m)	Notes (e.g. Colour, Smell)
	0.0			
FILL (Grey-brown sandy silty clay with frequent brick and coke fragments).				1 : There was a strong tar (?) smell throughout the excavation.
	0.6	D1/J1	0.5-1.0	
FILL (Black silty fine to coarse sand. Stained with black tar (?) in parts).				
	0.9			
FILL (Black-grey silty clay).				
	1.3			
		D2/J2	1.5-2.0	
FILL (Black silty ashy clay).				
		D3/J3	2.5-3.0	
	2.7			
Black to brown silty fine to coarse SAND. (Possibly FILL?).				
	3.0			
Trial Pit Complete at 3.0m.				

Remarks :

Groundwater was not encountered.

Trial pit relatively stable on completion.

Key :

D : Disturbed Sample

J : Jar Sample

W : Water Sample

HARRISON & COMPANY

Trial Pit Record

Location : Otford Road, Sevenoaks, Kent.

Client : British Gas (South Eastern).

Date : 7/8/92

Job No. : C1935/22

Plant : J.C.B. Excavator

Diameter : 0.70m x 1.50m

Trial Pit No. : 9

Soil Description	Depth below Ground Level (m)	Sample		Notes (e.g. Colour, Smell)
		Type	Depth (m)	
	0.0			
FILL (Grey-brown sandy silty clay with frequent brick and coke fragments).		D1/J1	0.5-1.0	
	0.7			
Orange-brown silty fine to coarse SAND. (Possibly FILL?).		D2/J2	1.5-2.0	
	2.0			
Firm brown very sandy silty CLAY. (Possibly FILL?).		D3/J3	2.5-3.0	
	3.0			
Trial Pit Complete at 3.0m.				

Remarks :

Groundwater was not encountered.

Trial pit relatively stable on completion.

Key :

D : Disturbed Sample

J : Jar Sample

W : Water Sample

HARRISON & COMPANY

Trial Pit Record

Location : Otford Road, Sevenoaks, Kent.

Client : British Gas (South Eastern).

Date : 7/8/92

Job No. : C1935/22

Plant : J.C.B. Excavator

Diameter : 0.70m x 1.50m

Trial Pit No. : 10

Soil Description	Depth below Ground Level (m)	Sample		Notes (e.g. Colour, Smell)
		Type	Depth (m)	
	0.0			
FILL (Grey-brown sandy silty clay with frequent brick, concrete, pipe and coke fragments).		D1/J1	0.5-1.0	
		D2/J2	1.5-2.0	
		D3/J3	2.5-3.0	
	3.0			
Trial Pit Complete at 3.0m.				

Remarks :

Groundwater was not encountered.

Trial pit relatively stable on completion.

Key :

D : Disturbed Sample

J : Jar Sample

W : Water Sample

HARRISON & COMPANY

Trial Pit Record

Location : Otford Road, Sevenoaks, Kent.

Client : British Gas (South Eastern).

Date : 7/8/92

Job No. : C1935/22

Plant : J.C.B. Excavator

Diameter : 0.70m x 1.50m

Trial Pit No. : 11

Soil Description	Depth below Ground Level (m)	Sample Type	Sample Depth (m)	Notes (e.g. Colour, Smell)
	0.0			
FILL (Grey slightly silty clay with occasional brick and coke fragments. Stained with black tar (?) in parts).				1 : There was a slight naphthalene (?) smell between about 0.2m and 0.5m depth.
	0.5	D1/J1	0.5-1.0	
Firm brown slightly sandy silty CLAY containing occasional roots. (Possibly FILL?).		D2/J2	1.5-2.0	
	2.1			
Orange-brown slightly clayey silty fine to coarse SAND. (Possibly FILL?).		D3/J3	2.5-3.0	
	3.0			
Trial Pit Complete at 3.0m.				

Remarks :

Groundwater was not encountered.

Trial pit relatively stable on completion.

Key :

D : Disturbed Sample

J : Jar Sample

W : Water Sample