Suite 407, Henry Lawson Business Centre
Birkenhead Point
Roseby Street, Drummoyne NSW 2047

BUCKTON LYSENKO
Consulting Engineer

Our Ref: BL-25381

February 7, 2011

Lia Skountzos
Senior Project Officer
Parks Reserves & Foreshores
Warringah Council
55 Middleton Road,
Cromer, NSW, 2099

WARRINGAH COUNCIL
THIS PLAN TO BE READ IN CONJUNCTION WITH
Construction
Certificate No. CC2011/0086

Dear Madam,

ELECTRICAL DESIGN STATEMENT

PROJECT: Proposed Flood Lighting
Nolan Reserve
North Manly NSW 2100

PROJECT: Proposed Flood Lighting

DATE: February, 2011

Project No: 25381

Total Pages **1 of 1**

Type: Reserve (parks)

Pursuant to the provisions of pertinent Australian Standards,

I Mark Vincent Buckton, (M Des Sc (Building Services)), Master Fire Safety Engineering Name of employer: Buckton Lysenko Consulting Engineers, endorses that the design has been carried out according to normal engineering practice and meets the minimum requirements of the standards as scheduled.

The amendment of the nominated Australian Standards are these applicable at the time of the CC:

a) Electrical systems – AS3000:2007 & AS3008.1.1:2009
b) Lighting systems – AS4282:1997 & AS2560.2.3:2007;

I am an appropriately qualified and experienced person in nominated engineering disciplines and possess indemnity insurance to the satisfaction of or my principal.

Nominated Plans: Electrical Services:

25381-3-3-E01, 25381-3-3-E02, 25381-3-0-E03, 25381-3-0-E04, 25381-3-0-E06, 25381-3-0-E07, 25381-3-0-E08, 25381-3-0-E09, 25381-3-0-E10, 25381-3-0-E11, 25381-3-0-E12, 25381-3-0-E13, 25381-3-0-E14, 25381-3-0-E15, 25381-3-2-E17, 25381-3-0-E18;

Sincerely,
BUCKTON LYSENKO

Mark Vincent Buckton

Suite 407, Henry Lawson Business Centre Roseby Street Drummoyne NSW 2047
PO BOX 3079 Wareemba New South Wales 2046
Phone 02 9719 3700
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ABN 23 243 774 132

AS/NZS ISO 9001
Certified
Davis Langdon Certification Services

REPORT

TO

WARRINGAH COUNCIL

ON

GEOTECHNICAL INVESTIGATION

FOR

PROPOSED LIGHT POLES

AT

NOLAN RESERVE, PITTWATER ROAD, NORTH MANLY, NSW

3 March 2011

Ref: 24681LBrpt

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
Postal Address: PO Box 976, North Ryde BC NSW 1670
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TABLE OF CONTENTS

1 INTRODUCTION

This report presents the results of a geotechnical investigation for the proposed light poles at the northern end of Nolan Reserve on Pittwater Road, North Manly, NSW. The investigation was commissioned by Mr Scot Hedge of Warringah Council and was carried out in accordance with our proposal dated 4 February 2011 (Ref: P33534LB).

As shown on the supplied drawings by Cordula Consulting Pty Ltd (Job No. 09426, Drawing Nos S01 and S02, Rev B, dated 18/8/10) light poles are proposed around the perimeter of the ovals within Nolan Reserve. This investigation was for the six north-westernmost poles, around Fields 1 and 2 and Junior Field 1, as shown on Figure 1. The drawings show that the light poles will be supported by bored piles, with a preliminary design being 900mm diameter piles founded at depths of 3.6m or 4m within material adequate for an allowable bearing pressure of 150kPa. Although the drawings quote a geotechnical investigation report, Mr Rick Briske has advised that no geotechnical investigation for the light poles has previously been undertaken.

The purpose of the investigation was to obtain geotechnical information on subsurface conditions at each proposed light pole location as a basis for comments and recommendations on parameters for the design of footings for the proposed poles.

2 INVESTIGATION PROCEDURE

Electrical Friction Cone Penetrometer (EFCP) tests 1 to 5 and 6c were carried out to depths ranging from 7.43m to 30.53m below the existing ground surface using our truck mounted EFCP testing rig. At test location 6, two tests (EFCP6 and EFCP6b) refused at shallow depth of 0.41m and 0.42m, but EFCP6c was able to penetrate the upper soils and was carried out to a depth of 9.61m. Prior to our arrival the proposed light pole locations were marked on site by Warringah Council. The test

locations were located as close as practical to the marked pole locations. Prior to testing, the test locations were checked for underground services using electronic service detection equipment.

EFCP testing involves continuously pushing a testing probe with a 35mm diameter conical tip into the soil using the hydraulic rams of our ballasted truck mounted EFCP rig. Measurements are made during testing of the end resistance of the cone tip and the frictional resistance of a separate 134mm long sleeve located directly behind the cone.

EFCP testing does not provide sample recovery. The subsurface material identification, including material strength/relative density, is by interpretation of the test results based on past experience and empirical correlations. Further details of the methods and procedures employed in the investigation, including the limitation of the EFCP testing, are presented in the attached Report Explanation Notes.

The test holes were checked for groundwater on completion.

The EFCP test results, including our interpreted subsurface profile are attached to this report.

3 RESULTS OF INVESTIGATION

3.1 Site Description

The site comprises the north-western end of Nolan Reserve, with a shallow (0.4m deep) drainage channel running along the south-eastern boundary. The site is located within gently sloping terrain that falls towards the south and the adjacent Brookvale Creek. Brookvale Creek runs along the south-western boundary of the site and eventually drains into Manly Lagoon.

The site comprises grassed sporting fields, with trees and shrubs around the perimeter. A two storey brick amenities and clubhouse building is located in the western corner of the site. This building appeared to be in fair external condition. The site is bounded to the north-east by Pittwater Road, with residential properties on the far side of Pittwater Road. To the north-west are bowling greens of the adjoining bowling club and to the south-east are more sporting fields within the remainder of Nolan Reserve. To the south-west is Brookvale Creek and then Warringah Golf Course.

3.2 Subsurface Conditions

The EFCP test results indicate a subsurface profile of alluvial soils, possibly with fill within the upper soils.

The upper 1m to 2m of the tests comprised banded sands and clays and we consider that this is likely to be fill. EFCP6 and EFCP6b refused on obstructions within the inferred fill at depths of 0.41m and 0.42m, respectively. Below this the soils were interpreted to comprise silty clay, organic clay, clayey silt and sandy silt generally of very soft to firm strength with some stiff to very stiff bands in EFCP1 and EFCP2. The clayey and silty soils extended to depths ranging from 3.2m to 5.6m.

Below depths of 3.2m to 5.6m, sand was encountered that was generally of medium dense relative density with some loose or very loose bands and occasional clay bands. However, in EFCP3 the sands were only of loose relative density. These sands extended to depths ranging from 6.9m to 9m. Below these depths silty clays, sandy silts and clayey silts of soft to firm strength were encountered to the limit of the tests.

EFCP1 was extended significantly deeper than the other EFCP tests and the clayey silt/silty clay continued with depth. This clayey silt/silty clay was initially of soft to

firm strength, becoming firm to stiff with depth, until a depth of 24.5m where a banded profile of loose to medium dense sands, silty sands and stiff to very stiff silty clays was encountered. Stiff to very stiff silty clay was encountered below a depth of 27.25m and extended to the limit of the test at a depth of 30.53m.

The test holes were checked for groundwater on completion and groundwater was measured in EFCP3 and EFCP5 at depths of 1m and 0.9m, respectively. The other test holes collapsed at depths ranging from 0.9m to 1.5m and this may indicate groundwater as test holes in sandy soils tend to collapse where groundwater is encountered.

Reference should be made to the attached EFCP test results for detailed test results and our interpreted subsurface profile.

4 COMMENTS AND RECOMMENDATIONS

From the supplied drawings by Cordula Consulting Pty Ltd the light poles are to be supported on bored piers of 900mm diameter drilled to depths of 3.6m or 4m into material adequate for an allowable bearing pressure of 150kPa. We note that the upper fill and soft clays and silt would not meet this requirement and we recommend that the piled footings be specifically designed for the actual subsurface conditions at each pole location. Our recommended parameters to design the footings are given below.

We do not recommend the use of bored piers for this site as the sides of the pier holes would almost certainly collapse and difficulties with groundwater seepage would occur given the shallow groundwater at depths of 0.9m to 1.5m. Auger, grout injected (CFA) piles may be used to overcome these difficulties. Consideration could be given to the use of driven piles, but the vibration effect on the nearby

structures, i.e. existing buildings, etc, would need to be considered and advice from specialist piling contractors on the suitability of such piles should be sought.

Since the vertical loads on the pole footings will be quite low the critical factor in the design of the footing system is likely to be the lateral capacity. Nevertheless, we recommend that the piles be founded within the loose or medium dense sands encountered at depths between 3.2m and 9m and not within the upper soft silts and clays due to the risk of pile settlements.

At each pole location we have provided our recommended founding depth and allowable end bearing pressure for the piles. These bearing pressures take into account any underlying weaker layers at each location. If piles need to be founded at different depths than given below (such as to satisfy lateral capacity) we should be contacted to provide specific advice. If piles are founded deeper than the depths given below the underlying weaker layers will have a greater effect and will result in lower bearing pressures being appropriate.

EFCP Location	Founding Depth	Founding Material	Allowable End Bearing Pressure
EFCP1	6m	Medium dense sand	400kPa
EFCP2	5.5m	Medium dense sand	400kPa
EFCP3	6.5m	Loose sand	150kPa
EFCP4	5m	Loose to medium dense sand	150kPa
EFCP5	4.5m	Medium dense sand	400kPa
EFCP6c	5.5m	Medium dense sand	200kPa

The above allowable end bearing pressures are based on a 900mm diameter pile and may not be appropriate for different pile diameters. Further advice is recommended where alternate pile diameters are proposed.

Allowable shaft adhesions of 5kPa within loose sands and 10kPa within medium dense sands may be used. Since the current proposed pile sizes are preliminary we should be commissioned to review the final pile design to confirm that the founding depths and allowable end bearing pressures are appropriate.

Analysis and design of the piles for lateral loads may be based on the parameters given in the table below. Parameters are given for the soils encountered within the EFCP tests and the designer will need to assess the specific subsurface conditions for each pole by reference to the EFCP test results. If required, we can complete lateral pile analysis using the computer program Wallap to estimate the lateral capacity and deflection of piles supporting the poles, if we are provided with the final design loads on the footing system.

Material	Friction Angle	Bulk Unit Weight	Undrained Shear Strength	Poissons Ratio	Elastic Modulus
Fill and very loose sands	25°	15kN/m^3	-	0.3	4MPa
Very soft to soft clays/silts	20° (c′ = 0)	15kN/m^3	10kPa	0.35	3MPa
Loose sands	27°	17kN/m^3	-	0.3	15MPa
Medium dense sands	30°	20kN/m^3	-	0.3	20MPa

Due to the generally poor and somewhat variable subsurface conditions, we recommend that the lateral capacity of the piles be checked by a geotechnical engineer to confirm that the intent of our recommendations provided herein have been adopted and assess the required pile lengths and movements.

5 GENERAL COMMENTS

The recommendations presented in this report include specific issues to be addressed during the construction phase of the project. In the event that any of the construction phase recommendations presented in this report are not implemented,

the general recommendations may become inapplicable and Jeffery and Katauskas Pty Ltd accept no responsibility whatsoever for the performance of the structure where recommendations are not implemented in full and properly tested, inspected and documented.

Occasionally, the subsurface conditions between the completed boreholes may be found to be different (or may be interpreted to be different) from those expected. Variation can also occur with groundwater conditions, especially after climatic changes. If such differences appear to exist, we recommend that you immediately contact this office.

This report provides advice on geotechnical aspects for the proposed civil and structural design. As part of the documentation stage of this project, Contract Documents and Specifications may be prepared based on our report. However, there may be design features we are not aware of or have not commented on for a variety of reasons. The designers should satisfy themselves that all the necessary advice has been obtained. If required, we could be commissioned to review the geotechnical aspects of contract documents to confirm the intent of our recommendations has been correctly implemented.

A waste classification will need to be assigned to any soil excavated from the site prior to offsite disposal. Subject to the appropriate testing, material can be classified as Virgin Excavated Natural Material (VENM), General Solid, Restricted Solid or Hazardous Waste. If the natural soil has been stockpiled, classification of this soil as Excavated Natural Material (ENM) can also be undertaken, if requested. However, the criteria for ENM are more stringent and the cost associated with attempting to meet these criteria may be significant. Analysis takes seven to 10 working days to complete, therefore, an adequate allowance should be included in the construction program unless testing is completed prior to construction. If contamination is encountered, then substantial further testing (and associated delays) should be

expected. We strongly recommend that this issue is addressed prior to the commencement of excavation on site.

If there is any change in the proposed development described in this report then all recommendations should be reviewed.

This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose. Copyright in this report is the property of Jeffery and Katauskas Pty Ltd. We have used a degree of care, skill and diligence normally exercised by consulting engineers in similar circumstances and locality. No other warranty expressed or implied is made or intended. Subject to payment of all fees due for the investigation, the client alone shall have a licence to use this report. The report shall not be reproduced except in full.

Should you have any queries regarding this report, please do not hesitate to contact the undersigned.

For and on behalf of
JEFFERY AND KATAUSKAS PTY LTD.

Daniel Bliss
Senior Associate

Reviewed by:

Linton Speechley
Principal

Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

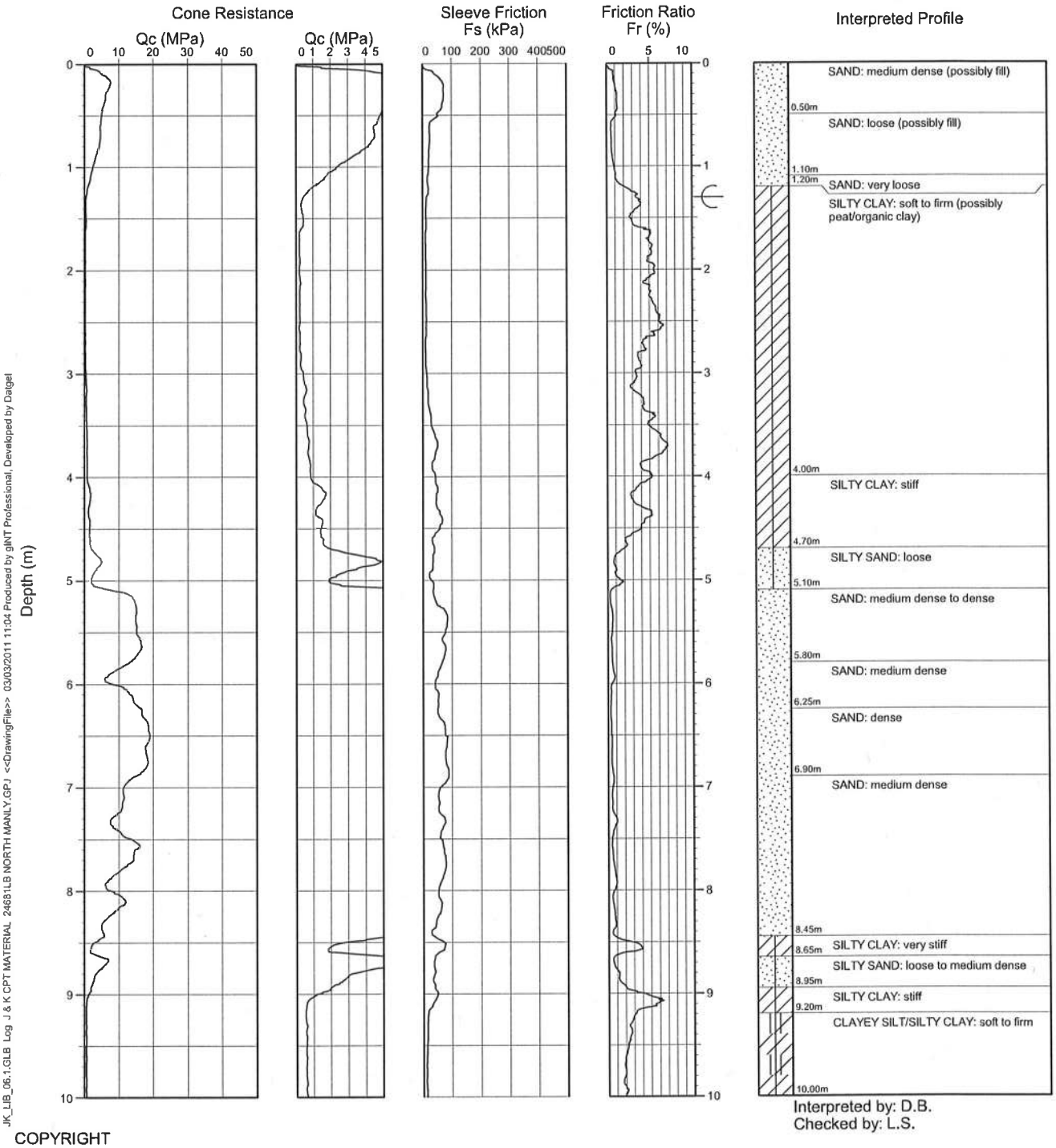
EFCP No. 1

1 / 4

ELECTRICAL FRICTION CONE PENETROMETER TEST RESULTS

Client:	WARRINGAH COUNCIL
Project:	PROPOSED LIGHT POLES
Location:	NOLAN RESERVE, PITTWATER ROAD, NORTH MANLY, NSW

Job No.: 24681LB	**R.L. Surface:** N/A	**Data File:** 24681B_1.GEF
Date: 15/02/11	**Datum:**	**Operator:** M.T.



Interpreted by: D.B.
Checked by: L.S.

Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

EFCP No. 1 2 / 4

ELECTRICAL FRICTION CONE PENETROMETER TEST RESULTS

Client:	WARRINGAH COUNCIL
Project:	PROPOSED LIGHT POLES
Location:	NOLAN RESERVE, PITTWATER ROAD, NORTH MANLY, NSW

Job No.: 24681LB	**R.L. Surface:** N/A	**Data File:** 24681B_1.GEF
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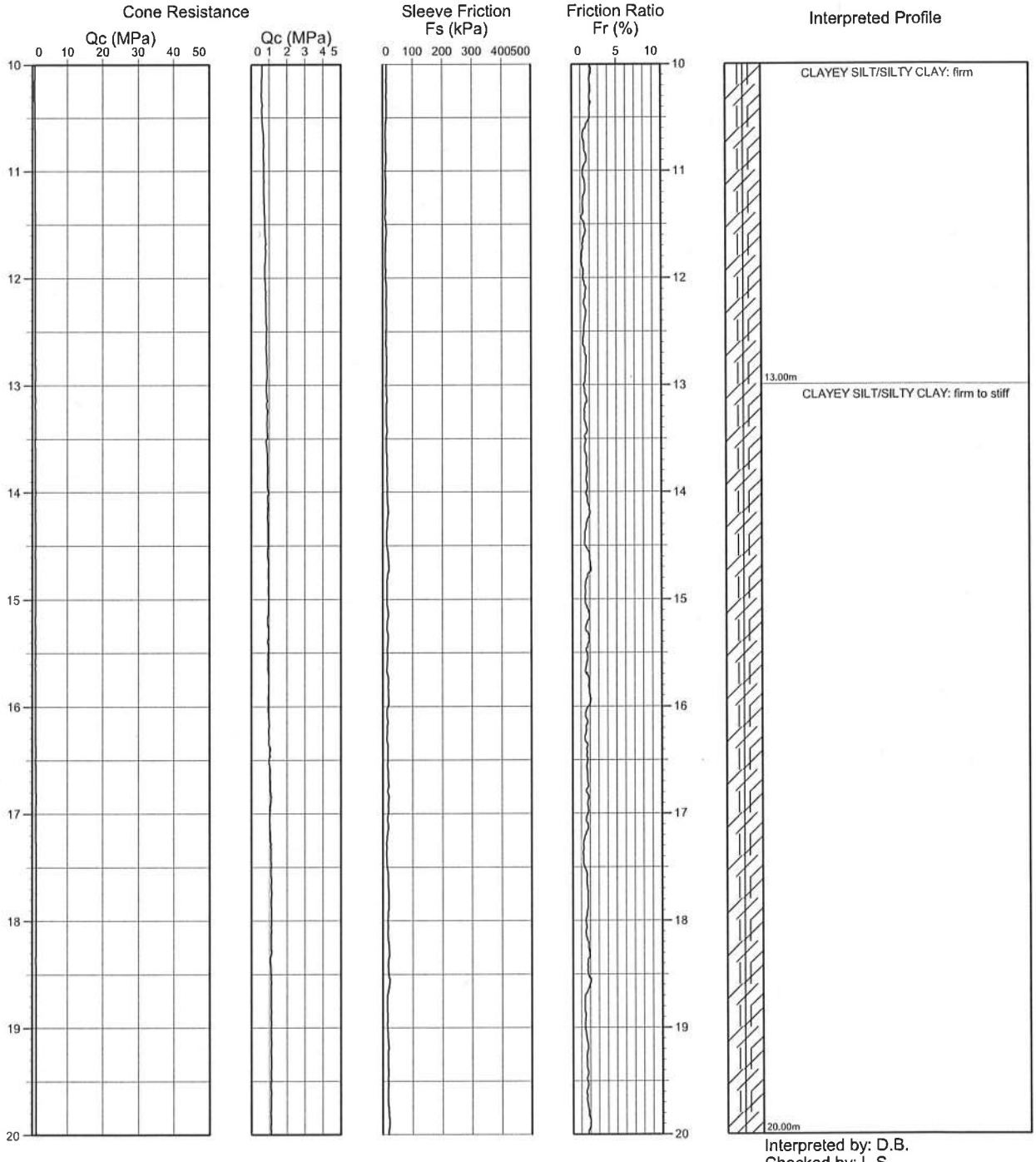

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Checked by: L.S.

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Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

EFCP No. 1 3 / 4

ELECTRICAL FRICTION CONE PENETROMETER TEST RESULTS

Client:	WARRINGAH COUNCIL
Project:	PROPOSED LIGHT POLES
Location:	NOLAN RESERVE, PITTWATER ROAD, NORTH MANLY, NSW

Job No.: 24681LB	**R.L. Surface:** N/A	**Data File:** 24681B_1.GEF
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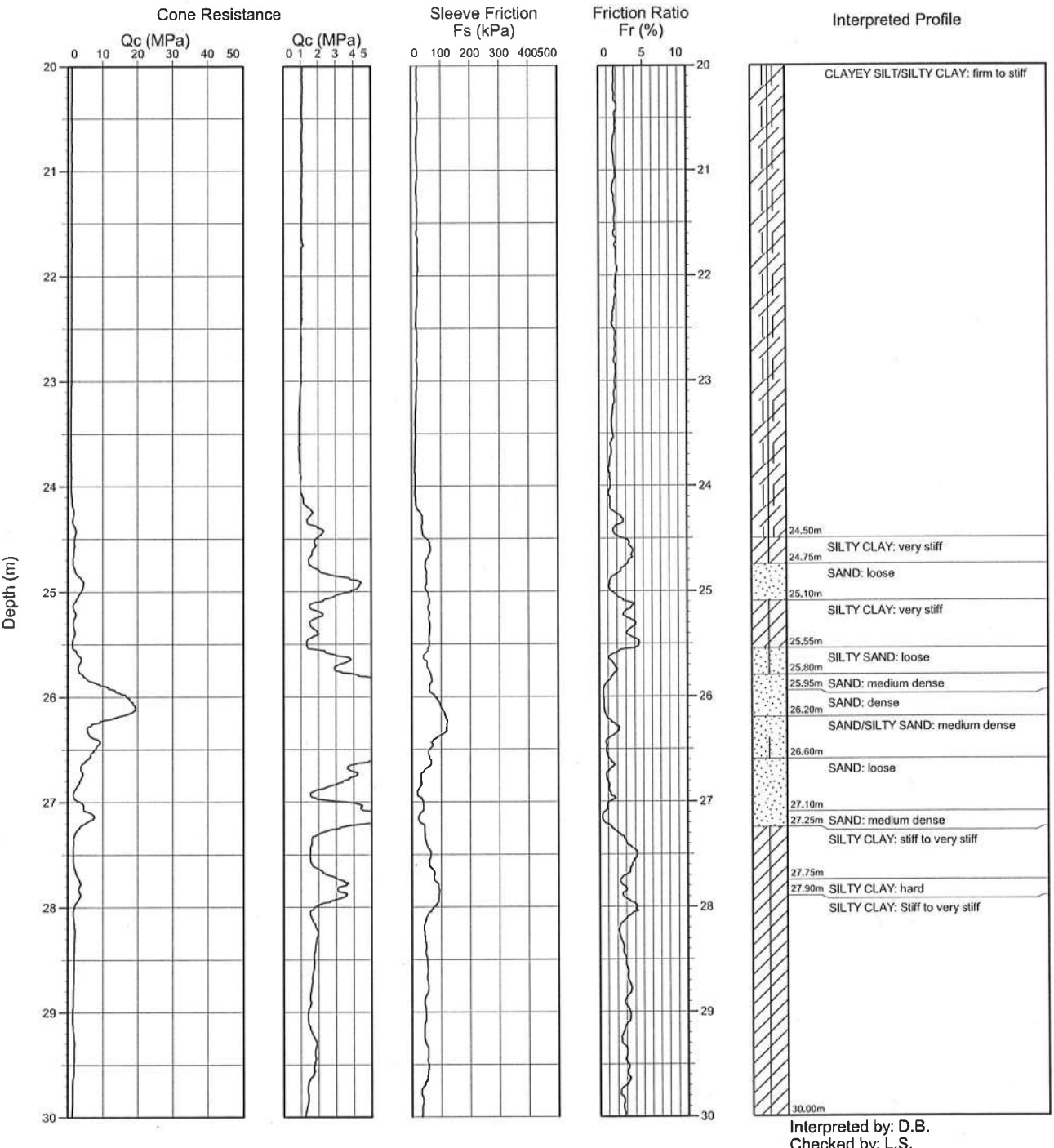

Interpreted by: D.B.
Checked by: L.S.

Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

EFCP No. 1 4 / 4

ELECTRICAL FRICTION CONE PENETROMETER TEST RESULTS

Client:	WARRINGAH COUNCIL
Project:	PROPOSED LIGHT POLES
Location:	NOLAN RESERVE, PITTWATER ROAD, NORTH MANLY, NSW

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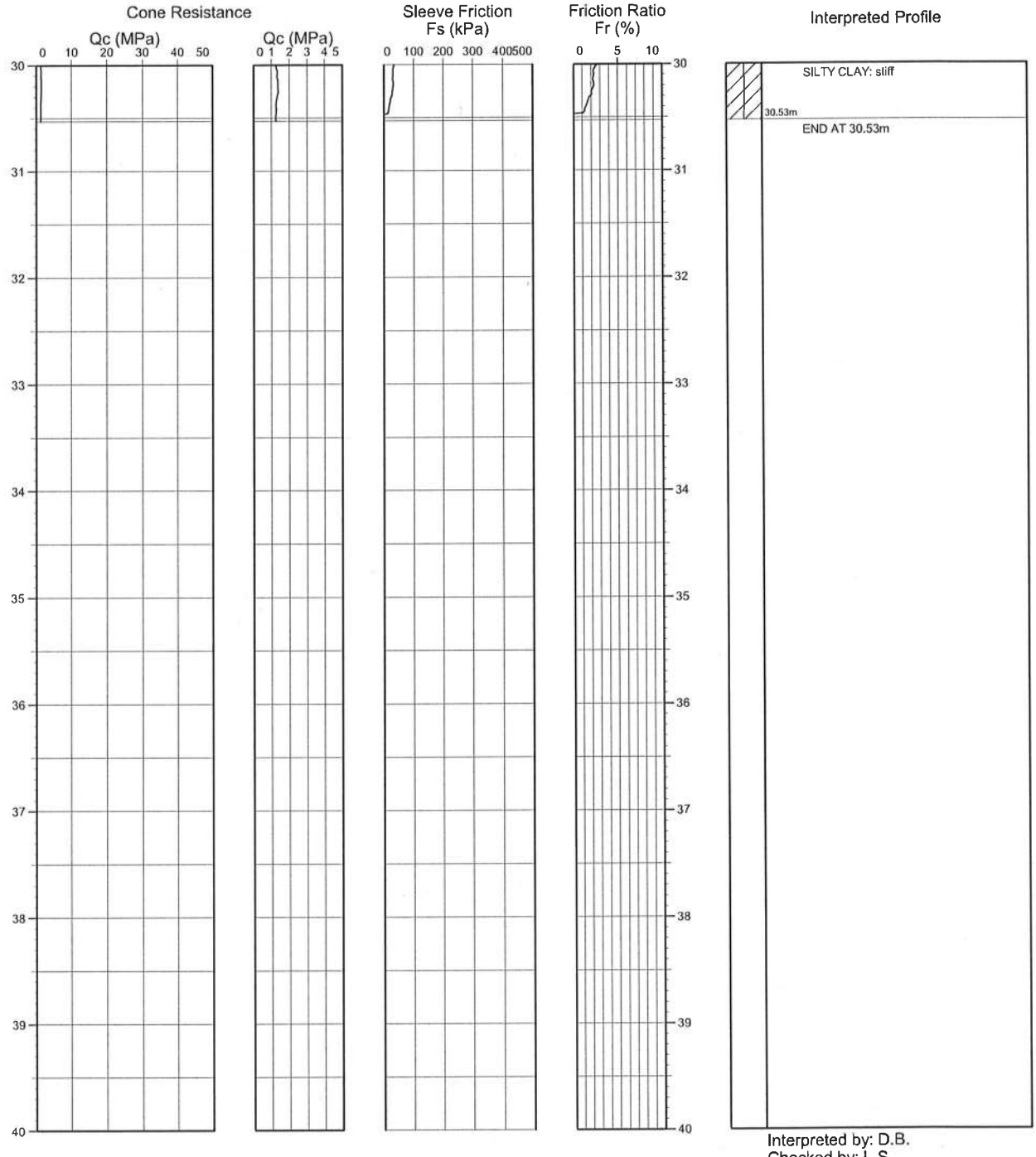

Interpreted by: D.B.
Checked by: L.S.

Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

EFCP No. 2

1 / 2

ELECTRICAL FRICTION CONE PENETROMETER TEST RESULTS

Client:	WARRINGAH COUNCIL
Project:	PROPOSED LIGHT POLES
Location:	NOLAN RESERVE, PITTWATER ROAD, NORTH MANLY, NSW

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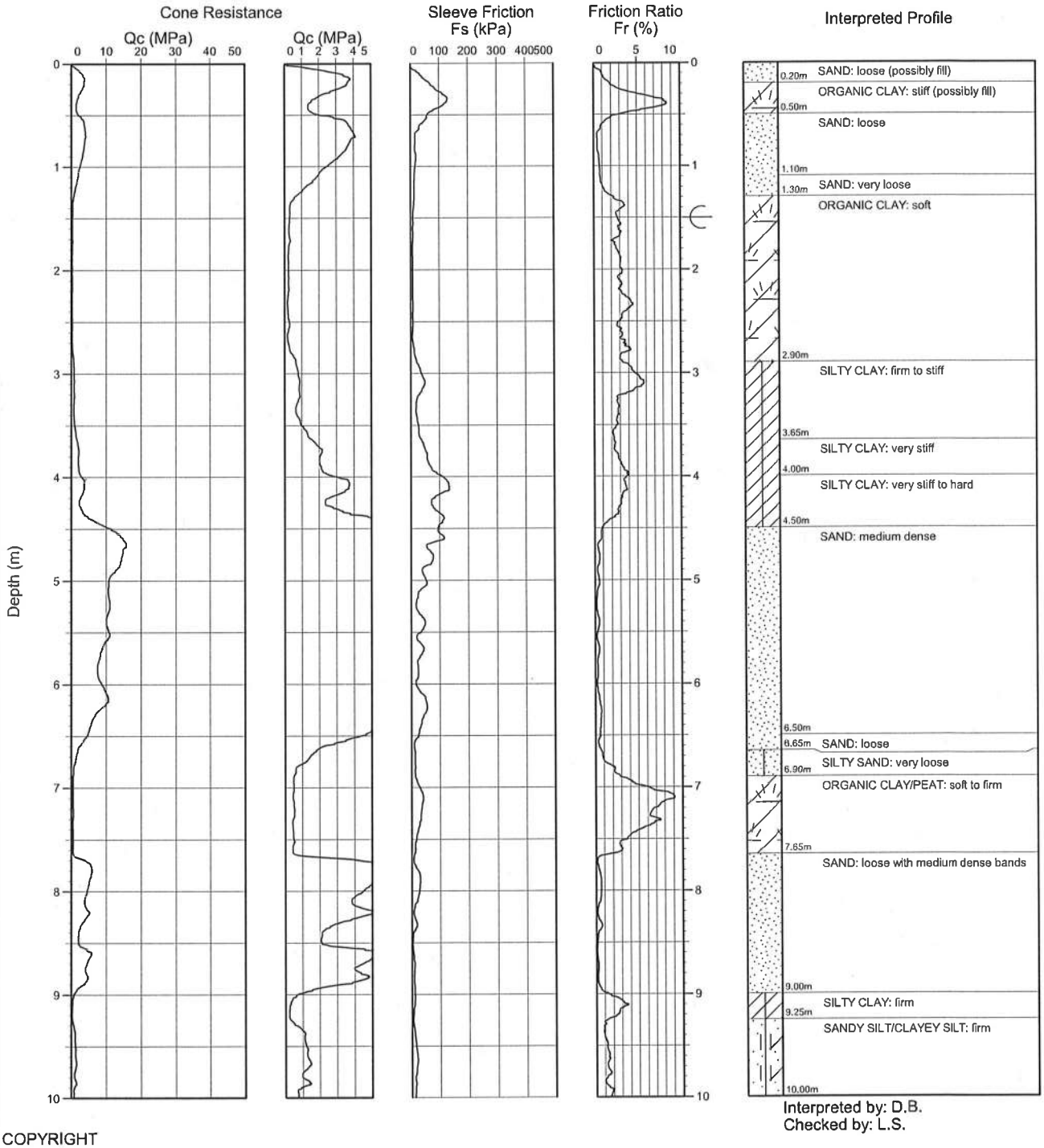

Interpreted by: D.B.
Checked by: L.S.

Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

EFCP No. 2 2 / 2

ELECTRICAL FRICTION CONE PENETROMETER TEST RESULTS

Client:	WARRINGAH COUNCIL
Project:	PROPOSED LIGHT POLES
Location:	NOLAN RESERVE, PITTWATER ROAD, NORTH MANLY, NSW

Job No.: 24681LB	**R.L. Surface:** N/A	**Data File:** 24681B_2.GEF
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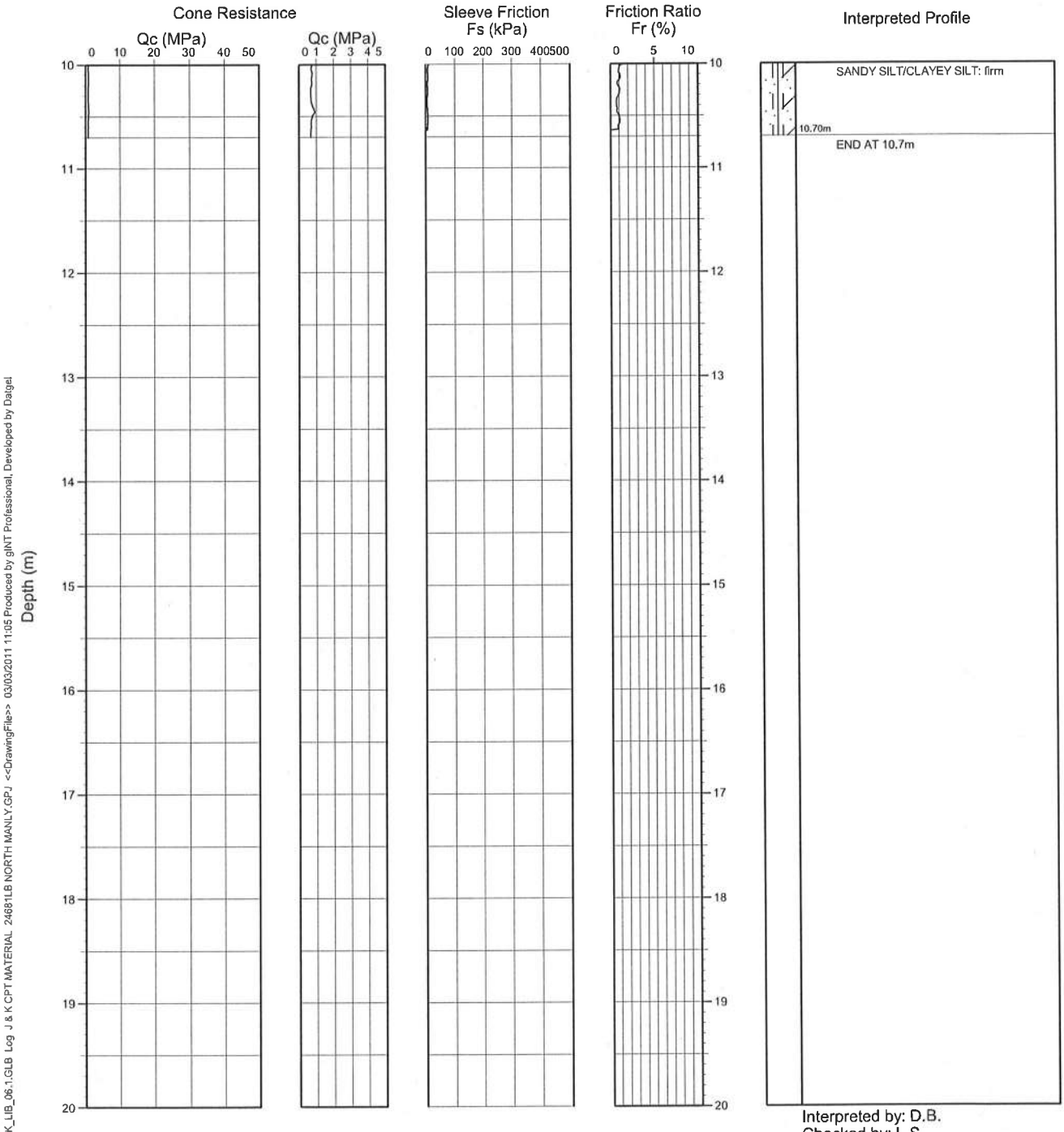

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Checked by: L.S.

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Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

EFCP No. 3 1 / 2

ELECTRICAL FRICTION CONE PENETROMETER TEST RESULTS

Client:	WARRINGAH COUNCIL
Project:	PROPOSED LIGHT POLES
Location:	NOLAN RESERVE, PITTWATER ROAD, NORTH MANLY, NSW

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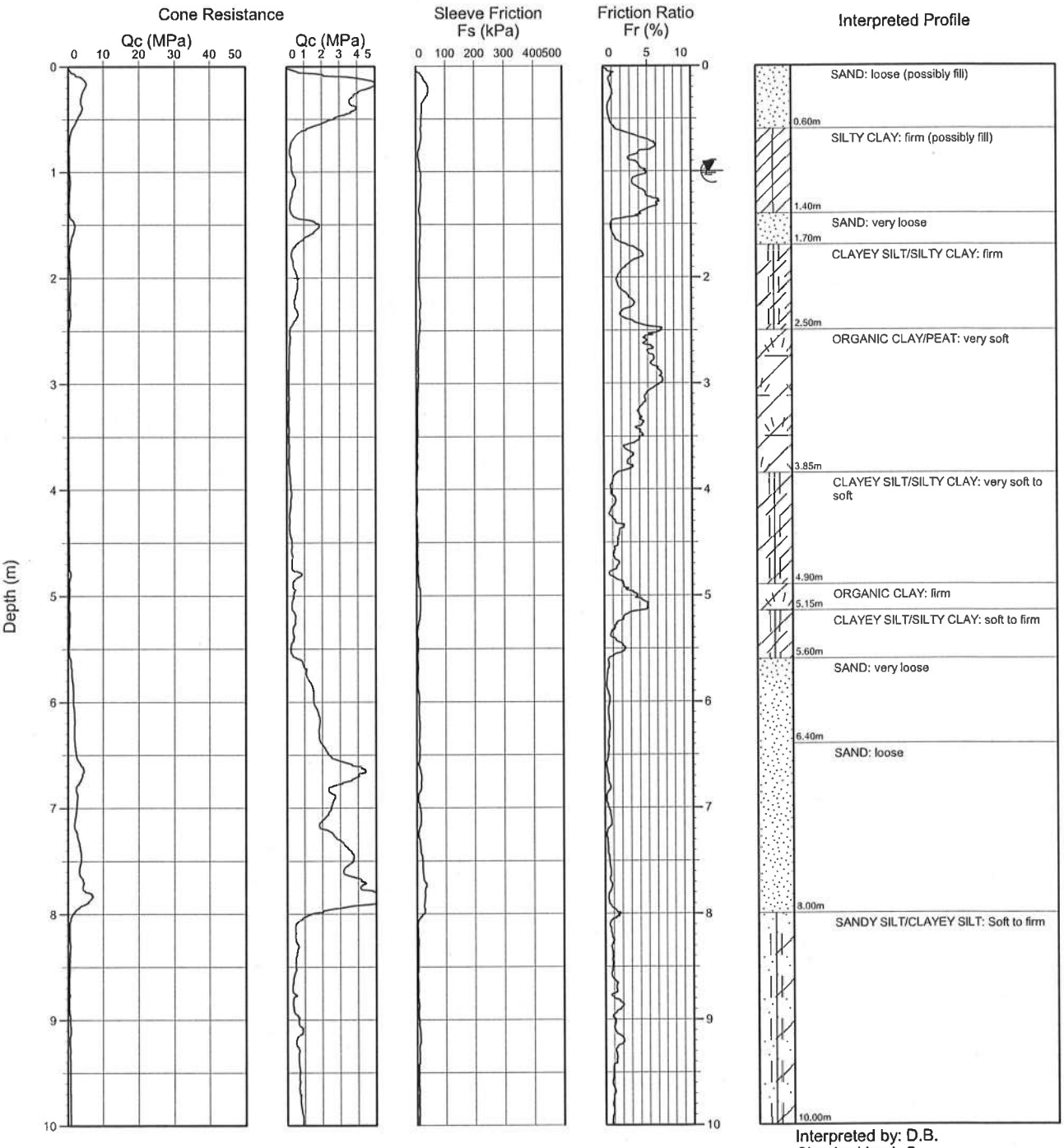

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Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

EFCP No. 3 2 / 2

ELECTRICAL FRICTION CONE PENETROMETER TEST RESULTS

Client:	WARRINGAH COUNCIL	
Project:	PROPOSED LIGHT POLES	
Location:	NOLAN RESERVE, PITTWATER ROAD, NORTH MANLY, NSW	
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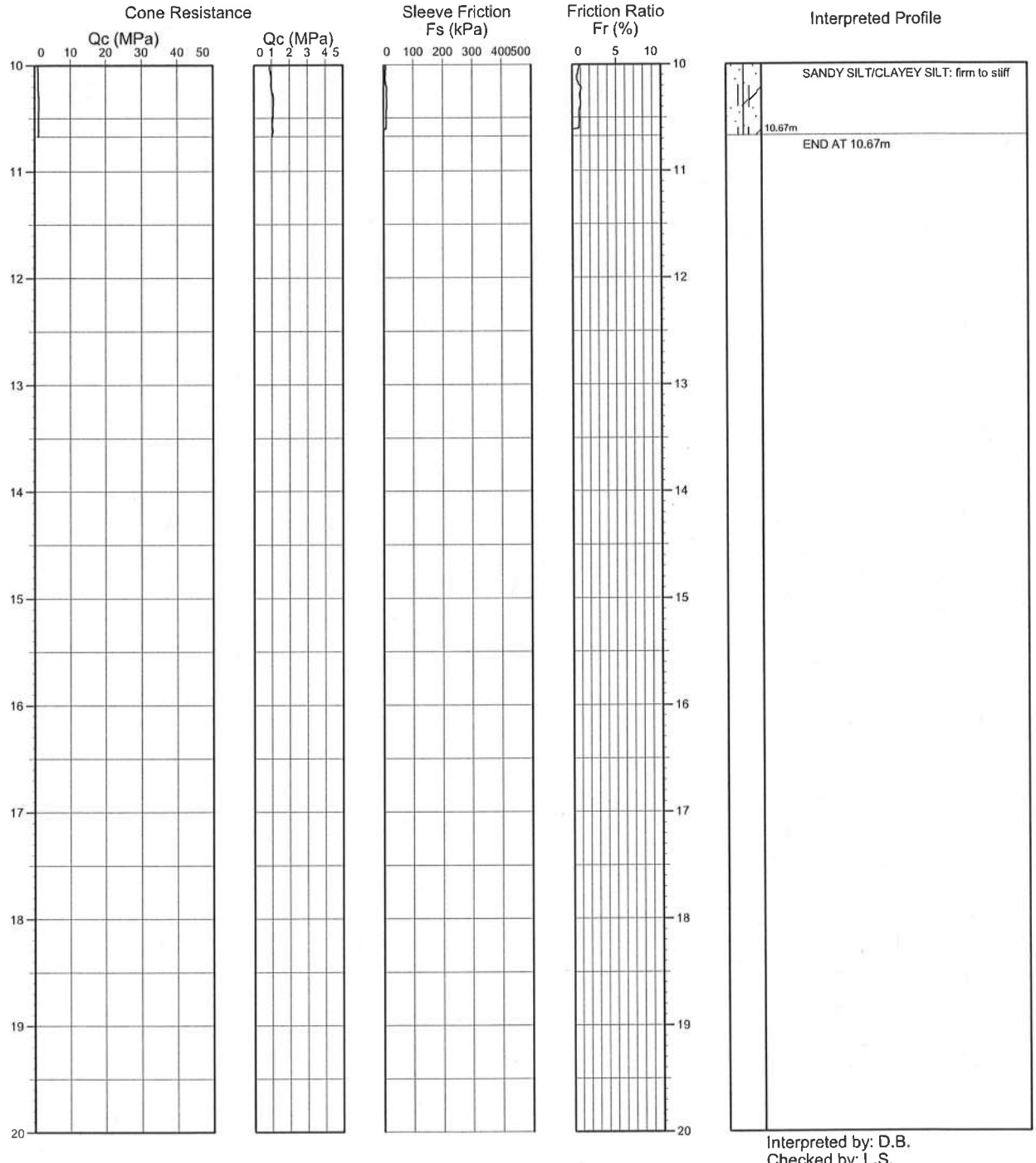

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Checked by: L.S.

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Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

EFCP No. 4

1 / 2

ELECTRICAL FRICTION CONE PENETROMETER TEST RESULTS

Client:	WARRINGAH COUNCIL		
Project:	PROPOSED LIGHT POLES		
Location:	NOLAN RESERVE, PITTWATER ROAD, NORTH MANLY, NSW		
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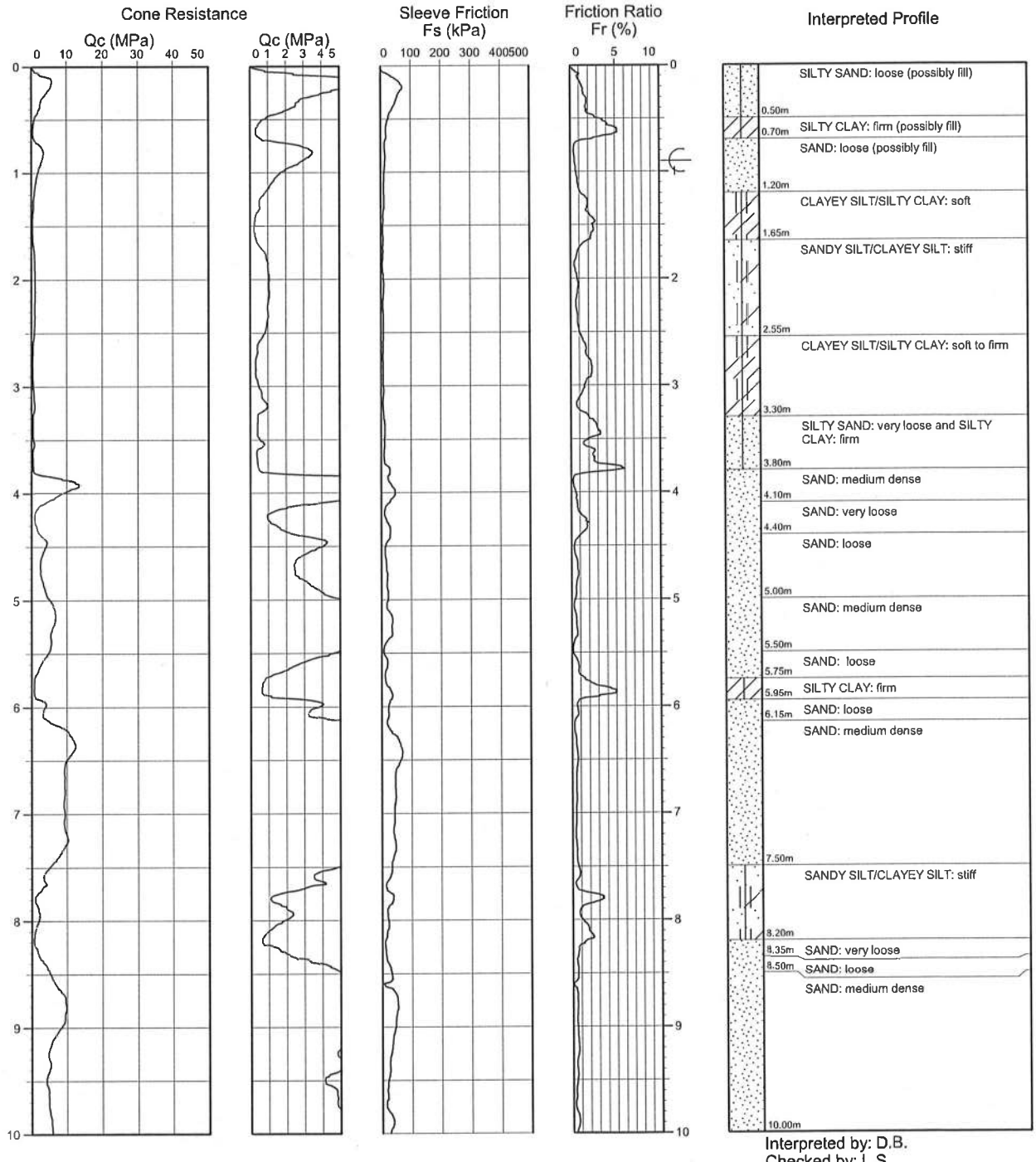

Interpreted by: D.B.
Checked by: L.S.

Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

EFCP No. 4 2 / 2

ELECTRICAL FRICTION CONE PENETROMETER TEST RESULTS

Client:	WARRINGAH COUNCIL
Project:	PROPOSED LIGHT POLES
Location:	NOLAN RESERVE, PITTWATER ROAD, NORTH MANLY, NSW

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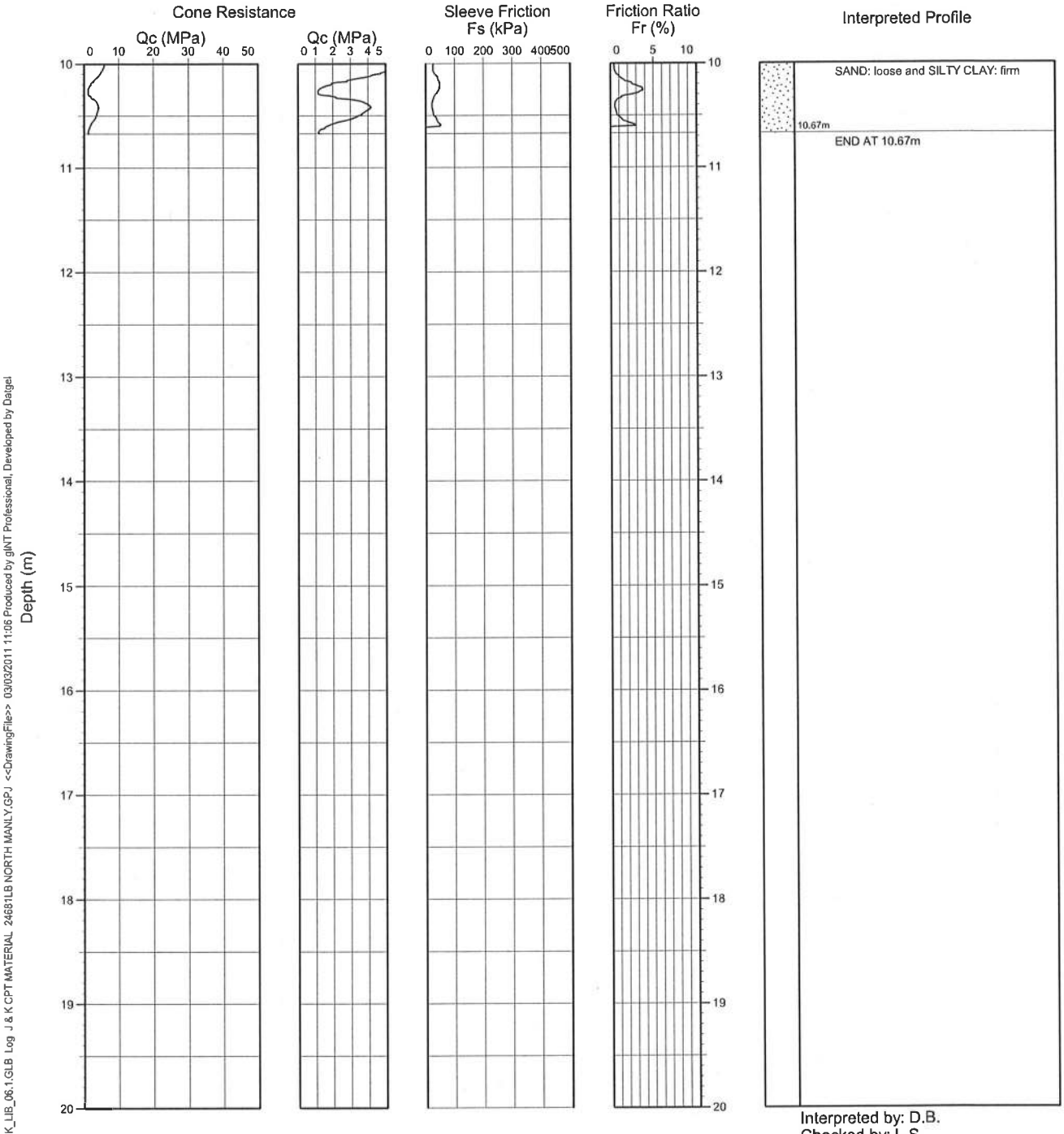

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Checked by: L.S.

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Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

EFCP No. 5 1 / 1

ELECTRICAL FRICTION CONE PENETROMETER TEST RESULTS

Client:	WARRINGAH COUNCIL
Project:	PROPOSED LIGHT POLES
Location:	NOLAN RESERVE, PITTWATER ROAD, NORTH MANLY, NSW

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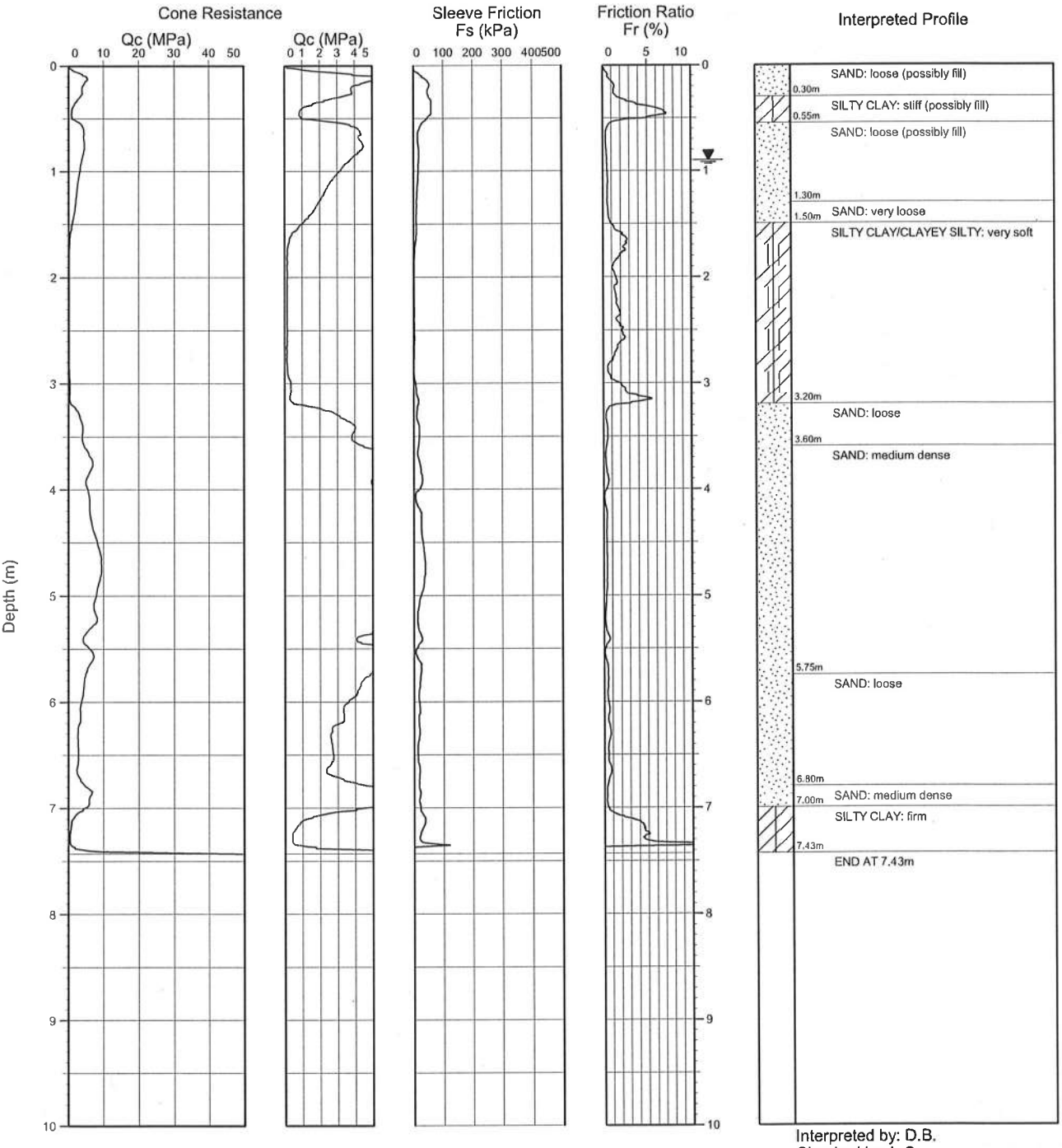

Interpreted by: D.B.
Checked by: L.S.

Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

EFCP No. 6 1 / 1

ELECTRICAL FRICTION CONE PENETROMETER TEST RESULTS

Client:	WARRINGAH COUNCIL
Project:	PROPOSED LIGHT POLES
Location:	NOLAN RESERVE, PITTWATER ROAD, NORTH MANLY, NSW

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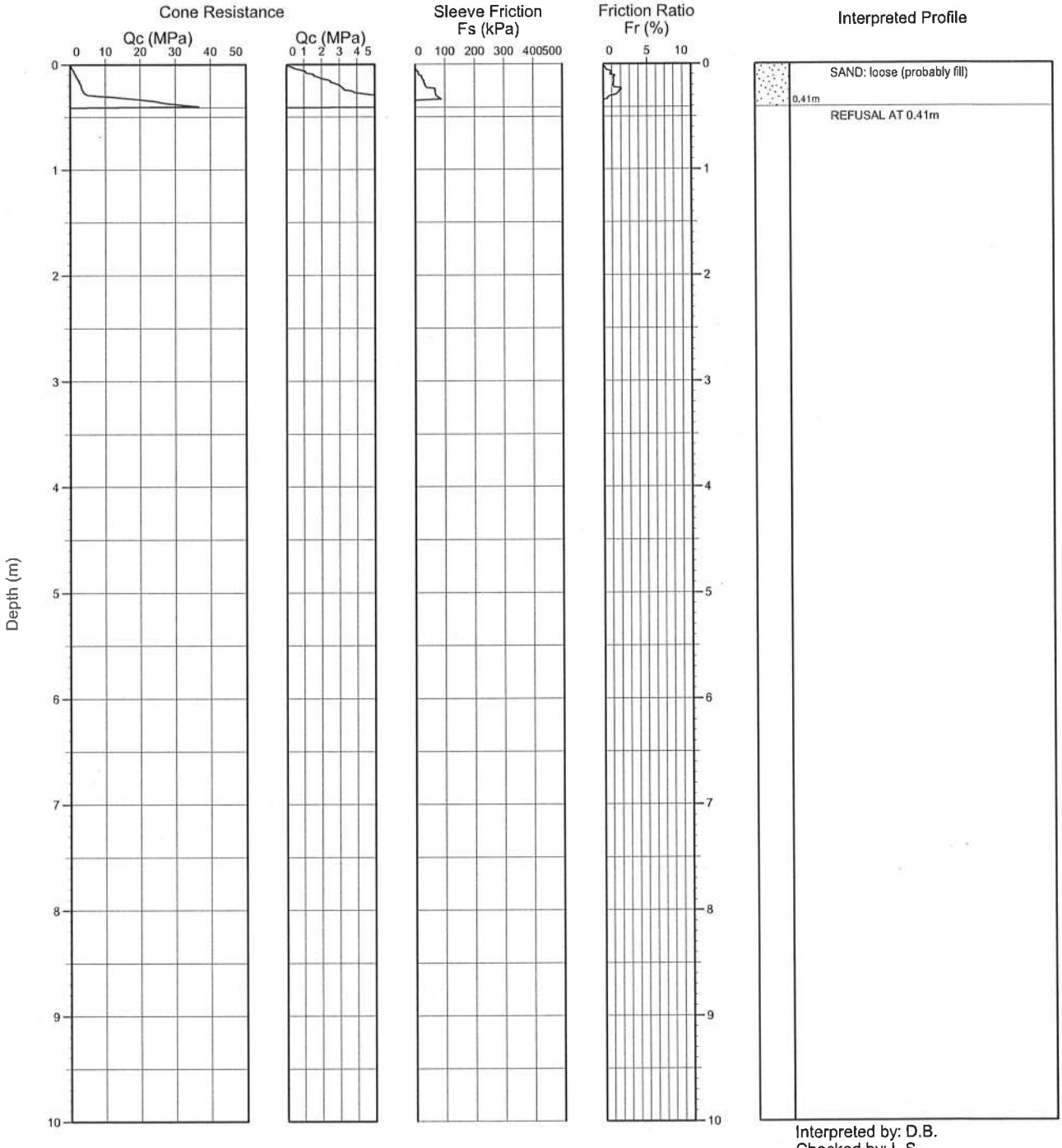

Interpreted by: D.B.
Checked by: L.S.

Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

EFCP No. 6b 1 / 1

ELECTRICAL FRICTION CONE PENETROMETER TEST RESULTS

Client:	WARRINGAH COUNCIL
Project:	PROPOSED LIGHT POLES
Location:	NOLAN RESERVE, PITTWATER ROAD, NORTH MANLY, NSW

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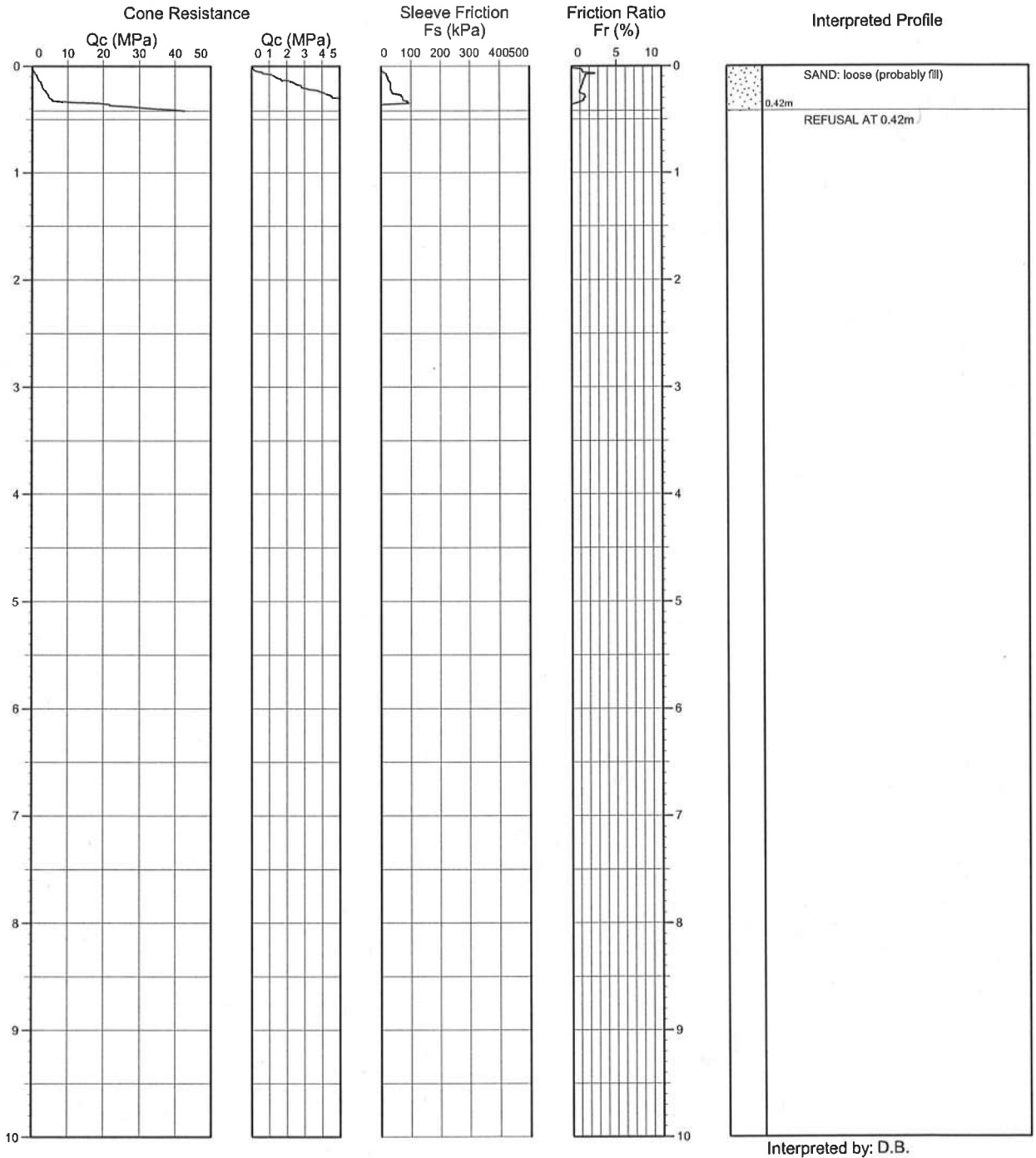

Interpreted by: D.B.
Checked by: L.S.