

Australian Piling Experts
PO Box 3865,
Marsfield, 2122

Friday 6th March 2020

TALL Ref: 2019/091181
RevB

Dear Sir,

Structural design certification for the screw pile foundations for the adjustments and additions to 19-21 The Corso, Manly

This letter is to certify that we Tall Engineers Pty Ltd have design the screw piles for the above project in accordance with the relevant SAA Codes, in particular the following:-

1. AS1163 – Cold-formed structural steel hollow sections
2. AS1170 – Structural design actions
3. AS2159 – Piling design and installation
4. AS3600 – Concrete structures
5. AS4100 – Steel structures
6. AS5100.6 - Composite steel and concrete design

Piles have been designed for the working loads and sizes as per the attached table below. Piles have been designed for sand and must be screwed to refusal in dense sand below the line of influence line of the sewer.

The site is 300m of the ocean and so will exposed to wind borne salt spray and can be expected to have mildly elevated salinity levels. From Consulting Earth Scientists Report CES070109-PKD-01-D dated 21st February 2017 there are no acid sulphate or soils with acid sulphate potential on site. We have therefore classified the site as mildly aggressive to steel piles. We have assessed, based on corrosion rates for mildly aggressive conditions as specified in the piling code AS2159 – 2009 (section 6.5.3), that the expected service life of the screw piles to be installed by Australian Piling Experts Pty Ltd exceeds fifty (50) years.

Relevant design data:

Geotechnical Information:

Geo Enviro Consultancy Pty Ltd Report JG18143A-r1(rev) dated 30th April 2019

Consulting Earth Scientists Report CES070109-PKD-01-D dated 21st February 2017

Structural Engineering Drawings:

Waddington Consulting drgs 11401-S0.00/A, S0.01/A, S1.00/A, S1.01/A, S1.02/A & S1.03/A all dated 23/10/2019

Pile Mark	Pile Tube Size	Shaft grade	Pile Helix	SWL per Pile in Compression	Minimum Driving Torque	Design installation depth
P1	114x6.0CHS	350MPa	400mmx400mm x16mm	160KN	15,000Nm	5.5m – 6.0m

All piles must be core filled with 40MPa block mix.

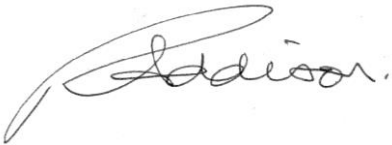
Piles must be spaced a minimum of 1.13m apart to prevent pile interaction.

Calculations to prove pile geotechnical capacity and pile structural capacity under long term corrosion are as attached.

Terms and conditions for certification are as attached.

For and on behalf of Tall Engineers Pty Ltd

Yours faithfully,



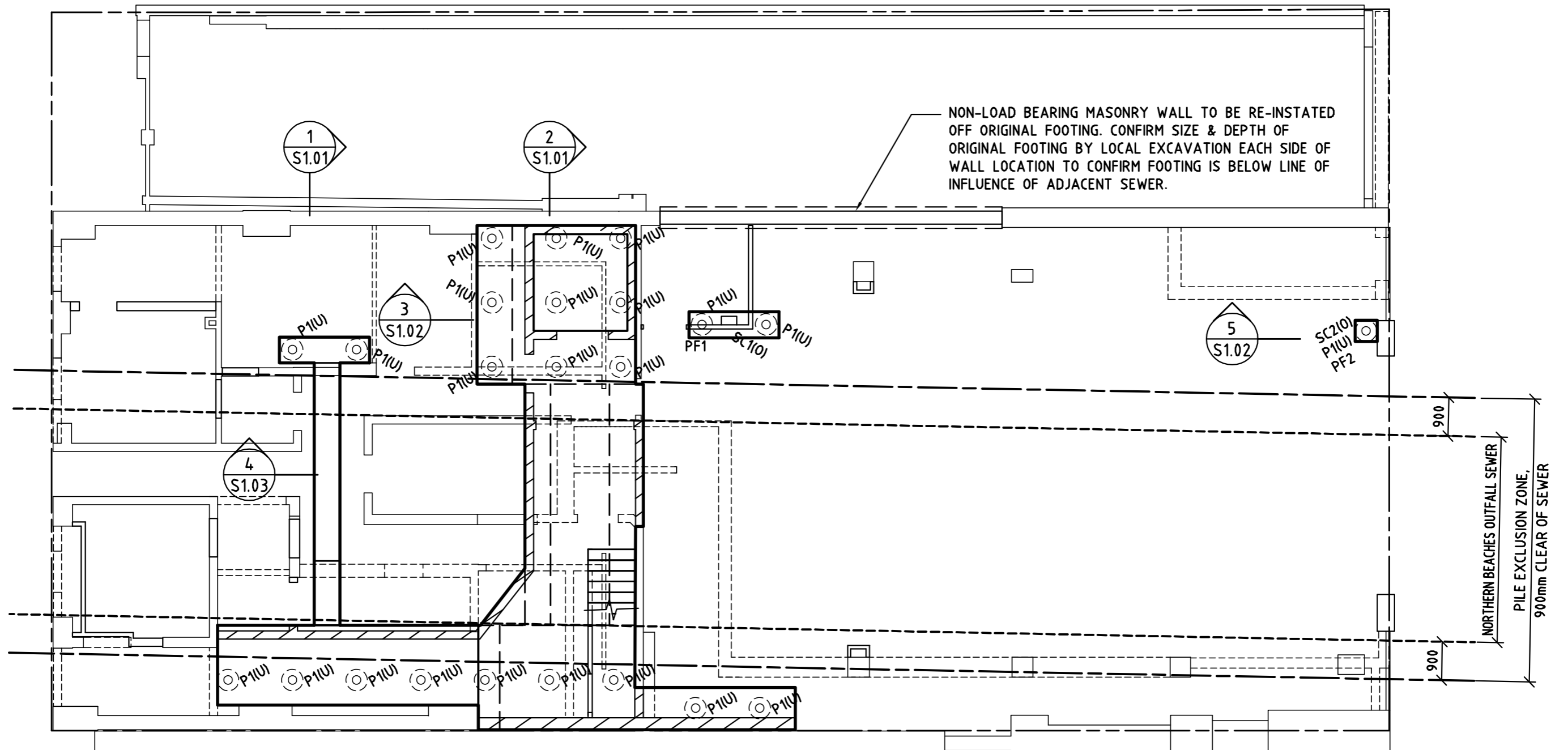
Richard Addison

MIEAust 228249

Senior Foundations Designer

TALL

NOTES:
 - FOR GENERAL NOTES REFER DRG No 11401-S0.00 & S0.01



GROUND FLOOR & FOOTING PLAN

SCALE 1:100

- ALL RAFT SLAB FOOTINGS & PAD FOOTINGS TO BE SUPPORTED ON STEEL SCREW PILES BEARING ON DENSE SAND GREATER THAN 5.5m BELOW GROUND & HENCE BELOW THE INVERT OF THE NORTHERN BEACHES OUTFALL SEWER.
- DENOTES:
 - P1 PROPRIETARY STEEL SCREW PILES MIN 5.5m DEEP BEARING ON DENSE SAND. PILES TO BE RATED TO MINIMUM ALLOWABLE WORKING LOAD 180kN.
 - PF1 & PF2 REINFORCED CONCRETE PAD FOOTING ON SCREW PILES. REFER DETAILS

The information contained on this drawing has been prepared for the exclusive use of the Client for this project. No liability or responsibility is accepted for use of this information by any third party or for any other project.

ISSUE	DESCRIPTION	BY	APR	DATE
A	ISSUED FOR SYDNEY WATER ASSESSMENT	JC	SW	23.10.2019

CHARTERED PROFESSIONAL ENGINEERS:



Waddington Consulting Pty Ltd
 ACN 130 522 851
 Structural and Civil Engineering Consultants
 Suite 506, Level 5, 22 Central Avenue Manly NSW
 P.O. Box 1044 Manly NSW 1655
 Phone (02) 9976 0070
 Email enquiries@wadconsulting.com

PROJECT:

PROPOSED ALTERATIONS & ADDITIONS
 at: 19-21 THE CORSO, MANLY
 for: HILROK PROPERTIES PTY LTD

DRAWING TITLE:

GROUND FLOOR & FOOTING PLAN

DESIGN: S.W. DATE: OCT 2019

DRAWN: J.C. SCALE: 1:100

FILENAME: 11401-S1.00.DWG

SIGNED: SIZE A3

DRAWING No: REV

11401-S1.00 A

Geotechnical reduction factor

Weighted factors and individual risk ratings for risk factors

	Risk	Risk factor	Risk Weighting	Risk Rating
Site				
Geotechnical complexity of the site	Moderate	3	2	6
Extent of ground investigation	Moderate	2	2	4
Amount and quantity of geotechnical data	Moderate	3	2	6
Design				
Experience with similar foundations in similar geotechnical conditions	Low	2	1	2
Method of assessment of geotechnical parameters for design	Moderate	3	2	6
Design method adopted	High	4	1	4
Method of utilizing results of insitu test data and installation data	Moderate	3	2	6
Installation				
Level of control	Moderate	3	2	6
Level of performance monitoring of the supported structure during and after construction	Moderate	3	0.5	1.5
			14.5	41.5
Average Risk Rating				2.9
Redundancy of system is low				
φ_{gb}				0.52

GEOTECHNICAL CAPACITY CALCULATION (AS2159-2009):

Project: Adjustments and Additions
 Location: 19-21 The Corso, Manly

Tender Information:
 Structural Drawings:
 Waddington Consulting drgs 11401-S0.00/A, S0.01/A, S1.00/A, S1.01/A, S1.02/A & S1.03/A all dated 23/10/2019
 Geotechnical Report:
 Geo Enviro Consultancy Pty Ltd Report JG18143A-r1(rev) dated 30th April 2019
 Consulting Earth Scientists Report CES070109-PKD-01-D dated 21st February 2007
 Sand properties taken from the Geo Enviro Report BH01 and BH02
 Water table levels taken from geotechnical reports for 8-28 The Corso

AFS Screw Pile Parameters:

P1-600 Pile Name
 400 Helix Dia
 Square Helix shape
 114.3 CHS Dia
 0.16 Helix Area (Helix dia**2)
 0.359084 CHS Circumference (πDia)

Pile Design Parameters:

4.5 Depth to Water Table
 9.81 Water Unit Weight (g)
 0.52 φ * Geotechnical Reduction Factor
 1.35 Structural Factor of Safety (S*)
 Note: Assume S*=1.35xSWL (on structural Dwg)

Layer	Depth (m)	Soil Type	ZL/d	Ks*Tand	g	Nq	s'v	Uv	s'v (effectiv	s'vb	Uvb	s'vb (effect s' (effective	Skin Friction	End Bearing	Rug	R*g	SWL				
	From	To	N/A	N/A	(kg/m3)	N/A	(kPa)	(kPa)	1. (kPa)	(kPa)	(kPa)	2. (kPa)	Less 1/2. ((kN)	(kN)	(kN)	(kN)	(kN)				
Layer #1	0	1	Loose	6	0.8	15	23	15	0	15	2.4	36	0	36	15	0	55.2	55.2	28.704	21.26222	
Layer #2	1	2	Loose	6	0.8	15	24	30	0	30	2.4	36	0	36	30	0	115.2	115.2	59.904	44.37333	
Layer #3	2	3	Loose	6	0.8	15	25	45	0	45	2.4	36	-20.601	36	36	0	144	144	74.88	55.46667	
Layer #4	3	4	Loose	6	0.8	15	26	60	0	60	2.4	36	-20.601	36	36	0	149.76	149.76	77.8752	57.68533	
Layer #5	4	4.5	Loose	6	0.8	15	26.5	67.5	0	67.5	2.4	36	-20.601	36	36	0	152.64	152.64	79.3728	58.79467	
Layer #6	4.5	5	Medium	8	1	16.5	35	75.75	4.905	70.845	3.2	52.8	-12.753	52.8	52.8	9.479819	9.479819	295.68	305.1598	158.6831	117.543
Layer #7	5	5.5	Dense	15	1.5	18	44	84.75	9.81	74.94	6	108	9.81	98.19	74.94	20.18232	29.66214	527.5776	557.2397	289.7647	214.6405

Need 160KN therefore ok

Geotechnical Capacity Formula: $R^*g > S^*$ (AS2159 Section 4.3):

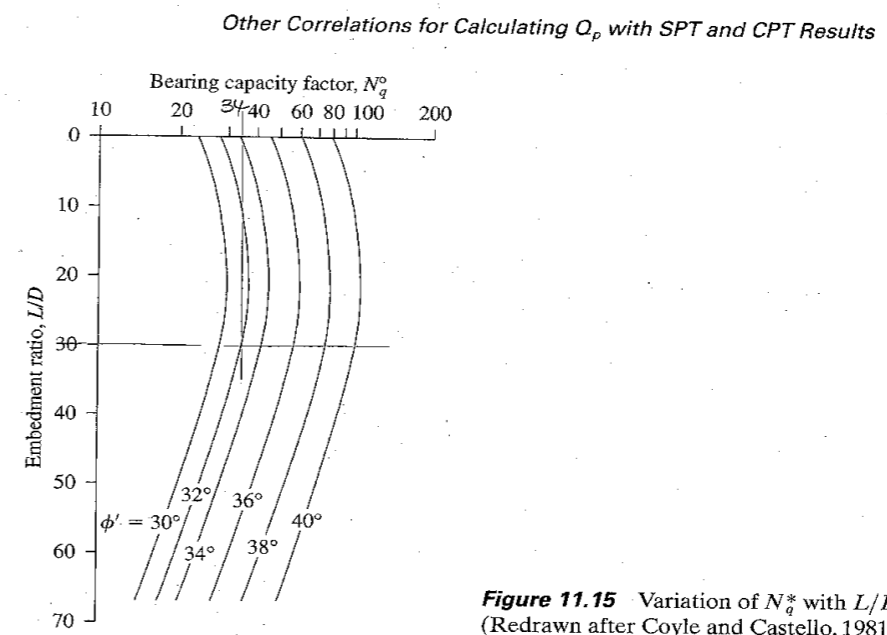
Rug = End Bearing + Skin Friction ... Section 4.4.1
 $Rug = (s'vb \cdot Nq \cdot Ab) + (s'v \cdot Ks \cdot Tand \cdot As)$
 $R^*g = \phi \cdot Rug$... Section 4.3.1

Sand Soil	ZL/d	Ks*Tand	g (kg/m3)
Loose	6	0.8	15
Medium	8	1	16.5
Dense	15	1.5	18

whereby ...

- R*g Design Geotechnical Strength ... Section 4.3.1
- Rug Ultimate Geotechnical Strength ... Section 4.4.1
- Nq Bearing Capacity Factor
- Ab Area of Helix Base
- As Area of Pile Shaft/Circumference
- s'vb Vertical Effective Stress at Helix/Base
- s'v Vertical Effective Stress at Nominated Layer
- Ks Lateral Pressure Coefficient
- Tand Tan of Adhesion Angle Between Pile & Soil
- ZL A depth the Vertical Effective Stresses do not Increase Beyond
- d Pile Diameter
- φ Geotechnical Strength Reduction Factor from previous pages
- S* Design Action Affect
- S Required Safe Working Load (SWL)
- Note: $R^*g \Rightarrow S^*$... Section 4.3.1

$L/D = 6000 / 400 = 15$



Pile eccentricity loading check.

Durability class	Mildly Aggressive
Pile life (years)	50
Maximum loss of section per year (mm)	0.02
Total section loss through life of pile (mm)	1
Max pile out of position (mm)	75
Max pile out of straightness after installation (mm)	10
Maximum pile slope 1:25 =	4.0%
Working to ultimate load factor	1.35
Concrete strength of core filling (MPa)	40

Pile Name	
Helix	400mm x 400mm
CHS Diameter (mm)	114.3
CHS Thickness (mm)	6
Steel grade	350
Internal area m ²	0.0082
SWL Compression (KN)	160
SWL Tension (KN)	0
Ultimate Compression (KN)	216
Ultimate Tension (KN)	0
Ultimate moment at pile head (KNm)	2.2

At installation

φ	Ns	Steel	(KN)	239	Buckling capacities used for an unrestrained buckling length Le of 4.5m
φ	Ns	Concrete	(KN)	62.3	Buckling capacities used for an unrestrained buckling length Le of 4.5m
φ	Ms	Steel	(KNm)	22.2	
			% utilisation of member at installation	81.4%	
			Section utilisation < 100%	Pass	

After design life and under loss of section

φ	Ns	Steel	(KN)	199.2	Buckling capacities used for an unrestrained buckling length Le of 4.5m
φ	Ns	Concrete	(KN)	62.3	Buckling capacities used for an unrestrained buckling length Le of 4.5m
φ	Ms	Steel	(KNm)	18.5	
			% utilisation of member at design life	94.28%	
			Section utilisation < 100%	Pass	

Services

1. We will undertake the services in accordance with the agreement and using due skill, care and diligence.
2. Any questions you have in relation to our services can be directed to our Director.
3. You will ensure that you and your employees, agents and contractors:
 - (a) cooperate with us; and
 - (b) do not interfere with or delay the services.

Information and Documents

4. To help us understand your requirements in connection with the services and the project, you will:
 - (a) tell us any specific requirements you have;
 - (b) provide any information and documents we ask you to provide;
 - (c) answer any questions we ask you; and
 - (d) provide in writing any comments you (or your employees, agents or contractors) have on any document on which we ask for your comments.
5. You confirm that information you (or your employees, agents or contractors) provide to us is complete and accurate. You understand that we will not check, and we do not accept any liability in connection with, any information you provide to us unless checking that information is part of the services.

Payment

6. You will pay the fees, other amounts payable under the agreement and applicable tax in accordance with the procedure detailed below.
7. We will invoice you for the fees relating to the services undertaken, and other amounts due under the agreement, during the period covered by the invoice.
8. Within the agreed time for payment set out in the agreement details (or otherwise, 14 days) after we send you an invoice, you will pay the invoice in full and without set off, deduction, counterclaim or withholding. If we ask you to do so, you will pay our final invoice in full and without set off, deduction, counterclaim or withholding before we deliver the final version of our reports or other documents.
9. If you fail to pay any amount due under the agreement in full by the date due:
 - (a) you will pay interest at the rate of 1.5% per month on all overdue amounts, including unpaid interest, accruing daily until the amount is paid in full; and
 - (b) we may keep any documents we have prepared in connection with the services and:
 - (i) stop undertaking the services; or
 - (ii) end the agreement by giving you written notice.
10. You will pay for any additional services we undertake, and any liability, cost or expense we incur, if:
 - (a) the scope or timing of the services or project change;
 - (b) any information you (or your employees, agents or contractors) provide to us is not complete and accurate;
 - (c) part or all of the services are delayed or suspended (other than as a result of our breach of the agreement);
 - (d) during or after completion of the services, we or any of our employees are required to give evidence before, or provide any information to, a court or other competent authority;
 - (e) you fail to pay an amount due under the agreement; or
 - (f) you end the agreement before we have completed the

services.

11. All amounts in the agreement and other documents we give you that relate to the fees or amounts payable under the agreement are exclusive of GST, VAT or other applicable service tax unless expressly included.
12. The amount you will pay for any additional services will be the amount we agree with you (or otherwise, the amount calculated by multiplying the number of hours our employees spend undertaking the additional services by the hourly rates and any amount due to our subconsultants or subcontractors plus 12.5%). We may ask you to confirm in writing that you will pay for any additional services, in which case, we are not required to commence the relevant additional services until we receive your written confirmation.

Insurance

13. We will maintain professional indemnity and public liability insurance. We will give you certificates of currency if you ask us for them at any time before we complete the services.

Liability

14. To the maximum extent permitted by law, any liability we have to you is limited (in the aggregate) to the lesser of AUD 5.0 million or ten times the fees paid under the agreement, and you release us from any further liability.
15. To the extent that we are not permitted by law to limit our liability as detailed in the previous clause, any liability we have to you is limited to re-supplying the services.
16. On the date that is one year after the date we send you our final invoice for the services, you release us and our servants, employees, agents and sub-consultants from all liability. For the purposes of this clause, we contract on our own behalf and also on behalf of each of our servants, employees, agents and subconsultants.

Intellectual Property

17. We own all intellectual property arising from or in connection with the services. We grant you a royalty free licence to use our intellectual property for the purposes of the project.

Confidentiality, documents and information

18. All information a party provides is confidential and must not be disclosed to any other person (unless the disclosure is authorised or required by law). You:
 - (a) will not alter in any way or copy any report or document we prepare to any other person without our prior written consent; and
 - (b) will only use any report or document we prepare for the purposes of the project; and
 - (c) authorise us to disclose any information you provide to our employees, subconsultants and others involved with the services.

Ending the agreement

19. Subject to the next clause, either party may end the agreement at any time by giving the other party at least 7 days notice. If the agreement is ended, we will send you an invoice for services undertaken to the date the agreement is ended.
20. The sections headed "payment", "liability", "intellectual property", "confidentiality, documents and information" and

"general matters" continue to operate after this agreement is ended.

General matters

21. The agreement applies to all services we undertake (including any additional services and any services undertaken before you executed the agreement).
22. If there is any inconsistency between these terms and any other document or agreement between the parties, these terms will prevail.
23. The agreement is the entire agreement. The only duties, obligations and responsibilities we have arising from or in connection with the subject matter covered by the agreement (including the services) are those expressly set out in the agreement and any other duties, obligations and responsibilities we might have are excluded.
24. You authorise us to destroy documents we prepare or hold in connection with the services or the project 7 years after the date we send you our final invoice for the services.
25. If any of these terms would be invalid, unenforceable or void, the relevant term must be read down to the maximum extent possible to prevent that occurring.
26. The agreement can only be amended or varied in a written document signed by both parties. We can only waive our rights under or in connection with the agreement by a written document signed by one of our directors.
27. You will indemnify us against any claim by, or liability to, a third party arising from, in respect of or in connection with the services and all expenses we incur defending or settling such claim or liability.
28. Neither party may assign or transfer the agreement or any right or obligation under the agreement without the other party's written consent.
29. You agree that we can publish articles, photographs and other illustrations relating to the services and the project unless you tell us in writing otherwise within 7 days of executing the agreement.

Definitions

30. Unless the context otherwise requires, in the agreement:
"**agreement**" means the agreement executed by the parties in connection with the services, including these terms, the agreement details and our proposal.
"**document**" includes a written or electronic document
"**fees**" means the amount set out in the agreement details including disbursements
"**hourly rate(s)**" means the relevant hourly rate(s) set out in the agreement details (or otherwise the rate(s) that Tall Engineers normally charges for work undertaken by the relevant Tall Engineers employee(s) at the time the work is undertaken)
"**information**" includes documents and information provided before execution of the agreement
"**liability**" means liability for loss or damage, whether arising under, in connection with or for breach of the agreement, or in connection with the performance or non-performance of the services and any additional services, whether such liability arises in contract, in tort (including negligence), under statute or otherwise, and whether arising in connection with one or more events
"**project**" means the project(s) that the services relate to
"**proposal**" means any proposal (and if more than one, the final proposal) we gave you in relation to the services
"**services**" means the services set out in the agreement details (or otherwise the services we undertake)
"**third party**" means a person who is not a party, but does not include our employees, agents, subcontractors and sub

consultants.

"**we**", "**us**" and "**Tall Engineers**" means the Tall Engineers Pty Ltd company set out in the agreement details.

"**you**" and "**the Client**" means the person(s) set out in the agreement details (and if more than one person, "you" means each of those persons severally and all of them jointly, except for the purposes of clauses 14 and 15 where "you" means all of those persons) including that person's permitted successors