Appendix 10-3: Proposed hotel & multistorey Car Park Dublin Airport

Proposed Hotel & Multistorey Car Park

Dublin Airport

Ground Investigation Report

(Report No. 13262)

Client: Dublin Airport Authority

Engineer: Ian Black Consulting Ltd

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FOREWORD

The following conditions and notes on site investigation procedures should be read in conjunction with this report.

General

The ground investigation works have been carried out in accordance with BS 5930 (1990) and the IEI Specification & Related Documents for Ground Investigation in Ireland (2006).

Recommendations made, and opinions expressed in the report are based on the strata observed in the exploratory holes, together with the results of in-situ and laboratory tests. No responsibility can be held for conditions which have not been revealed by exploratory work, or which occur between exploratory locations.

Whilst the report may suggest the likely configuration of strata, both between exploratory hole locations, or below the maximum depth of the investigation, this is only indicative, and liability cannot be accepted for its accuracy. Unless specifically stated, no account has been taken of possible subsidence due to mineral extraction below or close to the site.

Boring Procedures

Unless otherwise stated, the 'Shell and Auger' technique of soft ground boring has been employed. All boring operations sampling and/or logging of soils and in-situ testing complies with the recommendations of the British Standard Code of Practice BS 5930 (1981), 'Site Investigation' and BS 1377:1990, 'Methods of test for soils for civil engineering purposes'.

Whilst the technique allows the maximum data to be obtained in soft ground, some disturbance and variation of soft and layered soils is unavoidable. Attention is drawn to this condition, whenever it is suspected. Where cobbles and boulders are recorded, no conclusion should be drawn concerning the size, presence, lithological nature, or numbers per unit volume of ground.

Where peat has been encountered during siteworks, samples have been logged in accordance with the Von Post Classification (ref. Von Post, L. 1992. Sveriges Gologiska Undersoknings torvinventering och nogra av dess hittils vunna resultat (SGU peat inventory and some preliminary results) Svenska Mosskulturforeningens Tidskrift, Jonkoping, Swedden, 36, 1-37 & Hobbs N. B. Mire morphology and the properties of some British and foreign peats. QJEG, Vol. 19, 1986).

Routine Sampling

Undisturbed samples of soils, predominantly cohesive in nature are obtained unless otherwise stated by a 104mm diameter open-drive tube sampler. In granular soils, and where undisturbed sampling is inappropriate, disturbed samples are collected. Smaller disturbed samples are also recovered at intervals to allow a visual examination of the full strata section.

In-Situ Testing

Standard penetration tests, utilising either the standard split spoon sampler or solid cone and automatic trip-hammer are conducted unless otherwise where required by instruction. Subsequent to a seating drive of 150mm, a summation for the number of blows for 300mm penetration is recorded on the boring records together with the blow count for each 75mm penetration. In cases where incomplete penetration is obtained, the number of blows for the depth of penetration are recorded. In coarse granular soils, a cone end is fitted to the sampler and a similar procedure adopted.

Groundwater

The depth of entry of any influx of groundwater is recorded during the course of boring operations. However, the normal rate of boring does not usually permit the recording of an equilibrium level for any one water strike. Where possible drilling is suspended for a period of twenty minutes to monitor the subsequent rise in water level.

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Groundwater conditions observed in the borings or pits are those appertaining to the period of investigation. It should be noted however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage condition, tidal variation or other causes.

Retention of Samples
After satisfactory completion of all the scheduled laboratory tests on any sample, the remaining material will be discarded. Unless a period of retention of samples is agreed, it is our normal practice to discard all soil samples one month after submission of our final report.

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1. INTRODUCTION

On the instruction of Dublin Airport Authority (DAA), IGSL were appointed to carry out a programme of geotechnical and geo-environmental investigations at Dublin Airport. It is understood that DAA intend to construct a fourteen storey hotel and multistory car park (MSCP) at the site. In addition to this, general site infrastructure (drainage, roads, car parking etc) will be required. The investigatory work for this project was carried out in accordance with BS 5930, Code of Practice for Site Investigations (1999) and the Specification and Related Documents for Ground Investigation in Ireland (Engineers Ireland 2006).

The site encompasses an area of approximately 3.5 hectares and is currently occupied by car parking spaces, car hire area, roads and underground water reservoir. It is reported that the proposed hotel / MSCP site was formerly a borrow pit / quarry and was subsequently infilled. It is noted that IGSL has not carried out a desk study for this project and that no drawings or historical records were available for reference.

The fieldworks comprised a programme of inspection pits, cable percussion boreholes, rotary core drillholes and window sampling. Standpipes were installed in selected exploratory holes to establish equilibrium groundwater and gas levels and facilitate groundwater sampling. Geotechnical laboratory testing has been performed on representative soil and rock samples. Environmental laboratory testing is currently in progress on groundwater samples and results will be included in the final report.

The primary objectives of this investigation were as follows:

- Determine the composition and strength of the superficial deposits
- Establish depths to rockhead and rock quality characteristics (i.e. weathering, strength, discontinuities etc)
- Recover samples for geotechnical and environmental laboratory testing
- Assess groundwater conditions & determine equilibrium groundwater levels
- Determine gas concentrations in standpipes

This report presents the geotechnical and geo-environmental data obtained from the field and laboratory testing. An interpretation of the data is presented with summary details of the ground conditions and engineering properties of the soils and bedrock. Recommendations are developed on the key geotechnical issues impacting on the proposed development, including bearing capacity, foundations, groundwater, slopes and buried concrete. The geo-environmental data is also discussed and recommendations presented on landfill acceptance of made ground / fill materials.

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2. FIELDWORK

The fieldworks were undertaken during the period January and February 2008 and comprised the following:

- Inspection pits
- Cable percussion boreholes
- Rotary drilholes
- Window sampling
- Groundwater & gas monitoring
- Surveying

2.1 Inspection Pits

Trial or inspection pits were carried out at four locations, using hand dug methods. The pits were logged and sampled by an IGSL geotechnical engineer and details are presented in Appendix 1.

2.2 Cable Percussion Boreholes

Cable percussion boring (200mm diameter) was undertaken at nine locatios using a Dando 150 rig. A number of the boreholes 'refused' at relatively shallow depths and rotary core drilling was subsequently carried out to determine if this represented cobble / boulder obstructions or bedrock. Prior to boring, hand dug inspection pits were undertaken (to depth of 1.20m) to assess the presence of utility ducts / services. Representative bulk disturbed samples were recovered at 1.00 intervals or change of strata. Chiselling or hard strata boring was necessary to advance the boreholes through the fill material and glacial deposits.

Standard Penetration Tests (SPT's) were performed at 1.00m intervals in accordance with Section 3.3 Part 9 of BS 1377 (1990). Given the coarse nature of the glacial soils, a solid cone (60°) was used (CPT). It is noted that the SPT N-Values reported are the number of blows for 300mm increment penetration (e.g. BH 1 at 1.00m where N=14). These exclude the seating blow values, which represent the initial 150mm depth of penetration. Where partial penetration was achieved during testing, the number of blows is shown for the actual penetration depth achieved (e.g. BH 1 at 2.00m where N = 50/285mm).

The boreholes terminated at depths of between 0.50m (BH 15) and 9.30m (BH 27) and descriptions of the soils encountered, in-situ tests undertaken and samples recovered are presented on the engineering logs in Appendix 2. Details of groundwater strikes and hard strata boring (i.e. chiselling) are also presented on the aforementioned records.

2.3 Rotary Drilholes

Rotary drilling was carried out at fifteen locations using a top drive Puntel rig. Symmetrix drilling was utilized within the made ground / superficial deposits, with conventional coring techniques used in the bedrock. The rotary holes attained depths of between 7.40m (RC 7A) and 24.80m (RC 27). The drilling produced 90mm diameter (P Size) cores using air mist flush and core recovery was generally high, with 90 to 100% in the majority of the runs. Standpipes were installed in selected drillholes to determine equilibrium groundwater levels and facilitate groundwater sampling. These incorporated 50mm diameter uPVC slotted pipe, cement / bentonite grout seals and steel protective headwork covers.

The rock cores were placed in 3m capacity timber boxes and logged by an IGSL engineering geologist. This included photography of the cores with a digital camera. The core log records are presented in Appendix 3 and include engineering geological descriptions of the rock cores, details of the bedding / discontinuities and mechanical indices (TCR, SCR and RQD's) for each core run.

Where rock core was recovered, a graphic fracture log is also presented alongside the mechanical indices. This illustrates the fracture state of the rock cores and allows easy identification of highly fractured / non-intact zones and discontinuity spacings. It should

be noted that no correction for dip of the joints has been made and that the spacings shown are successive joint / core intersections within the core.

2.4 Window Sampling
Window sampling (or referred to as 'drive percussion boring') was carried out at twenty six locations using a Dando Terrier 2000 rig. Hand dug inspection pits were performed prior to window sampling commencing. The aforementioned Terrier rig used a 50kg DPH weight to drive the window sampler and the material is retrieved in a semi-rigid plastic core liner.

It is highlighted that a large number of the window samples failed to penetrate through the MADE GROUND / Fill stratum, though some did extend to depths of between 3 and 4.2m. The window sample records are presented in Appendix 4 and include descriptions of the soils encountered, total recovery per run and blowcounts for the penetration depths.

2.5 Groundwater & Gas Monitoring
Groundwater and gas monitoring was undertaken during the fieldwork period and results are presented in Appendix 5. Water levels were recorded manually using an electric dipmeter, while gas concentrations were measured using a GA 2000 infra red apparatus.

2.6 Surveying
Following completion of the exploratory holes, surveying was carried out using GPS techniques. Co-ordinates (x, y) were measured to national grid (Malin Head) and ground level (z) to an accuracy of 10mm. The co-ordinates and ground levels are shown on the exploratory logs.

2.7 Geophysical Surveying
Following a review of the geotechnical data in early March, geophysical surveying was subsequently commissioned by DAA to evaluate rockhead depths / elevations at the site. Apex Geoservices carried out the geophysical surveying on behalf of IGSL and details are presented in a separate report prepared by Apex (Ref No. AGL08092_1).

A number of seismic refraction profiles (P-wave) were performed in conjunction with S-wave measurements using Multi-channel Analysis of Surface Waves (MASW) to evaluate small strain stiffness parameters. Reference should be made to the Apex Geophysical Report for particular details on fieldwork methodology, data plots etc.

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3. LABORATORY TESTING

Geotechnical laboratory testing has been carried out on representative soil and rock core samples in accordance with BS 1377 (1990) and ISRM. The soils testing focused on gradings, Atterberg Limits and sulphates and the results are presented in Appendix 6.

The rock test results are presented in Appendix 7 and include Point Load Strength Index (PLSI) and uniaxial compressive strengths. Environmental laboratory testing was performed on selected soil samples by Alcontrol Laboratories Ireland and the results are presented in Appendix 8.

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4. GROUND CONDITIONS & ENGINEERING PROPERTIES

4.1 Ground Conditions

The exploratory holes have revealed the ground conditions to comprise:

- Made Ground / Fill
- Glacial deposits
- Limestone Bedrock

4.1.1 Made Ground

A prominent layer of MADE GROUND mantles the site. It was found to be most prominent in the area of BH 23 where it extended to a depth of at least 3.70m bgl (note sandy gravelly clay material between 3.70 and 5.50m may be reworked and represent made ground but is not conclusive). The MADE GROUND material comprises a reworked sandy gravelly clay fill with occasional brick, glass and concrete constituents throughout. A number of window samples encountered organic material within the made ground stratum. The matrix is classed as soft and soft / firm in consistency.

4.1.2 Glacial Deposits

The cable percussion boreholes show the indigenous soils to comprise low plasticity, brown and grey black sandy gravelly CLAY with cobbles. Subordinate layers of horizons of sandy medium to coarse GRAVEL (e.g. depth of 5.50 to 6.00m in BH 23) were also uncovered during the investigations. The cohesive or fine grained material is referred to as 'boulder clay' or 'glacial till, while the subordinate coarse or granular dominant materials are typical of fluvio-glacial deposits. Schematic geological / geotechnical x-sections (1-1 and 2-2) have been prepared and these are presented in Appendix 1.

The boulder clay soils represent over-consolidated lodgement till, the brown being the weathered surface of the grey black boulder clay. The general properties of the brown and black boulder clay have been presented in a paper by Farrell et al[4]. Close examination of the borehole and window showed samples show subtle changes in colour and grading. The gravel constituents or clasts range from fine to coarse, are subrounded to subangular and predominantly limestone in origin.

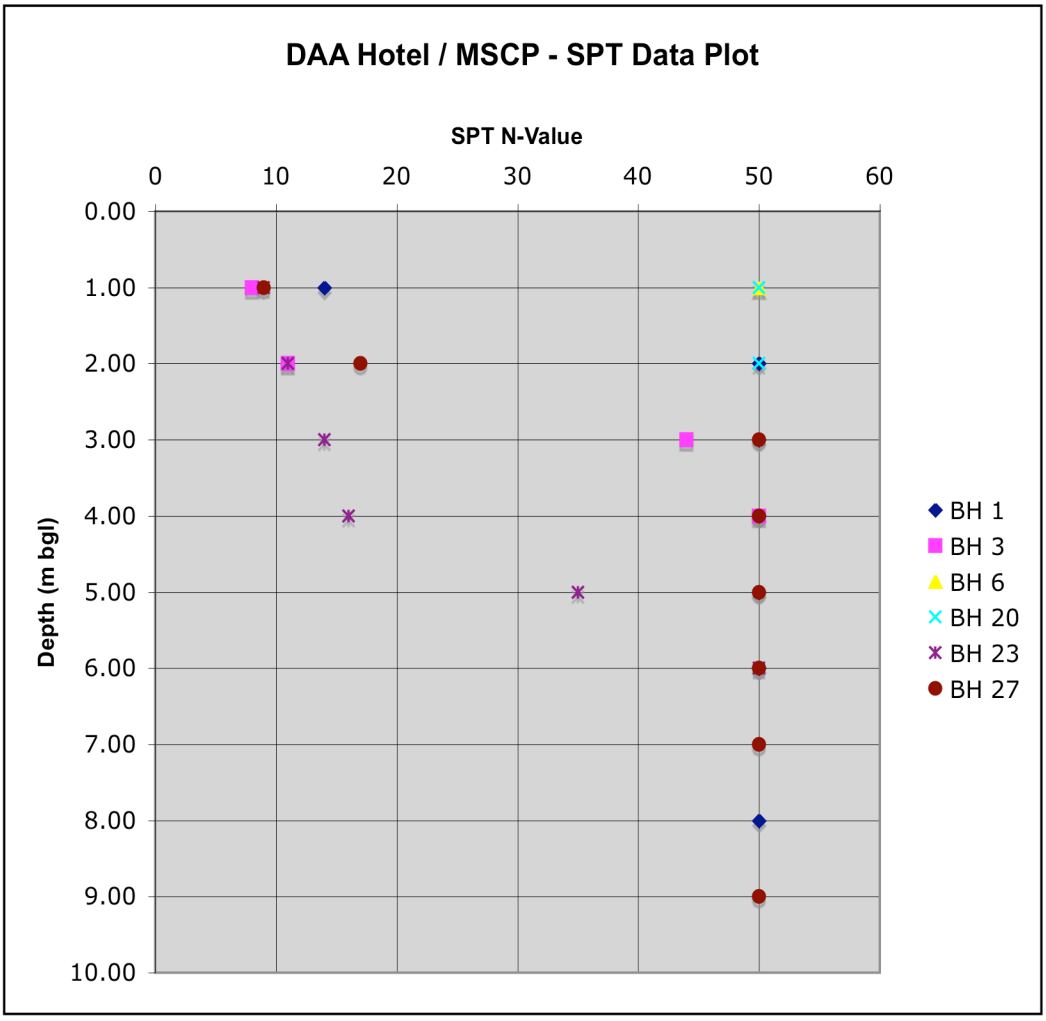
Due to the coarse or very 'stony' nature of the soils, no undisturbed samples (U100's) were recovered for laboratory strength testing. However, the SPT test is widely used in establishing the strength or relative density of glacial till deposits and relationships exist between SPT N-Value (blows for 300mm penetration) and undrained shear strength (C_u). The most widely used correlation between N-Value and C_u for glacial till soils is that proposed by Stroud & Butler where $C_u \approx 4$ to 6N. An SPT data plot has been prepared using the borehole data and this is presented in Figure 2.

The N-Values show the brown boulder clay to be principally stiff in consistency. On the basis of the aforementioned relationship between N-Value and Cu, the brown boulder CLAY is deemed to have a characteristic strength of the order of 75 to 100 kN/m^2. The grey black boulder clay is described as being very stiff / hard and nearby Geobor core drilling for the new DAA reservoir site and Metro North show its to have a cemented structure. It is highlighted that clays with undrained shear strengths in excess of 300 kN/m^2 can now be described as extremely weak mudstone or extremely high strength clay (see BS EN ISO 14689-1:2003 and BS 5930 Amendment No. 1, 2007).

Reference to triaxial tests carried out by Farrell et al at Croke Park, shows undrained shear strengths of about 450 kN/m^2 for the grey black boulder clay. The triaxial compression tests often shear in a brittle manner and the samples dilate as it approaches a critical state at $Ø'_{cv} = 37°$. This high $Ø'_{cv}$ is not unexpected, considering the high 'rock flour' component of its clay fraction. On the basis of the strengths established by the SPT N-Values, visual assessment of the samples and nearby Geobor core drillholes, the grey black boulder clay at Dublin Airport is deemed to have the engineering properties and behaviour of an extremely weak (UCS of 0.6 to 1 MPa) or very weak (1 to 5 MPa) mudstone.

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Figure 2 - SPT Data Plot



*** Note: N-Values of 50 represent 'refusals'*

Natural moisture contents were determined on representative bulk samples and produced values mostly in the range 8.2 to 13.3%. The lower end moisture contents are associated with the grey black boulder clay and values are typically of the order of 8 to 11%. Liquid and Plastic Limit tests (consistency indices) were also performed on selected samples and these show the boulder clay to be of low plasticity (CL). Each of the tests plot above the A-Line on the Casagrande Chart. Plasticity Indices are mainly in the 11 to 15% range.

Particle size gradings show characteristic well graded 'straight-line' profiles for the boulder clay material. Fines contents (i.e. silt & clay) vary with depth, with the gravelly clay or boulder clay unit having typically between 30 and 40% silt / clay. Applying the Hazen or Sherard equations, the boulder clay is classed as being of low permeability, with coefficients of permeability (K) of the order of 10^{-9} to 10^{-10} m/s.

4.2 Bedrock

The core drilholes show that bedrock consists of light grey / grey blue and grey black, fine grained LIMESTONE. The cores show a combination of clean calcisilite LIMESTONE and earthy argillaceous LIMESTONE at the Hotel and MSCP site. The light grey calcisiltite limestone appears to be have been silicified.. Both limestone units are classed as being predominantly slightly weathered to fresh but the argillaceous unit is locally moderately weathered. There is also evidence of possible solution weathering in the calcisiltite limestone cores, most notably RC 1 and RC 6. The geological memoirs and map for the

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area, shows Waulsortian Limestone to be present in this part of North Dublin. Waulsortian limestone (pure fine grained limestone) is known to be particularly susceptible to solution weathering (karstification) where the rock fabric is weakened or altered by chemical weathering. Rockhead depths or elevations vary considerably on this site and reference should be made to Table 1 for summary details. Inspection of Table 1 shows rockhead to be especially shallow in RC 6, 15, 20, 2A, 7A, 10A, 12A, 18A and 19A respectively.

Limestone bedrock appears to be deepest in the northeast corner and southeast portions of the site (Figure 3). Reference should be made to Maps 8092_3 and 8092_4 in the geophysical report (Apex Geoservices). These present rockhead depths and elevations across the site and were derived using the seismic refraction data and rotary drillhole findings. In general, the geophysical data shows reasonably good agreement with the rotary drillhole findings. Accurate or exact interpretation of the seismic data is difficult where hard (cemented) grey black boulder clay overlies limestone bedrock, as there is little contrast in velocities. It is highlighted that rockhead depths / elevations established by the rotary drillholes should take precedence over the geophysical data.

Table 1 - Summary Details of Rotary Drillholes

Rotary Hole	Total Depth (m bgl)	Rockhead (m bgl)	Rock Quality
RC 1	17.40	7.70	Strong / very strong (locally mod strong), fresh to SW Limestone, prominent calcite veining. Poor recovery between 12.70 & 14.20m, possible solution weathering.
RC 3	13.90	4.30	Strong / very strong (locally mod strong), fresh to SW Limestone, prominent calcite veining.
RC 6	10.60	1.50	Strong to mod strong, slightly to locally mod weathered, Limestone with calcite veining, possible solution weathering from 9.85 to 10.6m.
RC 15	9.60	0.50	Strong / very strong (locally ext strong) fresh to occ SW Limestone, prominent calcite veining.
RC 20	9.80	1.90	Strong / very strong (locally mod strong), fresh to SW Limestone, prominent calcite veining.
RC 23	16.85	6.10	Strong / mod strong, fresh to SW Limestone, massive, silicified
RC 27	24.80	7.20	Strong to locally mod strong, fresh to SW Limestone (argillaceous)
RC 32	20.00	8.00	Strong / very strong, fresh to SW Limestone (argillaceous)
RC 2A	11.00	1.30	Strong / very strong, fresh to SW Limestone, silicified.

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RC 7A	7.40	1.60	Strong / very strong, fresh to locally SW Limestone, silicified.
RC 10A	8.50	2.20	Strong / very strong, fresh / SW (locally MW) Limestone, silicified
RC 12A	7.70	1.70	Strong / very strong, fresh to SW Limestone, silicified.
RC 18A	7.80	1.80	Strong / very strong, fresh / SW (locally mod MW) Limestone, silicified.
RC 19A	7.60	1.30	Strong / very strong, fresh to locally SW Limestone, silicified.
RC 23A	10.10	5.20	Weak to mod weak, slightly to MW Limestone, argillaceous

Discontinuities vary from rough to undulose to occasionally irregular, while apertures appear to have widths of around 1 to 2mm. With drilling induced fractures prominent in the limestone, assessment of apertures is difficult. Dips vary between sub-horizontal and 45º and surfaces show some iron staining or discolouration. There is also evidence of slight smearing along discontinuity surfaces. Discontinuity spacings are principally medium spaced (200 to 600mm) though some rotary holes do show closely spaced (60 to 200mm) discontinuities (e.g. RC 6, 27, 32, 7A, 19A and 23A.

Point load strength index (PLSI) tests were carried out on a number of core samples and results are presented in Appendix 7. Inspection of the data sheets shows Is_{50} values of 0.16 and 7.72 MPa with a mean value of 2.86 MPa. The compressive strength of the rock (q_c) can be established using a correlation suggested by Goodman where $q_c \approx 18$ to 24 x Is_{50}.

Using a correlation value of 20, the point load test data suggests the limestone to be predominantly strong (i.e. 50 to 100 MPa) to locally moderately strong and very strong. Uniaxial compressive strength (UCS) testing was carried out on core samples and these tests produced UCS values of between 29 and 74 MPa, with a mean value of 56 MPa. The majority of the UCS values are between 50 and 60 MPa and this correlates well with the PLSI data.

4.3 Groundwater

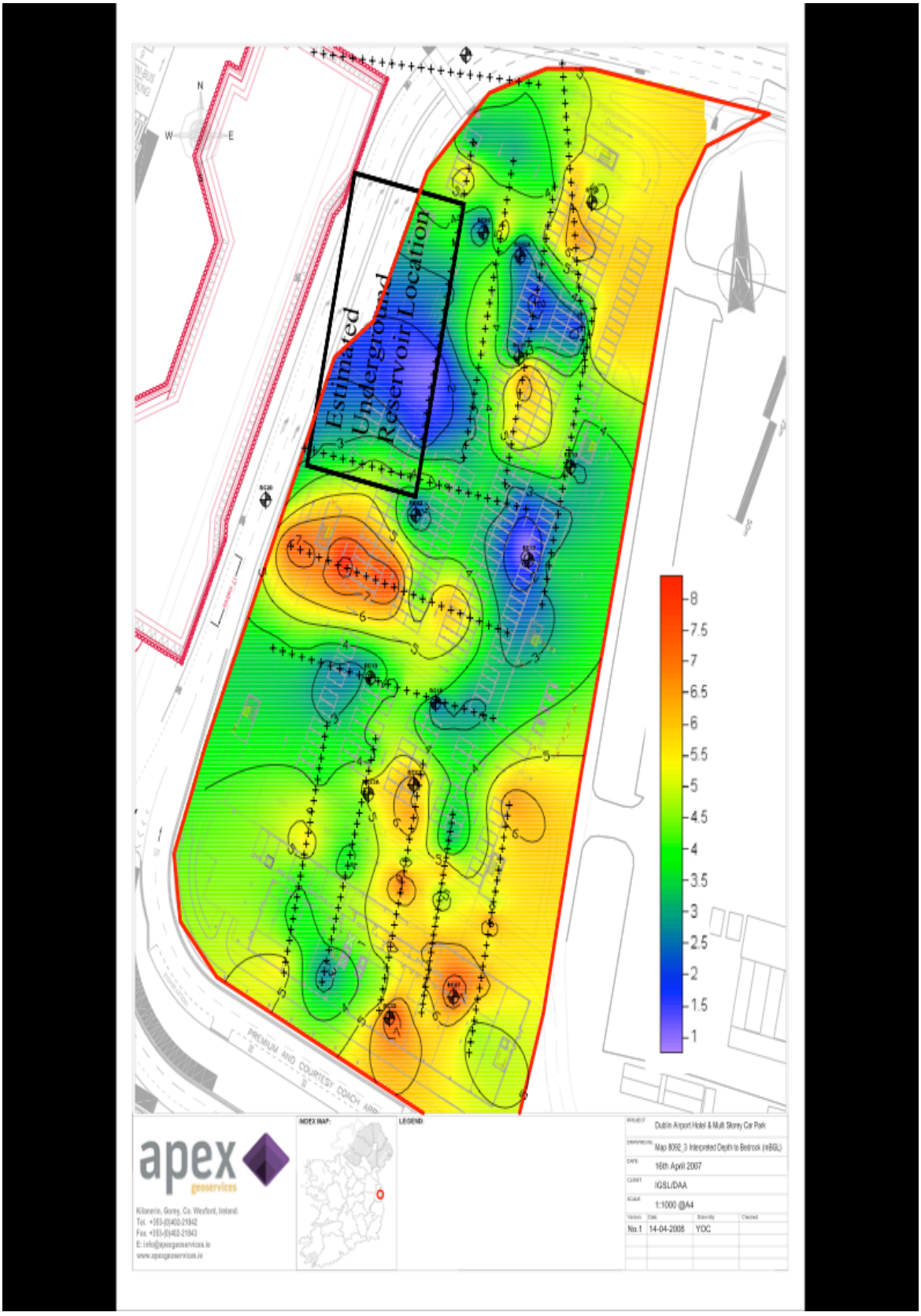
Groundwater was not encountered during construction of the cable percussion boreholes or window samples holes. With air mist flush used during drilling, groundwater strikes were difficult to establish. The standpipes installed in the rotary drillholes show equilibrium levels of between 1.91 and 4.89m bgl. With the response zones sealed within the limestone bedrock, this data suggests confined groundwater conditions operating in the bedrock.

4.4 Gas Concentrations

Gas concentrations were measured in BH 32, RC 06 and RC 20 respectively. Gases measured included methane (CH_4), Carbon Dioxide (CO_2) and Oxygen (O_2). Inspection of the data sheet in Appendix 5 shows zero concentrations of methane with small concentrations of CO_2 measured in RC 20 and BH 32.

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Figure 3 - Bedrock Topography Map (Extract from Apex Geophysical Report)



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5. DISCUSSION & RECOMMENDATIONS

5.1 General

It is understood that a 14 storey hotel and multistory car park will be constructed at this site. In light of this and the geotechnical / geophysical findings, the following ground engineering issues are developed and discussed:

- Bearing capacity
- Foundations
- Excavatability & earthworks
- Groundwater
- Slopes
- Buried concrete

5.2 Bearing Capacity

The strength and relative density of the soils has been discussed previously in Section 4.1.2. The brown boulder clay is firm / stiff in consistency, while the grey black boulder clay is deemed to have the engineering properties and behaviour of an extremely weak (UCS of 0.6 to 1 MPa) or very weak (1 to 5 MPa) mudstone. The weathering and strength of the limestone bedrock has been discussed in Section 4.2 and on foot of the strengths from point load and UCS testing, safe bearing and recommended allowable capacities (as defined in Section 2.2.8 of Tomlinson, 7th Ed) are presented in Table 2.

Table 2 - Summary Details of Safe Bearing Capacities

Stratum	Characteristic Strength or Relative Density Range	Assumed Safe Bearing Capacity (kN/m^2)	Recommended Allowable Bearing Capacity* (kN/m^2)
Firm / stiff brown sandy gravelly CLAY (N-Values of 15 to 20)	75 to 100 kN/m^2	150 to 200	150
Hard (cemented) grey black slightly sandy very gravelly CLAY with cobbles	SPT Values of 50+ Estimated Cu of between 300 and 500 kN/m^2	600 to 1000	750
Grey black argillaceous LIMESTONE	Moderately strong and strong	1500	1250
Light grey fossiliferous siliceous LIMESTONE	Strong and very strong	2250	1750

** Recommended allowable bearing pressures presented are proposed to limit differential settlement*

The firm / stiff brown sandy gravelly CLAY should provide an allowable bearing capacity of 150 kN/m^2. The low plasticity brown boulder clay will be particularly susceptible or sensitive to small increases in moisture content and should be protected without delay to avoid degradation. An allowable bearing capacity of 750 kN/m^2 is suggested for pad foundations located on the hard (cemented) grey black boulder clay.

This bearing capacity may appear optimistic but must be considered in light of the degree of over-consolidation. An allowable bearing capacity of 1250 kN/m^2 is suggested for pad or spread foundations located on the moderately strong / strong argillaceous limestone. The strong or very strong fossiliferous silicified limestone would be expected to provide an allowable bearing capacity of 1750 kN/m^2.

5.3 Foundations

The geotechnical investigations carried out show significant and rapid variations in both rockhead elevation and rock quality. As outlined in Section 1, it is reported that this part of the airport site was formerly a borrow pit / quarry. The changes or disparities in rockhead depths / elevations would be typical of an ad-hoc borrow pit, where shallow limestone would have been extracted and infilled with various types of materials.

In light of the above, foundation solutions for the principal structures are *suggested* in the following section. This is to provide *guidance* to the designer and he must consider all of the relevant geotechnical data and impact of differential settlement with regard to the foundation design for the structure**.** On the basis of the geotechnical findings, a number of foundation solutions available for the hotel and MSCP including:

- Option 1 - Pads founded or seated on shallow competent / slighly weathered limestone bedrock
- Option 2 - Pads founded on the hard cemented grey black boulder clay
- Option 3 - Piles founded in both the grey black boulder clay and limestone bedrock

With column loads for the hotel of 8000 kN and 5500 kN for the MSCP, the expectation is that pads would be founded on the upper competent (slighly weathered / strong) limestone bedrock, in conjunction with piles (combination of skin friction in boulder clay and end bearing in limestone bedrock). With regard to piling, it is anticipated that rotary bored piles would be used where plies are to be founded in the limestone bedrock. If pile design capacities can be achieved in the black boulder clay, then CFA piling methods could be used. Symmetrix / odex piling methods would be prefereable to CFA methods, in order to attain the necessary embedment depths in the strong competent limestone bedrock. Pile socket depths of the order of 3m into moderately strong competent bedrock are expected.

Settlement magnitudes for pad loadings of the order of 750 to 1000 kN/m^2 seated on either upper competent limestone bedrock or hard cemented black boulder clay are expected to be very small, typically < 5mm. Likewise, piles founded in the black boulder clay and limestone bedrock are expected to produce small amounts of settlement, probably 5 to 10mm for loads of the order of 1500 to 2000 kN.

Where stiff indigenous boulder clay or shallow limestone bedrock are present, then ground bearing floor slabs could be used. Ground bearing floor slabs should not be located directly on made ground / fill material. This is due its inherent variability and likely poor compaction (or no compaction), hence total and differential settlement would be a real concern. The made ground / fill should be removed and replaced with suitable approved engineering fill. Guidelines on imported granular fill are presented in Section 5.4.

Close inspection of all structural formations should be carried out by an experienced engineer (preferably with geotechnical experience). This is particularly important where pad foundations are seated on the upper bedrock, as pockets or zones of weak /

moderately to highly weathered bedrock (e.g. weak shale or calcareous mudstone) could be present. Should these be encountered, they should be replaced with lean mix or low-grade concrete.

If foundations for light structures (e.g. electricity substation, gas tanks etc) are located on the upper brown boulder clay, then dynamic probing and plate bearing testing should be considered to verify strength or stiffness of the soils. Dynamic probing provides a rapid and effective means of confirming the strength (and hence bearing capacity) of upper foundation soils.

5.4 Excavatability & Pavement

The key factors which govern or control excavation methods in dense or hard (cemented) glacial till / boulder clay and hence production rates are the strength of the matrix and frequency or predominance of boulders. On the basis of the SPT Values and strength assessment, excavation of the brown boulder clay is expected to be efficiently carried out using 20t tracked excavators.

Larger tracked excavators (30 or 40t) are recommended for excavations within the grey black boulder clay, as this material can be very difficult to efficiently dig even withheavy duty excavators. The use of rippers (Caterpillar D7) should be considered with tracked excavators loading into dump trucks. The grey black boulder clay would be suitable where MCV limits are between 8 and 14. However, in view of the cemented nature of the grey black boulder clay and the difficulty in breaking down the clods, this material should be carefully scarified and compacted with a sheepsfoot roller (not smooth drum roller), again in layers not exceeding 300mm. Ideally, the grey black boulder clay should be scarified to achieve a moisture content of optimum to + 2%.

It is understood that the ground floor at the MSCP is likely to be a flexible pavement (macadam). Capping material (6F1 / 6F2) is used to protect the sub-grade and the sub-base material and increase the stiffness modulus and strength of the formation. In accordance with DMRB Design Guidance for Road Pavement (HD 25) the lower-end equilibrium CBR values should be used to determine appropriate capping layer thickness. CBR tests have not carried out on the samples of the fill or upper boulder clay, however assuming a CBR value of circa 2 to 3% for the stiff brown boulder clay, a capping layer thickness of the order of 400 to 450mm is envisaged. Provision should be made for CBR tests to be carried out on the MSCP formation (i.e. push-in mould samples) or plate bearing tests to derive CBR values. It is expected that this would be undertaken at the groundworks stage to confirm design CBR value and validate appropriate capping layer thickness.

If imported limestone / mudstone derived granular fill is used under floor slabs or structures, then it should have a minimum Ten Per Cent Fines Value of 130 kN, minimum CBR value of 15% (derived using plate bearing plate method), maximum equivalent pyrite content of < 1% (i.e. low to medium swelling potential in accordance with CTQ-M200) and maximum total sulphur content of 1.0% (or < 0.4% if pyrite is suspected) in accordance with Section 6.3 of IS EN 13242:2002. If pyrite is present in granular fill, this may lead to problems with oxidation, weathering and adverse reaction with carbonate minerals. Potentially expansive fill materials should not be used under structures. Imported granular fill material (e.g. capping or sub-base) should be thoroughly checked for total sulphur and soluble sulphates (SO_4). Petrographic analysis should also be carried out to determine mineralogical composition, particularly for the presence of pyrite in the rock matrix.

5.5 Groundwater

Groundwater was not intercepted in any of the cable percussion boreholes or inspection pits. As outlined in Section 4.3, the standpipes installed in the drillholes showed equilibrium water levels of 1.91 to 4.89m bgl. These levels should be considered by the designer with regard to uplift or buoyancy. Packer tests were not carried out to evaluate the permeability or water-tightnes of the bedrock. However, on the evidence of the discontinuity spacings and fracture state of the cores, the bedrock would be expected to be of medium permeability (i.e. Lugeon Values of 5 to 20).

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Despite the fact that groundwater was not encountered in the boreholes, provision should be made for sump pumping in excavations. It is expected that groundwater pumping will be required for utility trenches and foundations areas. Sumps should be carefully located and constructed to ensure that groundwater is efficiently removed from excavations and trenches.

5.6 Slopes

On the basis of the strength of the material from the SPT's, groundwater conditions and behaviour of the sidewalls duringinspection pits, a temporary slope angle of 33º (1:1.5) is suggested for the made ground and brown boulder clay. The hard cemented grey black boulder clay should be capable of providing a satisfactory temporary slope angle of 60 to 70º. With the grey black boulder clay, shallow near surface slips often occur after a period of 6 to 12 months as suctions decrease.

Temporary slope protection measures should be considered to minimise the risk of spalling, particularly with the grey black boulder clay material. To mitigate against loose blocks / clods spalling, either galvanised mesh or a geogrid (Tensat SS 30 or similar) should be fixed against the crest, mid-point and toe of the batter. This is normally carried out with upturned reinforcing bars or a bulb of concrete at the toe.

The temporary slopes should be regularly inspected during the course of the excavation works by an experienced geotechnical engineer. A minimum of one visit per week is suggested. The purpose of this is to evaluate unfavourable or potentially unstable ground conditions, general slope behaviour and groundwater. The slope batters should be inspected daily by an experienced site engineer. If there are concers with instability, then advice should be sought from a suitably experienced geotechnical engineer.

5.7 Buried Concrete

The chemical analysis laboratory tests on the soil samples show pH values of between 8.0 and 8.6 while sulphates (SO_3) are mostly < 0.05%, the exception being BH 32 where n SO_4 value of 0.17% was obtained. In terms of BRE Special Digest SD 1, these values show DS-1 conditions (i.e. < 0.2%) therefore no special precautions are expected to protect buried concrete (i.e. use of sulphate resisting cement or increasing the cement content).

5.8 Geoenvironmental Testing & Analysis

Environmental testing was carried out on a selection of samples from the boreholes and window samples. The purpose of this was investigate for the presence of contaminated material, particularly within the made ground deposits. Samples were analysed for Mineral Oil, BTEX group, polyaromatic hydrocarbons (PAH) and PCB's. The level of total organic carbon (TOC) was also measured in each sample.

In the absence of recognised guidelines in Ireland, the results of these tests were compared with the New Dutch List, which recommends safe levels of contamination for in-situ soils in development areas. The guidelines specify an optimum and action level for each contaminant type. Contaminants are permitted to be present in concentrations that are above their optimum value, but cannot exceed their action level. Where the action level is exceeded, remediation or disposal of the contaminated material is required.

The results of environmental testing revealed no concentrations that exceeded the Action Level in accordance with the Dutch Standards. As such, there should be no immediate concerns regarding material left in place during construction and in the long term. However, as much of the site is overlain by made ground, which extends to depths of up to 3.0 metres in places, allowance should be made for the variability of this material. It is possible that localised pockets of made ground containing elevated levels of contamination may be encountered and vigilance should be maintained during construction to help identify "hot spots". Viual and olfactory observations are often a sufficient means of identifying substances such as diesel, petroleum and hydrocarbon derived sources, as well as industrial and domestic waste.

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Landfill acceptability testing was also carried out, to determine whether the material on the site could be accepted as 'inert material' by an Irish landfill. Samples were analysed in accordance with the "Murphy Suite", which is a programme of analyses adopted by Murphy Landfills when specifying the waste acceptance criteria of their inert landfills. Leachate analyses were performed, whereby leachate (CEN 10:1) was generated and then analysed for the presence of known contaminants. In addition to this, the levels of Total Organic Carbon (TOC), Heavy Metals, Sulphate, Total Dissolved Solids (TDS), Phenols, BTEX Group, Mineral Oil, PCBs and PAH were detected within dry soil. The results were compared with the published waste acceptance limits of Murphy Landfills.

The disposal suite results indicate that almost all substances were found to exist at levels *below the upper limits specified by the landfill criteria*. The level of Total Organic Carbon (TOC) was measured as 4.1% and 4.7% within the upper metre of material at BH23 and WS2 respectively, which slightly exceeds the published limit level of 3%. However, Murphy Landfills can cater for levels of TOC of up to 6% under certain circumstances. In the absence of any other elevated contamination within the samples, the levels of TOC would not be expected to prevent overall acceptability of the material as inert soil.

The results of the disposal suite indicate that all samples tested would be readily accepted by Murphy Landfills as inert landfill material in accordance with their current waste acceptance criteria. Although the results of the disposal suite fell within acceptable limits, any material to be removed from site will require additional testing prior to its disposal to a landfill. A sampling regime should be set up by an environmental engineer so that regular checks are made of the contaminant levels during excavation and removal. This is particularly relevant at this site where made ground is present in significant quantities, though it would not be unusual to detect localised "hot spots" of elevated contamination levels, which were not intercepted by the exploratory holes.

It is highlighted that very limited sampling was possible around the buried oil tank (due to a prominent concrete slab), hence further sampling and analysis is recommended. Typical 'hot spots' found within the made ground material include the remnants of oil spillages, petrol/diesel leakages from previous vehicular activity, chemical substances from industrial by-product and domestic waste. While it may be possible to rule out these processes from the history of this site, the importation of contamination with made ground / fill should not be discounted. Visual and olfactory assessment would be useful in identifying any localised contamination that may be undetected to date.

5.9 Gas Concentrations

As outlined in Section 4.4, gas monitoring was carried out in the standpipes and showed zero concentrations of methane (CH_4). However, small magnitudes of Carbon Dioxide (CO_2) were detected, typically of the order of 0.2 to 0.3%. Methane is flammable and asphyxiating (and will explode if confined andignited), while carbon dioxide is non-flammable, asphyxiating and toxic. The aforementioned methane gas concentrations fall into Charecteristic Situation 1 as defined by CIRIA publications 149 to 152 and EA/BRE Report 414, therefore no special precautions would be required. These levels of CO_2 are deemed to be small but are not unexpected, given the reported historical use of the site.

Provision should be made for gas monitoring during the course of the groundworks phase, particulaly in trench excavations and during piling works. Weekly flammable gas readings / monitoring (minimum) is suggested for this period. It is stressed that pockets of flammable gases could be present within the made ground / fill material, hence vigilance is advised at all times during the groundworks and foundations phase.

With regard to radon gas, Technical Guidance Document C (Building Regulations) sets out radon preventative measures to be applied in the construction of new dwellings or long stay residential buildings. Inspection of the RPI radon map for County Dublin shows the hotel and MSCP site (North Dublin) falls within the 1 to 5% category (i.e. percentage of dwellings to exceed 200 Bq/m^3 in each grid). A 'high radon area' is one in which more than 10% of dwellings are predicted to have radon levels in excess of the 200 Bq/m^3

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reference level. Based on current building regulations, it is expected that a fully sealed radon resisting membrane wil be incorporated at the hotel structure.

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References

1. BS 5930 (1999) Code of Practice for Site Investigation, British Standards Institution (BSI) incorporating Amendment No. 1 (December 2007)

2. BS 1377 (1990) Methods of Testing of Soils for Civil Engineering Purposes, BSI.

3. BS 8004 (1986) Code of Practice for Foundations, BSI.

4. CIRIA Report 149 / 152 (1995) Gas

5. Environment Agency / BRE Report, (1994) Protective Measures for Housing on Gas-Contaminated Ground.

6. Farrell E.R., Coxon P., Doff D.H, Priedhomme L. The genesis of brown boulder clay of Dublin, QJEG, 1995, 28, 143-152

7. IS EN 13242:2002, Aggregates For Unbound and Hydraulically Bound Materials for use in Civil Engineering and Road Construction, January 24, 2003

8. NRA Specification for Road Works, March 2000

9. Site Investigation Practice: Assessing BS 5930 (1986), Geological Society Special Publication, No. 2.

10. Tomlinson, M.J. Foundation Design & Construction, 7th Edition

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KEY TO EXPLORATORY RECORDS

Cable Percussion Boreholes

D	Small Disturbed Sample (Tub or Jar)
B	Large Disturbed Sample
U100	Undisturbed Sample (driven tube sample)
W	Groundwater Sample
C	SPT N-Value (Solid Cone)
S	SPT N-Value (Split Spoon / Open Shoe)
FHT	Falling Head Permeability Test
RHT	Rising Head Permeability Test
AB 360	Sample Reference No

Rotary Core Drillholes

TCR	Total Core Recovery (%)
SCR	Solid Core Recovery (%)
RQD	Rock Quality Designation Value (%)
FS	Fracture Spacing (mm) Presented as Graphic Fracture Log
NI	Non-Intact (where rock core is highly fractured)
ECL	Estimated Core Loss

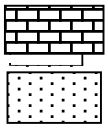
Trial Pits

B	Large Disturbed Bulk Sample
D	Small Disturbed Tub Sample
VT	Vane Test (KPa) Using Genor H-70 Hand Vane
HP	Hand Penetrometer Test (KPa)
W	Groundwater Sample
AB 361	Sample Reference No

Groundwater Installations

SP	Standpipe (uPVC 50mm diameter with 1mm slots)
Piez	Casagrande Piezometer (19mm diameter)

Strata Legends / Symbolic Logs



Strata legends / symbolic logs are in accordance with BS 5930 (1999). Legend codes are selected from GINT to reflect stratum.

Figure 1

Schematic Geological / Geotechnical X-Sections

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Appendix 1

Inspection Pit Records

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Appendix 2

Cable Percussion Records

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Appendix 3

Rotary Drillhole Records

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Appendix 4

Window Sample Records

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Appendix 5

Groundwater & Gas Monitoring Records

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Appendix 6

Soil Laboratory Test Records

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Appendix 7

Rock Laboratory Test Records

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Appendix 8

Environmental Laboratory Test Records

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Appendix 9

Rock Core Photographs

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Appendix 10

Site Plans

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GEOTECHNICAL BORING RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**BOREHOLE NO.**	**BH01**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,095.28 E 243,525.19 N	**GROUND LEVEL (m)**	66.79
		BOREHOLE DIAMETER (mm)	200
		DATE STARTED	05/02/2008
		DATE COMPLETED	06/02/2008
CLIENT	Dublin Airport Authority	**BOREHOLE DEPTH (m)**	8.80
		BORED BY	J. O'Hara
ENGINEER	Ian Black & Associates	**CASING DEPTH (m)**	8.80
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Field Test Results	Standpipe Details
0	MADE GROUND consisting of tarmacadam.		66.69	0.10					
	MADE GROUND consisting of light brown slightly sandy gravel (limestone hardcore).		66.49	0.30					
	MADE GROUND consisting of firm brown sandy gravelly clay.				AD4415	B	0.50		
1					AD4416	B	1.00		
	Firm brown slightly sandy gravelly CLAY with some cobbles		65.49	1.30				N = 14 (1, 1, 2, 3, 3, 6)	
					AD4417	B	1.50		
	Very stiff becoming hard black slightly sandy gravelly CLAY with some cobbles.		64.99	1.80					
2					AD4418	B	2.00	N = 50/285 mm (2, 3, 5, 11, 16, 18)	
3					AD4419	B	3.00	N = 50/125 mm (10, 13, 19, 31)	
4					AD4420	B	4.00	N = 50/85 mm (21, 4, 41, 9)	
5					AD4421	B	5.00	N = 50/50 mm (25, 50)	
6					AD4422	B	6.00		
								N = 50/25 mm (25, 50)	
7					AD4423	B	7.00		
8					AD4424	B	8.00	N = 50/10 mm (25, 50)	
	Obstruction - possible boulder		58.19	8.60					
	End of Borehole at 8.80 m		57.99	8.80					
9									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.7	3.9	0.75	
5.2	5.3	0.5	
6	6.2	0.75	
7.7	7.8	1	
8.6	8.8	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
05-02-08	3.00	3.00	-	Dry at end of day
06-02-08	3.00	3.00	-	Dry at start of day
06-02-08	8.80	8.80	-	Dry at end of borehole

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Hand dug inspection pit to 1.20m. Erected and removed fencing around location - 1 hour.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
U - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample

IGSL BH LOG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**BOREHOLE NO.**	**BH03**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,133.66 E 243,491.77 N	**GROUND LEVEL (m)**	67.21
		BOREHOLE DIAMETER (mm)	200
		DATE STARTED	31/01/2008
		DATE COMPLETED	01/02/2008
CLIENT	Dublin Airport Authority	**BOREHOLE DEPTH (m)**	4.30
		BORED BY	J. O'Hara
ENGINEER	Ian Black & Associates	**CASING DEPTH (m)**	4.30
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Field Test Results	Standpipe Details
0	MADE GROUND consisting of tarmacadam.		67.11	0.10					
	MADE GROUND consisting of light brown slightly sandy gravel (limestone hardcore).		66.81	0.40					
	MADE GROUND consisting of firm brown sandy gravelly clay.				AD4407	B	0.50		
1					AD4408	B	1.00	N = 8 (1, 2, 2, 1, 3, 2)	
2					AD4409	B	2.00	N = 11 (1, 1, 1, 2, 4, 4)	
	Very stiff brown slightly sandy gravelly CLAY with some cobbles		64.81	2.40					
3					AD4410	B	3.00	N = 44 (2, 3, 8, 10, 11, 15)	
	Very stiff black slightly sandy gravelly CLAY with some cobbles.		63.51	3.70					
4	Obstruction - possible bedrock		63.11	4.10	AD4411	B	4.00	N = 50/10 mm (25, 50)	
	End of Borehole at 4.30 m		62.91	4.30	AD4412	B	4.30		
5									
6									
7									
8									
9									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.5	2.6	0.75	
4.1	4.3	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
31-01-08	2.00	2.00	-	Dry at end of day
01-02-08	2.00	2.00	-	Dry at start of day
01-02-08	4.30	4.30	-	Dry at end of borehole

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Hand dug inspection pit to 1.20m. Erected and removed fencing around location - 1 hour.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
U - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample

IGSL BH LOG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**BOREHOLE NO.**	**BH06**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,100.62 E 243,484.91 N	**GROUND LEVEL (m)**	67.35
		BOREHOLE DIAMETER (mm)	200
		DATE STARTED	07/02/2008
		DATE COMPLETED	07/02/2008
CLIENT	Dublin Airport Authority	**BOREHOLE DEPTH (m)**	1.50
		BORED BY	J. O'Hara
ENGINEER	Ian Black & Associates	**CASING DEPTH (m)**	1.50
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Field Test Results	Standpipe Details
0	MADE GROUND consisting of tarmacadam.		67.25	0.10					
	MADE GROUND consisting of light brown slightly sandy gravel (limestone hardcore).		67.05	0.30					
1	MADE GROUND consisting of firm brown sandy gravelly clay with some organic matter.				AD4425	B	0.50		
					AD4426	B	1.00	N = 50/100 mm (4, 13, 28, 22)	
2	Obstruction - possible bedrock End of Borehole at 1.50 m		65.85	1.50					
3									
4									
5									
6									
7									
8									
9									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
1.4	1.5	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
07-02-08	1.50	1.50	-	Dry at end of borehole

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Hand dug inspection pit to 1.20m. Erected and removed fencing around location - 1 hour. Standing 3 hrs - waiting for hire cars to be moved

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
U - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample

IGSL BH LOG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**BOREHOLE NO.**	**BH15**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,114.36 E 243,410.61 N	**GROUND LEVEL (m)**	67.85
		BOREHOLE DIAMETER (mm)	200
		DATE STARTED	05/02/2008
		DATE COMPLETED	05/02/2008
CLIENT	Dublin Airport Authority	**BOREHOLE DEPTH (m)**	0.50
		BORED BY	J. O'Hara
ENGINEER	Ian Black & Associates	**CASING DEPTH (m)**	
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Field Test Results	Standpipe Details
0	MADE GROUND consisting of tarmacadam.		67.75	0.10					
	MADE GROUND consisting of light brown slightly sandy gravel (limestone hardcore).		67.45	0.40	AD4413	B	0.50		
	MADE GROUND consisting of firm brown sandy gravelly clay.		67.35	0.50					
1	Obstruction - possible bedrock End of Borehole at 0.50 m								
2									
3									
4									
5									
6									
7									
8									
9									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
05-02-08	0.50	-	-	Dry at end of borehole

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Hand dug inspection pit - obstruction at 0.50m - possible bedrock. Erected and removed fencing around location - 1 hour. Standing 3 hrs - waiting for hire cars to be moved

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
U - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample

IGSL BH LOG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**BOREHOLE NO.**	**BH20**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,035.69 E 243,414.28 N	**GROUND LEVEL (m)**	66.76
		BOREHOLE DIAMETER (mm)	200
		BOREHOLE DEPTH (m)	2.30
		CASING DEPTH (m)	2.30
		DATE STARTED	08/02/2008
		DATE COMPLETED	11/02/2008
CLIENT	Dublin Airport Authority	**BORED BY**	J. O'Hara
ENGINEER	Ian Black & Associates	**PROCESSED BY**	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Field Test Results	Standpipe Details
0	MADE GROUND consisting of tarmacadam.		66.66	0.10					
	MADE GROUND consisting of light brown slightly sandy gravel (limestone hardcore).		66.36	0.40					
	MADE GROUND consisting of brown grey sandy gravel with many angular cobbles.				AD4427	B	0.50		
1					AD4428	B	1.00	N = 50/50 mm (25, 50)	
2					AD4429	B	2.00	N = 50/10 mm (25, 50)	
	Obstruction - possible boulder End of Borehole at 2.30 m		64.46	2.30					
3									
4									
5									
6									
7									
8									
9									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
1.4	1.5	0.75	
1.8	1.9	0.75	
2.2	2.3	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
08-02-08	2.00	2.00	-	Dry at end of day
11-02-08	2.00	2.00	-	Dry at start of day
11-02-08	2.30	2.30	-	Dry at end of borehole

REMARKS Hand dug inspection pit to 1.20m. Erected and removed fencing around location - 1 hour. Standing 2 hrs - waiting for hire cars to be moved

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
U - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample

IGSL BH LOG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**BOREHOLE NO.**	**BH22**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,039.07 E 243,367.59 N	**GROUND LEVEL (m)**	66.40
		BOREHOLE DIAMETER (mm)	200
		DATE STARTED	29/01/2008
		DATE COMPLETED	29/01/2008
CLIENT	Dublin Airport Authority	**BOREHOLE DEPTH (m)**	0.60
		BORED BY	J. O'Hara
ENGINEER	Ian Black & Associates	**CASING DEPTH (m)**	
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Field Test Results	Standpipe Details
0	MADE GROUND consisting of tarmacadam.		66.30	0.10					
	MADE GROUND consisting of light brown slightly sandy gravel (limestone hardcore).		66.00	0.40					
	MADE GROUND consisting of concrete.		65.80	0.60					
1	Diesel Fuel tank End of Borehole at 0.60 m								
2									
3									
4									
5									
6									
7									
8									
9									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Hand dug inspection pit - encountered diesel tank. Repaired and moved location to reattempt borehole. Erected and removed fencing around location - 1 hour.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
U - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample

IGSL BH LOG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**BOREHOLE NO.**	**BH22A**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,043.14 E 243,378.46 N	**GROUND LEVEL (m)**	66.15
		BOREHOLE DIAMETER (mm)	200
		DATE STARTED	29/01/2008
		DATE COMPLETED	29/01/2008
CLIENT	Dublin Airport Authority	**BOREHOLE DEPTH (m)**	1.40
		BORED BY	J. O'Hara
ENGINEER	Ian Black & Associates	**CASING DEPTH (m)**	1.40
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Field Test Results	Standpipe Details
0	MADE GROUND consisting of tarmacadam.								
	MADE GROUND consisting of light brown slightly sandy gravel (limestone hardcore).		65.95	0.20					
1	MADE GROUND consisting of firm grey sandy gravelly clay.		65.55	0.60					
	Obstruction - possible service End of Borehole at 1.40 m		64.75	1.40					
2									
3									
4									
5									
6									
7									
8									
9									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Hand dug inspection pit to 1.20m. Obstruction encountered at 1.4m - possible service - abandoned borehole. Erected and removed fencing around location - 1 hour.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
U - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample

IGSL BH LOG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**BOREHOLE NO.**	**BH23**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,079.32 E 243,359.45 N	**GROUND LEVEL (m)**	66.22
		BOREHOLE DIAMETER (mm)	200
		BOREHOLE DEPTH (m)	6.00
		CASING DEPTH (m)	6.00
		DATE STARTED	30/01/2008
		DATE COMPLETED	30/01/2008
CLIENT	Dublin Airport Authority	**BORED BY**	J. O'Hara
ENGINEER	Ian Black & Associates	**PROCESSED BY**	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Field Test Results	Standpipe Details
0	MADE GROUND consisting of tarmacadam.		66.12	0.10					
	MADE GROUND consisting of light brown slightly sandy gravel (limestone hardcore).		65.82	0.40					
1	MADE GROUND consisting of soft becoming firm dark grey sandy organic clay.				AD4401	B	1.00	N = 9 (1, 1, 4, 1, 2, 2)	
2					AD4402	B	2.00	N = 11 (1, 1, 1, 4, 3, 3)	
3					AD4403	B	3.00	N = 14 (1, 2, 3, 3, 3, 5)	
4	Firm becoming stiff brown slightly sandy gravelly CLAY with some cobbles (possible made ground).		62.52	3.70	AD4404	B	4.00	N = 16 (1, 2, 3, 2, 4, 7)	
5					AD4405	B	5.00	N = 35 (1, 2, 4, 5, 10, 16)	
	Dense grey sandy angular GRAVEL with some cobbles.		60.72	5.50					
6	End of Borehole at 6.00 m		60.22	6.00	AD4406	B	6.00	N = 50/10 mm (25, 50)	
7									
8									
9									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.6	4.7	0.75	
5.5	5.7	1	
5.9	6	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
30-01-08	6.00	6.00	-	Dry at end of borehole

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Hand dug inspection pit to 1.20m. Erected and removed fencing around location - 1 hour.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
U - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample

IGSL BH LOG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**BOREHOLE NO.**	**BH27**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,091.44 E 243,311.26 N	**GROUND LEVEL (m)**	65.20
		BOREHOLE DIAMETER (mm)	200
		DATE STARTED	24/01/2008
		DATE COMPLETED	25/01/2008
CLIENT	Dublin Airport Authority	**BOREHOLE DEPTH (m)**	9.30
		BORED BY	J. O'Hara
ENGINEER	Ian Black & Associates	**CASING DEPTH (m)**	9.30
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Field Test Results	Standpipe Details
0	MADE GROUND consisting of tarmacadam.		65.10	0.10					
	MADE GROUND consisting of light brown slightly sandy gravel (limestone hardcore).		64.70	0.50					
1	MADE GROUND consisting of firm brown sandy gravelly clay.				375	B	1.00	N = 9 (1, 1, 1, 3, 3, 2)	
	MADE GROUND consisting of dark grey slightly sandy clay.		63.70	1.50					
2	Firm brown slightly sandy gravelly CLAY with some cobbles		63.10	2.10	376	B	2.00	N = 17 (1, 1, 1, 3, 5, 8)	
					377	B	2.50		
	Very stiff becoming hard black slightly sandy gravelly CLAY with some cobbles.		62.50	2.70					
3					378	B	3.00	N = 50/125 mm (3, 15, 21, 29)	
4					379	B	4.00	N = 50/240 mm (8, 10, 13, 14, 18, 5)	
5					380	B	5.00	N = 50/230 mm (1, 3, 4, 16, 25, 5)	
6					381	B	6.00	N = 50/50 mm (20, 5, 50)	
7					382	B	7.00	N = 50/50 mm (25, 50)	
8	Dark grey very clayey sandy angular GRAVEL with many angular cobbles. (Possible weathered mudstone)		57.20	8.00	383	B	8.00		
9					384	B	9.00	N = 50/10 mm (25, 50)	
	End of Borehole at 9.30 m		55.90	9.30					

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.4	4.6	0.75	
5.8	5.9	0.75	
7	7.2	1	
9.1	9.3	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
24-01-08	6.00	6.00	-	Dry at end of day
25-01-08	6.00	6.00	-	Dry at start of day
25-01-08	9.30	9.30	-	Dry at end of borehole

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Hand dug inspection pit to 1.20m. Erected and removed fencing around location - 1 hour.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
U - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample

IGSL BH LOG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**BOREHOLE NO.**	**BH32**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,068.84 E 243,305.39 N	**GROUND LEVEL (m)**	65.21
		BOREHOLE DIAMETER (mm)	200
		DATE STARTED	28/01/2008
		DATE COMPLETED	28/01/2008
CLIENT	Dublin Airport Authority	**BOREHOLE DEPTH (m)**	8.60
		BORED BY	J. O'Hara
ENGINEER	Ian Black & Associates	**CASING DEPTH (m)**	8.60
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Field Test Results	Standpipe Details
0	MADE GROUND consisting of tarmacadam.		65.11	0.10					
	MADE GROUND consisting of light brown slightly sandy gravel (limestone hardcore).		64.71	0.50					
1	Firm brown slightly sandy gravelly CLAY with some cobbles.				385	B	1.00	N = 9 (1, 2, 1, 2, 2, 4)	
2					386	B	2.00	N = 35 (1, 1, 4, 5, 8, 18)	
	Very stiff becoming hard black slightly sandy gravelly CLAY with some cobbles.		63.01	2.20					
3					387	B	3.00	N = 50/125 mm (6, 16, 22, 28)	
4					388	B	4.00	N = 50/95 mm (16, 9, 33, 17)	
5					389	B	5.00	N = 50/25 mm (25, 50)	
6					390	B	6.00		
								N = 50/125 mm (5, 18, 29, 21)	
7					391	B	7.00		
8					392	B	8.00	N = 50/80 mm (10, 15, 42, 8)	
	Obstruction - possible boulder		56.71	8.50					
	End of Borehole at 8.60 m		56.61	8.60					
9									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.8	2.9	0.5	
4.3	4.4	0.5	
5.7	5.8	0.75	
8.5	8.6	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
6.60	6.60	No	6.60	20	Seepage

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
28-01-08	8.00	1.00	8.00	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
28-01-08	8.60	8.60	8.60	End of borehole

REMARKS Hand dug inspection pit to 1.20m. Erected and removed fencing around location - 1 hour.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
U - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample

IGSL BH LOG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC01**
		SHEET	Sheet 1 of 2
CO-ORDINATES(_)	317,095.28 E 243,525.19 N	**GROUND LEVEL (m)**	66.79
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	12/02/2008
		DATE COMPLETED	13/02/2008
ENGINEER	Ian Black & Associates	**DRILLED BY**	Millennium
		LOGGED BY	IGSL

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of tar onto brown clay (Firm - based on Borehole SPT results).	1.30		65.49		
1								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of brown clay (Firm - based on Borehole SPT results).	1.80		64.99		
2								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of black gravelly clay (Stiff to hard - based on Borehole SPT results).					
3													
4													
5													
6													
7									7.70				
8	8.00	100	100	100				SYMMETRIX OPEN HOLE DRILLING: Observed by driller as angular gravel size returns of limestone (probable bedrock).	8.00		59.09 58.79		
9	9.60												

REMARKS

4 Core boxes (8.8m core liner). Move and set up 1½hrs (moving fence). 20mins - Set up over shell & auger hole. 1½hrs clean up - and power wash area.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
13-02-08	17.40	11.40	17.40	50mm SP

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC01**
		SHEET	Sheet 2 of 2
CO-ORDINATES(_)	317,095.28 E 243,525.19 N	**GROUND LEVEL (m)**	66.79
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	12/02/2008
		DATE COMPLETED	13/02/2008
ENGINEER	Ian Black & Associates	**DRILLED BY**	Millennium
		LOGGED BY	IGSL

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
10		100	100	100	0 250 500			Strong to very strong and locally moderately strong, massive, grey/white mottled, fine to medium grained, fossiliferous (silicified) LIMESTONE with frequently randomly orientated calcite veins and stylolites. Fresh to locally slightly and moderately (with some loss of recovery) weathered. *(continued)*		Discontinuities are rough and undulose. Apertures are moderately open to open with commonly iron oxide stained surfaces. Dips are possibly 10-45°, variable fractures throughout. Vertical fractures 15.29m-15.44m, 17.31m-17.4m. Heavily solution weathered and calcite veined (12.2m-14.2m, 15.56m-15.87m) *(continued)*			
	10.60												
11		100	98	98									
12					570								
	12.20	100	60	60									
	12.70												
13		60	0	0									
14													
	14.20	100	81	81									
15													
	15.70	100	73	73									
16													
	16.60	100	85	85									
17									17.40				
	17.40							End of Corehole at 17.4 (m)			49.39		
18													
19													

REMARKS

4 Core boxes (8.8m core liner). Move and set up 1½hrs (moving fence). 20mins - Set up over shell & auger hole. 1½hrs clean up - and power wash area.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
13-02-08	17.40	11.40	17.40	50mm SP

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC02A**
		SHEET	Sheet 1 of 2
CO-ORDINATES(_)	317,111.78 E 243,479.48 N	**GROUND LEVEL (m)**	67.60
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	22/02/2008
		DATE COMPLETED	25/02/2008
ENGINEER	Ian Black & Associates	**DRILLED BY**	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
0					0 250 500			SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of tar onto brown gravelly clay	1.30		66.30		
1								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as angular gravel size returns of limestone (probable limestone bedrock)	1.90		65.70		
2	1.90	100	58	53				Strong to very strong, thickly bedded, fine to medium grained, grey, siliceous fossiliferous LIMESTONE. Fresh to locally slightly weathered.		Discontinuities are rough and undulose. Apertures are moderately open. Dips are sub-10-20° with local sub-vertical fractures (2.0m-2.1m, 2.6m-2.9m) and drilling induced at 3.07m.			
3	3.30	100	99	96									
4	4.80	100	100	0									
5	4.90	100	93	90									
6	6.40	100	97	97									
7													
8	8.00	100	100	100	550								
9	9.60				710								

REMARKS

3 Core boxes. Move and set up 1hr50mins. Clean car park 1¾hrs. Power washing 1hr.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC02A**
		SHEET	Sheet 2 of 2
CO-ORDINATES(_)	317,111.78 E 243,479.48 N	**GROUND LEVEL (m)**	67.60
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	22/02/2008
		DATE COMPLETED	25/02/2008
ENGINEER	Ian Black & Associates	**DRILLED BY**	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
10		100	100	100	630				11.00		56.60		
11	11.00							End of Corehole at 11 (m)					
12													
13													
14													
15													
16													
17													
18													
19													

REMARKS

3 Core boxes. Move and set up 1hr50mins. Clean car park 1¾hrs. Power washing 1hr.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC03**
		SHEET	Sheet 1 of 2
CO-ORDINATES(_)	317,133.66 E 243,491.77 N	**GROUND LEVEL (m)**	67.21
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	08/02/2008
ENGINEER	Ian Black & Associates	**DATE COMPLETED**	08/02/2008
		DRILLED BY	Millennium
		LOGGED BY	IGSL

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
0					0 250 500			SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of brown gravelly clay (Firm - based on Borehole SPT results).	2.40		64.81		
1								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of brown gravelly clay (Very stiff - based on Borehole SPT results).	3.70		63.51		
2								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of black gravelly clay (Very stiff - based on Borehole SPT results).	4.30		62.91		
3								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as angular gravel size returns of limestone (probable bedrock).	4.60		62.61		
4								Strong to very strong/extremely strong, massive, grey/white mottled, fine to medium grained, fossiliferous (silicified) LIMESTONE with local randomly orientated calcite veins and local stylolites. Fresh to locally slightly weathered.		Discontinuities are rough and undulose to irregular. Apertures are moderately open to locally open with locally slightly iron oxide stained surfaces. 0-45° fractures throughout. Vertical fracture 11.52m-11.67m.			
5	4.60	100	93	93	600								
6	6.10	100	98	98	550								
7	7.30	100	100	100									
8	7.60	100	90	85	510								
9	9.20	100	86	86									

REMARKS

4 Core boxes. Move and set up 1hr. 20mins - Set up over shell & auger hole. 1½hrs clean up - and power wash area. 6/2/08 - 2hrs taking down fence on RC23 and moving to RC3

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
08-02-08	13.90	7.90	13.90	50mm SP

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC03**
		SHEET	Sheet 2 of 2
CO-ORDINATES(_)	317,133.66 E 243,491.77 N	**GROUND LEVEL (m)**	67.21
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	08/02/2008
		DATE COMPLETED	08/02/2008
ENGINEER	Ian Black & Associates	**DRILLED BY**	Millennium
		LOGGED BY	IGSL

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
10	10.20	100	100	100	560			Strong to very strong/extremely strong, massive, grey/white mottled, fine to medium grained, fossiliferous (silicified) LIMESTONE with local randomly orientated calcite veins and local stylolites. Fresh to locally slightly weathered. *(continued)*		Discontinuities are rough and undulose to irregular. Apertures are moderately open to locally open with locally slightly iron oxide stained surfaces. 0-45° fractures throughout. Vertical fracture 11.52m-11.67m. *(continued)*			
11	10.80	100	94	94	720								
12	12.40	100	83	83									
13	13.90								13.90				
14								End of Corehole at 13.9 (m)			53.31		
15													
16													
17													
18													
19													

REMARKS

4 Core boxes. Move and set up 1hr. 20mins - Set up over shell & auger hole. 1½hrs clean up - and power wash area. 6/2/08 - 2hrs taking down fence on RC23 and moving to RC3

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
08-02-08	13.90	7.90	13.90	50mm SP

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC06**
		SHEET	Sheet 1 of 2
CO-ORDINATES(_)	317,100.62 E 243,484.91 N	**GROUND LEVEL (m)**	67.35
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	11/02/2008
		DATE COMPLETED	12/02/2008
ENGINEER	Ian Black & Associates	**DRILLED BY**	Millennium
		LOGGED BY	IGSL

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of tar onto brown gravelly clay (Firm - based on Borehole SPT results).	1.50		65.85		
1								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as angular gravel size returns of limestone (probable bedrock).	1.90		65.45		
2	1.90	100	94	66				Strong to moderately strong, massive, grey/white mottled, fine to medium grained, fossiliferous (silicified) LIMESTONE with frequently randomly orientated calcite veins. Slightly to locally moderately weathered.		Discontinuities are rough and undulose. Apertures are open to locally moderately open with local iron oxide stained surfaces. Dips are possibly 0-30°, variable fractures throughout. 9.85m-10.6m vertical fracture heavily solution weathered.			
3	3.50	100	38	20									
4	4.70	100	48	25									
5	5.10	100	17	10									
6	6.10	100	29	20									
7	7.60	100	55	55									
8													
9	9.10	100	17	10									

REMARKS

3 Core boxes (1.5m core liner). Move and set up 1½hrs (moving fence). 20mins - Set up over shell & auger hole. 1½hrs clean up - and power wash area.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
12-02-08	10.70	4.70	10.70	50mm SP

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC06**
		SHEET	Sheet 2 of 2
CO-ORDINATES(_)	317,100.62 E 243,484.91 N	**GROUND LEVEL (m)**	67.35
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	11/02/2008
		DATE COMPLETED	12/02/2008
ENGINEER	Ian Black & Associates	**DRILLED BY**	Millennium
		LOGGED BY	IGSL

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
10									10.60		56.75		
	10.60							End of Corehole at 10.6 (m)					
11													
12													
13													
14													
15													
16													
17													
18													
19													

REMARKS

3 Core boxes (1.5m core liner). Move and set up 1½hrs (moving fence). 20mins - Set up over shell & auger hole. 1½hrs clean up - and power wash area.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
12-02-08	10.70	4.70	10.70	50mm SP

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC07A**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,111.43 E 243,456.58 N	**GROUND LEVEL (m)**	67.64
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	25/02/2008
		DATE COMPLETED	26/02/2008
ENGINEER	Ian Black & Associates	**DRILLED BY**	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of tar onto brown gravelly clay	1.60		66.04		
1								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as angular gravel size returns of limestone (probable limestone bedrock)	1.90		65.74		
2	1.90	100	54	47				Strong to very strong, thickly bedded, fine to medium grained, grey, siliceous fossiliferous LIMESTONE with frequent calcite veining. Fresh to locally slightly weathered.		Discontinuities are rough and undulose to locally irregular. Apertures are moderately open to locally open. Dips are sub-0-10° with local sub-vertical fractures (3.98m-4.18m, 5.94m-6.24m-clay smeared slightly) and drilling induced at 3.22m-3.38m, 3.94m & 5.01m.			
3	3.50	100	79	79									
4	4.90	100	94	86									
5	5.90	93	64	64	510								
6	7.40								7.40				
7								End of Corehole at 7.4 (m)			60.24		
8													
9													

REMARKS

2 Core boxes. Move and set up 1½hrs. Clean car park 1hr40mins.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC10A**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,127.11 E 243,431.74 N	**GROUND LEVEL (m)**	68.18
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	26/02/2008
		DATE COMPLETED	26/02/2008
ENGINEER	Ian Black & Associates	**DRILLED BY**	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of tar onto brown gravelly clay	1.20				
1								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of tar onto brown and black gravelly clay	2.20		66.98		
2									2.50		65.98		
3	2.50	100	59	56				SYMMETRIX OPEN HOLE DRILLING: Observed by driller as angular gravel size returns of limestone (probable limestone bedrock)		Discontinuities are rough and undulose to irregular. Apertures are tight to open with locally sandy clay smeared and locally moderately iron oxide stained surfaces. Dips are variable and sub-10° with local sub-vertical fractures (5.75m-5.96m, 8.26m-8.41m).	65.68		
4	4.10	100	91	86	510			Strong to very strong and locally moderately strong, thickly bedded, grey, fine to medium grained, siliceous fossiliferous LIMESTONE with frequent calcite veining. Fresh to slightly and locally moderately weathered.					
5	5.50	100	84	79									
6	7.10	100	56	56	580								
7	8.50								8.50		59.68		
8								End of Corehole at 8.5 (m)					
9													

REMARKS

2 Core boxes. Move and set up 1½hrs. Clean car park 1hr20mins.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC12A**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,079.91 E 243,420.79 N	**GROUND LEVEL (m)**	67.15
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	25/02/2008
		DATE COMPLETED	25/02/2008
ENGINEER	Ian Black & Associates	**DRILLED BY**	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of tar onto brown gravelly clay	1.70				
1													
2	2.00	100	81	75				SYMMETRIX OPEN HOLE DRILLING: Observed by driller as angular gravel size returns of limestone (probable limestone bedrock)	2.00		65.45		
3	3.50	100	82	74				Strong to very strong, thickly bedded, fine to medium grained, grey, siliceous fossiliferous LIMESTONE. Fresh to locally slightly weathered.		Discontinuities are rough and undulose to irregular. Apertures are moderately open to locally open. Dips are sub-0°.	65.15		
4													
5	4.90	100	98	98									
6													
7	6.50	100	94	94	1120				7.70				
8	7.70							End of Corehole at 7.7 (m)			59.45		
9													

REMARKS

2 Core boxes. Move and set up 1½hrs. Clean area 1½hrs.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC15**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,114.36 E 243,410.61 N	**GROUND LEVEL (m)**	67.85
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
		DATE STARTED	07/02/2008
		DATE COMPLETED	07/02/2008
CLIENT	Dublin Airport Authority	**DRILLED BY**	Millennium
ENGINEER	Ian Black & Associates	**LOGGED BY**	IGSL

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
0					0 250 500			SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of tar fill.	0.50				
1	0.50	100	77	57				Strong to very strong/extremely strong, massive, grey/white mottled, fine to medium grained, fossiliferous (silicified) LIMESTONE with local randomly orientated calcite veins and local stylolites. Fresh to locally slightly weathered.		Discontinuities are rough and undulose to irregular. Apertures are moderately open to locally open with locally slightly iron oxide stained surfaces. 0-45° fractures throughout.	67.35		
2	2.00	100	100	100									
3	3.00	100	87	70									
4	4.50	100	100	100									
5	5.20	100	100	100									
6	6.70	100	92	85	540								
7													
8	8.00	100	98	94									
9					590				9.60				
	9.60							End of Corehole at 9.6 (m)			58.25		

REMARKS

4 Core boxes. Standing 4hrs - waiting on tow truck. Move and set up 1½hr. 20mins - Set up over shell & auger hole. 1½hrs clean up - and power wash area. 1½hrs taking down fence.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

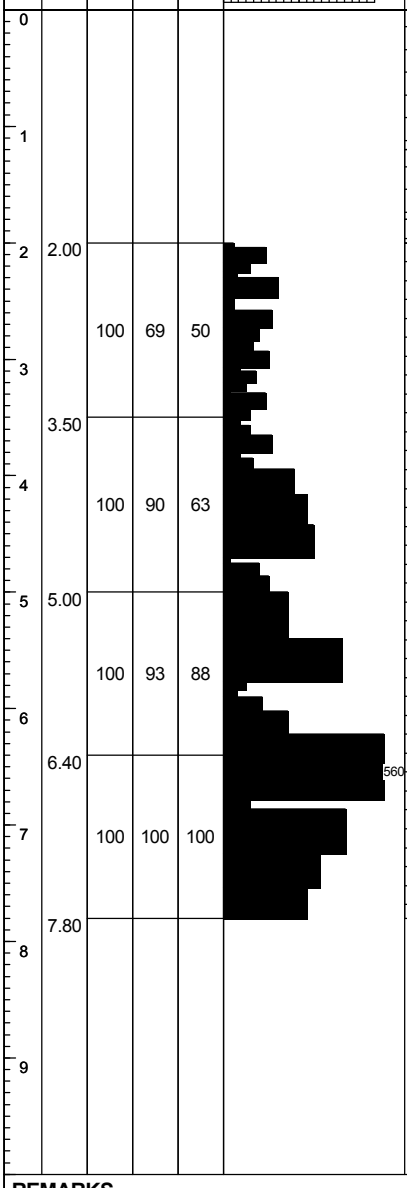
Date	Tip Depth	RZ Top	RZ Base	Type
07-02-08	9.60	3.60	9.60	50mm SP

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC18A**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,085.98 E 243,378.01 N	**GROUND LEVEL (m)**	66.58
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	28/02/2008
		DATE COMPLETED	28/02/2008
ENGINEER	Ian Black & Associates	**DRILLED BY**	Millennium
		LOGGED BY	A. Mahony



Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of tar onto brown gravelly clay	1.20		65.38		
SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of tar onto black gravelly clay	1.80				
SYMMETRIX OPEN HOLE DRILLING: Observed by driller as angular gravel size returns of limestone (probable limestone bedrock)	2.00		64.78		
Strong to very strong and locally moderately strong, thickly bedded, grey, fine to medium grained, siliceous fossiliferous LIMESTONE with frequent calcite veining. Fresh to slightly and locally moderately (2.0m-5.0m) weathered.		Discontinuities are rough and undulose to irregular. Apertures are moderately open to locally open with commonly iron oxide stained surfaces and incipient fractures (2.0m-5.0m). Dips are variable and commonly sub-10-20°.	64.58		
	7.80				
End of Corehole at 7.8 (m)			58.78		

REMARKS

2 Core boxes. Move and set up 1hr. Clean area 1hr15mins. Digging inspection pit 1hr55mins.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC19A**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,066.10 E 243,383.64 N	**GROUND LEVEL (m)**	66.57
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	27/02/2008
		DATE COMPLETED	27/02/2008
ENGINEER	Ian Black & Associates	**DRILLED BY**	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of tar onto brown gravelly clay	1.30		65.27		
1								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as angular gravel size returns of limestone (probable limestone bedrock)	2.00		64.57		
2	2.00	100	97	97				Strong to very strong, thickly bedded, fine to medium grained, grey, siliceous fossiliferous (convoluted appearance) LIMESTONE with local calcite veining. Fresh to locally slightly weathered.		Discontinuities are rough and undulose to locally irregular. Apertures are moderately open to locally open with very locally iron oxide stained. Dips are sub-0-10° with local sub-vertical fractures (5.94m-6.02m, 5.94m-6.24m) and drilling induced at 2.59m.			
3	3.50	100	85	75									
4													
5	5.00	100	72	72									
6													
7	6.50	100	100	89					7.60				
8	7.60							End of Corehole at 7.6 (m)			58.97		
9													

REMARKS

2 Core boxes. Move and set up 45mins. Clean area 1½hrs.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC20**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,034.19 E 243,424.20 N	**GROUND LEVEL (m)**	67.19
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	13/02/2008
		DATE COMPLETED	13/02/2008
ENGINEER	Ian Black & Associates	**DRILLED BY**	Millennium
		LOGGED BY	IGSL

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of tar onto brown gravelly clay.	0.40		66.79		
1								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of brown gravelly clay.	1.90				
2	2.00	100	87	64				SYMMETRIX OPEN HOLE DRILLING: Observed by driller as angular gravel size returns of limestone (probable bedrock).	2.00	Discontinuities are rough and undulose. Apertures are moderately open with commonly iron oxide stained surfaces. Dips are possibly 10-45°, variable fractures throughout. Vertical fracture 6.36m-6.61m.	65.29 65.19		
3								Strong to very strong and locally moderately strong, massive, grey/white mottled, fine to medium grained, fossiliferous (silicified) LIMESTONE with frequently randomly orientated calcite veins. Fresh to locally slightly weathered.					
4	3.50	100	80	80									
5	4.70	100	93	93									
6	5.10	100	77	66	510								
7	6.70	100	92	75									
8	7.70	100	100	100									
9	8.30	100	100	100									
	9.80							End of Corehole at 9.8 (m)	9.80		57.39		

REMARKS

3 Core boxes (7.8m core liner). Move and set up 1½hrs. Digging inspection pit 1½hrs. ¾hr clean up - water spilling onto road.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
13-02-08	9.80	4.80	9.80	50mm SP

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC23**
		SHEET	Sheet 1 of 2
CO-ORDINATES(_)	317,079.32 E 243,359.45 N	**GROUND LEVEL (m)**	66.22
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
		DATE STARTED	05/02/2008
		DATE COMPLETED	06/02/2008
CLIENT	Dublin Airport Authority	**DRILLED BY**	Millennium
ENGINEER	Ian Black & Associates	**LOGGED BY**	IGSL

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of tar onto dark grey gravelly clay (soft to firm - based on Borehole SPT results).	3.70		62.52		
4								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of brown gravelly clay (Firm to stiff - based on Borehole SPT results).	5.70		60.52		
6								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of black gravelly clay (possible highly weathered bedrock).	6.10		60.12		
6	6.60							SYMMETRIX OPEN HOLE DRILLING: Observed by driller as angular gravel size returns of limestone (probable bedrock).	6.60		59.62		
7		100	63	31				Strong to moderately strong, thin to medium bedded, dark grey/black, fine grained, fossiliferous argillaceous LIMESTONE. Slightly to locally moderately/highly weathered.		Discontinuities are smooth and planar to undulose. Apertures are tight to moderately open with iron oxide stained surfaces. Dips are sub-20°.			
8	8.10	100	67	33									
9	9.00	100	38	0									
	9.60												

REMARKS

Move and set up 3hrs20mins - taking down fencing, setting up over shell & auger hole, clean up site and powerwash area. 5 Core boxes (10.35m core liner)

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
06-02-08	16.85	7.85	16.85	50mm SP

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC23**
		SHEET	Sheet 2 of 2
CO-ORDINATES(_)	317,079.32 E 243,359.45 N	**GROUND LEVEL (m)**	66.22
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	05/02/2008
		DATE COMPLETED	06/02/2008
ENGINEER	Ian Black & Associates	**DRILLED BY**	Millennium
		LOGGED BY	IGSL

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
10		100	60	18					10.30		55.92		
	10.80	100	100	100				Strong to moderately strong, massive, grey, fine grained, siliceous LIMESTONE with frequently stylolites. Fresh to slightly weathered.		Discontinuities are rough and undulose. Apertures are open to moderately open with local iron oxide stained (10.3m-13.0m) and locally clay smeared (red/brown 11.68m-11.71m) surfaces. Dips are 10-40°.			
11	11.10	100	98	98									
12													
	12.70	100	100	100	640								
13													
	13.70	100	99	96									
14													
15					510								
	15.80	100	100	100	630								
16													
	16.85								16.85		49.37		
17								End of Corehole at 16.85 (m)					
18													
19													

REMARKS

Move and set up 3hrs20mins - taking down fencing, setting up over shell & auger hole, clean up site and powerwash area. 5 Core boxes (10.35m core liner)

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
06-02-08	16.85	7.85	16.85	50mm SP

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC23A**
		SHEET	Sheet 1 of 2
CO-ORDINATES(_)	317,065.53 E 243,357.34 N	**GROUND LEVEL (m)**	66.22
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
		DATE STARTED	26/02/2008
		DATE COMPLETED	27/02/2008
CLIENT	Dublin Airport Authority	**DRILLED BY**	Millennium
ENGINEER	Ian Black & Associates	**LOGGED BY**	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of tar onto brown gravelly clay	1.20				
1								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of black gravelly clay	2.70		65.02		
2								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of black clayey gravel	5.20		63.52		
3													
4													
5								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as angular gravel size returns of argillaceous limestone (probable limestone bedrock)	5.50		61.02		
6	5.50	100	25	25				Weak to locally moderately weak, thin to medium bedded, fine graineddark grey to black, argillaceous, fossiliferous LIMESTONE. Moderately to highly and locally slightly weathered.		Discontinuities are smooth and slightly rough and planar to undulose. Apertures are open with commonly clay smeared surfaces. Iron oxide stained moderately to highly. Dips are sub-45° where intact. Predominantly non-intact throughout.	60.72		
7	7.00	100	0	0									
8	8.50								8.50		57.72		
9		100	86	86						Discontinuities are rough and undulose. Apertures are tight to moderately open and locally open with locally clay smeared and slightly iron oxide stained surfaces. Dips are variable between			

REMARKS

2 Core boxes. Waterstrike at 2.7m. Move and set up 1¾hrs. Clean car park 1hr50mins. Drilling stopped due to water and clay flush going over car park.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC23A**
		SHEET	Sheet 2 of 2
CO-ORDINATES(_)	317,065.53 E 243,357.34 N	**GROUND LEVEL (m)**	66.22
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	26/02/2008
		DATE COMPLETED	27/02/2008
ENGINEER	Ian Black & Associates	**DRILLED BY**	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
10	10.10							Strong to locally moderately strong, thickly bedded, fine grained, grey, siliceous fossiliferous LIMESTONE. Fresh to locally slightly and moderately weathered. *(continued)*	10.10	sub-20-45°.	56.12		
11								End of Corehole at 10.1 (m)					
12													
13													
14													
15													
16													
17													
18													
19													

REMARKS

2 Core boxes. Waterstrike at 2.7m. Move and set up 1¾hrs. Clean car park 1hr50mins. Drilling stopped due to water and clay flush going over car park.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC27**
		SHEET	Sheet 1 of 3
CO-ORDINATES(_)	317,091.44 E 243,311.26 N	**GROUND LEVEL (m)**	65.20
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
		DATE STARTED	31/01/2008
		DATE COMPLETED	01/02/2008
CLIENT	Dublin Airport Authority	**DRILLED BY**	Millennium
ENGINEER	Ian Black & Associates	**LOGGED BY**	IGSL

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of tar onto brown clay (Firm - based on Borehole SPT results).	1.50		63.70		
1								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of dark grey clay.	2.10		63.10		
2								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of brown clay (Firm - based on Borehole SPT results).	2.70		62.50		
3								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of black clay (Very stiff to hard - based on Borehole SPT results).					
4													
5													
6													
7									7.20		58.00		
8	8.00	100	71	51				SYMMETRIX OPEN HOLE DRILLING: Observed by driller as angular gravel size returns of limestone (probable variably weathered bedrock).	8.00		57.20		
9	9.10	100	0	0									

REMARKS

10 Core boxes (16.8m core liner).Standing 4½hrs waiting on fencing. 1hr erecting fence.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
01-02-08	12.00	9.00	12.00	50mm SP

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC27**
		SHEET	Sheet 2 of 3
CO-ORDINATES(_)	317,091.44 E 243,311.26 N	**GROUND LEVEL (m)**	65.20
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
		DATE STARTED	31/01/2008
		DATE COMPLETED	01/02/2008
CLIENT	Dublin Airport Authority	**DRILLED BY**	Millennium
ENGINEER	Ian Black & Associates	**LOGGED BY**	IGSL

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
10	10.00	100	76	76				Strong to locally moderately strong, thin to medium bedded, grey, dark grey (predominantly) to black, fine grained, fossiliferous, predominantly argillaceous and locally siliceous LIMESTONE. Fresh to locally slightly weathered. *(continued)*		Discontinuities are smooth and planar to locally undulose and slightly rough. Apertures are tight to moderately open with local iron oxide stained (8.0m-18.7m) surfaces and very loca clay smeared surfaces (8.41m-8.52m). Dips are sub-20° with local sub-vertical fractures (9.16m-9.37m, 10.23m-10.32m, 12.06m-12.31m, 18.06m-18.29m, 19.98m-20.06m, 23.19m-23.35m, 24.44m-24.63m). *(continued)*			
11	10.90	100	86	40									
12	11.90	100	16	0									
	12.40	100	80	48									
13	13.40	100	67	67									
14	14.70	100	74	53									
15	16.20	100	100	77									
16	17.70	100	82	69									
17	19.20												
18													
19													

REMARKS

10 Core boxes (16.8m core liner).Standing 4½hrs waiting on fencing. 1hr erecting fence.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
01-02-08	12.00	9.00	12.00	50mm SP

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC27**
		SHEET	Sheet 3 of 3
CO-ORDINATES(_)	317,091.44 E 243,311.26 N	**GROUND LEVEL (m)**	65.20
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	31/01/2008
		DATE COMPLETED	01/02/2008
ENGINEER	Ian Black & Associates	**DRILLED BY**	Millennium
		LOGGED BY	IGSL

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
20		100	76	74				Strong to locally moderately strong, thin to medium bedded, grey, dark grey (predominantly) to black, fine grained, fossiliferous, predominantly argillaceous and locally siliceous LIMESTONE. Fresh to locally slightly weathered. *(continued)*		Discontinuities are smooth and planar to locally undulose and slightly rough. Apertures are tight to moderately open with local iron oxide stained (8.0m-18.7m) surfaces and very loca clay smeared surfaces (8.41m-8.52m). Dips are sub-20° with local sub-vertical fractures (9.16m-9.37m, 10.23m-10.32m, 12.06m-12.31m, 18.06m-18.29m, 19.98m-20.06m, 23.19m-23.35m, 24.44m-24.63m). *(continued)*			
21	20.90	100	92	88									
22	22.50	100	70	69									
23	23.80	100	84	83					24.80		40.40		
24	24.80							End of Corehole at 24.8 (m)					
25													
26													
27													
28													
29													

REMARKS

10 Core boxes (16.8m core liner).Standing 4½hrs waiting on fencing. 1hr erecting fence.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
01-02-08	12.00	9.00	12.00	50mm SP

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC32**
		SHEET	Sheet 1 of 3
CO-ORDINATES(_)	317,071.87 E 243,306.50 N	**GROUND LEVEL (m)**	65.18
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
		DATE STARTED	04/02/2008
		DATE COMPLETED	05/02/2008
CLIENT	Dublin Airport Authority	**DRILLED BY**	Millennium
ENGINEER	Ian Black & Associates	**LOGGED BY**	IGSL

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of brown gravelly clay (Firm - based on Borehole SPT results).					
1													
2									2.20				
								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of black sandy gravelly cobbly clay (Stiff to hard - based on Borehole SPT results).			62.98		
3													
4													
5													
6													
7									7.20				
								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of black gravelly clay (Very stiff to hard - based on Borehole SPT results).			57.98		
8	8.00	100	84	58					8.00		57.18		
9	9.60												

REMARKS

5 Core boxes. Move and set up 1½hr (moving fencing). 1½hr - digging inspection pit. 1½hrs clean up - and power wash area.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC32**
		SHEET	Sheet 2 of 3
CO-ORDINATES(_)	317,071.87 E 243,306.50 N	**GROUND LEVEL (m)**	65.18
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	04/02/2008
		DATE COMPLETED	05/02/2008
ENGINEER	Ian Black & Associates	**DRILLED BY**	Millennium
		LOGGED BY	IGSL

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
10		100	55	45				Strong to very strong and locally moderately strong, thin to medium bedded, dark grey/black, fine grained, argillaceous LIMESTONE. Fresh to slightly weathered. *(continued)*		Discontinuities are smooth to slightly rough and planar to undulose. Apertures are tight to moderately open with iron oxide stained surfaces and locally gravel infillid (13.09m-13.13m). Dips are sub-30° with local vertical fractures (8.41m-8.48m, 10.26m-10.55m, 11.44m-11.55m, 12.58m-12.64m, 14.95m-15.9m, 16.67m-16.83m, 17.25m-17.36m). *(continued)*			
	10.90	100	100	100									
11	11.10	100	85	67									
	11.70	100	76	46									
12	12.70	100	79	70									
	13.60	100	100	100									
13	14.20	100	45	34									
	15.80	100	83	77									
14	17.30	100	84	70									
	18.30	100	86	76									
15	18.80	100	96	96	550				20.00				
16													
17													
18													
19													

End of Core at 20.00 (m)

REMARKS

5 Core boxes. Move and set up 1½hr (moving fencing). 1½hr - digging inspection pit. 1½hrs clean up - and power wash area.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

IGSL RC NEWLOG 10M PER PG 13262.GPJ IGSL.GDT 20/3/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**DRILLHOLE NO**	**RC32**
		SHEET	Sheet 3 of 3
CO-ORDINATES(_)	317,071.87 E 243,306.50 N	**GROUND LEVEL (m)**	65.18
		CORE DIAMETER (mm)	90
		INCLINATION	-90
		FLUSH	Air/Mist
CLIENT	Dublin Airport Authority	**DATE STARTED**	04/02/2008
ENGINEER	Ian Black & Associates	**DATE COMPLETED**	05/02/2008
		DRILLED BY	Millennium
		LOGGED BY	IGSL

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
20	20.00										45.18		
21													
22													
23													
24													
25													
26													
27													
28													
29													

REMARKS

5 Core boxes. Move and set up 1½hr (moving fencing). 1½hr - digging inspection pit. 1½hrs clean up - and power wash area.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS02**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,120.70 E 243,504.19 N	**GROUND LEVEL (m)**	67.17
		DATE STARTED	30/01/2008
		DATE COMPLETED	30/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	F. Akinseloyin

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	67.07						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to subangular cobbles.		0.40	66.77						
	MADE GROUND comprised of brown clayey sandy gravel with occasional cobbles.									
1.0										
	MADE GROUND comprised of grey sandy fine to medium gravel		1.30	65.87						
	MADE GROUND comprised of concrete		1.40	65.77						
	MADE GROUND comprised of yellow organic silt		1.45	65.72						
	Final Depth 1.80m		1.70	65.47		1.20-1.80	100	100 blows		
2.0										
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 1.2m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS04**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,135.63 E 243,470.94 N	**GROUND LEVEL (m)**	67.54
		DATE STARTED	25/01/2008
		DATE COMPLETED	25/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	I.Reder

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	67.44						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subangular to angular cobbles.		0.40	67.14						
	MADE GROUND comprised of firm brown sandy clay									
1.0										
	Firm brown gravelly CLAY with occasional subrouneded cobbles		1.60	65.94		1.20-2.00	100	78 blows		
2.0						2.00-2.30	100	65 blows		
	Final Depth 2.30m		2.30	65.24						
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 1.2m).

Installations

IGSL WS LOG 13262.GPJ IGSL.GDT 20/3/08

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS05**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,111.78 E 243,479.48 N	**GROUND LEVEL (m)**	67.60
		DATE STARTED	31/01/2008
		DATE COMPLETED	31/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	I.Reder

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	67.50						
	MADE GROUND comprised of grey slightly sandy clayey gravel with occasional subangular to angular cobbles.		0.40	67.20						
1.0	MADE GROUND comprised of soft to firm brown sandy gravelly clay with occasional cobbles					1.20-1.50	100	82 blows		
	Final Depth 1.50m		1.50	66.10						
2.0										
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 1.2m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS07**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,091.13 E 243,462.82 N	**GROUND LEVEL (m)** 67.23	**DATE STARTED** 31/01/2008
			DATE COMPLETED 31/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	I.Reder

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	67.13						
	MADE GROUND comprised of grey clayey gravel with occasional subrounded to subangular cobbles.		0.40	66.83						
1.0	MADE GROUND comprised of mottled grey brown sandy gravelly clay with red brick, glass and organic fibres									
	MADE GROUND comprised of mottled grey brown sandy gravelly clay with concrete at 1.6mbgl		1.50	65.73		1.20-2.00	100	66 blows		
2.0	MADE GROUND comprised of grey brown sandy gravelly clay with red brick, rootlets and organic fibres		2.00	65.23		2.00-2.40	100	78 blows		
	Final Depth 2.40m		2.40	64.83						
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 1.2m).

Installations

IGSL WS LOG 13262.GPJ IGSL.GDT 20/3/08

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS08**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,111.43 E 243,456.58 N	**GROUND LEVEL (m)**	67.64
		DATE STARTED	30/01/2008
		DATE COMPLETED	30/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	F. Akinseloyin

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	67.54						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to subangular cobbles.		0.30	67.34						
	MADE GROUND comprised of soft light brown sandy gravelly clay with concrete and organic fibres.									
1.0										
	Firm brown sandy CLAY with occasional cobbles		1.40	66.24						
	Firm brown sandy slightly gravelly CLAY with occasional subrounded cobbles		1.50	66.14		1.20-1.60	100	73 blows		
	Final Depth 1.60m		1.60	66.04						
2.0										
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 0.8m with 2 No. bag samples taken (0.1-0.3m and 0.3 to 1.2m).

Installations

IGSL WS LOG 13262.GPJ IGSL.GDT 20/3/08

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS09**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,130.22 E 243,442.10 N	**GROUND LEVEL (m)** 68.09	**DATE STARTED** 25/01/2008
			DATE COMPLETED 25/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	S. Letch

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	67.99						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to subangular cobbles.									
	Light brown COBBLES and BOULDERS		0.70	67.39						
	Final Depth 0.90m		0.90	67.19						
1.0										
2.0										
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 0.9m with 2 No. bag samples taken (0.1-0.7m and 0.7 to 0.9m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS10**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,124.33 E 243,420.32 N	**GROUND LEVEL (m)**	68.19
		DATE STARTED	28/01/2008
		DATE COMPLETED	28/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	S. Letch

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	68.09						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to subangular cobbles.		0.40	67.79						
	Light brown COBBLES and BOULDERS									
	Final Depth 0.80m		0.80	67.39						
1.0										
2.0										
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 0.8m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS11**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,105.29 E 243,432.47 N	**GROUND LEVEL (m)**	67.75
		DATE STARTED	30/01/2008
		DATE COMPLETED	30/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	F. Akinseloyin

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	67.65						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to subangular cobbles.		0.40	67.35						
	MADE GROUND comprised of firm brown grey sandy gravelly clay with occasional cobbles, organic fibres and rootlets									
1.0										
						1.20-2.00	100	86 blows		
2.0										
						2.00-3.00	100	140 blows		
3.0	Final Depth 3.00m		3.00	64.75						
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 1.2m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS12**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,085.84 E 243,437.11 N	**GROUND LEVEL (m)**	67.23
		DATE STARTED	01/02/2008
		DATE COMPLETED	01/02/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	S. Letch

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	67.13						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrouneded to angular cobbles.		0.50	66.73						
	MADE GROUND comprised of soft light brown sandy gravelly clay.									
1.0			1.20	66.03						
	MADE GROUND comprised of brown slightly sandy gravelly clay									
			1.80	65.43						
	MADE GROUND comprised of grey sandy coarse gravel with occasional subrounded cobbles		2.00	65.23		1.20-2.00	70	66 blows		
2.0	Firm brown slightly sandy CLAY with occasional gravel					2.00-2.30	100	59 blows		
	Final Depth 2.30m		2.30	64.93						
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.5m and 0.5 to 1.2m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS13**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,054.50 E 243,419.84 N	**GROUND LEVEL (m)**	66.90
		DATE STARTED	01/02/2008
		DATE COMPLETED	01/02/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	S. Letch

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	66.80						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to subangular cobbles.		0.40	66.50						
1.0	MADE GROUND comprised of soft light brown sandy gravelly clay.					1.20-1.70	100	107 blows		
	Final Depth 1.70m		1.70	65.20						
2.0										
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 1.2m).

Installations

IGSL WS LOG 13262.GPJ IGSL.GDT 20/3/08

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS14**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,080.20 E 243,420.78 N	**GROUND LEVEL (m)**	67.13
		DATE STARTED	02/02/2008
		DATE COMPLETED	02/02/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	S. Letch

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	67.03						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to subangular cobbles.		0.40	66.73						
	MADE GROUND comprised of grey brown sandy gravelly clay									
1.0	Firm grey brown sandy gravelly CLAY		1.20	65.93		1.20-1.70	100	147 blows		
	Final Depth 1.70m		1.70	65.43						
2.0										
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 1.2m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS16**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,119.35 E 243,400.15 N	**GROUND LEVEL (m)** 67.46	**DATE STARTED** 28/01/2008
			DATE COMPLETED 28/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	S. Letch

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	67.36						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrouneded to angular cobbles.		0.40	67.06						
	Light brown COBBLES and BOULDERS		0.60	66.86						
	Final Depth 0.60m									
1.0										
2.0										
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 0.6m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 0.6m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS17**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,099.55 E 243,369.59 N	**GROUND LEVEL (m)**	66.03
		DATE STARTED	29/01/2008
		DATE COMPLETED	29/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	F. Akinseloyin

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	65.93						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to angular cobbles.		0.40	65.63						
	MADE GROUND comprised of brown clayey sandy gravel with occasional cobbles.									
1.0										
	MADE GROUND comprised of soft brown sandy slightly gravelly clay.		1.60	64.43						
						1.20-2.00	100	80 blows		
2.0	Brown very sandy clayey GRAVEL(possible gravelly clay)		2.00	64.03						
						2.00-3.00	100	90 blows		
3.0	Stiff brown sandy gravelly clay		3.20	62.83						
						3.00-4.00	100	136 blows		
4.0	Final Depth 4.20m		4.20	61.83						
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 1.2m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS18**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,085.84 E 243,376.35 N	**GROUND LEVEL (m)**	66.62
		DATE STARTED	24/01/2008
		DATE COMPLETED	24/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	I.Reder

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	66.52						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to subangular cobbles.		0.40	66.22						
	MADE GROUND comprised of brown grey sandy slightly gravelly clay with occasional cobbles and wood									
1.0			1.20	65.42						
	MADE GROUND comprised of grey brown sandy gravel with occasional subrounded to angular cobbles		1.40	65.22						
	MADE GROUND comprised of grey brown sandy gravel with timber		1.50	65.12		1.20-1.70	100	86 blows		
	MADE GROUND comprised of firm mottled grey brown slightly sandy clay		1.70	64.92						
	Final Depth 1.70m									
2.0										
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 1.2m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS19**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,066.56 E 243,383.51 N	**GROUND LEVEL (m)**	66.62
		DATE STARTED	24/01/2008
		DATE COMPLETED	24/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	I.Reder

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	66.52						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to angular cobbles).		0.40	66.22						
	MADE GROUND comprised of firm grey brown sandy very gravelly clay					1.20-1.50	100	71 blows		
1.0	Final Depth 1.50m		1.50	65.12						
2.0										
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 1.2m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS21**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,022.06 E 243,384.15 N	**GROUND LEVEL (m)**	66.39
		DATE STARTED	23/01/2008
		DATE COMPLETED	23/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	I.Reder

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	66.29						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to subangular cobbles.		0.40	65.99						
	MADE GROUND comprised of grey brown sandy slightly gravelly clay with occasional cobbles and wood									
1.0										
	MADE GROUND comprised of grey brown sandy gravel with occasional subrounded to angular cobbles		1.20	65.19						
	MADE GROUND comprised of mottled grey brown slightly sandy gravelly clay with traces of red brick		1.30	65.09						
						1.20-2.00	100	62 blows		
2.0	MADE GROUND comprised of dark brown slightly clayey sandy gravel		2.00	64.39						
	Firm grey brown sandy gravelly CLAY		2.30	64.09						
	Grey sandy fine to medium GRAVEL with occasional cobbles		2.50	63.89						
	Firm brown sandy gravelly CLAY		2.60	63.79		2.00-2.80	100	121 blows		
	Final Depth 2.80m		2.80	63.59						
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 1.2m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS24**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,095.29 E 243,348.73 N	**GROUND LEVEL (m)**	65.98
		DATE STARTED	18/01/2008
		DATE COMPLETED	18/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	F. Akinseloyin

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	65.88						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to subangular cobbles.		0.40	65.58						
	MADE GROUND comprised of firm brown slightly sandy gravelly clay.									
1.0			1.10	64.88						
	MADE GROUND comprised of soft/firm slightly sandy slightly gravelly clay									
			1.60	64.38						
	MADE GROUND comprised of brown slightly sandy clay with rootlets and red brick		1.80	64.18						
	MADE GROUND comprised of soft mottled grey brown sandy gravelly clay					1.20-2.00	100	128 blows		
2.0	Final Depth 2.00m		2.00	63.98						
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 1.2m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS25**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,106.40 E 243,335.81 N	**GROUND LEVEL (m)**	65.59
		DATE STARTED	21/01/2008
		DATE COMPLETED	21/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	I.Reder

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	65.49						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional surounded to angular cobbles .		0.40	65.19						
	MADE GROUND comprised of dark brown sandy clay with occasional gravel									
1.0			1.20	64.39						
	MADE GROUND comprised of dark brown sandy clay with traces of red brick									
			1.50	64.09						
	MADE GROUND comprised of firm brown grey sandy gravelly clay with occasional cobbles		1.70	63.89						
	MADE GROUND comprised of mottled grey brown sandy clay with organic fibres		1.90	63.69		1.20-2.00	100	67 blows		
2.0	MADE GROUND comprised of grey brown slightly sandy very gravelly clay with occasional cobbles and red brick									
	Firm grey brown sandy gravelly clay with occasional cobbles		2.30	63.29						
	Grey slightly clayey sandy fine to coarse GRAVEL		2.60	62.99						
			2.90	62.69		2.00-3.00	70	85 blows		
3.0	Stiff brown sandy gravelly CLAY									
						3.00-3.70	100	200 blows		
	Final Depth 3.70m		3.70	61.89						
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 1.2m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS26**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,100.53 E 243,303.17 N	**GROUND LEVEL (m)**	65.01
		DATE STARTED	16/01/2008
		DATE COMPLETED	16/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	F. Akinseloyin

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	64.91						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to angular cobbles.		0.40	64.61						
	MADE GROUND comprised of grey brown sandy clay with glass and root hairs					0.00-1.00	100	70 blows		
1.0										
	MADE GROUND comprised of mottled grey brown sandy clay with organic fibres		1.20	63.81						
	MADE GROUND comprised of mottled grey brown sandy gravelly clay		1.30	63.71						
	Grey sandy fine to medium GRAVEL.		1.80	63.21		1.00-2.00	100	51 blows		
2.0	Stiff grey brown sandy gravelly CLAY		2.10	62.91						
	Stiff black slightly sandy gravelly CLAY.		2.60	62.41		2.00-3.00	100	121 blows		
3.0	Final Depth 3.00m		3.00	62.01						
4.0										
5.0										

General Remarks

Installations

IGSL WS LOG 13262.GPJ IGSL.GDT 20/3/08

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS28**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,062.61 E 243,335.50 N	**GROUND LEVEL (m)**	65.80
		DATE STARTED	22/01/2008
		DATE COMPLETED	22/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	C. Kavanagh
ENGINEER	Ian Black & Associates	**LOGGED BY**	F. Akinseloyin

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	65.70						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to angular cobbles.		0.40	65.40						
	MADE GROUND comprised of firm brown slightly sandy gravelly clay									
1.0										
	MADE GROUND comprised of mottled grey brown very sandy gravelly clay with pockets of organic fibres		1.30	64.50						
2.0						1.10-2.10	90	69 blows		
	MADE GROUND comprised of soft mottled grey brown very sandy very gravelly clay with pockets of organic fibres		2.10	63.70						
	MADE GROUND comprised black fine to medium sand		2.50	63.30						
	Stiff grey brown sandy gravelly CLAY		2.55	63.25		2.10-3.00	100	200 blows		
3.0										
	Final Depth 3.00m		3.10	62.70						
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 1.2m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS29**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,056.31 E 243,339.94 N	**GROUND LEVEL (m)**	65.93
		DATE STARTED	29/01/2008
		DATE COMPLETED	29/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	S. Letch

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	65.83						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to subangular cobbles.		0.40	65.53						
	MADE GROUND comprised of soft brown sandy slightly gravelly CLAY with traces of red brick									
1.0										
	Firm brown grey sandy gravelly CLAY with occasional cobbles		1.70	64.23		1.20-2.00	100	89 blows		
2.0										
	Firm brown sandy gravelly CLAY		2.40	63.53		2.00-2.60	100	78 blows		
	Final Depth 2.60m		2.60	63.33						
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 0.6m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS30**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,006.66 E 243,350.97 N	**GROUND LEVEL (m)**	66.33
		DATE STARTED	22/01/2008
		DATE COMPLETED	22/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	C. Kavanagh
ENGINEER	Ian Black & Associates	**LOGGED BY**	F. Akinseloyin

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	66.23						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to subangular cobbles.		0.40	65.93						
1.0	MADE GROUND comprised of light brown slightly sandy gravel with cobbles, concrete and red brick.									
	Final Depth 1.30m		1.30	65.03						
2.0										
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4-1.2m). Possible service located - unable to continue. Backfill and re-attempt inspection pit 3m away.

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS30A**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,002.82 E 243,351.71 N	**GROUND LEVEL (m)**	66.32
		DATE STARTED	23/01/2008
		DATE COMPLETED	23/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	S. Letch

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.15	66.17						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to subangular cobbles.		0.50	65.82						
	Obstruction - concrete Final Depth 0.50m									
1.0										
2.0										
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 0.5m with 1 No. bag sample taken (0.1-0.5m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS31**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,032.95 E 243,318.56 N	**GROUND LEVEL (m)**	65.66
		DATE STARTED	21/01/2008
		DATE COMPLETED	21/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	C. Kavanagh
ENGINEER	Ian Black & Associates	**LOGGED BY**	F. Akinseloyin

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	65.56						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to angular cobbles		0.40	65.26						
	MADE GROUND comprised of firm brown slightly sandy gravelly clay .									
1.0			1.20	64.46						
	MADE GROUND comprised of soft grey brown very sandy gravelly silt/clay		1.40	64.26						
	Firm/stiff grey brown sandy gravelly CLAY with occasional subrounded cobbles					1.20-2.20	100	87 blows		
2.0			2.50	63.16						
	Stiff black slightly sandy gravelly CLAY.					2.20-2.90	100	200 blows		
	Final Depth 2.90m		2.90	62.76						
3.0										
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 1.2m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS33**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,082.20 E 243,300.53 N	**GROUND LEVEL (m)**	65.03
		DATE STARTED	18/01/2008
		DATE COMPLETED	18/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	F. Akinseloyin

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	64.93						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to subangular cobbles.		0.40	64.63						
	MADE GROUND comprised of mottled grey brown very sandy gravelly clay									
1.0	MADE GROUND comprised of mottled grey brown very sandy gravelly clay		1.00	64.03						
	Firm mottled grey brown sandy gravelly clay with pockets of coarse orange sand		1.60	63.43		1.20-2.00	100	83 blows		
2.0	Firm brown slightly sandy gravelly CLAY.		2.30	62.73						
	Stiff black slightly sandy gravelly CLAY.		2.70	62.33		2.00-3.00	100	105 blows		
3.0	Final Depth 3.00m		3.00	62.03						
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 1.2m).

Installations

WINDOW SAMPLE RECORD

REPORT NUMBER 13262

CONTRACT	Dublin Airport Hotel & Multi-Story Car Park	**PROBE NO.**	**WS34**
		SHEET	Sheet 1 of 1
CO-ORDINATES(_)	317,091.22 E 243,297.44 N	**GROUND LEVEL (m)**	64.92
		DATE STARTED	16/01/2008
		DATE COMPLETED	16/01/2008
CLIENT	Dublin Airport Authority	**SAMPLED BY**	E. Leahy
ENGINEER	Ian Black & Associates	**LOGGED BY**	F. Akinseloyin

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND comprised of tarmacadam.		0.10	64.82						
	MADE GROUND comprised of light brown slightly sandy gravel with occasional subrounded to angular cobbles.		0.40	64.52						
	MADE GROUND comprised of soft brown very sandy gravelly clay									
1.0										
	Firm brown slightly sandy gravelly CLAY		1.40	63.52		1.20-2.00	100	71 blows		
2.0										
	Stiff black slightly sandy gravelly CLAY.		2.50	62.42		2.00-3.00	100	120 blows		
3.0						3.00-3.30	100	100 blows		
	Final Depth 3.30m		3.30	61.62						
4.0										
5.0										

General Remarks
Inspection pit dug to 1.20m with 2 No. bag samples taken (0.1-0.4m and 0.4 to 1.2m).

Installations

Project:	proposed Hotel and Multistorey Car Park Dublin Airport
Component:	Geotechnical Sections
Title:	proposed Hotel and Multistorey Car Park Dublin Airport
Designed: DAA	**geo section Scale**
Drawn: C.KILLALY	**Original scales:** 1:2000@A3
Checked C.KILLALY	**Date:** 20/03/08

Drawing No. IGSL–13262–PLAN

Section 2–2

Section 1–1

section 2–2

BH01 RC01 BH02 RC02A BH03 RC03 BH06 RC06 BH07 RC07A BH08 RC08 BH10 RC10A BH11 RC11 BH12 RC12A BH13 RC13 BH14 RC14 BH15 RC15 BH16 RC16 BH17 RC17 BH18 RC18A BH19 RC19A BH20 RC20 BH21 RC21 BH22 RC22 BH22A RC23 RC23A BH23 BH24 RC24 BH25 RC25 BH26 RC26 BH27 RC27 BH28 RC28 BH29 RC29 BH30 RC30 BH31 RC31 BH32 RC32 BH33 RC33 BH34 RC34

WS01 WS02 WS03 WS04 WS05 WS06 WS07 WS08 WS09 WS10 WS11 WS12 WS13 WS14 WS15 WS16 WS17 WS18 WS19 WS20 WS21 WS22 WS23 WS24 WS25 WS26 WS27 WS28 WS29 WS30 WS30A WS31 WS32 WS33 WS34

Down Ramp

Up Ramp

Entrance Plaza

Taxi Access

Car Hire Return

Vertical Circulation Core (VCC)

High Value Vehicles Display

High Value Vehicle Plaza

Proposed zone to be safe guarded for future A.P.M.

Hotel Dentise

Public Access Boundary

MINI-BUS PARKING

OFF / PICK UP AREA

BUS PARKING

PREMIUM AND COURTESY COACH ARRIVALS

PRIVATE CAR DEPARTURE

PREMIUM AND COURTESY COACH DEPARTURE

TAXI ARRIVALS

TAXI DEPARTURE

LONG TERM CAR PARK

T2 MSCP

APM

Borehole Location

Rotary Hole Location

Window Sample Location

Ian Black Consulting Ltd

Consulting Structural & Civil Engineers

daa Dublin Airport Authority plc

I.G.S.L Limited

Unit F,M7 Business Park

Tel: 045 846176/045 846180

Fax: 045 846187

Email: info@igsl.ie