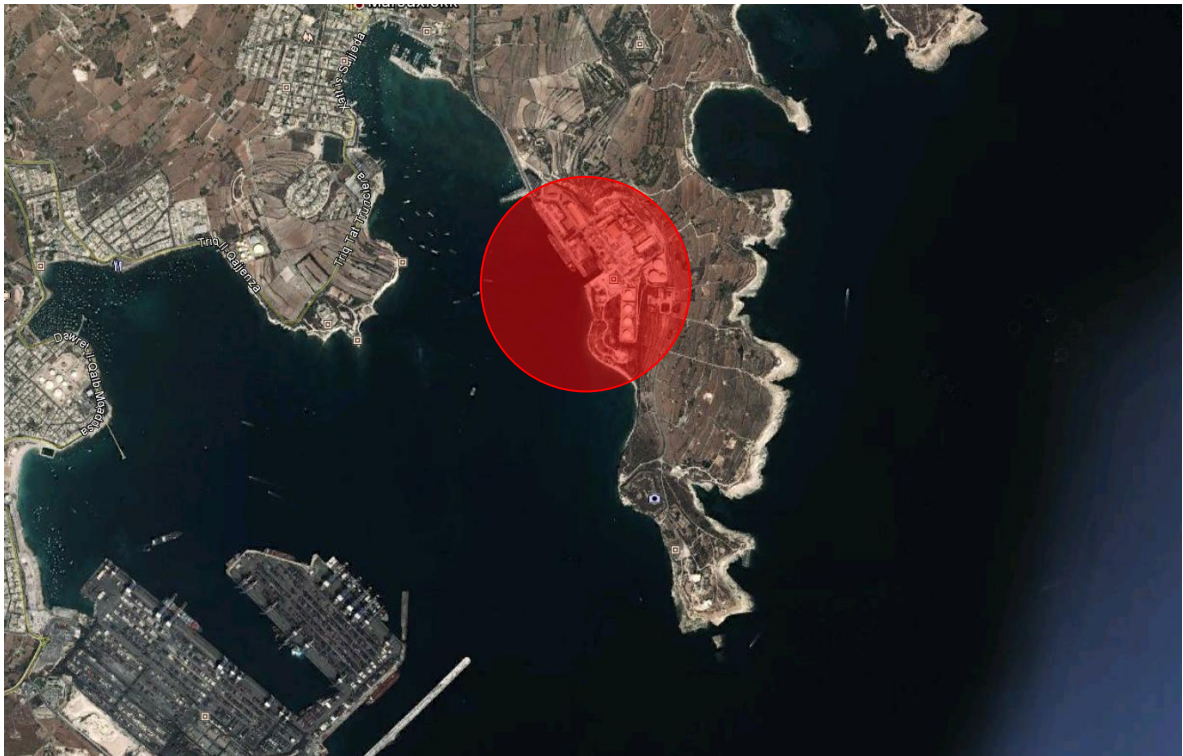


SITE INVESTIGATION AT DELIMARA

GEOLOGICAL SUB-SURFACE INVESTIGATION REPORT



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FOREWARD

The recommendations made and opinions expressed in this report are based on the ground conditions revealed by the site works, together with an assessment of the site and of laboratory test results. Whilst opinions may be expressed relating to sub-soil conditions in parts of the site not investigated, for example away from the location of the borehole drilled, these are only for guidance and no liability can be accepted for their accuracy.

The rocks and soils encountered and the samples retained represent a limited amount of the material present in the subsurface at the site. Although the investigation recovered representative samples of the rocks present, some material present on the site may not have been examined. Should significantly different rocks or soils be determined during site works, then further investigation may prove necessary.

Unless otherwise stated in this report, drilling is undertaken using rotary techniques. This method is regarded as being one of the most reliable.

Boring and sampling procedures are undertaken in accordance with B.S.5930, 1999 “Code of practice for Site Investigations”. Likewise laboratory testing complies with ISRM Suggested Method 1999.

EXECUTIVE SUMMARY

GENERAL

This project proposes the design and building of a new gas power station in Delimara and the conversion of the existing BWSC power station to gas.

It is known from previous investigations that the area used for the Dellimara power station is reclaimed land.

This report provides a synopsis of the above investigations and provides information for the client to be able to arrive to conclusions and recommendations in respect of foundations and other construction related matters.

SCOPE

The information given in this report is based on actual intrusive investigations in the form of drilling and investigative coring undertaken in May in locations indicated in Figure 9, as instructed by iAS Ltd and Enemalta.

OBJECTIVES OF THE INVESTIGATION

The principal objectives of this investigation are:

- I. To undertake a geotechnical investigation in the proposed sites to identify through core sampling and lab analysis engineering properties, thickness, distribution and extent of the soil and rock strata.
- II. To obtain representative samples of the soils and rock for identification and classification and to use in laboratory tests to determine relevant soil characteristics.

SUMMARY

- The substrate consists of Middle Globigerina Limestone.
- Allowable bearing capacity on fill is 95.6kPa and 2.08on rock.

1 INTRODUCTION

1.1 GENERAL

Terracore Limited was commissioned by iAS Ltd to undertake a site investigation at a number of locations in Delimara, as part of the new proposed power station.

Works included drilling of 21 boreholes in fill and Middle Globigerina Limestone with continuous rock core sample recovery. This report contains the factual data collected during the investigation and the results of laboratory testing.



Figure 1: Aerial photograph indicating site location.

1.2 SCOPE AND METHODOLOGY OF WORKS

The aim of the investigation is to identify the existing terrain conditions, the presence of Clay beds, caverns and voids as well as the quality of the rock beneath the foundations for the proposed development.

The intrusive investigation consisted of rotary drilling at twenty one (21) locations onshore and twelve (12) locations offshore (still to be drilled) in the site of the proposed development, drilled with open, SPT's and full core recovery. An additional ten (10) offshore potential boreholes were proposed. Each core was duly labelled with permanent ink, and the lid of each core box securely fastened.

The coring and extraction operation was supervised by Terracore's consulting Geologist.

1.3 STANDARDS AND GUIDANCE

The site investigation was conducted in full accordance with BS 5930: 1999; Code of practice for geological site investigations and BS EN 1997 - 2: 2007 Geotechnical Design – Part 1 and Part 2. Uniaxial compressive strength tests were done according to BS 5930 and ISRM suggested methods.

In situ testing complies with BS1377,1990 "Soils for civil engineering purposes" – Part 9: In-situ tests and Eurocode 7 (DD ENV 1997-3), as well as The Standard Penetration Test (SPT): Methods and Use, CIRIA report 143 Clayton, C.R.I. (1995).

2 THE SITE

2.1 LOCATION



Figure 2: Map showing Delimara in 1984 (OS Sheet 1984)



Figure 3: Superimposed Google aerial photo on 1984 OS Map

2.2 GEOLOGY

2.2.1 GEOLOGY OF MALTA

The geology of Malta can be divided into 5 major formations (**Figure 4**). These are listed below from oldest to youngest:

1. Lower Coralline Limestone (oldest)
2. Globigerina Limestone
3. Blue Clay
4. Green Sand
5. Upper Coralline Limestone (youngest)

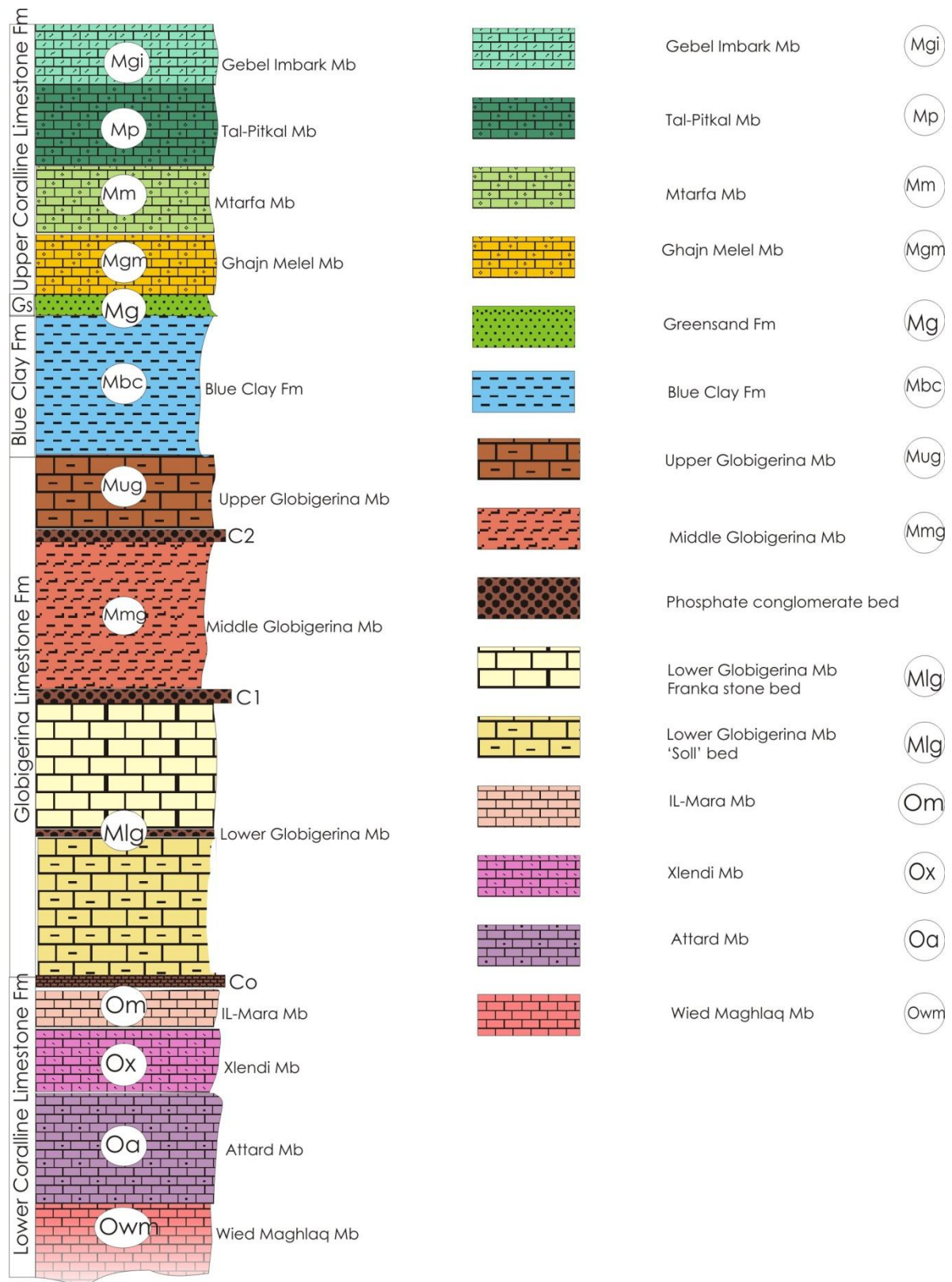


Figure 4: Lithostratigraphy of the Maltese Islands

2.2.2 GEOLOGY OF THE SITE



Figure 5: General geological view of Delimara and Marsaxlokk



Figure 6: Photograph showing cliff with Upper Globigerina Limestone (A) in contact with Middle Globigerina Limestone (B) and reclaimed land with Limestone debris fill (C).

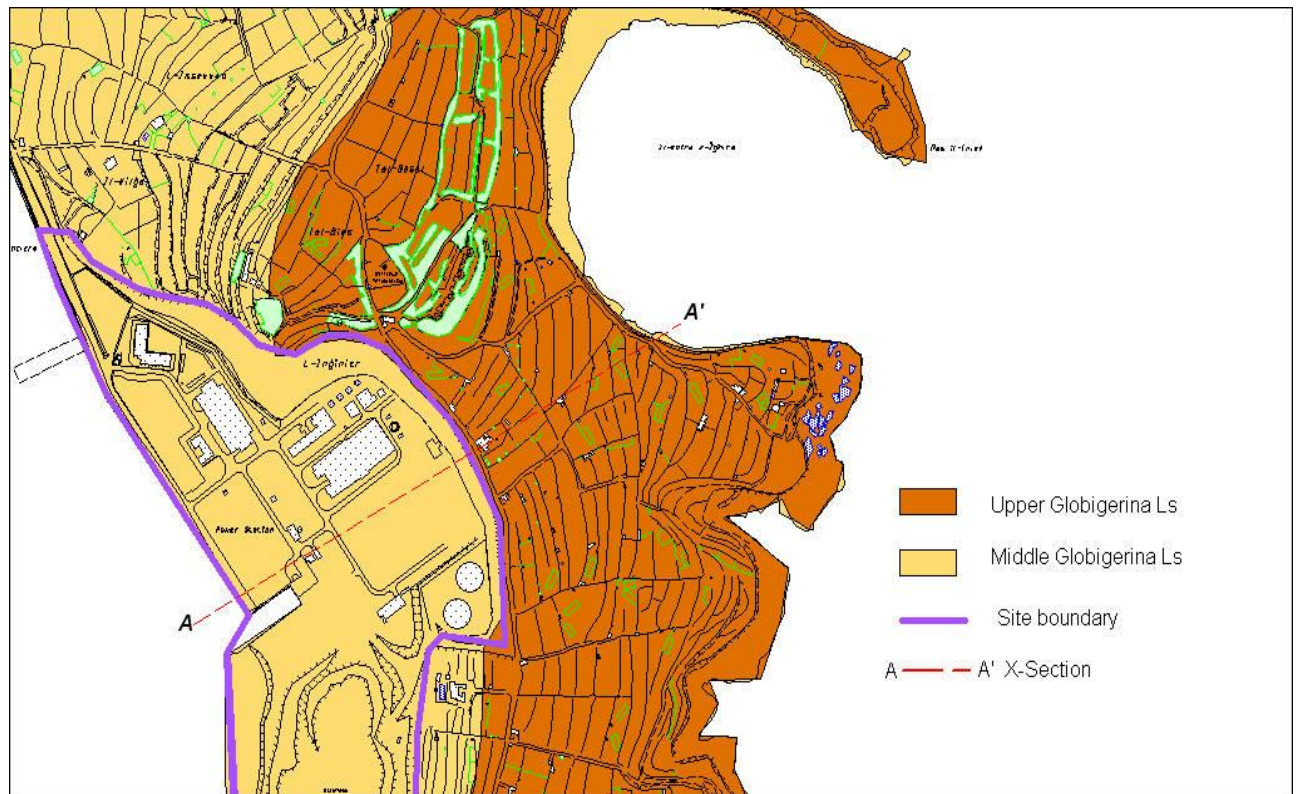


Figure 7: Geological map of the environs of the site

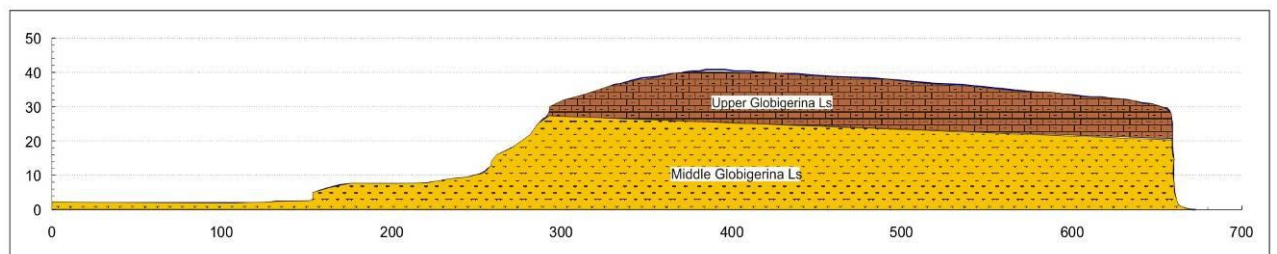


Figure 8: Geological cross-section across the site. Horizontal and vertical scales are in m . For line of section see Figure 6 (Vertical exaggeration 2X)

As show in figures 5-8, the rock exposed at the site is Upper Globigerina Limestone underlain by Middle Globigerina Limestone.

3 FIELD WORK

3.1 DRILLING

Field work was undertaken in May 2013 and comprised the drilling of 21 holes denoted as L01-L21 (**Figure 7**) drilled with open hole and SPT in situ testing in the overburden and continuous rock core sample recovery in the underlying rock. Borehole depths ranged from ground level to depths ranging from 6m to 51.30m below ground level. Core drilling was done using a T2 86 double tube core barrel in conjunction with water circulation using a T44 rotary drill, belonging to Terracore Limited. Casing was inserted as necessary to stabilise the hole walls during drilling.

In the SPT test a split-barrel sampler is driven from the bottom of a pre-bored hole into the soil by means of a 63.5 kg hammer, dropped freely from a height of 0.76 m. The diameter of the pre-bored hole varies normally between 60 and 200 mm. The sampler is first driven to a depth of 15 cm below the bottom of the pre-bored hole, then the number of blows required to drive the sampler another 30 cm into the soil, the so called N30 count, is recorded.

Complete drilling records are found in **Appendix 1**. A drilling, SPT testing and rock core sampling summary is shown in **Table 1** below. .

Table 1: Borehole drilling summary

	<u>L01</u>	<u>L02</u>	<u>L03</u>	<u>L04</u>	<u>L05</u>
<u>Date drilled</u>	07/05/2013	07/05/2013	08/05/2013	09/05/2013	09/05/2013
<u>GL m OD</u>	2.24	2.39	2.42	2.26	2.20
<u>SPT No1, m</u>	0.5		0.5	0.5	0.5
<u>SPT No2, m</u>	1.5		1.5	1.5	1.5
<u>SPT No3, m</u>	3.0		2.5	2.5	2.5
<u>Bedrock, m</u>	6.20	5.10	5.40	6.60	13.60
<u>Core sampling</u>	8.00-14.00	6.00-12.00	6.00-12.00	7.50-13.50	15.00-21.00
<u>TD</u>	14.00	12.00	12.00	13.50	21.00
	<u>L06</u>	<u>L07</u>	<u>L08</u>	<u>L09</u>	<u>L10</u>

<u>Date drilled</u>	09/05/2013	08/05/2013	10/05/2013	11/05/2013	10/05/2013
<u>GL m OD</u>	3.27	2.26	3.77	3.87	16.04
<u>SPT No1, m</u>	0.5	0.5	0.5	0.5	
<u>SPT No2, m</u>	1.5	1.5	1.5	1.5	
<u>SPT No3, m</u>	2.5	2.5	2.5	2.5	
<u>Bedrock, m</u>	8.10	8.20	10.20	12.50	39.60
<u>Core sampling</u>	9.00-15.00	9.00-15.00	12.00-18.00	12.00-18.00	-
<u>TD</u>	15.00	15.00	18.00	18.50	39.60

	<u>L11</u>	<u>L12</u>	<u>L13</u>	<u>L14</u>	<u>L15</u>
<u>Date drilled</u>	05/05/2013	04/05/2013	04/05/2013	04/05/2013	06/05/2013
<u>GL m OD</u>	3.70	5.54	5.53	5.42	14.26
<u>SPT No1, m</u>			0.5	0.5	10.0
<u>SPT No2, m</u>			1.5	1.5	12.0
<u>SPT No3, m</u>			2.5	2.5	13.5
<u>Bedrock, m</u>	7.10	21.30	16.00	10.00	28.30
<u>Core sampling</u>	-	-	18.00-24.00	10.50-16.50	30.00-36.00
<u>TD</u>	9.00	21.30	24.00	16.50	36.00
	<u>L16</u>	<u>L17</u>	<u>L18</u>	<u>L19</u>	<u>L20</u>
<u>Date drilled</u>	06/05/2013	10/05/2013	10/05/2013	12/05/2013	11/05/2013
<u>GL m OD</u>	20.00	20.92	22.28	13.04	5.50
<u>SPT No1, m</u>	20.5				0.5
<u>SPT No2, m</u>	22.5				1.5

<u>SPT No3, m</u>	24.0				2.5
<u>Bedrock, m</u>	45.30	45.00	33.70	32.40	6.80
<u>Core sampling</u>	45.30-51.30	-	-	32.40-38.40	7.50-13.50
<u>TD</u>	51.30	45.00	33.70	32.40	13.50
	<u>L21</u>				
<u>Date drilled</u>	11/05/2013				
<u>GL m OD</u>	5.57				
<u>Bedrock, m</u>	5.70				
<u>Core sampling</u>	-				
<u>TD</u>	6.00				



Figure 9: Aerial photograph showing borehole locations

4 RESULTS AND INTERPRETATION

4.1 CLASSIFICATION

4.1.1 OVERBURDEN

Overburden thickness ranged from 5.70m in L21 and 45.30m in L16. Composition of overburden consisted of marly limestone fill material and debris.

4.1.2 LITHOLOGY

Rock core samples recovered consisted entirely of Middle Globigerina Limestone which is made up of cream/grey, massive fine –grained moderately weak to moderately strong marly limestone

4.2 OPEN HOLE DRILLING

Open hole drilling was performed to drill through the fill and find top of bedrock. SPT's were carried out to estimate the bearing capacity of the fill.

4.3 ROCK QUALITY

The rock core samples recovered were of excellent quality. Rock core recovery RQD and SCR are listed in **Table 2**.

Table 2: Rock core sample recovery (Rec) Rock Quality Designation (RQD) and Solid Core Recovery (SCR)

	Run No	Rec (%)	SCR (%)	RQD (%)	f/m
L01	1	100	100	100	0
	2	100	100	100	0
L02	1	100	100	100	0
	2	100	100	100	0
L03	1	100	100	100	0
	2	100	100	100	0
L04	1	100	100	100	0
	2	100	100	100	0
L05	1	100	100	100	0
	2	100	100	100	0
L06	1	100	100	100	0
	2	77	77	77	0

L07	1	100	100	100	0
	2	100	100	100	0.3
L09	1	75	75	75	0
	2	90	90	90	0
L13	1	100	92	92	0.3
	2	100	100	100	0
L14	1	50	50	50	0
	2	100	100	100	0
L15	1	100	100	100	0
	2	100	100	100	0
L16	1	100	100	100	0.3
	2	100	100	100	0.6
L19	1	100	100	100	0
	2	78	78	78	0
L20	1	100	100	100	0
	2	100	100	100	0

4.4 FRACTURE FREQUENCY

Rock samples recovered had low fracture frequency as shown in Table 2.

4.5 LABORATORY RESULTS AND INTERPRETATION

33 samples were selected for uniaxial unconfined compressive strength (UCS), testing being done at the materials testing laboratory of Terracore Ltd.

Testing was undertaken to the following standards:

- Determination of Compressive Strength of Rock according to BS5930:1999 and ISRM Sugg. Method
- Determination of Water Absorption and Bulk Specific Gravity according to BS5930:1999 and ISRM Sugg. Method

The test results are listed in **Table 3**.

The relevant test certificates are attached to this document as **Appendix 3**.

<u>Sample</u>	<u>BH</u>	<u>Depth</u>	<u>Avg Bulk density</u>	<u>Avg Dry density</u>	<u>Compressive</u>
<u>no.</u>	<u>no.</u>				<u>Strength</u>
		(m)	(Kg/m ³)	(Kg/m ³)	(N/mm ²)
1	1	9.40	2092	1849	20.6
2	1	10.75	2076	1791	19.4
3	1	11.60	2071	1781	18.9
4	2	6.60	2072	1784	15.1
5	2	8.75	2082	1776	13.6
6	2	9.75	2131	1851	16.4
7	5	16.40	2063	1793	14.8
8	5	17.80	2096	1817	15.4
9	5	19.90	2103	1864	21.4
10	6	9.60	2178	1894	11.7
11	6	10.40	2175	1873	12.8
12	6	12.00	2165	1855	9.8

13	8	12.80	2083	1682	2.4
14	8	14.70	2149	1822	9.9
15	8	15.60	2120	1797	10.9
16	13	20.20	2065	1750	6.2
17	13	21.80	2088	1804	12.0
18	13	23.80	2079	1792	11.2
19	14	11.25	2088	1805	8.1
20	14	12.40	2066	1727	16.9
21	14	14.80	2046	1700	19.0
22	15	30.80	2015	1734	11.8
23	15	31.60	1953	1708	8.7
24	15	33.60	1977	1704	14.1
25	16	46.20	2061	1791	15.0
26	16	46.70	2131	1859	17.0
27	16	49.80	2167	1877	20.0
28	19	34.20	2120	1765	15.2
29	19	35.20	2131	1787	15.8
30	19	37.50	2079	1707	14.1
31	20	9.30	2151	1818	7..7
32	20	10.00	2145	1806	6.4
33	20	11.70	2187	1911	12.2

Table 3: Laboratory test results – unconfined compressive strength

4.6 SPT TESTING

The results of the Borehole investigation are summarised in Table 3 below. SPT testing frequently had to be terminated when the SPT tool encountered hard rock. Under such conditions further penetration of the tool was not possible.

A summary of the Blow Count results is shown in **Table 4 below**.

Table 4: In Situ Testing -Listing of SPT results (Blow Count)

<u>BH No</u>	L01	L03	L04	L05	L06
	<u>Blow Count</u>	<u>Blow Count</u>	<u>Blow Count</u>	<u>Blow Count</u>	<u>Blow Count</u>
<u>SPT No 1</u>	26	17	20	20	20
<u>SPT No 2</u>	19	22	27	19	80
<u>SPT No 3</u>	23	28	19	17	4
<u>BH No</u>	L07	L08	L09	L13	L14
	Blow Count	<u>Blow Count</u>	<u>Blow Count</u>	<u>Blow Count</u>	<u>Blow Count</u>
<u>SPT No 1</u>	21	10	17	23	11
<u>SPT No 2</u>	27	7	14	2	5
<u>SPT No 3</u>	21	8	9	2.5	4
<u>BH No</u>	L15	L16	L20		
	Blow Count	<u>Blow Count</u>	<u>Blow Count</u>		
<u>SPT No 1</u>	8	6	9		
<u>SPT No 2</u>	22	16	22		
<u>SPT No 3</u>	24	16	17		

Table 4 shows that most of the locations tested are not uniformly compacted. The following tested intervals may be considered as composed of loose fill:

BHL06 SPT test No 3

BHL08	SPT test No 1 No 2 and No 3
BHL09	SPT test No 3
BHL13	SPT test No 2 and No 3
BHL14	SPT test No 1 No 2 and No 3
BHL15	SPT test No 1
BHL16	SPT test No 1
BHL20	SPT test No 1

Of all the blow counts obtained 20 blows appears to be the most representative N value. This value has been used to estimate the allowable bearing capacity of the COMPACTED FILL INTERVALS investigated.

Considering that fill investigated is a granular soil, SPT N values may be interpreted according to the Table 5 from Terzaghi and Peck which correlates the N-Value with the strength of the soil.

Table 5: Interpretation of SPT test results according to Terzaghi and Peck

<u>SAND</u>		<u>CLAY</u>	
N	Density	N Blows	Consistency
< 4	Very loose	< 2	Very soft
4-10	Loose	2-4	Soft
10-30	Normal	4-8	Normal
30-50	Dense	8-15	Stiff
> 50	Very dense	15-30	Very stiff
		> 30	Hard

4.6.1 ALLOWABLE BEARING CAPACITY OF THE COMPACTED FILL

The equations that are commonly used were proposed by Meyerhoff based on one inch of allowable foundation settlement.

Meyerhoff's equations

For footing width, 2 feet or less:

$$Q_a = (N/2.5) / K \quad [1.14]$$

For footing width, greater than 4 ft:

$$Q_a = (N/4)[(B+1)/B]^2 / K \quad [1.15]$$

Q_a : Allowable soil bearing capacity, in kips/ft².

N : SPT numbers below the footing.

B : Footing width, in feet

$$K = 1 + 0.33(D/B) \leq 1.33$$

D : Depth from ground level to the bottom of footing, in feet

For $D=3.3\text{ft}$ and $B=3.3\text{ft}$ (1m footing)

Given Measured $N = 20$ Blows

$$\begin{aligned} Q_a &= (20/2.5)/1.33 = 6.02 \text{ kips/ft}^2 \quad (1 \text{ kips/ft}^2 = 47.7 \text{ kN/m}^2) \\ &= 286 \text{ kN/m}^2 \end{aligned}$$

Apply a safety factor of 3 for minimal settlement

$$Q_a = 95.6 \text{ kPa}$$

Rock core samples recovered were Middle Globigerina Limestone.

On exposure, this rock, being marly, easily shrinks and cracks and may become unstable.

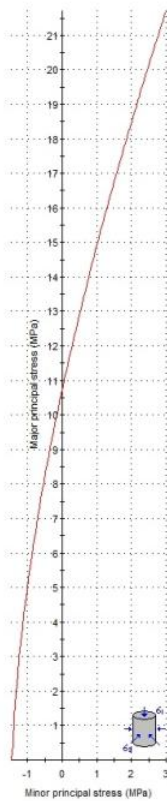
Uniaxial compressive strength results varied from 2.4MPa in BH8 and 21.4MPa in BH5 (Table 3). Allowable bearing capacity was calculated using RocLab software, taking into consideration rock compressive strength, RQD, fracture frequency and an appropriate safety factor. Most of the unrecovered rock core is due to wash-out of soft core.

RQD = 100%

Fracture Frequency = 0.3

Average Compressive strength = 12MPa

Allowable Bearing Capacity on bedrock = 2.08MPa (For unexposed sound rock)

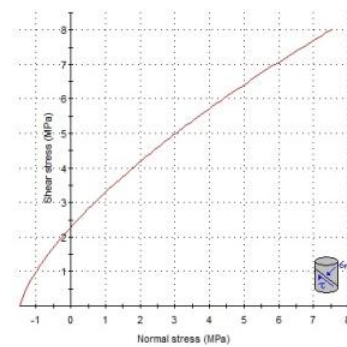


Hoek-Brown Classification
intact uniaxial comp. strength (σ_{ci}) = 12 MPa
GSI = 98 m_i = 7 Disturbance factor (D) = 0
intact modulus (Ei) = 12000 MPa
modulus ratio (MR) = 1000

Hoek-Brown Criterion
 m_b = 6.517 a = 0.8007 b = 0.500

Mohr-Coulomb Fit
cohesion = 2.379 MPa friction angle = 38.74 deg

Rock Mass Parameters
tensile strength = -1.474 MPa
uniaxial compressive strength = 10.738 MPa
global strength = 9.920 MPa
deformation modulus = 11872.40 MPa



5 CONCLUSION

1. A geotechnical investigation was carried out in connection with the proposed construction of a gas power station. This comprised the drilling of 21 boreholes by continuous rock core sampling.
2. The rock core samples recovered were composed of excellent quality Middle Globigerina Limestone.
3. Core recovery, Solid Core recovery and RQD measured were very good to excellent.
4. Rock compressive strength results ranged from 2.4 N/mm^2 to 21.4 N/mm^2 .
5. SPT testing has shown that the fill is not homogeneously compacted Allowable bearing capacity of compacted fill of average Blow Count $N=20$ is estimated to be 95.6 kPa . Loading of such fill is NOT recommended.
6. Allowable bearing capacity of rock is estimated to be 2.08 MPa

6 PLATES



Plate 1: Core sample recovered from BH 1 Run 1 and Run 2



Plate 2: Core samples recovered from BH 2 Run 1 and Run 2

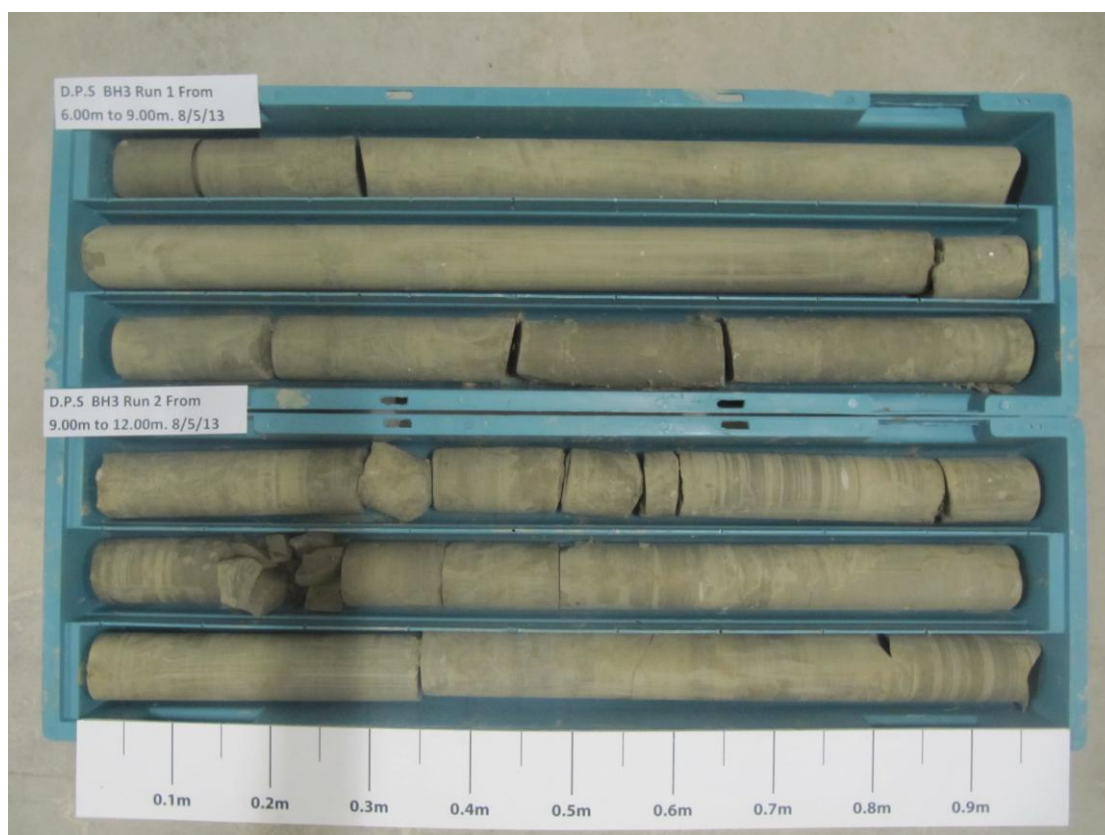


Plate 3: Core samples recovered from BH3 Run 1 and Run 2



Plate 4: Core sample recovered from BH4 Run 1 and Run 2

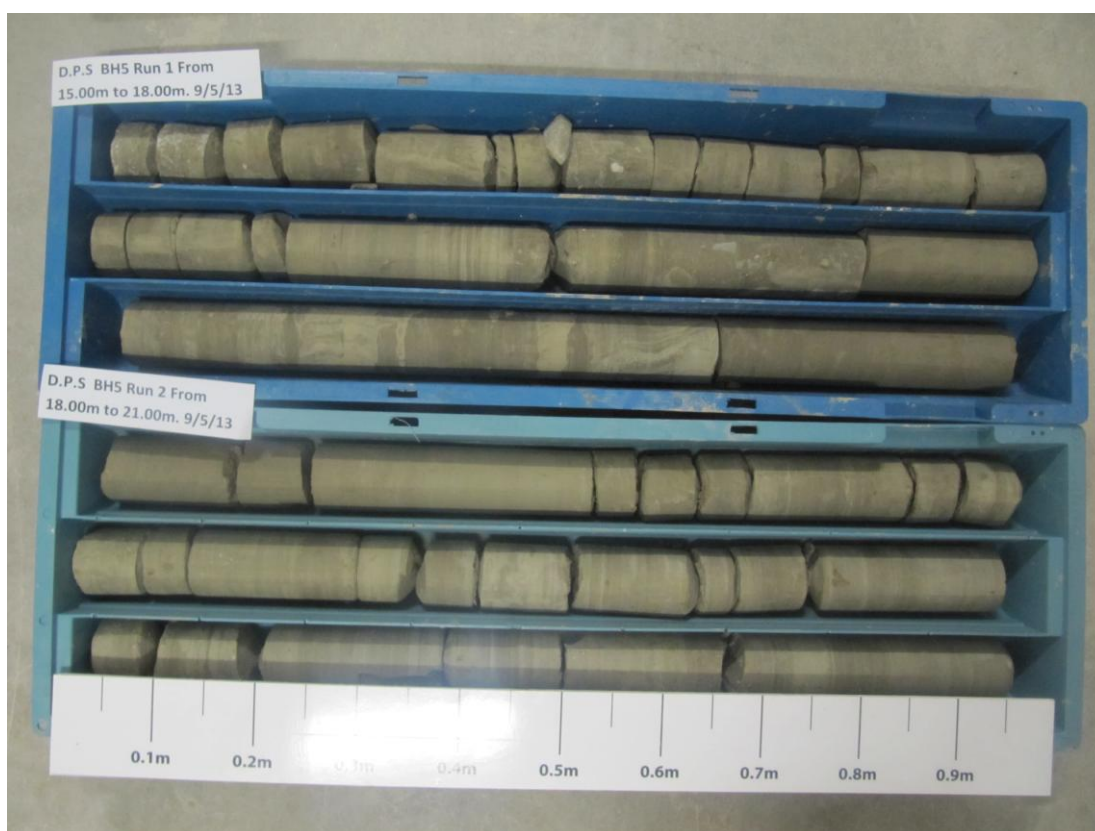


Plate 5: Core samples recovered from BH5 Run 1 and Run 2



Plate 6: Core samples recovered from BH6 Run 1 and Run 2

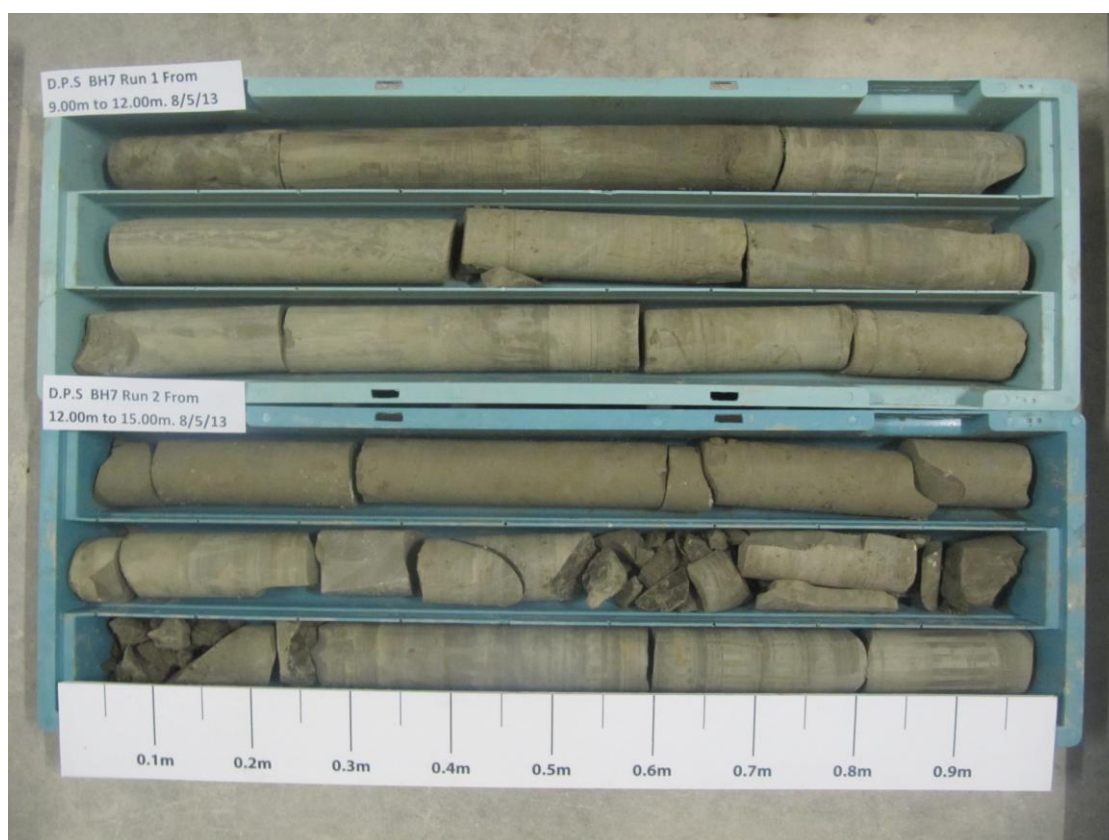


Plate 7: Core samples recovered from BH7 Run 1 and Run 2



Plate 8: Core samples recovered from BH9 Run 1 and Run 2



Plate 9: Core samples recovered from BH13 Run 1 and Run 2



Plate 10: Core samples recovered from BH15 Run 1 and Run 2



Plate 11: Core samples recovered from BH16 Run 1 and Run 2

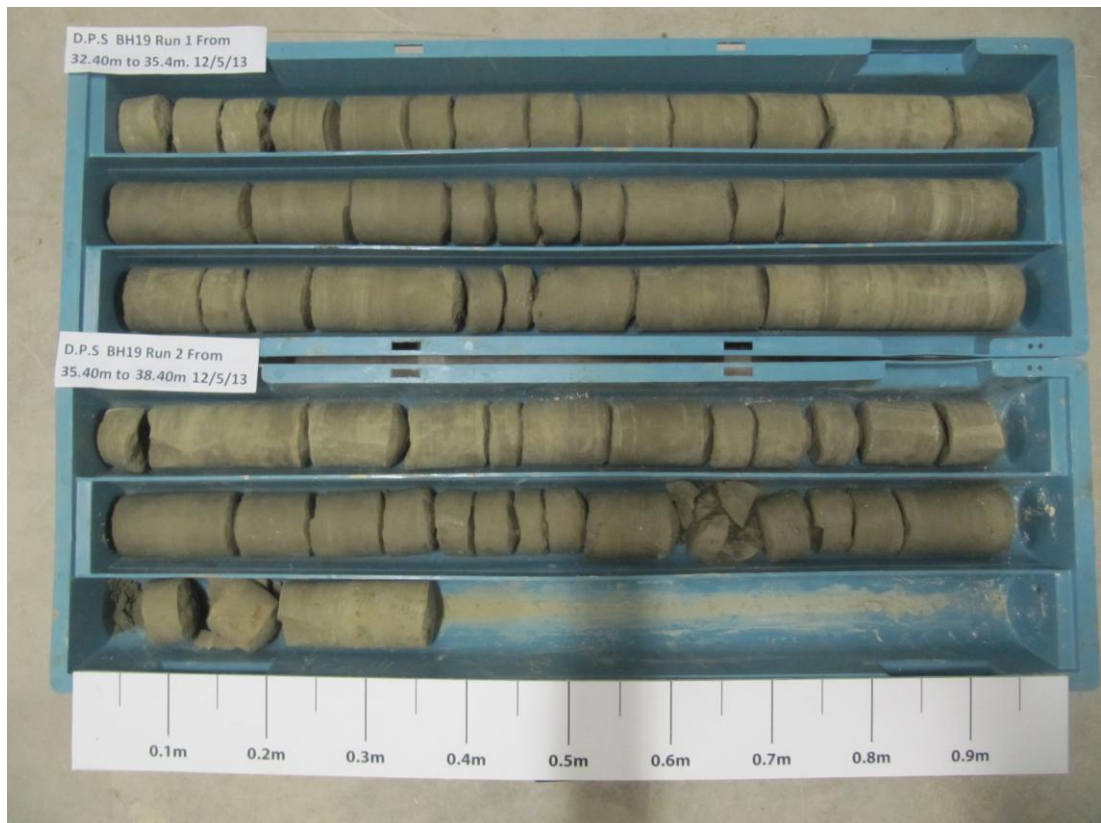



Plate 12: Core samples recovered from BH19 Run 1 and Run 2




Plate 13: Core samples recovered from BH20 Run 1 and Run 2


APPENDIX 1 – DRILLING LOGS


		Terracore Ltd, New Street in Kappara Street, Industrial Estate, Mosta T: (+356) 2158 3241 F: (+356) 2141 8645 M: (+356) 9947 1618 E: info@terracoreshm.com W: www.terracoreshm.com									
Client:		IAS Ltd		Drill Type:		T44		B/H No:		1	
Location:		Delimara		Drilling Fluid:		Water		Job No:		J1722	
Area		Powerstation		Drill:		Beretta		Date:		07/05/2013	
From	TO	DESCRIPTION				Core Run Length	Core Run Recovery	Circulation	Core Recovery %		
0.00	0.50	Started drilling open hole.									
0.50	0.95	SPT No. 1 from 0.50m to 0.95m:									
		1st 7.5cm : 1 blow 4th 7.5cm : 7 blows									
		2nd 7.5cm : 3 blows 5th 7.5cm : 7 blows									
		3rd 7.5cm : 3 blows 6th 7.5cm : 9 blows									
0.95	1.50	Continued drilling open hole to 1.50m.									
0.00	1.50	Advance casing from 0.00m to 1.50m.									
1.50	1.95	SPT No. 2 from 1.50m to 1.95m:									
		1st 7.5cm : 2 blows 4th 7.5cm : 7 blows									
		2nd 7.5cm : 3 blows 5th 7.5cm : 5 blows									
		3rd 7.5cm : 2 blows 6th 7.5cm : 5 blows									
1.95	3.00	Continued drilling open hole to 3.00m.									
0.00	3.00	Advance casing from 0.00m to 3.00m.									
3.00	3.45	SPT No. 3 from 3.00m to 3.45m:									
		1st 7.5cm : 2 blows 4th 7.5cm : 7 blows									
		2nd 7.5cm : 2 blows 5th 7.5cm : 6 blows									
		3rd 7.5cm : 4 blows 6th 7.5cm : 6 blows									
3.45	6.20	Continued drilling open hole to find bedrock. Top of bedrock is									
0.00	8.00	Advance casing from 0.00m to 8.00m.									
		Clean hole									
8.00	11.00	Core run no.1. Drilled with grey returns.				3.00	3.00	F	100%		
11.00	14.00	Core run no.2. Drilled with grey returns.				3.00	3.00	F	100%		
		Water level is at 2.25m.									
		Top of bedrock is at 6.20m									
Driller						Roderick Fenech					
Assistant Driller						Philip Giordimaina					
REMARKS											
						Circulation: F = Full, P = Partial Loss, L = Total Loss.					
						Test = SPT, Vane, Soil Sampling.					


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Client:	IAS Ltd	Drill Type:	T44	B/H No:	2
Location:	Delimara	Drilling Fluid:	Water	Job No:	J1722
Area	Powerstation	Drill:	Beretta	Date:	07/05/2013
From	TO	DESCRIPTION	Core Run Length	Core Run Recovery	Core Recovery %
0.00	6.00	Started drilling open hole. Top of bedrock is at 5.10m. Drilled with grey returns.			
0.00	6.00	Advance casing from 0.00m to 6.00m.			
6.00	9.00	Core run no.1. Drilled with grey returns.	3.00	3.00	F 100%
9.00	12.00	Core run no.2. Drilled with grey returns.	3.00	3.00	F 100%
		Water level is at 2.25m.			
		Top of bedrock is at 5.10m			
		REMARKS			
Driller	Roderick Fenech				
Assistant Driller	Philip Giordimaina	Circulation: F = Full, P = Partial Loss, L = Total Loss.			
		Test = SPT, Vane, Soil Sampling.			


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Client:	IAS Ltd	Drill Type:	T44	B/H No:	3
Location:	Delimara	Drilling Fluid:	Water	Job No:	J1722
Area	Powerstation	Drill:	Beretta	Date:	08/05/2013
From	TO	DESCRIPTION	Core Run Length	Core Run Recovery	Core Recovery %
0.00	0.50	Started drilling open hole from 0.00m to 0.50m. Advance casing.			
0.50	0.95	SPT No. 1 from 0.50m to 0.95m			
		1st 7.5cm = 2 blows			
		4th 7.5cm = 3 blows			
		2nd 7.5cm = 4 blows			
		5th 7.5cm = 5 blows			
		3rd 7.5cm = 4 blows			
		6th 7.5cm = 5 blows			
0.50	1.50	Drilled to 1.50m. Advance casing.			
1.50	1.95	SPT No. 2 from 1.50m to 1.95m			
		1st 7.5cm = 2 blows			
		4th 7.5cm = 5 blows			
		2nd 7.5cm = 3 blows			
		5th 7.5cm = 7 blows			
		3rd 7.5cm = 5 blows			
		6th 7.5cm = 5 blows			
1.95	2.50	Drilled to 2.50m. Advance casing.			
2.50	2.95	SPT No. 3 from 2.50m to 2.95m			
		1st 7.5cm = 2 blows			
		4th 7.5cm = 7 blows			
		2nd 7.5cm = 2 blows			
		5th 7.5cm = 7 blows			
		3rd 7.5cm = 5 blows			
		6th 7.5cm = 9 blows			
2.95	6.00	Continued drilling open hole to 6.00m. Top of bedrock is at 5.40m. Advance casing to 6.00m.			
6.00	9.00	Cored run no.1 with grey returns.	3.00	3.00	F 100%
9.00	12.00	Cored run no.2 with grey returns.	3.00	3.00	F 100%
		Water level at 2.00m			
		Top of bedrock is at 5.40m			
		REMARKS			
Driller	Roderick Fenech				
Assistant Driller	Philip Giordimaina	Circulation: F = Full, P = Partial Loss, L = Total Loss.			
		Test = SPT, Vane, Soil Sampling.			


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Client:		IAS Ltd		Drill Type:		T44		B/H No:		4	
Location:		Delimara		Drilling Fluid:		Water		Job No:		J1722	
Area		Powerstation		Drill:		Beretta		Date:		09/05/2013	
From	TO	DESCRIPTION				Core Run Length	Core Run Recovery	Circulation	Core Recovery %		
0.00	0.50	Started drilling open hole from 0.00m to 0.50m. Advance casing.									
0.50	0.95	SPT No. 1 from 0.50m to 0.95m									
		1st 7.5cm = 1 blow							4th 7.5cm = 5 blows		
		2nd 7.5cm = 1 blow							5th 7.5cm = 5 blows		
		3rd 7.5cm = 3 blows							6th 7.5cm = 7 blows		
0.50	1.50	Drilled to 1.50m. Advance casing.									
1.50	1.95	SPT No. 2 from 1.50m to 1.95m									
		1st 7.5cm = 2 blows							4th 7.5cm = 7 blows		
		2nd 7.5cm = 1 blow							5th 7.5cm = 7 blows		
		3rd 7.5cm = 3 blows							6th 7.5cm = 10 blows		
1.95	2.50	Drilled to 2.50m. Advance casing.									
2.50	2.95	SPT No. 3 from 2.50m to 2.95m									
		1st 7.5cm = 2 blows							4th 7.5cm = 4 blows		
		2nd 7.5cm = 2 blows							5th 7.5cm = 6 blows		
		3rd 7.5cm = 4 blows							6th 7.5cm = 5 blows		
2.95	7.50	Continued drilling open hole to 7.5m. Top of bedrock is at 6.60m. Advance casing.									
7.50	10.50	Cored run no.1 with grey returns.				3.00	3.00	F	100%		
10.50	13.50	Cored run no.2 with grey returns.				3.00	3.00	F	100%		
		Top of bedrock at 6.60m									
Driller						REMARKS					
Roderick Fenech											
Assistant Driller						Circulation: F = Full, P = Partial Loss, L = Total Loss.					
Philip Giordimaina						Test = SPT, Vane, Soil Sampling.					

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Client:		IAS Ltd		Drill Type:		T44		B/H No:		5	
Location:		Delimara		Drilling Fluid:		Water		Job No:		J1722	
Area		Powerstation		Drill:		Beretta		Date:		09/05/2013	
From	TO	DESCRIPTION				Core Run Length	Core Run Recovery	Circulation	Core Recovery %		
0.00	0.50	Started drilling open hole from 0.00m to 0.50m. Advance casing.									
0.50	0.95	SPT No. 1 from 0.50m to 0.95m									
		1st 7.5cm = 1 blow							4th 7.5cm = 4 blows		
		2nd 7.5cm = 2 blows							5th 7.5cm = 5 blows		
		3rd 7.5cm = 4 blows							6th 7.5cm = 7 blows		
0.50	1.50	Drilled to 1.50m. Advance casing.									
1.50	1.95	SPT No. 2 from 1.50m to 1.95m									
		1st 7.5cm = 1 blow							4th 7.5cm = 6 blows		
		2nd 7.5cm = 1 blow							5th 7.5cm = 5 blows		
		3rd 7.5cm = 3 blows							6th 7.5cm = 5 blows		
1.95	2.50	Drilled to 2.50m. Advance casing.									
2.50	2.95	SPT No. 3 from 2.50m to 2.95m									
		1st 7.5cm = 2 blows							4th 7.5cm = 4 blows		
		2nd 7.5cm = 1 blow							5th 7.5cm = 6 blows		
		3rd 7.5cm = 2 blows							6th 7.5cm = 5 blows		
2.95	15.00	Continued drilling open hole to 15m. Top of bedrock is at 13.60m. Advance casing.									
15.00	18.00	Cored run no.1 with grey returns.				3.00	3.00	F	100%		
18.00	21.00	Cored run no.2 with grey returns.				3.00	3.00	F	100%		
		Top of bedrock is at 13.60m									
REMARKS											
Driller		Roderick Fenech									
Assistant Driller		Philip Giordimaina									
						Circulation: F = Full, P = Partial Loss, L = Total Loss.					
						Test = SPT, Vane, Soil Sampling.					

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Client:		IAS Ltd		Drill Type:		T44		B/H No:		6	
Location:		Delimara		Drilling Fluid:		Water		Job No:		J1722	
Area		Powerstation		Drill:		Beretta		Date:		09/05/2013	
From	TO	DESCRIPTION				Core Run Length	Core Run Recovery	Circulation	Core Recovery %		
0.00	0.50	Started drilling open hole from 0.00m to 0.50m. Advance casing.									
0.50	0.95	SPT No. 1 from 0.50m to 0.95m									
		1st 7.5cm = 1 blow							4th 7.5cm = 4 blows		
		2nd 7.5cm = 2 blows							5th 7.5cm = 7 blows		
		3rd 7.5cm = 4 blows							6th 7.5cm = 5 blows		
0.50	1.50	Drilled to 1.50m. Advance casing.									
1.50	1.95	SPT No. 2 from 1.50m to 1.95m									
		1st 7.5cm = 4 blows							4th 7.5cm = 24 blows		
		2nd 7.5cm = 7 blows							5th 7.5cm = 22 blows		
		3rd 7.5cm = 16 blows							6th 7.5cm = 18 blows		
1.95	2.50	Drilled to 2.50m. Advance casing.									
2.50	2.95	SPT No. 3 from 2.50m to 2.95m									
		1st 7.5cm = 1 blow							4th 7.5cm = 1 blow		
		2nd 7.5cm = 1 blow							5th 7.5cm = 1 blow		
		3rd 7.5cm = 1 blow							6th 7.5cm = 1 blow		
2.95	9.00	Continued drilling open hole to 9m. Top of bedrock is at 8.10m. Advance casing.									
9.00	12.00	Cored run no.1 with grey returns.				3.00	3.00	F	100%		
12.00	15.00	Cored run no.2 with grey returns.				3.00	3.00	F	100%		
		Top of bedrock is at 8.10m									
Driller						REMARKS					
Roderick Fenech											
Assistant Driller						Circulation: F = Full, P = Partial Loss, L = Total Loss.					
Philip Giordimaina						Test = SPT, Vane, Soil Sampling.					


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Client:		IAS Ltd		Drill Type:		T44		B/H No:		7	
Location:		Delimara		Drilling Fluid:		Water		Job No:		J1722	
Area		Powerstation		Drill:		Beretta		Date:		08/05/2013	
From	TO	DESCRIPTION				Core Run Length	Core Run Recovery	Circulation	Core Recovery %		
0.00	0.50	Started drilling open hole from 0.00m to 0.50m. Advance casing.									
0.50	0.95	SPT No. 1 from 0.50m to 0.95m									
		1st 7.5cm = 2 blows							4th 7.5cm = 5 blows		
		2nd 7.5cm = 3 blows							5th 7.5cm = 5 blows		
		3rd 7.5cm = 3 blows							6th 7.5cm = 8 blows		
0.50	1.50	Drilled to 1.50m. Advance casing.									
1.50	1.95	SPT No. 2 from 1.50m to 1.95m									
		1st 7.5cm = 1 blow							4th 7.5cm = 9 blows		
		2nd 7.5cm = 2 blows							5th 7.5cm = 5 blows		
		3rd 7.5cm = 7 blows							6th 7.5cm = 6 blows		
1.95	2.50	Drilled to 2.50m. Advance casing.									
2.50	2.95	SPT No. 3 from 2.50m to 2.95m									
		1st 7.5cm = 1 blow							4th 7.5cm = 7 blows		
		2nd 7.5cm = 3 blows							5th 7.5cm = 5 blows		
		3rd 7.5cm = 3 blows							6th 7.5cm = 6 blows		
2.95	9.00	Continued drilling open hole to 9m. Top of bedrock is at 8.20m. Advance casing to 9.00m									
9.00	12.00	Cored run no.1 with grey returns.				3.00	3.00	F	100%		
12.00	15.00	Cored run no.2 with grey returns.				3.00	3.00	F	100%		
		Top of bedrock is at 8.20m									
REMARKS											
Driller		Roderick Fenech									
Assistant Driller		Paul Mifsud				Circulation: F = Full, P = Partial Loss, L = Total Loss.					
						Test = SPT, Vane, Soil Sampling.					


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Client:		IAS Ltd		Drill Type:		T44		B/H No:		8	
Location:		Delimara		Drilling Fluid:		Water		Job No:		J1722	
Area		Powerstation		Drill:		Beretta		Date:		10/05/2013	
From	TO	DESCRIPTION				Core Run Length	Core Run Recovery	Circulation	Core Recovery %		
0.00	0.50	Started drilling open hole from 0.00m to 0.50m. Advance casing.									
0.50	0.95	SPT No. 1 from 0.50m to 0.95m									
		1st 7.5cm = 1 blow							4th 7.5cm = 2 blows		
		2nd 7.5cm = 1 blow							5th 7.5cm = 3 blows		
		3rd 7.5cm = 2 blows							6th 7.5cm = 3 blows		
0.95	1.50	Drilled to 1.50m. Advance casing.									
1.50	1.95	SPT No. 2 from 1.50m to 1.95m									
		1st 7.5cm = 0.5 blow							4th 7.5cm = 2 blows		
		2nd 7.5cm = 0.5 blows							5th 7.5cm = 2.5 blows		
		3rd 7.5cm = 1 blow							6th 7.5cm = 1.5 blows		
1.95	2.50	Drilled to 2.50m. Advance casing.									
2.50	2.95	SPT No. 3 from 2.50m to 2.95m									
		1st 7.5cm = 1 blow							4th 7.5cm = 2 blows		
		2nd 7.5cm = 1 blow							5th 7.5cm = 2.5 blows		
		3rd 7.5cm = 2 blows							6th 7.5cm = 1.5 blows		
2.95	12.00	Continued drilling open hole with black returns. At 10.20m found to be bedrock. Advance casing to 12.00m. Drilled open hole to 12.00m with cream returns.									
12.00	15.00	Cored run no.1 with cream returns.				3.00	3.00	F	100%		
15.00	18.00	Cored run no.2 with grey returns.				3.00	3.00	F	100%		
		Top of bedrock is at 10.20m									
Driller						REMARKS					
Roderick Fenech											
Assistant Driller						Circulation: F = Full, P = Partial Loss, L = Total Loss.					
Paul Mifsud						Test = SPT, Vane, Soil Sampling.					

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Client:		IAS Ltd		Drill Type:		T44		B/H No:		9	
Location:		Delimara		Drilling Fluid:		Water		Job No:		J1722	
Area		Powerstation		Drill:		Beretta		Date:		11/05/2013	
From	TO	DESCRIPTION				Core Run Length	Core Run Recovery	Circulation	Core Recovery %		
0.00	0.50	Started drilling open hole from 0.00m to 0.50m. Advance casing.									
0.50	0.95	SPT No. 1 from 0.50m to 0.95m									
		1st 7.5cm = 1 blow							4th 7.5cm = 3 blows		
		2nd 7.5cm = 1 blow							5th 7.5cm = 7 blows		
		3rd 7.5cm = 3 blows							6th 7.5cm = 4 blows		
0.95	1.50	Drilled to 1.50m. Advance casing.									
1.50	1.95	SPT No. 2 from 1.50m to 1.95m									
		1st 7.5cm = 1 blow							4th 7.5cm = 4 blows		
		2nd 7.5cm = 2 blows							5th 7.5cm = 4 blows		
		3rd 7.5cm = 1 blow							6th 7.5cm = 5 blows		
1.95	2.50	Drilled to 2.50m. Advance casing.									
2.50	2.95	SPT No. 3 from 2.50m to 2.95m									
		1st 7.5cm = 1 blow							4th 7.5cm = 1 blow		
		2nd 7.5cm = 1 blow							5th 7.5cm = 3 blows		
		3rd 7.5cm = 2 blows							6th 7.5cm = 3 blows		
2.95	12.50	Continued drilling open hole to 12.50m. Advance casing. Top of bedrock is at 11.80m									
12.00	15.50	Cored run no.1 with cream returns.				3.00	2.25	F	75%		
15.00	18.50	Cored run no.2 with grey returns.				3.00	2.70	F	90%		
		Top of bedrock is at 12.50m									
Driller						REMARKS					
Roderick Fenech											
Assistant Driller						Circulation: F = Full, P = Partial Loss, L = Total Loss.					
Paul Mifsud						Test = SPT, Vane, Soil Sampling.					


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Client:		IAS Ltd		Drill Type:		T44		B/H No:		10	
Location:		Delimara		Drilling Fluid:		Water		Job No:		J1722	
Area		Powerstation		Drill:		Beretta		Date:		10/05/2013	
From	TO	DESCRIPTION					Core Run Length	Core Run Recovery	Circulation	Core Recovery %	
0.00	39.60	Started drilling open hole to find bedrock at 39.60. Material is Middle Globigerina Limestone.									
		Top of bedrock is at 39.60m									
				REMARKS							
Driller		Wilfred Bonanno									
Assistant Driller		Paul Mifsud		Circulation: F = Full,P = Partial Loss, L = Total Loss. Test = SPT, Vane, Soil Sampling.							


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Client:		IAS Ltd		Drill Type:		T44		B/H No:		11	
Location:		Delimara		Drilling Fluid:		Water		Job No:		J1722	
Area		Powerstation		Drill:		Beretta		Date:		05/05/2013	
From	TO	DESCRIPTION					Core Run Length	Core Run Recovery	Circulation	Core Recovery %	
0.00	7.10	Started drilling open hole to find bedrock. Drilled into soft material and at 5.50m start boulders. Top of bedrock is at 7.10m.									
7.10	9.00	Conitnued drilling open hole to 9.00m with lost returns.									
		Top of bedrock is at 7.10m.									
				REMARKS							
Driller		Wilfred Bonanno									
Assistant Driller		Roderick Fenech		Circulation: F = Full,P = Partial Loss, L = Total Loss. Test = SPT, Vane, Soil Sampling.							

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Client:		IAS Ltd		Drill Type:		T44		B/H No:		12	
Location:		Delimara		Drilling Fluid:		Water		Job No:		J1722	
Area		Powerstation		Drill:		Beretta		Date:		04/05/2013	
From	TO	DESCRIPTION				Core Run	Core Run		Core Recovery		
						Length	Recovery	Circulation	%		
0.00	21.30	Started drilling open hole to find bedrock. Drilled into soft, compacted material. Took sample no. 1. From 0.00m to 3.00m drilled with light brown returns. At 4.30m drilled into compacted material. At 14.00m start boulders. Top of bedrock is at 21.30m.									
		Top of bedrock is at 21.30m.									
REMARKS											
Driller		Wilfred Bonanno									
Assistant Driller		Roderick Fenech				Circulation: F = Full, P = Partial Loss, L = Total Loss.					
						Test = SPT, Vane, Soil Sampling.					

				Terracore Ltd, New Street in Kappara Street, Industrial Estate, Mosta T: (+356) 2158 3241 F: (+356) 2141 8645 M: (+356) 9947 1618 E: info@terracoreshm.com W: www.terracoreshm.com							
Client:		IAS Ltd		Drill Type:		T44		B/H No:		13	
Location:		Delimara		Drilling Fluid:		Water		Job No:		J1722	
Area		Powerstation		Drill:		Beretta		Date:		04/05/2013	
From	TO	DESCRIPTION				Core Run Length	Core Run Recovery	Circulation	Core Recovery %		
0.00	0.50	Started drilling open hole to 0.50m.									
0.50	0.95	SPT No. 1 from 0.50m to 0.95m:									
		1st 7.5cm : 0.5 blows 4th 7.5cm : 6 blows									
		2nd 7.5cm : 0.5 blows 5th 7.5cm : 7 blows									
		3rd 7.5cm : 1 blow 6th 7.5cm : 9 blows									
0.95	1.50	Continued drilling open hole from 0.95m to 1.50m.									
1.50	1.95	SPT No. 2 from 1.50m to 1.95m.									
		1st 7.5cm : 1 blow 4th 7.5cm : 0.5 blows									
		2nd 7.5cm : 1 blow 5th 7.5cm : 0.5 blows									
		3rd 7.5cm : 0.5 blows 6th 7.5cm : 0.5 blows									
1.95	2.50	Continued drilling open hole from 1.95m to 2.50m.									
2.50	2.95	SPT No. 3 from 2.50m to 2.95m.									
		1st 7.5cm : 1 blow 4th 7.5cm : 0.5 blows									
		2nd 7.5cm : 0.5 blows 5th 7.5cm : 0.5 blows									
		3rd 7.5cm : 0.5 blows 6th 7.5cm : 1 blow									
2.95	16.00	Continued drilling open hole into soft material. Start boulders at 14.50m. Top of bedrock is at 16.00m.									
16.00	18.00	Continued drilling open hole to 18.00m. Drilled with light cream returns.									
0.00	17.00	Advance casing from 0.00m to 17.00m.									
18.00	21.00	Core run no. 1. Drilled with light cream returns.				3.00	3.00	F	100%		
21.00	24.00	Core run no. 2. Drilled with light cream returns. At 22.00m drilled with grey returns.				3.00	3.00	F	100%		
		Water level is at 5.40m.									
		Top of bedrock is at 16.00m.									
REMARKS											
Driller		Wilfred Bonanno									
Assistant Driller		Roderick Fenech				Circulation: F = Full, P = Partial Loss, L = Total Loss.					
						Test = SPT, Vane, Soil Sampling.					

TERRACORE		Terracore Ltd, New Street in Kappara Street, Industrial Estate, Mosta T: (+356) 2158 3241 F: (+356) 2141 8645 M: (+356) 9947 1618 E: info@terracoreshm.com W: www.terracoreshm.com			
Client:	IAS Ltd	Drill Type:	T44	B/H No:	14
Location:	Delimara	Drilling Fluid:	Water	Job No:	J1722
Area	Powerstation	Drill:	Beretta	Date:	04/05/2013
From	TO	DESCRIPTION	Core Run Length	Core Run Recovery	Core Recovery %
0.00	0.50	Started drilling open hole. Drilled into soft material and soft/hard boulders. Diameter of boulders start from 0.30m to 1.00m.			
0.50	0.95	SPT No. 1 from 0.50m to 0.95m:			
		1st 7.5cm : 0.5 blows 4th 7.5cm : 6 blows			
		2nd 7.5cm : 0.5 blows 5th 7.5cm : 3 blows			
		3rd 7.5cm : 1 blow 6th 7.5cm : 1 blow			
0.95	1.50	Continued drilling open hole to 1.50m.			
1.50	1.95	SPT No. 2 from 1.50m to 1.95m:			
		1st 7.5cm : 1 blow 4th 7.5cm : 1.5 blows			
		2nd 7.5cm : 0.5 blows 5th 7.5cm : 0.5 blows			
		3rd 7.5cm : 0.5 blows 6th 7.5cm : 2 blows			
1.95	2.50	Continued drilling open hole to 2.50m.			
2.50	2.95	SPT No. 3 from 2.50m to 2.95m:			
		1st 7.5cm : 4 blows 4th 7.5cm : 1.5 blows			
		2nd 7.5cm : 1 blow 5th 7.5cm : 0.5 blows			
		3rd 7.5cm : 1 blow 6th 7.5cm : 0.5 blows			
2.95	10.50	Continued drilling open hole to 10.50m. Top of bedrock is at 10.00m.			
10.50	13.50	Core run no. 1. Drilled with lost returns.	3.00	3.00	L 100%
13.50	16.50	Core run no. 2. Drilled with lost returns.	3.00	3.00	L 100%
		Top of bedrock is at 10.00m			
Driller		REMARKS			
Wilfred Bonanno					
Assistant Driller		Circulation: F = Full, P = Partial Loss, L = Total Loss.			
Roderick Fenech		Test = SPT, Vane, Soil Sampling.			


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Client:		IAS Ltd		Drill Type:		T44		B/H No:		15b	
Location:		Delimara		Drilling Fluid:		Water		Job No:		J1722	
Area		Powerstation		Drill:		Beretta		Date:		06/05/2013	
From	TO	DESCRIPTION				Core Run Length	Core Run Recovery	Circulation	Core Recovery %		
0.00	10.00	Started drilling open hole from 0.00m to 10.00m.									
0.00	10.00	Advance casing from 0.00m to 10.00m.									
10.00	10.45	SPT No. 1 from 10.00m to 10.45m:									
		1st 7.5cm : 2 blows 4th 7.5cm : 2 blows									
		2nd 7.5cm : 1 blow 5th 7.5cm : 2 blows									
		3rd 7.5cm : 2 blows 6th 7.5cm : 1.5 blows									
10.45	12.00	Continued drilling open hole to 12.00m.									
10.00	12.00	Advance casing from 10.00m to 12.00m.									
12.00	12.45	SPT No. 2 from 12.00m to 12.45m:									
		1st 7.5cm : 3 blows 4th 7.5cm : 6 blows									
		2nd 7.5cm : 3 blows 5th 7.5cm : 5 blows									
		3rd 7.5cm : 4 blows 6th 7.5cm : 7 blows									
12.45	13.50	Continued drilling open hole to 13.50m.									
12.00	13.50	Advance casing from 12.00m to 13.50m.									
13.50	13.95	SPT No. 3 from 13.50m to 13.95m:									
		1st 7.5cm : 3 blows 4th 7.5cm : 4 blows									
		2nd 7.5cm : 5 blows 5th 7.5cm : 7 blows									
		3rd 7.5cm : 6 blows 6th 7.5cm : 7 blows									
13.95	30.00	Continued drilling open hole to find bedrock. Top of bedrock is at 28.30m.									
13.50	33.00	Advance casing from 0.00 to 30.00m									
		Clean out hole.									
30.00	33.00	Core run no. 1. Drilled with cream returns.				3.00	3.00	F	100%		
33.00	36.00	Core run no. 2. Drilled with cream returns.				3.00	3.00	F	100%		
		Top of bedrock is at 28.30m									
REMARKS											
Driller		Roderick Fenech									
Assistant Driller		Philip Giordimaina									
Circulation: F = Full, P = Partial Loss, L = Total Loss.											
Test = SPT, Vane, Soil Sampling.											

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Client:		IAS Ltd		Drill Type:		T44		B/H No:		16	
Location:		Delimara		Drilling Fluid:		Water		Job No:		J1722	
Area		Powerstation		Drill:		Beretta		Date:		06/05/2013	
From	TO	DESCRIPTION				Core Run Length	Core Run Recovery	Circulation	Core Recovery %		
0.00	20.50	Started drilling open hole from 0.00m to 20.50m. Drilled into clay.									
20.50	20.95	SPT No. 1 from 20.50m to 20.45m:									
		1st 7.5cm : 0.5 blows 4th 7.5cm : 2 blows									
		2nd 7.5cm : 0.5 blows 5th 7.5cm : 2 blows									
		3rd 7.5cm : 1 blows 6th 7.5cm : 1 blow									
20.95	22.50	Continued drilling open hole to 22.50m.									
22.50	22.95	SPT No. 2 from 22.50m to 22.95m:									
		1st 7.5cm : 2 blows 4th 7.5cm : 4 blows									
		2nd 7.5cm : 2 blows 5th 7.5cm : 5 blows									
		3rd 7.5cm : 3 blows 6th 7.5cm : 4 blows									
22.95	24.00	Continued drilling open hole to 24.00m.									
24.00	24.45	SPT No. 3 from 24.00m to 24.45m:									
		1st 7.5cm : 2 blows 4th 7.5cm : 3.5 blows									
		2nd 7.5cm : 3 blows 5th 7.5cm : 4.5 blows									
		3rd 7.5cm : 3 blows 6th 7.5cm : 5 blows									
24.45	45.30	Continued drilling open hole to find bedrock. From 32.00m to 45.00m drilled into seasand and small boulders. Top of bedrock is at 45.30m.									
		Advance casing to 45.3m and clean out hole.									
45.30	48.30	cored run no 1 with grey returns.				3.00	3.00	F	100%		
48.30	51.30	Cored run no 2 with grey returns.				3.00	3.00	F	100%		
		Top of bedrock is at 45.30m.									
REMARKS											
Driller		Wilfred Bonanno									
Assistant Driller		Paul Mifsud									
						Circulation: F = Full, P = Partial Loss, L = Total Loss.					
						Test = SPT, Vane, Soil Sampling.					

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Client:	IAS Ltd	Drill Type:	T44	B/H No:	17
Location:	Delimara	Drilling Fluid:	Water	Job No:	J1722
Area	Powerstation	Drill:	Beretta	Date:	10/05/2013
From	TO	DESCRIPTION	Core Run Length	Core Run Recovery	Core Recovery %
0.00	45.00	Started drilling open hole to find bedrock. Drilled with lost returns. Top of bedrock is at 45.00m.			
		Top of bedrock is at 45.00m.			
		REMARKS			
Driller	Wilfred Bonanno				
Assistant Driller	Roderick Fenech	Circulation: F = Full, P = Partial Loss, L = Total Loss.			
		Test = SPT, Vane, Soil Sampling.			

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Client:	IAS Ltd	Drill Type:	T44	B/H No:	18
Location:	Delimara	Drilling Fluid:	Water	Job No:	J1722
Area	Powerstation	Drill:	Beretta	Date:	10/05/2013
From	TO	DESCRIPTION	Core Run Length	Core Run Recovery	Core Recovery %
0.00	33.70	Started drilling open hole to find bedrock. Drilled with lost returns. Top of bedrock is at 33.70m.			
		Top of bedrock is at 33.70m.			
		REMARKS			
Driller	Wilfred Bonanno				
Assistant Driller	Roderick Fenech	Circulation: F = Full, P = Partial Loss, L = Total Loss.			
		Test = SPT, Vane, Soil Sampling.			

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Client:	IAS Ltd	Drill Type:	T44	B/H No:	19
Location:	Delimara	Drilling Fluid:	Water	Job No:	J1722
Area	Powerstation	Drill:	Beretta	Date:	12/05/2013
From	TO	DESCRIPTION	Core Run Length	Core Run Recovery	Core Recovery %
0.00	32.40	Started drilling open hole with no returns. Top of bedrock is at 32.40m			
0.00	32.40	Run casing to top of bedrock. Clean out casing.			
32.40	35.40	Cored run no.1 with grey returns.	3.00	3.00	F 100%
35.40	38.40	Cored run no.2 with grey returns. 65cm not recovered	3.00	2.35	F 78%
		Top of bedrock is at 32.40m.			
		REMARKS			
Driller	Wilfred Bonanno				
Assistant Driller	Roderick Fenech	Circulation: F = Full, P = Partial Loss, L = Total Loss.			
		Test = SPT, Vane, Soil Sampling.			

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Client:		IAS Ltd		Drill Type:		T44		B/H No:		20	
Location:		Delimara		Drilling Fluid:		Water		Job No:		J1722	
Area		Powerstation		Drill:		Beretta		Date:		11/05/2013	
From	TO	DESCRIPTION				Core Run Length	Core Run Recovery	Circulation	Core Recovery %		
0.00	0.50	Started drilling open hole from 0.00m to 0.50m. Advance casing.									
0.50	0.95	SPT No. 1 from 0.50m to 0.95m:									
		1st 7.5cm = 1 blow							4th 7.5cm = 2 blows		
		2nd 7.5cm = 1 blow							5th 7.5cm = 1 blow		
		3rd 7.5cm = 3 blows							6th 7.5cm = 3 blows		
0.95	1.50	Drilled to 1.50m. Advance casing.									
1.50	1.95	SPT No.2 from 1.50m to 1.95m									
		1st 7.5cm = 2 blows							4th 7.5cm = 7 blows		
		2nd 7.5cm = 2 blows							5th 7.5cm = 5 blows		
		3rd 7.5cm = 5 blows							6th 7.5cm = 5 blows		
1.95	2.50	Drilled to 2.50m. Advance casing.									
		SPT No.3 from 2.50m to 3.00m									
		1st 7.5cm = 3 blows							4th 7.5cm = 4 blows		
		2nd 7.5cm = 5 blows							5th 7.5cm = 5 blows		
		3rd 7.5cm = 3 blows							6th 7.5cm = 6 blows		
		Drilled to 7.50m. Advance casing. Top of bedrock is at 6.80m									
7.50	10.50	Started coring run 1 with grey returns.				3.00	3.00	F	100%		
10.50	13.50	Started coring run 2 with grey returns.				3.00	3.00	F	100%		
REMARKS											
Driller		Roderick Fenech									
Assistant Driller		Paul Mifsud				Circulation: F = Full, P = Partial Loss, L = Total Loss.					
						Test = SPT, Vane, Soil Sampling.					



Client:	IAS Ltd		Drilling Fluid:	Water		BH No:	21	
Location:	Delimara		Bit type:	Drag bit three wing		Job No:	J1722	
Area	Powerstation		Drill Type:	T44		Date:	11/05/2013	
From	TO					Time	Pressure	Circulation
(m)	(m)	DESCRIPTION				(s/0.5m)	on bit (psi)	
0.00	0.50	Started drilling open hole with no returns.						L
0.50	1.00	Continued drilling open hole with no returns.						L
1.00	1.50	Continued drilling open hole with no returns.						L
1.50	2.00	Continued drilling open hole with no returns.						L
2.00	2.50	Continued drilling open hole with no returns.						L
2.50	3.00	Continued drilling open hole with no returns.						L
3.00	3.50	Continued drilling open hole with no returns.						L
3.50	4.00	Continued drilling open hole with no returns.						L
4.00	4.50	Continued drilling open hole with no returns.						L
4.50	5.00	Continued drilling open hole with no returns.						L
5.00	5.50	Continued drilling open hole with no returns.						L
5.50	6.00	Continued drilling open hole with no returns. Top of bedrock is at 5.70m						L
Legend								
		Brown returns: Soil				Pale grey/brownish to cream: Upper Coralline.		
		Cream/brown/grey: Infill / Overburden (fast drilling)				Medium grey/Yellow: Clay Formation		
		Drop or very fast drilling				Cream/pale grey returns: Globigerina		
		No or lost returns				Pale cream/white returns: Lower Coralline		
REMARKS								
Driller	Roderick Fenech							
Assistant	Paul Mifsud		Circulation: F = Full, P = Partial Loss, L = Total Loss.					
Test = SPT, Vane, Soil Sampling.								

APPENDIX 2 – CORE LOGS

APPENDIX 3 – LABORATORY TEST CERTIFICATES

Laboratory Test Certificate				
Determination of Uniaxial Compressive Strength of Rock materials according to ISRM Suggested Method + Annex W				
Client Name:	IAS Ltd	Date of sampling:	07/05/2013	Certificate no:
Client address:	Level 4, Cobalt House, Notabile Road, Mriehel Malta	Date of test:	14/05/2013	Date of certificate:
		Type of Corebarrel:	T44	Job no:
Commisioned by:	Perit Peter Zammit	Location/Town:	Delimara	Test reference no:
Attn:	Perit Peter Zammit	Project:	Delimara Power Station	Tested by:
Client Tel No:	21499374			Drill Type:
				T286

Details of prepared specimens		BoreHole Number: 1		
		RC 1	RC 2	RC 3
Specimen No:				
Orientation of bedding planes with respect to the test specimen:		Perpendicular	Perpendicular	Perpendicular
Storage condition of specimens:		Sealed	Sealed	Sealed
Depth:		9.40m	10.75m	11.60m
Run No:		1	1	2
Specimen end flat to 0.02mm:		Yes	Yes	Yes
Specimen perpendicular to 0.001 Radian, about 3.5' or 0.05mm/50mm:		Yes	Yes	Yes
Specimen sides smooth and straight to 0.3mm over full length of specimen:		Yes	Yes	Yes
Initial diameter:(Average)	mm	67.0	67.0	67.0
Initial length:(Average)	mm	171	175	173
Initial area:	mm ²	3525.4	3528.2	3528.6
Initial volume:	mL	601.4	616.9	612.2
Length/diameter ratio:	L/D	2.55	2.61	2.59
Condition as tested:		As received	As received	As received
Mass of specimen	g	1258.11	1280.77	1268.02
Water content (to 0.1%)	%	11.6	13.7	14.0
Bulk Density	kg/m ³	2092	2076	2071
Dry Density	kg/m ³	1849.59	1791.33	1781.98
Test details				
Machine type/ref:		EQ001 No:6 (Range 0 - 150kN)	EQ001 No:6 (Range 0 - 150kN)	EQ001 No:6 (Range 0 - 150kN)
Rate of loading	N/min	7000	9000	9000
Stress rate:	Mpa/s	0.033	0.043	0.042
Maximum failure load:	kN	72.7	68.6	66.8
Test duration:	sec	662	600	463
Uniaxial compressive strength:	Mpa	20.6	19.4	18.9
Average UCS:			19.7	
Mode of failure:		Fragmented	Multiple shear	Multiple shear
Degree of saturation:		100.0	100.0	100.0
Comments/Deviations from suggested method:				
			Sample No: 1 Out of time range	
Measurment of Uncertainty:				
Nil				

Prepared by:  <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> Jessica Farrugia Quality Manager	Approved by:  <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> Chris Magro Laboratory Manager
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TEST CERTIFICATE

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Registration No.: C32227
 Directors: Alfred Xerri



Filename: J1722_Rock_Report001.xls



Laboratory Test Certificate					
Determination of Uniaxial Compressive Strength of Rock materials according to ISRM Suggested Method + Annex W					
Client Name:	IAS Ltd	Date of sampling:	07/05/2013	Certificate no:	2
Client address:	Level 4, Cobalt House, Notabile Road, Mriehel Malta	Date of test:	14/05/2013	Date of certificate:	14/05/2013
Commisioned by:	0	Type of Corebarrel:	T44	Job no:	J1722
Attn:	0	Location/Town:	Delimara	Test reference no:	RCC002
Client Tel No:	21499374	Project:	Delimara Power Station	Tested by:	LS
				Drill Type:	T286

Details of prepared specimens		BoreHole Number: 2		
		RC 4	RC 5	RC 6
Specimen No:				
Orientation of bedding planes with respect to the test specimen:		Perpendicular	Perpendicular	Perpendicular
Storage condition of specimens:		Sealed	Sealed	Sealed
Depth:		6.60m	8.75m	9.75m
Run No:		1	1	2
Specimen end flat to 0.02mm:		Yes	Yes	Yes
Specimen perpendicular to 0.001 Radian, about 3.5° or 0.05mm/50mm:		Yes	Yes	Yes
Specimen sides smooth and straight to 0.3mm over full length of specimen:		Yes	Yes	Yes
Initial diameter:(Average)	mm	62.0	67.2	67.0
Initial length:(Average)	mm	150	176	176
Initial area:	mm ²	3015.6	3543.7	3529.4
Initial volume:	mL	451.2	624.3	622.6
Length/diameter ratio:	L/D	2.42	2.63	2.63
Condition as tested:		As received	As received	As received
Mass of specimen	g	935.11	1299.89	1326.77
Water content (to 0.1%)	%	13.9	14.7	13.1
Bulk Density	kg/m ³	2072	2082	2131
Dry Density	kg/m ³	1784.17	1776.16	1851.47

Test details		EQ001 No:6 (Range 0 - 150kN)	EQ001 No:6 (Range 0 - 150kN)	EQ001 No:6 (Range 0 - 150kN)
Machine type/ref:				
Rate of loading	N/min	9000	9000	9000
Stress rate:	Mpa/s	0.050	0.042	0.042
Maximum failure load:	kN	45.5	48.3	57.8
Test duration:	sec	318	322	379
Uniaxial compressive strength:	Mpa	15.1	13.6	16.4
Average UCS:			15.0	
Mode of failure:		Multiple shear	Multiple shear	Multiple shear
Degree of saturation:		100.0	100.0	100.0
Comments/Deviations from suggested method:				Nil
Measurment of Uncertainty:				Nil

Prepared by:  <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> Jessica Farrugia Quality Manager	Approved by:  <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> Chris Magro Laboratory Manager
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Registration No.: C32227
Directors: Alfred Xerri
Filename: J1722_Rock_Report002.xls





Laboratory Test Certificate					
Determination of Uniaxial Compressive Strength of Rock materials according to ISRM Suggested Method + Annex W					
Client Name:	IAS Ltd	Date of sampling:	09/05/2013	Certificate no:	3
Client address:	Level 4, Cobalt House, Notabile Road, Mriehel Malta	Date of test:	14/05/2013	Date of certificate:	14/05/2013
Commisioned by:	0	Type of Corebarrel:	T44	Job no:	J1722
Attn:	0	Location/Town:	Delimara	Test reference no:	RCC003
Client Tel No:	21499374	Project:	Delimara Power Station	Tested by:	LS
				Drill Type:	T286

Details of prepared specimens		BoreHole Number: 5				
Specimen No:	RC	7	RC	8	RC	9
Orientation of bedding planes with respect to the test specimen:		Perpendicular		Perpendicular		Perpendicular
Storage condition of specimens:		Sealed		Sealed		Sealed
Depth:		16.40m		17.80m		19.90m
Run No:		1		1		2
Specimen end flat to 0.02mm:		Yes		Yes		Yes
Specimen perpendicular to 0.001 Radian, about 3.5' or 0.05mm/50mm:		Yes		Yes		Yes
Specimen sides smooth and straight to 0.3mm over full length of specimen:		Yes		Yes		Yes
Initial diameter:(Average)	mm	67.1		67.1		67.1
Initial length:(Average)	mm	173		173		178
Initial area:	mm ²	3536.1		3533.8		3540.3
Initial volume:	mL	612.2		610.5		630.9
Length/diameter ratio:	L/D	2.59		2.59		2.66
Condition as tested:		As received		As received		As received
Mass of specimen	g	1263.05		1279.72		1326.84
Water content (to 0.1%)	%	13.1		13.3		11.3
Bulk Density	kg/m ³	2063		2096		2103
Dry Density	kg/m ³	1793.06		1817.04		1864.66

Test details		EQ001 No:6 (Range 0 - 150kN)		
Machine type/ref:	N/min	9000	9000	9000
Rate of loading	Mpa/s	0.042	0.042	0.042
Stress rate:	kN	52.4	54.5	75.9
Maximum failure load:	sec	370	386	543
Test duration:	Mpa	14.8	15.4	21.4
Uniaxial compressive strength:				17.2
Average UCS:				
Mode of failure:		Multiple shear	Multiple shear	Shear
Degree of saturation:		100.0	100.0	100.0

Comments/Deviations from suggested method: Nil

Measurment of Uncertainty: Nil

Prepared by:  <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> Jessica Farrugia Quality Manager	Approved by:  <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> Chris Magro Laboratory Manager
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Registration No.: C32227
 Directors: Alfred Xerri

Filename: J1722_Rock_Report003.xls



Laboratory Test Certificate					
Determination of Uniaxial Compressive Strength of Rock materials according to ISRM Suggested Method + Annex W					
Client Name:	IAS Ltd	Date of sampling:	09/05/2013	Certificate no:	4
Client address:	Level 4, Cobalt House, Notabile Road, Mriehel Malta	Date of test:	16/05/2013	Date of certificate:	17/05/2013
		Type of Corebarrel:	T44	Job no:	J1722
Commisioned by:	Perit Peter Zammit	Location/Town:	Delimara	Test reference no:	RCC004
Attn:	Perit Peter Zammit	Project:	Delimara Power Station	Tested by:	LS
Client Tel No:	21499374			Drill Type:	T286

Details of prepared specimens		BoreHole Number: 6				
Specimen No:	RC	10	RC	11	RC	12
Orientation of bedding planes with respect to the test specimen:	Perpendicular		Perpendicular		Perpendicular	
Storage condition of specimens:	Sealed		Sealed		Sealed	
Depth:	9.6m		10.40m		12m	
Run No:	1		1		2	
Specimen end flat to 0.02mm:	Yes		Yes		Yes	
Specimen perpendicular to 0.001 Radian, about 3.5' or 0.05mm/50mm:	Yes		Yes		Yes	
Specimen sides smooth and straight to 0.3mm over full length of specimen:	Yes		Yes		Yes	
Initial diameter:(Average)	mm	65.8	67.0	67.0		
Initial length:(Average)	mm	181	181	181		
Initial area:	mm ²	3398.7	3529.6	3524.2		
Initial volume:	mL	615.6	639.0	638.3		
Length/diameter ratio:	L/D	2.76	2.70	2.71		
Condition as tested:		As received	As received	As received		
Mass of specimen	g	1340.67	1389.98	1381.93		
Water content (to 0.1%)	%	13.0	13.9	14.3		
Bulk Density	kg/m ³	2178	2175	2165		
Dry Density	kg/m ³	1894.92	1873.78	1855.87		



Test details		EQ001 No:6 (Range 0 - 150kN)	EQ001 No:6 (Range 0 - 150kN)	EQ001 No:6 (Range 0 - 150kN)
Machine type/ref:				
Rate of loading	N/min	7000	6500	6500
Stress rate:	Mpa/s	0.034	0.031	0.031
Maximum failure load:	kN	39.8	45.2	34.5
Test duration:	sec	360	442	337
Uniaxial compressive strength:	Mpa	11.7	12.8	9.8
Average UCS:			11.4	
Mode of failure:		Multiple shear	Multiple shear	Multiple shear
Degree of saturation:		100.0	100.0	100.0

Comments/Deviations from suggested method:

Nil

Measurment of Uncertainty:

Nil

Prepared by:  <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> Jessica Farrugia Quality Manager	Approved by:  <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> Chris Magro Laboratory Manager
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Registration No.: C32227
Directors: Alfred Xerri

Filename: J1722_Rock_Report004.xls



Laboratory Test Certificate					
Determination of Uniaxial Compressive Strength of Rock materials according to ISRM Suggested Method + Annex W					
Client Name:	IAS Ltd	Date of sampling:	10/05/2013	Certificate no:	5
Client address:	Level 4, Cobalt House, Notabile Road, Mriehel Malta	Date of test:	16/05/2013	Date of certificate:	17/05/2013
		Type of Corebarrel:	T44	Job no:	J1722
Commisioned by:	Perit Peter Zammit	Location/Town:	Delimara	Test reference no:	RCC005
Attn:	Perit Peter Zammit	Project:	Delimara Power Station	Tested by:	LS
Client Tel No:	21499374			Drill Type:	T286

Details of prepared specimens		BoreHole Number: 8		
		RC 13	RC 14	RC 15
Specimen No:				
Orientation of bedding planes with respect to the test specimen:		Perpendicular	Perpendicular	Perpendicular
Storage condition of specimens:		Sealed	Sealed	Sealed
Depth:		12.8m	14.7m	15.6m
Run No:		1	1	2
Specimen end flat to 0.02mm:		Yes	Yes	Yes
Specimen perpendicular to 0.001 Radian, about 3.5' or 0.05mm/50mm:		Yes	Yes	Yes
Specimen sides smooth and straight to 0.3mm over full length of specimen:		Yes	Yes	Yes
Initial diameter:(Average)	mm	67.0	67.0	67.0
Initial length:(Average)	mm	181	181	181
Initial area:	mm ²	3521.5	3522.3	3522.3
Initial volume:	mL	637.3	638.3	638.7
Length/diameter ratio:	L/D	2.71	2.71	2.71
Condition as tested:		As received	As received	As received
Mass of specimen	g	1327.38	1371.61	1354.13
Water content (to 0.1%)	%	19.2	15.2	15.2
Bulk Density	kg/m ³	2083	2149	2120
Dry Density	kg/m ³	1682.74	1822.91	1797.70
Test details				
Machine type/ref:		EQ001 No:6 (Range 0 - 150kN)	EQ001 No:6 (Range 0 - 150kN)	EQ001 No:6 (Range 0 - 150kN)
Rate of loading	N/min	6000	6500	6500
Stress rate:	Mpa/s	0.028	0.031	0.031
Maximum failure load:	kN	8.4	35.0	38.3
Test duration:	sec	20	339	368
Uniaxial compressive strength:	Mpa	2.4	9.9	10.9
Average UCS:			7.7	
Mode of failure:		Multiple shear	Multiple shear	Multiple shear
Degree of saturation:		100.0	100.0	100.0
Comments/Deviations from suggested method:		Specimen No: 13 - Out of time limit		
Measurment of Uncertainty:		Nil		

Prepared by:  _____ Jessica Farrugia Quality Manager	Approved by:  _____ Chris Magro Laboratory Manager	<h2 style="color: orange; margin: 0;">TEST CERTIFICATE</h2> <p style="font-size: small; margin: 0;">This document can only be reproduced in its entirety without revision and with written authorisation from Terracore Ltd</p>
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Registration No.: C32227
Directors: Alfred Xerri

Filename: J1722_Rock_Report005.xls





Laboratory Test Certificate					
Determination of Uniaxial Compressive Strength of Rock materials according to ISRM Suggested Method + Annex W					
Client Name:	IAS Ltd	Date of sampling:	04/05/2013	Certificate no:	6
Client address:	Level 4, Cobalt House, Notabile Road, Mrieħel Malta	Date of test:	14/05/2013	Date of certificate:	14/05/2013
		Type of Corebarrel:	T44	Job no:	J1722
Commisioned by:	Perit Peter Zammit	Location/Town:	Delimara	Test reference no:	RCC006
Attn:	Perit Peter Zammit	Project:	Delimara Power Station	Tested by:	LS
Client Tel No:	21499374			Drill Type:	T286

Details of prepared specimens		BoreHole Number: 13	
Specimen No:	RC 16	RC 17	RC 18
Orientation of bedding planes with respect to the test specimen:	Perpendicular	Perpendicular	Perpendicular
Storage condition of specimens:	Sealed	Sealed	Sealed
Depth:	20.2m	21.80m	23.80m
Run No:	1	2	2
Specimen end flat to 0.02mm:	Yes	Yes	Yes
Specimen perpendicular to 0.001 Radian, about 3.5' or 0.05mm/50mm:	Yes	Yes	Yes
Specimen sides smooth and straight to 0.3mm over full length of specimen:	Yes	Yes	Yes
Initial diameter:(Average)	mm 67.0	55.4	62.0
Initial length:(Average)	mm 173	146	145
Initial area:	mm ² 3523.5	2412.0	3021.6
Initial volume:	mL 609.2	351.6	436.8
Length/diameter ratio:	L/D 2.58	2.63	2.34
Condition as tested:	As received	As received	As received
Mass of specimen	g 1258.14	734.11	908.19
Water content (to 0.1%)	% 15.3	13.6	13.8
Bulk Density	kg/m ³ 2065	2088	2079
Dry Density	kg/m ³ 1750.00	1804.31	1792.65

Test details		EQ001 No:6 (Range 0 - 150kN)	EQ001 No:6 (Range 0 - 150kN)	EQ001 No:6 (Range 0 - 150kN)
Machine type/ref:	N/min	9000	7000	9000
Rate of loading	Mpa/s	0.043	0.048	0.050
Stress rate:	kN	21.8	29.0	34.0
Maximum failure load:	sec	159	266	199
Test duration:	Mpa	6.2	12.0	11.2
Uniaxial compressive strength:				9.8
Average UCS:				
Mode of failure:	Multiple shear	Fragmented	Fragmented	
Degree of saturation:	100.0	100.0	100.0	

Comments/Deviations from suggested method: All samples were out of time limit

Measurment of Uncertainty: Nil

Prepared by:  _____ Jessica Farrugia Quality Manager	Approved by:  _____ Chris Magro Laboratory Manager
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Registration No.: C32227
Directors: Alfred Xerri
Filename: J1722_Rock_Report006.xls



Laboratory Test Certificate					
Determination of Uniaxial Compressive Strength of Rock materials according to ISRM Suggested Method + Annex W					
Client Name:	IAS Ltd	Date of sampling:	04/05/2013	Certificate no:	7
Client address:	Level 4, Cobalt House, Notabile Road, Mriehel Malta	Date of test:	14/05/2013	Date of certificate:	14/05/2013
		Type of Corebarrel:	T44	Job no:	J1722
Commisioned by:	Perit Peter Zammit	Location/Town:	Delimara	Test reference no:	RCC007
Attn:	Perit Peter Zammit	Project:	Delimara Power Station	Tested by:	LS
Client Tel No:	21499374			Drill Type:	T286

Details of prepared specimens		BoreHole Number:		14	
Specimen No:	RC	19	RC	20	RC
Orientation of bedding planes with respect to the test specimen:		Perpendicular		Perpendicular	Perpendicular
Storage condition of specimens:		Sealed		Sealed	Sealed
Depth:		11.25m		12.40m	14.80m
Run No:		1		1	2
Specimen end flat to 0.02mm:		Yes		Yes	Yes
Specimen perpendicular to 0.001 Radian, about 3.5' or 0.05mm/50mm:		Yes		Yes	Yes
Specimen sides smooth and straight to 0.3mm over full length of specimen:		Yes		Yes	Yes
Initial diameter:(Average)	mm	66.8		67.0	67.0
Initial length:(Average)	mm	161		162	162
Initial area:	mm ²	3509.3		3520.8	3528.9
Initial volume:	mL	566.7		569.0	570.5
Length/diameter ratio:	L/D	2.41		2.41	2.41
Condition as tested:		As received		As received	As received
Mass of specimen	g	1183.56		1175.69	1167.33
Water content (to 0.1%)	%	13.5		16.4	16.9
Bulk Density	kg/m ³	2088		2066	2046
Dry Density	kg/m ³	1805.83		1727.78	1700.55

Test details		EQ001 No:6 (Range 0 - 150kN)		EQ001 No:6 (Range 0 - 150kN)		EQ001 No:6 (Range 0 - 150kN)	
Machine type/ref:							
Rate of loading	N/min	9000		9000		9000	
Stress rate:	Mpa/s	0.043		0.043		0.042	
Maximum failure load:	kN	28.4		59.7		67.2	
Test duration:	sec	202		399		479	
Uniaxial compressive strength:	Mpa	8.1		16.9		19.0	
Average UCS:						14.7	
Mode of failure:		Multiple shear		Multiple shear		Multiple shear	
Degree of saturation:		100.0		100.0		100.0	

Comments/Deviations from suggested method:

Sample No: 19 was out of time limit

Measurement of Uncertainty:

Nil

Prepared by:



Jessica Farrugia
Quality Manager

Approved by:



Chris Magro
Laboratory Manager

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Registration No.: C32227
Directors: Alfred Xerri

Filename: J1722_Rock_Report007.xls



Laboratory Test Certificate					
Determination of Uniaxial Compressive Strength of Rock materials according to ISRM Suggested Method + Annex W					
Client Name:	IAS Ltd	Date of sampling:	06/05/2013	Certificate no:	8
Client address:	Level 4, Cobalt House, Notabile Road, Mrieħel Malta	Date of test:	14/05/2013	Date of certificate:	14/05/2013
		Type of Corebarrel:	T44	Job no:	J1722
Commisioned by:	Perit Peter Zammit	Location/Town:	Delimara	Test reference no:	RCC008
Attn:	Perit Peter Zammit	Project:	Delimara Power Station	Tested by:	LS
Client Tel No:	21499374			Drill Type:	T286

Details of prepared specimens		BoreHole Number:		15	
Specimen No:	RC	22	RC	23	RC
					24
Orientation of bedding planes with respect to the test specimen:	Perpendicular		Perpendicular		Perpendicular
Storage condition of specimens:	Sealed		Sealed		Sealed
Depth:	30.80m		31.60m		33.60m
Run No:	1		1		2
Specimen end flat to 0.02mm:	Yes		Yes		Yes
Specimen perpendicular to 0.001 Radian, about 3.5' or 0.05mm/50mm:	Yes		Yes		Yes
Specimen sides smooth and straight to 0.3mm over full length of specimen:	Yes		Yes		Yes
Initial diameter:(Average)	mm	67.1	67.0	67.0	
Initial length:(Average)	mm	170	170	170	
Initial area:	mm ²	3531.7	3528.9	3521.9	
Initial volume:	mL	598.9	598.8	599.0	
Length/diameter ratio:	L/D	2.53	2.53	2.54	
Condition as tested:		As received	As received	As received	
Mass of specimen	g	1206.59	1169.58	1184.21	
Water content (to 0.1%)	%	13.9	12.5	13.8	
Bulk Density	kg/m ³	2015	1953	1977	
Dry Density	kg/m ³	1734.31	1708.80	1704.03	
Test details					
Machine type/ref:		EQ001 No:6 (Range 0 - 150kN)	EQ001 No:6 (Range 0 - 150kN)	EQ001 No:6 (Range 0 - 150kN)	
Rate of loading	N/min	9000	9000	9000	
Stress rate:	Mpa/s	0.042	0.042	0.043	
Maximum failure load:	kN	41.8	30.7	49.7	
Test duration:	sec	300	204	331	
Uniaxial compressive strength:	Mpa	11.8	8.7	14.1	
Average UCS:				11.5	
Mode of failure:		Multiple shear	Shear	Multiple shear	
Degree of saturation:		100.0	100.0	100.0	
Comments/Deviations from suggested method:					Nil
Measurment of Uncertainty:					Nil

Prepared by:  <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> Jessica Farrugia Quality Manager	Approved by:  <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> Chris Magro Laboratory Manager
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Registration No.: C32227
Directors: Alfred Xerri

Filename: J1722_Rock_Report008.xls



Laboratory Test Certificate						
Determination of Uniaxial Compressive Strength of Rock materials according to ISRM Suggested Method + Annex W						
Client Name:	IAS Ltd	Date of sampling:	06/05/2013	Certificate no:	9	
Client address:	Level 4, Cobalt House, Notabile Road, Mriehel Malta	Date of test:	14/05/2013	Date of certificate:	14/05/2013	
		Type of Corebarrel:	T44	Job no:	J1722	
Commisioned by:	Perit Peter Zammit	Location/Town:	Delimara	Test reference no:	RCC009	
Attn:	Perit Peter Zammit	Project:	Delimara Power Station	Tested by:	LS	
Client Tel No:	21499374			Drill Type:	T286	

Details of prepared specimens		BoreHole Number: 16					
		RC	25	RC	26	RC	27
Specimen No:							
Orientation of bedding planes with respect to the test specimen:		Perpendicular		Perpendicular		Perpendicular	
Storage condition of specimens:		Sealed		Sealed		Sealed	
Depth:		46.20m		46.70m		49.80m	
Run No:		1		1		2	
Specimen end flat to 0.02mm:		Yes		Yes		Yes	
Specimen perpendicular to 0.001 Radian, about 3.5' or 0.05mm/50mm:		Yes		Yes		Yes	
Specimen sides smooth and straight to 0.3mm over full length of specimen:		Yes		Yes		Yes	
Initial diameter:(Average)	mm	66.9		67.0		67.1	
Initial length:(Average)	mm	175		167		168	
Initial area:	mm ²	3511.7		3527.0		3532.3	
Initial volume:	mL	616.1		588.7		595.0	
Length/diameter ratio:	L/D	2.62		2.49		2.51	
Condition as tested:		As received		As received		As received	
Mass of specimen	g	1269.94		1254.47		1289.67	
Water content (to 0.1%)	%	13.1		12.8		13.4	
Bulk Density	kg/m ³	2061		2131		2167	
Dry Density	kg/m ³	1791.01		1859.34		1877.99	
Test details							
Machine type/ref:		EQ001 No:6 (Range 0 - 150kN)		EQ001 No:6 (Range 0 - 150kN)		EQ001 No:6 (Range 0 - 150kN)	
Rate of loading	N/min	9000		9000		9000	
Stress rate:	Mpa/s	0.043		0.043		0.042	
Maximum failure load:	kN	52.7		60.1		70.5	
Test duration:	sec	396		399		500	
Uniaxial compressive strength:	Mpa	15.0		17.0		20.0	
Average UCS:						17.3	
Mode of failure:		Multiple shear		Shear		Multiple shear	
Degree of saturation:		100.0		100.0		100.0	
Comments/Deviations from suggested method:						Nil	
Measurment of Uncertainty:						Nil	

Prepared by:  <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> Jessica Farrugia Quality Manager	Approved by:  <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> Chris Magro Laboratory Manager
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 Directors: Alfred Xerri

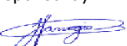

Filename: J1722_Rock_Report009.xls



Laboratory Test Certificate					
Determination of Uniaxial Compressive Strength of Rock materials according to ISRM Suggested Method + Annex W					
Client Name:	IAS Ltd	Date of sampling:	12/05/2013	Certificate no:	10
Client address:	Level 4, Cobalt House, Notabile Road, Mrieħel Malta	Date of test:	16/05/2013	Date of certificate:	17/05/2013
		Type of Corebarrel:	T44	Job no:	J1722
Commisioned by:	Perit Peter Zammit	Location/Town:	Delimara	Test reference no:	RCC010
Attn:	Perit Peter Zammit	Project:	Delimara Power Station	Tested by:	LS
Client Tel No:	21499374			Drill Type:	T286

Details of prepared specimens		BoreHole Number: 19		
		RC 28	RC 29	RC 30
Specimen No:				
Orientation of bedding planes with respect to the test specimen:		Perpendicular	Perpendicular	Perpendicular
Storage condition of specimens:		Sealed	Sealed	Sealed
Depth:		34.2m	35.2m	37.5m
Run No:		1	1	2
Specimen end flat to 0.02mm:		Yes	Yes	Yes
Specimen perpendicular to 0.001 Radian, about 3.5' or 0.05mm/50mm:		Yes	Yes	Yes
Specimen sides smooth and straight to 0.3mm over full length of specimen:		Yes	Yes	Yes
Initial diameter:(Average)	mm	67.0	67.0	67.0
Initial length:(Average)	mm	181	174	181
Initial area:	mm ²	3526.1	3522.6	3523.0
Initial volume:	mL	638.9	613.6	638.3
Length/diameter ratio:	L/D	2.71	2.60	2.71
Condition as tested:		As received	As received	As received
Mass of specimen	g	1354.39	1307.4	1327.39
Water content (to 0.1%)	%	16.7	16.1	17.9
Bulk Density	kg/m ³	2120	2131	2079
Dry Density	kg/m ³	1765.79	1787.91	1707.43

Test details		EQ001 No:6 (Range 0 - 150kN)	EQ001 No:6 (Range 0 - 150kN)	EQ001 No:6 (Range 0 - 150kN)
Machine type/ref:				
Rate of loading	N/min	6500	6500	6500
Stress rate:	Mpa/s	0.031	0.031	0.031
Maximum failure load:	kN	53.8	55.6	49.7
Test duration:	sec	514	535	460
Uniaxial compressive strength:	Mpa	15.2	15.8	14.1
Average UCS:			15.0	
Mode of failure:		Multiple shear	Multiple shear	Multiple shear
Degree of saturation:		100.0	100.0	100.0
Comments/Deviations from suggested method:				Nil
Measurment of Uncertainty:				Nil

Prepared by:  <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> Jessica Farrugia Quality Manager	Approved by:  <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> Chris Magro Laboratory Manager
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Registration No.: C32227
Directors: Alfred Xerri
Filename: J1722_Rock_Report010.xls



Laboratory Test Certificate					
Determination of Uniaxial Compressive Strength of Rock materials according to ISRM Suggested Method + Annex W					
Client Name:	IAS Ltd	Date of sampling:	11/05/2013	Certificate no:	11
Client address:	Level 4, Cobalt House,	Date of test:	16/05/2013	Date of certificate:	17/05/2013
	Notabile Road, Mrieħel Malta	Type of Corebarrel:	T44	Job no:	J1722
Commissioned by:	Perit Peter Zammit	Location/Town:	Delimara	Test reference no:	RCC011
Attn:	Perit Peter Zammit	Project:	Delimara Power	Tested by:	LS
Client Tel No:	21499374		Station	Drill Type:	T286

Details of prepared specimens		BoreHole Number:		20	
Specimen No:	RC	31	RC	32	RC 33
Orientation of bedding planes with respect to the test specimen:	Perpendicular		Perpendicular		Perpendicular
Storage condition of specimens:	Sealed		Sealed		Sealed
Depth:	9.30m		10m		11.7m
Run No:	1		1		2
Specimen end flat to 0.02mm:	Yes		Yes		Yes
Specimen perpendicular to 0.001 Radian, about 3.5' or 0.05mm/50mm:	Yes		Yes		Yes
Specimen sides smooth and straight to 0.3mm over full length of specimen:	Yes		Yes		Yes
Initial diameter: (Average)	mm	67.1	67.0	67.0	
Initial length: (Average)	mm	181	181	181	
Initial area:	mm ²	3535.1	3522.1	3526.3	
Initial volume:	mL	640.1	637.1	638.8	
Length/diameter ratio:	L/D	2.70	2.71	2.71	
Condition as tested:		As received	As received	As received	
Mass of specimen	g	1377.05	1366.2	1397.36	
Water content (to 0.1%)	%	15.4	15.8	12.6	
Bulk Density	kg/m ³	2151	2145	2187	
Dry Density	kg/m ³	1818.96	1806.55	1911.07	
Test details					
Machine type/ref:		EQ001 No:6 (Range 0 - 150kN)	EQ001 No:6 (Range 0 - 150kN)	EQ001 No:6 (Range 0 - 150kN)	
Rate of loading	N/min	6500	6250	6000	
Stress rate:	Mpa/s	0.031	0.030	0.028	
Maximum failure load:	kN	27.1	22.7	43.2	
Test duration:	sec	268	236	452	
Uniaxial compressive strength:	Mpa	7.7	6.4	12.2	
Average UCS:				8.8	
Mode of failure:		Multiple shear	Multiple shear	Multiple shear	
Degree of saturation:		100.0	100.0	100.0	
Comments/Deviations from suggested method:	Nil				
Measurement of Uncertainty:	Nil				

Prepared by: _____ Jessica Farrugia Quality Manager	Approved by: _____ Chris Magro Laboratory Manager
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TEST CERTIFICATE

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