8.0 Geotechnical and Environmental Assessment

8.1 Introduction

At the request of Hickey Fabrics & Co Ltd, Arup Consulting Engineers have completed a Geotechnical and Environmental Assessment of the Hickey & Co Ltd, Fabrics Wholesale, located at No 43 Parkgate House, Parkgate Street, Dublin 8.

The principal aims of the Site Assessment are to:

(a) Evaluate the Environmental and Geotechnical setting of the site including local geology and hydrogeology.

(b) Investigate the ground conditions of the site including an assessment for subsurface contamination.

(c) Provide information from which likely contaminant pathway-receptor relationships can be identified

(d) Evaluate Environmental and Geotechnical options relating to the site development, in accordance with relevant legislation.

(e) Assess the Geotechnical conditions across the site and provide recommendations for foundations, excavations, gas control measures, dewatering and further investigative work.

The Environmental Assessment is carried out in accordance with BS 10175:2001, Investigation of Potentially Contaminated Sites – Code of Practice.

The Geotechnical Assessment is carried out in accordance with BS 5930: 1999 – Code of Practice for Site Investigations.

8.2 Limitations

The conclusions and recommendations contained in this report are based upon information provided by agencies and individuals outside of Arup Consulting Engineers, taking account of particular limitations and hazards such as asbestos and lead based paint, or of radon levels. Any third parties using this report must satisfy themselves that the information provided is correct and that the recommendations are appropriate in all respects for their particular requirements. Please also note waste and environmental legislation change on a regular basis, and the information given in this report is correct as of March 2006.

8.3 Site Location and Setting

The subject sits is located on the north bank of the River Liffey approximately 7 kilometres east of the Liffey discharge point to the Irish Sea. The Liffey forms the southern site boundary and the Sean Heuston Bridge is located within 20 metres of the east tip of the site (Figure 1, Appendix 8.1). The Frank Sherwin Bridge which permits vehicular access to the southside of the Liffey is located approximately 100 metres further downstream of the site.

Parkgate Street forms the northern site boundary, and numerous commercial properties including a car garage lie on the opposite side of this street. Residential properties comprising apartments adjoin the western boundary of the site.

8.3.1 Existing Environment

The site covers an area of approximately 5,000m^2, of which approximately 3,600m^2 is covered by buildings (Figure 2, Appendix 8.1).

The outer area of the site is used for parking and skip storage and is surfaced with tarmacadam and concrete. Hickey Fabrics Ltd currently occupies the warehouses for storage and dispatch of fabrics and related items.

There are 2 No. underground storage tanks (UST's) located beneath the site and are currently in operation. Pressure tests conducted on both tanks and pipework indicate there are no significant leaks. The location of a third suspected UST is not confirmed. The known tanks are used as petrol storage tanks for delivery vehicles and both tanks are connected to a pump located in the Garage.

Four above ground storage tanks (AST's) are located on the site. Three AST's are currently used to store heating oil for the buildings. The fourth tank is out of use, and there is evidence of a former tank located adjoining the old house / office.

The garage building covers an area of approximately 50m^2 and has a concrete floor. The paint room was used for storage of lubricating oil and paints stored in sealed containers. The fuel pump from UST#1 and #2 is located inside the garage. The roof tiles on this building are comprised of a fibrous material that may be asbestos containing. The garage was not in use at the time of the walkover. Small amounts of oil staining around the fuel pump were observed from outside.

The old generator room covers an area of approximately 80m^2 and has a concrete floor which in partly tiled. It is currently used as a maintenance shop and for storage of miscellaneous items. According to Hickey Fabrics Ltd, the building formerly housed two large generators and an electricity board that was located on the east interior wall. The generator provided electricity to the site and a conduit/channel cut approximately 0.3 metres into the floor runs through the length of the building in an east-west direction. This conduit is covered with wooden slats and a small portion that was accessed for visual observation showed no signs of staining or odours. Behind the wall upon which the electricity board was housed are three small storage rooms that connect to the old storage area.

There are two boiler houses located on the site. One boiler house was inspected and an AST is located approximately 1.5 metres above the inside floor level of this building. This provides temporary storage of oil prior to use by the generators. Visual and olfactory evidence of petroleum / fuel contamination is evident on the interior walls and flooring of this building. In addition staining was observed on an outer portion of the wall to which the AST is attached.

The pipework within this building is covered by a fibrous lagging material that is possibly asbestos containing. The material is corroded in places.

The office building was not accessed during the walkover. According to Hickeys Fabrics the house was previously used as a residence and an office.

The old Storage area covers approximately 760m^2 and comprises between 8 to 10 storage rooms located on ground floor and first floor level. The ground floor is concrete and the upper floors are constructed in timber. The rooms are currently used for storage of furniture and clothes. The new warehouse building covers over one half of the total surface area of the site i.e., approximately 2,500m^2. The Hickey Fabrics offices are located in the northwest corner of this building, adjoining Parkgate Street. The remaining area of the warehouse is open plan with an elevated ceiling and is currently used for the storage and display of fabrics. Access to this warehouse is from the site parking area, through the old storage area and a pedestrian access door at the southeastern tip of the building.

One above ground storage tank is located at the southeastern tip of this building adjacent to the pedestrian access door. A former train track once operated along the south boundary of this building, adjacent to the River Liffey. The track is still visible within the new warehouse, Figure 2, Appendix 8.1.

8.4 Site History

The site lies on the original floodplain of the River Liffey. The site levels in the 18th century would have been significantly lower than present levels. Records show that between 2 and 5 metres of fill (man-made deposits) was placed on the original ground around the flood plain to raise ground levels to present day elevations.

The history of the proposed development site (No 43), its adjoining sites (No 41 and 42), and neighbouring sites was compiled from various documentary sources, including Thom's Dublin Street Directory, Ordnance Survey and historical maps.

The first recorded development on the site was revealed to be an iron works, which was known as both the Phoenix and Royal Phoenix Iron Works, and was in operation from the early 1800s to approximately 1890. Following on from this, a woollen worsted manufacturer, known as The Kingsbridge Mills, is known to have occupied the site for about ten years. From approximately 1900 to 1910, another manufacturer, Phoenix Park Works, was in operation on the site; however, the type of manufacture is unknown. While in the possession of the Phoenix Park Works, the site then lay vacant until about 1920 when it was taken over for use as Government Stores. In about 1930, a printing works was set up on site and this remained in operation until the mid 1970s when the current owners, Hickey's Fabrics, took up residence. Also of note is the presence of an electricity sub-station, which lies just to the east of the existing building at the corner of Parkgate Street and the Sean Heuston Bridge (c. 1969 to present).

Directly to the west of the site lie Nos 41 and 42 where several significant previous developments have been noted, which include Lucan Dairies Limited and various petrol stations and garages including a Maxol Garage. A petrol spill occurred at the Maxol Garage approximately 10 years ago.

Several other garages and depots (bus and electric railway) were recorded, both on Conyngham Road and on the northern side of Parkgate Street. To the west of the site, on Conyngham Road, was the location of a chemical works around the early 1800s; no information on the nature of the factory was found. A chemical factory was also noted on the northern side of Parkgate Street, the use of which was recorded as chemical manufacturing and chemical importing at various times

8.5 Desk study Geology and Hydrogeology

Geological Survey of Ireland (GSI) drift maps for the site indicate limestone bedrock, overlain by over 10m of glacial till (Boulder Clay). However, due to proximity of the site to the River Liffey, there is a strong likelihood of glacial and alluvial gravels also being present. The presence of alluvium in the area, which is associated with the River Liffey, was also noted.

8.5.1 Previous Site Investigation (1973)

GSI records were consulted for previous site investigation reports relating to the site and adjacent sites and the data obtained was used to supplement the present site investigation. A summary of a previous investigation carried out on the Hickey Fabrics site by Site Investigations Limited is given below.

The investigation consisted of 3 No. shell and auger boreholes (BHs 1 to 3) and was undertaken in November 1973. The boreholes were located to the west and northwest of the existing building near the site boundary. The logs reveal the subsurface to consist of 2.4 to 6.1m of FILL overlying natural ground. The underlying soil was found to be quite variable, with layers of silt, sand, gravel and clay (with shells and organics) all encountered.

Presumed rock was found at depths of between about 6.4 and 7.9m below ground level (BGL). Standing water levels in boreholes were found to be between 4.3 and 4.9m BGL approximately.

8.5.2 Present Site Investigation (2002)

A site investigation, consisting of 8 No. shell and auger boreholes (Nos. 1 to 7 and 8B) and 16 No. window samples (Nos. 1 to 8, 9B and 10 to 16), was undertaken by Irish Geotechnical Services Limited in December 2002, under the direction of representatives from Arup Consulting Engineers, Dublin. It should be noted that due to access restrictions no geotechnical investigations were undertaken in the area of the current warehouse. However due to the smaller plant size required for environmental investigation, window samples were undertaken in this area.

The locations of the boreholes and window samples are shown on Figure 2 in Appendix 8.1. The ground conditions were interpreted from the borehole and window sample logs, which are presented in Appendix 8.2.

8.6 Desk Study Hydrogeology

As noted above, the local water body is the River Liffey, which forms the southern boundary of the site and discharges into the sea approximately 7km downstream to the east. Records from a previous investigation for the site immediately to the west of Hickey's Fabrics suggest that approximately half of the site is in the tidal mixing zone.

Boreholes carried out by Site Investigations Limited in November 1973 revealed water strikes at depths of between 4.3 and 4.6m bgl approximately, and standing water levels of between about 4.3 and 4.9m bgl with no tidal information presented. However, water levels may fluctuate on a seasonal basis and may be found at depths deeper or shallower, depending on rainfall and surrounding hydrogeological conditions.

Geological Survey of Ireland records were consulted for information relating to the local aquifer (Ref: The Geology and Hydrogeology of Co Dublin with Particular Reference to the Location of Waste Disposal Sites, JR Creighton, D Daly, TA Reilly, 1979). The rock unit and aquifer protection zone classifications are taken from a protection scheme dating from 1979, and the information is therefore provisional and based on the data available at that time.

The proposed aquifer protection policy for Ireland is based on the division of the country into three zones, depending on the ability of the underlying rocks to yield water. An additional safety zone is designated around each public supply source. The aquifer protection zone for the site is Zone 3b, a minor resource aquifer that may yield locally important quantities of water. Given the urban site setting and the provision of potable water supply, it is unlikely that this aquifer will be used as a future potable resource.

8.7 Other Features and Events

Anecdotal evidence suggests the presence of an underground passageway linking the house to the main building. However, the exact location is not known.

Information procured from Dublin City Council shows that from 1993 to 1997, soil and groundwater investigation and remediation was conducted at the adjoining former Maxol Station at No. 42 Parkgate Street. A report entitled 'Environmental Review and Remediation Proposal' dated June 1997, and subsequent correspondence indicates that on-site sources / events that contributed to soil and groundwater contamination include 'a major petroleum leakage', former packaging operations, leakages from AST's, and heavy lube oil storage. Groundwater samples taken from monitoring wells located within 10 metres of the Hickey site boundary showed values of volatile organic

compounds (VOC's) of up to 9,805 ug/l (MW5 located close to the southwest corner of the Hickey site).

8.9 Geotechnical Assessment

8.9.1 Site Investigation

The geotechnical site investigation consisted of:

- 8 No. 'shell and auger' boreholes to depths of between 0.4m and 7.2m bellow ground level (bgl).
- 4 No. follow on rotary coreholes to prove rock by penetrating between 4.5 and 5.1m into bedrock.
- Standpipe installations to monitor groundwater levels.
- Insitu and laboratory testing.

The results of this investigation are presented at Appendix 8.3.

Limited additional geotechnical information was also obtained from the environmental window sampling. It should be noted that all geotechnical site investigation took place in the yard to the western end of the site. The presence of the main building prevented further geotechnical investigation in the remainder of the site. Therefore, it is likely that further geotechnical site investigation will be required in the eastern section of the site to confirm the ground conditions, when access to this area becomes available.

8.10 Stratigraphy

Stratum	Thickness (m)	Maximum depth to top of stratum (mOD Malin) (approximate)
MADE GROUND consisting of clayey sandy gravel with bricks, cobbles and ash.	2.0 – 4.0	Ground Level 3.3 – 4.8mOD
* Sandy CLAY – soft to firm / stiff sandy CLAY	*0.5 – 2.0	*0.8mOD
*SILT – soft grey SILT	1.0 – 4.0	*1.0mOD
GRAVEL – medium dense sandy fine to coarse sub	1.0 – 4.0	-0.16mOD
*SILT – soft grey SILT	*0.3	*-2.4mOD
GRAVEL – medium dense sandy fine to coarse sub rounded GRAVEL	*0.7	*-2.7mOD
LIMESTONE – strong to locally moderately strong thickly to locally thinly bedded, grey TO dark grey fine grained LIMESTONE fresh to locally moderately weathered.	4.5m +	-3.43mOD

* The above sequence represents the general order of occurrence of the strata below ground surface; however, one or more of the units may be absent at specific locations.

8.10.1 Made Ground

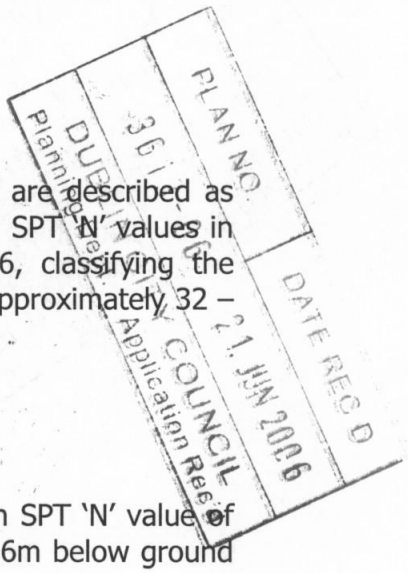
The fill is variable in thickness across the site and comprises of bricks, cobbles and ash in a clayey sandy gravel matrix.

8.10.2 Sandy CLAY

This stratum comprises soft to firm / stiff sandy CLAY, which was not encountered in every location, but where present, was located beneath the made ground. Two Standard Penetration Tests (SPT's) were undertaken in this material (in the same borehole), giving 'N' values of 4 and 6, which classifies the material as soft. It is described elsewhere as stiff (drillers / loggers description) with a Cu value of 20kN/m².

8.10.3 SILT

Soft grey SILT was encountered at two locations directly beneath the made ground. No SPT's were undertaken in this material. It would be expected that this material would be soft in consistency.



8.10.4 Gravel

The alluvial gravels were encountered across the site and are described as medium dense sandy fine to coarse sub-rounded GRAVEL. SPT 'N' values in the gravel range from 11 to 26, with an average of 16, classifying the material as medium dense with an angle of friction (Ø) of approximately 32 – 34° (BS 8002).

8.10.5 Silt

In one location, material described as soft grey silt with an SPT 'N' value of 10 (which classifies the material as firm) was encountered 6m below ground level.

8.10.6 Gravel

In one location immediately below the silt layer described in above, a layer of loose fine to coarse sub rounded gravels with shells was encountered immediately above bedrock.

8.10.7 Bedrock

In each location where rotary coring was undertaken, bedrock was encountered, and is generally described as strong to locally moderately strong thickly to locally thinly bedded fine-grained LIMESTONE fresh to locally moderately weathered. Core recovery is typically 100%, except for the first run where poor quality rock is often expected. Rock Quality Designation,

which is an indication of the degree of fracturing in the rock, was very poor, in all cases less than 36%, with an average of 15%.

8.10.8 Groundwater

Groundwater monitoring standpipes were installed in six of the eight 'shell and auger' boreholes (see Appendix 8.3). Water was generally encountered in the gravel layer, typically at 3 – 4m bgl, and stabilised at this level. This would indicate the groundwater level to lie at approximately – 0.5 to 1.0mOD (Malin).

8.11 Hydrogeology

There are likely to be two main aquifers in the area around the study site. These are the limestone bedrock and the overlying gravel stratum.

8.11.1 Limestone Bedrock

The site is believed to be underlain by middle Carboniferous Limestone locally referred to as 'Calp'. It is typically interbedded sequence of stronger calcisiltite with weaker dark grey calcilutite limestone / mudstone. The bedrock is considered to have poor potential as an aquifer for water supply and there are no known well abstractions from bedrock within the site vicinity.

It should be noted however, that the bedrock encountered beneath the site was highly fractured in nature to at least 5m into the bedrock, which will have the effect of causing a localised increase in permeability and storativity characteristics.

8.11.2 Gravels

It is unclear from the site investigation to date, whether the gravels encountered across the site are alluvial, glacial or both in origin. The likelihood is that they are a combination of the two, with an alluvial gravel laid down by the River Liffey overlying the glacial gravel, most likely laid down during the retreat of the Dublin glaciation.

In-situ variable head permeability tests were performed in this strata, with the water escaping so quickly that measurements could not be made. This suggests the material to have extremely high permeability, in the region of 10-3 m/s.

The groundwater gradient in the upper gravel aquifer at Low Tide is believed to be south to southeast, towards the River Liffey.

8.12 Environmental Site Investigation

8.12.1 Scope of Investigation

The subsurface investigation is designed to assess the presence, if any, of contamination in soil and groundwater beneath the site, to identify areas where it is suspected, and to show the absence of contamination in other areas of the site. The sampling was conducted in accordance with:

- BS10175 (2001) Investigation of Potentially Contaminated Sites – Code of Practice; and
- BS ISO 5667 – 18: 2001 Water Quality Sampling, Part 18 Guidance on Sampling of Groundwater at Contaminated Sites.

8.12.2 Legislation

Where material is to be removed to facilitate a basement, the recovered material is classified as a waste and falls under the Waste Management Act 1996. Disposal of these soils is governed by Directive 1999/31/EC (The Landfill Directive) which sets out typical limits for specific types of landfill. It should be noted that individual landfills have their own specific acceptance criteria but generally these fall under the guidelines presented in this directive. These guidelines provide eluate and total organic content limit values for inert landfills. The Landfill Directive values are applied to all licensed landfills in Ireland.

In this report, consideration is given to the application of leaching limit values calculated at a liquid to solid ratio of 10l/kg, and to the total organic content parameters. However these analyses were carried out before the finalising of the Landfill Directive which specifies a sample preparation of leachates as according to the CEN method. The method used here was that of the NRA method. This means that the values obtained are indicative only. Leachates are formed by passing a defined volume of water through a soil sample and testing the water which comes out the other side to see what contaminants have been removed from the soil and into the water. The main difference between the two methods is that the CEN approach involves drying the soil initially, while the NRA method involves passing water through the soil at it's natural moisture content.

There is no legal framework or official guidelines regulating levels of environmental components of soils or groundwater in Ireland. However, the Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to the Landfill Directive 1999/31/EC took effect in all member states on 16 July 2004 and the waste acceptance criteria set out in it were implemented in all member states on 16 July 2005. It sets limit values for each landfill type based on total contents and leachate concentrations.

However landfills are permitted to apply for a derogation of up to three times the inert limits for some of the acceptance criteria to the EPA. For example, from previous dealings with inert landfills such as Murphy's Environmental they have confirmed that their acceptance criteria are the following.

- PAH (Sum of 6) – 6mg/kg
- Antimony – 0.18mg/kg
- TDS (Total Dissolved Solids) – 12000mg/kg
- TOC (Total Organic Carbon) – 6%
- Zinc – 12.0mg/kg
- Sulphate – 3000mg/kg

8.12.3 Chemical Results

A total of thirty two (32) samples including four (4) groundwater samples and twenty eight (28) soil samples were retrieved from both window samples and boreholes. Window sample boreholes provide a continuous column of soil which can be logged and sampled. These samples were dispatched to a United Kingdom Accreditation Service (UKAS) accredited laboratory, Alcontrol Laboratories for analysis. The soil and groundwater samples were analysed for contaminants commonly found in fill materials, and for those linked to the historical activities of the site, including:

- PAHs.
- Heavy Metals
- Petrol range organics (PROs), benzene, toluene, ethylbenzene, and xylene (BTEX), MTBE, diesel range organics (DRO's) and mineral oil.
- SVOC's.
- VOC's.
- PCBs in groundwater only.

Ten of the soil samples were also subjected to leachate testing and analysed for:

- Heavy metals.
- PAHs.
- Petrol range organics (PROs), BTEX, diesel range organics (DRO's) and mineral oil.

The samples were retrieved from the MADE GROUND / FILL materials found in the upper 2 to 3 metres below ground level, and from the underlying natural ground described as brown slightly gravely CLAY, and sandy fine to coarse GRAVEL. The results of these analyses are included in Appendix 8.2.

The laboratory analysis indicated that a number of samples exhibited elevated levels in each of the following parameters.

Mineral Oil – These are typically associated with diesel, turpentine and fuel oil spills, and found in or around fuel tanks and car parks. They may build up over time or be part of larger spill. Elevated levels were noted in samples from two of the boreholes.

PAH's – Polynuclear Aromatic Hydrocarbons – These are typically the breakdown products of the combustion of fossil fuels, such as coal and also form a component of petrol. These were found at varying levels across the site, in samples taken from five of the boreholes.

Other contaminants which were analysed for, such as total metal content of soils and leachates were all found to be below the levels for acceptance into an inert landfill.

From the analysis, to allow a simple visual representation, the following soils categorisation is proposed*:

Category	PAH	Mineral Oils
A	<2ppm	<500ppm
B	>2ppm, <6ppm	
C	>6ppm, <40ppm	
D	>40ppm	>1000ppm

*Please note that the categorisation may be effected by other results from different parameters such as TOC, leachates and VOC's.

A number of interpretive drawings showing the breakdown of categories across the site are presented in Appendix 1. These categories are based on correspondence with Murphy's Landfill and prior experience dealing with other licenced landfills around Ireland. It is proposed that Category A materials may be disposed of to a permitted site, Category B materials to a facility such as Murphy's Landfill, The Naul, Co. Dublin, Category C materials to a facility such as KTK Landfill, and Category D would have to be disposed of to export or a waste recovery facility. It should be stressed however that it is at the discretion of the receiving facility and on each facilities licence, as to whether or not they will accept the material for disposal.

8.13 Conclusions and Recommendations

8.13.1 Geotechnical Recommendations

8.13.1.1 Foundations

Based on the architect's drawings (see Scott Tallon Walker Drawing, 00031-PLA-003, Rev. P1), the development will include a basement which will have a maximum finished floor level of 1.8mOD, with an additional 0.5m excavation to allow for blinding, services and drainage layers. The inclusion of this basement will require the removal of the majority of the fill (made ground) across the site.

It is also likely that the water table will exist at or below the base of the basement works which may require localised dewatering during construction. Assuming at least 0.5m penetration into the gravel stratum, an allowable bearing capacity of 150kN/m^2 would be applicable using spread foundations.

Any uplift pressures will need to be counteracted by the dead weight of the structure, or a number of other methods such as drainage or anchoring.

It is likely that sheet piling will be required to support the edges of the basement excavation during construction, which is discussed further in section 8.13.1.2.

8.13.1.2 Dewatering and Excavation Support

The groundwater was encountered in the upper gravel layer across the site, generally at levels of between -0.5 and 1.0mOD Malin, (approximately 3 – 4m BGL) and is likely to be seasonally influenced. It is therefore not anticipated that significant dewatering is will be required, but may be required locally or during specific climatic events.

There may be issues associated with the driving of the sheet piles, particularly close to adjacent structures and the quay wall, where vibrations may be high, and may cause damage. Further examination of the quay wall will be required to determine its overall quality and to see if it 'keys' into the site prior to sheet pile driving and / or excavation.

8.13.1.3 Gas Precautionary Measures

CIRIA 149 (protecting development from methane) suggests the highest measured gas parameter should be used as the determining factor in recommending gas precautionary measures. The highest measured parameters for CO_2 and CH_4 (methane) were 2.3% and 3.9% respectively.

Based on Table 2.8, page 144, CIRIA 149, a characteristic situation 3 should be utilised. However, it should be noted that Irish legislation has stricter guidelines ("Protection of New Buildings and Occupants from Landfill Gas", Construction Research Section, DOE, 1994) on CO_2 levels than the United Kingdom (UK = 5%, Ireland = 0.5%).

The recommended precautionary measures for a characteristic situation 3 are:-

- Ventilation of confined spaces.
- Well constructed ground slab.
- Low permeability gas membrane.
- Minimum penetration of the ground slab by services.
- #Passive venting the building, granular filled void
- *Possible passive venting to building under slab void.

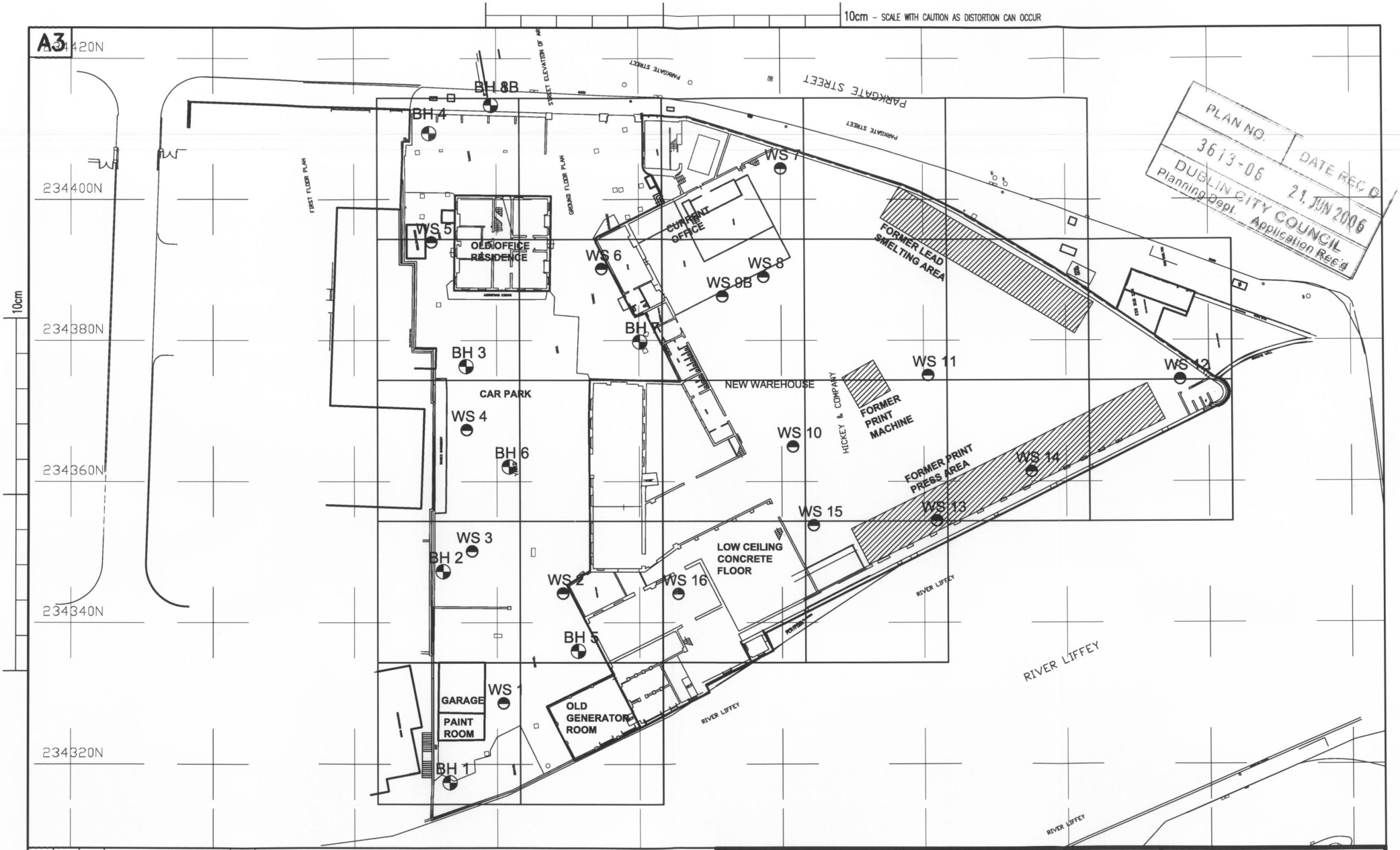
Both office and residential
* Residential only

8.14 Environmental Recommendations

With regard to the proposed residential and commercial development at Parkgate Street, a preliminary evaluation of the site development is outlined below.

Based on an estimated site area of 7,000m^2, this option will involve the removal of approximately 15,000m^3 of soil, comprising mainly of fill materials. The primary contaminants i.e. metals, petroleum hydrocarbons and PAHs are shown to occur at concentrations above the criteria for inert landfill within localised 'hotspots' in the fill materials. It is estimated, based upon the current soil quality data, that approximately 5,000m^3 of material may be unsuitable for disposal as inert material under the Landfill Directive guidelines. However of this 5,000m^3, 3,750m^3 may be acceptable at an engineered (i.e. lined) inert landfill (i.e. Murphy's Environmental). Of the remaining 1,250m^3, 600m^3 could be disposed of at a non-hazardous landfill such as KTK, with the remaining 650m^3 requiring overseas treatment / disposal. It must be stressed that it is at the discretion of the receiving facility and on the facilities licence as to whether or not they will accept the material for disposal.

Appendix 8.1: Figures



PLAN NO. 3613-06
DATE REC'D 21 JUN 2006
DUBLIN CITY COUNCIL Planning Dept. Application Rec'd

LEGEND

WS 4 – WINDOW SAMPLE

BH 6 – BOREHOLE

Rev.	Date	By	Description	Chd By

Job Title
HICKEYS FABRIC & CO. LTD.
NO 43 PARKGATE HOUSE
PARKGATE STREET
DUBLIN 8

Drawing Title
BOREHOLE/WINDOW SAMPLE LOCATIONS AND EXTENT OF HISTORICAL OPERATIONS

Drawing Status
FOR INFORMATION ONLY

ARUP
10 Wellington Road Dublin 4
Tel 01-6144200 Fax 01-6683169
Email dublin@arup.com
DUBLIN CORK LIMERICK

Scales NTS
Originator
Checked
Approved
Date

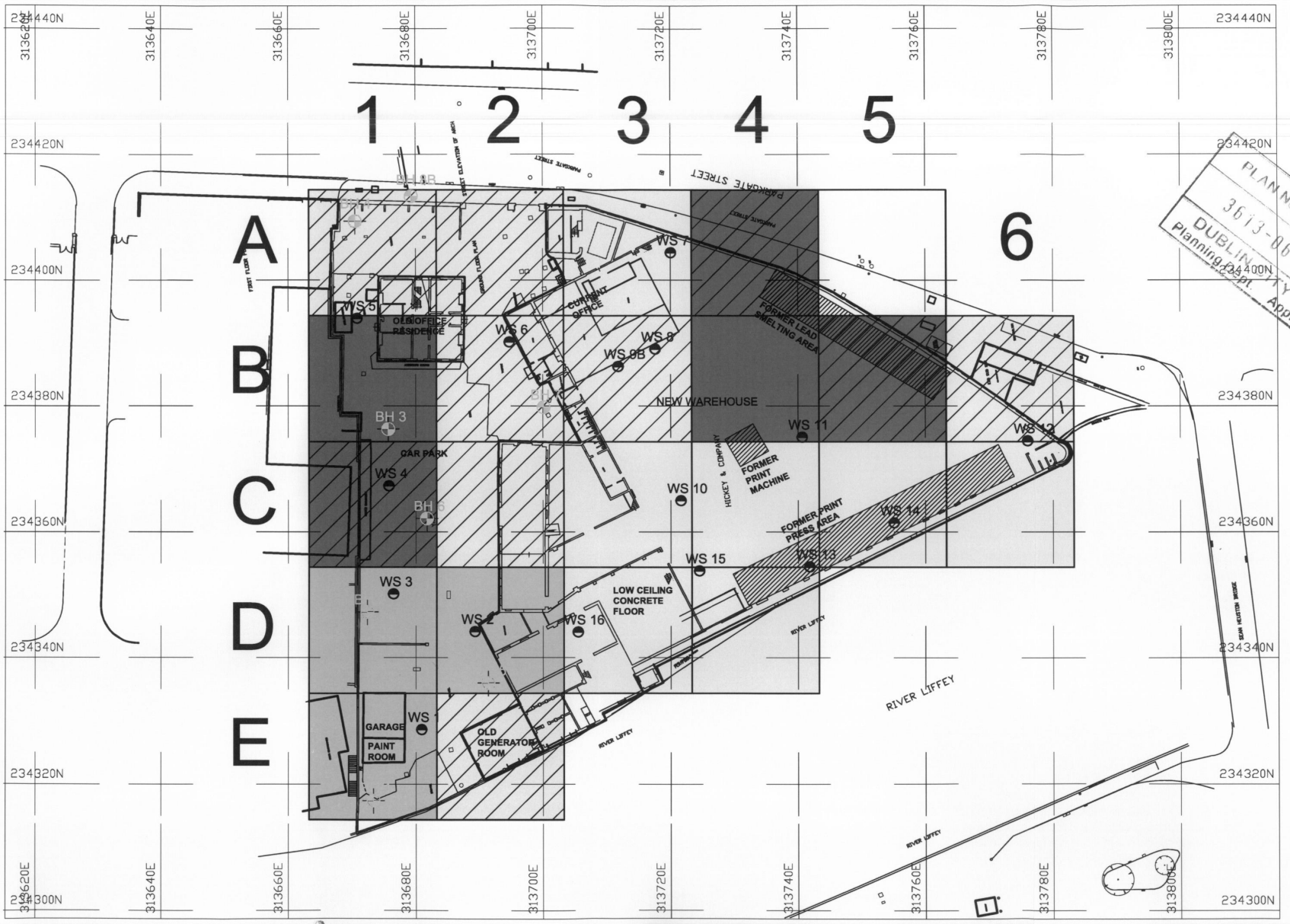
Job No. D3586.11
Drawing No. FIGURE 2
Rev.

J:\D3500-D3599\D3586\3) Drawings\(e) Geotechnical\10\Figure 2.dwg 20 Mar 2006 12:30:13

A3

10cm – SCALE WITH CAUTION AS DISTORTION CAN OCCUR

10cm



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Rev.	Date	By	Description	Chd By

A – INERT NATURAL GROUND

A* – INERT MADE GROUND

B – SOILS PAH SUM OF 6 >2ppm <6ppm

C – SOILS PAH SUM OF 6 >6ppm DRO <1000ppm

D – SOILS DRO >1000ppm

▨ – CELL NOT TESTED

Job Title
HICKEYS FABRICS & CO. LTD.
NO 43 PARKGATE HOUSE
PARKGATE STREET
DUBLIN 8

Drawing Title
CATEGORIES FOR EXCAVATION
GL – 3.0mOD

Drawing Status
FOR INFORMATION ONLY

ARUP
10 Wellington Road Dublin 4
Tel 01-6144200 Fax 01-6683169
Email dublin@arup.com
DUBLIN CORK LIMERICK

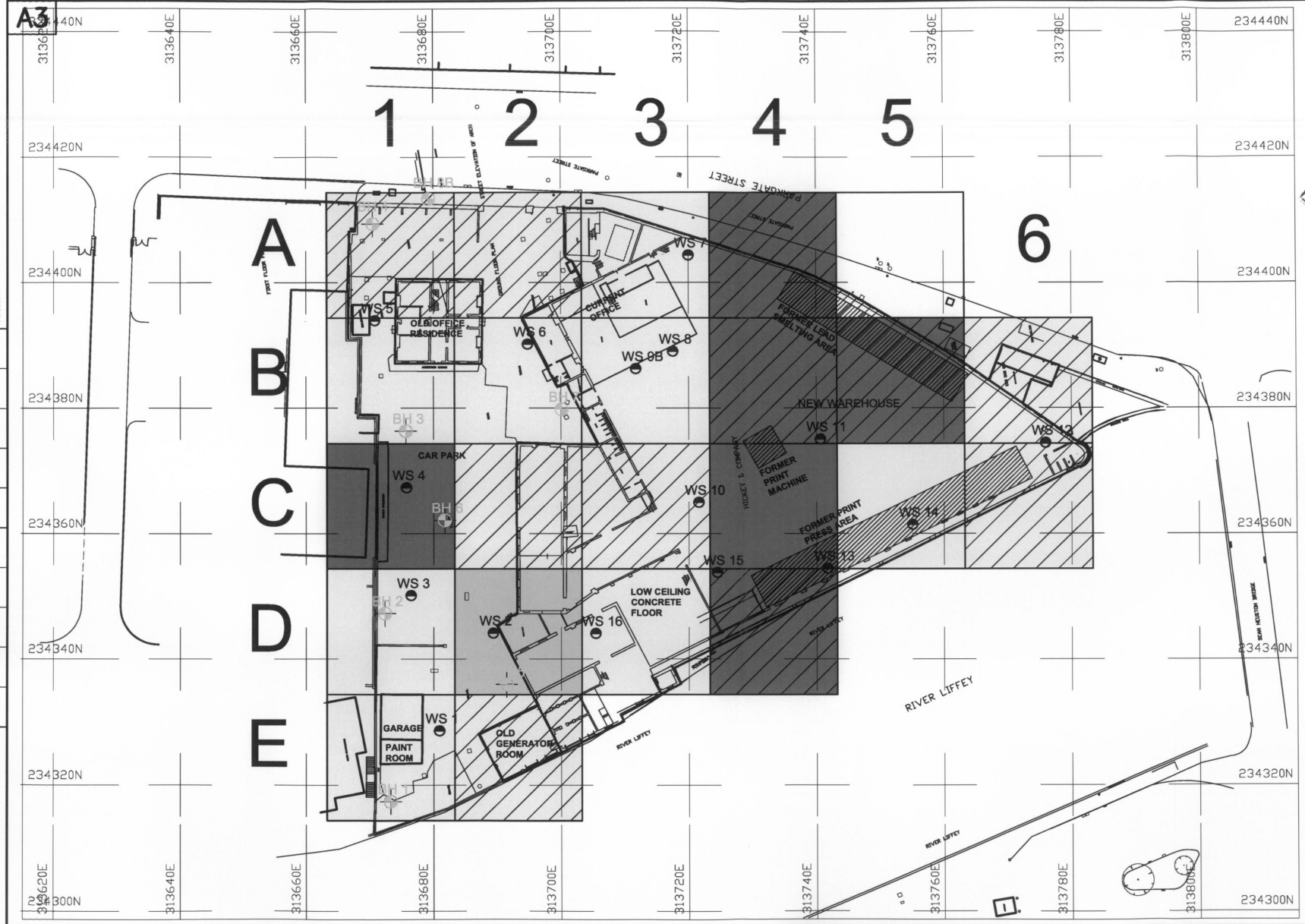
Scales NTS
Originator
Checked
Approved
Date

Job No. D3586.11
Drawing No. FIGURE 3
Rev.

J:\D3500-D3599\D3586\3) Drawings\(e) Geotechnical\10\Figure 3.dwg 20 Mar 2006 12:30:50

A3

10cm – SCALE WITH CAUTION AS DISTORTION CAN OCCUR



10cm

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CELL	CATEGORY
D2	CAT. D TO 2.25M OD, CAT A* TO 1.75M OD
D1	CAT. A* TO 2.11M OD, CAT B TO 1.61M OD

A – INERT NATURAL GROUND
A* – INERT MADE GROUND
B – SOILS PAH SUM OF 6 >2ppm <6ppm
C – SOILS PAH SUM OF 6 >6ppm DRO <1000ppm
D – SOILS DRO >1000ppm
– CELL NOT TESTED

Rev.	Date	By	Description	Chd By

Job Title
HICKEYS FABRICS & CO. LTD.
NO 43 PARKGATE HOUSE
PARKGATE STREET
DUBLIN 8

Drawing Title
CATEGORIES FOR EXCAVATION
3.0mOD – FORMATION LEVEL

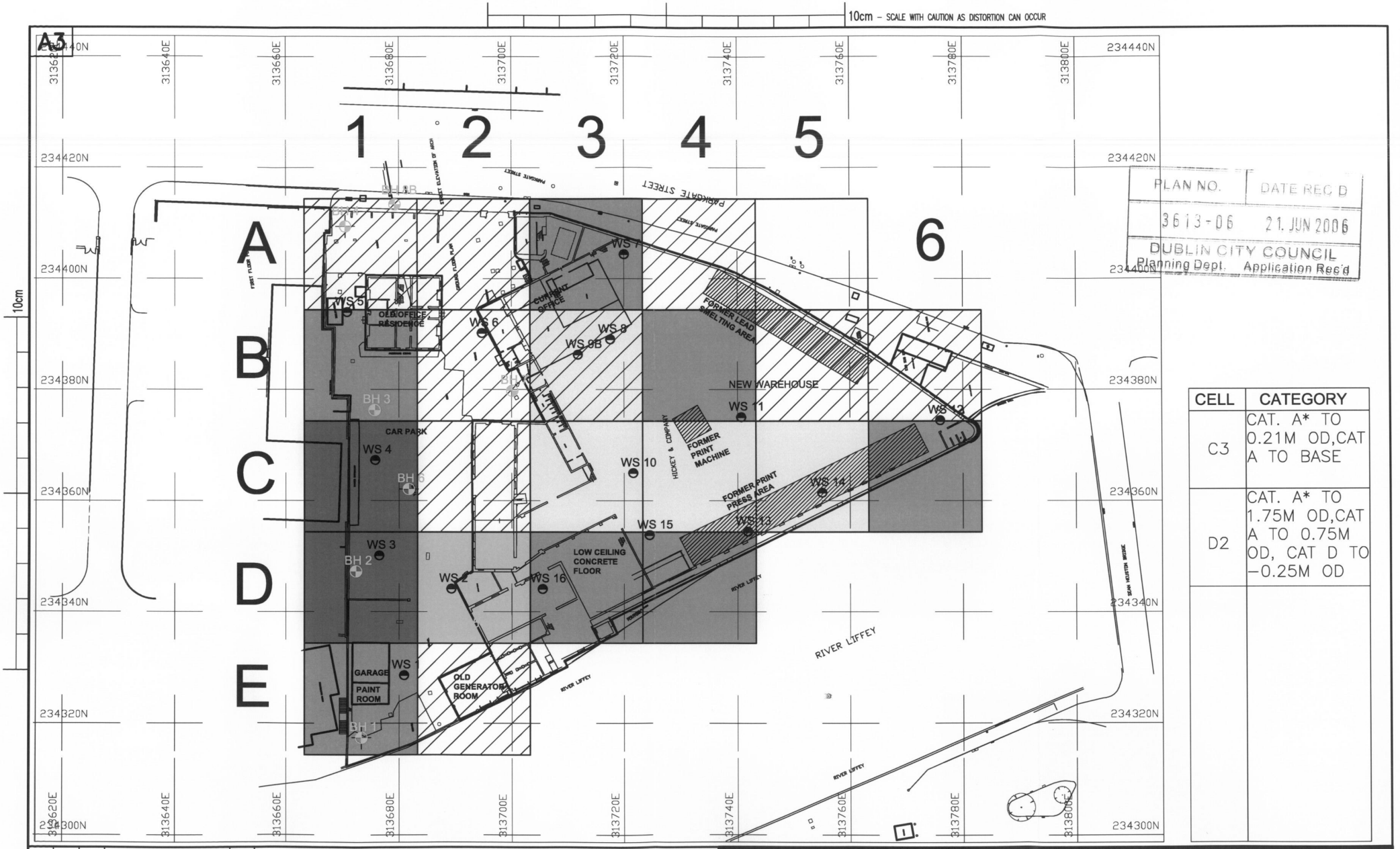
Drawing Status
FOR INFORMATION ONLY

ARUP
10 Wellington Road Dublin 4
Tel 01-6144200 Fax 01-6683169
EMail dublin@arup.com
DUBLIN CORK LIMERICK

Scales NTS
Originator
Checked
Approved
Date

Job No. D3586.11
Drawing No. FIGURE 4
Rev.

J:\D3500-D3599\D3586\3) Drawings\(e) Geotechnical\10\Figure 4.dwg 20 Mar 2006 12:31:16



PLAN NO. 3613-06 | DATE REC'D 21 JUN 2006

DUBLIN CITY COUNCIL Planning Dept. Application Rec'd

CELL	CATEGORY
C3	CAT. A* TO 0.21M OD, CAT A TO BASE
D2	CAT. A* TO 1.75M OD, CAT A TO 0.75M OD, CAT D TO −0.25M OD

Rev.	Date	By	Description	Chd By

A – INERT NATURAL GROUND

A* – INERT MADE GROUND

B – SOILS PAH SUM OF 6 >2ppm <6ppm

C – SOILS PAH SUM OF 6 >6ppm DRO <1000ppm

D – SOILS DRO >1000ppm

– CELL NOT TESTED

Job Title
HICKEYS FABRIC & CO. LTD.
NO 43 PARKGATE HOUSE
PARKGATE STREET
DUBLIN 8

Drawing Title
BELOW FORMATION LEVEL

Drawing Status
FOR INFORMATION ONLY

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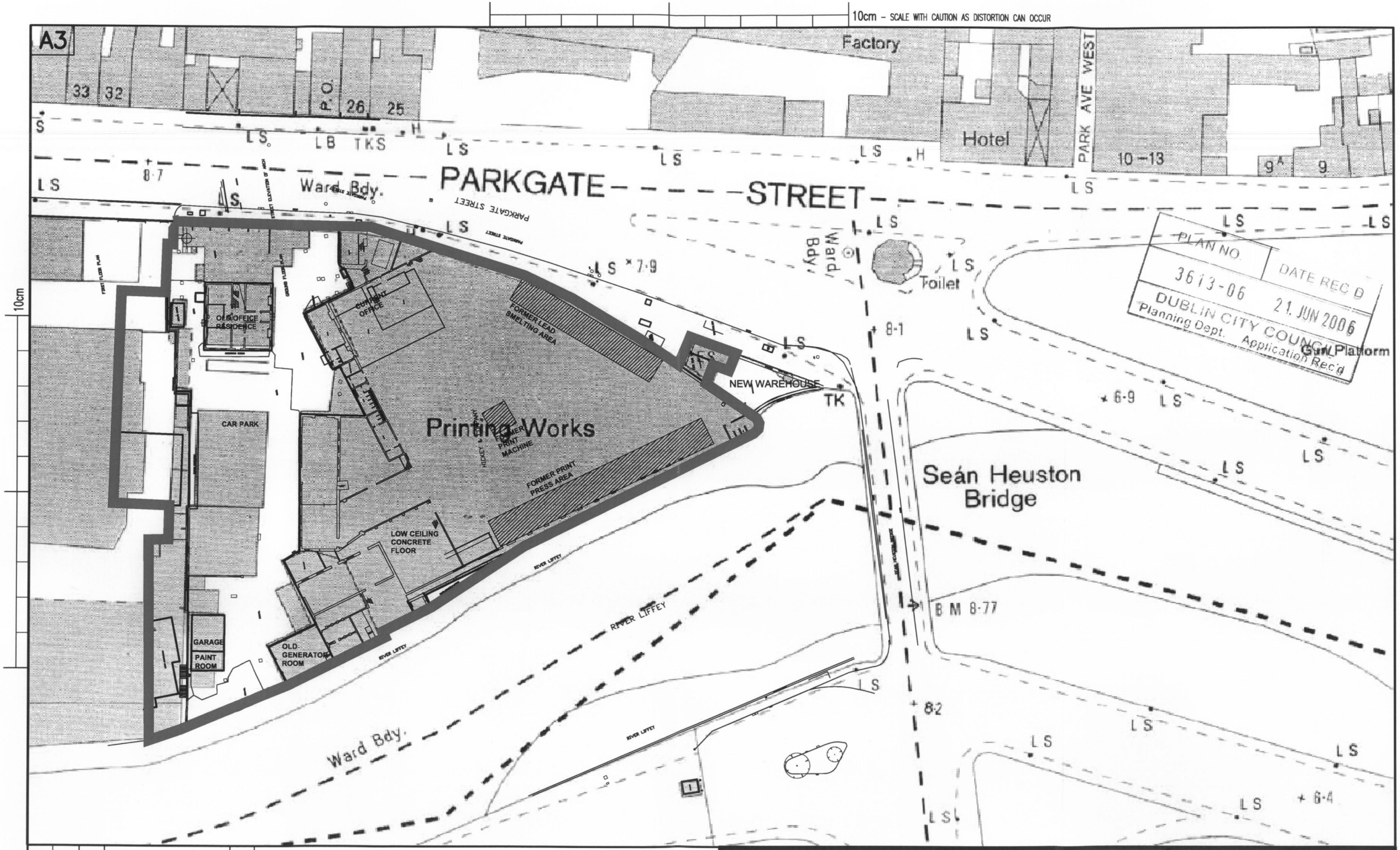
Scales NTS | Originator | Checked | Approved | Date

Job No. D3586.11 | Drawing No. FIGURE 5 | Rev.

J:\D3500-D3599\D3586\3) Drawings\(e) Geotechnical\10\Figure 5.dwg 20 Mar 2006 12:31:40



10cm

Rev.	Date	By	Description	Chd By

Job Title
HICKEYS FABRIC & CO. LTD.
NO 43 PARKGATE HOUSE
PARKGATE STREET
DUBLIN 8

Drawing Title
SITE LOCATION PLAN

Drawing Status
FOR INFORMATION ONLY

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DUBLIN CORK LIMERICK

Scales NTS
Originator
Checked
Approved
Date

Job No. D3586.11
Drawing No. FIGURE 1
Rev.

J:\D3500-D3599\D3586\3) Drawings\(e) Geotechnical\10\Figure 1.dwg 20 Mar 2006 12:29:17