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Ground Investigation Geotechnical Analysis Environmental Appraisal

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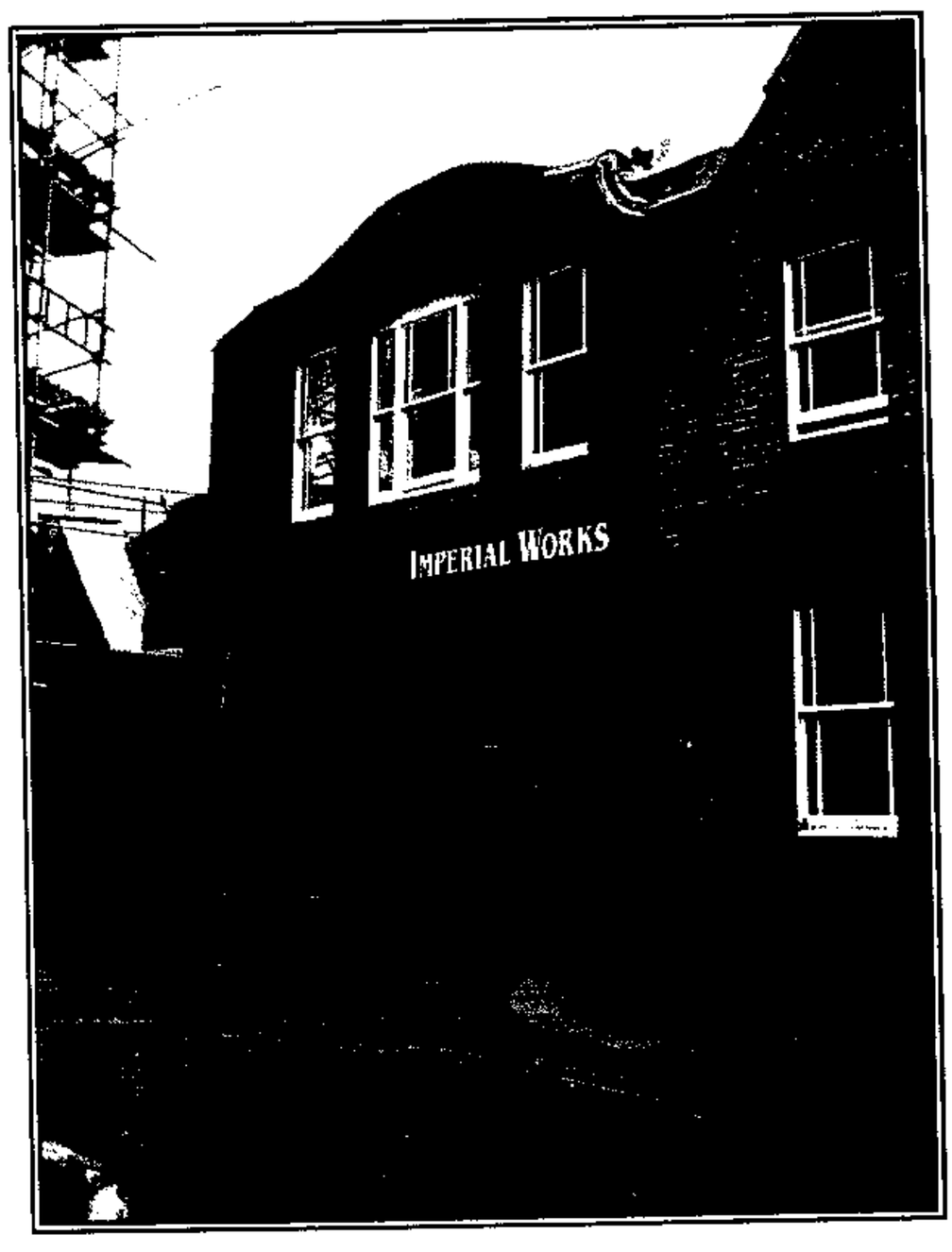
REPORT ON PRELIMINARY GROUND INVESTIGATION

PROPOSED COMMERCIAL REDEVELOPMENT:

IMPERIAL WORKS
PERREN STREET
LONDON
NW5



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1.0 INTRODUCTION

Consideration is being given to the remodelling/refurbishment of this existing factory to commercial office use. An investigation has therefore been carried out to determine the configuration of the existing foundations, establish the near surface ground conditions and to provide a preliminary assessment of ground contamination.

This report describes the investigation undertaken, provides details of the existing foundations exposed, gives a summary of the ground conditions and then discusses the design of new foundations. An outline contamination appraisal is also included.

2.0 SITE DESCRIPTION

The site is a vacant triangular-shaped building which is formed by Unit B of the Imperial Works in Perren Street. The site measures approximately 48 x 15m [maximum dimension] with its centre at grid reference 528610E 184785N. The site is surrounded on its north, east and southern sides by existing factory buildings whilst the western boundary is formed by the Kentish Town West railway station and works buildings, with high-lying rail lines/platforms and arches beneath.

The existing building is of single-storey brick construction with steel-framed asbestos roof and a generally level concrete floor slab; some internal mezzanine offices are present. The northern end of the building is formed by a separate relatively low room with an external above-ground storage tank at roof level.

The geological survey map of the area indicates that the London Clay formation is present beneath the site.

A desk study was carried out by RPS Health, Safety & Environment in January 2005 and some relevant points from the RPS report are as follows:

- at the time of the desk study the building was occupied by a metal coating firm [DP Enamellers]
- the operation comprised the main building unit with a separate compressor house and paint store at the rear of the building [northern end]. In January 2005 the main workshop contained gas-fired ovens, powder spray bays, a solvent decreasing *[sic]* tank [Trichloroethylene - TCE] and material storage
- the above-ground storage tank over the paint store in the north was apparently used for the solvent TCE. The tank is approximately 20 years in age with a capacity of about 700 litres
- it is reported that process water from the painting bays was discharged directly into the foul sewer
- RPS reported that at the time of the desk study "no strong solvent odours were detected within any of the buildings/confined atmospheres"
- the adjacent buildings have contained a variety of businesses, including engineering and light engineering works, paper/printing works and organ/pianoforte works

3.0 EXPLORATORY WORK

The ground investigation comprised the construction of six hand-dug trial pits which were located within the existing building. The trial pits were taken to depths of between 1.00m and 1.40m and on completion were logged by one of our geotechnical engineers. Small disturbed samples and a ground water sample were recovered and these were dispatched to a specialist laboratory for analysis of a range of commonly occurring contaminants.

The trial pit records and results of contamination testing are presented in the Appendix to this report, together with a Site Plan showing the pit locations.

4.0 GROUND CONDITIONS

Beneath the concrete floor slab [120mm to 230mm thick] a variable thickness of made ground was encountered overlying natural clay soils.

4.1 Made ground

The made ground varied considerably in composition from brown, grey or black clayey silty sand to soft or firm clay with subsidiary amounts of gravel, brick fragments, ash, clinker, wire and timber. Layers of brick/concrete hardcore were present in some of the pits.

In TP Nos 1 and 3, which were located along the western side of the site, smooth buried concrete walls were encountered which appeared to be tank/basement structures which have been infilled with made ground. Basal concrete slabs were met in both of these pits at depths of 1.28m and 1.11m respectively. The basal slab was broken out in TP No 3 where it proved to be 120mm thick; underlying black ash and clinker was proven to the base of the pit at 1.40m depth.

In TP No 4, a very strong solvent odour was detected. This pit was located at the northern end of the building, in the immediate vicinity of the above-ground solvent storage tank.

4.2 Natural clay soils

These soils were encountered in TP Nos 4 and 6 at depths of between 0.65m and 1.10m respectively, comprising firm to stiff brown and grey mottled clay, probably representing the London Clay. The clay was proven to a maximum depth of 1.35m in TP No 6.

4.3 Ground water

Ground water was observed in TP No 4 only, comprising a relatively heavy inflow which stabilised at a depth of 0.75m. The ground water, which is probably a localised perched pocket within the made ground, appeared to be contaminated with obvious free product.

5.0 DISCUSSION

The proposed works will involve the remodelling of the existing factory building to office use. We understand that the existing external walls are to remain but that a new roof structure and partition walls are to be built which will require some new internal columns. The investigation has revealed that a variable thickness of made ground is present which extended to the full depth of a number of the trial pits. The underlying natural clay soils, which were encountered in two of the trial pits, should be capable of supporting moderate increases in load from new spread foundations.

5.1 Spread foundations

Moderate sized strip or pad foundations must bypass all made ground and be placed within the natural firm brown/grey clay. Such foundations may be designed at a net allowable bearing pressure of 110kN/m^2, at which pressure the factor of safety against bearing capacity failure should be in excess of three and settlements should remain within tolerable limits.

Excavations will be through both granular and cohesive made ground and provision should be made for lateral support. On the evidence of the trial pits, localised significant inflows of ground water will occur and these will need to be controlled by appropriate pumping. Significant buried concrete obstructions [former tanks?] are present within the ground, particularly down the western side of the site, and these will need to be broken out in any foundation excavations.

As discussed above the thickness of the made ground is highly variable, extending to the full depth of a number of the trial pits [1.4m max]. The two trial pits in which the base of the fill was proven [TP Nos 4 and 6] were located at each extreme end of the building and consequently there is considerable uncertainty as to the depth and distribution of the fill in the main central area of the site. We therefore consider that it would be advisable to carry out additional investigation work in order to profile the made ground and near-surface natural soils in greater detail; a small diameter window sample borehole investigation would probably be the most appropriate. An alternative but potentially less economic option to undertaking additional investigation would be carry out regular inspection by an experienced foundation engineer to ensure that competent material is exposed; a contingency sum will need to be included to allow for additional excavation and disposal.

5.2 Ground floor slab

In general the existing slab appears to have performed satisfactorily and following a thorough inspection/survey would probably be suitable for the proposed office use.

5.3 Foundation concrete

Generally low concentrations of soluble sulphate were measured in selected soil samples, with the results falling into the current Site Design Class DS1 of Table 2 given in BRE Special Digest 1 [2001]. We we understand that

a proposed revision will reduce the upper level of the DS1 classification to 0.5g/l [2:1 extract] with the consequence that some of the measured results correspond to Design Class DS2. Notwithstanding this, with the site assessed as being 'brownfield' with mobile ground water conditions, we recommend that new buried concrete is designed in accordance with ACEC Site Class AC-1.

5.4 Outline contamination appraisal

Five soil samples and one ground water sample were tested for a range of commonly occurring contaminants in order to allow a preliminary assessment of ground contamination and provide a general guidance evaluation for the proposed form of redevelopment. A detailed remediation scheme, including any further testing and verification that may be necessary, is beyond the scope of this outline assessment. Reference should be made to the foreword to the appended contamination test results in order to fully understand the context in which this discussion should be viewed.

The results of the testing have been assessed where relevant against the DEFRA Soil Guidance Values [SGV], or where UK guidance is not available the Dutch target values and other general guidelines have been used. Elevated levels of the following determinands were measured:

Determinand	Comment
Soil – general [5 samples]	
Lead	➢ high concentrations between 1200mg/kg and 3500mg/kg were measured in two fill samples [TP Nos 1 and 3]; the SGV for commercial/industrial use is 750mg/kg. However, the geometric mean value [DEFRA, SGV for lead contamination, 2002] of all of the results is 423mg/kg which is below the SGV
Speciated PAHs	➢ slightly elevated levels of 2.8mg/kg and 11mg/kg were measured in two samples [TP Nos 1 and 3] against the Dutch target value [ie uncontaminated] for PAH [sum of 10] of 1.0mg/kg; however the concentrations are well below the intervention value of 40mg/kg
Soil – VOC [3 samples from TP Nos 1, 4 and 5]	
cis 1,2-dichloroethene & trichloroethylene [TCE]	➢ elevated levels of cis 1,2-dichloroethene [a by-product of the breakdown of TCE] were measured in the three VOC samples tested, ranging between 670µg/kg and 5400µg/kg; the Dutch intervention value for this compound is 1000µg/kg ➢ very slightly elevated levels of trichloroethylene were measured against the Dutch target level of 100µg/kg, varying between 330µg/kg to 450µg/kg. These levels are however well below the intervention value of 60000µg/kg
Water – general [1 sample from TP No 4]	
Lead	➢ a concentration of 150µg/kg was measured; the Dutch intervention value is 75µg/kg
Speciated PAHs	➢ Dutch intervention values were exceeded for chrysene, benzo [k] fluoranthene, benzo [a] pyrene, indeno [1, 2, 3-cd] pyrene and benzo [ghi] perylene

The laboratory testing confirms the visual/olfactory observation that some contamination of the ground and ground water has taken place. However, it is noted that whilst obvious contamination was present in TP No 4 [ie adjacent to the above-ground solvent storage tank], elevated levels of certain contaminants were also measured

in the made ground from other trial pits, indicating that affected soil may be present elsewhere within the site.

The investigation has revealed elevated levels of some of the measured contaminants. However, when taking into account the presence of very low permeability clay beneath the site [which will act as a barrier to downward migration] and the fact that the potentially contaminated soil will be covered by the floor slab, we consider it unlikely that there will be a requirement to remove the contaminated soil off site, other than spoil from the foundation excavations. The localised elevated concentrations of lead, PAH and VOCs in some soil samples and the presence of a trapped pocket of solvent-contaminated ground water [TP No 4] will need to be addressed and we consider that the planning authorities may require the following measures to be implemented:

- the provision of appropriate PPE to construction workers when in contact with the soil/ground water and observation of suitable hygiene standards

- the disposal/draining of the trapped pocket of ground water

- the inclusion of a permanent vapour barrier within the floor construction

As discussed in Section 5.1 we consider that an additional investigation would be advisable in the form of small diameter window sample boreholes. This work could also provide confirmatory information for a site specific risk assessment based upon the source/pathway/target approach prior to final design.

For disposal purposes of any soil or water from foundation excavations, due regard will need to be given to the localised high levels of lead and PAHs. Early consultations should be made with the appropriate disposal authorities to confirm the waste classifications. It should be noted that under certain circumstances the waste regulator may require additional testing to confirm the levels of contamination.

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