



APPENDIX 13: Geotechnical Assessment

FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

**SCOPING & ENVIRONMENTAL IMPACT ASSESSMENT (S&EIA) FOR THE
PROPOSED 2 MEGALITRES PER DAY (MLD) SOLAR POWERED SEAWATER
DESALINATION PLANT IN THE PORT OF EAST LONDON, BUFFALO CITY
METROPOLITAN MUNICIPALITY, EASTERN CAPE PROVINCE, BY TRANSNET
NATIONAL PORTS AUTHORITY**

DFFE EA Application Reference Number: 14/12/16/3/3/2/2845

September 2026



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Technical Report
2025 / 03 / 22 / GTEC



EAST LONDON PORT DESALINATION PLANT

Geotechnical investigation in support of feasibility study for the proposed Solar Powered Desalination plant and related infrastructure at the East London Harbour, Buffalo City Metropolitan Municipality, Eastern Cape

April 2025

Prepared for: **Sunwater East London JV (Pty) Ltd**

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Compiled by: **AGES Omega (Pty) Ltd**



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EAST LONDON PORT DESALINATION PLANT

Geotechnical investigation in support of the feasibility study for the proposed Solar Powered Desalination plant and related infrastructure at the East London Harbour, Buffalo City Metropolitan Municipality, Eastern Cape

April 2025

Conducted on behalf of:

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Appendix 6 of the EIA Regulations

A specialist report prepared in terms of these Regulations must contain—

Requirement	Section where this is addressed in report or description of how requirement has been addressed.
(a) details of— (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	Page 2 and attached at the end of the document.
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Specialist declaration attached at the end of the document
(c) an indication of the scope of, and the purpose for which, the report was prepared; (cA) an indication of the quality and age of base data used for the specialist report; (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 1, 2, 3, 4
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 1
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 2, 3, 4
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	N/A. Geotech test pit analysis was done for the desal plant, solar plant and reservoir positions to determine the most suitable position so as to avoid sensitive/ inappropriate environments.
(g) an identification of any areas to be avoided, including buffers;	N/A
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	N/A. This is included in EIR
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	N/A. As this process is about collecting data to accurately assess the site, no assumptions has been made.
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 2, 3, 4, 5
(k) any mitigation measures for inclusion in the EMPr;	See the response in (i) below.

(l) any conditions for inclusion in the environmental authorisation;	N/A
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	N/A
(n) a reasoned opinion—	
(i) whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	It is the opinion of the geotechnical engineer that the proposed development can proceed and should be authorised. The primary purpose of the study was to investigate the underlying soil and geological conditions in order to determine the most suitable location, foundations, and construction methods for the proposed development. In this regard, the study is inherently aimed at identifying and avoiding unsuitable or structurally unsound areas and technologies at the feasibility stage, thereby reducing the likelihood of environmental or structural risks arising during or after construction. The study contributes directly to avoidance and mitigation by guiding the placement and design of infrastructure in a way that prevents failure and minimises disturbance to the receiving environment. No additional management or mitigation measures specific to environmental impacts were identified as necessary by the engineer, other than that the recommendations of the geotechnical report should be implemented in full and incorporated into the EMPr to ensure that construction is aligned with the identified feasibility constraints.
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Only consultation with the EAP and Proponent.
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
(q) any other information requested by the competent authority.	N/A

1 INTRODUCTION

1.1 GENERAL

AGES Omega (Pty) Ltd was appointed by the Sunwater East London Joint Venture (Pty) Ltd to conduct detailed engineering geological investigations in support of the feasibility study for the proposed 0.5 MLD solar-powered seawater desalination plant and related infrastructure i.e. solar farm, desalination plant and 1 ML reservoir, at the port of East London.

1.2 TERMS OF REFERENCE

The investigation was requested by Mr. Patrice Boyer of the firm Impact Water Solutions (Pty) Ltd and Mr. Jarl Heurlin of the firm Norland Construction, on behalf of the Sunwater East London Joint Venture (Pty) Ltd. AGES was appointed for the relevant geotechnical investigation following the submission of various detailed proposals for the geotechnical investigation, and was appointed on the 17th of May 2024. The scope of the investigation was changed since appointment with the final sites selected and draft layouts received in December 2024.

1.3 SCOPE OF THE INVESTIGATION

The investigation had the following aims:

- Geotechnical investigation of proposed infrastructure for determination of the following:
 - ❑ competent horizon / estimated safe bearing capacity.
 - ❑ adverse material occurrence and properties.
 - ❑ potential use of the in-situ materials in construction.
 - ❑ perched groundwater conditions.
 - ❑ Excavatability conditions.
- Geotechnical investigations required at the following positions:
 - ❑ Desalination Plant.
 - ❑ Reservoir 1ML.
 - ❑ Solar Farm.

1.4 LOCATION OF THE PROJECT AREA

The project area is located within the East London Harbour on the west bank of the river port of East London. The site is generally accessed via the Dr Zahn Road from the Buffalo Bridge to the West Bank Town. The site is located in the Buffalo City Metropolitan Municipality, Eastern Cape.

The locality of the proposed desalination plant and related infrastructure can be defined by the following coordinate, as also indicated in the regional locality figure below:

- Latitude: 33.029019° S
- Longitude: 27.906822° E



Figure 1: Regional locality of the desalination plant.



Figure 2: Site layout of the proposed desalination plant

1.5 REGIONAL GEOLOGICAL SETTING

According to the 1: 250 000 geological map 3326 GRAHAMSTOWN and the 1:50 000 geological map 3327 BB EAST LONDON; the project area is underlain by the rocks of the Middleton and Balfour Formation (Pa) that forms part of the Adelaide Subgroup of the Karoo Supergroup sequence of rocks. The lithology of the formations comprise of mudstone, sandstone, locally overlain by soil >1m thick. The Formation dips to the northwest at approximately 5 degrees.

The geology map indicates material from the Nanaga Formation in close proximity to the site, and therefore it is possible that this formation might be encountered within the project area. The Nanaga formation comprise of Aeolianite (calcareous sandstone), paleosol and subordinate calcrete.

Dolerite intruded into the sedimentary formations of the Karoo Supergroup in the form of dykes and sills. The west bank area is located on a very large and prominent dolerite sill. Although not present on the surface geology, dolerite can be expected at depth. No dolerite intrusions were encountered on the project area during the site investigation.

The geology maps do not indicate any prominent geological structures such as fault zones and/or lineaments derived from LANDSAT imagery that intersect the project area. The area does not reflect any risk for the formation of sinkholes or subsidence caused by the presence of water-soluble rocks (for example: dolomite or limestone).



Figure 3: Regional geological setting of project area

1.6 REGIONAL SEISMIC INTENSITY

According to Fernandez *et al* (1979) the regional seismic hazard in the project area can be defined as follows:

- The area exhibits a 90 % probability of the occurrence of a seismic event not exceeding Class VI-intensity¹ (i.e.: equivalent to a seismic event registering 4.9 to 5.4 on the Richter Scale) within a period of 100 years.
- The area exhibits a 90 % probability of the occurrence of a seismic event not exceeding Class VII-intensity (i.e.: equivalent to a seismic event registering 6.1 on the Richter Scale) within a period of 500 years.

In this light, the seismic risk of the project area can be classified as SLIGHT to LOW, and as such requires that Masonry Class B design and construction measures be implemented, incorporating good workmanship and reinforced mortar work, but specific design and construction measures to resist the effect of lateral forces on the proposed structures are not deemed necessary.

1 The effects of a Class VII-intensity event (categorized as strong to very strong) can be summarized as follows:

- Difficult to stand
- Noticed by drivers of motorcars
- Hanging objects quiver
- Furniture broken
- Damage to weak materials (such as adobe: poor mortar; low standards of workmanship; weak horizontally) including cracks (Masonry Class D)
- Weak chimneys broken at roof line
- Fall of plaster, loose bricks, stones, tiles, cornices, unbraced parapets and architectural ornaments
- Some cracks in ordinary workmanship and mortar (Masonry Class C)
- Small slides and caving-in along sand or gravel banks and concrete irrigation ditches will be damaged

2 DESALINATION PLANT INVESTIGATION

2.1 Trial pit profiling

A total of four (4) trial pits, numbered DS 1 to DS 4 were excavated utilising a CAT 426 4x4 TLB-type excavator on the 4th of February 2025 with pit positions indicated in the figure below. Test pits were generally excavated to a depth of 3.00 mbgl or refusal. Profiling of the trial pits were conducted according to the Guidelines for Soil and Rock Profiling in South Africa (Sept 2008).

Detailed trial pit profiles are included as Appendix A-1.



Figure 4: Test pit layout – Desalination Plant

2.2 Generalised soil profile

The following generalised soil conditions can be expected based on limited point source test pit information obtained from test pits.

The proposed desalination plant site is generally covered by fill material that is likely related to previous construction activities (road construction). The imported soil material is generally composed of abundant angular gravel to cobbles loosely packed in a matrix of silty sand to sandy clay. This imported soil horizon was found to be highly variable in composition and highly collapsible with sidewall collapse / overbreak

observed in most test pits. The material has a thickness of between 0.70 m and in excess of 3.00 m in portions of the site.

The imported soils are underlain by transported aeolian soil material in the form of dune sand. The dune sand exhibits an intact soil structure with a loose to very loose consistency and a thickness of up to 1.60 mbgl.

The dune sand is underlain by colluvium / hillwash soil material generally composed of clayey sand with scattered cobbles and boulders. The material exhibits a firm consistency and intact to micro-shattered soil structure. The material has a thickness of up to 0.70 m.

The transported soil material is underlain by residual siltstone material composed of sandy clay with scattered to abundant angular gravel and cobbles. The material exhibits a shattered to intact(relic) soil structure with a firm consistency in ported matrix rich horizons, to a dense overall consistency in clast rich horizons of the material. The material has a thickness in excess of 1.00 m.

No bedrock material was encountered in any of the test pits.

The generalised soil profile the desalination plant site is indicated in the figure below with detailed test pit logs and photographs attached in Appendix A-1 for reference.



Photo 1: Test pit excavation on DS 3

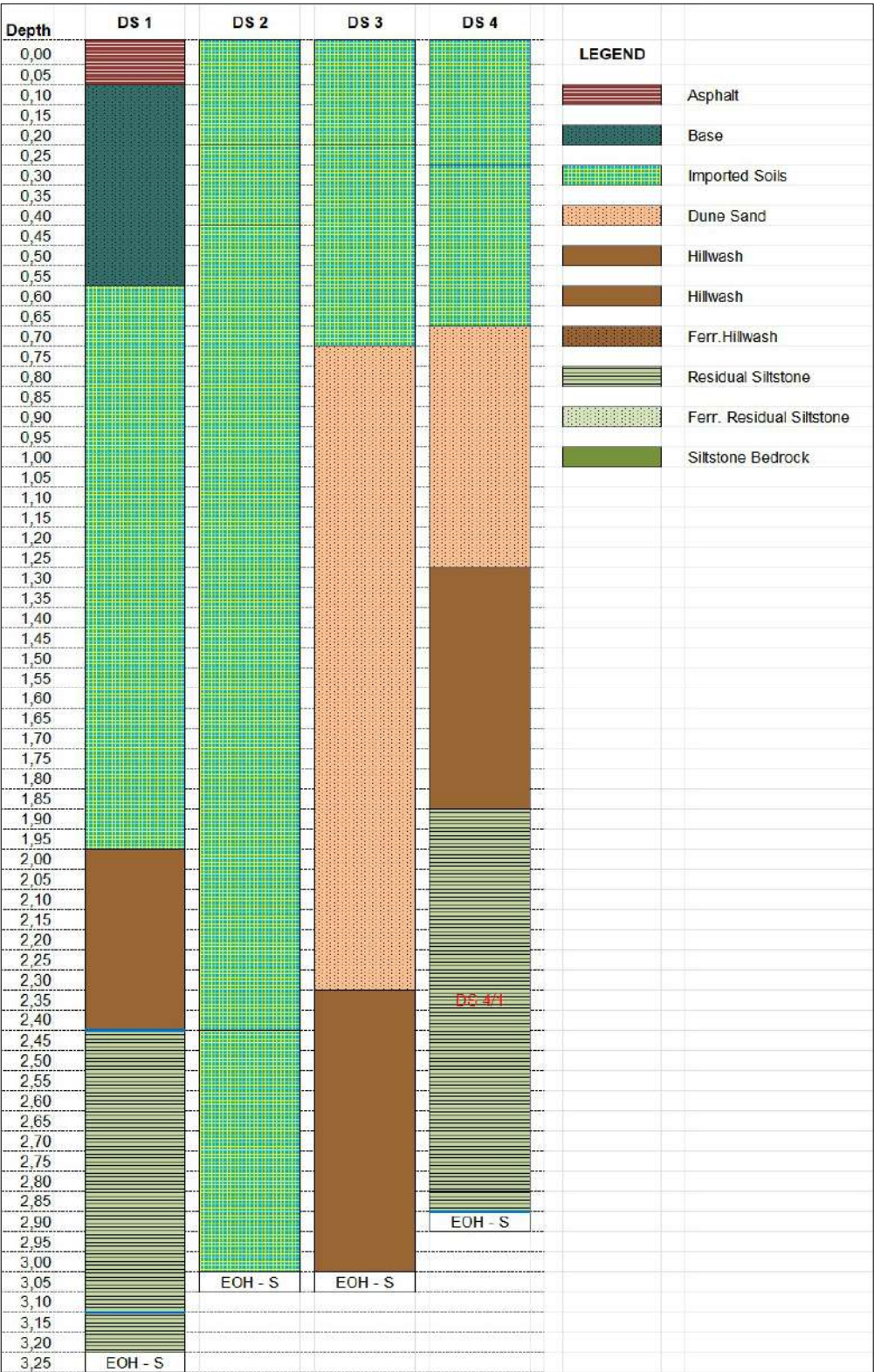


Figure 5: Conceptual soil profile - Desalination Plant

2.3 Excavatability

It was possible to excavate trial pits by TLB to a depth between 2.85 and 3.20 mbgl (mean 3.01 mbgl) after which excavation was stopped as the machine's excavation capacity was reached. No bedrock material was encountered. Excavation conditions are summarised in the table below.

Table 1: Test Pit Excavation Summary – Desalination Plant

Test Pit No:	Coordinates		Excavation Depth	Depth to Bedrock	E.O.H Comment(Refused/Stopped)	G/W Seepage	Materials Encountered			
	Latitude	Longitude					Imported Soils	Dune Sand	Hillwash	Residual Siltstone
DS 1	-33.028840	27.906560	3,20	—	Stopped	3,1	0,00 - 1,95	—	1,95 - 2,40	2,40 - 3,20
DS 2	-33.028710	27.906710	3,00	—	Stopped	—	0,00 - 3,00	—	—	—
DS 3	-33.028800	27.906910	3,00	—	Stopped	—	0,00 - 0,70	0,70 - 2,30	2,30 - 3,00	—
DS 4	-33.028890	27.907150	2,85	—	Stopped	2,85	0,00 - 0,65	0,65 - 1,25	1,25 - 1,85	1,85 - 2,85

2.4 Sidewall Stability

The sidewalls of the trial pits remained moderately stable during profiling with little collapse or overbreak occurring. The imported fill materials are considered highly unstable with overbreak encountered in this material. It is recommended that all excavations with a depth in excess of 1.0 m must be shored and/or battered back to safe angles to prevent any slope stability problems.

2.5 Groundwater Occurrences

Slight to moderate groundwater seepage was encountered in 2 of the 4 test pits, DS1 and DS4 at depths of 3.10 and 2.85 mbgl respectively. The soils in this portion of the project area are generally moist to wet. The presence of pedogenic soil material and groundwater seepage indicates that the occurrence of seasonal groundwater seepage conditions are likely to occur.

2.6 Dynamic Cone Penetrometer Testing

A total of 3 DCP tests was conducted during the site investigation. The tests were conducted from surface to a depth of approximately 1.0 mbgl or refusal adjacent to each of the trial pits and at the bottom of test pits where possible.

The DCP testing does not give an accurate estimation on the expected excavation conditions and in-situ bearing capacity of the soil materials, as only the UCS of the material is determined. The testing is however useful to get a basic estimation of existing in-situ conditions.

Please note the calculated DCP values does not incorporate any factor of safety and is only applicable to soil moisture contents at the time of the investigation. Processed DCP results are attached in Appendix A-2.

2.7 Laboratory Testing

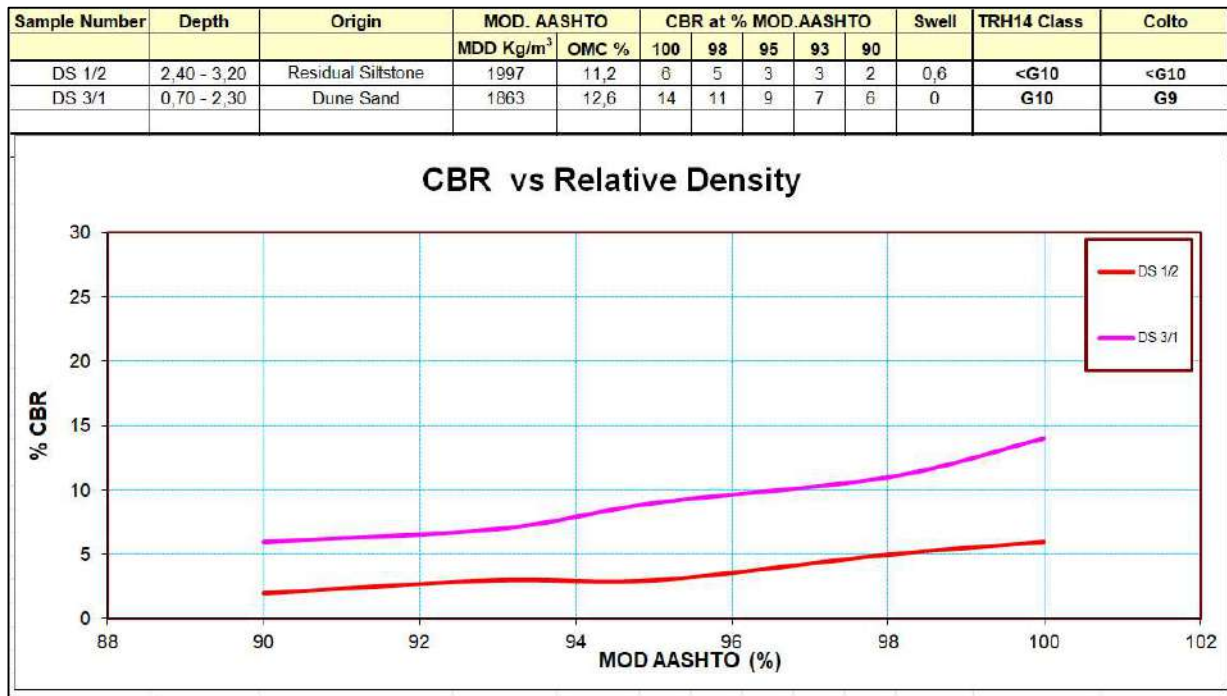
Selected samples were taken of the prominent soil horizons identified during the site investigation for detailed laboratory analysis. The samples were submitted to Messrs. Labco (Pty) Ltd, Civil engineering materials and geotechnical laboratory in East London on the 6th of February 2025. Results were received on the 24th of March 2025. Materials were generally tested for the following:

- Sieve Analysis including Hydrometer to determine % clay.
- Atterberg Limits
- Foundation Indicators
- Maximum Dry Density
- Optimum Moisture Content
- CBR vs MOD AASHTO density
- % Swell
- TRH14 / COLTO Classification

Processed laboratory results are summarised in the Tables below. Analysis certificates are attached in Appendix D for reference.

Table 2 : Summarised lab testing results - Desalination Plant

SAMPLE INFORMATION			GRADING ANALYSES				ATTERBERG LIMITS			LS	Moisture	UNIFIED (ASTM D2487)
Number	Depth (m - m)	Material Origin	Gravel %	Sand %	Silt %	Clay %	LL %	PI	PI'	%	%	Soil Classification
DS 1/1	1,95 - 2,40	Hillwash	0	68	22	10	15	3	3,0	1,5	17,10	SM: Silty sand
DS 3/1	0,70 - 2,30	Dune Sand	4	87	5	4	19	NP	NP	0,0	15,90	SP-SM: Poorly graded sand with silt
DS 4/1	1,85 - 2,85	Residual Siltstone	0	42	50	8	26	5	4,9	2,5	16,00	CL-ML: Sandy silty clay



2.8 Geotechnical Properties of Materials

Based on the site investigation results and laboratory data the following geotechnical conditions can be expected and should be allowed for in the foundation design.

- The overlying fill / imported soil material is highly variable in composition and highly collapsible.
- The transported soil materials are potentially highly to very highly compressible / collapsible with a calculated collapse / consolidation settlement greatly in excess of 10 mm (calculated 112 mm).
- The transported soil material are not potentially expansive.
- The residual siltstone soil material is potentially highly to very highly compressible / collapsible with a calculated collapse / consolidation settlement in excess of 10 mm (calculated 40 mm).
- The residual soil material materials are not potentially.
- The transported soil and residual siltstone materials are potentially highly erodible and dispersive.

2.9 Material Utilisation

None of the sampled materials have good TRH14 classifications with low maximum CBR's. The materials are therefore not suitable for use in any engineered fills and not suitable for use during construction. Potential application of the materials can be discussed.

2.10 Founding Conditions & Recommendations

*In the light of the results of this investigation the site is deemed to be **MARGINALLY SUITABLE** for the placement of the proposed Desalination Plant with the implementation of special precautionary measures, giving due cognisance to the following aspects.*

- ❑ No site development plan or design drawings with foundation requirements were available at the time of reporting.
- ❑ No competent horizon was encountered over the entire project area during the investigation that included the excavation of 4 test pits up to a depth of 3.20 mbgl.
- ❑ The imported, transported and residual materials encountered on site are deemed to be highly compressible / collapsible with a calculated collapse / consolidation settlement greatly excess of 10 mm.
- ❑ The materials on site are not suitable for use during construction due to very low CBR values. Possible application of the materials can be discussed.
- ❑ Follow up geotechnical investigation in the form of deep pit excavation and/or rotary-core drilling is recommended to determine the thickness of the materials and depth to competent bedrock material if required.
- ❑ The following foundation options can be considered for the proposed desalination plant:
 - The fill-, transported- and possibly residual materials have to be stripped to spoil.
 - Foundation options that can be considered and discussed include but is not limited to the following:
 - Engineered Fill / Rockfill mattress.
 - Raft foundations.
 - Piled or pier foundations on competent bedrock material.
- ❑ It is recommended that an efficient surface water drainage system be installed around the structure to ensure that moisture contents in the soils near foundations are kept stable. Water seepage and ponding will result in differential movement of the structure.
- ❑ Please note that the recommendations and findings are based on limited site investigation information and data in the form of point source trial pits. It is essential that the site be inspected during bulk earthworks by a qualified engineering geologist or geotechnical engineer prior to the construction of the foundations, to confirm soil conditions encountered in this investigation and / or identify any differences.

3 RESERVOIR SITE INVESTIGATION

3.1 Trial Pit Profiling

A total of three (3) trial pits, numbered RS 1 to RS 3 were excavated utilising a CAT 426 4x4 TLB-type excavator on the 5th of February 2025 with pit positions indicated in the figure below. Test pits were generally excavated to a depth of 3.00 mbgl or refusal. Profiling of the trial pits were conducted according to the Guidelines for Soil and Rock Profiling in South Africa (Sept 2008).

Detailed trial pit profiles are included as Appendix B-1.



Figure 6: Reservoir– Trial Pit Layout

3.2 Generalised soil profile

The following generalised soil conditions can be expected based on limited point source test pit information obtained from test pits.

The site is generally covered by Fill material that is likely related to previous construction. The imported soil material is generally composed of silty sand to sandy clay with frequent to abundant gravel, bricks and cobbles and rubble. This imported soil horizon was found to highly variable in composition and highly collapsible with sidewall collapse/ overbreak observed in most test pits. The material has a thickness up

to 1.10 m.

The imported soils are underlain by hillwash soil material generally composed of clayey sand to sandy clay. The material exhibits a firm consistency and intact soil structure. The material has a maximum thickness of 0.50 m.

The transported soil material is underlain by residual siltstone material generally composed of silty clay to sandy clay with scattered to abundant angular gravel and cobbles. The material exhibits a shattered to an intact(relic) soil structure with a firm consistency in ported matrix rich horizons to dense overall consistency in clast-rich horizons of the material. The residual siltstone material has a thickness of approximately 0.60 m and in excess thereof in portions of the site.

Siltstone bedrock was encountered in 2 of the 3 test pits. The bedrock material is highly to moderately weathered, very fine grained, thinly jointed and highly fractured with a soft rock to hard rock hardness. The bedrock material was encountered from a depth of 1.10 to 2.20 mbgl (mean 1.77 mbgl).

Detailed test pit logs and photographs are attached in Appendix B-1. The generalised soil profile the site is indicated in the Figure below.



Photo 2: Test pit excavation on the Reservoir position



Figure 7: Conceptual Soil Profile - Reservoir

3.3 Excavatability

It was possible to excavate trial pits by TLB to a depth between 1.50 and 2.95 mbgl (mean 2.37 mbgl) after which excavation refused on bedrock material or excavation was stopped as the machine's excavation capacity was reached. Excavation conditions are summarised in the table below.

Table 3: Excavation Summary - Reservoir

Test Pit No:	Coordinates		Excavation Depth	Depth to Bedrock	E.O.H Comment(Refused/Stopped)	G/W Seepage	Materials Encountered				
	Latitude	Longitude					Imported Soils	Dune Sand	Hillwash	Residual Siltstone	Siltstone Bedrock
RS 1	-33.029220	27.906630	2,65	2,00	Stopped	2,65	0,00 - 0,80	—	0,80 - 1,25	1,25 - 2,00	2,00 - 2,65
RS 2	-33.028990	27.906800	2,95	2,20	Stopped	—	0,00 - 1,10	—	1,10 - 1,60	1,60 - 2,95	—
RS 3	-33.029200	27.906950	1,50	1,10	Refused	1,50	—	—	0,00 - 0,30	0,30 - 1,10	1,10 - 1,50

3.4 Sidewall Stability

The sidewalls of the trial pits remained stable to moderately stable during profiling with little to no collapse or overbreak occurring. It is recommended that all excavations with a depth in excess of 1.0 m must be shored and/or battered back to safe angles to prevent any slope instability.

3.5 Groundwater Occurrences

Slight to moderate groundwater seepage was encountered in all 3 test pits from a depth of 1.50 to 2.65 mbgl in 2 of the 3 test pits. The soil of this portion of the project area are generally very moist to wet.

The occurrence of seasonal groundwater seepage conditions is likely to occur across the proposed reservoir position.

3.6 Dynamic Cone Penetrometer Testing

A total of 3 DCP tests were conducted as part of the investigation. The tests were conducted at surface adjacent to each of the trial pits and at the bottom of test pits where possible. The DCP did not refuse in any of the tests.

The DCP testing does not give an accurate estimation on the expected excavation conditions and in-situ bearing capacity of the soil materials, as only the UCS of the material is determined. The testing is however useful to get a basic estimation of existing in-situ conditions.

Please note the calculated DCP values does not incorporate any factor of safety and is only applicable to soil moisture contents at the time of the investigation. Processed DCP results are attached in Appendix B-2.

3.7 Laboratory Testing

Selected samples were taken of the prominent soil horizons identified during the site investigation for detailed laboratory analysis. The samples were submitted to Messrs. Labco (Pty) Ltd, Civil engineering materials and geotechnical laboratory in East London on the 6th of February 2025. Results were received on the 24th of March 2025. Materials were generally tested for the following:

- Sieve Analysis including Hydrometer to determine % clay.
- Atterberg Limits
- Foundation Indicators
- Maximum Dry Density
- Optimum Moisture Content
- CBR vs MOD AASHTO density
- % Swell
- TRH14 / COLTO Classification

Processed laboratory results are summarised in the Tables below. Analysis certificates are attached in Appendix D for reference.

Table 4: Summarised Lab testing results - Reservoir

SAMPLE INFORMATION			GRADING ANALYSES				ATTERBERG LIMITS			LS	Moisture	UNIFIED (ASTM D2487)
Number	Depth (m - m)	Material Origin	Gravel %	Sand %	Silt %	Clay %	LL %	PI %	PI'	%	%	Soil Classification
RS 1/1	0,80 - 1,25	Hillwash	0	49	33	18	27	13	12,6	7,0	11,90	CL: Sandy lean clay
RS 3/1	0,30 - 1,10	Residual Siltstone	15	27	44	14	31	4	3,1	2,0	12,40	ML: Sandy silt with gravel

Sample Number	Depth	Origin	MOD. AASHTO		CBR at % MOD.AASHTO					Swell	TRH14 Class	Colto	TRH 20 Class
			MDD Kg/m ³	OMC %	100	98	95	93	90				
RS 1/2	1,25 - 2,00	Residual Siltstone	2009	10	8	7	5	5	3	0,6	G10	<G10	Class B

CBR vs Relative Density

MOD AASHTO (%)	% CBR
90	3.0
92	4.5
94	5.0
96	5.5
98	7.0
100	8.0

3.8 Geotechnical Properties of Materials

Based on the site investigation results and laboratory data the following adverse geotechnical conditions can be expected and should be allowed for in the foundation design of the reservoir.

- The overlying fill / imported soil material is highly variable in composition and highly collapsible.
- The residual siltstone material is potentially highly to very highly compressible / collapsible with a calculated collapse / consolidation settlement in excess of 10 mm (calculated 55 mm).
- The residual soil material is not potentially expansive.
- The residual siltstone materials are potentially highly erodible and dispersive.

3.9 Material Utilisation

None of the sampled materials have good TRH14 classifications with low maximum CBR's. The materials are therefore not suitable for use in any engineered fills and not suitable for use during construction. Potential application of the materials can be discussed.

The residual siltstone soil material has a TRH 14 classification of <G10 together with a maximum CBR of 8 at a 100% compaction effort. This material is not suitable for use during construction.

3.10 Foundation Conditions & Recommendations

In the light of the results of this investigation the site is deemed to be SUITABLE to MARGINALLY SUITABLE for the placement of the proposed reservoir with the implementation of special precautionary measures, giving due cognizance to the following aspects.

- ❑ No site development plan or design drawings with foundation requirements were available at the time of reporting.
- ❑ The moderately hard rock siltstone bedrock material on which excavation by TLB refused on 1 of the 3 test pits (RS 3) at a depth of 1.50 mbgl is a suitable competent horizon for the founding of the reservoir. It is recommended that excavation up to this competent horizon be conducted over the entire reservoir site if possible.
- ❑ The imported, hillwash and residual siltstone materials are deemed to highly compressible / collapsible with a calculated collapse / compress in greatly excess of 10 mm. This material is not suitable for founding and should be removed.
- ❑ The following foundation options can be considered for the proposed desalination plant:
 - The fill, hillwash and residual siltstone materials have to be stripped to spoil.
 - Foundation options that can be considered and discussed include but is not limited to the following:

- Engineered Fill / Rockfill mattress.
 - Raft foundations.
 - Piled or pier foundations on competent bedrock material.
-
- It is recommended that an efficient surface water drainage system be installed around the structure to ensure that moisture contents in the soils near foundations are kept stable. Water seepage and ponding will result in differential movement of the structure.

 - Please note that the recommendations and findings are based on limited site investigation information and data in the form of point source trial pits. It is essential that the site be inspected during bulk earthworks by a qualified engineering geologist or geotechnical engineer prior to the construction of the foundations, to confirm soil conditions encountered in this investigation and / or identify any differences.

4 SOLAR FARM INVESTIGATION

4.1 Trial Pit Profiling

A total of eight (8) trial pits, numbered SF 1 to SF 8 were excavated utilising a CAT 426 4x4 TLB-type excavator on the 5th, 8th and the 18th of February 2025 with pit positions indicated in the figure below. Test pits were generally excavated to a depth of 3.00 mbgl or refusal. Profiling of the trial pits were conducted according to the Guidelines for Soil and Rock Profiling in South Africa (Sept 2008).

Detailed trial pit profiles are included as Appendix C-1.



Figure 8: Solar Farm – Trail Pit Layout

4.2 Generalised soil profile

The following generalised soil conditions can be expected based on limited point source test pit information obtained from test pits.

The site is generally covered by fill / spoil material that is likely related to previous construction. The imported soil material is generally composed of silty sand to sandy clay with frequent to abundant gravel, bricks and cobbles. This imported soil horizon was found to highly variable in composition and highly collapsible with sidewall collapse/ overbreak observed in most test pits. The material has a thickness of

up to 1.70 m as encountered in test pit SF 1.

The transported soil material is underlain by residual siltstone material generally composed of silty clay to sandy clay with scattered to abundant angular gravel and cobbles. The material exhibits a micro-shattered to an intact (relic) soil structure with a firm to dense consistency. The residual siltstone material has a thickness up to and potentially in excess of 1.10 m in portions of the site.

Siltstone bedrock was encountered in 7 of the 8 test pits. The bedrock material is highly to moderately weathered, very fine grained, thinly jointed and highly fractured with a soft rock to hard rock hardness. The bedrock material was encountered from a depth of 1.10 to 1.70 mbgl (mean 1.51 mbgl).

Detailed test pit logs and photographs are attached in Appendix C-1. The generalised soil profile the site is indicated in the Figure below.



Photo 3: Site conditions - Solar Farm

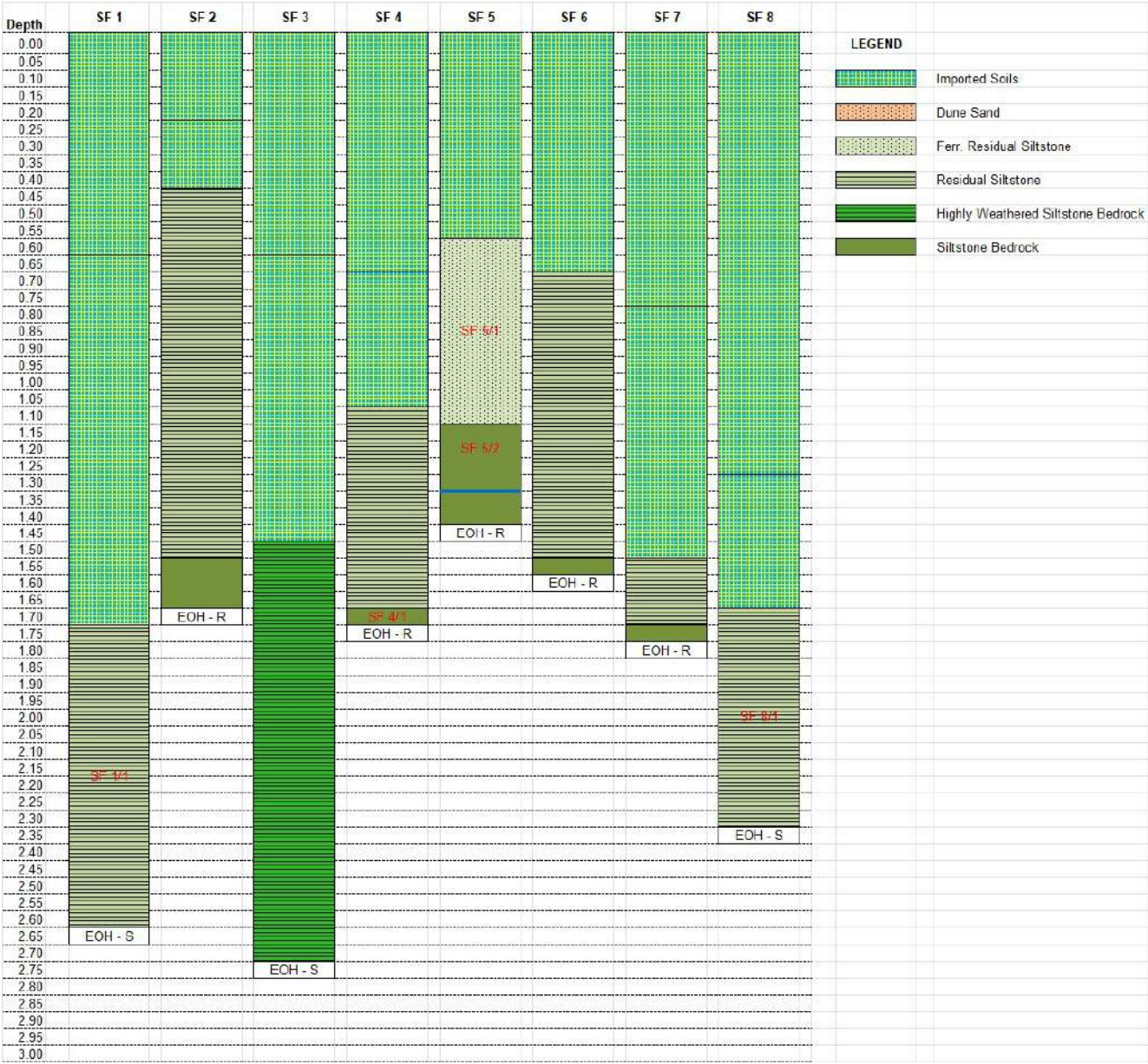


Figure 9: Conceptual Soil Profile – Solar Farm Area

4.3 Excavatability

It was possible to excavate trial pits by TLB to a depth between 1.40 and 2.70 mbgl (mean 1.95 mbgl) after which excavation refused on siltstone bedrock material or excavation was stopped as the required excavation depth was reached.

Table 5: Excavation Summary – Solar Farm

Test Pit No:	Coordinates		Excavation Depth	Depth to Bedrock	E.O.H Comment(Refused/Stopped)	G/W Seepage	Materials Encountered				
	Latitude	Longitude					Imported Soils	Hillwash	Residual Siltstone	H/W Siltstone Bedrock	Siltstone Bedrock
SF 1	-33.029040	27.907110	2.60	1.70	Stopped	1.80	0,00 - 1,70	–	1,70 - 2,60	–	2,60 - 2,65
SF 2	-33.029290	27.907140	1.65	1.50	Refused		0,00 - 0,40	–	0,40 - 1,50	–	1,50 - 1,65
SF 3	-33.029080	27.907470	2.70	1.45	Stopped	2.10	0,00 - 1,45	–	–	1,45 - 2,70	–
SF 4	-33.029290	27.907410	1.70	1.65	Refused		0,00 - 1,05	–	1,05 - 1,65	–	1,65 - 1,70
SF 5	-33.029125	27.907815	1.40	1.10	Refused	1.30	0,00 - 0,55	–	0,55 - 1,10	–	1,10 - 1,45
SF 6	-33.029310	27.907890	1.55	1.50	Refused		0,00 - 0,65	–	0,65 - 1,50	–	1,50 - 1,55
SF 7	-33.029270	27.908210	1.70	1.65	Refused		0,00 - 1,50	–	1,50 - 1,65	–	1,65 - 1,70
SF 8	-33.029380	27.908650	2.30	–	Stopped	2.30	0,00 - 1,65	–	1,65 - 2,30	–	–

4.4 Sidewall Stability

The sidewalls of the trial pits remained stable to moderately stable during profiling with little to no collapse or overbreak occurring. It is recommended that all excavations with a depth in excess of 1.0 m must be shored and/or battered back to safe angles to prevent any slope instability.

4.5 Groundwater Occurrences

Slight to moderate groundwater seepage was encountered in 4 of the 8 test pits from a depth between 1.30 to 2.30 mbgl (mean 1.88 mbgl).

The occurrence of seasonal groundwater seepage conditions is likely to occur across the proposed solar farm position.

4.6 Dynamic Cone Penetrometer Testing

A total of 9 DCP tests were conducted as part of the investigation. The tests were conducted at surface adjacent to each of the trial pits and at the bottom of test pits where possible.

The DCP testing does not give an accurate estimation on the expected excavation conditions and in-situ bearing capacity of the soil materials, as only the UCS of the material is determined. The testing is however useful to get a basic estimation of existing in-situ conditions.

Please note the calculated DCP values does not incorporate any factor of safety and is only applicable to soil moisture contents during investigation. Processed DCP results are attached in Appendix B-3.

4.7 Laboratory Testing

Selected samples were taken of the prominent soil horizons identified during the site investigation for detailed laboratory analysis. The samples were submitted to Messrs. Labco (Pty) Ltd, Civil engineering materials and geotechnical laboratory in East London on the 6th of February 2025. Results were received on the 24th of March 2025. Materials were generally tested for the following:

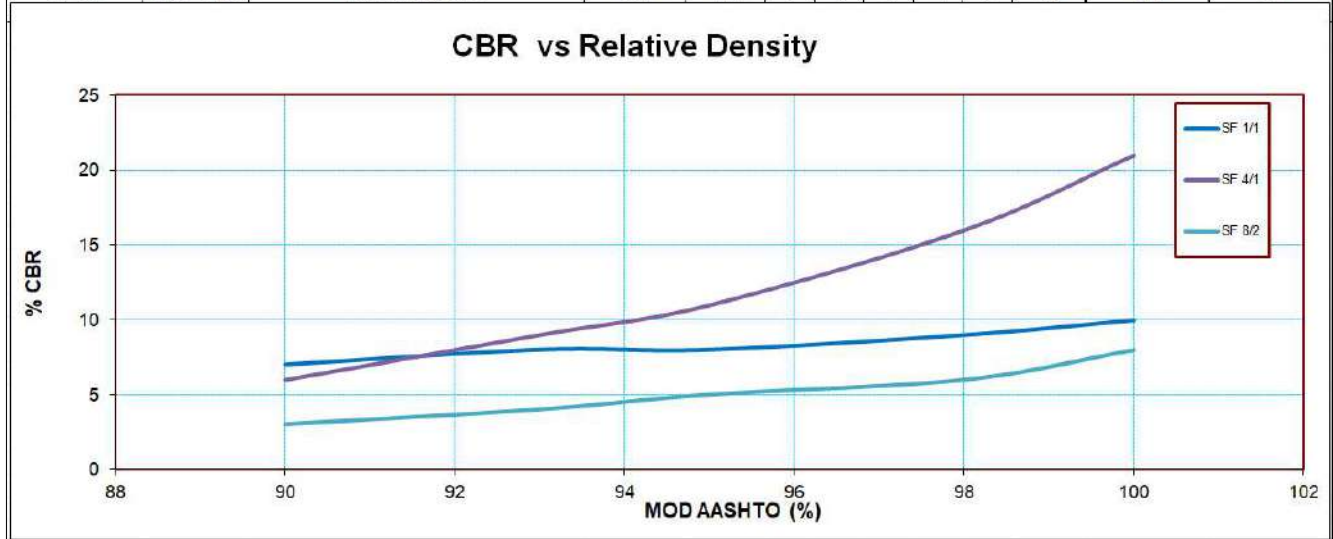
- Sieve Analysis including Hydrometer to determine % clay.
- Atterberg Limits
- Foundation Indicators
- Maximum Dry Density
- Optimum Moisture Content
- CBR vs MOD AASHTO density
- % Swell
- TRH14 / COLTO Classification

Processed laboratory results are summarised in the Tables below. Analysis certificates are attached in Appendix D for reference.

Table 6: Summarised lab results - Solar Farm

SAMPLE INFORMATION			GRADING ANALYSES				ATTERBERG LIMITS			LS	Moisture	UNIFIED (ASTM D2487)
Number	Depth (m - m)	Material Origin	Gravel %	Sand %	Silt %	Clay %	LL %	PI %	PI*	%	%	Soil Classification
SF 1/1	1,70 - 2,60	Residual Siltstone / H/w Siltstone Bedrock	60	13	18	9	31	9	3,2	4,0	10,10	GC: Clayey gravel
SF 8/1	1,65 - 2,30	Residual Siltstone	23	40	23	14	26	7	5,3	3,5	17,50	SC - SM: Silty, clayey sand with gravel

Sample Number	Depth	Origin	MOD. AASHTO		CBR at % MOD.AASHTO					Swell	TRH14 Class	Colto
			MDD Kg/m ³	OMC %	100	98	95	93	90			
SF 1/1	1,70 - 2,60	Residual Siltstone / H/w Siltstone Bedrock	1811	15,1	10	9	8	8	7	0,6	G10	G9
SF 4/1	1,65 - 1,70	Siltstone Bedrock	2013	10,4	21	16	11	9	6	0,4	G10	G9
SF 8/2	1,65 - 2,30	Residual Siltstone	1934	11,4	8	6	5	4	3	0,6	G10	G10



4.8 Geotechnical Properties of Materials

Based on the site investigation results and laboratory data the following adverse geotechnical conditions can be expected and should be allowed for in the foundation design.

- The transported and residual materials are potentially moderately to highly compressible / collapsible with a combined settlement in excess of 10 mm expected.
- The materials are not potentially expansive.
- The materials are potentially highly erodible and dispersive.

4.9 Material Utilisation

None of the sampled materials have good TRH14 classifications with low maximum CBR's. The materials are therefore not suitable for use in any engineered fills and not suitable for use during construction. Potential application of the materials can be discussed.

4.10 Foundation Conditions & Recommendations

In the light of the results of this investigation the site is deemed to be SUITABLE for the placement of the proposed solar farm with the implementation of special precautionary measures, giving due cognizance to the following aspects.

- ❑ The moderately hard rock siltstone bedrock material on which excavation by TLB refused on 5 of the 8 test pits from a depth of 1.10 to 1.65 mbgl (mean 1.48 mbgl) is a suitable competent horizon for foundations.
- ❑ The residual siltstone materials are deemed to highly compressible / collapsible with a calculated collapse / consolidation settlement greatly in excess of 10 mm.
- ❑ The soil materials are not expansive.
- ❑ The following foundation options can be considered for the proposed solar farm.:
 - The fill / imported soil materials have to be stripped to spoil.
 - Foundations on competent siltstone bedrock material at average depth 1.59 mbgl, with an estimated safe bearing capacity exceeding 200 kPa.
 - The following foundation options that can be considered for portions with deeper soils.
 - Deep strip foundations on competent horizon.
 - Pier foundations excavated up to competent horizon.
 - Rockfill mattress utilising imported materials (G5 and better) and incorporation of geotextiles depending on design requirements.
 - Raft foundations.
- ❑ It is recommended that an efficient surface water drainage system be installed around the structure to ensure that moisture contents in the soils near foundations are kept stable. Water seepage and ponding will result in differential movement of the structure.
- ❑ Please note that the recommendations and findings are based on limited site investigation information and data in the form of point source trial pits. It is essential that the site be inspected during bulk earthworks by a qualified engineering geologist or geotechnical engineer prior to the construction of the foundations, to confirm soil conditions encountered in this investigation and / or identify any difference.

5 SUMMARY AND RECOMMENDATIONS

- AGES Omega (Pty) Ltd was appointed by the Sunwater East London Joint Venture (Pty) Ltd to conduct detailed engineering geological investigations in support of the feasibility study for the proposed 0.5 MLD solar-powered seawater desalination plant and related infrastructure i.e. solar farm, desalination plant and 1 ML reservoir, at the port of East London.
- The investigation was requested by Mr. Patrice Boyer of the firm Impact Water Solutions (Pty) Ltd and Mr. Jarl Heurlin of the firm Norland Construction, on behalf of the Sunwater East London Joint Venture (Pty) Ltd.
- The investigation was conducted at the proposed Solar Farm area, Desalination Plant area and proposed 1 ML reservoir.
- According to the 1: 250 000 geological map 3326 GRAHAMSTOWN and the 1:50 000 geological map 3327 BB EAST LONDON; the project area is underlain by the rocks of the Middleton and Balfour Formation (Pa) that forms part of the Adelaide Subgroup of the Karoo Supergroup sequence of rocks. The lithology of the formations comprise of mudstone, sandstone, locally overlain by soil >1m thick. The Formation dips to the northwest at approximately 5 degrees. The geology maps do not indicate any prominent geological structures such as fault zones and/or lineaments derived from LANDSAT imagery that intersect the project area. The area does not reflect any risk for the formation of sinkholes or subsidence caused by the presence of water-soluble rocks.
- Site investigation was conducted as follow:
 - Desalination Plant: A total of four (4) trial pits, numbered DS 1 to DS 4 were excavated utilising a CAT 426 4x4 TLB-type excavator on the 4th of February 2025.
 - Reservoir Site: A total of three (3) trial pits, numbered RS 1 to RS 3 were excavated utilising a CAT 426 4x4 TLB-type excavator on the 5th of February 2025.
 - Solar Farm Area: A total of eight (8) trial pits, numbered SF 1 to SF 8 were excavated utilising a CAT 426 4x4 TLB-type excavator on the 5th, 8th and the 18th of February 2025.
- Selected samples were taken of the prominent soil horizons identified during the site investigation for detailed laboratory analysis. The samples were submitted to Messrs. Labco (Pty) Ltd, Civil engineering materials and geotechnical laboratory in East London on the 6th of February 2025. Results were received on the 24th of March 2025.
- The materials are generally highly collapsible / compressible and prone to differential collapse / consolidation settlement. The material is also highly erodible. The materials are not potentially expansive due to low clay contents and weighted plasticity indexes.

- The materials are generally not suitable for use during construction due to very low CBR values and general THR14 classifications of G10 or poorer.
- Detailed results and recommendations are discussed in Chapter 2, 3 and 4 of the report regarding the site conditions and recommendations for the Desalination Plant, Reservoir and Solar Farm respectively.
- Please note that the recommendations and findings are based on limited site investigation information and data in the form of point source trial pits. It is essential that the site be inspected during bulk earthworks by a AGES prior to the construction of the foundations, to confirm soil conditions encountered in this investigation and / or identify any difference.

6 BIBLIOGRAPHY

BELL, P and WRIGHT, D, 1985.

Rocks and Minerals. Hamlyn Practical Guides, Hamlyn Publishing, England.

BRINK, A B A, 1979.

Engineering Geology of Southern Africa, Vol. 3. Building Publications, Pretoria.

CRAIG RF, 1997.

Soil Mechanics, Sixth Edition. Department of Civil Engineering, University of Dundee UK.

CALITZ, F, 1998.

The adaptation of existing terrain evaluation techniques for application in engineering geological reconnaissance investigations in developing countries. *M.Sc.-thesis*, Potchefstroomse Universiteit vir Christelike Hoër Onderwys.

MIDGLEY, D C, PITMAN, W V and MIDDLETON, B J, 1994.

Surface water resources of South Africa 1990, Book of Maps. Water Research Commission report number 298/5.2/94.

SOUTH AFRICAN COMMITTEE FOR STRATIGRAPHY (SACS), 1980.

Stratigraphy of South Africa. Part 1 (Comp L E Kent). Lithostratigraphy of the Republic of South Africa, South West Africa/Namibia, and the Republics of Bophuthatswana, Transkei and Venda. *Handbook of the Geological Survey of South Africa*, No. 8, Government Printer, Pretoria.

THE NATIONAL HOME BUILDERS REGISTRATION COUNCIL, 1995.

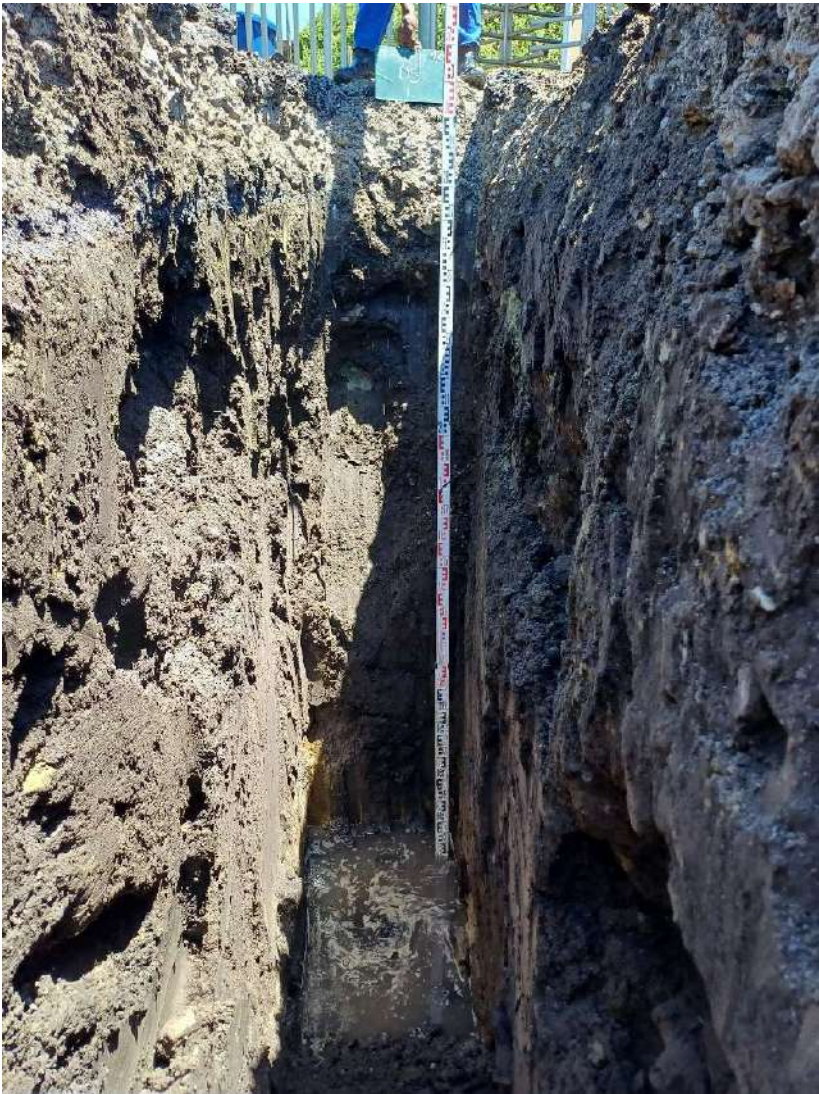
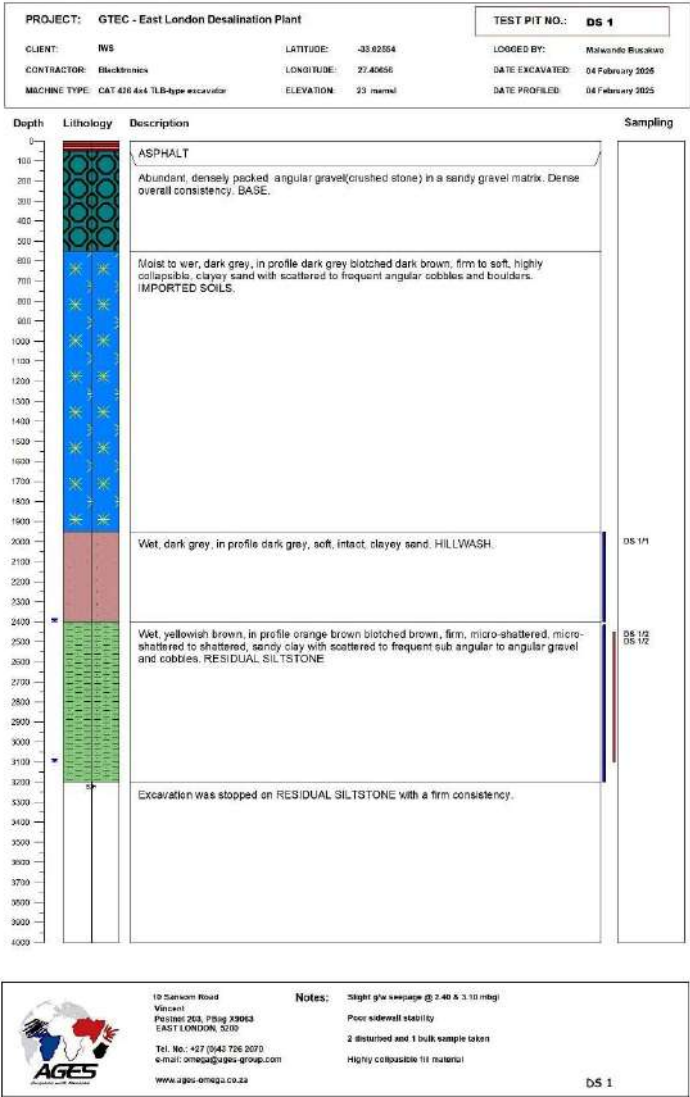
Standards and guidelines. First issue, May 1995.

WEINERT, H H, 1980.

The natural road construction materials of Southern Africa. Academia, Cape Town.

APPENDIXES

APPENDIX A 1 – DESALINATION PLANT TESTPIT LOGS & PHOTOS



PROJECT: GTEC - East London Desalination Plant			TEST PIT NO.: DS 2
CLIENT: IWS	LATITUDE: -33.02871	LOGGED BY: Mthwando Gasekwe	
CONTRACTOR: Blacktronics	LONGITUDE: 27.90671	DATE EXCAVATED: 04 February 2025	
MACHINE TYPE: CAT 426 4x4 TLG-type excavator	ELEVATION: 23. m above	DATE PROFILED: 04 February 2025	

Depth	Lithology	Description	Sampling
0		Moist, dark brown, soft, clayey sand. Roots, IMPORTED SOILS.	DS 21
100			
200		Moderately densely packed gravel and bricks in a dusky brown, silty sand matrix. FILL/IMPORTED SOILS.	
300			
400		Moist, brown, micro-chattered, firm, highly collapsible, clayey sand with frequent gravel and boulders. IMPORTED SOILS.	
500			
600			
700			
800			
900			
1000			
1100			
1200			
1300			
1400			
1500		Very moist, dark brown, soft, clayey sand with scattered gravel and boulders. IMPORTED SOILS.	
1600			
1700			
1800			
1900			
2000			
2100			
2200			
2300			
2400			
2500		Excavation was stopped on IMPORTED SOILS with a soft consistency.	
2600			
2700			
2800			
2900			
3000			
3100			
3200			
3300			
3400			
3500			
3600			
3700			
3800			
3900			
4000			
4100			
4200			
4300			
4400			



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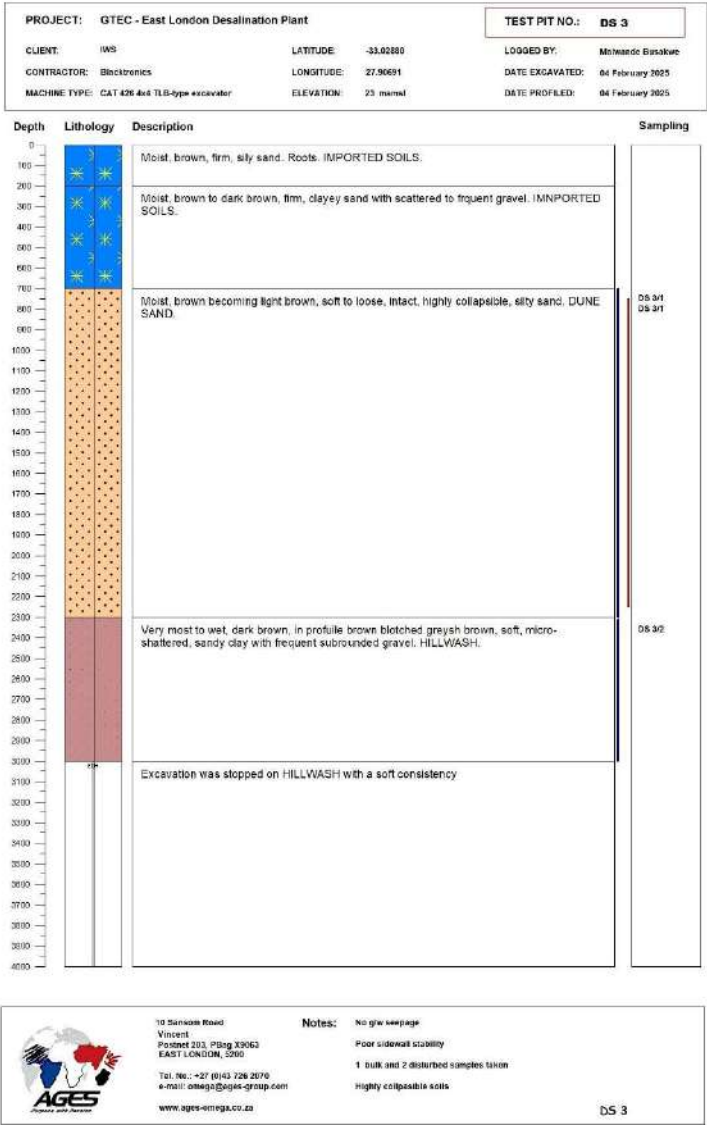
Notes:

No glw seepage
Poor sidewall stability
1 bulk sample taken
Highly collapsible soils

DS 2

A photograph of a test pit excavation. A measuring tape is placed vertically along the right side of the pit, indicating depth. The soil is dark brown and appears moist. There are some roots visible in the soil. The pit is surrounded by green grass. A person's leg and boot are visible at the top left of the pit.

30



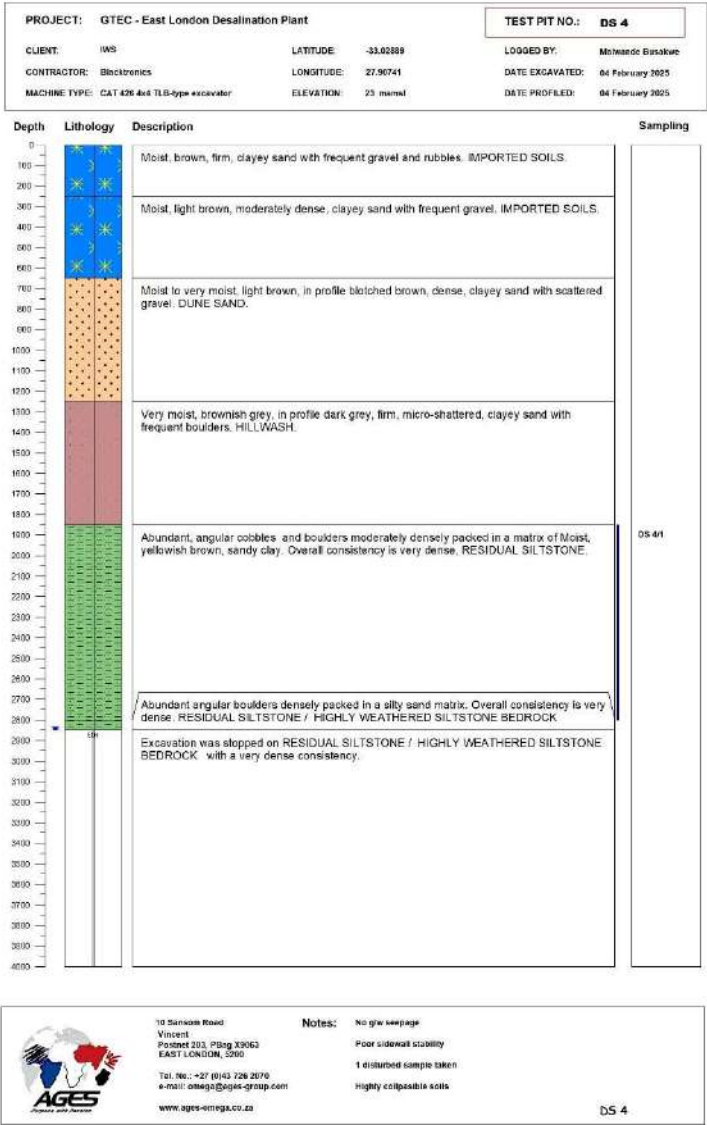


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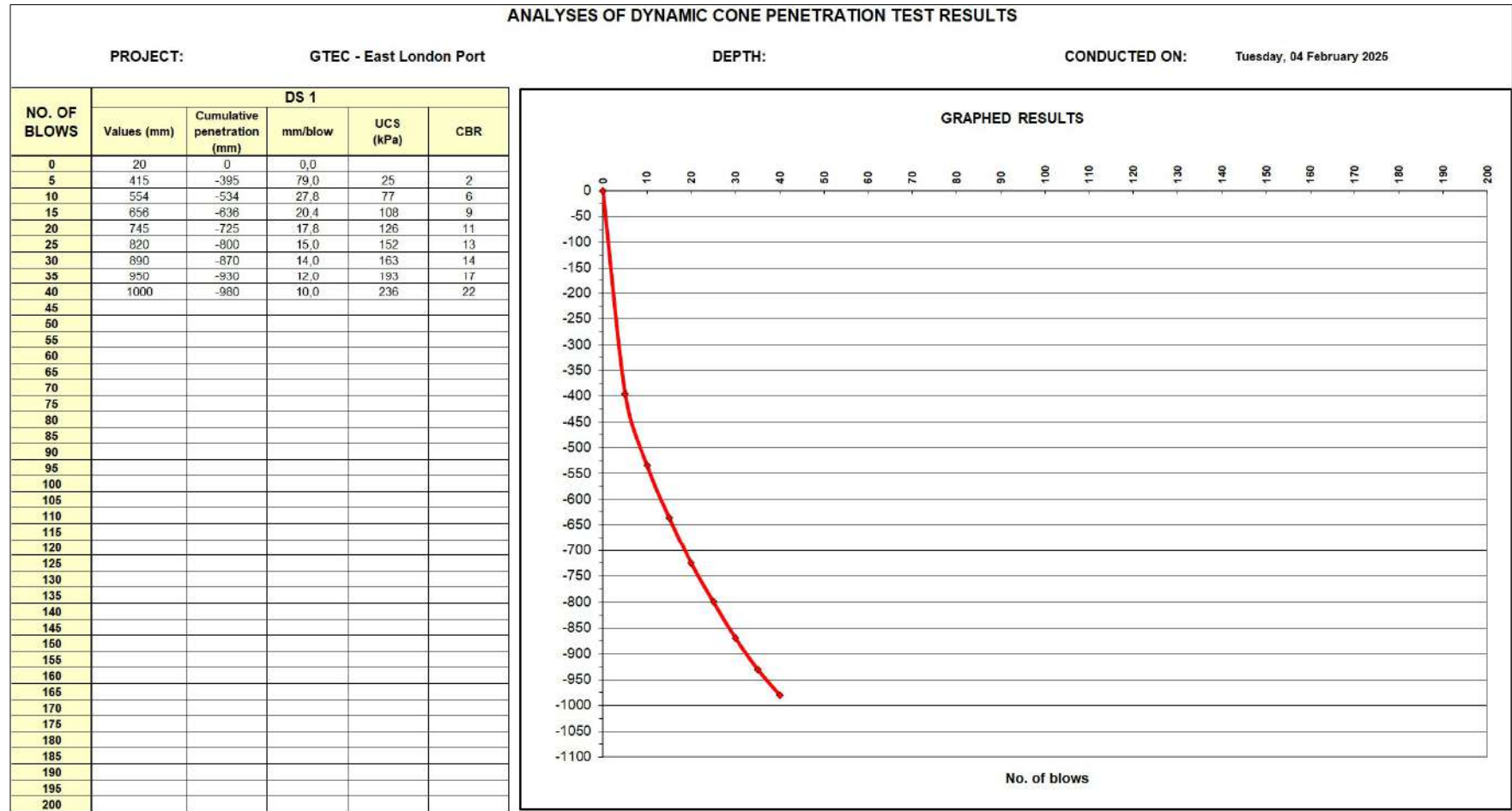
Notes:
No g/w seepage
Poor sidewall stability
1 bulk and 2 disturbed samples taken
Highly collapsible soils

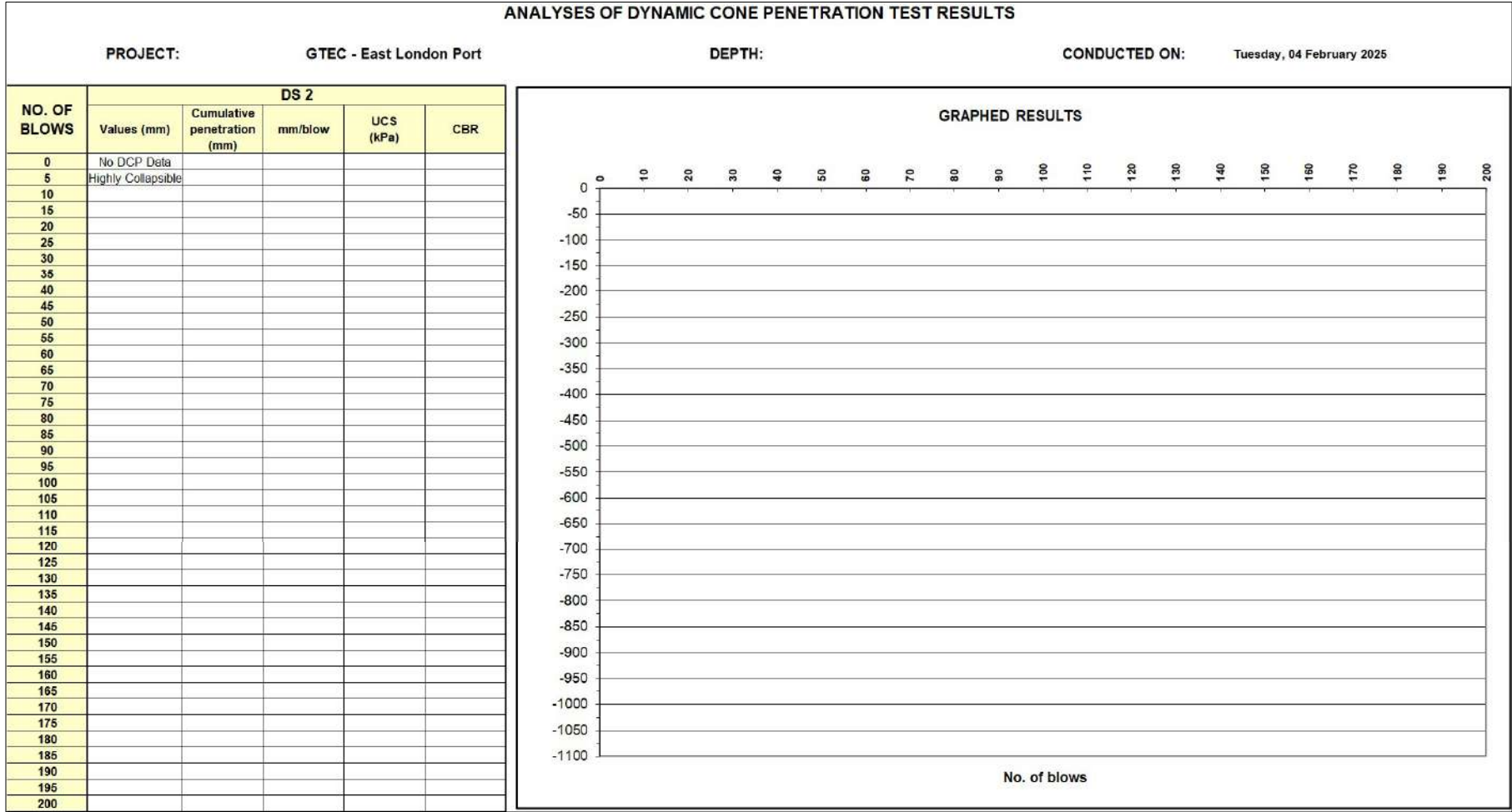
DS 3

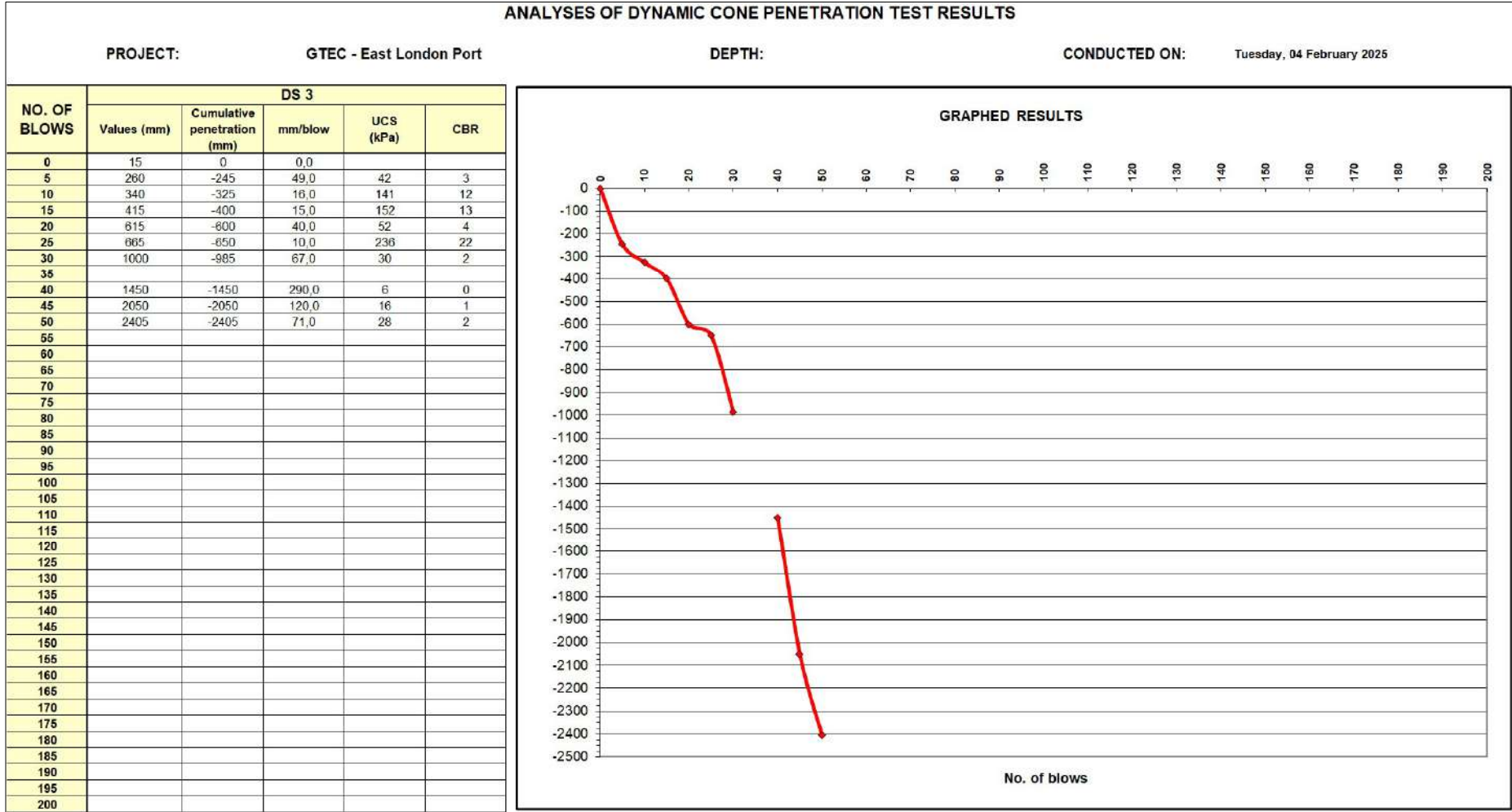




APPENDIX A 2 – DASALINATION PLANT DYNAMIC CONE PENETROMETER DATA



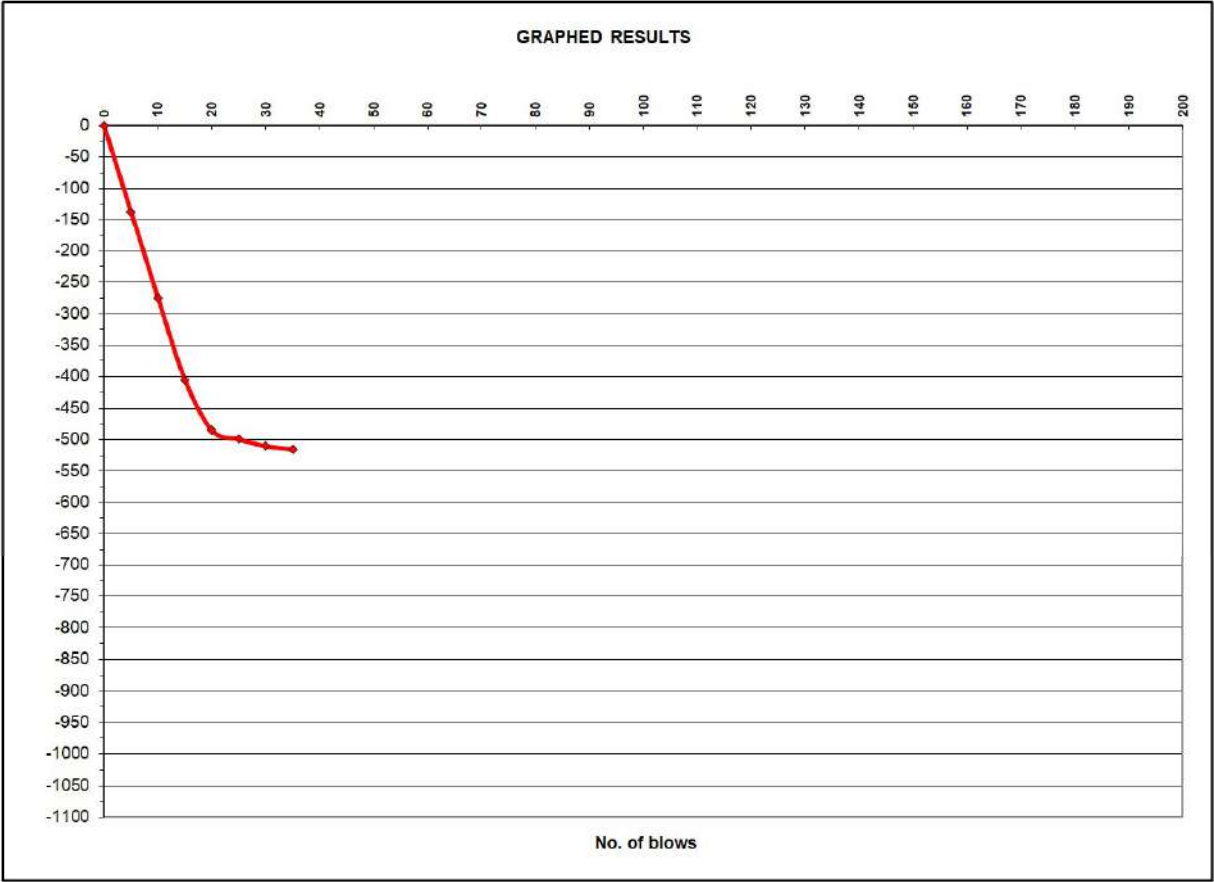




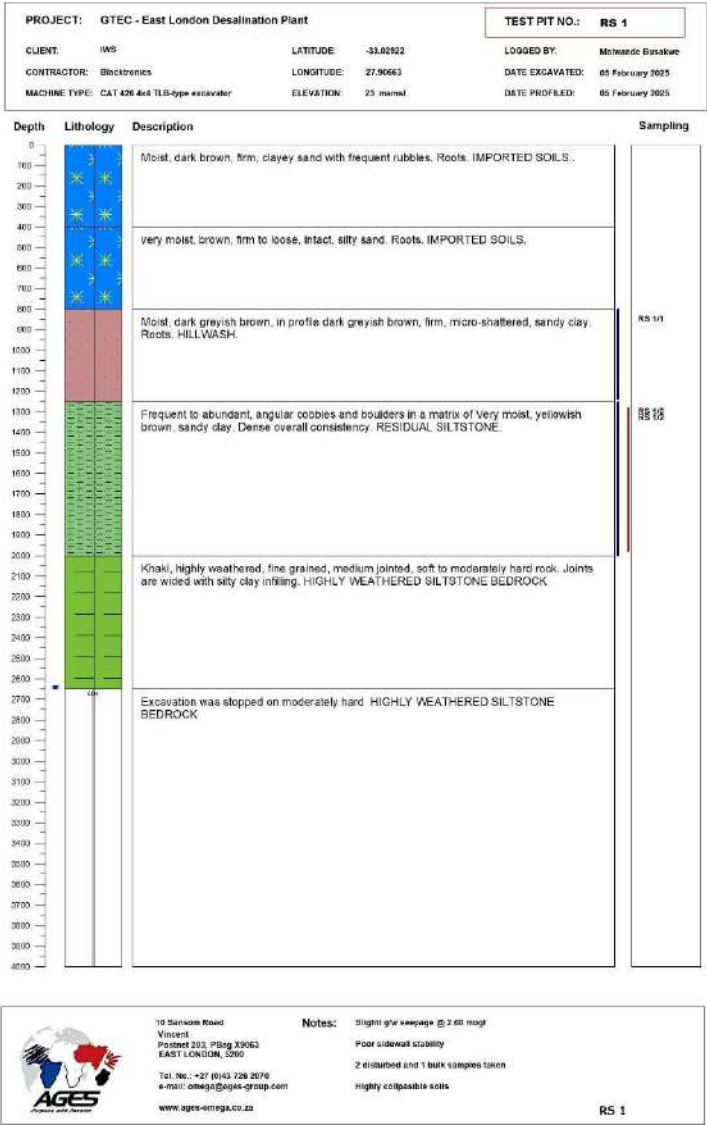
ANALYSES OF DYNAMIC CONE PENETRATION TEST RESULTS

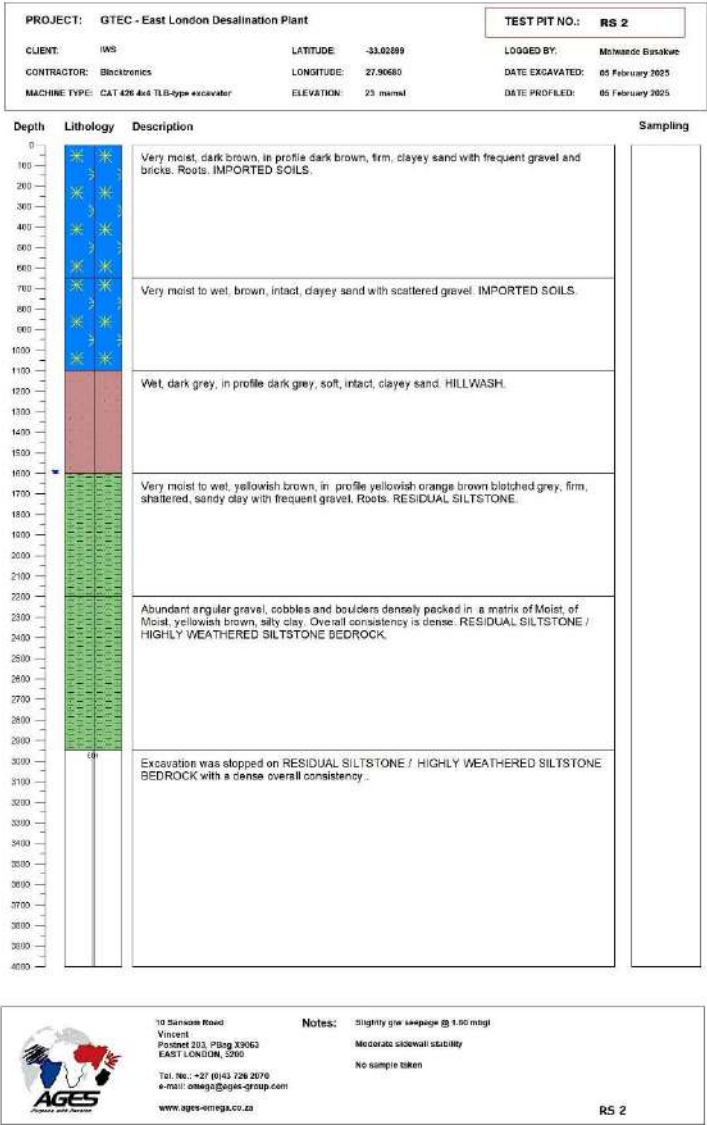
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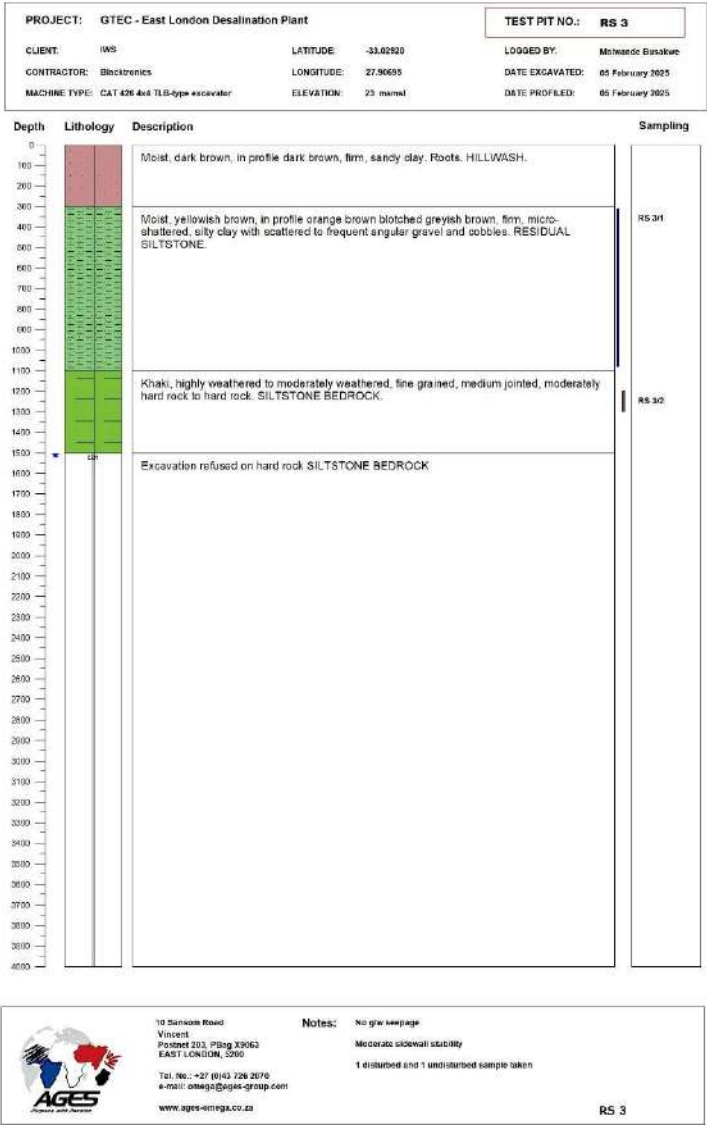
NO. OF BLOWS	DS 4				
	Values (mm)	Cumulative penetration (mm)	mm/blow	UCS (kPa)	CBR
0	85	0	0.0		
5	222	-137	27.4	79	6
10	360	-275	27.6	78	6
15	490	-405	28.0	83	7
20	570	-485	18.0	141	12
25	584	-499	2.8	944	111
30	595	-510	2.2	1228	151
35	600	-515	1.0	2900	410
40					
45					
50					
55					
60					
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APPENDIX B 1 –RESERVOIR TESTPIT LOGS & PHOTOS







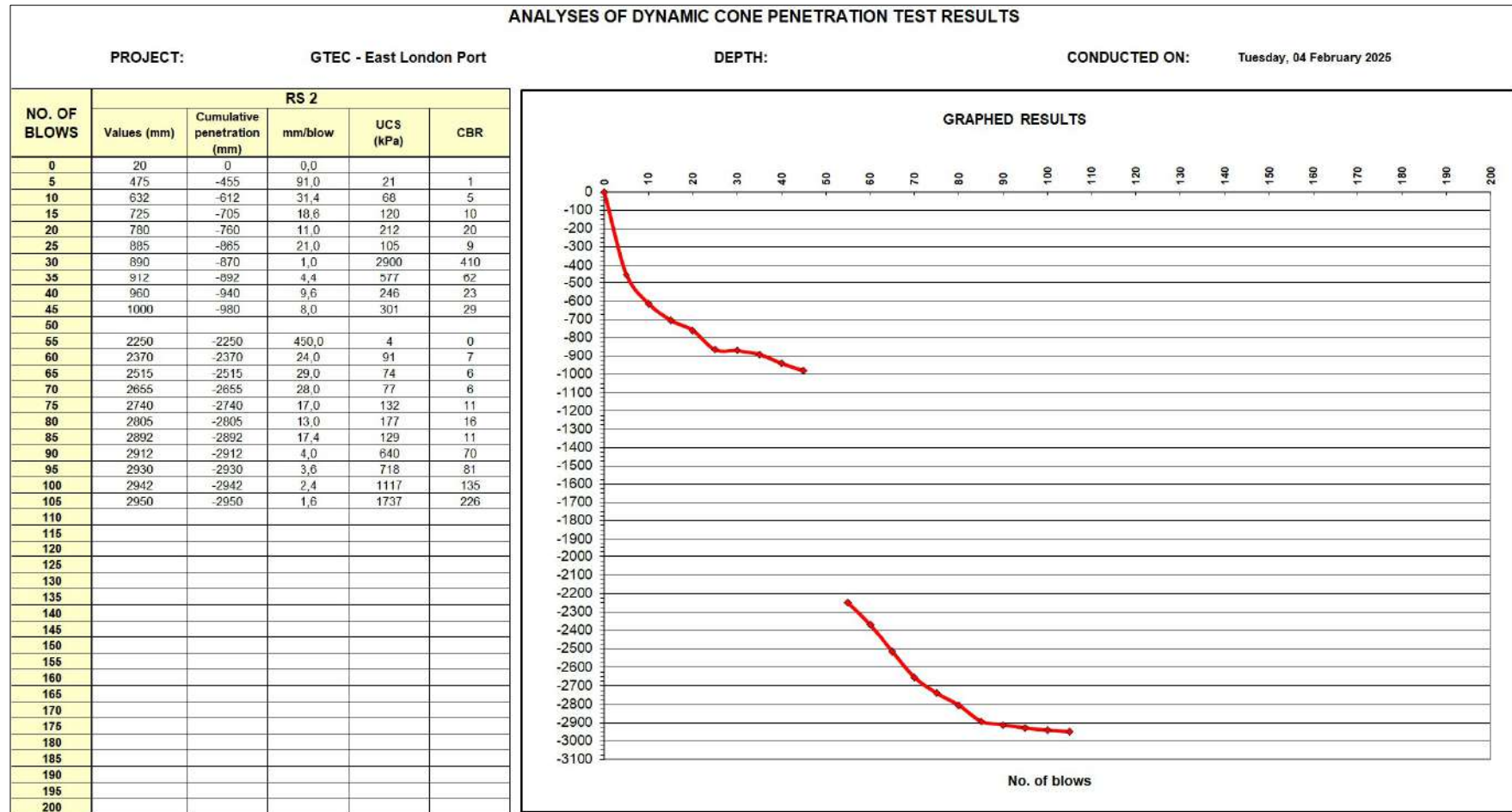
APPENDIX B 2 – RESERVOIR DYNAMIC CONE PENETROMETER DATA

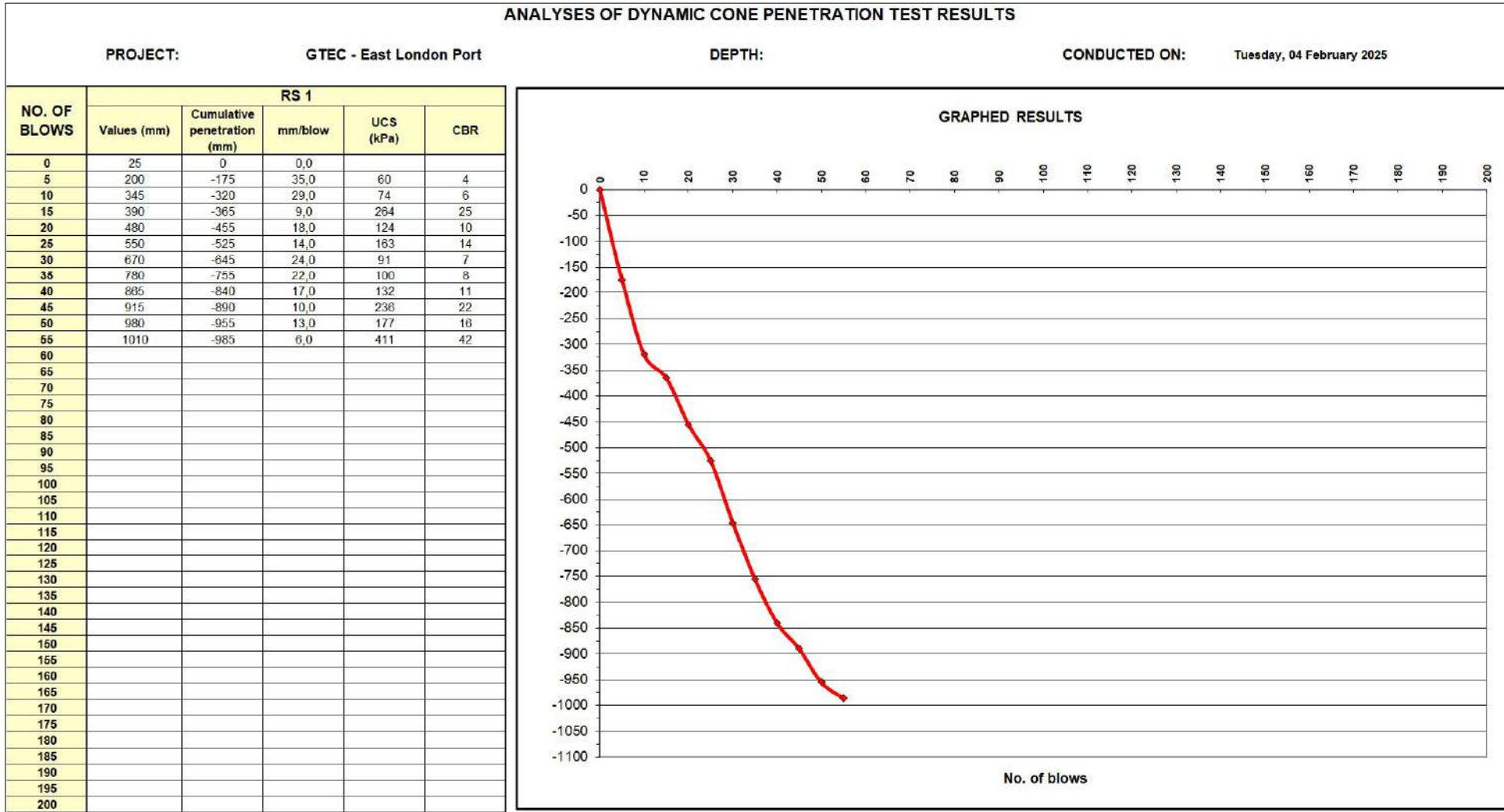
ANALYSES OF DYNAMIC CONE PENETRATION TEST RESULTS

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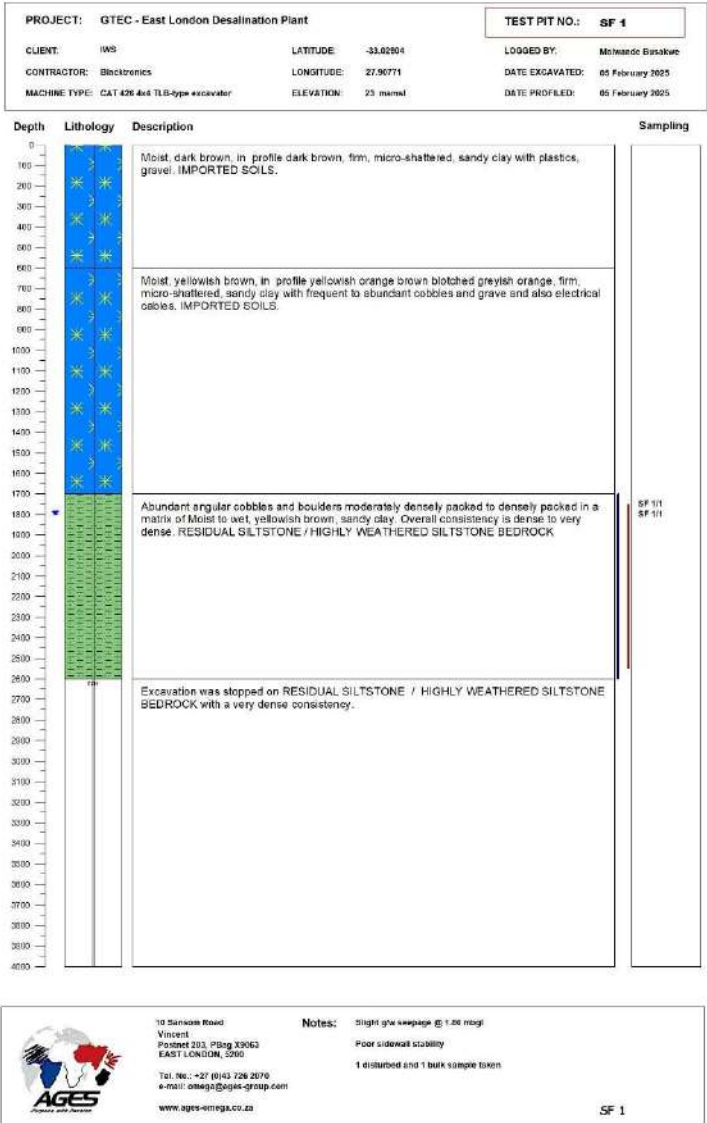
NO. OF BLOWS	RS 1				
	Values (mm)	Cumulative penetration (mm)	mm/blow	UCS (kPa)	CBR
0	5	0	0.0		
5	162	-157	31.4	68	5
10	272	-267	22.0	100	8
15	405	-400	26.6	81	6
20	525	-520	24.0	91	7
25	635	-630	22.0	100	8
30	770	-765	27.0	80	6
35	895	-890	25.0	87	7
40	900	-895	1.0	2900	410
45					
50					
55					
60					
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75					
80					
85					
90					
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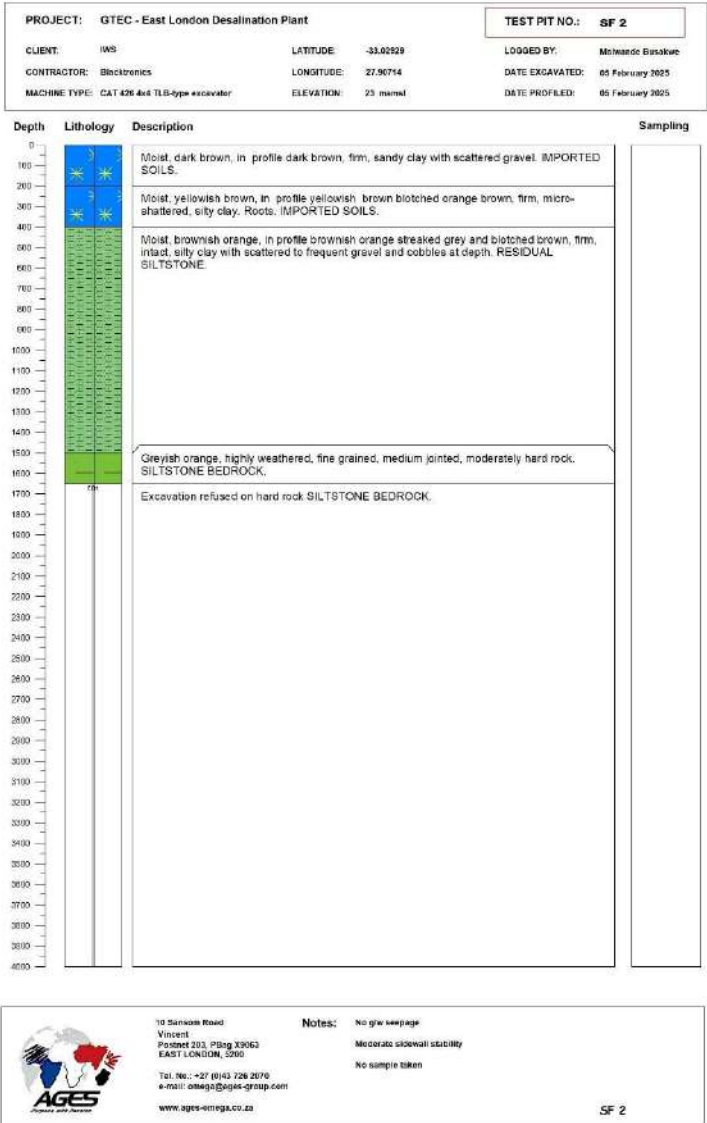


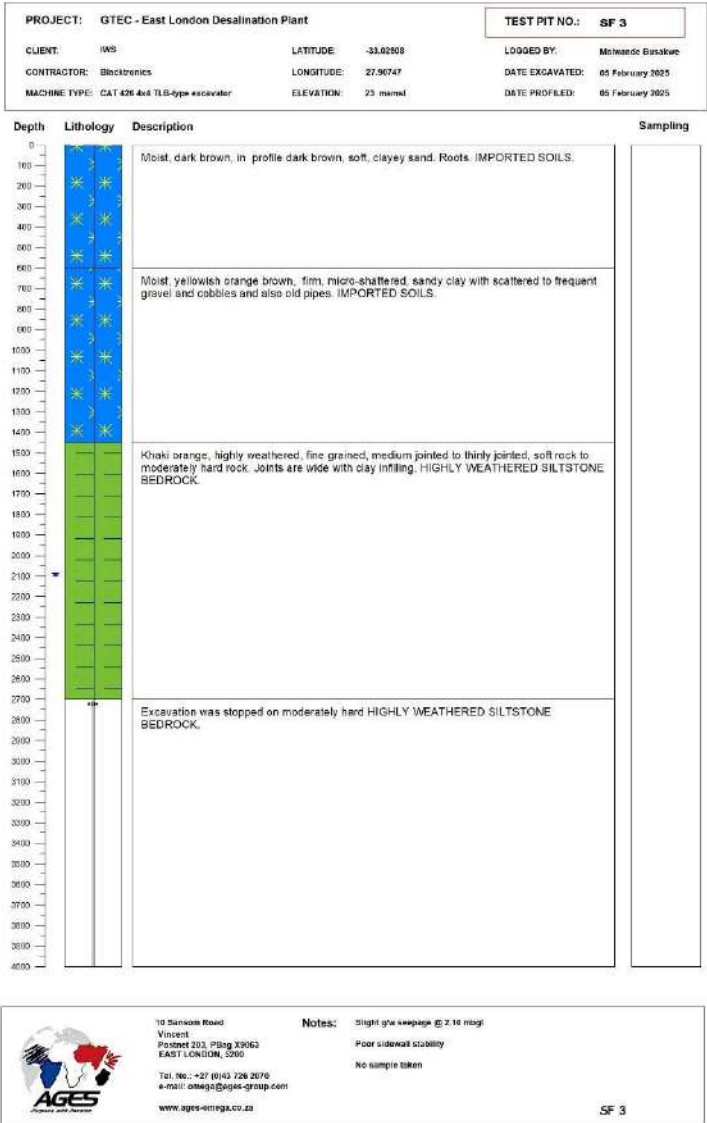


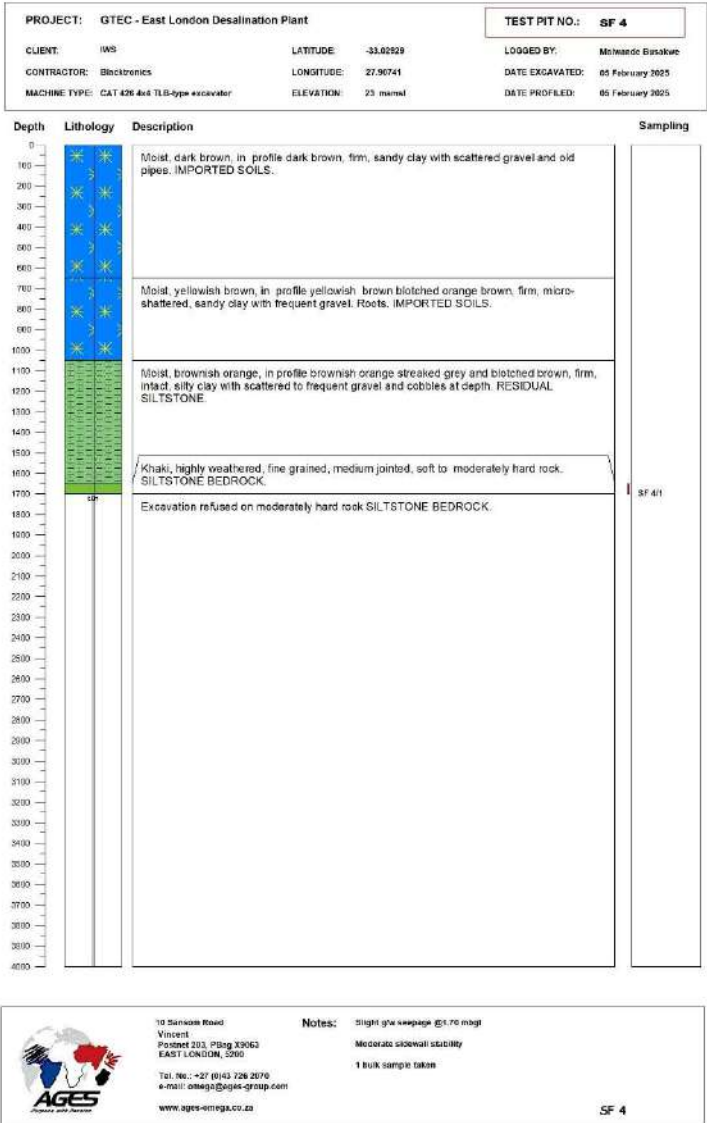


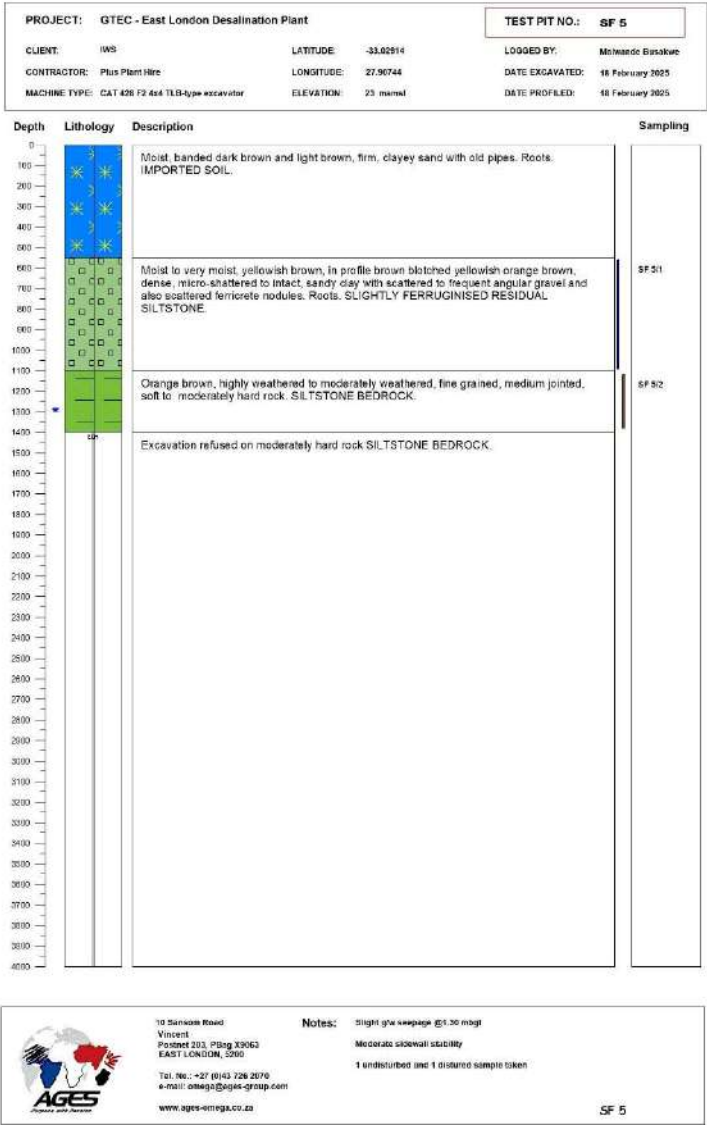
APPENDIX C 1 – SOLAR FARM TESTPIT LOGS & PHOTOS

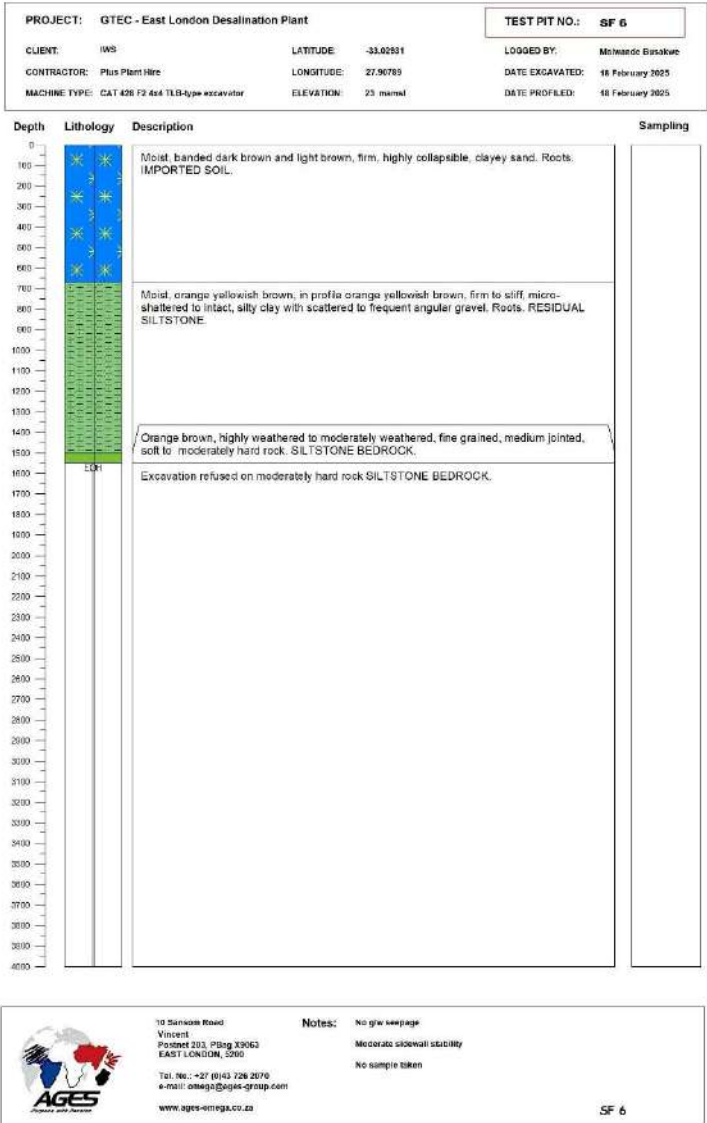


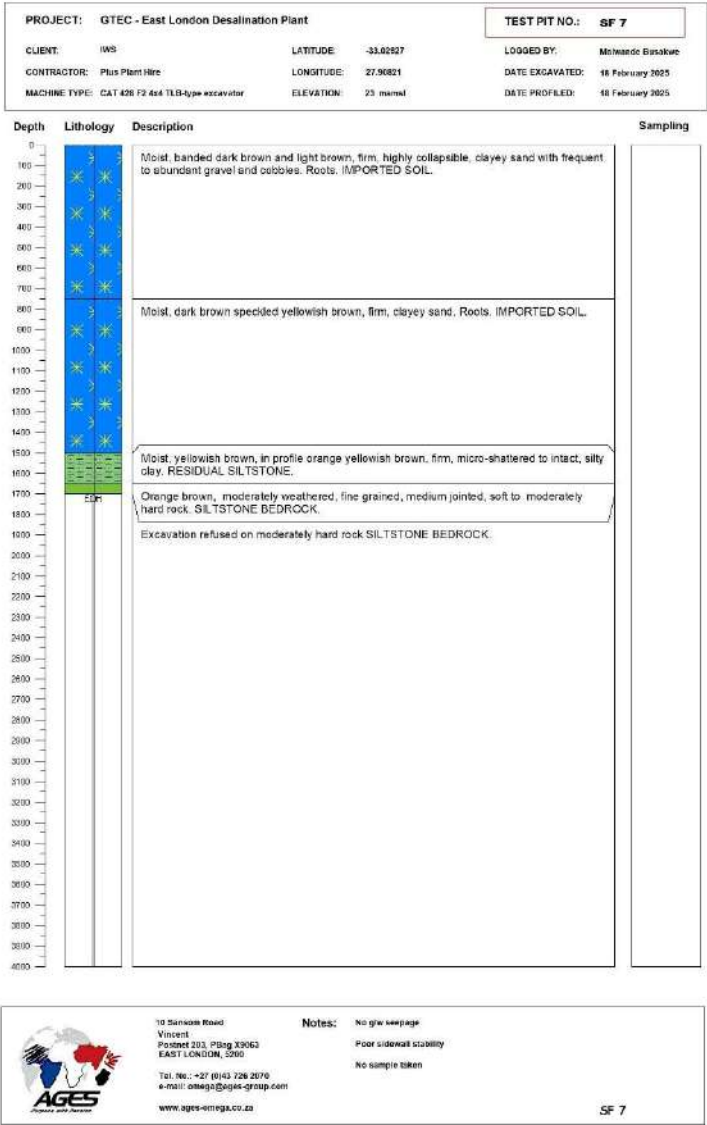


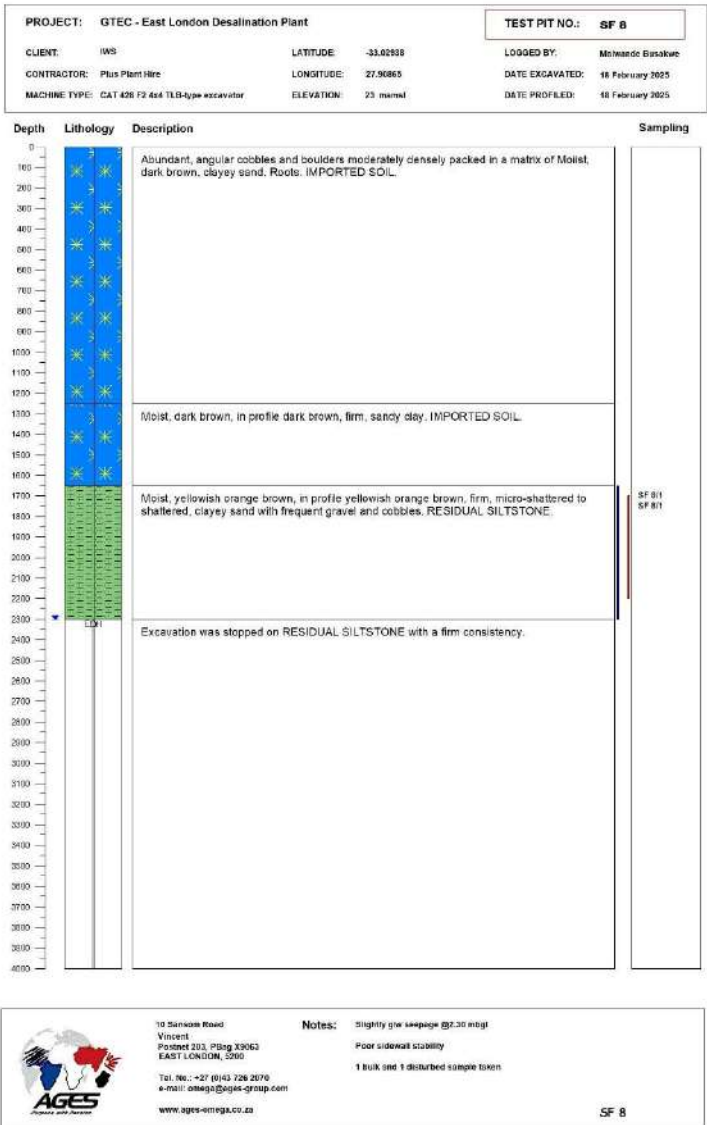












APPENDIX C 2 – SOLAR FARM DYNAMIC CONE PENETROMETER DATA

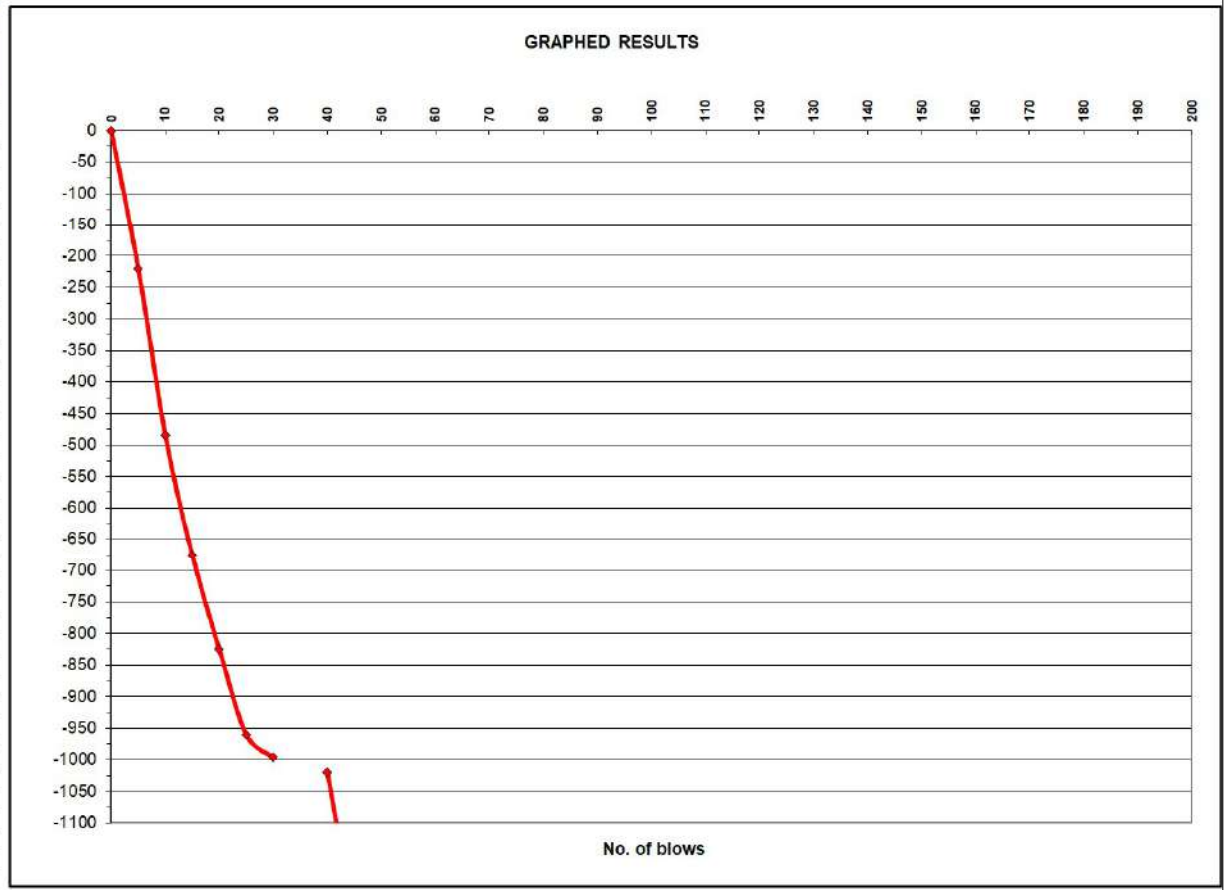
ANALYSES OF DYNAMIC CONE PENETRATION TEST RESULTS

PROJECT: GTEC - East London Port

DEPTH:

CONDUCTED ON: Tuesday, 04 February 2025

NO. OF BLOWS	SF 1				
	Values (mm)	Cumulative penetration (mm)	mm/blow	UCS (kPa)	CBR
0	5	0	0,0		
5	225	-220	44,0	47	3
10	489	-484	52,8	38	3
15	680	-675	38,2	55	4
20	830	-825	30,0	71	5
25	965	-960	27,0	80	6
30	1000	-995	7,0	348	35
35					
40	1020	-1020	204,0	9	0
45	1245	-1245	45,0	46	3
50	1385	-1385	28,0	77	6
55	1495	-1495	22,0	100	8
60	1580	-1580	17,0	132	11
65	1620	-1620	8,0	301	29
70	1652	-1652	6,4	383	39
75	1660	-1660	1,6	1737	226
80					
85					
90					
95					
100					
105					
110					
115					
120					
125					
130					
135					
140					
145					
150					
155					
160					
165					
170					
175					
180					
185					
190					
195					
200					



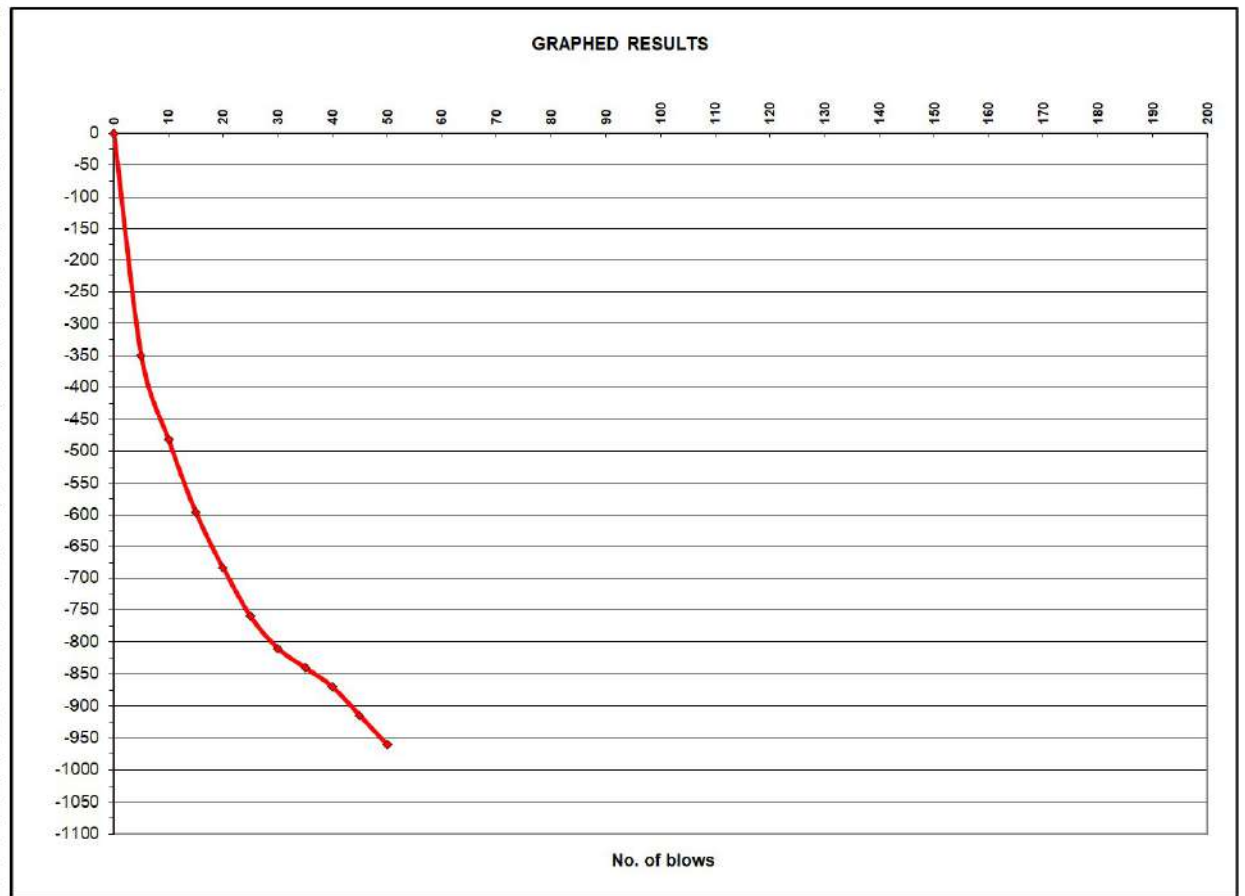
ANALYSES OF DYNAMIC CONE PENETRATION TEST RESULTS

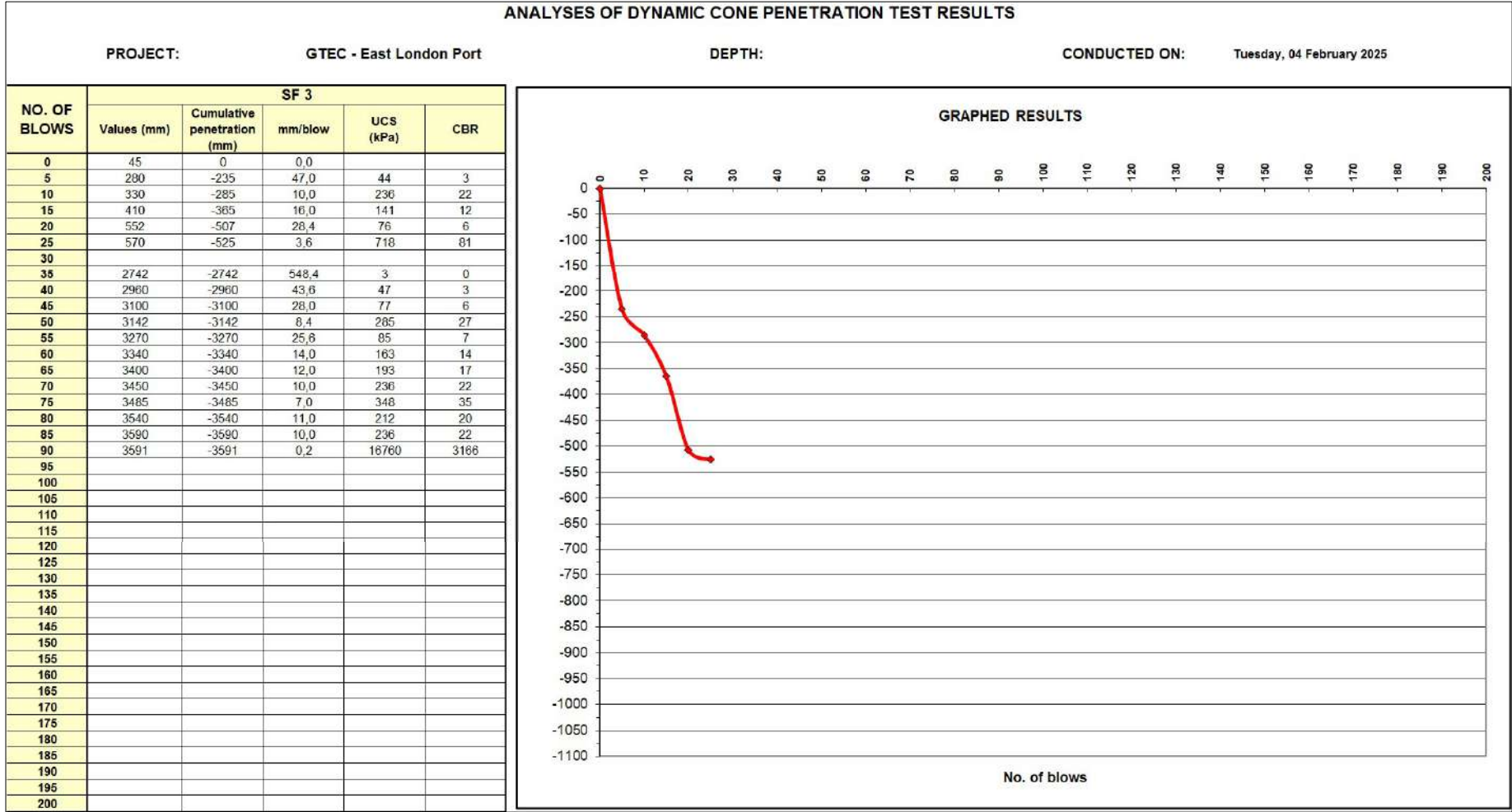
PROJECT: GTEC - East London Port

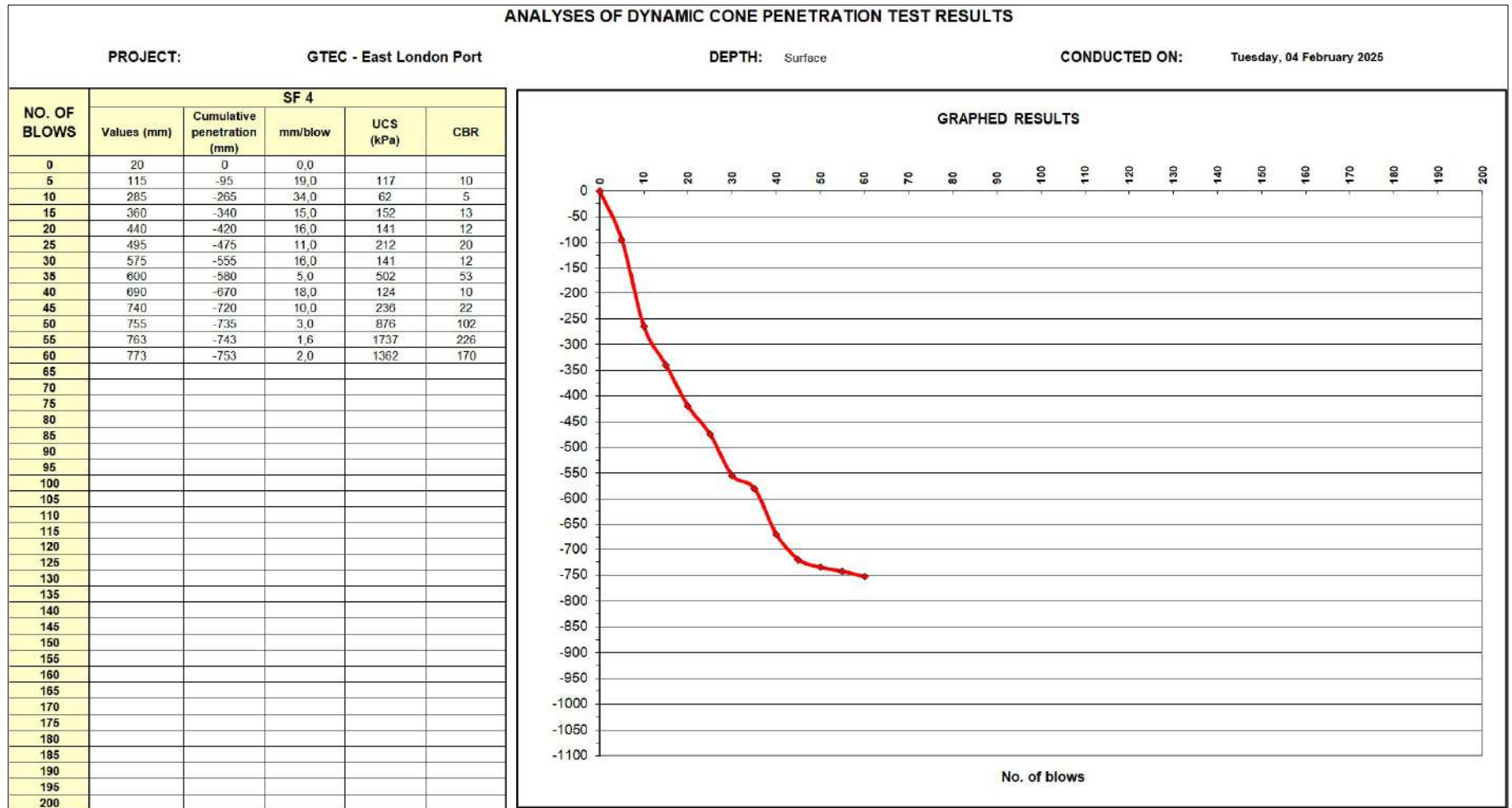
DEPTH:

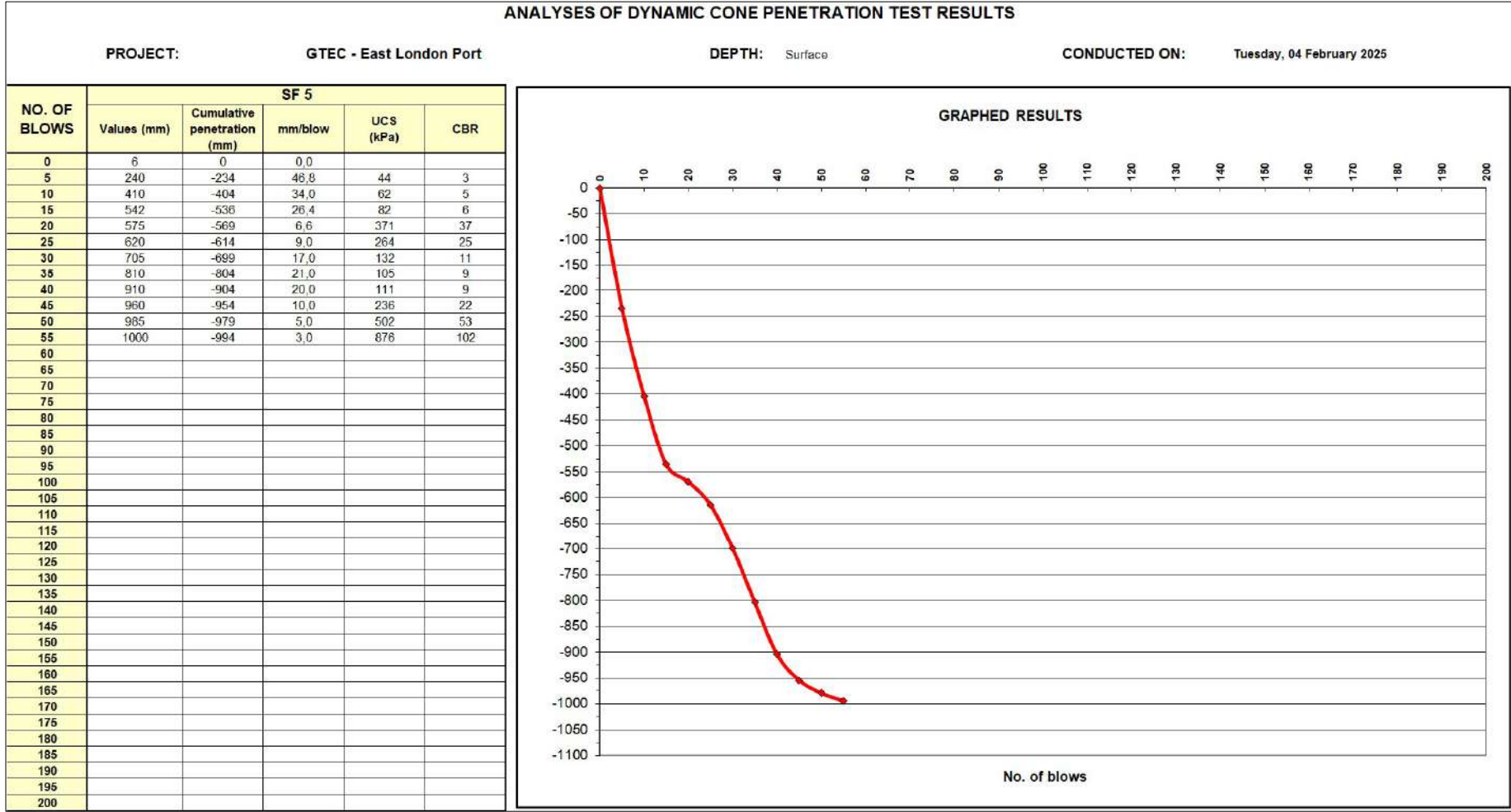
CONDUCTED ON: Tuesday, 04 February 2025

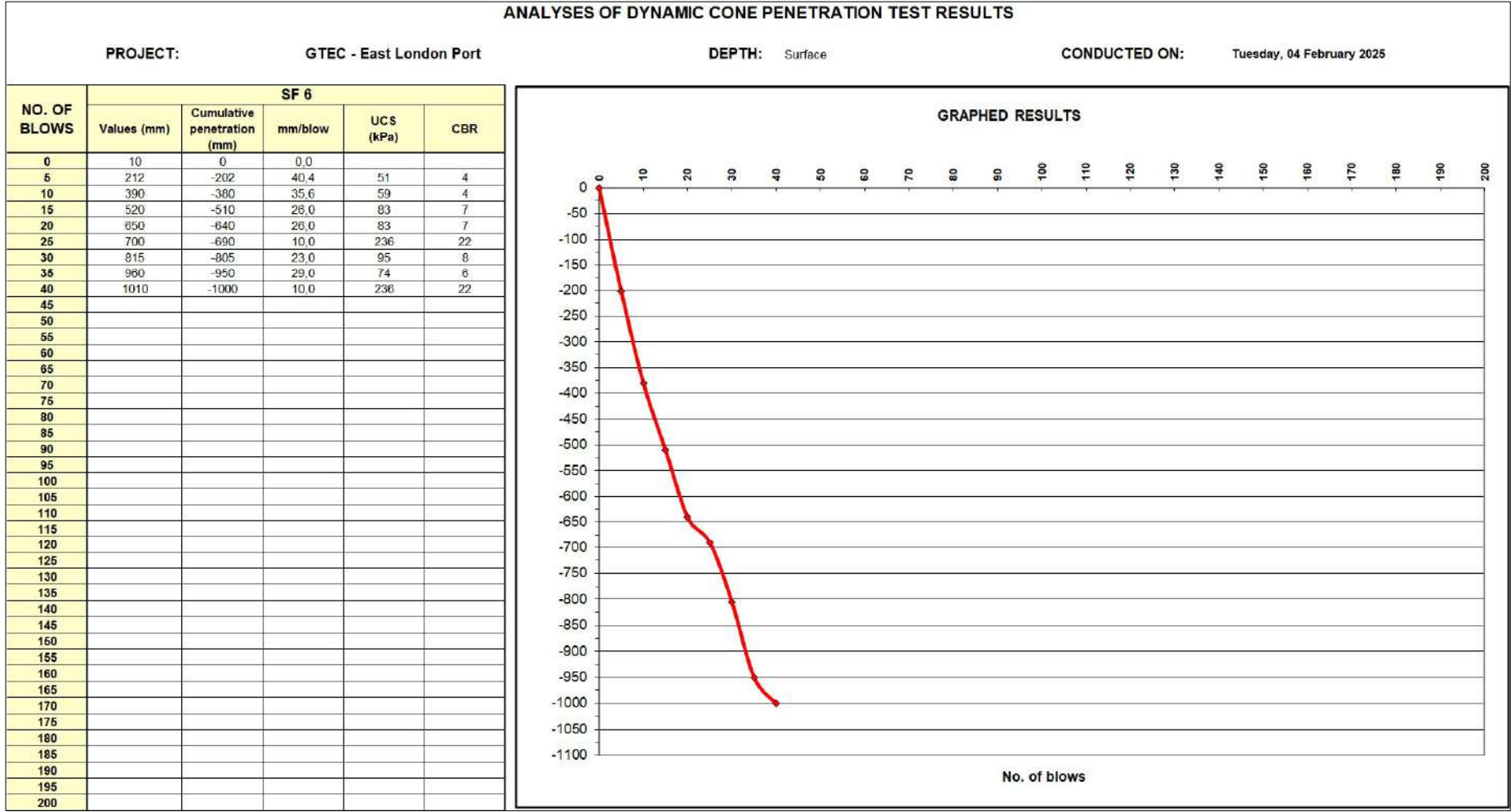
NO. OF BLOWS	SF 2				
	Values (mm)	Cumulative penetration (mm)	mm/blow	UCS (kPa)	CBR
0	50	0	0.0		
5	400	-350	70.0	28	2
10	532	-482	26.4	82	6
15	646	-596	22.8	96	8
20	734	-684	17.8	127	11
25	810	-760	15.2	149	13
30	860	-810	10.0	236	22
35	890	-840	6.0	411	42
40	920	-870	6.0	411	42
45	965	-915	9.0	264	25
50	1010	-960	9.0	264	25
55					
60					
65					
70					
75					
80					
85					
90					
95					
100					
105					
110					
115					
120					
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185					
190					
195					
200					

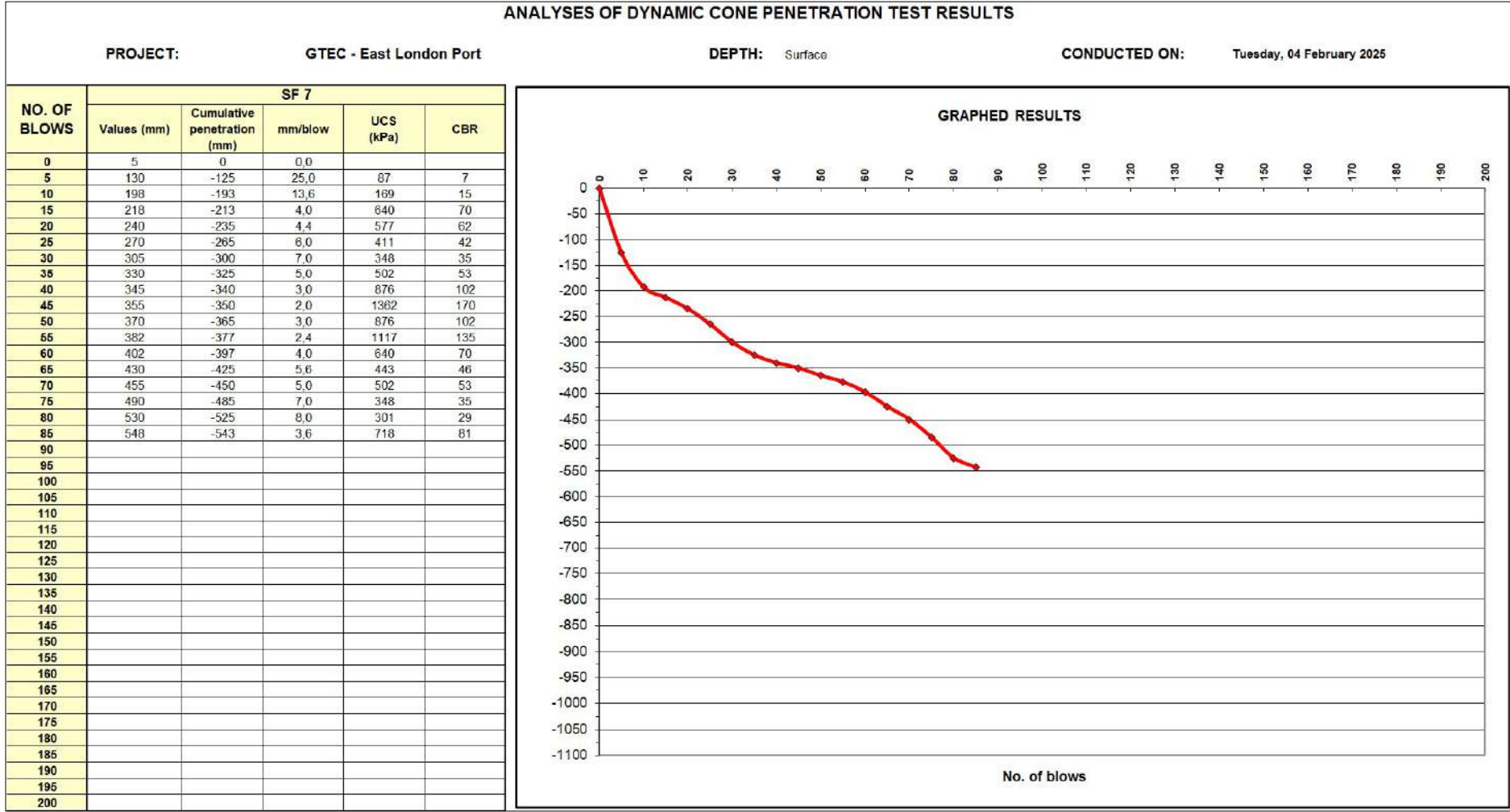


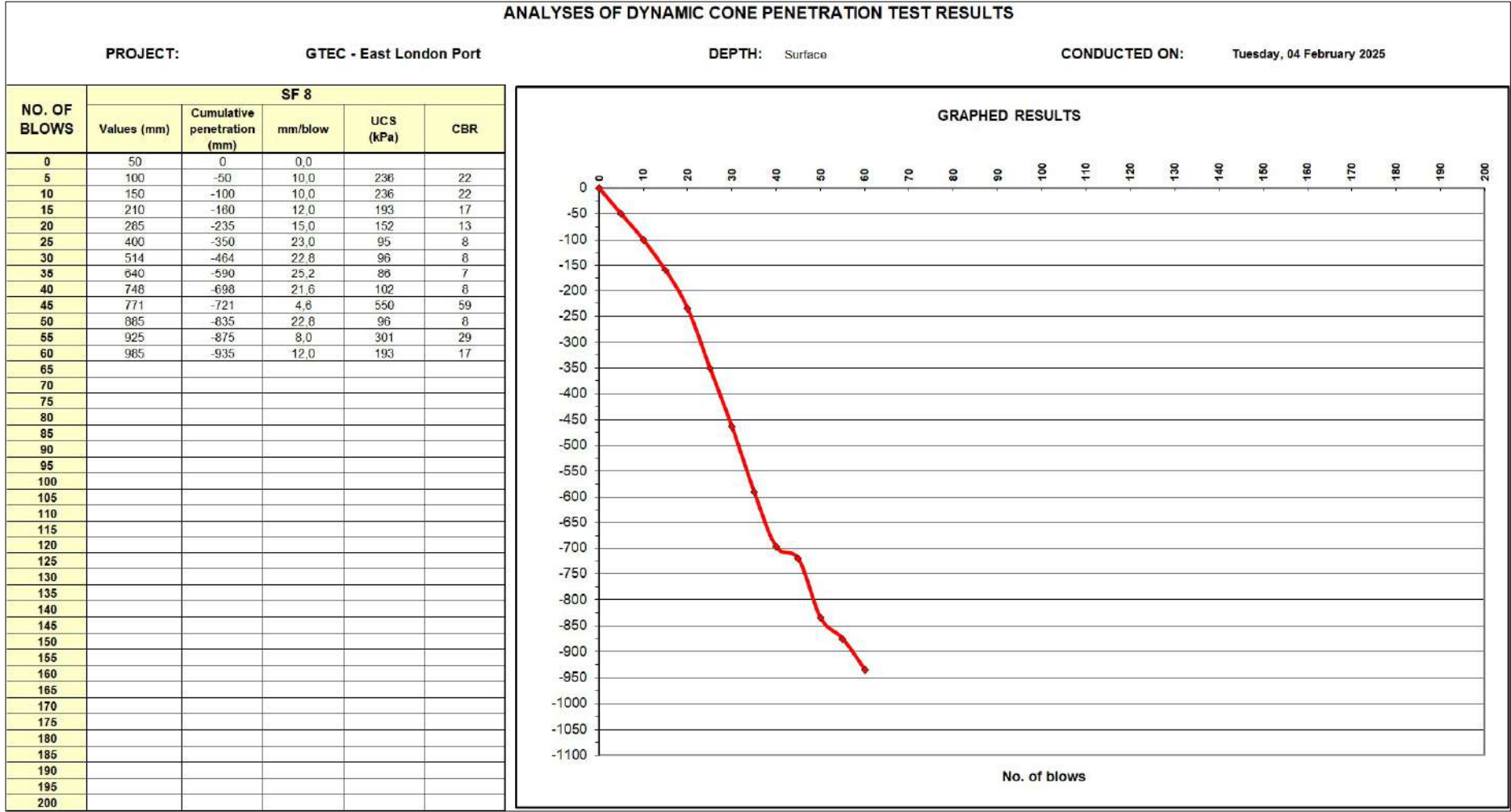












APPENDIX D – LABORATORY TESTING CERTIFICATES



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East London ■ Unit 5 Evergreen Park, Holmhill, c/o Main Road & B Road, Beacon Bay ■ PO Box 10114 Linton Grange 6015



Client: Ages Omega (Pty) Ltd
 Project: GTEC E24-091 DSP
 Job Card No: E3017

Date Received: 24.02.2025
 Date Reported: 17.03.2025
 Page No.: 2 of 9

FOUNDATION INDICATOR

Laboratory Number	E3017/1	E3017/2
Field Number	-	-
Client Reference	DS 1/1	DS 3/1
Depth (m)	-	-
Position	DS 1/1	DS 3/1
Coordinates	X Y	
Visual Description	Dark Brown Silty Sand	Dark Brown Sand
Classification Description	Silty sand \ Silt-Clay Materials	Poorly graded sand \ silty sand \ Silt-Clay Materials
Stabilizing Agent		

Moisture Content & Relative Density

Moisture Content (%)	17.1	15.9
Relative Density (S.G.)		

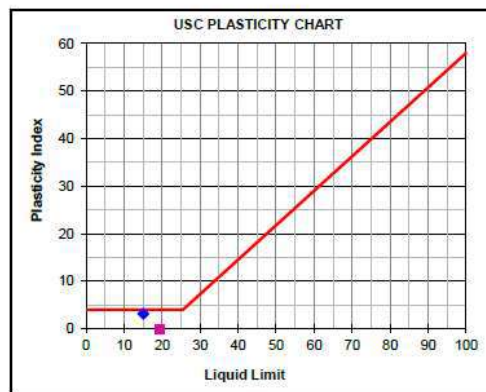
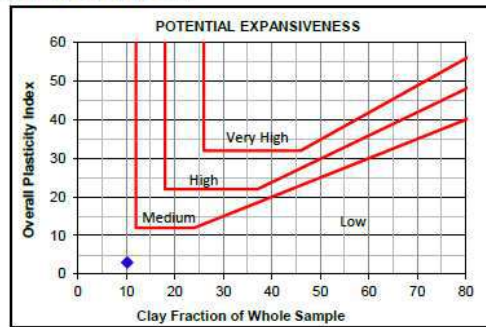
Sieve Analysis (Wet Prep)

Percentage Passing	100 mm		
	75 mm		
	63 mm		
	50 mm		
	37.5 mm		
	28 mm		
	20 mm		100
	14 mm		99
	5 mm		96
	2 mm		95
	0.425 mm	100	94
	0.250 mm	89	85
0.150 mm	47	21	
0.075 mm	32	9	
Grading Modulus	0.69	1.02	

Hydrometer Analysis

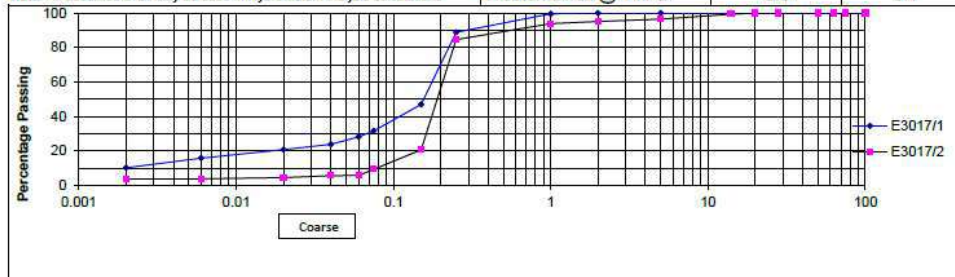
Percentage Passing	0.060 mm	28	6
	0.040 mm	24	6
	0.020 mm	21	5
	0.006 mm	16	4
	0.002 mm	10	4
Gravel	%	0	5
Sand	%	72	89
Silt	%	18	2
Clay	%	10	4

Note: An assumed S.G. may be used in Hydrometer Analysis calculations



Laboratory Number	E3017/1	E3017/2
Atterberg Limits		
Liquid Limit	% 15	19
Plasticity Index	% 3	NP
Linear Shrinkage	% 1.5	0.0
Overall PI	% 3	

Classifications		
HRB (AASHTO)	A-2-4(0)	A-3(0)
Unified (ASTM D2487)	SM	SP-SM
Weston Swell @ 1 kPa	0.0	0.1





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Client: Ages Omega (Pty) Ltd
 Project: GTEC E24-091 DSP
 Job Card No: E3017

Date Received: 24.02.2025
 Date Reported: 17.03.2025
 Page No.: 3 of 9

FOUNDATION INDICATOR

Laboratory Number	E3017/3	E3017/4
Field Number	-	-
Client Reference	DS 4/1	RS 1/1
Depth (m)	-	-
Position	DS 4/1	RS 1/1
Coordinates	X	
	Y	
Visual Description	Dark Brown Silty Sand	Dark Brown Silty Sand
Classification Description	Clay of low plasticity \ silt \ Silt-Clay Materials	Clay of low plasticity \ Silt-Clay Materials
Stabilizing Agent		

Moisture Content & Relative Density

Moisture Content (%)	16.0	11.9
Relative Density (S.G.)		

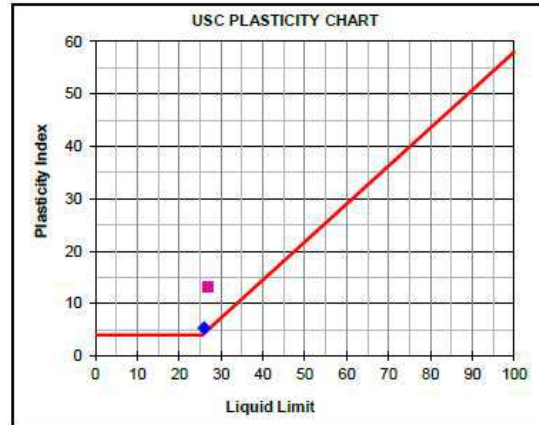
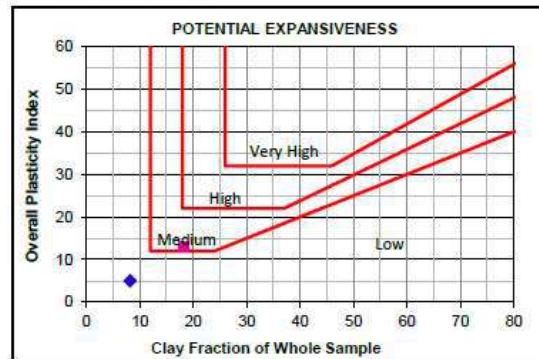
Sieve Analysis (Wet Prep)

Percentage Passing	100 mm		
	75 mm		
	63 mm		
	50 mm		
	37.5 mm		
	28 mm		
	20 mm		
	14 mm		
	5 mm	100	100
	2 mm	99	98
	0.425 mm	98	97
	0.250 mm	90	87
0.150 mm	70	60	
0.075 mm	58	51	
Grading Modulus	0.45	0.55	

Hydrometer Analysis

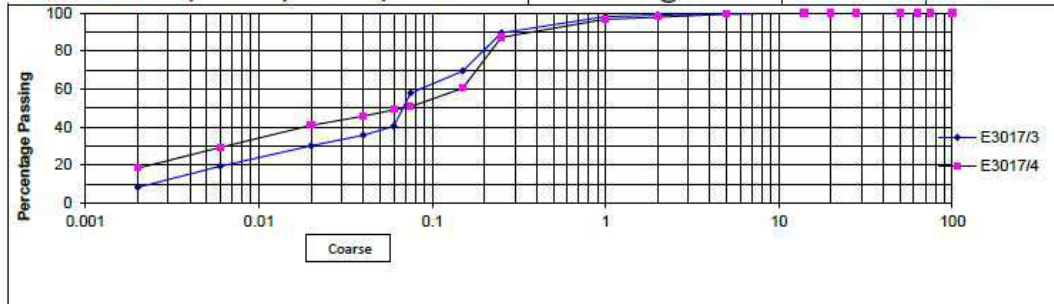
		-2.00 mm	-2.00 mm
Percentage Passing	0.060 mm	40	49
	0.040 mm	36	46
	0.020 mm	30	41
	0.006 mm	19	29
	0.002 mm	8	18
Gravel	%	1	2
Sand	%	59	49
Silt	%	32	31
Clay	%	8	18

Note: An assumed S.G. may be used in Hydrometer Analysis calculations



Laboratory Number		E3017/3	E3017/4
Atterberg Limits			
Liquid Limit	%	26	27
Plasticity Index	%	5	13
Linear Shrinkage	%	2.5	7.0
Overall PI	%	5	13

		Classifications
HRB (AASHTO)	A-4(1)	A-6(3)
Unified (ASTM D2487)	CL-ML	CL
Weston Swell @ 1 kPa	0.5	1.0





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Client: Ages Omgea (Pty) Ltd
Project: GTEC E24-091 DSP
Job Card No: E3017

Date Received: 24.02.2025
Date Reported: 17.03.2025
Page No.: 4 of 9

FOUNDATION INDICATOR

Laboratory Number	E3017/5	E3017/6
Field Number	-	-
Client Reference	RS 3/1	SF 1/1
Depth (m)	-	-
Position	RS 3/1	SF 1/1
Coordinates	X Y	
Visual Description	Yellow Orange Clayish Sand	Dark Brown Silty Sand
Classification Description	Silt \ Silt-Clay Materials	Clayey gravel \ Silt-Clay Materials
Stabilizing Agent		

Moisture Content & Relative Density

Moisture Content (%)	12.4	10.1
Relative Density (S.G.)		

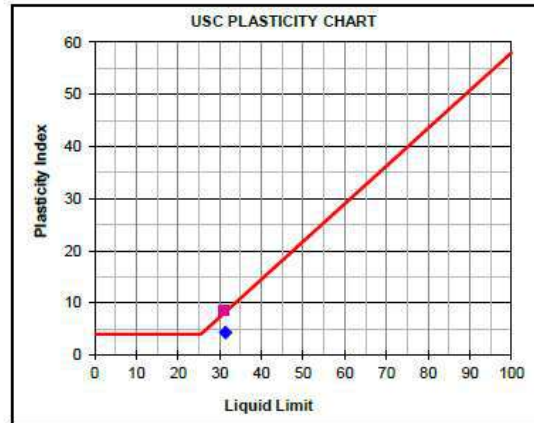
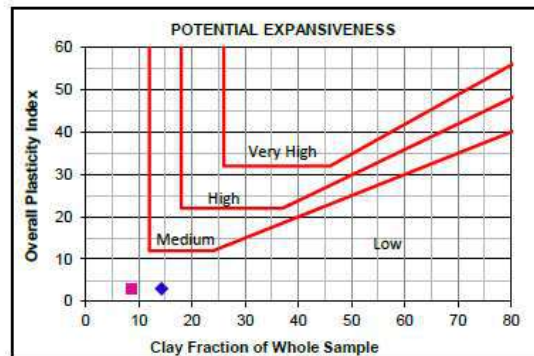
Sieve Analysis (Wet Prep)

Percentage Passing	100 mm		
	75 mm		100
	63 mm		69
	50 mm		65
	37.5 mm		59
	28 mm		54
	20 mm	100	52
	14 mm	98	47
	5 mm	85	40
	2 mm	81	38
	0.425 mm	77	36
	0.250 mm	73	35
	0.150 mm	67	32
0.075 mm	58	27	
Grading Modulus		0.84	1.99

Hydrometer Analysis

Percentage Passing	0.060 mm	54	24
	0.040 mm	46	21
	0.020 mm	33	18
	0.006 mm	21	13
	0.002 mm	14	9
Gravel	%	19	62
Sand	%	27	14
Silt	%	40	15
Clay	%	14	9

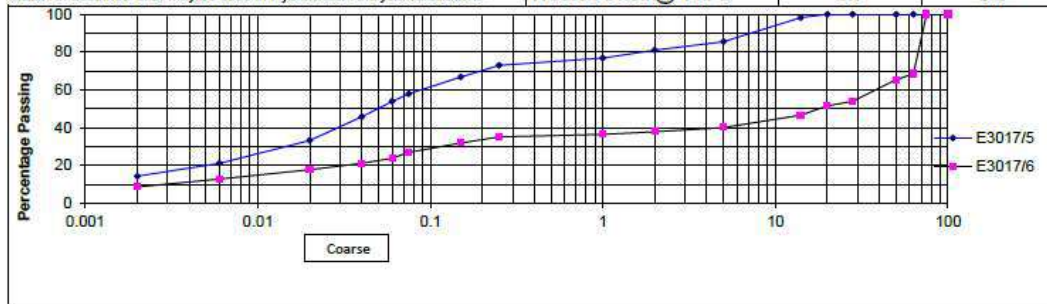
Note: An assumed S.G. may be used in Hydrometer Analysis calculations



Laboratory Number		E3017/5	E3017/6
Atterberg Limits			
Liquid Limit	%	31	31
Plasticity Index	%	4	9
Linear Shrinkage	%	2.0	4.0
Overall PI	%	3	3

Classifications

HRB (AASHTO)	A-4(1)	A-2-4(0)
Unified (ASTM D2487)	ML	GC
Weston Swell @ 1 kPa	0.7	0.0





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Client: Ages Omgea (Pty) Ltd
Project: GTEC E24-091 DSP
Job Card No: E3017

Date Received: 24.02.2025
Date Reported: 17.03.2025
Page No.: 5 of 9

FOUNDATION INDICATOR

Laboratory Number	E3017/7
Field Number	-
Client Reference	SF 8/1
Depth (m)	-
Position	SF 8/1
Coordinates	X Y
Visual Description	Light Brown Clayey Sand
Classification Description	Clayey sand \ Silt- Clay Materials
Stabilizing Agent	

Moisture Content & Relative Density

Moisture Content (%)	17.5
Relative Density (S.G.)	

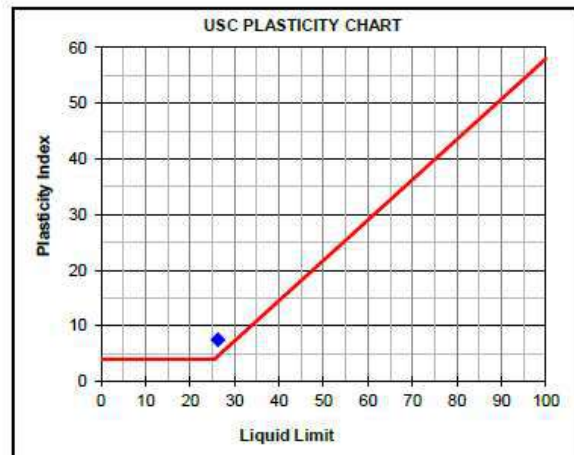
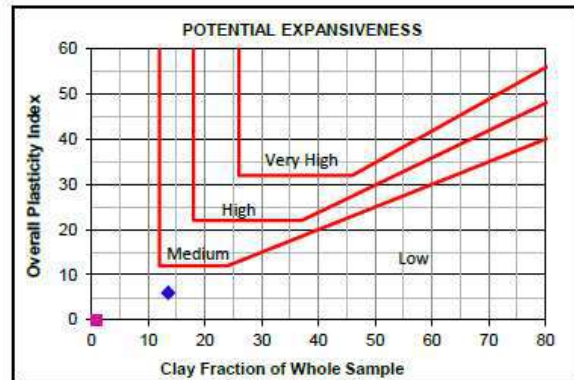
Sieve Analysis (Wet Prep)

Percentage Passing	100 mm	
	75 mm	
	63 mm	
	50 mm	100
	37.5 mm	90
	28 mm	84
	20 mm	79
	14 mm	79
	5 mm	77
	2 mm	77
	0.425 mm	76
	0.250 mm	69
	0.150 mm	49
0.075 mm	37	

Hydrometer Analysis

Percentage Passing	0.060 mm	36
	0.040 mm	31
	0.020 mm	27
	0.006 mm	20
	0.002 mm	14
Gravel	%	23
Sand	%	41
Silt	%	22
Clay	%	14

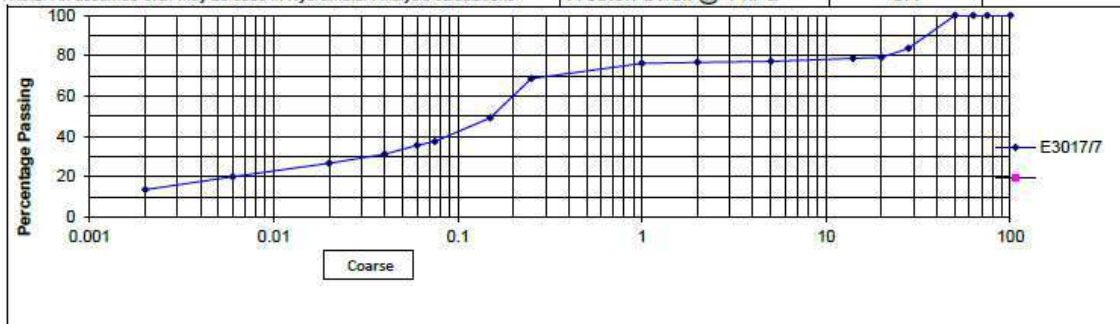
Note: An assumed S.G. may be used in Hydrometer Analysis calculations



Laboratory Number	E3017/7
Atterberg Limits	
Liquid Limit	% 26
Plasticity Index	% 7
Linear Shrinkage	% 3.5
Overall PI	% 6

Classifications

HRB (AASHTO)	A-4(0)
Unified (ASTM D2487)	SC
Weston Swell @ 1 kPa	0.1





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Client : Ages Omega (Pty) Ltd
Project : GTEC E24-091 DSP
Job Card No: E3017

Date Received : 06.02.2025
Date Reported : 17.03.2025
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CALIFORNIA BEARING RATIO (CBR) & ROAD INDICATOR REPORT

Laboratory No.	E3017/2	E3017/6
Field Number	-	-
Client Reference	DS 3/1	SF 1/1
Depth (m)		
Position	DS 3/1	SF 1/1
Coordinates	X	
	Y	
Description	Dark Brown Sand	Dark Brown Silty Sand
Additional information		
Calcrete/Crushed		
Stabilizing Agent		

Laboratory No.	E3017/2	E3017/6	
Maximum Dry Density & Optimum Moisture Content			
MDD	kg/m ³	1863	1811
OMC	%	12.6	15.2

California Bearing Ratio

Compaction Data							
Moisture	%	12.4			15.1		
Dry Density	kg/m ³	1875	1792	1714	1816	1717	1627
Compaction	%	100.0	95.5	91.4	100.0	94.6	89.6

		Penetration Data					
CBR at	2.50 mm	17	7	6	11	7	7
	5.00 mm	23	10	8	11	8	6
	7.50 mm	27	16	9	11	8	7
Swell @ 96hrs (%)		0.0	0.0	0.0	0.4	0.5	0.6
Final Moisture (%)		15.3	16.7	18.0	24.7	27.8	32.7

Sieve Analysis (Wet preparation)

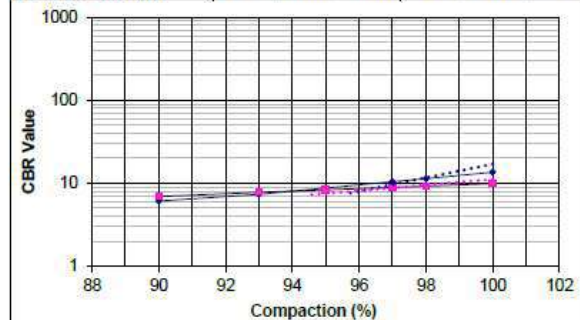
Percentage Passing	100 mm		
	75 mm		100
	63 mm		69
	50 mm		65
	37.5 mm		59
	28 mm		54
	20 mm	100	52
	14 mm	99	47
	5 mm	96	40
	2 mm	95	38
	1 mm	95	38
	0.425 mm	94	36
	0.075 mm	9	27
Grading Modulus	1.02		1.99

Soil Mortar Analysis

Coarse Sand	1	4
Coarse Fine Sand	10	4
Medium Fine Sand	67	8
Fine Fine Sand	12	13
Silt and Clay	10	71

Atterberg Limits

Liquid Limit (%)	19	31
Plasticity Index (%)	NP	9
Linear Shrinkage (%)	0.0	4.0

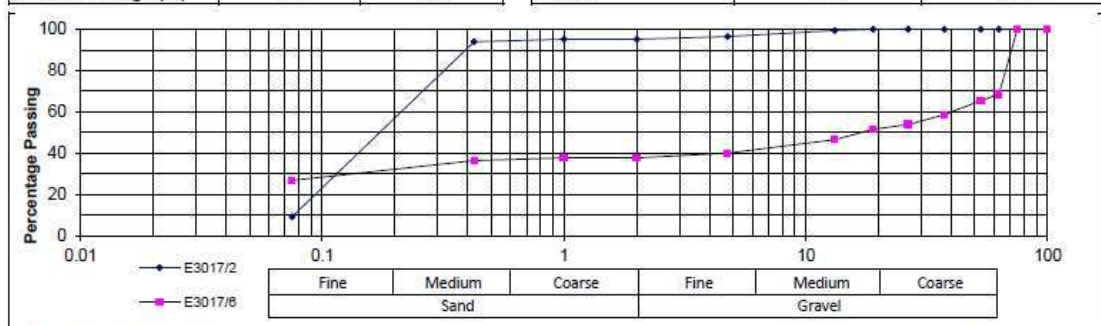


Interpolated CBR Data

CBR	@ 100%	14	10
	@ 98%	11	9
	@ 97%	10	9
	@ 95%	9	8
	@ 93%	7	8
	@ 90%	6	7
	@ SANS3001 Midpoint	11	9

Classifications

HRB (AASHTO)	A-3(0)	A-2-4(0)
COLTO*	G9	G9
TRH14*	G10	G10



*The Colto / TRH 14 Classifications are only based on the above results. Further testing may be required



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Client : Ages Omega (Pty) Ltd
Project : GTEC E24-091 DSP
Job Card No: E3017

Date Received : 06.02.2025
Date Reported : 17.03.2025
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CALIFORNIA BEARING RATIO (CBR) & ROAD INDICATOR REPORT

Laboratory No.	E3017/8	E3017/9
Field Number	-	-
Client Reference	DS 1/2	RS 1/2
Depth (m)		
Position	DS 1/2	RS 1/2
Coordinates	X Y	
Description	Light Brown Clayish Sand	Light Brown Clayish Sand
Additional information		
Calcrete/Crushed		
Stabilizing Agent		

Laboratory No.	E3017/8	E3017/9	
Maximum Dry Density & Optimum Moisture Content			
MDD	kg/m ³	1997	2009
OMC	%	11.2	10.0

California Bearing Ratio

Compaction Data							
Moisture	%	11.3			9.9		
Dry Density	kg/m ³	1984	1900	1798	2018	1960	1867
Compaction	%	100.0	95.8	90.6	100.0	97.1	92.5

		Penetration Data					
CBR at	2.50 mm	5	4	2	7	7	4
	5.00 mm	5	4	2	9	8	4
	7.50 mm	5	4	2	10	8	4
Swell @ 96hrs (%)		0.5	0.5	0.6	0.4	0.6	0.6
Final Moisture (%)		14.5	17.3	19.8	12.3	14.5	15.8

Sieve Analysis (Wet preparation)

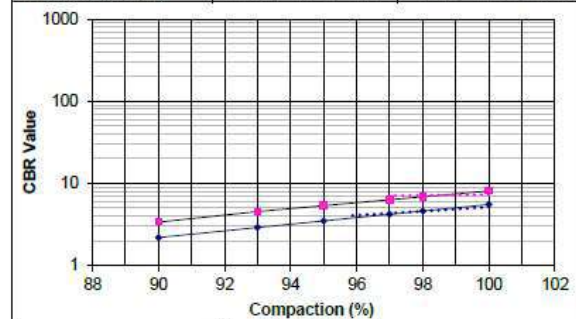
Percentage Passing	100 mm	100	100
	75 mm	91	100
	63 mm	86	97
	50 mm	80	87
	37.5 mm	80	82
	28 mm	79	73
	20 mm	79	70
	14 mm	78	65
	5 mm	77	53
	2 mm	76	50
	1 mm	76	50
	0.425 mm	76	48
	0.075 mm	29	35
Grading Modulus	1.19	1.67	

Soil Mortar Analysis

Coarse Sand	1	5
Coarse Fine Sand	13	4
Medium Fine Sand	39	11
Fine Fine Sand	11	10
Silt and Clay	38	70

Atterberg Limits

	<0.425mm	<0.425mm
Liquid Limit (%)	22	26
Plasticity Index (%)	9	8
Linear Shrinkage (%)	4.0	4.0

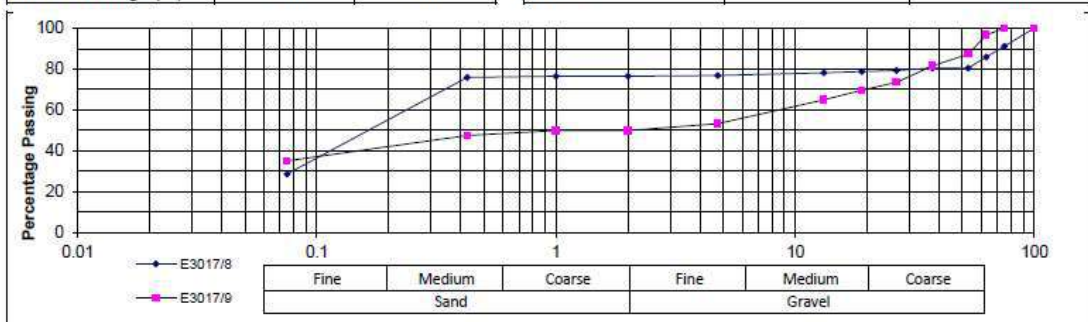


Interpolated CBR Data

@ 100%	6	8
@ 98%	5	7
@ 97%	4	6
@ 95%	3	5
@ 93%	3	5
@ 90%	2	3
@ SANS3001 Midpoint	5	7

Classifications

HRB (AASHTO)	A-2-4(0)	A-4(0)
COLTO*		
TRH14*		G10



*The Colto / TRH 14 Classifications are only based on the above results. Further testing may be required



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Client : Ages Omega (Pty) Ltd
Project : GTEC E24-091 DSP
Job Card No: E3017

Date Received : 06.02.2025
Date Reported : 17.03.2025
Page No. : 8 of 1

CALIFORNIA BEARING RATIO (CBR) & ROAD INDICATOR REPORT

Laboratory No.	E3017/10	E3017/11	Laboratory No.	E3017/10	E3017/11
Field Number	-	-	Maximum Dry Density & Optimum Moisture Content		
Client Reference	SF 4/1	SF 8/2	MDD	kg/m ³ 2013	1934
Depth (m)			OMC	% 10.4	11.4
Position	SF 4/1	SF 8/2	California Bearing Ratio		
Coordinates	X		Moisture	% 10.3	11.4
	Y		Dry Density	kg/m ³ 2016 1918 1816 1937 1833 1742	
Description	Yellow Orange Clayish Sand	Yellow Brown Clayish Sand	Compaction	% 100.0 95.1 90.1 100.0 94.6 89.9	
Additional information			Penetration Data		
Calcrete/Crushed			CBR at	2.50 mm 19 12 6 6 6 3	
Stabilizing Agent				5.00 mm 25 15 7 7 7 3	
				7.50 mm 27 15 7 8 8 3	
			Swell @ 96hrs (%)	0.5 0.5 0.4 0.6 0.5 0.6	
			Final Moisture (%)	14.6 16.9 18.6 15.5 16.8 18.2	

Sieve Analysis (Wet preparation)

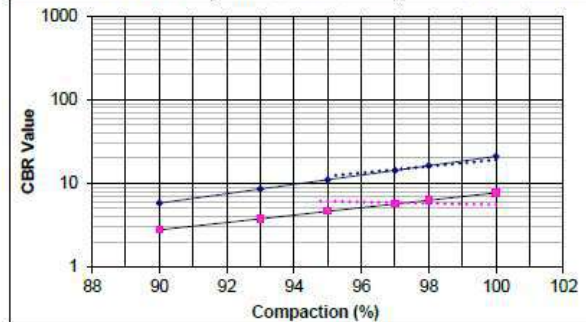
Percentage Passing	100 mm	100	
	75 mm	76	
	63 mm	73	100
	50 mm	59	98
	37.5 mm	53	94
	28 mm	44	89
	20 mm	39	80
	14 mm	36	74
	5 mm	28	62
	2 mm	26	59
	1 mm	26	59
	0.425 mm	24	58
	0.075 mm	17	49
Grading Modulus	2.33	1.33	

Soil Mortar Analysis

Coarse Sand	5	2
Coarse Fine Sand	5	1
Medium Fine Sand	13	4
Fine Fine Sand	11	11
Silt and Clay	66	83

Atterberg Limits

Liquid Limit (%)	<0.425mm	<0.425mm
Plasticity Index (%)	27	32
Linear Shrinkage (%)	6	6
	3.0	3.0

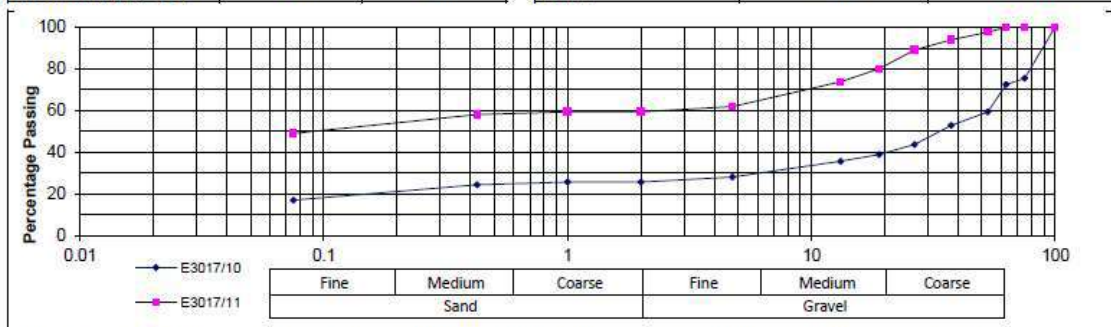


Interpolated CBR Data

CBR	@ 100%	21	8
	@ 98%	16	6
	@ 97%	14	6
	@ 95%	11	5
	@ 93%	9	4
	@ 90%	6	3
	@ SANS3001 Midpoint	15	6

Classifications

HRB (AASHTO)	A-2-4(0)	A-4(1)
COLTO*	G9	
TRH14*	G10	G10



*The Colto / TRH 14 Classifications are only based on the above results. Further testing may be required



forestry, fisheries & the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042

SPECIALIST DECLARATION FORM – AUGUST 2023

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

REPORT TITLE

Geotechnical investigation in support of feasibility study for the proposed Solar Powered Desalination plant and related infrastructure at the East London Harbour, Buffalo City Metropolitan Municipality, Eastern Cape

Kindly note the following:

1. This form must always be used for assessment that are in support of applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting, where this Department is the Competent Authority.
2. This form is current as of August 2023. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at <https://www.dffe.gov.za/documents/forms>.
3. An electronic copy of the signed declaration form must be appended to all Draft and Final Reports submitted to the department for consideration.
4. The specialist must be aware of and comply with 'the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the act, when applying for environmental authorisation - GN 320/2020', where applicable.

1. SPECIALIST INFORMATION

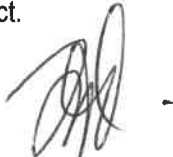
Title of Specialist Assessment	Geotechnical investigation
Specialist Company Name	AGES Omega (Pty) Ltd
Specialist Name	Mr. Frederick De Jager
Specialist Identity Number	7703225098088
Specialist Qualifications:	BSc Honors Engineering Geology
Professional affiliation/registration:	SACNASP Pr.Sci.Nat 400177/06; Member of SAIEG
Physical address:	10 Sansom Road, Berea, East London
Postal address:	Postnet 203; PBag X9063, East London
Postal address	5200
Telephone	0437262070
Cell phone	Click or tap here to enter text.
E-mail	omega@ages-group.com

SPECIALIST DECLARATION FORM – AUGUST 2023

2. DECLARATION BY THE SPECIALIST

I, Mr. Frederick De Jager declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. “the Protocols”) and in Government Notice No. 1150 of 30 October 2020.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
 - any decision to be taken with respect to the application by the competent authority; and;
 - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.



Signature of the Specialist

AGES Omega (Pty) Ltd

Name of Company:

22 May 2025

Date

SPECIALIST DECLARATION FORM – AUGUST 2023

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, _ Mr. Frederick De Jager _____, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist



AGES Omega (Pty) Ltd

Name of Company

22 May 2025

Date

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THERE ARE NO INDICATIONS THAT THE
ORIGINAL DOCUMENT HAS BEEN ALTERED
BY UNAUTHORISED PERSONS

NOLUBABALO HANNAH NTUNZI

Click or tap here to enter text.

COMMISSIONER OF OATHS
ENVIRONMENTAL SCIENTIST - AGES OMEGA (PTY) LTD

Signature of the Commissioner of Oaths

DATE: 22/05/2025

22 May 2025

Date

ADMINISTRATIVE OFFICE:

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AGES Group Offices: North West Eastern Cape Western Cape Limpopo Gauteng KwaZulu-Natal Northern Cape



CURRICULUM VITAE

FREDERICK NIKOLAAS DE JAGER

NAME OF STAFF MEMBER	: FREDERICK NIKOLAAS DE JAGER
IDENTITY NUMBER	: 7703225098088
PROFESSION	: PRINCIPAL ENGINEERING & ENVIRONMENTAL GEOLOGIST
POSITION IN FIRM	: DIRECTOR AGES OMEGA (PTY) LTD
DATE OF BIRTH	: 22 MARCH 1977
YEARS WITH FIRM	: 24 YEARS
YRS RELEVANT EXPERIENCE	: 25 YEARS
DRIVERS LICENCE	: CODE EB & CODE A
NATIONALITY	: SOUTH AFRICAN

MEMBERSHIP(S) IN PROFESSIONAL SOCIETIES

- South African Council for Natural Scientific Professions (SACNASP - 4001 77/06)
- South African Institute for Engineering Geologists (SAIEG – 09/240)
- National Home Builders Registration Council (NHBRC – 3000154338)
- Member of the Eastern Cape Groundwater Division of the Geological Society South-Africa

Frederick Nikolaas De Jager is a registered Professional Natural Scientist with the South African Council of Natural Scientific Professions, with 25 years' experience in geotechnical, geohydrological and geo-environmental investigations within South Africa. He specializes in Engineering Geology and Environmental Geology, comprising both geotechnical and geohydrological inputs. Mr. De Jager is one of the directors of the AGES Omega office.

Mr. De Jager has been based in the Eastern Cape Province for the last 24 years and has extensive experience on all geological conditions encountered within the province, obtained from geotechnical projects ranging from feasibility studies and preliminary investigations, reserve and desktop studies, geological and groundwater exploration and development, geotechnical investigations, groundwater water quality management, water and sanitation projects, roads, landfill and waste sites etc. He was and is also actively involved in RDP housing projects, detailed civil structures, shopping centres, dams, bridges and many more.



DETAILED TASKS ASSIGNED

- Project definition, management & co-ordination
- Conduct geotechnical investigations
- Conduct geo-environmental investigations
- Conduct forensic geotechnical investigations
- Conduct slope stability assessment & monitoring
- Construction Supervision
- Pre-construction consultation
- On-site hazard & risk assessments with mitigation recommendations
- Contractor training and supervision
- Mentoring of young professionals in AGES Omega and on applicable projects
- Data analyses, interpretation, and verification
- Comprehensive and Concise Report writing
- Manager of the Geotechnical Unit in AGES Omega
- Financial Director at AGES Omega

KEY QUALIFICATIONS

- Engineering Geology
- Environmental Geology
- Hydrogeological Studies & Investigations
- Geotechnical site investigations for low-cost housing in urban and rural environments – GFSH-2 & SANS 634:2012 Preliminary Investigations, Phase 1 Investigations and Phase 2 Investigations.
- Geographic Information Systems (GIS) data management & map compilation
- Geo-environmental investigations for potential of contamination to soils and groundwater
- Groundwater feasibility studies & potential determination - Eastern Cape Aquifers
- Geotechnical inputs for sanitation investigations – regional and site-specific approaches
- Geo-Environmental assessments at proposed cemetery sites, Wastewater treatment works, landfill sites, etc.
- Feasibility studies for developments on geotechnical, geohydrological and geo-environmental aspects.
- Geotechnical site investigations for large structures and developments e.g. shopping malls, bridges, reservoirs, dams, hard rock quarries, roads, multi-storey structures, water reticulation and storage etc.
- Project management & Administration
- Hydrogeological & Geotechnical project planning and management

EDUCATION

B.Sc Hons (Engineering Geology)	University of Pretoria	2000
B.Sc (Environmental & Engineering Geology)	University of Pretoria	1999

LATEST COURSES ATTENDED

- : SAIEG – 2 Day Workshop on Engineering Geology in Practice 2023
- : SAIEG – 2 Day Workshop on Site Investigation, In-Situ Testing and Laboratory Assessments 2022
- : Multiple short courses for SACNASP Accreditation
- : Slope & Foundation Design Workshop, Global Prospectus

GEOLOGICAL SOFTWARE

: Dips 8; ArcView 3.2; PLANET GIS, SURFER, LOGPLOT,

MICROSOFT PACKAGE

: Microsoft Office 365

EMPLOYMENT RECORD

DATE	ORGANISATION	POSITION
2004 TO DATE	AGES OMEGA (PTY) LTD	PRINCIPAL ENGINEERING GEOLOGIST & DIRECTOR
2001 TO 2003	SA GeoConsultants (PTY) LTD	PROJECT ENGINEERING GEOLOGIST
2000	GEOTECH AFRICA – NAMIBIA	QUALIFIED ENGINEERING GEOLOGIST
1998 TO 2000	UNIVERSITY OF PRETORIA- DEPT OF GEOLOGY	PART-TIME GEOTECHNICAL FIELD ASSISTANT

LANGUAGE PROFICIENCY

	SPEAK	READ	WRITE
AFRIKAANS	EXCELLENT	EXCELLENT	EXCELLENT
ENGLISH	EXCELLENT	EXCELLENT	EXCELLENT

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this information provided correctly describes me, my qualifications, and my experience. I also certify that I have only given permission for my CV to be included in the tender submission.



Mr F N De Jager (Pr.Sci.Nat)

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that
Frederick Nikolaas de Jager

Registration Number: 400177/06

is a registered scientist

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NOLUBABALO HANNAH NTUNZI
COMMISSIONER OF OATHS
ENVIRONMENTAL SCIENTIST - AGES OMEGA (PTY) LTD
10 SANSOM RD, VINCENT, EAST LONDON, 5247
DATE: 11/09/2026

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)

Geological Science (Professional Natural Scientist)

Effective 11 July 2006

Expires 31 March 2027




President of Council


Chief Executive Officer

To verify this certificate scan this code

