APPENDIX 6.3 EXAMPLES OF VALUING IMPORTANT ECOLOGICAL FEATURES

International Importance:

- 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.
- Proposed Special Protection Area (pSPA).
- Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended).
- Features essential to maintaining the coherence of the Natura 2000 Network.[5]
- Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive.
- Resident or regularly occurring populations (assessed to be important at the national level)[6] of the following: -
  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or
  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
- Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).
- World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972).
- Biosphere Reserve (UNESCO Man & The Biosphere Programme).
- Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).
- Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).
- Biogenetic Reserve under the Council of Europe.
- European Diploma Site under the Council of Europe.
- Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 1988).[7]

National Importance:

- Site designated or proposed as a Natural Heritage Area (NHA).
- Statutory Nature Reserve.
- Refuge for Fauna and Flora protected under the Wildlife Acts.
- National Park.
- Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.

5 See Articles 3 and 10 of the Habitats Directive

6 It is suggested that, in general, 1% of the national population of such species qualifies as an internationally important population. However, a smaller population may qualify as internationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

7 Note that such waters are designated based on these waters' capabilities of supporting salmon (Salmo salar), trout (Salmo trutta), char (Salvelinus) and whitefish (Coregonus)

- Resident or regularly occurring populations (assessed to be important at the national level)[8] of the following: -
  - Species protected under the Wildlife Acts; and / or
  - Species listed on the relevant Red Data list.
- Site containing 'viable areas'[9] of the habitat types listed in Annex I of the Habitats Directive.

County Importance:

- Area of Special Amenity.[10]
- Area subject to a Tree Preservation Order.
- Area of High Amenity, or equivalent, designated under the County Development Plan.
- Resident or regularly occurring populations (assessed to be important at the County level)[11] of the following: -
  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive.
  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
  - Species protected under the Wildlife Acts; and/or
  - Species listed on the relevant Red Data list.
- Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.
- County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local Biodiversity Action Plan, if this has been prepared.
- Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.
- Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local Importance (higher value):

- Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared.

8 It is suggested that, in general, 1% of the national population of such species qualifies as a nationally important population. However, a smaller population may qualify as nationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

9 A 'viable area' is defined as an area of a habitat that, given the particular characteristics of that habitat, was of a sufficient size and shape, such that its integrity (in terms of species composition, and ecological processes and function) would be maintained in the face of stochastic change (for example, as a result of climatic variation).

10 It should be noted that whilst areas such as Areas of Special Amenity, areas subject to a Tree Preservation Order and Areas of High Amenity are often designated on the basis of their ecological value, they may also be designated for other reasons, such as their amenity or recreational value. Therefore, it should not be automatically assumed that such sites are of County importance from an ecological perspective.

11 It is suggested that, in general, 1% of the County population of such species qualifies as a County important population. However, a smaller population may qualify as County important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

- Resident or regularly occurring populations (assessed to be important at the Local level)[12] of the following: -
  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive.
  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
  - Species protected under the Wildlife Acts; and/or
  - Species listed on the relevant Red Data list.
- Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality.
- Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

Local Importance (lower value):

- Sites containing small areas of semi-natural habitat that are of some local importance for wildlife.
- Sites or features containing non-native species that are of some importance in maintaining habitat links.

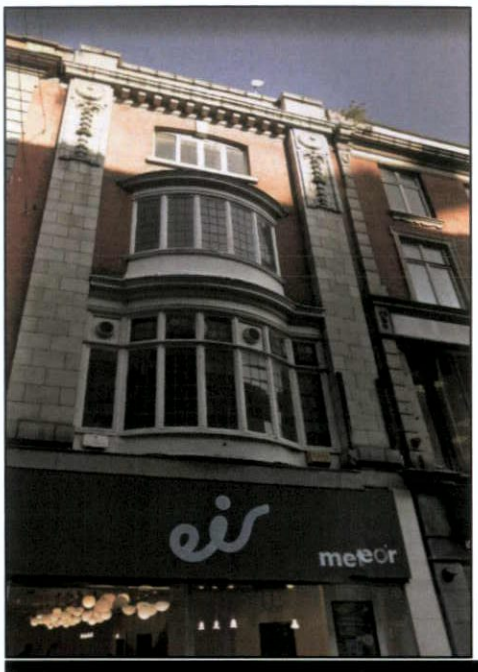
[12] It is suggested that, in general, 1% of the local population of such species qualifies as a locally important population. However, a smaller population may qualify as locally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

APPENDIX 6.4 POTENTIAL ROOST FEATURE (PRF) PHOTOS FROM BUILDING INSPECTIONS

Building	PRFs	PRF Suitability	Photograph
Building 4 (10-11 Moore Lane)	Flat roofed building, with gaps on external wall between brick work and roof, and access into building above sliding door at entrance.	Low	 

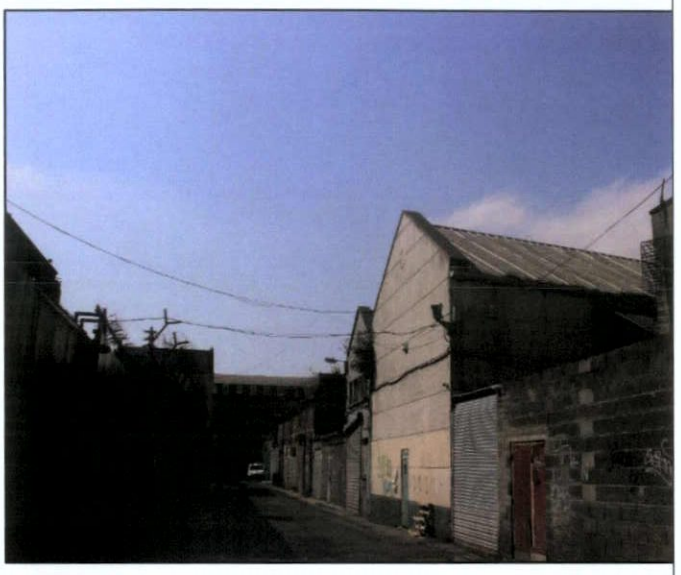
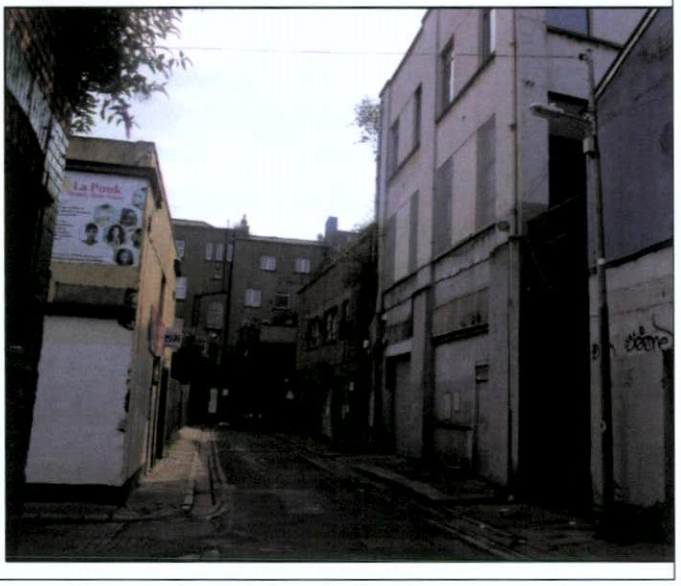
Building	PRFs	PRF Suitability	Photograph
Building 5 (6-8 Moore Lane)	Pitched roof building with open grated buildings allowing access within, also gaps between brickwork on external walls.	Low	 

Building	PRFs	PRF Suitability	Photograph
Building 6 (10 Henry Place)	Pitched roof building with attic space, PRFs on external walls between brickwork and soffits where they join the external walls.	Low	 

Building	PRFs	PRF Suitability	Photograph
Building 7 (37 Henry Street)	No attic space within this building (flat roof), but PRFs on external walls and above window lintels .	Low	 

Building	PRFs	PRF Suitability	Photograph

Building	PRFs	PRF Suitability	Photograph
Henry Street	Flat roofed, well-sealed retail units, no surrounding vegetation suitable for commuting/foraging.	Negligible	
Moore Street	Red brick flat-roofed buildings with very little gaps or crevices suitable for roosting bats. No surrounding vegetation for commuting/foraging bats.	Negligible	

Building	PRFs	PRF Suitability	Photograph
Moore Lane	Mostly dilapidated, run-down buildings, some with low potential as described above. Largely unsuitable for bats with no PRFs, or too exposed to be suitable for roosting bats. No surrounding vegetation for commuting/foraging.	Negligible	 

APPENDIX 7.1 ENVIRONMENTAL ASSESSMENT (SITE INVESTIGATION)

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environmental management for business

ENVIRONMENTAL ASSESSMENT

DUBLIN CENTRE

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January 2009

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1. INTRODUCTION

In 2006 O' Callaghan Moran & Associates (OCM) conducted a preliminary environmental assessment of the proposed Dublin Centre site located between Upper O'Connell Street and Moore Street and between Parnell Street and Henry Street, Dublin. The proposed development comprises a mixed retail and commercial development over deep basement.

The assessment involved a desk study of available information on historic land use and a site inspection, based on which OCM prepared a Map outlining areas of potential high, moderate and low risk of contamination (Ref.: Figure 1).

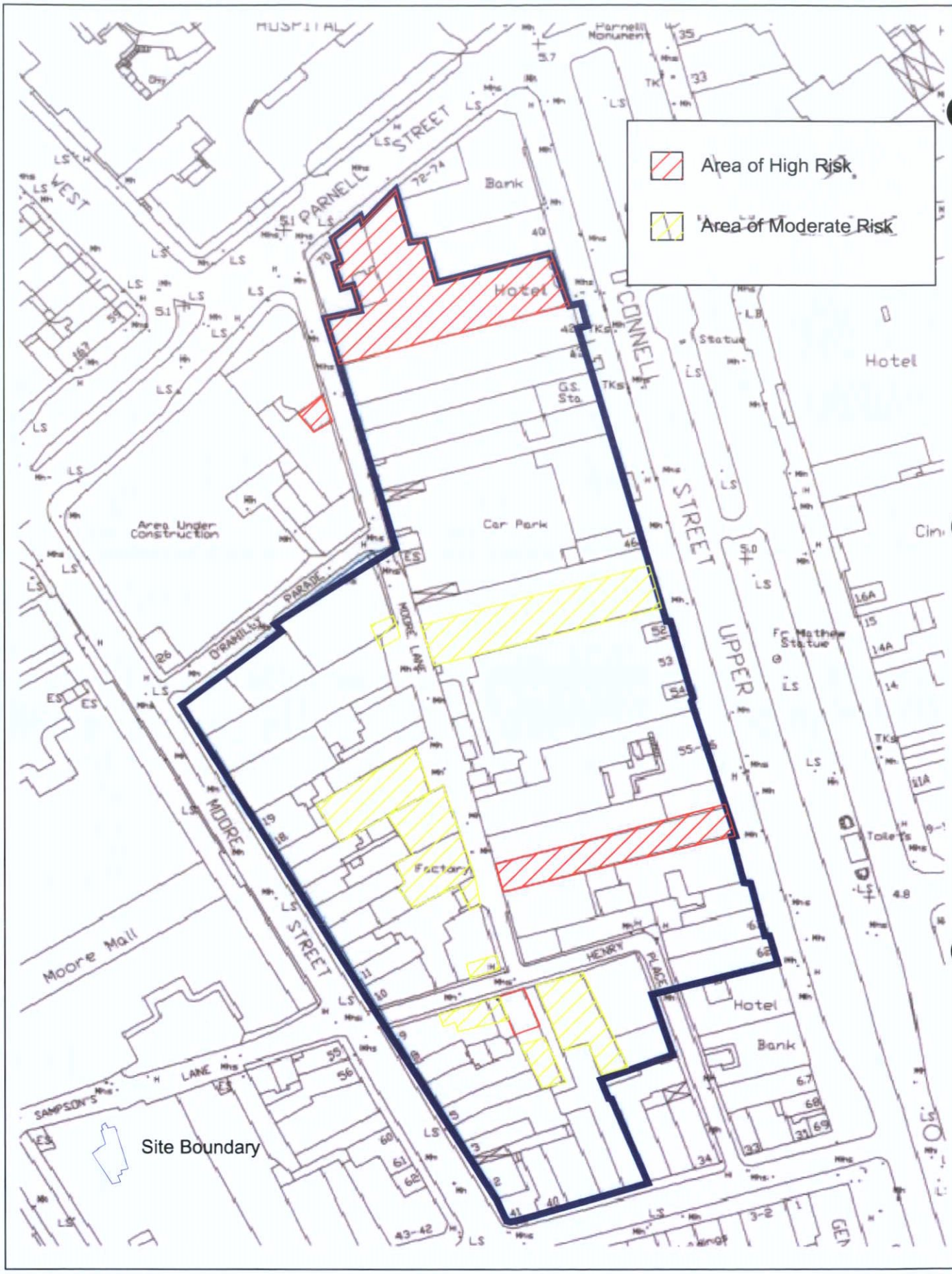
In 2008 a joint geotechnical and environmental site investigation was undertaken comprising the excavation of trial pits, the installation of boreholes in the subsoils and bedrock and the collection and testing of soil and groundwater samples. The geotechnical investigations were supervised by AGL while the environmental elements of the investigation were supervised by OCM.

The purpose of the environmental investigation was to identify if there was contamination in the subsoils or groundwater; identify appropriate management options for any contaminated subsoils that may have to be removed from the site during the redevelopment; and establish the status of groundwater quality. This report presents the findings of the environmental investigation.

1.1 Investigation Scope

The scope comprised: -

- Collection of samples of the fill material and the underlying subsoils for laboratory analysis to establish if these materials have been impacted by historical activities;
- Characterisation of the impacted soils, based on the laboratory testing, to identify suitable off-site disposal/recovery outlets for any soils that have to be removed;
- Collection and analysis of groundwater samples from the subsoils and bedrock to provide data for an application to Dublin City Council for a trade effluent discharge license for dewatering during the construction of the basement.



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Areas of Risk from 2006

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Figure No.
1

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1.1.1 Limitations

While every effort was made to target the areas of concern identified in OCM 2006 Report, the intrusive investigations were confined to open areas in the middle of the site and around the site parameter. This was due to the fact that most of the premises within the development footprint were either still occupied, or in the case of those that had been vacated, had not yet been demolished. Therefore it is possible that there areas of localized contamination at the site that have not been identified in this assessment.

2. SITE DESCRIPTION

2.1 Location

Dublin Centre is bounded to the east by O'Connell Street Upper, to the North by Parnell Street and O'Rahilly Parade, to the south by Henry Street and to the west by Moore Street and Moore Lane. Henry Place is also part of the development area as shown on Figure 2.1.

2.2 Site Layout and Current Use

In 2006 OCM conducted a site walkover to determine the use of the buildings at that time. The occupier of each building and type of activity carried out therein are listed in Table 2.1.

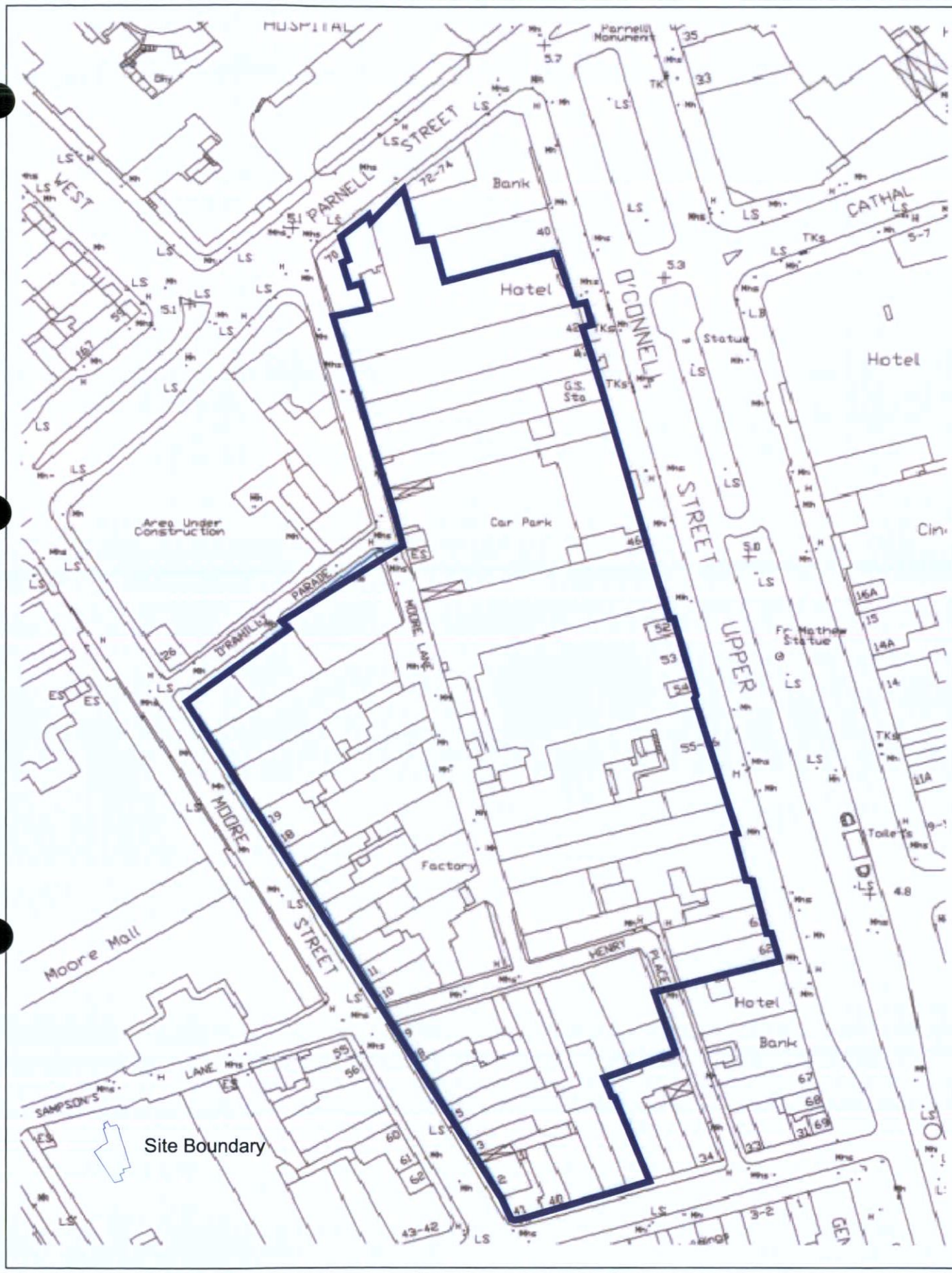

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Table 2.1 Name and Address of Occupiers within the subject area

Address	Name	Type of Activity
41 – 42 O'Connell Street Upper	Royal Dublin Hotel	Hotel
43 O'Connell Street Upper	Ned Kelly's	Snooker Hall
44 O'Connell Street Upper	An Garda Síochana	Offices
	Vacant	
	Vacant	
	Londis	Grocery/Newsagent
	Dr. Quirkey's	Amusement Arcade
52 O'Connell Street Upper	Slattery's	Camera Shop
52 – 54 O'Connell Street Upper	Carlton Cinema (Closed)	Cinema
55 – 56 O'Connell Street Upper	Dr. Quirkey's	Amusement Arcade
57 – 58 O'Connell Street Upper	Carroll's	Irish Gift Shop
58 O'Connell Street Upper	Profiles (Above Carroll's)	Ladies Gym
59 – 60 O'Connell Street Upper	Dublin Bus (Closed)	Office
61 O'Connell Street Upper	Flanagan's	Restaurant
62 O'Connell Street Upper	McDonalds	Fast Food Restaurant
37 Henry Street	The Card Company	Card shop
38 Henry Street	NoName	Clothes shop
39 Henry Street	Game	Electronic Game Shop
40 Henry Street	Simon Hart	Shoe Shop
41 Henry Street	McGiveney's	Optician & Jewellers
4 Henry Place	Unknown possibly The Mint	Tattoo parlour
5 – 9 Henry Place	Han Yang Asian Market	Asian Food Shop
1 Moore Street	Everyday Seafood & Grocery	Grocery shop
1 Moore Street (upstairs)		Hairdresser
3 Moore Street	Paddy Power	Bookmaker
4 Moore Street	Bryan's (Closed)	Shoe Repair/Key Cutting
5 Moore Street	Doyle's (Closed)	Bingo/ Hardware
6 Moore Street	Talk Cents	Internet/Phone Shop
7 Moore Street	Troy's Butchers	Butcher's Shop
8 – 9 Moore Street	Hair Extension Master / Central Supermarket (Closed)	Supermarket and Hairdressers
10 Moore Street	Rong Xing	Chinese Supermarket
11 Moore Street	Home Store	Hardware/Homeware shop
12 Moore Street	Oceanic Superstore	Asian Food Shop
13 Moore Street	Pat's Household	Homeware shop
14 Moore Street	Charity Hair Studio	Hairdressers
15 Moore Street	Larmints Paylink	Money Transfer shop
16 Moore Street	Plunketts	Closed
17 Moore Street	Mobile Phone Centre	Phone / electronic shop
18 Moore Street	Crystal Superstores	Afro-Caribbean shop
19 Moore Street	American Design Wears	Basketball & sports shop
20 Moore Street	Unknown	Chinese Restaurant & Hairdressers upstairs
21 Moore Street	Madina Asian Food Co.	Asian Food Market
22 Moore Street	China House	Restaurant
23 Moore Street	Vacant	Possibly offices upstairs
1 – 2 O'Rahilly Parade	Dublin City Council	Waste management equipment storage
3 – 8 O'Rahilly Parade	Dublin City Council	Storage Containers for the Moore St. Traders

O'Connell Street Upper

The lots on Upper O'Connell Street were occupied by eight retail outlets; the Royal Dublin Hotel and two restaurants (Flanagan's and McDonalds).

Parnell Street

The Royal Dublin Hotel was the only lot on Parnell Street.

Henry Street

There were 5 No. retail outlets in 37 to 41 Henry Street.

Henry Place

Two buildings on Henry Place were being used for retail purposes (one Asian food market and one tattoo parlour). The remaining area was occupied by derelict buildings. The rear gardens or yard areas of the lots on O'Connell Street form the eastern and northern boundary of Henry Place.

Moore Street

All of the buildings on Moore Street where occupied were retail outlets, which include restaurants, general shops and food markets. Of the 23 buildings 4 were vacant.

Moore Lane

The rear of the buildings on O'Connell Street Upper form the eastern boundary of Moore Lane. Derelict buildings and yards and the rear of the buildings on Moore Street form the western boundary of Moore Lane.

O'Rahilly Parade

O'Rahilly Parade is occupied by two yards. 1 – 2 which are used by Dublin City Council as a storage area for bins and street cleaning equipment. 3 to 8 O'Rahilly Parade was being used by Dublin City Council as a storage area for the Moore Street Traders.

2.3 Services

OCM understand that heating for all of the buildings is either by gas supplied by Bord Gais and/or individual electric heating systems. OCM did not observe any heating oil storage tanks

in the rear of any of the premises. While it is unlikely that oil is widely used for heating purposes, it is possible that there may be some individual heating oil storage tanks in use.

Water is supplied from the Dublin City Council mains supply. OCM did not identify the presence of any supply wells and a review of Geological Survey of Ireland records indicates that there are no water supply wells in the area.

Sanitary wastewater discharges to the Dublin City Council foul sewer, while storm water is discharged to the municipal Storm Sewer. No records of any Trade Effluent Discharge Licences were identified in the review of Dublin City Council files, the details of which are discussed in Section 3.

An ESB transformer station was identified in the basement of 40 and 41 O'Connell Street Upper during OCMs 2006 assessment. It is understood that the transformer was installed in the mid 1960's, but OCM could not establish either the exact installation time or whether it is still in place. This transformer, if present, may have coolants containing PCBs , which would require specialist handling.

3. PHYSICAL SETTING

3.1 Geology

Information on the local and regional geology was obtained from the GSI databases and the geotechnical investigation, which comprised the installation of cable tool percussion (shell & auger) and rotary cores boreholes. The site investigation findings are discussed in detail in Section 4.

3.1.1 Bedrock

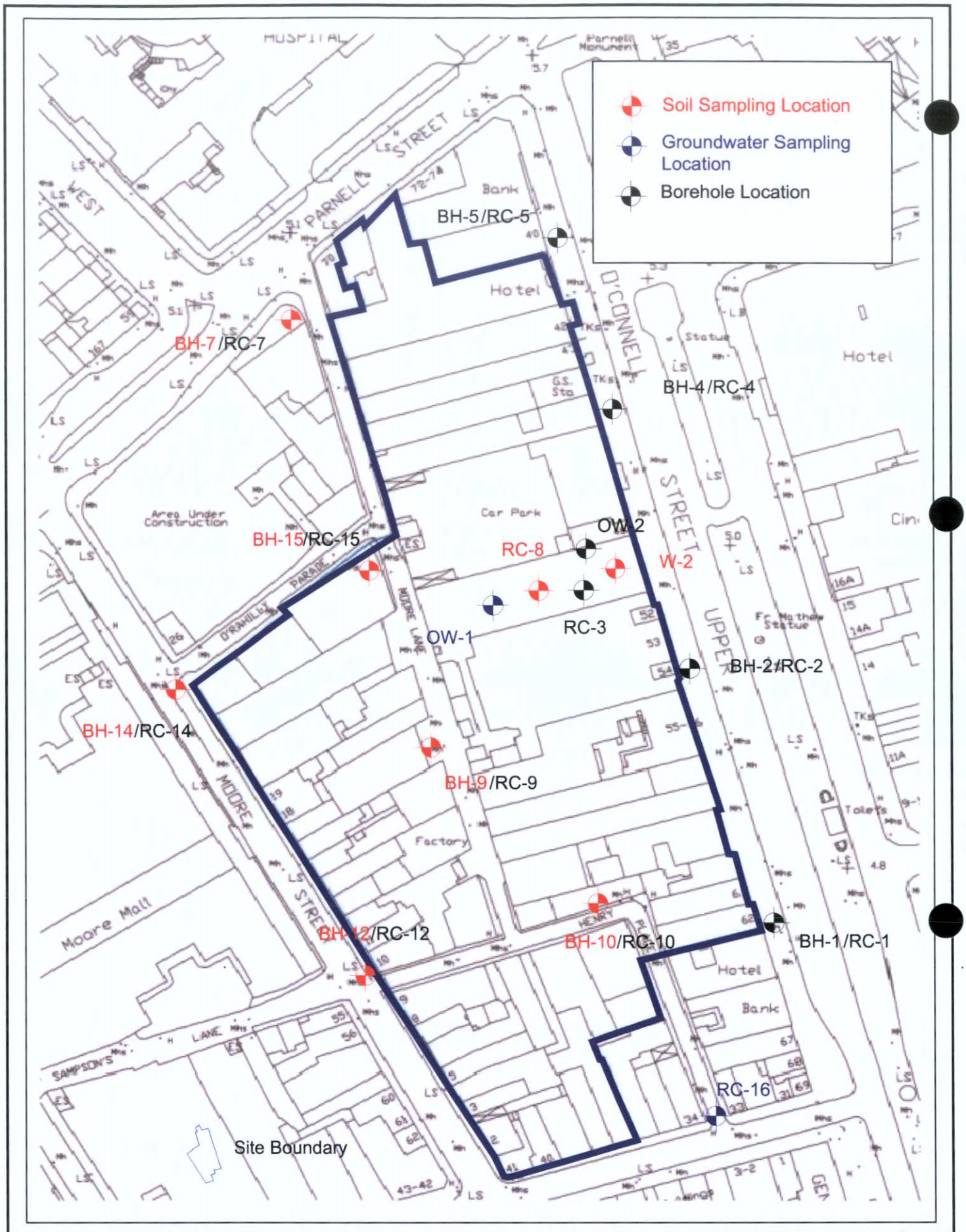
The GSI bedrock "Geology of Kildare – Wicklow", Map 1994 states that the subject area is underlain by dark grey to black limestones and shales of the Calp Limestones. Calp units typically consist of dark grey, fine grained, graded limestone with interbedded black, poorly fossiliferous shales. The limestone bed thickness, grain size, colour and proportion of shale vary widely.

The borehole locations used for environmental sampling purposes are shown on Figure 3.1 and the complete map showing all the site investigation locations is included in Appendix 1 The borehole logs are included in Appendix 2.

The rotary core borehole logs indicate that the bedrock is mostly interbedded black calcareous shale, argillaceous limestone and siliceous limestone. In OW-1 and OW-2, located in the centre of the site, the bedrock is described as limestone. In BH-5 the bedrock encountered was interbedded limestone and shale and grey blue limestone. The depth to bedrock ranged from 12.6 m below ground level (bgl) for RC-16 to 27.3 m bgl for RC-4 in the northeast of the site.

3.1.2 Subsoils/Quaternary Geology

According to the quaternary map of Dublin, the area is underlain by made ground, alluvium deposits close to the Liffey and glacial till. Much of the central Dublin area is underlain by fill material comprising gravels and clays interspersed with glass pottery and in some cases ash, which was deposited in the 17th and 18th century particularly in the low lying areas close to the Liffey.



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Borehole Locations

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The borehole logs indicate that the subsoils range in thickness from between 12.6 m to 27.3 m across the site and comprises fill material underlain by natural ground. The fill material ranges from 2 m thick at RC-8 to 5 m at BH-4 and is thickest at the O'Connell Street, eastern side of the site. The fill is described as brown grey slightly gravelly clay with cobbles and fragments of brick and concrete. Underneath the fill material, the natural ground comprises mostly gravels underlain by a brown clay.

3.2 Hydrogeology

3.2.1 Aquifer Classification and Vulnerability

The bedrock aquifer beneath the site is classified locally by the GSI as a locally important aquifer (Ll) which is moderately productive only in local zones, indicating that water movement through the bedrock is very slow and along short flow paths. The limited groundwater movement within the rock tends to be restricted to the surficial weathered horizons (top1-3m) or to non-extensive fractured zones. These zones tend to have a limited hydraulic continuity, low storage capacity and potential yield.

It is likely that groundwater flow locally is from north to south toward the River Liffey which is approximately 500 m to the south of the site.

Vulnerability is defined by the GSI as the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. The GSI uses four groundwater vulnerability categories – extreme (<3m), high (3-5m), moderate (5-8m) and low>10m) - for mapping purposes and in the assessment of risk to groundwaters. Groundwater is most at risk where the subsoils are either absent or thin. The data from the borehole logs indicates that the vulnerability of the bedrock aquifer is moderate to low.

3.2.2 Hydrogeological Risk Assessment

The development site is predominantly covered by paved areas, roofs roads and pavement, but there may be some very small unpaved areas to the rear of some of the buildings. Most of the incident rainfall runs off to storm sewer, with infiltration to ground limited to open green or unpaved yard areas.

Beneath the site the subsurface materials comprise made ground, gravels and clay. The thickness of these materials above the bedrock according to the borehole logs ranges from 12.6 – 23.3 m. It is likely therefore that any impacts on the subsurface associated with historical landuse are localised as vertical migration of contamination to the bedrock aquifer will have been greatly inhibited by the type and thickness of the subsoils and in particular the brown clay underlying the gravels.

The development will involve deep excavation into the bedrock will be opened at the site. OCM understand that groundwater pumping tests have been undertaken separately by AGL Consulting Engineers to assess the impacts of dewatering on the local hydrogeological conditions. The impact of dewatering is not therefore been discussed in this report, except in relation to the quality of the groundwater that will be discharged during the dewatering activities.

Post development, the extent of hard standing will be similar to the existing conditions. Therefore the amount of direct recharge as a result of rainfall will be very low and similar to the existing situation.

4. SITE INVESTIGATION

4.1 Sample Locations

The geotechnical investigation comprised the installation of eleven (11) shell and augur boreholes and fifteen (15) rotary core boreholes. The locations are shown on Figure 3.1. The environmental investigation involved the collection of samples of the fill material and underlying natural ground and groundwater samples from selected boreholes identified by OCM.

Fill and subsoil samples were collected from eight boreholes, BH-7, 9, 10, 12, 14, 15, RC-8 and W-2. Groundwater samples were collected at both RC-16 and OW-1, where two standpipes were located with one in the subsoil and one in the bedrock aquifer.

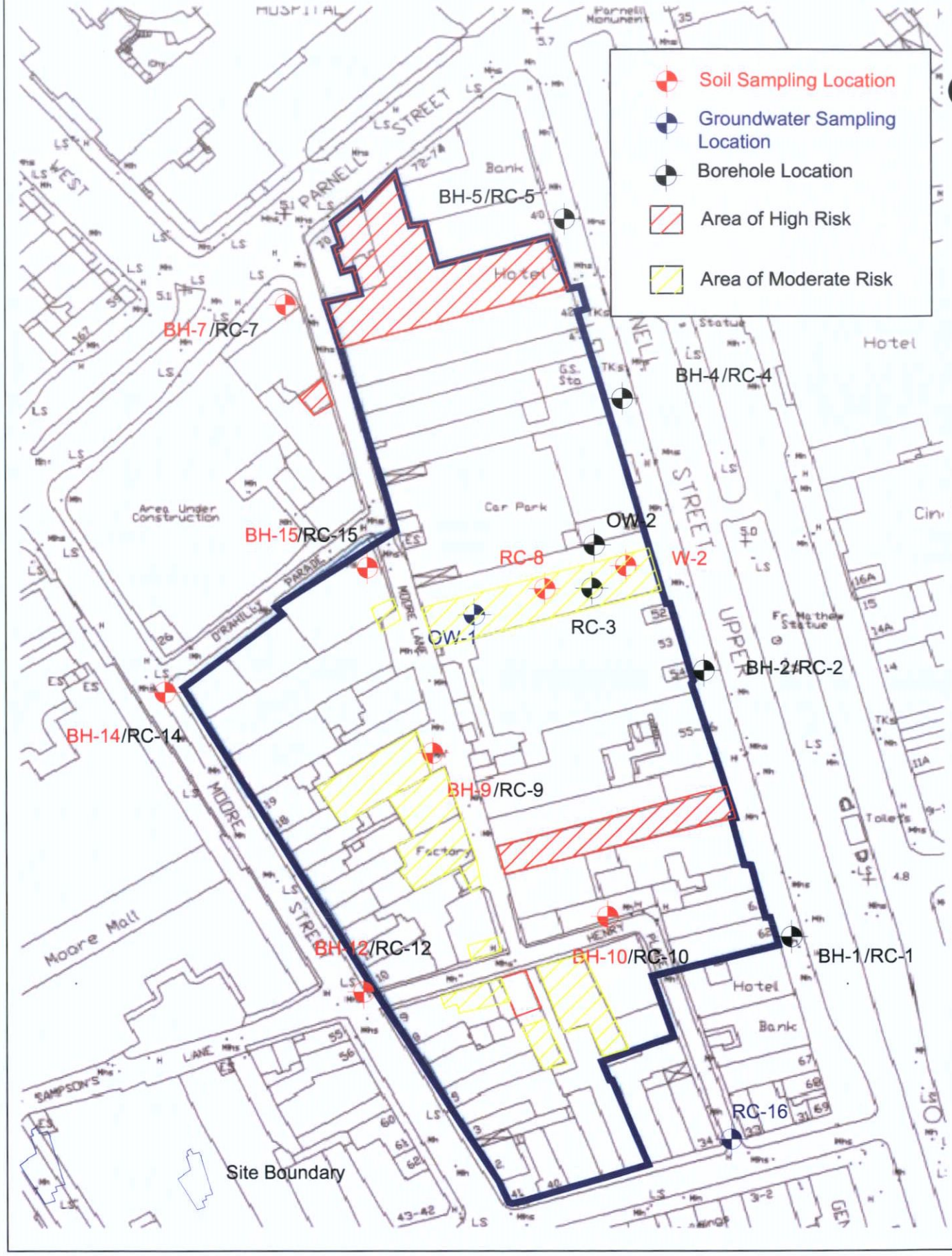
As none of the buildings identified in the 2006 assessment had been demolished, the boreholes had to be positioned in open areas and around the site perimeter and could not be located in all of the risk areas identified in the 2006 assessment. Figure 4.1 shows the location of the boreholes and the areas of risk identified in the assessment. This meant that only W-2 and RC-8 were located directly in an area identified in 2006 assessment as being at risk. Both were in an unpaved area used as a staff car park and storage area for Dr. Quirke's Emporium, which had been identified as being at moderate risk.

BH-7 was located on Parnell Street within 10 m of the rear entrance of the Royal Dublin Hotel which was considered an area of high risk in the 2006 site assessment. BH-9 was located directly beside buildings on Moore Lane, which had been designated at moderate risk. On Henry Place BH-10 was located across the lane from areas that had been designated at moderate and high risk. The remainder of the boreholes BH-12, 14 and 15, were considered to provide a representative spread of samples throughout the site.

4.2 Borehole Installation

The subsoil boreholes were drilled using a shell and augur (cable tool percussion) drill rig. The rotary core boreholes were drilled using a rotary core drill rig. All boreholes were drilled by IGSL and were logged for geotechnical purposes by IGSL personnel.

The installation of the boreholes from which samples for environmental testing purposes were collected were supervised by an OCM scientist and logged in accordance with BS5930. The Borehole logs are included in Appendix 2.



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Sample Locations and Areas of Risk

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4.3 Soil

4.3.1 Sampling

The purpose of the soil sampling was to establish the presence or absence of contamination and to characterise the fill and subsoils. The samples were collected in accordance with OCM soil sampling protocol, a copy of which is included in Appendix 3.

4.3.2 Laboratory Analysis

All samples were sent to the STL laboratory in Blanchardstown, Dublin for analysis. The range of parameters tested was based on the nature of the historical site activities. In addition selected samples were tested for a range of parameters specified in the EU Council Decision establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC.

The Decision specifies Waste Acceptance Criteria (WAC) for a range of inorganic and organic parameters that define whether a waste is suitable for disposal to an inert, non-hazardous or hazardous waste landfill. Materials that comply with the inert WAC are deemed to be essentially inert and present a minimal environmental risk.

Three (3) samples of the fill material from BH-7, 9 and 10 were analysed for Total Petroleum Hydrocarbons (TPH), BETX (benzene, toluene, ethylbenzene and xylene), PAH (polycyclic aromatic hydrocarbons) and metals (arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, tin, selenium and zinc).

Nineteen (19) samples, of the fill and natural ground from, BH-7, 9, 10, 12, 14, 15, RC-8 and W-2, were tested for the WAC, which included Total Organic Carbon (TOC), BETX, PCBs (polychlorinated biphenyls, 7 congeners), Mineral Oil (C10 to C40) and PAH sum of 17. They were also subjected to leach testing at a liquid to solid ratio of 10:1 and the leachate analysed for arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, tin, selenium, zinc, chloride, fluoride, sulphate, phenols, dissolved organic carbon and total dissolved solids.

Details of the sample points, sample depth, nature of the sample and analytical tests are presented in Table 4.1

Table 4.1

Summary of Soils Samples				
Borehole Name	Sample Type	Sample Type	Sample Depth	Type of Subsoil
BH-7	Fill Material	Soil	0.5-1 m	
	Natural Ground	WAC	4-5 m	Gravel
	Natural Ground	WAC	12-13m	Gravel
BH-9	Fill Material	Soil	0.4-0.8m	
	Natural Ground	WAC	4-5m	Gravel
BH-10	Fill Material	Soil	1.7.2.5m	
BH-12	Fill Material	WAC	0.5-1m	
	Fill Material	WAC	3-4m	
	Natural Ground	WAC	4-5m	Clay
	Natural Ground	WAC	8-10m	Clay
BH-14	Fill Material	WAC	0.5-1m	
	Fill Material	WAC	1-2m	
	Fill Material	WAC	2-3m	
	Natural Ground	WAC	3-4m	Clay
	Natural Ground	WAC	8-10m	Gravel
RC-8	Fill Material	WAC	0.5-1m	
	Fill Material	WAC	1-2m	
W-2	Fill Material	WAC	0.5-1m	
	Fill Material	WAC	1-2m	

4.3.3 Results

The results of analysis of three solid samples of the fill material are shown in Table 4.2. The Table includes, for comparative purposes, the EU Council Decision WAC and the Dutch Government Soil Quality Standards commonly referred to as the Dutch List. These guidelines specify two categories, a target level (D) and an intervention level (I). The (D) level is considered representative of background conditions. The (I) level is one at or above which remedial action may be considered necessary depending on the potential environmental exposure risk. Many Irish Local Authorities use these standards to assess the potential for contamination. These samples were also compared with the EPA typical range for non-polluted soils for major elements and trace elements.

TPH was detected in BH-7 (180 mg/kg) and in BH-9 (150 mg/kg). Although this is above the Dutch D limit of 50 mg/kg they are considerably below the Dutch I limit of 5000 mg/kg and also below the inert WAC of 500 mg/kg.

Cadmium was detected in BH-9 and BH-10 at levels of 1.2 mg/kg and 1.6 mg/kg respectively. These are slightly above the Dutch D limit of 0.8 mg/kg, but below the I limit of 12 mg/kg. In BH-9, the mercury level (0.34 mg/kg) is marginally above the Dutch D limit of 0.3 mg/kg. All the remaining heavy metals were below the Dutch D limit and within the EPA range for non-polluted soils.

Table 4.2 Soil Results Dublin Centre 2008

Parameter	Sample ID / Sample Depth / Units	BH-7 0.5-1m	BH-9 0.4-0.8m	BH-10 1.7-2.5m	EPA Range for Non-polluted Soils	Dutch D Values	Dutch I values	EU limits for Inert landfill
Antimony	mg/kg	1.6	1.6	1.7	0.2-3	3	15	0.06
Arsenic	mg/kg	16	12	13	1.0-50	29	55	0.5
Barium	mg/kg	150	72	79	NE	160	625	20
Cadmium	mg/kg	0.65	1.2	1.6	0.1-1	0.8	12	0.04
Chromium	mg/kg	11	14	14	5-250	100	380	0.5
Copper	mg/kg	19	28	30	2-100	36	190	2
Iron	mg/kg	8900	20000	25000	10000-50000	-	-	-
Lead	mg/kg	42	79	59	2.0-80	85	530	0.5
Manganese	mg/kg	830	1100	1500	20-3000	NE	NE	-
Mercury	mg/kg	<0.25	0.34	<0.25	0.3-0.8	0.3	10	0.01
Nickel	mg/kg	24	31	37	0.5-100	35	210	0.4
Tin	mg/kg	<2.0	3.5	3.7	1.0-40	NE	900	-
Zinc	mg/kg	68	86	94	10-200	140	720	4
TPH C6-C40	mg/kg	180	150	<50	NE	50*	5000*	500
BTEX	mg/kg	<0.2	<0.2	<0.2	NE	NE	100	6
PAHs (sum of 10)	mg/kg	17.3	2.9	0.3	NE	1	40	-
PAHs (sum of 16)	mg/kg	23.0	3.7	<1.0	NE	NE	-	100

*Denotes limit for mineral oil

In BH-7 and BH-9 PAHs (sum of 10) the PAH, 17.3 mg/kg and 2.9 mg/kg respectively, exceeded the D value of 1 mg/kg, but are well below the 100 mg/kg limit applied at Irish inert waste disposal landfills.

Waste Acceptance Criteria (WAC) Testing

The results of the WAC testing of the fill material and the natural susbsoils are shown in Table 4.3 and 4.4 respectively. The Tables include the WAC for inert and non-inert landfills. The EU Council Decision does not include a WAC for PAH, but allows individual member states to apply their own limits. The limit used in this assessment is derived from the Waste Licence issued by the EPA for an inert landfill in County Dublin.

TPH was detected above the inert WAC (500 mg/kg) in four of the fill material samples- RC-8 (510 mg/kg and 1800 mg/kg); BH-12 (640 mg/kg), and W-2 (5000 mg/kg).

Antimony exceeded the inert WAC of 0.06 mg/kg in the upper fill sample of OW2 (0.36 mg/kg), but was less than the non-hazardous WAC (0.7 mg/kg). The chromium level in BH-14 (0.53 mg/kg) was slightly above the inert WAC of 0.5 mg/kg, but well below the non-hazardous WAC of 10 mg/kg.

Mercury was detected in samples of the fill taken in BH-12 (0.5-1m) and BH-14 (2-3m) and the natural ground (BH 7 (4-5m) marginally above the inert WAC of 0.01 mg/kg, but below the non-hazardous WAC of 0.2 mg/kg.

PAH levels greater that the inert WAC (100 mg/kg) were detected in both samples from OW-2, 230 mg/kg and 570 mg/kg respectively and the lower sample from RC-8 (280 mg/kg). There is no non-hazardous WAC for PAH.

PCBs were only detected in one sample at RC-8 (0.5-1m) at 0.028 mg/kg. This is considerably below the EU limit of 1 mg/kg.

Sulphate levels exceeded the inert WAC (1000 mg/kg) in two samples from RC-8, however the levels -15000 mg/kg (0.5-1m) and 14000 mg/kg (1-2m) respectively- were less than the non-hazardous WAC of 20,000 mg/kg. The TDS of both samples from RC-8 exceeded the inert WAC, but were less than the non-hazardous WAC.

Table 4.3 Fill Material WAC Dublin Centre 2008

Parameter	Sample I.D. Depth (m) Unit	BH-12 0.5-1m	BH-12 3-4 m	BH-14 0.5-1m	BH-14 1-2m	EU Limits for Inert Landfill	EU Limits for Non-Hazardous Landfill
Arsenic	mg/kg	<0.50	<0.50	<0.50	<0.50	0.5	2
Barium	mg/kg	0.19	0.033	0.12	0.097	20	100
Cadmium	mg/kg	<0.001	<0.001	<0.001	<0.001	0.04	1
Chromium	mg/kg	0.33	<0.10	0.53	0.48	0.5	10
Copper	mg/kg	<0.10	<0.10	0.24	0.44	2	50
Mercury	mg/kg	0.016	<0.003	0.0051	0.0068	0.01	0.2
Molybdenum	mg/kg	0.084	0.31	0.27	0.43	0.5	10
Nickel	mg/kg	<0.10	<0.10	<0.10	<0.10	0.4	10
Lead	mg/kg	<0.10	<0.10	<0.10	<0.10	0.5	10
Antimony	mg/kg	<0.30	<0.30	<0.30	<0.30	0.06	0.7
Selenium	mg/kg	<0.060	<0.060	<0.060	<0.060	0.1	0.5
Zinc	mg/kg	<0.10	<0.10	<0.10	<0.10	4	50
Chloride	mg/kg	<25	<25	<25	29	800	15000
Fluoride	mg/kg	3	2.3	<2	2	10	150
Sulphate	mg/kg	910	300	190	820	1,000	20000
Phenols	mg/kg	<0.50	<0.50	<0.50	<0.50	1	-
Dissolved Organic Carbon	mg/kg	26	22	58	69	500	800
Total Dissolved Solids	mg/kg	3200	<2000	2900	<2000	4000	60000
Total Organic Carbon	%	5.3	3	4.4	3.8	3*	-
BTEX	mg/kg	<0.5	<0.5	<0.5	<0.5	6	-
PCBs	mg/kg	<0.01	<0.01	<0.01	<0.01	1	-
TPH	mg/kg	640	170	99	180	500**	-
PAH (16)	mg/kg	6.6	<1.0	8.1	8.3	-	-
PAH (17).	mg/kg	6.6	<1.0	8.1	8.3	Murphy's 100mg/kg	-

*If DOC is less than 500 then a higher limit can be accepted

** Limit is for Mineral Oil

Table 4.3 continued Fill Material WAC Dublin Centre 2008

Parameter	Sample I.D. Depth (m) Unit	BH-14 2-3m	BH-15 0.5-1	BH-15 1.0-2.0	BH-8 0.5-1	EU Limits for Inert Landfill	EU Limits for Non-Hazardous Landfill
Arsenic	mg/kg	<0.50	<0.5	<0.5	<0.5	0.5	2
Barium	mg/kg	0.13	0.06	0.055	0.21	20	100
Cadmium	mg/kg	<0.001	<0.001	<0.001	<0.001	0.04	1
Chromium	mg/kg	0.17	0.18	<0.1	<1	0.5	10
Copper	mg/kg	0.47	0.36	0.28	<1	2	50
Mercury	mg/kg	0.012	0.0035	0.0049	<0.003	0.01	0.2
Molybdenum	mg/kg	0.34	0.16	0.13	0.1	0.5	10
Nickel	mg/kg	0.12	0.15	0.14	<1	0.4	10
Lead	mg/kg	<0.10	0.42	0.43	<1	0.5	10
Antimony	mg/kg	<0.30	<0.3	<0.3	<0.3	0.06	0.7
Selenium	mg/kg	<0.060	<0.06	<0.06	<0.06	0.1	0.5
Zinc	mg/kg	<0.10	<0.1	0.13	<1	4	50
Chloride	mg/kg	54	<25	<25	43	800	15000
Fluoride	mg/kg	<2	2.3	<2	<2	10	150
Sulphate	mg/kg	140	500	190	15000	1,000	20000
Phenols	mg/kg	<0.50	<0.5	<0.5	<0.5	1	-
Dissolved Organic Carbon	mg/kg	82	62	36	52	500	800
Total Dissolved Solids	mg/kg	<2000	4200	<2000	24000	4000	60000
Total Organic Carbon	%	3.6	3.6	5.2	3.1	3.33%	-
BTEX	mg/kg	<0.5	<0.5	<0.5	<0.5	6	-
PCBs	mg/kg	<0.01	<0.01	<0.01	0.028	1	-
Mineral Oil	mg/kg	<50	120	86	510	500	-
PAH (16)	mg/kg	<1.0	4.2	1.4	44	-	-
PAH (17).	mg/kg	<1.0	4.2	1.4	44	Murphy's 100mg/kg	-

*If DOC is less than 500 then a higher limit can be accepted

** Limit is for Mineral Oil

Table 4.3 continued Fill Material WAC Dublin Centre 2008

Parameter	Sample I.D.	BH-8	W-2	W-2		EU Limits for Inert Landfill	EU Limits for Non-Hazardous Landfill
	Depth (m)	1.0-2.0	0.5-1	1.0-2.0			
	Unit						
Arsenic	mg/kg	<0.5	<0.5	<0.5		0.5	2
Barium	mg/kg	0.25	0.24	0.18		20	100
Cadmium	mg/kg	<0.001	<0.001	<0.001		0.04	1
Chromium	mg/kg	<1	0.21	<1		0.5	10
Copper	mg/kg	<1	0.34	<1		2	50
Mercury	mg/kg	<0.003	<0.003	<0.003		0.01	0.2
Molybdenum	mg/kg	0.095	0.066	0.081		0.5	10
Nickel	mg/kg	<1	0.13	<1		0.4	10
Lead	mg/kg	<1	0.43	<1		0.5	10
Antimony	mg/kg	<0.3	0.36	<0.3		0.06	0.7
Selenium	mg/kg	<0.06	<0.06	<0.06		0.1	0.5
Zinc	mg/kg	<1	0.11	<1		4	50
Chloride	mg/kg	58	27	140		800	15000
Fluoride	mg/kg	<2	4.1	<2		10	150
Sulphate	mg/kg	14000	440	1600		1,000	20000
Phenols	mg/kg	<0.5	<0.5	<0.5		1	-
Dissolved Organic Carbon	mg/kg	73	45	60		500	800
Total Dissolved Solids	mg/kg	24000	2100	4200		4000	60000
Total Organic Carbon	%	3	5.6	5.4		3.33%	-
BTEX	mg/kg	<0.5	<0.5	<0.5		6	-
PCBs	mg/kg	<0.01	<0.01	<0.01		1	-
Mineral Oil	mg/kg	1800	150	5000		500	-
PAH (16)	mg/kg	272	228.5	566		-	-
PAH (17).	mg/kg	280	230	570		Murphy's 100mg/kg	-

*If DOC is less than 500 then a higher limit can be accepted

** Limit is for Mineral Oil

Table 4.4 Natural Ground WAC Dublin Centre 2008

Parameter	Sample I.D. / Depth (m) / Unit	BH-7 4-5 m	BH-7 13-14 m	BH-9 4-5 m	BH-12 4-5 m	EU Limits for Inert Landfill	EU Limits for Non-Hazardous Landfill
Arsenic	mg/kg	<0.50	<0.5	<0.50	<0.50	0.5	2
Barium	mg/kg	0.084	0.14	0.076	0.068	20	100
Cadmium	mg/kg	<0.001	<0.001	<0.001	<0.001	0.04	1
Chromium	mg/kg	<0.10	<0.1	<0.10	<0.10	0.5	10
Copper	mg/kg	<0.10	<0.1	<0.10	<0.10	2	50
Mercury	mg/kg	0.012	0.0038	0.0078	<0.003	0.01	0.2
Molybdenum	mg/kg	<0.03	0.085	0.056	0.2	0.5	10
Nickel	mg/kg	<0.10	<0.1	<0.10	<0.10	0.4	10
Lead	mg/kg	<0.10	<0.1	<0.10	<0.10	0.5	10
Antimony	mg/kg	<0.30	<0.3	<0.30	<0.30	0.06	0.7
Selenium	mg/kg	<0.060	<0.06	<0.060	<0.060	0.1	0.5
Zinc	mg/kg	<0.10	<0.1	<0.10	<0.10	4	50
Chloride	mg/kg	<25	71	<25	<25	800	15000
Fluoride	mg/kg	3	4.2	2.7	2.9	10	150
Sulphate	mg/kg	<110	<110	<110	<110	1,000	20000
Phenols	mg/kg	<0.50	<0.5	<0.50	<0.50	1	-
Dissolved Organic Carbon	mg/kg	13	39	14	19	500	800
Total Dissolved Solids	mg/kg	<2000	<2000	<2000	<2000	4000	60000
Total Organic Carbon	%	3.1	0.52	2.8	2.4	3%*	-
BTEX	mg/kg	<0.5	<0.5	<0.5	<0.5	6	-
PCBs	mg/kg	<0.01	<0.01	<0.01	<0.01	1	-
TPH	mg/kg	<50	<50	<50	57	500**	-
PAH (16)	mg/kg	<1.0	<1.0	<1.0	<1.0	-	-
PAH (17).	mg/kg	<1.0	<1.0	<1.0	<1.0	Murphy's 100mg/kg	-

*If DOC is less than 500 then a higher limit can be accepted

** Limit is for Mineral Oil

Table 4.4 continued Natural Ground WAC Dublin Centre 2008

Parameter	Sample I.D. / Depth (m) / Unit	BH-12 8-10m	BH-14 3-4m	BH-14 8-10m	BH-15 12.0-13.0	EU Limits for Inert Landfill	EU Limits for Non-Hazardous Landfill
Arsenic	mg/kg	<0.50	<0.50	<0.50	<0.5	0.5	2
Barium	mg/kg	0.17	0.046	0.27	0.17	20	100
Cadmium	mg/kg	<0.001	<0.001	<0.001	<0.001	0.04	1
Chromium	mg/kg	<0.10	<0.10	<0.10	<0.1	0.5	10
Copper	mg/kg	<0.10	<0.10	<0.10	0.15	2	50
Mercury	mg/kg	0.0047	0.0039	0.0036	<0.003	0.01	0.2
Molybdenum	mg/kg	0.1	0.18	0.15	0.046	0.5	10
Nickel	mg/kg	<0.10	<0.10	<0.10	0.14	0.4	10
Lead	mg/kg	<0.10	<0.10	<0.10	0.41	0.5	10
Antimony	mg/kg	<0.30	<0.30	<0.30	<0.3	0.06	0.7
Selenium	mg/kg	0.079	<0.060	<0.060	<0.06	0.1	0.5
Zinc	mg/kg	0.19	<0.10	<0.10	<0.1	4	50
Chloride	mg/kg	41	<25	35	100	800	15000
Fluoride	mg/kg	2.7	2.3	2.4	4.7	10	150
Sulphate	mg/kg	250	<110	420	130	1,000	20000
Phenols	mg/kg	<0.50	<0.50	<0.50	<0.5	1	-
Dissolved Organic Carbon	mg/kg	19	27	23	37	500	800
Total Dissolved Solids	mg/kg	<2000	<2000	<2000	<2000	4000	60000
Total Organic Carbon	%	1.4	3.5	1.4	0.34	3%*	-
BTEX	mg/kg	<0.5	<0.5	<0.5	<0.5	6	-
PCBs	mg/kg	<0.01	<0.01	<0.01	<0.01	1	-
TPH	mg/kg	<50	<50	<50	<50	500**	-
PAH (16)	mg/kg	<1.0	<1.0	<1.0	<1.0	-	-
PAH (17).	mg/kg	<1.0	<1.0	<1.0	<1.0	Murphy's 100mg/kg	-

*If DOC is less than 500 then a higher limit can be accepted

** Limit is for Mineral Oil

4.4 Groundwater

Samples were collected from four groundwater monitoring wells, OW-1 Subsoils (OW-1 S) and OW-1 Bedrock (OW-1 B) and RC-16 Subsoils (RC-16 S) and RC-16 Bedrock (RC-16 B). The samples were collected in accordance with OCM's Groundwater Sampling Protocol, a copy of which is included in Appendix 5.

All the samples were sent to the STL laboratory in Santry for analysis. The range of parameters tested was based on the nature of the historical site activities and included dissolved metals (arsenic, antimony, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, tin and zinc.), sodium, chloride, potassium, magnesium, sulphate, sulphide, total hardness, bicarbonate, TPH, BTEX and PAH.

The laboratory test report is included in Appendix 5 and the results are shown in Table 4.5. The results are compared for discussion purposes with the EPA Interim Guideline Values (IGVs). The IGVs are not statutory guidelines but have been prepared by the EPA to assist in the assessment of impacts on groundwater quality.

TPH was only detected in one well-RC-16- at a level of 8 mg/l, which is above the IGV of 0.01 mg/l. Iron, manganese and potassium exceeded their respective IGVs in both the subsoil and bedrock samples from RC -16. Barium, sodium and copper exceeded the IGV in the bedrock sample from RC-16 and PAH exceeded the IGV in the bedrock sample from RC-16.

PAHs exceeded the IGV in the subsoil and bedrock samples from RC-16 Subsoil and the bedrock sample in OW-1.

Chloride exceeded the IGV of 30 mg/l in both subsoil and bedrock samples from RC-16 and OW-1. The sulphate level in the bedrock sample marginally exceeded the IGV and hardness also exceeded the IGV in the subsoil sample from OW-1 and both subsoil and bedrock samples from RC-16.

Table 4.5 Groundwater Results Dublin Centre December 2008

Sample I.D.	Units	Subsoil Wells		Bedrock Wells		IGV
		RC-16 Subsoil	OW-1 Subsoil	RC-16 Bedrock	OW-1 Bedrock	
Antimony	mg/l	0.00048	0.00017	0.0023	0.00015	-
Arsenic	mg/l	0.0069	<0.0001	0.0059	<0.0001	0.01
Barium	mg/l	0.056	0.015	0.12	0.018	0.1
Cadmium	mg/l	<0.0001	0.00014	0.00024	<0.0001	0.005
Chromium	mg/l	<0.03	<0.03	<0.03	<0.03	0.03
Copper	mg/l	0.025	<0.007	0.096	<0.007	0.03
Iron	mg/l	0.41	0.045	0.55	0.041	0.2
Lead	mg/l	0.0033	<0.0005	0.00081	<0.0005	0.01
Manganese	mg/l	0.17	0.022	0.07	<0.01	0.05
Mercury	mg/l	<0.0003	<0.00030	0.00074	<0.00030	0.001
Nickel	mg/l	0.006	<0.0005	0.0039	0.0005	0.02
Tin	mg/l	<0.01	<0.01	<0.01	<0.01	-
Zinc	mg/l	0.053	<0.005	0.016	0.005	0.1
Magnesium	mg/l	6.6	8.8	28	8.4	50
Potassium	mg/l	60	11	7.6	10	5
Sodium	mg/l	100	35	680	35	150
Hardness (as CaCO3)	mg/l	100	360	210	360	200
Bicarbonate as CaCO3	mg/l	710	200	350	200	-
Chloride as Cl	mg/l	150	39	860	41	30
Sulphate as SO4	mg/l	<11	150	230	160	200
Sulphide as S	mg/l	0.14	<0.010	0.011	<0.010	-
TPH	mg/l	8	<0.1	<0.1	<0.1	0.01
PAH Total (Sum of 16)	µg/l	16	<0.10	0.25	1.7	0.1
Benzene	µg/l	<10	<10	<10	<10	1
Toluene	µg/l	<10	<10	<10	<10	10
Ethylbenzene	µg/l	<10	<10	<10	<10	10
p & m xylene	µg/l	<20	<20	<20	<20	10
o-Xylene	µg/l	<10	<10	<10	<10	10

5. DISCUSSION

5.1 Discussion

The purpose of environmental site investigation was to establish if there was contamination in the subsoils or groundwater associated with the historical use of the site. It was also undertaken to establish the nature of the fill material and underlying subsoils in terms of off-site management options for such materials that will have to be removed during site development.

The majority of the Dublin Centre area has been in use as shops, offices, stores and houses since the late 1700's. The 2006 assessment concluded that, given the nature of these historic landuses, the potential for subsurface soil or groundwater contamination is considered to be low. However, the assessment identified areas where there was potential for subsurface contamination. These included the Royal Dublin Hotel; car parking area for Dr. Quirke's Emporium; 5-11 Moore Lane, and 4-8 Henry Place.

The environmental investigation, in so far as the ground conditions allowed, targeted those risk areas identified in the 2006 assessment. Boreholes RC-8 and W-2 were installed in 48A-50 O' Connell Street, which had been designated at moderate risk. It is presently used as an unpaved car park and storage area for Dr. Quirke's Emporium.

5.2 Soils

In RC-8 and W-2, the levels of sulphate, total dissolved solids, TPH and PAHs exceeded the inert waste WAC. However all of the levels were less than the non-hazardous WAC.

In BH-12, which was located on the southeast perimeter of the site TPH and mercury were detected above the inert waste WAC in the upper fill sample; however the levels of these parameters in the underlying fill and natural ground were less than the inert WAC.

There was no evidence of significant contamination in any of the other samples and the tested parameters, where detected, are at levels generally below the inert WAC.

5.3 Groundwater

TPH and PAHs above the IGV limits were detected in the well installed in the subsoil in RC-16. A strong hydrocarbon odour was noted during sampling. No TPH or PAH was detected in the bedrock well. RC-16 is located immediately to the south and not within the portion of the site where deep excavation will occur. It is possible therefore that the hydrocarbons detected in this well originate from an off-site location and not from within the development site.

Low levels of PAH were detected in the subsoil and bedrock wells at OW-1 in the centre of the site. While the levels detected are above the IGV limits, they are not indicative of significant pollution.

The elevated iron and manganese levels detected in the subsoil and bedrock wells and are most likely naturally occurring. The copper level detected in OW-1, while slightly above the IGV is less than the drinking water standard for this parameter (2mg/L) and this detection is not therefore considered to be significant.

Elevated potassium and chloride levels were detected in both wells with higher chloride leves detected in RC-16, which is closest to the River Liffey. The levels detected are not indicative of significant contamination from historical site activities and it is possible that there is link via the gravels beneath the site and the brackish waters in the River Liffey.

OCM understand that pumping tests have been carried out to estimate the dewatering rate that will be necessary during the deep excavation and construction of the basement. While the volumes of groundwater in the fill, subsoil and bedrock, higher volumes may be expected from the gravels where present in significant thickness.

The groundwater quality monitoring data indicates that while low levels of PAH are present, the water should be suitable for discharge to sewer. Dublin City Council are likely to require on-site settlement to treat suspended solids and possibly pH control during any concrete forming or piling works.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The subsurface comprises made ground ranging in thickness from 2 – 5.2 m, which contains mainly grey brown gravelly clay fill with red brick. This is underlain by natural ground of between 11.1 m and 23.3 m in thickness, that comprises gravels underlain by clay. The minimum depth to bedrock is 12.6 m while the maximum is 27.3 m.

The bedrock ranges from interbedded argillaceous limestone, siliceous limestone and black fossiliferous shale which are part of the Calp Limestone formation. The bedrock is considered to be a Locally Important Aquifer (Ll), which is moderately productive only in local zones. Aquifer vulnerability is considered to be moderate to low.

The investigation has established that the fill material and the underlying subsoils can generally be categorised as inert and suitable either for disposal at inert landfill or for use in land reclamation projects. There are localised zones in the fill such as at BH-12, RC-8 and W-2, where the contaminant levels exceed the inert category limits. However in these cases the materials fall into the non-hazardous waste category.

Elevated PAH levels were detected in the groundwater wells immediately to the south but not within the portion of the site where deep excavation will occur. It is possible therefore that these from an off-site location and not from within the development site. Low levels of PAH were detected in the subsoil and bedrock wells in the centre of the site. While the levels are above the IGV limits they are not indicative of significant pollution and the water should be suitable for discharge to sewer during the dewatering programme.

6.2 Recommendations

OCM recommend that following site clearance and as part of the bulk excavation samples of the fill and subsoil excavated in the vicinity of BH-12, W-2 and RC-8 be tested to confirm the waste characterisation i.e. inert or non-hazardous.

OCM recommend that all material excavated and removed from the site be disposed of in accordance with Dublin City Council Waste Management Regulations to suitably permitted or licensed waste management facilities.