

1 July 2016

WM Project Number: 13222
Our Ref: A13222Ltr01072016

Brad Searle
Arcadis
Level 5/141 Walker Street
NORTH SYDNEY NSW 2060

Dear Brad

Re: Dunmore Sand Extraction Proposal - Response to JRPP

Shellharbour City Council (SCC) is proposing to redevelop its Dunmore Sand Extraction facility at 44 Buckleys Road, Dunmore (the Proposal).

Wilkinson Murray conducted a detailed noise and vibration assessment report for the project (Wilkinson Murray Report No. 13222 Version B, dated December 2014).

The noise assessment identified that there could be possible exceedances of the Project Specific Noise Levels (PSNL – 45dBA, $L_{Aeq, 15min}$) for sand extraction and site rehabilitation at the closest residential receivers along Dunmore Road (See Figure 1).

The noise assessment considered the following noise mitigation options and recommended these should be considered at the detail design stage when more detailed information was known, namely:

- Negotiated agreements with potentially affected residences. Such agreement would address architectural treatment and noise barrier 'at receiver' (along residential boundary fence fronting the site); and/or
- Treatment of suction dredge (sand extraction); and/or
- Treatment of long armed excavator (site rehabilitation); and/or
- Barrier treatment of barge (i.e. to shield noise generated by plant on board); and/or
- Noise barrier 'at source' (along the northern boundary of the proposed extraction area).

To respond to Councils and the (Joint Regional Planning Panel) JRPP concerns, a more detailed noise modelling exercise has been conducted with more detailed topography and buildings in the model.

The predicted noise levels for sand extraction and Site Rehabilitation without noise mitigation is presented in Table 1.

As can be seen the predicted noise levels without noise mitigation exceeds the noise criteria at 3 residential receivers.

Figure 1 Site and closest residential receivers.**Table 1 Noise Predictions for Sand Extraction and Site Rehabilitation**

Location	Predicted $L_{Aeq, 15min}$ Noise level		Criteria	Complies? Yes/No
	Sand Extraction (dBA)	Site Rehabilitation (dBA)		
R1 - 1 Dunmore Rd	48.5	53.3	45	No/No
R1 - 5 Dunmore Rd	48.5	51.1		No/No
R1 - 7 Dunmore Rd	44.4	45.6		Yes/No
R1 - 9 Dunmore Rd	43.1	44.3		Yes/Yes
R1 - 11 Dunmore Rd	42.8	43.2		Yes/Yes
R1 - 19 Dunmore Rd	44.9	44.9		Yes/Yes
R1 - 21 Dunmore Rd	44.3	44.4		Yes/Yes
R1 - 23 Dunmore Rd	43.6	43.7		Yes/Yes

Reducing noise from the dredge and the long armed excavator for placement of the rehabilitation material could be possible as the noise levels from the dredge and long armed excavator are the main reason for exceedances at the residences. Modifying dredging activities so that the dredge can operate further to the south of the extraction pit may also be feasible. However, as both sand extraction and site rehabilitation scenarios exceed the PSNL, it was considered that a single noise barrier that could reduce noise levels due to both sand extraction and site rehabilitation would be more reasonable than mitigating two individual pieces of plant; specifically the barge and the excavator.

Therefore, the location of the proposed noise barrier has been reviewed considering potential ancillary impacts from flooding, visual impact, loss of habitat and encroachment on mining area and resultant noise mitigation. Figure 2 shows the preferred location of the noise barrier.

Figure 2 Proposed noise barrier location.



An iterative approach was used and it was found that a 5.2m barrier would reduce noise levels from sand extraction and site rehabilitation to below the PSNL.

However when considering the most reasonable and feasible barrier it was found that a 4m noise barrier would reduce noise levels for sand extraction to within the PSNL however for site rehabilitation a negligible 1dB exceedance occurs at 1 Dunmore Rd and 5 Dunmore Rd (See Table 2).

Table 2 Noise Predictions for Sand Extraction and Site Rehabilitation with a 4 metre barrier

Location	Predicted L _{Aeq, 15min} Noise level Sand Extraction (dBA)	Predicted L _{Aeq, 15min} Noise level Site Rehabilitation (dBA)	Criteria	Complies with barrier? Yes/No
R1 - 1 Dunmore Rd	44.2	46.0	45	Yes/No
R1 - 5 Dunmore Rd	44.8	45.9		Yes/No
R1 - 7 Dunmore Rd	43.2	43.3		Yes/ Yes
R1 - 9 Dunmore Rd	41.8	42.9		Yes/Yes
R1 - 11 Dunmore Rd	42.6	42.9		Yes/Yes
R1 - 19 Dunmore Rd	42.7	42.8		Yes/Yes
R1 - 21 Dunmore Rd	42.4	42.6		Yes/Yes
R1 - 23 Dunmore Rd	42.0	41.7		Yes/Yes

The exceedance of 1 dB for the site rehabilitation could be easily reduced if the long armed excavator were to have its source noise level reduced by 1dB by possibly increasing the transmission loss of the engine enclosure by cladding with wavebar, or similar.

The predicted noise levels for the site rehabilitation with the recommended mitigation, specifically a 4 m barrier and a long armed excavator with a 1 dB reduction in noise level, is presented in Table 3.

Table 3 Noise Predictions for Site Rehabilitation with a noise barrier and the long armed excavator noise level reduced by 1 dB.

Location	Predicted L _{Aeq, 15min} Noise level with mitigation (dBA)	Criteria	Complies with mitigation? Yes/No
R1 - 1 Dunmore Rd	45	45	Yes
R1 - 5 Dunmore Rd	44.9		Yes
R1 - 7 Dunmore Rd	42.3		Yes
R1 - 9 Dunmore Rd	41.9		Yes
R1 - 11 Dunmore Rd	41.9		Yes
R1 - 19 Dunmore Rd	41.8		Yes
R1 - 21 Dunmore Rd	41.6		Yes
R1 - 23 Dunmore Rd	40.7		Yes

As shown in Table 3, the predicted noise levels during site rehabilitation, with the recommended mitigation, comply with the noise criterion.

The applicant has committed that a noise mitigation strategy will be developed for the Project and will be addressed when developing the Noise Management Plan (NMP). As such it was expected that the consent would include the noise limits and a noise management plan process. This process was preferred by the Applicant as it provided flexibility to confer with the stockholders and develop a noise mitigation strategy.

I trust this information is sufficient. Please contact us if you have any further queries.

Yours faithfully

WILKINSON MURRAY



Nic Hall

Manager (Newcastle)

5 June 2016

WM Project Number: 13222

Our Ref: A13222Ltr04062016

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Arcadis
Level 5/141 Walker Street
NORTH SYDNEY NSW 2060

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The noise assessment identified that there could be possible exceedances of the Project Specific Noise Levels (PSNL – 45dBA, $L_{Aeq, 15min}$) for sand extraction and site rehabilitation at the closest residential receivers along Dunmore Road (See Figure 1).

The noise assessment considered the following noise mitigation options and recommended these should be considered at the detail design stage when more detailed information was known, namely:

- Negotiated agreements with potentially affected residences. Such agreement would address architectural treatment and noise barrier 'at receiver' (along residential boundary fence fronting the site); and/or
- Treatment of suction dredge (sand extraction); and/or
- Treatment of long armed excavator (site rehabilitation); and/or
- Barrier treatment of barge (i.e. to shield noise generated by plant on board); and/or
- Noise barrier 'at source' (along the northern boundary of the proposed extraction area).

To respond to Councils and the (Joint Regional Planning Panel) JRPP concerns, a more detailed noise modelling exercise has been conducted with more detailed topography and buildings in the model.

The predicted noise levels for sand extraction and Site Rehabilitation without noise mitigation is presented in Table 1.

As can be seen the predicted noise levels without noise mitigation exceeds the noise criteria at 3 residential receivers.

Figure 1 Site and closest residential receivers.**Table 1 Noise Predictions for Sand Extraction and Site Rehabilitation**

Location	Predicted $L_{Aeq, 15min}$ Noise level		Criteria	Complies with bund Yes/No
	Sand Extraction (dBA)	Site Rehabilitation (dBA)		
R1 - 1 Dunmore Rd	48.5	53.3	45	No/No
R1 - 5 Dunmore Rd	48.5	51.1		No/No
R1 - 7 Dunmore Rd	44.4	45.6		Yes/No
R1 - 9 Dunmore Rd	43.1	44.3		Yes/Yes
R1 - 11 Dunmore Rd	42.8	43.2		Yes/Yes
R1 - 19 Dunmore Rd	44.9	44.9		Yes/Yes
R1 - 21 Dunmore Rd	44.3	44.4		Yes/Yes
R1 - 23 Dunmore Rd	43.6	43.7		Yes/Yes

Reducing noise from the dredge and the long armed excavator for placement of the rehabilitation material could be possible as the noise levels from the dredge and long armed excavator are the main reason for exceedances at the residences. Modifying dredging activities so that the dredge can operate further to the south of the extraction pit may also be feasible. However, as both sand extraction and site rehabilitation scenarios exceed the PSNL, it was considered that a single noise barrier that could reduce noise levels due to both sand extraction and site rehabilitation would be more reasonable than mitigating two individual pieces of plant; specifically the barge and the excavator.

Therefore, the location of the proposed noise barrier has been reviewed considering potential ancillary impacts from flooding, visual impact, loss of habitat and encroachment on mining area and resultant noise mitigation. Figure 2 shows the preferred location of the noise barrier.

Figure 2 Proposed noise barrier location.



An iterative approach was used and it was found that a 5.2m barrier would reduce noise levels from sand extraction and site rehabilitation to below the PSNL.

However when considering the most reasonable and feasible barrier it was found that a 4m noise barrier would reduce noise levels for sand extraction to within the PSNL however for site rehabilitation a negligible 1dB exceedance occurs at 1 Dunmore Rd and 5 Dunmore Rd (See Table 2).

Table 2 Noise Predictions for Sand Extraction and Site Rehabilitation with a 4 metre barrier

Location	Predicted L _{Aeq, 15min} Noise level Sand Extraction (dBA)	Predicted L _{Aeq, 15min} Noise level Site Rehabilitation (dBA)	Criteria	Complies with bund Yes/No
R1 - 1 Dunmore Rd	44.2	46.0	45	Yes/No
R1 - 5 Dunmore Rd	44.8	45.9		Yes/No
R1 - 7 Dunmore Rd	43.2	43.3		Yes/ Yes
R1 - 9 Dunmore Rd	41.8	42.9		Yes/Yes
R1 - 11 Dunmore Rd	42.6	42.9		Yes/Yes
R1 - 19 Dunmore Rd	42.7	42.8		Yes/Yes
R1 - 21 Dunmore Rd	42.4	42.6		Yes/Yes
R1 - 23 Dunmore Rd	42.0	41.7		Yes/Yes

The exceedance of 1 dB for the site rehabilitation could be easily reduced if the long armed excavator were to have its source noise level reduced by 1dB by possibly increasing the transmission loss of the engine enclosure by cladding with wavebar, or similar. The predicted noise levels for the site rehabilitation with the barrier and a long armed excavator noise level reduced by 1 dB is presented in Table 3.

Predicted noise levels during site rehabilitation with and without the barrier are presented in Table 3.

Table 3 Noise Predictions for Site Rehabilitation with a noise barrier and the long armed excavator noise level reduced by 1 dB.

Location	Predicted L _{Aeq, 15min} Noise level With bund (dBA)	Criteria	Complies with bund Yes/No
R1 - 1 Dunmore Rd	45	45	Yes
R1 - 5 Dunmore Rd	44.9		Yes
R1 - 7 Dunmore Rd	42.3		Yes
R1 - 9 Dunmore Rd	41.9		Yes
R1 - 11 Dunmore Rd	41.9		Yes
R1 - 19 Dunmore Rd	41.8		Yes
R1 - 21 Dunmore Rd	41.6		Yes
R1 - 23 Dunmore Rd	40.7		Yes

As can be seen the predicted noise levels with the barrier and the long armed excavator noise mitigated by 1 dB for site rehabilitation comply with the noise criterion.

The applicant has committed that a noise mitigation strategy will be developed for the Project and will be addressed when developing the Noise Management Plan (NMP). As such it was expected that the consent would include the noise limits and a noise management plan process. This process was preferred by the Applicant as it provided flexibility to confer with the stockholders and develop a noise mitigation strategy.

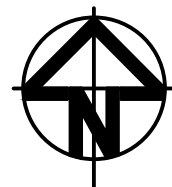
I trust this information is sufficient. Please contact us if you have any further queries.

Yours faithfully

WILKINSON MURRAY



John Wassermann
Director



SITE PLAN
NTS

- LEGEND
- Extraction pit
 - Proposal site
 - Existing sand washery and stockpiles
 - Lot boundary
 - Proposed noise wall
 - Railway

PROPOSED NOISE WALL.
REFER TO DRG.
S0002-AA005925 FOR FOUNDATION OPTION 1 (BORED PIERS)
S0004-AA005925 FOR FOUNDATION OPTION 2 (STRIP FOOTING)

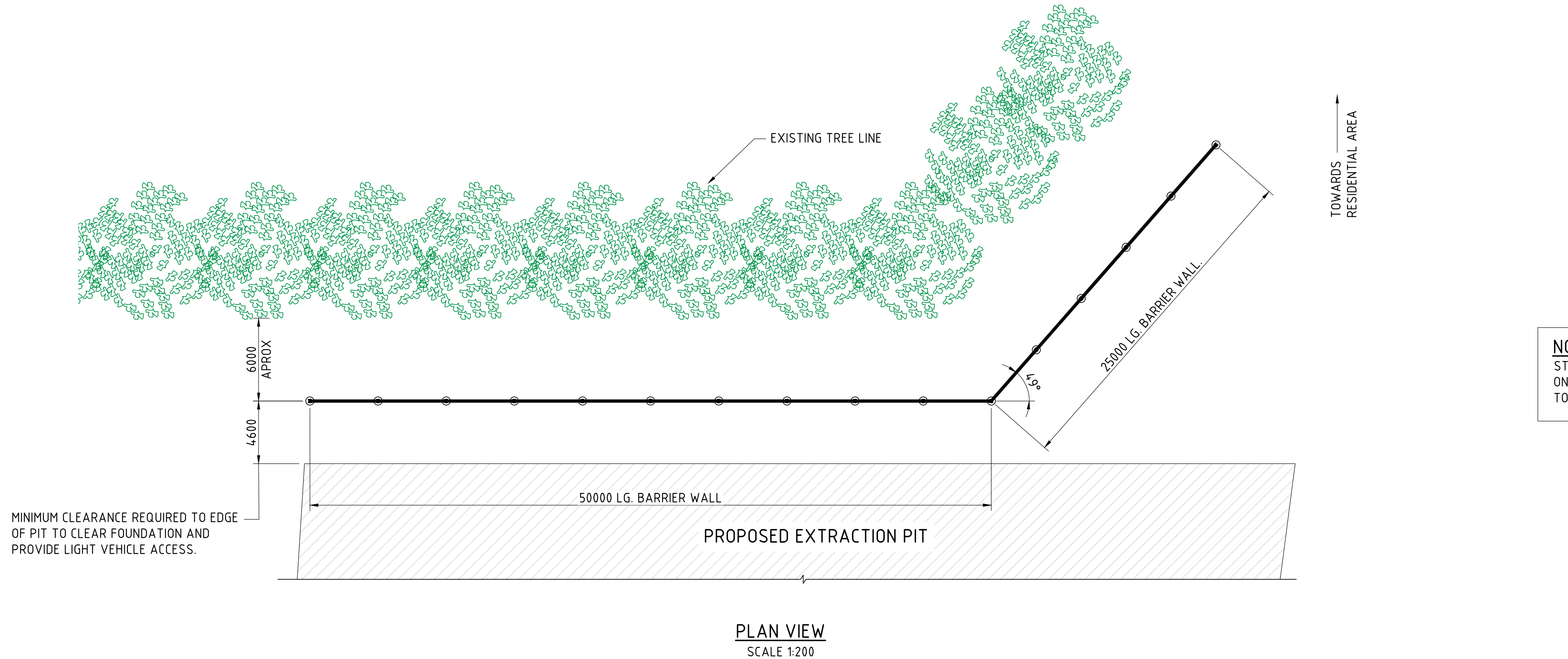
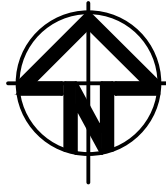


KEY PLAN

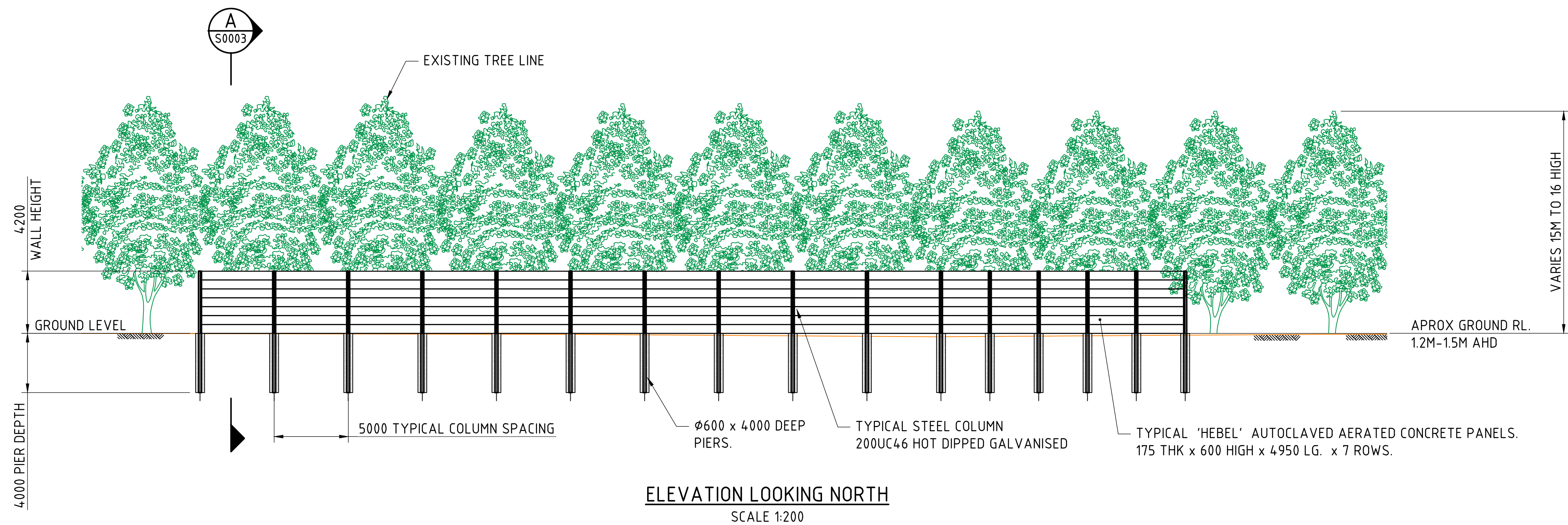
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Height Datum	AHD	Checked --	
Grid	MGA	Approved --	
Filename: S0001-AA005925-A.DWG			
Client			
			
			
Arcadis Australia Pacific Pty Limited Level 5, 141 Walker St NORTH SYDNEY NSW 2060 ABN 76 104 485 289 Tel No: +61 2 8907 9000 Fax No: +61 2 8907 9001 arcadis.com			
Project			
DUNMORE WASTE DISPOSAL DEPOT SAND EXTRACTION AREA NOISE WALL			
Title			
SITE PLAN			
Drawing No. Project No. Issue			
S0001 — AA005925 — A			

DRAWING LIST:

- S0001-AA005925 SITE PLAN
- S0002-AA005925 NOISE WALL ARRANGEMENT - FOUNDATION OPTION 1 (BORED PIERS)
S0003-AA005925 NOISE WALL SECTION - FOUNDATION OPTION 1 (BORED PIERS)
- S0004-AA005925 NOISE WALL ARRANGEMENT - FOUNDATION OPTION 2 (STRIP FOOTING)
S0005-AA005925 NOISE WALL SECTION - FOUNDATION OPTION 2 (STRIP FOOTING)

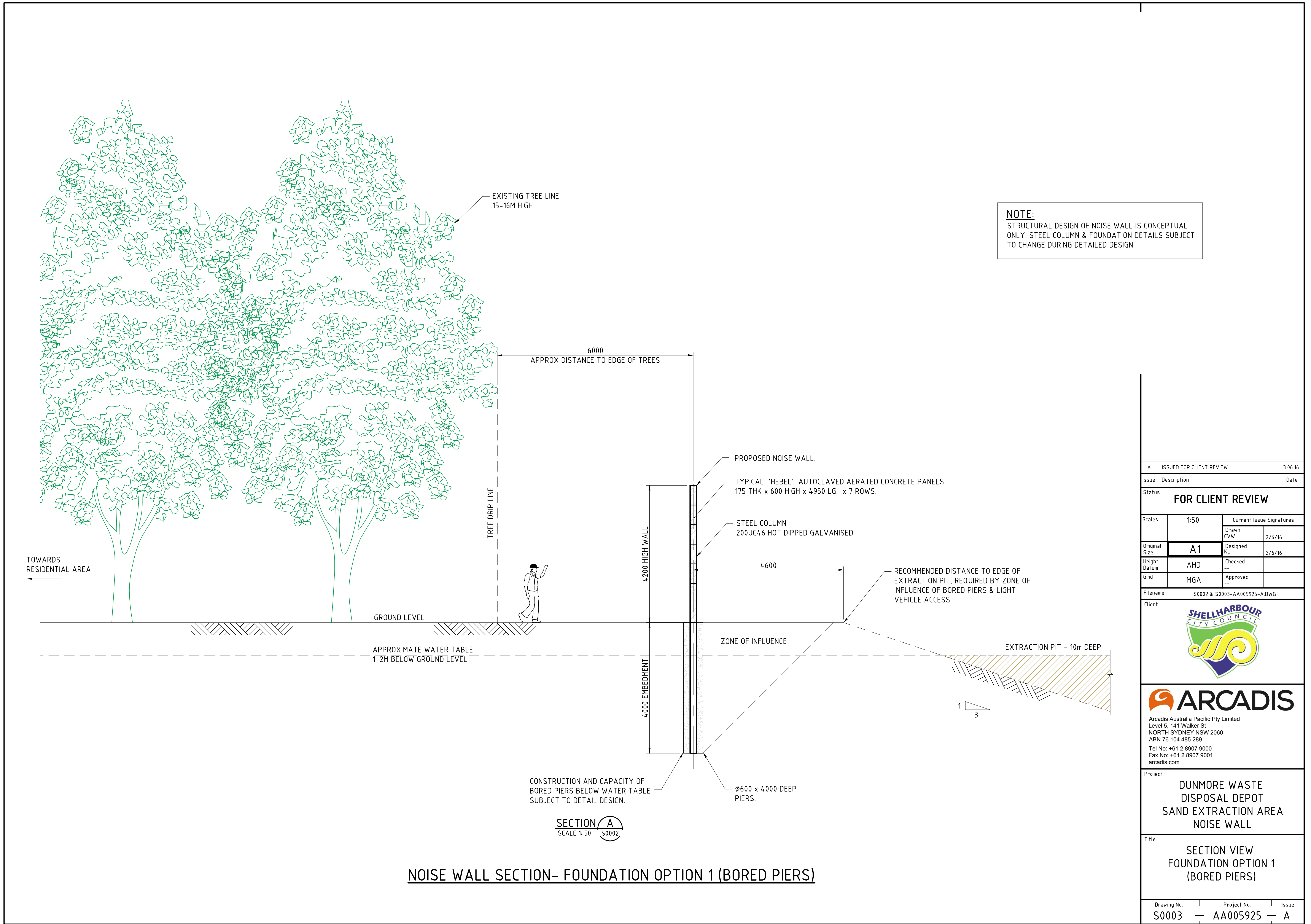


NOTE:
STRUCTURAL DESIGN OF NOISE WALL IS CONCEPTUAL ONLY. STEEL COLUMN & FOUNDATION DETAILS SUBJECT TO CHANGE DURING DETAILED DESIGN.

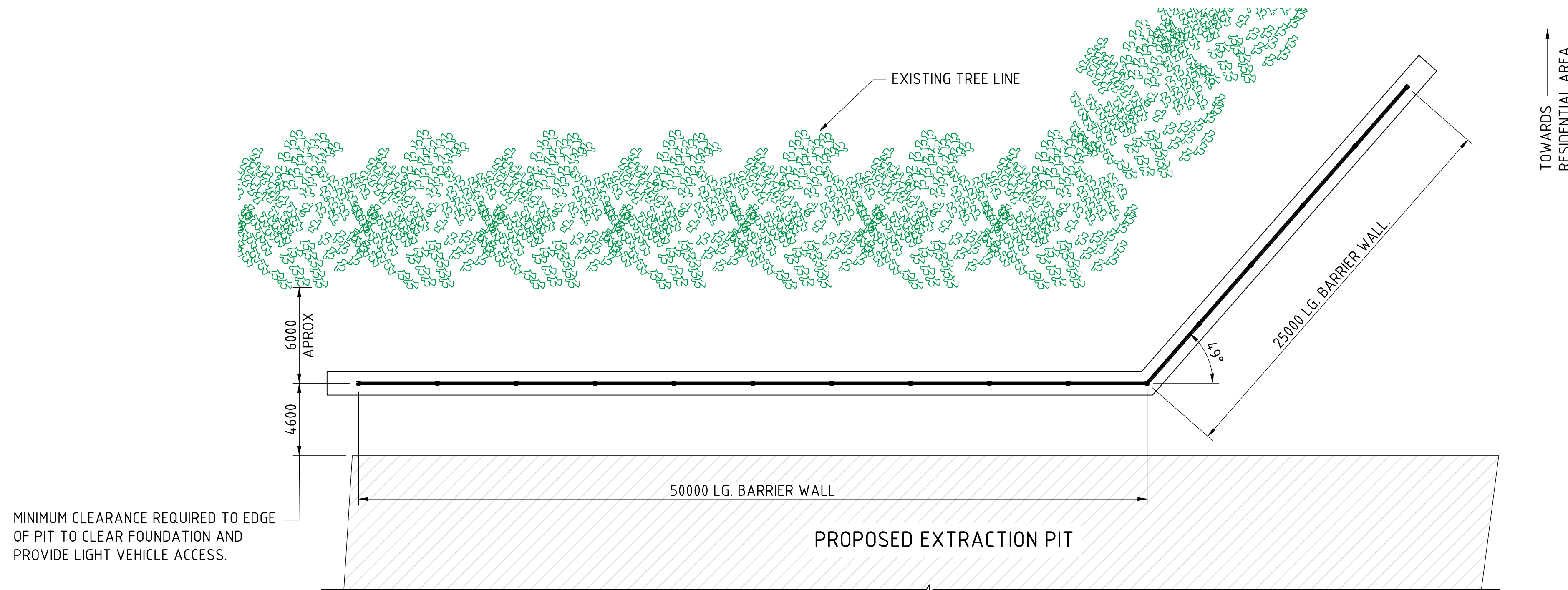


NOISE WALL ARRANGEMENT - FOUNDATION OPTION 1 (BORED PIERS)

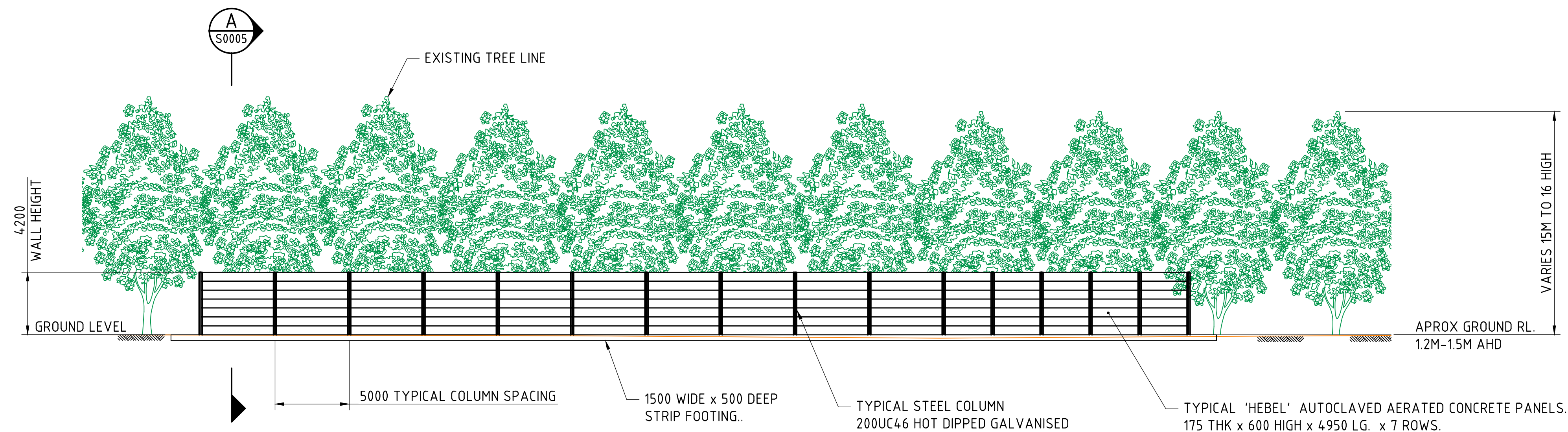
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Project		
DUNMORE WASTE DISPOSAL DEPOT SAND EXTRACTION AREA NOISE WALL		
Title		
ARRANGEMENT FOUNDATION OPTION 1 (BORED PIERS)		
Drawing No.	Project No.	Issue
S0002	AA005925	A



A		ISSUED FOR CLIENT REVIEW			3.06.16
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Filename: S0002 & S0003-AA005925-A.DWG					
Client					
					
					
Arcadis Australia Pacific Pty Limited Level 5, 141 Walker St NORTH SYDNEY NSW 2060 ABN 76 104 485 289 Tel No: +61 2 8907 9000 Fax No: +61 2 8907 9001 arcadis.com					
Project					
DUNMORE WASTE DISPOSAL DEPOT SAND EXTRACTION AREA NOISE WALL					
Title					
SECTION VIEW FOUNDATION OPTION 1 (BORED PIERS)					
Drawing No.		Project No.		Issue	
S0003		AA005925		A	





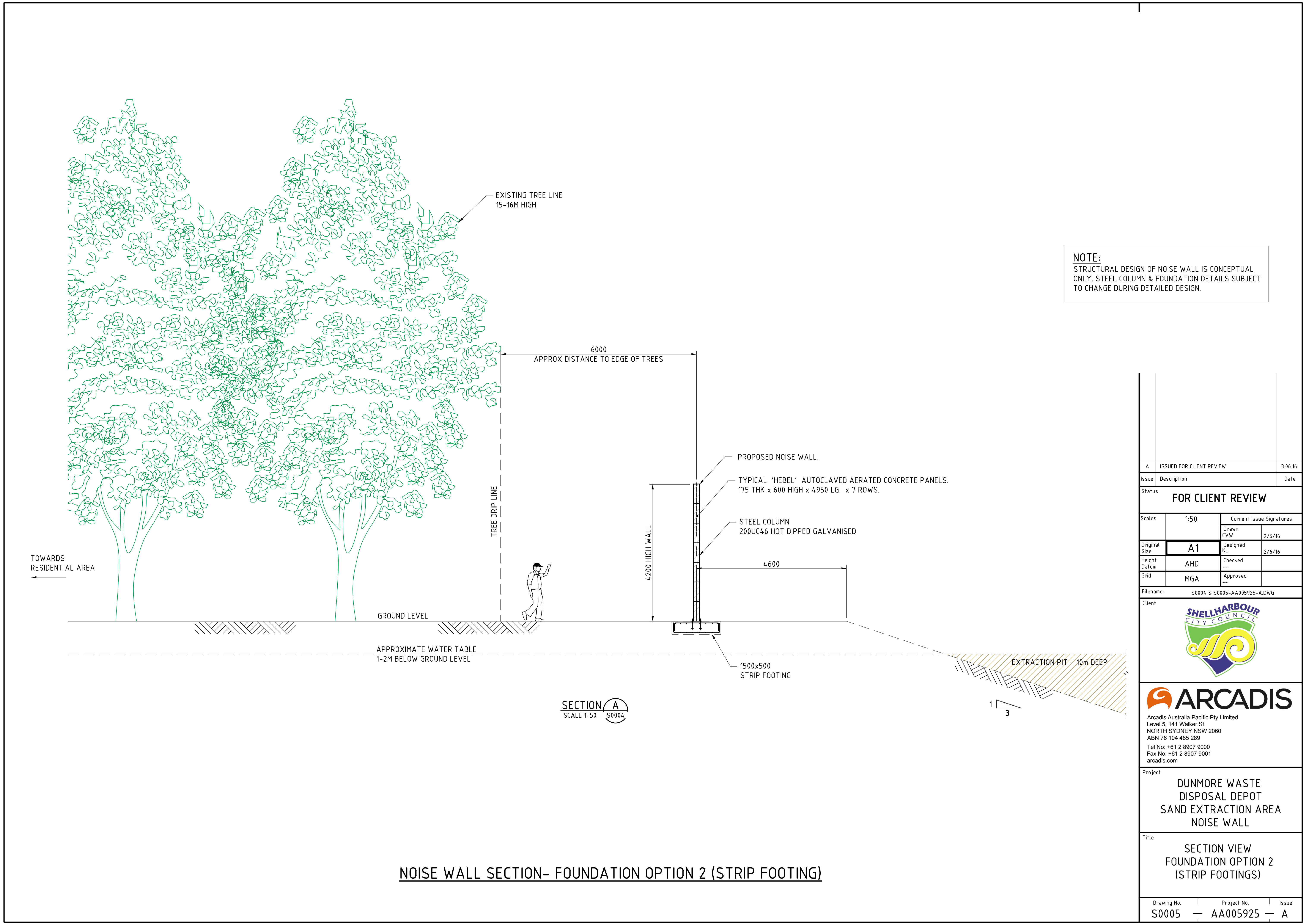
PLAN VIEW
SCALE 1:200



ELEVATION LOOKING NORTH
SCALE 1:200

NOTE:
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FOR CLIENT REVIEW					
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Grid	MGA		Approved --		
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Client					
					
 ARCADIS					
Arcadis Australia Pacific Pty Limited Level 5, 141 Walker St NORTH SYDNEY NSW 2060 ABN 76 104 485 289 Tel No: +61 2 8907 9000 Fax No: +61 2 8907 9001 arcadis.com					
Project					
DUNMORE WASTE DISPOSAL DEPOT SAND EXTRACTION AREA NOISE WALL					
Title					
ARRANGEMENT FOUNDATION OPTION 2 (STRIP FOOTING)					
Drawing No.		Project No.		Issue	
S0004		— AA005925		— A	



NOISE WALL SECTION- FOUNDATION OPTION 2 (STRIP FOOTING)

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Client			
			
			
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Project			
DUNMORE WASTE DISPOSAL DEPOT SAND EXTRACTION AREA NOISE WALL			
Title			
SECTION VIEW FOUNDATION OPTION 2 (STRIP FOOTINGS)			
Drawing No.	Project No.	Issue	
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