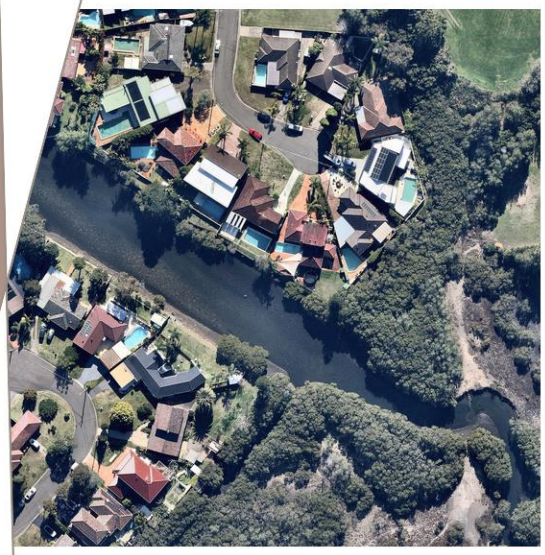
Design & Construction Technical Performance Specification

Proposed Seawalls upstream of Belgrave Esplanade (near 227)



Prepared for

Sylvania Waterways

22 May 2020

Cardno

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Document Information

Prepared for	Sylvania Waterways
Project Name	Proposed Seawalls upstream of Belgrave Esplanade (near 227)
File Reference	V190685_Ver C_Sylvania Waterways Seawalls Technical Performance Spec.docx
Job Reference	V190685
Date	22 May 2020
Version Number	0

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Effective Date 22/05/2020

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Date Approved 22/05/2020

Document History

Version	Effective Date	Description of Revision	Prepared by	Reviewed by
A	6/08/2019	Draft for Client Review	I.Chandrawansa	G.Spiliopoulos
B	10/09/2019	Revised following client comment	I.Chandrawansa	L. Bresolin
C	6/05/2020	Revised following client comment	F. Bonacci	L. Bresolin
0	22/5/2020	Issued 'For Tender'	F. Bonacci	L. Bresolin

Table of Contents

1 General

1.1 Introduction

This Technical Performance Specification (Specification) outlines the requirements for the design and construction of retaining seawalls, herein referred to as '**seawall(s)**' at Sylvania Waters.

Project specific contract conditions including conditions of tendering, traffic management, environmental management, allowable working hours and required resident notifications are specified in the special conditions of contract.

The roles of key stakeholders on this project are as follows;

- Sylvania Waterways Ltd – Asset owner, funding and delivery, herein referred to as the '**Principal'**.
- Cardno – Engineering consultant responsible for the delivery of this Specification.
- The Construction Contractor – responsible for the detailed design and construction of the proposed seawalls, herein referred to as the **'Contractor'**.
- Contractor's Design Engineer – An Engineers Australia chartered engineer in the college of Structural Engineering and employed by the Contractor. This engineer will herein be referred to as the '**Design Engineer'**.

1.2 Site Location and Description of Works

The site is located upstream of 260 Belgrave Esplanade, Sylvania Waters, NSW as indicated in Figure 1-1 below.

Figure 1-1 Site Location

The Principal wishes to engage a suitably qualified Contractor to undertake detailed design and subsequently complete construction of two seawalls along the river embankment. As indicated in Figure 1-1, the project comprises design and construction of a seawall along the southern river embankment (outlined in

orange) and northern river embankment (outlined in yellow). Note that the footprints outlined are indicative only and the exact footprint of the seawalls is to be confirmed by detailed design.

This specification covers technical requirements for design and construction of both seawalls. The existing river embankments along which these seawalls are to be constructed are shown by Figure 1-2 and Figure 1-3 below.

Figure 1-2 Illustration of Existing Southern River Embankment

Figure 1-3 Illustration of Existing Northern River Embankment

1.3 Scope of Works

The Contractor is responsible for the following scope of work that is applicable to the northern and southern river embankment seawalls.

- Detailed design (including construction specification), by the Design Engineer, of the seawalls and ancillary works in accordance with this Specification. The scope of the detailed design includes:
  - Undertaking any relevant site investigations. Note that existing feature survey and geotechnical investigation information are provided in Appendix A for information. However, it is the Contractor's responsibility to carry out any additional investigations it considers necessary to inform the detailed design (bathymetric survey, additional feature survey, additional geotechnical investigations, or other).
  - The reinstatement of existing stormwater outlets and any other services.
  - Permanent and temporary fencing
  - Provision of an easement between the new wall and private property to allow sufficient space for maintenance vehicles
  - Provision of steps providing water access for each property.
- Obtaining all necessary authority approvals to undertake the proposed works.
- Dilapidation survey to adjacent structures, pavements and landscaping prior to site mobilisation.
- Demolition/removal and appropriate disposal of any existing retaining walls along the alignment of the new seawalls.
- Site establishment, site survey and set out.
- Construction of the seawalls and ancillary works in accordance with the approved design and specifications.
- Post construction survey and 'Work As Executed' drawings.

- Site reinstatement including repair of any damage to infrastructure, site clean-up and removal of all construction waste and used material.
- Landscape with grass any reclamation works
- 'Making good' all landscaped areas next to Belgrave Esplanade.

1.4 Exclusions

The following items have been excluded from the scope and will be undertaken by the Principal:

- The removal of any existing trees (including necessary approvals) that may interfere with construction of the new seawalls.
- Community and stakeholder consultation.

1.5 Staging

The two seawalls are to be designed and constructed in two separate stages. The southern seawall is to be designed and constructed as Stage 1, whilst the northern seawall is to be constructed as Stage 2.

Consequently, for each stage, the Contractor shall allow for separate design and site investigations, site mobilisation, site establishment, site set out, and any other activity required to carry out the works as two separate stages. The two seawalls shall be priced separately as Stage 2 will follow sometime after Stage 1.

An indicative example, as marked up by Sylvania Waterways Ltd, of the proposed site fencing & construction plan for the Stage 1 works is attached in the Appendix A.

1.6 Existing information

The following documentation has been attached to this specification:

- Geotechnical investigation report undertaken by Consulting Earth Scientists dated 08 August 2017
- Previous Survey information undertaken by Cardno dated 05 February 2014
- Development Application Drawings of the adjacent seawall
- Valuation Report undertaken by Taylor Byrne dated 11 Oct 2018

The Contractor shall be responsible for the review of the appropriateness and sufficiency of the above information. Photographs from a site visit in May 2019 are available upon request.

1.7 Hold Points

At hold points, the required documentation shall be submitted to the Principal for approval prior proceeding to the next phase of the project.

As a minimum, hold points shall include:

- Approval of Basis of Design
- Approval of Concept Design (including footprint of future seawalls)
- Approval of Design and Technical specifications
- Obtaining all the necessary approvals and permits prior to construction
- Post construction survey and 'Work as executed' drawings shall be submitted to the Principal prior to demobilising from site
- Certification by the Design Engineer that all works have been delivered in accordance with the approved design and technical specifications.

The Contractor's design documents may require multiple revisions to obtain the approval of the Principal depending on the quality of the document. The Contractor shall be responsible for and cover costs for undertaking any necessary amendments to the design documentation.

The Contractor must, as part of its design obligations, provide all necessary documents to enable the design and construction to be checked, assessed and inspected for conformity to this Specification at all appropriate stages. Construction must not commence until the design submission has been reviewed and approved by the Principal. The Contractor's final drawings need to be verified and certified by the Design Engineer.

1.8 Design and Construction Standards

The work, including materials, construction, fabrication and erection, shall generally conform (but not limited) to the latest editions, including amendments of the following standards:

- AS 1170 Structural design actions
- AS 1012 Methods of testing concrete
- AS 1141 Methods of sampling and testing aggregates
- AS 1181 Method of Measurement of Civil Engineering Works and Associated Building Works.
- AS 1289 Methods of testing soils for engineering purposes
- AS 1379 Specification and supply of concrete
- AS 1478 Chemical admixtures for concrete, mortar and grout
- AS 1726 Geotechnical site investigations
- AS 2159 Piling – Design and Installation
- AS 2601 SAA Demolition Code
- AS 2758.1 Aggregates and rock for engineering purposes
- AS 3600 Concrete structures
- AS 3610 Formwork for concrete
- AS 3706 Geotextiles – Methods of test
- AS 3798 Guidelines on earthworks for commercial and residential developments
- AS 3972 Portland and blended cements
- AS 4100 Steel Structures
- AS 4671 Steel reinforcing materials
- AS 4678 Earth-retaining structures
- AS 4997 Guidelines for the design of maritime structures
- Safework Australia Demolition Code Feb 2016
- Other standards referenced in manufacturer's specifications.

1.9 Tender submission

For consideration by the Principal, the Contractor shall submit:

- Proposed seawall construction methodology (including descriptions of land and/or water based activities).
- Separate itemised pricing schedules for Stages 1 and 2 that include lump sum costs for:
  - Site investigations (if any)
  - Design and documentation
  - Approvals
  - Construction
    - Development of relevant plans and safe work method statements
    - Site preparation including demolition and disposal (assuming no contamination)
    - Construction of seawalls (including fabrication, supply and installation).
    - Demobilisation
    - Certification and Work as Executed drawings

  Note that design and construction of the water access steps at each property is to be priced as a provisional sum.

- Proposed team (including design consultants and any proposed sub-Contractors)
- Previous relevant experience
- Schedule of rates for:
  - Disposal of contaminated soils Categories A, B and C ($/m^3).

2 Design Criteria

The Design Engineer, employed by the Contractor, must document all of the below design criteria in a Basis of Design. This document is to be agreed with the Principal prior to commencing design work.

2.1 Design Requirements

The Design Engineer shall be responsible for designing and detailing the proposed seawalls, including connections with the existing walls, in accordance with the criteria outlined following.

2.1.1 Seawall Concept

The Contractor, in collaboration with its Design Engineer, is responsible for proposing its own seawall design concept. This seawall concept can take any form the Contractor deems appropriate.
The Contractor's seawall design concepts may include (but not limited to);

- Rock revetment
- Precast concrete wall
- Sheet-pile wall (steel, concrete or vinyl)

Priority and preference will be given to the submissions which provide Sylvania Waterways with minimal maintenance issues over its design life and construction methods that are non-destructive.

Existing seawall designs previously implemented at Sylvania Waters are provided in Appendix B. These existing designs have been provided as a guide only. The Contractor, in collaboration with its Design Engineer, may choose to adopt and modify these existing designs to suit the site location and conditions. Otherwise an alternative design concept can be adopted. Note that the seawall design ultimately proposed, whether it be based on an existing design or a new design concept, must be designed and certified by the Design Engineer.

2.1.2 Length & Alignment

The length of the seawall is such that the river embankment is retained along the lots listed in Table 2-1 and Table 2-2 below for Stages 1 and 2 respectively. These lots are displayed in the existing feature survey contained in Appendix A.

Table 2-1 Stage 1 Seawall Construction – Applicable Residential Lots

Parent Lot	Address
518	25 Bellinger Place
519	27 Bellinger Place
520	29 Bellinger Place
521	31 Bellinger Place
522	33 Bellinger Place
532	229 Belgrave Esplanade

Table 2-2 Stage 2 Seawall Construction - Applicable Residential Lots

Parent Lot	Address
485	23 Wollondilly Place
486	21 Wollondilly Place
487	19 Wollondilly Place
488	17 Wollondilly Place
489	15 Wollondilly Place
495	227 Belgrave Esplanade

The seawall's alignment and offset into the river is to be proposed by the Contractor depending on its own design and construction methodology. It should be noted that there is no limitation for the seawall's encroachment into the river since the waterway is owned by the Principal. However, the alignment of the seawall must provide for a minimum 5m wide trafficable easement measured from the private property boundary. Note that regardless of the seawall alignment, the Contractor is responsible for backfilling behind the seawall to match existing surface levels of the river embankment crest. The Contractor shall make due consideration for the selection of any geotextile fabric required to prevent washout of backfill material through the seawall.

2.1.3 Finished Surface Level

The new seawalls shall have a finished surface level of 1.9m AHD, which is consistent with the top of the existing seawalls throughout the precinct.

2.1.4 Connection to Existing

The Contractor's new seawall shall match into the existing concrete seawalls indicated in the existing feature survey contained in Appendix A. Refer Figure 2-1 below for an illustration of the existing concrete seawalls. The details of this interface shall be documented by the Design Engineer.

Figure 2-1 Illustration of Existing Precast Concrete Seawall & Capping Beam

2.1.5 Design Life

The Principal requires the constructed seawall to achieve the service life requirements stated in Table 2-3 below.

Table 2-3 Service Life Requirements

Asset	Design Life (years)
Seawalls	100
Stairs/Steps	25

In its Basis of Design, the Design Engineer is to detail the durability considerations (material selection, coatings, etc) that enable the above design life requirements to be met.

2.1.6 Design Actions

Design actions are to be in accordance with AS4678, AS1170 and AS4997 (as applicable), noting the following;

- Surcharge live loads are to a minimum of Class 5 in Table 5.1 of AS 4997.
- Applicable construction actions are to be accounted for after consideration of the Contractor's own construction methodology.

2.1.7 Stability, Strength & Serviceability Requirements

Load combinations and requirements for stability, strength and serviceability shall be in accordance with AS 1170, AS 4678 and AS4997 (as applicable).

The Design Engineer shall calculate potential scour at the toe/face of the seawall and shall make allowance for it in its design.

2.1.8 Drainage

The Contractor shall be responsible for designing an appropriate back-wall drainage system to the seawall and incorporating any relevant existing drainage in the design. As outlined in Section 3.2, the Contractor shall also be responsible for reinstating any impacted drainage systems.

2.1.9 Geotextile

The seawall design is to incorporate appropriate use of geotextile filter fabric to prevent washout of backfill material into the river. The specification for such geotextile material is to be detailed by the 'Design Engineer'.

3 Functional Requirements

3.1 Property Boundaries

The seawall design must be cognisant of existing property boundaries shown in the existing feature survey in Appendix A. No part of the Contractor's finished work can encroach upon private property. For instance, a seawall design with tie-backs that extend into private property would not be deemed acceptable by the Principal.

3.1.1 Boundary Fence

Included in the Contractor's scope, and to be documented in its design, is construction of a chain mesh fence (minimum 1300mm high) along the private property boundaries adjacent to the new seawalls.

3.2 Existing Services

The seawall design must provide for the reinstatement (and alteration where required) of existing services within the location of works.

3.3 Water Access

The design is to include steps providing water access for each property. However, such steps are to be priced by the Contractor as a provisional item which may or may not be included in the final design depending upon construction cost, maintenance and service life.

4 Construction Requirements

Construction shall not commence until the design documentation is approved by the Principal and the Contractor has obtained all the necessary permits and approvals to commence the works.

Construction must be strictly in accordance with the technical requirements of the approved design documentation and construction specification. Any variations and deviations from the approved design will need to be approved by both the Design Engineer and the Principal.

4.1 Work Method statements

The Contractor shall submit a detailed Method Statement for the construction of the seawalls, including demolition, site preparation and construction for the approval of the Principal prior to the commencement of the site works. These method statements shall detail the Contractors working methods and sequences, proposed plant, safety measures, quality assurance procedures, any relevant testing procedures, environmental monitoring plans and contingency plans for inclement weather. Once approved the methods and plant shall not be changed without the prior written approval of the Principal.

4.2 Temporary Works

Temporary works and structures shall be the responsibility of the Contractor. This includes the construction, installation, design and certification of design.

4.2.1 Excavation

During construction the Contractor is responsible for the stability of excavation faces and must make due consideration to surcharge loading and zones of influence. The Contractor shall provide for stable excavation slope, benching and/or shoring as required.

In addition, the Contractor shall provide cofferdam and/or dewatering arrangements if required to protect construction works from flooding due to tides, rainfall or other.

4.3 Existing Services

The Contractor is responsible for locating all existing services both above and below ground within the worksite. The Contractor shall not terminate or shut down any of the existing services without approval by the Principal. All existing services, unless specified otherwise in the design documentation, are to be protected and maintained by the Contractor at all times.

4.4 Plant Access

Sylvania Waterways own the waterway and consequently the new seawalls can extend into the waterway as required to allow sufficient working space for land based construction.

The Contractor shall deliver all the required materials and plant required for construction. The Contractor may wish to access the site from land and/or water based on their own assessment of the site. The Contractor shall outline how labour will access the site and how delivery vehicles shall be called to the site with the minimum disruption to local residents.

4.5 Demolition and Site Preparation

The Contractor shall carry out all demolition in a careful and systematic manner. All demolished, excavated and refuse materials not required for re-incorporation into the works becomes the property of the Contractor and must be removed from the site within a week of the completion of the Works.

Demolished, excavated and refuse material, debris, and rubbish shall be contained within the area of the demolition site, where practical, or within the Contractor's work area and disposed of in accordance with the Contract documents and local authority requirements. Demolition materials shall not be allowed to drop into the water or be left on the seabed and shall not be burned or buried on site.

4.6 Unsuitable and Contaminated Material

All contaminated and unsuitable material shall be transported to and disposed at a suitable location outside the site in accordance with authority requirements. The Contractor shall be responsible to obtain all

necessary permits to dispose this material in a suitable manner. These permits shall be submitted to the Principal for approval. Only after obtaining the Principal's approval shall the material be transported outside the site boundaries to the approved locations. The Contractor remains ultimately responsible for the safe transport of this material.

4.7 Protection of Adjacent Works

Structures, services and surfaces adjacent to the proposed worksite which are to remain shall be protected from damage throughout demolition and construction. The Contractor shall make good all damage at its own cost.

4.8 Construction Tolerance

The finished product shall be built to the construction tolerances specified in the design documentation. The construction tolerances specified in the design documentation must ensure the intent of the design is not compromised.

4.9 Make Good Works

Upon completion of the Work, the Contractor shall reinstate all affected areas to their pre-construction condition.

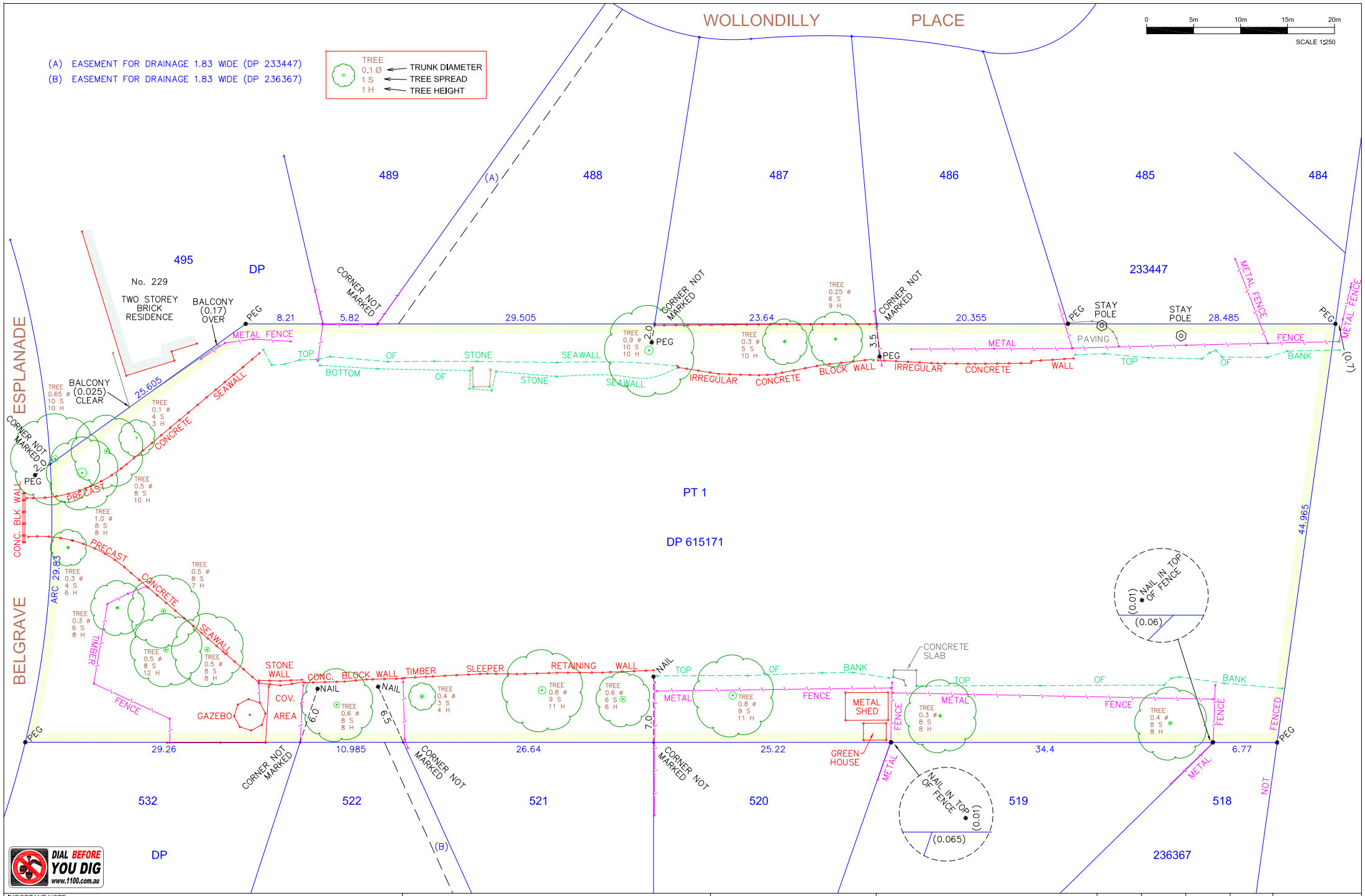
4.10 Design Certification

The Contractor shall supply a set of 'Works As Executed' drawings to the Principal electronically in format AutoCAD and PDF indicating all variation and departures from the 'For Construction' design drawings. These 'Works As Executed' drawings are to also include the location of buried services identified during the works. The Design Engineer shall certify that the seawalls have been constructed in accordance with the design documentation and issue a certificate of practical completion.

APPENDIX

A

EXISTING SITE INVESTIGATIONS



DIAL BEFORE YOU DIG www.1100.com.au

IMPORTANT NOTE:
This plan is prepared for SYLVANIA WATERWAYS LIMITED from a combination of field survey and existing records for the purpose of designing new constructions on the land and should not be used for any other purpose.

A services search of the area surveyed above has not been undertaken. Visible services shown hereon have been located where possible by field survey. Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services.
This note is an Integral part of this plan.

REVISION	DATE	DESCRIPTION	CCAD5 REF	APPROVED
00	05-02-14	ORIGINAL ISSUE	116706AD	PH

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PROJECT: PLAN OF BOUNDARY MARKING OF PART LOT 1 IN DP 615171 & DETAIL OF ADJOINING LANDS

CLIENT: SYLVANIA WATERWAYS LIMITED

SURVEYED	DRAWN	CHECKED	PASSED
JPM	JT		
SCALE 1:250		SHT 1 OF 1 SHTS	
DRAWING NUMBER		REV	A2
116706500		00	

CONSULTING EARTH SCIENTISTS

08 August 2017

CES Document Reference:
CES150601-BNS-AN

BNS Landscapes Pty Ltd,
PO Box 2023,
Taren Point, NSW 2229.

For the attention of Mr. Barry Stubbs

Re: Sylvania Waters Seawall Rectification: Verification of Ground Conditions and Retaining Wall Analysis at 227 Belgrave Esplanade

1 INTRODUCTION

Consulting Earth Scientists Pty Ltd (CES) was engaged by BNS Landcapes Pty Ltd (the Client) to carry out a geotechnical investigation and subsequently undertake retaining wall analysis for the new seawalls proposed at the riverfront property located at 227 Belgrave Esplanade, Sylvania Waters (the site).

CES has previously issued Retaining Wall Analysis (RWA) Report (CES document reference: CES150601-BNS-AD) which provided recommended standard embedment depths for retaining walls associated with a range of ground conditions likely to be present at the site. The report recommended that prior to construction of any new retaining walls, a geotechnical investigation should be carried out to confirm the design assumption inputs to the retaining wall analysis.

As part of the geotechnical investigation works, a borehole was drilled at the site in Sylvania Waters where construction of new seawalls is proposed. The site is in close proximity to the riverfront property at 227 Belgrave Esplanade. Construction of the new seawalls had not commenced at the time of the geotechnical fieldwork.

This letter report presents the summary findings of the WALLAP retaining wall analysis undertaken based on the actual ground conditions encountered at the abovementioned site.

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2 GEOTECHNICAL INVESTIGATION

On 07 July 2017, a boreholes was drilled at the location nominated by the Client. One borehole (BH03) was drilled from ground surface at the location shown in Figure 1. The borehole was drilled using a truck-mounted drilling rig in the full-time presence of a CES Geotechnical Engineer. The 100mm diameter hole were advanced by wash boring techniques with Standard Penetration Tests (SPTs) undertaken at 1.5m intervals to assess strength and relative density of materials encountered. The borehole logs and logging notes and symbols are appended to this report.

A summary of the ground conditions encountered at each site is presented below, the depths of each stratum are further detailed in Section 4.

- 227 Belgrave Esplanade (BH03) – Fill overlying very loose Clayey Sand, soft Sandy Clay and very soft Silty Clay.

3 BASIS OF RETAINING WALL ANALYSIS

The retaining wall analysis have been carried out using WALLAP, a retaining wall analysis computer programme used to model the soil/structure interaction and assess overall stability of a wall by calculating the Factor of Safety (FoS) based on limit equilibrium method of analysis.

The seawalls have been modelled based on the following design assumptions:

- Top of proposed capping beam RL+1.90m (assumed to be the same level as top of existing capping beam)
- New tie rod RL +1.7m
- Tie rod inclination 30°
- Tie rod spacing 3.0m
- Concrete panel thickness 175mm
- Length of pre-fabricated concrete panel 6m
- Mean High Water Springs (MHWS) RL +0.63m AHD
- Indian Spring Low Water (ISLW) RL -0.94m AHD

A uniformly distributed surcharge load of 5kPa at the crest of the new seawall has also been adopted.

Table 1 presents the design parameters assumed in the analysis, adopted based on the ground investigations undertaken at the site and experience with similar geological units.

Table 1: Retaining Wall Design Parameters

Soil Unit	Bulk Unit Weight (kN/m^3)	Effective Cohesion c' (kPa)	Effective Friction angle Ø' (degrees)	Elastic Modulus (MPa)
Sandy Fill	18	0	27	5
Very Loose Clayey Sand	18	0	29	5
Very Soft Mud	16	0 (Cu=10)	23	1
Firm Sandy Clay	19	3 (Cu=20)	26	8
Soft Sandy Clay	18	0	26	5

Notes:

- An at rest earth pressure coefficient, K_o, of 0.5 has been adopted for all materials
- Wall friction of 0.75Ø' has been adopted for the calculation of the active and passive earth pressure coefficients
- Cu is the undrained shear strength

Factors of Safety (FoS) have been calculated using the Strength Factor method.

The initial groundwater level on the active (retained) side of the wall has been taken as the Mean High Water level (RL +0.63m). The analysis considered the water level on the passive side of the wall to be equal to RL -0.94m which is equivalent to ISLW level. A mid-tide condition has been analysed with the water level at RL -0.10m.

4 RETAINING WALL ANALYSIS

The following section details the analysis based upon the ground conditions encountered during the drilling conducted on 07 July 2017.

4.1 227 BELGRAVE ESPLANADE

Borehole BH03 was located in a private recreation area, approximately 5m north east of 227 Belgrave Esplanade and approximately 1.5m from the position of the existing seawall (inland side). The subsurface profile encountered from seabed depth (inferred at RL-0.4m) was:

- 0.0 to 1.5m: Very loose Clayey Sand
- 1.5 to 3.0m: Soft Sandy Clay
- 3.0m to 4.95m (end of borehole): Very soft Silty Clay

The depth to seabed from the top of the capping beam was recorded as 3.0m. The borehole was terminated at 10.45m below the top of the existing capping beam.

Analysis indicate a 3.2m embedment depth (for a 6m long panel plus 0.2m depth of soil stiffening below the base of wall) is required at this site to achieve the target FoS of 1.5 for water level profiles of MHWS and mid-tide conditions.

Given the range of tide conditions and the short time over which the ISLW condition applies, a 3.2m embedment depth (for a 6m long panel plus 0.2m depth of soil stiffening below the base of wall) is considered acceptable to provide adequate FoS against passive ground failure, subject to the recommendations outlined in Section 5.

5 RECOMMENDATIONS

- This letter report should be read in conjunction with the Retaining Wall Analysis (RWA) Report (CES document reference: CES150601-BNS-AD). The recommendations provided in the RWA report remain applicable.
- It is understood that standard 6m long concrete panels will utilised to build the seawalls. For this site, soil stiffening is considered necessary to compensate for the loss of wall embedment depth. Construction of the seawalls should be such that the base of concrete wall is embedded into the stiffened zone (as one structural element) to achieve the desired wall embedment depth and wall structural capacity adopted in the modelling analysis.
- Adequate drainage should be provided to prevent a build-up of water pressure behind the retaining wall. Based on the ‘New Seawall (Option 2) – Plan, Section &

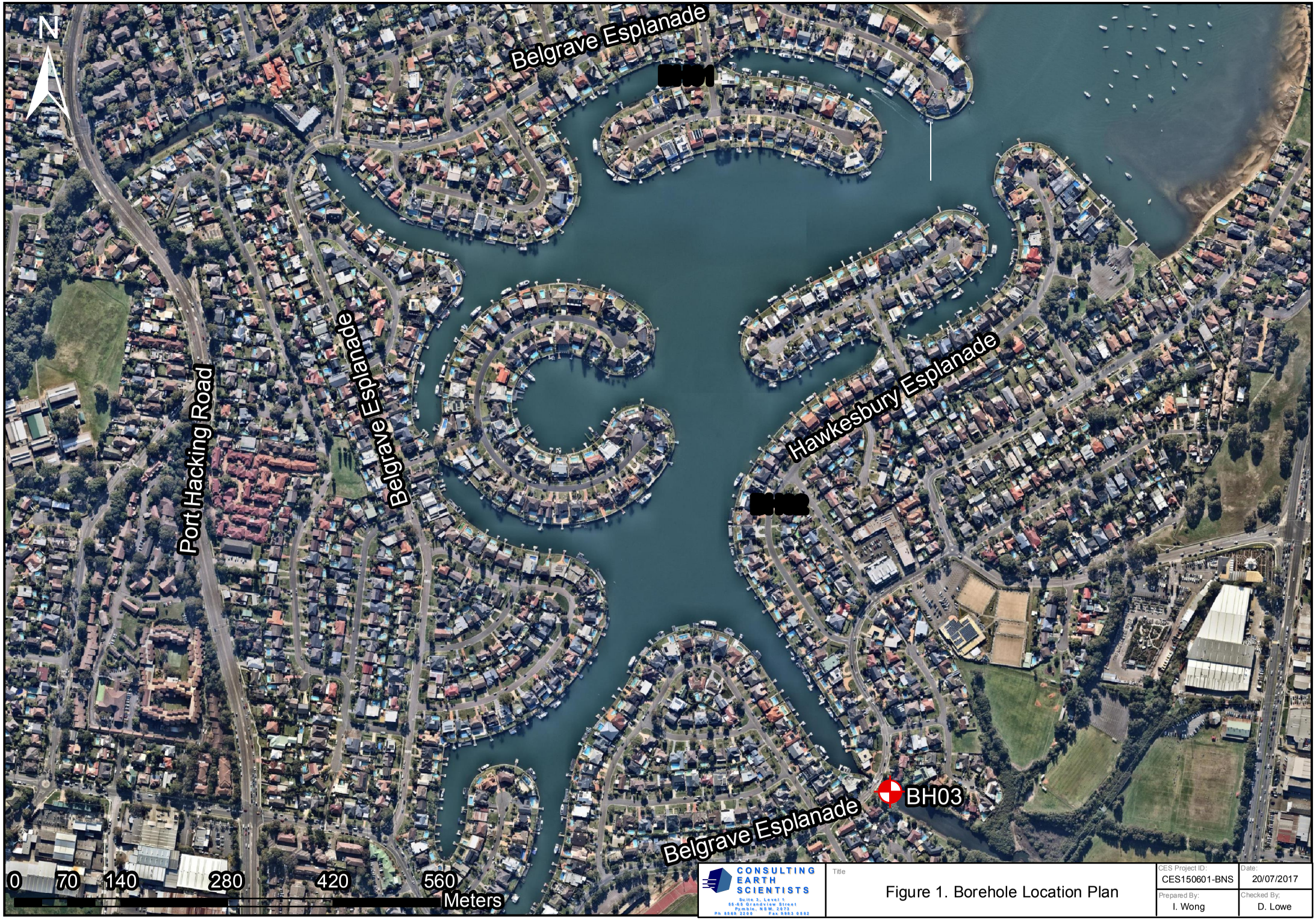
Details Sheet 1' (Drawing number:S21 Revision P2) prepared by Taylor Thomson Whittings Pty Ltd (TTW) dated 25 July 2015, it is assumed that the 40mm diameter cored holes through the grouted sock in between the concrete panels are intended for this drainage function.

- A suitably qualified and experienced geotechnical engineer should be engaged on site during the construction work to verify the ground conditions and design assumptions at these sites.

For and on behalf of Consulting Earth Scientists Pty Ltd,

Ivan Wong
Senior Geotechnical Engineer

Enclosed:
Figure 1: Borehole location plan
Borehole log (BH03)
WALLAP Outputs



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Title

Figure 1. Borehole Location Plan

CES Project ID:	Date:
CES150601-BNS	20/07/2017
Prepared By:	Checked By:
I. Wong	D. Lowe

Borelog Symbols and Notes

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DRILLING INFORMATION:

Support		Method		Water	
None	No support provided	HA	HAND AUGER		Inflow of water
Mud	Drilling mud used	RA	ROTARY AIR		Water Loss
NQ	NQ size drilling pipe (69.9 mm ODia)	ADV	Auger 'V'-STEEL BIT		Water Level during drilling / excavation
HQ	HQ size drilling pipe (88.9 mm ODia)	ADTC	Auger 'TUNGSTEN-CARBIDE' BIT		Stabilised Water Level
PQ	PQ size drilling pipe (139.9mm ODia)	NMLC	DIAMOND CORING		

SAMPLING:

Sample ID

ddmmyy-01-SM Date-Sample Number-Initials of Sampler

Note : Sample Depth is indicated by horizontal lines which define the start and end depths

Type		
	D	Small Disturbed Sample
	U50	Undisturbed 50mm dia. tube sample
	B	Bulk Disturbed Sample
	PT	Geoprobe Push Tube Sample in
	J	Environmental Sample collected in a laboratory supplied glass jar
	SPT	SPT Split Tube Sampler

FIELD TESTS:

Standard Penetration Test (SPT)

2 / 3 / 4	Number of blows per 150mm over a depth of 450mm
N = 7	SPT "N" number = sum of last two blow counts
R	Refusal. SPT not able to penetrate
HB	Hammer Bouncing

Vane Shear

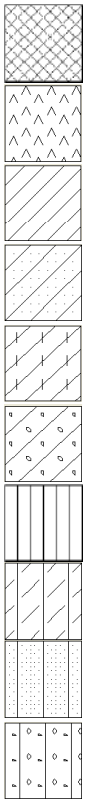
VS=30 Vane Shear Reading of 30 kPa

Pocket Penetromenter

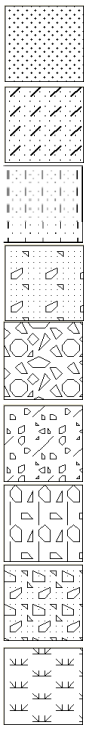
PP=100 Pocket Penetrometer Reading of 100 kPa

SYMBOLS:

Soils

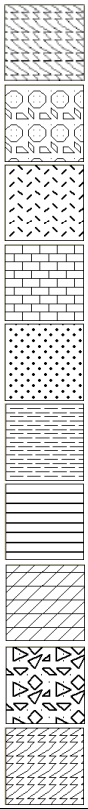


FILL
TOPSOIL
CLAY
SANDY CLAY
SILTY CLAY
GRAVELLY CLAY
SILT
CLAYEY SILT
SANDY SILT
GRAVELLY SILT



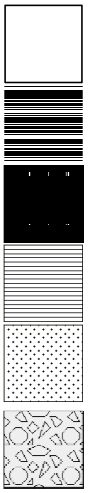
SAND
CLAYEY SAND
SILTY SAND
GRAVELLY SAND
GRAVEL
CLAYEY GRAVEL
SILTY GRAVEL
SANDY GRAVEL
PEAT

Rocks



GNEISS
CONGLOMERATE
GRANITE
LIMESTONE
SANDSTONE
SILTSTONE, MUDSTONE
SHALE
SHALEY CLAY (Extremely Weathered Shale)
VOLCANIC BRECCIA
BASALT

Other



NO CORE
ASPHALT
BENTONITE PLUG
WELL SCREEN
WELL BACKFILLED SAND
CONCRETE

NATURAL ROCK DEFECTS:

Description Order:

Fracture Type, Orientation, Infilling, Shape, Roaghness, Other

Fracture Type

JT	Joint
PT	Bedding Plane Parting
SM	Seam
FZ	Fragmented Zone
SZ	Shear Zone
VN	Vein

Orientation

VT	Vertical
HZ (or 0o)	Horizontal
X o	X' degrees from Horizontal

Infilling

CN	Clean
X	Carbonaceous
CLAY	Clay
CA	Calcite
FE	Iron Oxide
MI	Micaceous
QZ	Quartz

Shape

PLN	Planar
CU	Curved
UN	Undulose
ST	Stepped
IR	Irregular

Roughness

POL	Polished
SLK	Slickensided
SO	Smooth
RF	Rough
VR	Very

Others

DIS	Discontinuous
TI	Tight

Project ID:	CES150601-BNS
Client:	BNS Landscapes Pty Ltd
Project:	Sylvania Waters Seawall Rehabilitation
Location:	227 Belgrave Esplanade

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble NSW 2073
PH: (02) 8569 2200 FAX: (02) 9983 0582
www.consultingearth.com.au

LOG ID: BH03

Sheet: 1 of 1

X-Coord:	6233786	**Date Commenced:**	7/7/2017	**Logged by:**	IW
Y-Coord:	326041	**Date Completed:**	7/7/2017	**Checked by:**	DL
Surface Elevation (R.L) :	N/A	**Hole Diameter (mm):**	100		

Drilling Information				LITHOLOGY					Samples	Tests		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor component	Consistency / Density	Moisture	Sample ID	SPT	Pocket Penetrometer (kPa) 100 200 300 400	Notes and additional observations

Depth (mBGL)	Description	Consistency / Density	Moisture	SPT	Notes
0	Sandy SILT: dark brown, fine to medium grained sand, low plasticty with high organics and rootlets. [Topsoil]	VL	M		Borehole is located at a recreation grassed area, 5m north-east of property at 227 Belgrave Esplanade and is approximately 1.5m away inland from existing seawall.
1	Silty SAND: yellow brown, fine to coarse grained sand, low plasticity silt. [Fill]				Seabed level is 2.3m below top of existing capping beam.
2	Clayey SAND: dark grey brown, fine to coarse grained sand, medium plasticity clay with silt. [Natural]		M-W		
2.5	At 2.5m, inferred seabed level.			SPT01 @ 2.5-2.95m 3,1,1 N=2	
4	Sandy CLAY: pale grey, medium to high plasticity clay, with seashells.	S		SPT02 @ 4-4.45m 1,2,2 N=4	
5.5	Silty CLAY: grey, medium to high plasticity clay, trace seashells.	VS		SPT03 @ 5.5-5.95m Rods fell under self weight N=0	
7				SPT04 @ 7-7.45m Rods fell under self weight N=0	
7.45	End of borehole at 7.45m				
8					

Drill Company:	Martens	**Operator Name:**	Pal Satnam
Machine Type:	Truck Mounted Rig		

Refer to Standard Sheets for details of abbreviations

Units: kN,m

INPUT DATA

SOIL PROFILE

Stratum no.	Elevation of top of stratum	Soil types Left side		Soil types Right side	
1	1.90	6	Sandy Fill	6	Sandy Fill
2	-1.10	5	VL Clayey Sand	4	Very soft Mud
3	-1.40	5	VL Clayey Sand	5	VL Clayey Sand
4	-2.60	7	Soft Sandy Clay	7	Soft Sandy Clay
5	-4.10	7	Soft Sandy Clay	7	Soft Sandy Clay
6	-6.10	10	Very Soft Silty Clay	10	Very Soft Silty Clay

SOIL PROPERTIES

-- Soil type -- No.	Description (Datum elev.)	Bulk density kN/m3	Young's Modulus Eh,kN/m2 (dEh/dy)	At rest coeff. Ko (dKo/dy)	Consol state. NC/OC (Nu)	Active limit Ka (Kac)	Passive limit Kp (Kpc)	Cohesion kN/m2 (dc/dy)
1	Very loose Sand	17.00	5000	0.500	OC (0.300)	0.319 (0.000)	3.968 (0.000)	
2	Loose Sand	18.00	10000	0.500	OC (0.300)	0.280 (0.000)	4.822 (0.000)	
3	Medium dense Sand	20.00	25000	0.500	OC (0.300)	0.245 (0.000)	3.392 (0.000)	
4	Very soft Mud	16.00	1000	0.500	NC (0.490)	0.378 (1.464)	3.117 (4.988)	0.0d
5	VL Clayey Sand	18.00	5000	0.500	OC (0.300)	0.305 (0.000)	4.229 (0.000)	
6	Sandy Fill	18.00	5000	0.500	OC (0.300)	0.319 (0.000)	3.969 (0.000)	
7	Soft Sandy Clay	18.00	5000	0.500	OC (0.450)	0.333 (1.368)	3.729 (5.596)	0.0d
8	Firm Clay	18.00	8000	0.500	OC (0.490)	0.348 (1.399)	3.509 (5.380)	2.000d
9	Stiff Clay	20.00	20000	0.500	OC (0.490)	0.348 (1.399)	3.509 (5.380)	5.000d
10	Very Soft Silty Clay	17.00	5000	0.500	NC (0.490)	0.378 (1.464)	3.117 (4.988)	1.000d

Additional soil parameters associated with Ka and Kp

------- Soil type ------- No.	Description	--- parameters for Ka --- Soil friction angle	Wall adhesion coeff.	Back-fill angle	--- parameters for Kp --- Soil friction angle	Wall adhesion coeff.	Back-fill angle
1	Very loose Sand	27.00	0.750	0.00	27.00	0.750	0.00
2	Loose Sand	30.00	0.750	0.00	30.00	0.750	0.00
3	Medium dense Sand	33.00	0.750	0.00	33.00	0.000	0.00
4	Very soft Mud	26.81	0.000	0.00	23.00	0.750	0.00
5	VL Clayey Sand	28.00	0.750	0.00	28.00	0.750	0.00
6	Sandy Fill	31.09	0.000	0.00	27.00	0.750	0.00
7	Soft Sandy Clay	26.00	0.750	0.00	26.00	0.750	0.00
8	Firm Clay	25.00	0.750	0.00	25.00	0.750	0.00
9	Stiff Clay	25.00	0.750	0.00	25.00	0.750	0.00
10	Very Soft Silty Clay	23.00	0.750	0.00	23.00	0.750	0.00

GROUND WATER CONDITIONS

Density of water = 10.00 kN/m3

	Left side	Right side
Initial water table elevation	0.40	0.63

Automatic water pressure balancing at toe of wall : No

Water press. profile no.	Left side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	Right side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2
1	1	-0.10	-0.10	0.0	1	-0.10	-0.10	0.0
2	1	-0.94	-0.94	0.0	1	-0.94	-0.94	0.0

WALL PROPERTIES

Type of structure = Fully Embedded Wall
Elevation of toe of wall = -4.30
Maximum finite element length = 0.30 m
Youngs modulus of wall E = 3.6000E+07 kN/m2
Moment of inertia of wall I = 4.4700E-04 m4/m run
E.I = 16092 kN.m2/m run
Yield Moment of wall = Not defined

STRUTS and ANCHORS

Strut/anchor no.	Elev.	Strut spacing m	X-section area of strut sq.m	Youngs modulus kN/m2	Free length m	Inclin -ation (degs)	Pre-stress /strut kN	Tension allowed
1	1.70	3.00	0.000490	2.000E+08	6.00	30.00	1.000	No

SURCHARGE LOADS

Surch-arge no.	Elev.	Distance from wall	Length parallel to wall	Width perpend. to wall	Surcharge kN/m2 Near edge	Surcharge kN/m2 Far edge	Equiv. soil type	Partial factor/ Category
1	1.90	0.00(L)	20.00	5.00	5.00	=	N/A	N/A

Note: L = Left side, R = Right side

CONSTRUCTION STAGES

Construction stage no.	Stage description
1	Install strut or anchor no.1 at elevation 1.70
2	Excavate to elevation -1.10 on RIGHT side
3	Apply surcharge no.1 at elevation 1.90
4	Apply water pressure profile no.1
5	Apply water pressure profile no.2

FACTORS OF SAFETY and ANALYSIS OPTIONS

Stability analysis:
Method of analysis - Strength Factor method
Factor on soil strength for calculating wall depth = 1.50

Parameters for undrained strata:
Minimum equivalent fluid density = 5.00 kN/m3
Maximum depth of water filled tension crack = 0.00 m

Bending moment and displacement calculation:
Method - Subgrade reaction model using Influence Coefficients
Open Tension Crack analysis? - No
Non-linear Modulus Parameter (L) = 6.000 m

Boundary conditions:
Length of wall (normal to plane of analysis) = 50.00 m

Width of excavation on Left side of wall = 9.00 m
Width of excavation on Right side of wall = 9.00 m

Distance to rigid boundary on Left side = 9.00 m
Distance to rigid boundary on Right side = 9.00 m

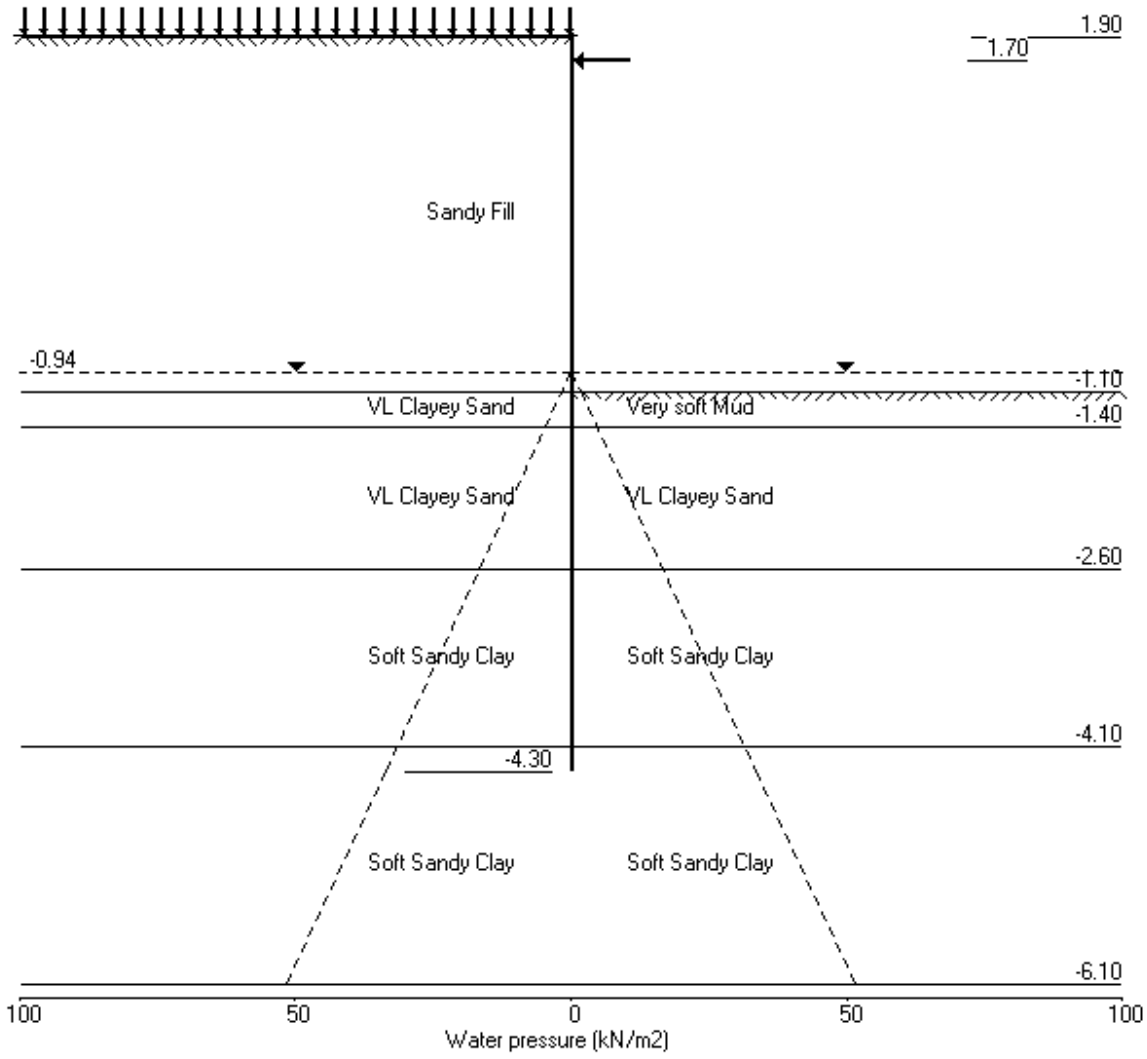
OUTPUT OPTIONS

Stage no.	Stage description	Output options: Displacement, Bending mom., Shear force	Active, Passive pressures	Graph. output
1	Install strut no.1 at elev. 1.70	Yes	Yes	Yes
2	Excav. to elev. -1.10 on RIGHT side	Yes	Yes	Yes
3	Apply surcharge no.1 at elev. 1.90	Yes	Yes	Yes
4	Apply water pressure profile no.1	Yes	Yes	Yes
5	Apply water pressure profile no.2	Yes	Yes	Yes
*	Summary output	Yes	-	Yes

CONSULTING EARTH SCIENTISTS | Sheet No.
Program: WALLAP Version 6.06 Revision A49.B68.R53 | Job No. 150601
Licensed from GEOSOLVE | Made by : IW
Data filename/Run ID: 227_Belgrave_Esplanade |
Sylvania Waters | Date: 1-08-2017
227 Belgrave Esplanade | Checked :

Units: kN,m

Stage No.5 Apply water pressure profile no.2



Units: kN,m

Stage No. 2 Excavate to elevation -1.10 on RIGHT side

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	G.L. Act.	G.L. Pass.	Strut Elev.	FoS for toe elev. = -4.30 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.500 Toe elev.	Wall Penetr -ation	Direction of failure
2	1.90	-1.10	1.70	1.781	n/a	-3.55	2.45	L to R

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 50.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Left side 9.00 from wall
Right side 9.00 from wall

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	1.90	0.00	0.002	-2.16E-03	0.0	-0.0	
2	1.70	1.15	0.003	-2.16E-03	0.1	0.0	11.5
		1.15	0.003	-2.16E-03	-11.3	0.0	
3	1.45	2.58	0.003	-2.14E-03	-10.9	-2.8	
4	1.20	4.02	0.004	-2.08E-03	-10.0	-5.4	
5	0.92	5.65	0.004	-1.96E-03	-8.7	-8.1	
6	0.63	7.29	0.005	-1.80E-03	-6.8	-10.3	
7	0.40	6.31	0.005	-1.64E-03	-5.3	-11.7	
8	0.15	6.95	0.006	-1.45E-03	-3.6	-12.8	
9	-0.10	7.59	0.006	-1.24E-03	-1.8	-13.5	
10	-0.35	8.23	0.006	-1.03E-03	0.2	-13.7	
11	-0.60	8.86	0.006	-8.28E-04	2.3	-13.4	
12	-0.77	9.30	0.007	-6.89E-04	3.9	-12.8	
13	-0.94	9.73	0.007	-5.58E-04	5.5	-12.0	
14	-1.10	10.14	0.007	-4.43E-04	7.1	-11.0	
		9.61	0.007	-4.43E-04	7.1	-11.0	
15	-1.40	6.39	0.007	-2.61E-04	9.5	-8.5	
		2.73	0.007	-2.61E-04	9.5	-8.5	
16	-1.60	-3.55	0.007	-1.67E-04	9.4	-6.6	
17	-1.80	-7.35	0.007	-9.79E-05	8.3	-4.7	
18	-2.10	-7.86	0.007	-3.05E-05	6.0	-2.5	
19	-2.35	-8.26	0.007	-8.39E-07	4.0	-1.3	
20	-2.60	-8.65	0.007	1.33E-05	1.9	-0.5	
		-3.42	0.007	1.33E-05	1.9	-0.5	
21	-2.80	-2.87	0.007	1.81E-05	1.3	-0.2	
22	-3.00	-2.31	0.007	1.97E-05	0.7	-0.0	
23	-3.30	-1.48	0.007	1.90E-05	0.2	0.1	
24	-3.60	-0.65	0.007	1.71E-05	-0.1	0.1	
25	-3.85	0.05	0.007	1.58E-05	-0.2	0.1	
26	-4.10	0.74	0.007	1.53E-05	-0.1	0.0	
27	-4.30	0.42	0.007	1.53E-05	0.0	-0.0	

At elev. 1.70 Strut force = 34.4 kN/strut = 11.5 kN/m run (horiz.)
= 13.2 kN/m run (inclined)

(continued)

Stage No.2 Excavate to elevation -1.10 on RIGHT side

Node no.	Y coord	LEFT side ------- Effective stresses ------- Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
1	1.90	0.00	0.00	0.00	0.00	0.00	0.00	1600
2	1.70	0.00	3.60	1.15	14.29	1.15	1.15a	1600
3	1.45	0.00	8.10	2.58	32.14	2.58	2.58a	1600
4	1.20	0.00	12.60	4.02	50.00	4.02	4.02a	1600
5	0.92	0.00	17.73	5.65	70.36	5.65	5.65a	1600
6	0.63	0.00	22.86	7.29	90.72	7.29	7.29a	1600
7	0.40	0.00	27.00	8.61	107.15	8.61	8.61a	1600
8	0.15	2.50	29.00	9.25	115.09	9.25	11.75a	1600
9	-0.10	5.00	31.00	9.89	123.02	9.89	14.89a	1600
10	-0.35	7.50	33.00	10.53	130.96	10.53	18.03a	1600
11	-0.60	10.00	35.00	11.16	138.90	11.16	21.16a	1600
12	-0.77	11.70	36.36	11.60	144.29	11.60	23.30a	1600
13	-0.94	13.40	37.72	12.03	149.69	12.03	25.43a	1600
14	-1.10	15.00	39.00	12.44	154.77	12.44	27.44a	1600
		15.00	39.00	11.91	164.92	11.91	26.91a	1600
15	-1.40	18.00	41.40	12.65	175.07	12.65	30.65a	1600
16	-1.60	20.00	43.00	13.13	181.83	13.13	33.13a	1600
17	-1.80	22.00	44.60	13.62	188.60	13.62	35.62a	1600
18	-2.10	25.00	47.00	14.36	198.75	14.36	39.36a	1600
19	-2.35	27.50	49.00	14.97	207.21	14.97	42.47a	1600
20	-2.60	30.00	51.00	15.58	215.66	15.58	45.58a	1600
		30.00	51.00	16.98	190.19	16.98	46.98a	2162
21	-2.80	32.00	52.60	17.51	196.16	17.51	49.51a	2162
22	-3.00	34.00	54.20	18.05	202.12	18.05	52.05a	2162
23	-3.30	37.00	56.60	18.85	211.07	18.85	55.85a	2162
24	-3.60	40.00	59.00	19.65	220.02	19.65	59.65a	2162
25	-3.85	42.50	61.00	20.31	227.48	20.31	62.81a	2162
26	-4.10	45.00	63.00	20.98	234.94	20.98	65.98a	2162
27	-4.30	47.00	64.60	21.51	240.91	21.51	68.51a	2162

Node no.	Y coord	RIGHT side ------- Effective stresses ------- Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
1	1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	1.45	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	0.40	2.30	-0.00	0.00	0.00	0.00	2.30	0.0
8	0.15	4.80	0.00	0.00	0.00	0.00	4.80	0.0
9	-0.10	7.30	0.00	0.00	0.00	0.00	7.30	0.0
10	-0.35	9.80	-0.00	0.00	0.00	0.00	9.80	0.0
11	-0.60	12.30	-0.00	0.00	0.00	0.00	12.30	0.0
12	-0.77	14.00	-0.00	0.00	0.00	0.00	14.00	0.0
13	-0.94	15.70	0.00	0.00	0.00	0.00	15.70	0.0
14	-1.10	17.30	0.00	0.00	0.00	0.00	17.30	0.0
		17.30	0.00	0.00	0.00	0.00	17.30	559
15	-1.40	20.30	1.80	0.68	5.61	3.96	24.26	559
		20.30	1.80	0.55	7.61	7.61	27.91p	1955
16	-1.60	22.30	3.40	1.04	14.39	14.39	36.69p	1955
17	-1.80	24.30	5.01	1.53	21.17	18.67	42.97	1955

(continued)

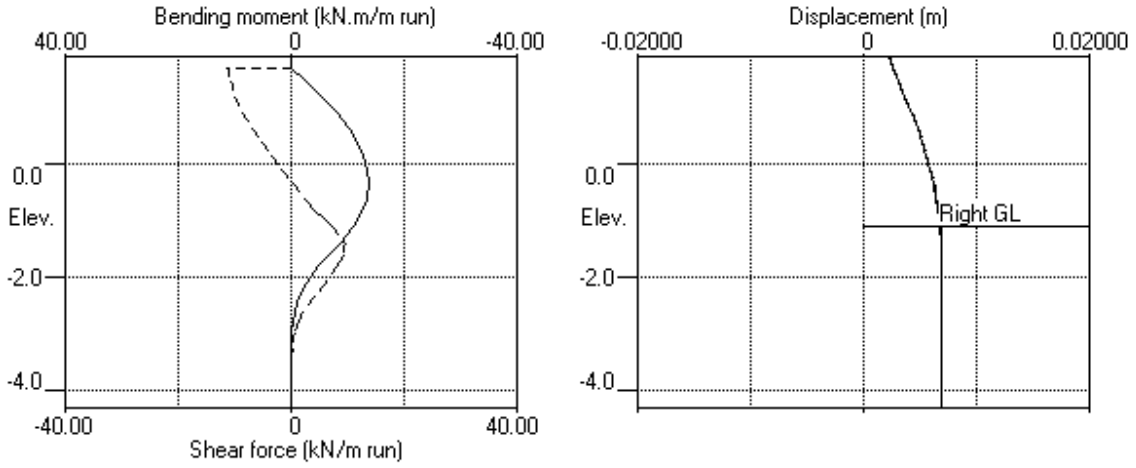
Stage No.2 Excavate to elevation -1.10 on RIGHT side

Node no.	Y coord	RIGHT side						
			Effective stresses				Total earth pressure	Coeff. of subgrade reaction
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
18	-2.10	27.30	7.42	2.27	31.38	19.91	47.21	1955
19	-2.35	29.80	9.44	2.88	39.92	20.93	50.73	1955
20	-2.60	32.30	11.47	3.50	48.50	21.93	54.23	1955
		32.30	11.47	3.82	42.77	18.10	50.40	2532
21	-2.80	34.30	13.10	4.36	48.86	18.08	52.38	2532
22	-3.00	36.30	14.74	4.91	54.97	18.06	54.36	2532
23	-3.30	39.30	17.21	5.73	64.19	18.03	57.33	2532
24	-3.60	42.30	19.71	6.56	73.49	17.99	60.29	2532
25	-3.85	44.80	21.80	7.26	81.29	17.96	62.76	2532
26	-4.10	47.30	23.91	7.96	89.16	17.94	65.24	2532
27	-4.30	49.30	25.61	8.53	95.49	18.79	68.09	2532

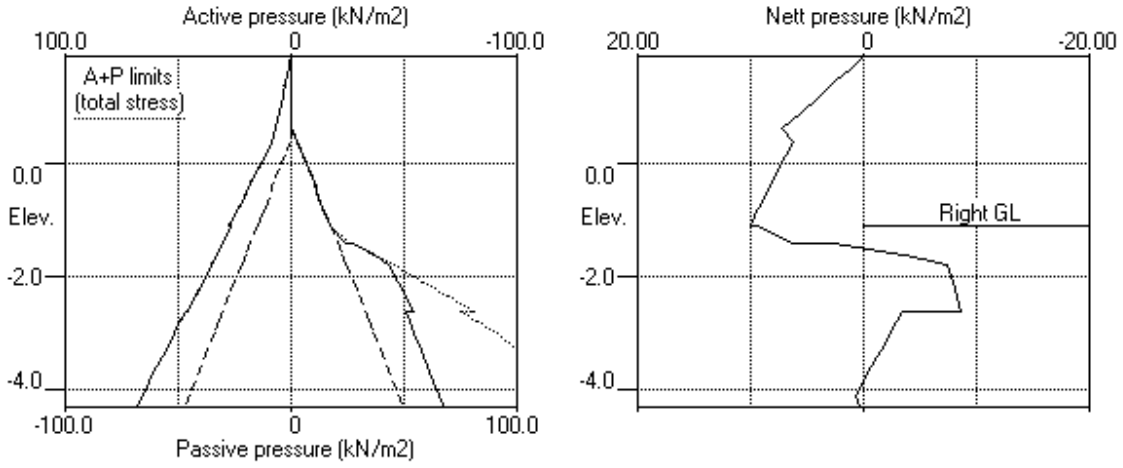
Note: 68.51a Soil pressure at active limit
36.69p Soil pressure at passive limit

Units: kN,m

Stage No.2 Excav. to elev. -1.10 on RIGHT side



Stage No.2 Excav. to elev. -1.10 on RIGHT side



Units: kN,m

Summary of results

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method
Factor of safety on soil strength

Stage No.	G.L. Act.	G.L. Pass.	Strut Elev.	FoS for toe elev. = -4.30: Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.500: Toe elev.	Wall Penetr -ation	Direction of failure
1	1.90	1.90	1.70	Conditions not suitable for FoS calc.				
2	1.90	-1.10	1.70	1.781	n/a	-3.55	2.45	L to R
3	1.90	-1.10	1.70	1.675	n/a	-3.80	2.70	L to R
4	1.90	-1.10	1.70	1.500	n/a	-4.30	3.20	L to R
5	1.90	-1.10	1.70	1.401	n/a	***	***	L to R

Legend: *** Result not found

Units: kN,m

Summary of results

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 50.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Left side 9.00 from wall
Right side 9.00 from wall

Bending moment, shear force and displacement envelopes

Node no.	Y coord	Displacement maximum m	Displacement minimum m	Bending moment maximum kN.m/m	Bending moment minimum kN.m/m	Shear force maximum kN/m	Shear force minimum kN/m
1	1.90	0.004	-0.000	0.0	-0.0	0.0	0.0
2	1.70	0.005	-0.000	0.0	-0.0	0.4	-20.3
3	1.45	0.006	-0.000	0.0	-4.9	0.0	-19.5
4	1.20	0.007	-0.000	0.0	-9.7	0.1	-18.2
5	0.92	0.008	-0.000	0.0	-14.6	0.2	-16.4
6	0.63	0.009	-0.000	0.1	-19.0	0.4	-14.1
7	0.40	0.010	-0.000	0.2	-22.0	0.5	-11.9
8	0.15	0.010	-0.000	0.3	-24.6	0.4	-9.2
9	-0.10	0.011	-0.000	0.4	-26.5	0.3	-6.1
10	-0.35	0.012	-0.000	0.4	-27.6	0.2	-2.7
11	-0.60	0.012	-0.000	0.5	-27.8	2.7	0.0
12	-0.77	0.012	-0.000	0.5	-27.4	4.7	0.0
13	-0.94	0.012	-0.000	0.5	-26.5	7.2	-0.0
14	-1.10	0.013	-0.000	0.5	-25.2	9.7	-0.1
15	-1.40	0.013	-0.000	0.4	-21.5	14.2	-0.2
16	-1.60	0.013	-0.000	0.4	-18.5	15.7	-0.2
17	-1.80	0.013	-0.000	0.3	-15.2	15.9	-0.2
18	-2.10	0.013	-0.000	0.3	-10.5	13.9	-0.2
19	-2.35	0.012	-0.000	0.2	-7.4	11.0	-0.2
20	-2.60	0.012	-0.000	0.2	-5.0	8.1	-0.2
21	-2.80	0.012	-0.000	0.1	-3.6	6.5	-0.2
22	-3.00	0.012	-0.000	0.1	-2.4	5.0	-0.2
23	-3.30	0.012	-0.000	0.1	-1.2	3.1	-0.1
24	-3.60	0.011	-0.000	0.1	-0.5	1.7	-0.1
25	-3.85	0.011	-0.000	0.1	-0.2	0.9	-0.2
26	-4.10	0.011	-0.000	0.0	-0.0	0.3	-0.1
27	-4.30	0.011	-0.000	0.0	-0.0	0.0	-0.0

Maximum and minimum bending moment and shear force at each stage

Stage no.	Bending moment maximum kN.m/m	Bending moment elev.	Bending moment minimum kN.m/m	Bending moment elev.	Shear force maximum kN/m	Shear force elev.	Shear force minimum kN/m	Shear force elev.
1	0.5	-0.94	-0.0	1.20	0.5	0.40	-0.2	-2.60
2	0.1	-3.30	-13.7	-0.35	9.5	-1.40	-11.3	1.70
3	0.1	-3.60	-16.9	-0.35	11.1	-1.60	-14.6	1.70
4	0.0	1.70	-24.6	-0.35	14.3	-1.60	-18.8	1.70
5	0.0	1.70	-27.8	-0.60	15.9	-1.80	-20.3	1.70

Summary of results (continued)

Maximum and minimum displacement at each stage

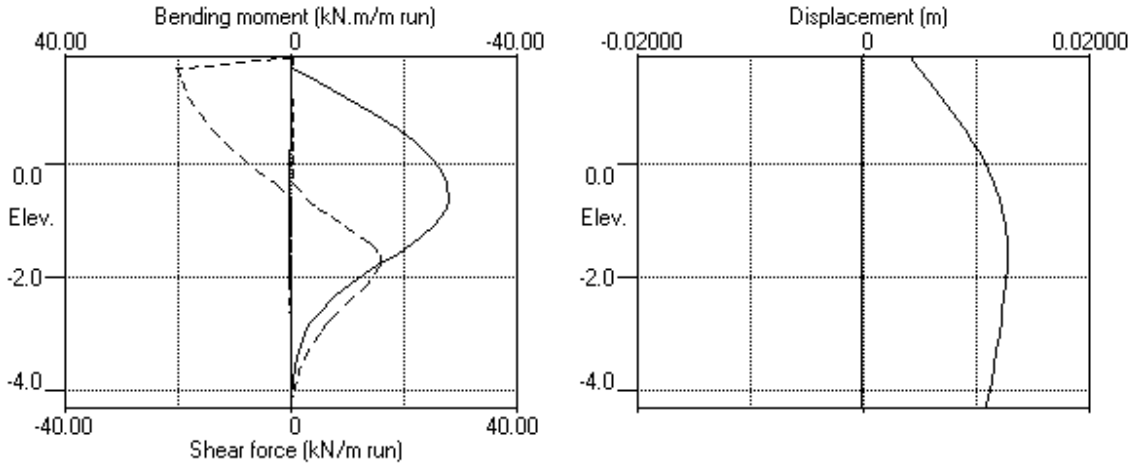
Stage no.	Displacement maximum m	elev.	minimum m	elev.	Stage description
1	0.000	1.90	-0.000	-1.40	Install strut no.1 at elev. 1.70
2	0.007	-2.35	0.000	1.90	Excav. to elev. -1.10 on RIGHT side
3	0.008	-1.60	0.000	1.90	Apply surcharge no.1 at elev. 1.90
4	0.011	-1.40	0.000	1.90	Apply water pressure profile no.1
5	0.013	-1.60	0.000	1.90	Apply water pressure profile no.2

Strut forces at each stage (horizontal components)

Stage no.	Strut no. 1 at elev. 1.70 kN/m run	kN/strut
1	0.29	0.87
2	11.45	34.36
3	14.99	44.96
4	19.27	57.81
5	20.76	62.28

Units: kN,m

Bending moment, shear force, displacement envelopes



TAYLOR BYRNE

VALUATION OF

VARIOUS PROPOSED LOTS

LOCATED AT

2R BELGRAVE ESPLANADE
SYLVANIA WATERS NSW 2224

17 September 2018

File No: SYD-372480/AM

TAYLOR BYRNE SYDNEY
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Adelaide | Albury Wodonga | Bathurst | Bundaberg | Cairns | Coffs Harbour | Emerald Gladstone | Grafton | Gold Coast | Hervey Bay | Inverell | Ipswich | Kingaroy | Lismore | Mackay | Newcastle | Orange | Port Macquarie | Rockhampton | Roma | Sunshine Coast | Sydney | Tamworth | Taree | Toowoomba | Townsville

TABLE OF CONTENTS

ANNEXURES

- Letter of Instruction

1 EXECUTIVE SUMMARY

This valuation is based on certain conditions and contains a number of qualifications. Do not rely on this executive summary alone. This executive summary should be read in conjunction with and subject to our complete Valuation Report.

1.1	**Subject Property**	Various Lots, 2R Belgrave Esplanade Sylvania Waters NSW 2224
1.2	**Instructions**	In this matter we have been instructed by Mr Rolf Wiedemann on behalf of The Directors, Sylvania Waterways Limited to assess the Market Value of the property described herein for Disposal purposes. The interest being valued is the potential added value of the respective lots identified in the survey plan and is subject to the subdivision of these lots as per the attached plans.
1.3	**Prepared For**	The Directors Sylvania Waterways Limited P O Box 2727 Taren Point NSW 2229 Attn: Mr Rolf Wiedemann This valuation has been prepared in accordance with the Practice Standards of the Australian Property Institute for Residential Valuations and the IVSC Valuation Standard.
1.4	**Client Reference**	Sylvania Waterways
1.5	**Registered Owner**	Sylvania Waterways Limited
1.6	**Brief Description**	The subject property comprises of a portion of the seabed and foreshore of the "Sylvania Waterways", a canal subdivision of reclaimed land on the shores of the Georges River at Sylvania in Sydney's southern suburbs. The proposed subdivision comprises of a portion of a larger parcel of land (Lot 1 in DP615171) that forms the seabed and is an area located to the east of Belgrave Esplanade between Wollondilly Place to the north and Bellinger Place to the south. Essentially the proposed lots in question comprise the residue areas of land located between the high-water mark of the canal (waterway) and the existing boundaries of the respective house sites that front Belgrave Esplanade, Wollondilly Place and Bellinger Place. The proposed sites vary in area ranging from 22m² to 389m².
1.7	**Date of Inspection**	17 September 2018
1.8	**Date of Valuation**	17 September 2018

1.9 Valuation Summary

1.10 Critical Conditions

- The valuation assumes that the site is subdivided in accordance with the Survey Plan provided by Cardno, and the various subdivided portions are amalgamated, upon the successful negotiation of a contract of sale for the respective lots on just terms.
- The values have been provided on the basis of areas provided and if a formal survey provides area that materially differs from these we reserve the right to review the valuation.
- This report is for negotiation and disposal purposes only and may not be used for mortgage lending purposes.

1.11 Valuation

Subject to the stipulations and conditions contained within the body of this report, it is our opinion that the Market Value of the added value of the proposed lots on a vacant possession basis, assuming formal re-subdivision as at 17 September 2018 is:

ADDRESS	LOT	DP	VALUE
229 Belgrave Esp.	495	233447	$90,000
15 Wollondilly Place	489	233447	$20,000
17 Wollondilly Place	488	233447	$200,000
19 Wollondilly Place	487	233447	$195,000
21 Wollondilly Place	486	233447	$150,000
23 Wollondilly Place	485	233447	$150,000
227 Belgrave Esp.	532	236367	$430,000
33 Bellinger Place	522	236367	$80,000
31 Bellinger Place	521	236367	$335,000
29 Bellinger Place	520	236367	$310,000
27 Bellinger Place	519	236367	$370,000
25 Bellinger Place	518	236367	$30,000

VALUER

ANTHONY E. MARTIN AAPI MRICS
Certified Practising Valuer
Branch Manager
TAYLOR BYRNE

The counter signatory verifies that this report is genuine and endorsed by Taylor Byrne.
The opinion of value expressed in this report has been arrived at by the prime signatory alone.

2 INTRODUCTION

2.1 Instructions

In this matter we have been instructed by Mr Rolf Wiedemann on behalf of The Directors, Sylvania Waterways Limited to assess the Market Value of the property described herein for Disposal purposes.

The interest being valued is the potential freehold value of the respective lots identified in the survey plan and is subject to the subdivision of these lots as per the attached plans, and their amalgamation into adjacent allotments.

2.2 Market Value

Market Value is defined as the estimated amount for which an asset or liability should exchange on the valuation date between a willing buyer and a willing seller in an arm's length transaction, after proper marketing and where the parties had each acted knowledgeably, prudently and without compulsion.

2.3 Date of Inspection

17 September 2018

2.4 Date of Valuation

17 September 2018

2.5 Basis of Valuation

This valuation is made conditional upon the following:

1. That the property complies with all statutory requirements with respect to health, building, town planning, and fire safety regulations, and that all appropriate approvals have been obtained from the relevant authorities.

2. That a detailed structural survey would not reveal defects other than the maintenance items referred to in the body of this report.

3. That the improvements are sited within the title boundaries and without encroachment by adjoining properties.

4. That a comprehensive test of soils on the land would not reveal contamination of any kind which could affect the utility of the property.

5. That there are no orders of compulsory acquisition for the whole or part of the property currently issued by any government authority.

We recommend you make your own enquiries in regard to the above conditions. Should any issues arise, this report should be returned to the valuer for comment. We reserve the right to review and or amend our report if necessary, at that time.

2.6 Qualifications and Disclaimers

(i) This valuation has been prepared on specific instructions from Mr Rolf Wiedemann on behalf of The Directors, Sylvania Waterways Limited for Disposal purposes. The report is not to be relied upon by any other person, or for any other purpose. We accept no liability to third parties, nor do we contemplate that this report will be relied upon by third parties. Any parties who may seek to rely on this report must seek the specific written consent of the valuer. We reserve the right to withhold our consent or to review the contents of this report in the event that our consent is sought. In any event this valuation cannot be assigned if the valuation is older than 90 days.

(ii) We state that this report is for the use only of Sylvania Waterways Limited. The report is to be used for no other purpose, and no responsibility is accepted to any third party for the whole or part of its contents and annexures. No responsibility will be accepted for photocopied signatures.

(iii) This valuation cannot be relied upon for mortgage security purposes.

(iv) This valuation is current as at the date of valuation only. The value assessed herein may change significantly and unexpectedly over a relatively short period (including as a result of general market movements or factors specific to the particular property). We do not accept liability for losses arising from such subsequent changes in value. Without limiting the generality of the above comment, we do not assume any responsibility or accept any liability where this valuation is relied upon after the expiration of three (3) months from the date of the valuation, or such earlier date if you become aware of any factors that have any effect on the valuation.

(v) Buildings, including houses, built prior to 2004 may contain asbestos related products. Taylor Byrne is not expert in detection, remediation or disposal of asbestos or contamination of any kind. It is recommended that advice be sought from experts in that field should that issue affect your reliance on this valuation. The Professional Indemnity Insurance Policy for Taylor Byrne does not cover losses arising from any asbestos issues.

(vi) We advise we do not have a pecuniary or other interest that would conflict with the proper valuation of the property.

(vii) Taylor Byrne provides no warranty for claims arising out of, based upon directly or indirectly resulting from or in consequence of, or in any way involving the depreciation, failure to appreciate, or loss of any investments and/or property for investment purposes when such depreciation, failure to appreciate or loss is a result of normal or abnormal fluctuations in any financial, stock or commodity, or other markets which are outside the influence or control of the valuer.

(viii) This valuation has been based on the condition of the structural improvements and the property in general as at the date of inspection. If the property has to be sold in circumstances where its condition has deteriorated, and/or essential fixtures/fittings have been removed there is likely to be a significant fall in value compared to the current assessment. Under these circumstances neither the valuer nor Taylor Byrne will be responsible for any reduction in value.

(ix) Unless stated as otherwise in this report we advise that we have not searched or been provided with a copy of the current Title or Registered Plans and that any dimensions or land areas quoted in this report have been obtained from third party information sources and whilst every endeavour has been made to verify such information we accept no responsibility for inaccuracy of any information provided and relied upon.

(x) The instructing party acknowledges its responsibility for full disclosure of all relevant information and undertakes to provide all relevant documents in its possession that may have an effect on the service to be provided. This valuation is based upon information reasonably available to the valuer as at the date of issue in accordance with usual valuation practices.

(xi) Taylor Byrne does not undertake or commission site surveys, nor has a site survey been provided to us. Our valuation assumes that there are no encroachments by or on to the subject property. The nominated parties who are relying on this report should seek their own advice in this regard from a registered surveyor. Should any encroachments be found this valuation should not be relied upon without consulting Taylor Byrne to assess any effect on the valuation.

2.7 Certification

The property has been identified by reference to the current title search listed in Section 3 and cross referenced against the Cadastral Map reproduced below:

Source: SIX maps

3 PROPERTY SEARCH DETAILS

3.1 Real Property Description

An Estate in Fee Simple at Sylvania Waters in the Local Government Area of Sutherland, Parish of Sutherland, in the County of Cumberland being Lot 1 in Deposited Plan 615171.

Current title reference: 1/615171

A copy of the current title search is shown below.

LAND REGISTRY SERVICES

Order number: 53272110
Your Reference: SYD-372480
19/09/18 10:15

SAI GLOBAL

NSW LRS - Title Search

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 1/615171

SEARCH DATE	TIME	EDITION NO	DATE
19/9/2018	10:15 AM	6	10/9/2018

LAND

LOT 1 IN DEPOSITED PLAN 615171
AT SYLVANIA WATERS
LOCAL GOVERNMENT AREA SUTHERLAND SHIRE
PARISH OF SUTHERLAND COUNTY OF CUMBERLAND
TITLE DIAGRAM DP615171

FIRST SCHEDULE

SYLVANIA WATERWAYS LIMITED (CN 5391168)

SECOND SCHEDULE (21 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 8310479 EASEMENT TO DRAIN WATER AFFECTING THE LAND ABOVE DESCRIBED
3 AK690056 EASEMENT FOR REPAIR 1 WIDE AFFECTING THE PART DESIGNATED (IS) IN DP1199902
4 AK690057 EASEMENT FOR REPAIR 1 WIDE AFFECTING THE PART DESIGNATED (HJ) IN DP1199902
5 AK690058 EASEMENT FOR REPAIR 1 WIDE AFFECTING THE PART DESIGNATED (KB) IN DP1199902
6 AK690059 EASEMENT FOR REPAIR 1 WIDE AFFECTING THE PART DESIGNATED (KA) IN DP1199902
7 AK794181 EASEMENT FOR REPAIR 1 WIDE AFFECTING THE PART DESIGNATED (IR) IN DP1199902
8 AK855172 EASEMENT FOR REPAIR 1 WIDE AFFECTING THE PART DESIGNATED (HF) IN DP1199902
9 AK855173 EASEMENT FOR REPAIR 1 WIDE AFFECTING THE PART DESIGNATED (IQ) IN DP1199902
10 AM109950 EASEMENT FOR BATTER AND RETAINING WALL 1 WIDE AFFECTING THE PART DESIGNATED (A) IN PLAN WITH AM109950
11 AN187794 EASEMENT FOR REPAIR 1 WIDE AFFECTING THE PART DESIGNATED (IU) IN DP1199902
12 AN187795 EASEMENT FOR REPAIR 1 WIDE AFFECTING THE PART DESIGNATED (HH) IN DP1199902
13 AN187796 EASEMENT FOR REPAIR 1 WIDE AFFECTING THE PART DESIGNATED (HG) IN DP1199902
14 AN187797 EASEMENT FOR REPAIR 1 WIDE AFFECTING THE PART DESIGNATED (LY) IN DP1199902
15 AN187798 EASEMENT FOR REPAIR 1 WIDE AFFECTING THE PART DESIGNATED (LW) IN DP1199902

END OF PAGE 1 - CONTINUED OVER

PRINTED ON 19/9/2018

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 1/615171 PAGE 2

SECOND SCHEDULE (21 NOTIFICATIONS) (CONTINUED)

16	AN187799	EASEMENT FOR REPAIR 1 WIDE AFFECTING THE PART DESIGNATED (KV) IN DP1199902
17	AN608708	EASEMENT FOR REPAIR 1 WIDE AFFECTING THE PART DESIGNATED (AC) IN DP1199902
18	AN608709	EASEMENT FOR REPAIR 1 WIDE AFFECTING THE PART DESIGNATED (LT) IN DP1199902
19	AN608710	EASEMENT FOR REPAIR 1 WIDE AFFECTING THE PART DESIGNATED (BY) IN DP1199902
20	AN608711	EASEMENT FOR REPAIR 1 WIDE AFFECTING THE PART DESIGNATED (CK) IN DP1199902
21	AN608712	EASEMENT FOR REPAIR 1 WIDE AFFECTING THE PART DESIGNATED (BZ) IN DP1199902

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

3.2 Registered Owner

Sylvania Waterways Limited

3.3 Easements and Encumbrances

Details of easements and encumbrances are shown on the title search shown above.

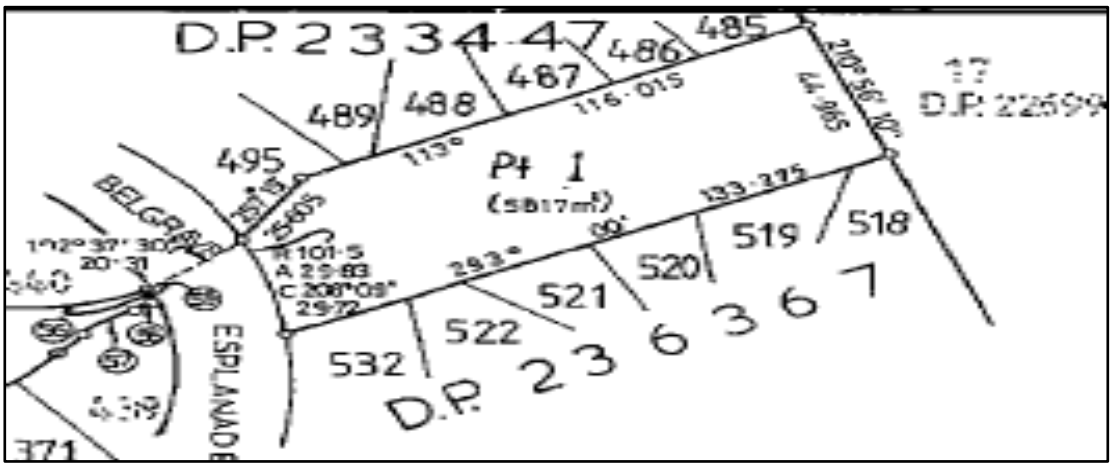
Essentially the encumbrances are for access to repair the canal estate infrastructure and are not deemed to have a deleterious effect on the value of the sites.

There are no apparent adverse easements or encumbrances registered on title that would impact on value. Should any be discovered the valuer should be requested to comment.

3.4 Land Area

The parent site comprises of land forming the seabed and sections of foreshore within the Sylvania Waters Estate and extends to an area of 30.46 hectares.

Part Lot 1,as identified in the diagram below, is located to the south eastern portion of the estate and has an area of 5,817m².

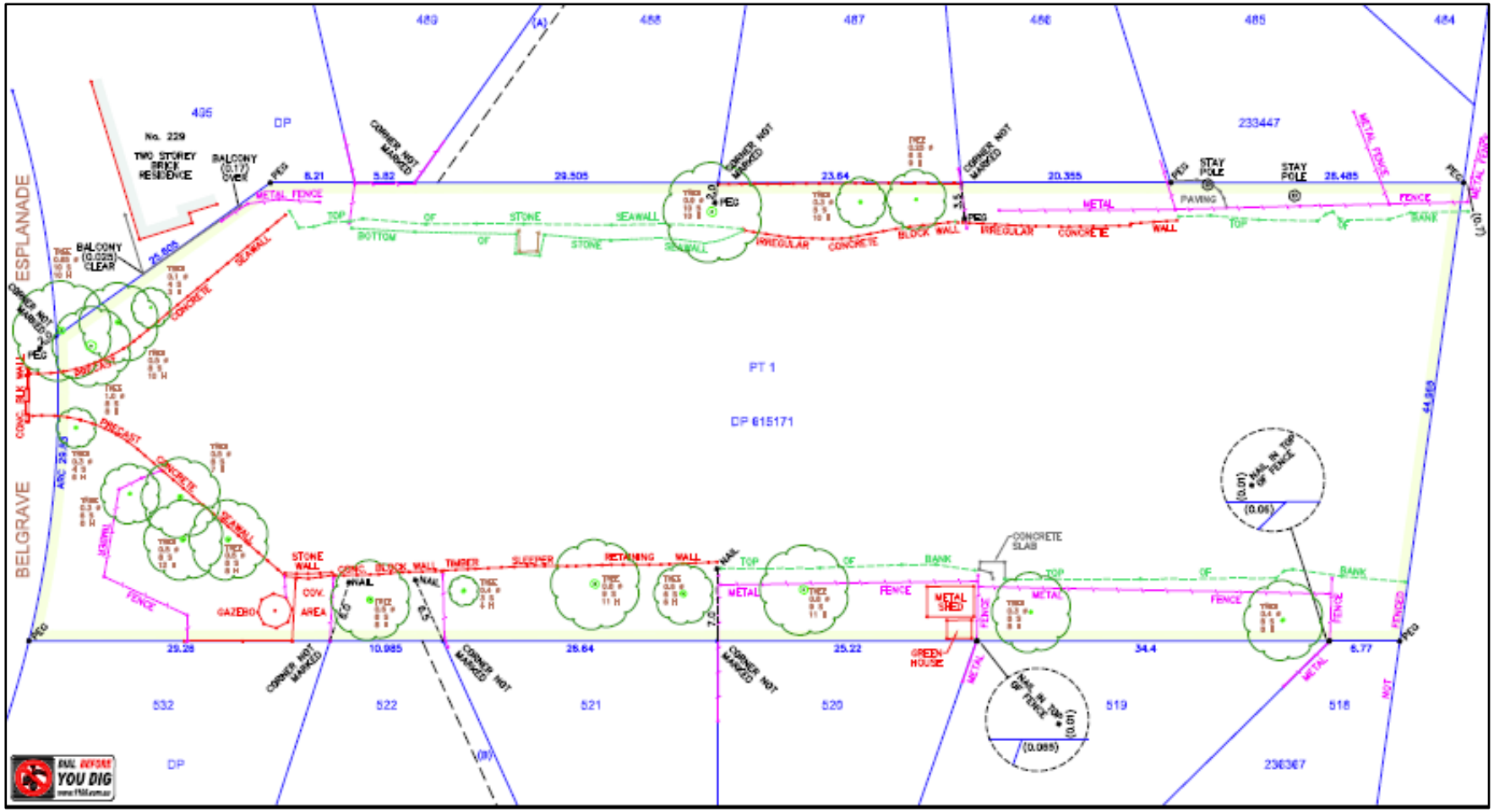


The areas proposed for subdivision off Part Lot 1 are tabled below and total 1,661m²in area, or 28.55%.

ADDRESS	PARENT LOT	DP	DISPOSAL AREA
227 Belgrave Esplanade	495	233447	389m²
229 Belgrave Esplanade	532	236367	136m²
15 Wollondilly Place	489	233447	22m²
17 Wollondilly Place	488	233447	118m²
19 Wollondilly Place	487	233447	115m²
21 Wollondilly Place	486	233447	83m²
23 Wollondilly Place	485	233447	93m²
25 Bellinger Place	518	236367	43m²
27 Bellinger Place	519	236367	216m²
29 Bellinger Place	520	236367	181m²
31 Bellinger Place	521	236367	195m²
33 Bellinger Place	522	236367	70m²

Various Lots, 2R Belgrave Esplanade, Sylvania Waters NSW 2224
File No. SYD-372480/AM

The survey below reveals the areas in question that form the seawall section adjacent to the respective allotments.



3.5 Local Authority

Sutherland Shire

3.6 Town Planning

Within the Town Planning Scheme for Sutherland Shire the subject property is designated "RE2 Private Recreation" and "W2 Recreational Waterways".

Source: NSW Planning & Environment

Permitted Uses

Zone RE2 Private Recreation

1 Objectives of zone

- To enable land to be used for private open space or recreational purposes.
- To provide a range of recreational settings and activities and compatible land uses.
- To protect and enhance the natural environment for recreational purposes.
- To ensure the scale, density and form of development reflects the nature of the recreational use of the land and is compatible with the surrounding urban form and natural setting.

2 Permitted without consent

Environmental protection works

3 Permitted with consent

Animal boarding or training establishments; Car parks; Community facilities; Entertainment facilities; Environmental facilities; Hotel or motel accommodation; Kiosks; Marinas; Passenger transport facilities; Recreation areas; Recreation facilities (indoor); Recreation facilities (outdoor); Registered clubs; Restaurants or cafes; Roads; Small bars; Water recreation structures

4 Prohibited

Any other development not specified in item 2 or 3

Zone W2 Recreational Waterways

1 Objectives of zone

- To protect the ecological, scenic and recreation values of recreational waterways.
- To allow for water-based recreation and related uses.
- To provide for sustainable fishing industries and recreational fishing.
- To achieve a balance between public and private use of the waterways and intertidal areas.
- To protect remnant natural features, aquatic habitat, public access and the navigability of waterways.
- To allow suitable mooring facilities having regard to the established character of an area, recreational uses, the functionality of the waterways and the cumulative impact of mooring facilities and other man-made structures in a waterway.

2 Permitted without consent

Moorings

3 Permitted with consent

Aquaculture; Boat launching ramps; Boat sheds; Charter and tourism boating facilities; Environmental facilities; Environmental protection works; Flood mitigation works; Kiosks; Marinas; Mooring pens; Passenger transport facilities; Recreation facilities (outdoor); Water recreation structures

4 Prohibited

Industries; Multi dwelling housing; Residential flat buildings; Seniors housing; Warehouse or distribution centres; Any other development not specified in item 2 or 3

The current use as a recreational waterway appears to comply with the zoning.

The residential allotments adjacent to the land and waterways in question are all zoned as "R2 – Low Density Residential", and it would be assumed that any acquired area would revert to this zoning.

We have searched the publicly available records for the relevant zoning and/or designation for the information noted above. We advise however, that a **formal** search with the appropriate Local Authority has not been carried out or obtained.

The valuation is made on the basis that all appropriate and necessary town planning and building approvals and/or certifications are in place.

3.7 Site Value

The Property NSW site value, effective for local authority rating and land tax purposes as at 1 July 2017 is $1,750,000.

3.8 Land Tax

On a company ownership single holding basis Land Tax is assessed at $18,036.

3.9 Contamination Factors

A search with the Environmental Protection Agency (NSW has been undertaken.

The subject land is not listed on the Contaminated Land Record of Notices.

Home Contaminated land Record of notices

Search results

Your search for: LGA: Sutherland Shire Council

Matched 55 notices relating to 15 sites.

Search Again Refine Search

Suburb	Address	Site Name	Notices related to this site
CARINGBAH	101-103 Cawarra ROAD	Adjacent to Spirent Australia	3 former
CARINGBAH	105 Cawarra ROAD	Spirent Australia	4 former
ENGADINE	963 Old Princes HIGHWAY	BP Branded Service Station	4 current
ENGADINE	1234 Princes HIGHWAY	BP Service Station	1 current
GYMEA	470 Princes (Cnr The Boulevarde) HIGHWAY	Coles Express Kirrawee	1 current
KURNELL	Captain Cook DRIVE	Abbott Australasia	2 former
KURNELL	2 Solander STREET	Caltex Refinery	1 current and 4 former
LOFTUS	127 Loftus AVENUE	BP Freedom Fuel Service Station Loftus	2 former
LUCAS HEIGHTS	access from Little Forest ROAD	Harringtons Quarry	3 current and 2 former
LUCAS HEIGHTS	Little Forest ROAD	IWC landfill	2 current and 1 former
MIRANDA	455 Kingsway OTHER	Woolworth's Service Station	4 current and 2 former
OYSTER BAY	20 Carvers ROAD	Shell Coles Express Service Station	6 current and 1 former
SUTHERLAND	1 to 3 Oxford STREET	United Service Station and Sutherland Reservoir	4 current
SYLVANIA	414-416 Princes HIGHWAY	Caltex Service Station - Sylvania Heights	3 current and 2 former
TAREN POINT	(formerly 98 Woodlands Rd) 2R Alexander AVENUE	Former Oyster Farmer	2 current

Page 1 of 1

19 September 2018

No indication of contamination was apparent during inspection. However, the reader should be aware that this valuation has been prepared without the benefit of appropriate tests or expert advice and presupposes that no contamination exists that would adversely affect market value.

The Australian Property Institute Real Property Guidance Notes at Guidance Note 12 Appendix 2, provides a list of potentially contaminating activities.

This property is presently a waterway and adjacent recreational land and is bound by low density residential house blocks, which use is not identified as a potentially contaminating activity within Guidance Note 12.1 of the ARPGN.

The client acknowledges and recognises that the valuer is not an expert in identifying environmental hazards and compliance requirements affecting properties. The valuer has endeavoured to identify all matters of environmental concern and the effect they might have on the value of the property. However, the valuer will not be held liable nor responsible for his/her failure to identify all such matters of environmental concern and the impact which any environmental related issue has on the property and its value including loss arising from site contamination; or the non-compliance with environmental laws; or cost associated with the clean-up of the property to which an environmental hazard has been recognised, including action by the Environmental Protection Agency to recover clean-up costs pursuant to the relevant Environmental Protection Act.

3.10 Environmental Factors

None apparent.

We advise that we have not undertaken a formal search to confirm whether or not the property is subject to flooding or has previously been flooded. We recommend you undertake your own enquiries in this regard. Should any issues arise this report should be referred back to the valuer for comment and or amendment.

3.11 Heritage Implications

None apparent.

4 PHYSICAL SITE DETAILS

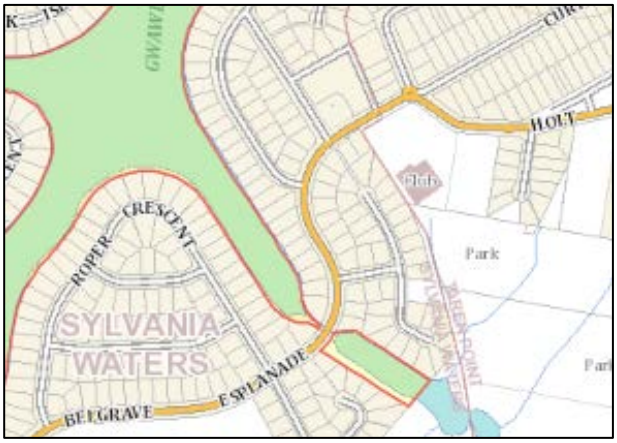
4.1 Situation and Locality

The subject property comprises of a contiguous part of foreshore land located within the "Sylvania Waters Estate", within the Sutherland Local Government Area approximately 22 kilometres south of the Sydney CBD. The estate is a planned canal development that was completed circa 1970 and is located on the southern side of the Georges River where it meets with Botany bay to the east.

Surrounding development comprises primarily of low-density residential development completed between 1970 and the present and includes numerous waterfront sites located along the man-made canal system, most with deep water frontage although some have only tidal access.

The Taren Point light industrial and bulky goods retail centre is located approximately 1 kilometre to the east with the Sylvania neighbourhood retail centre located on the junction of Port Hacking Road and the Princes Highway approximately 2 kilometres to the north west of the subject. The major regional retail centre of Miranda Fair is located some 4 kilometres to the south.

The area contains a vast array of social infrastructure that incudes schools, churches and hospitals, with extensive recreation areas that includes Botany Bay, beaches at Cronulla and Wanda and a vast river system.



4.2 Roads and Access

The land in question is roughly concentrated along three (3) thoroughfares namely Belgrave Esplanade, Bellinger Place and Wollondilly Place.

Belgrave Esplanade forms the western elevation of the subject canal area and is a through thoroughfare running through Sylvania Waters. The other thoroughfares run off Belgrave Esplanade and are both end in cul-de-sacs.

All roads are bitumen sealed with formed kerbs and gutters.

4.3 Services and Amenities

All normal utilities including electricity, telephone, reticulated town water and sewerage services are available and connected to the property.

4.4 Land Description

The land in question currently comprises a section of a larger parcel that includes land adjacent to the Sylvania Waters Estate as well as the seafloor. This encompasses an area of in excess of 30 hectares. The proposed parcels of land are of varying shape but are level and sit adjacent to existing residential allotments.

It is essentially that land identified within the red boundary below.

Source: SIX maps

5 IMPROVEMENTS

5.1 General Description

The subject land is largely devoid of structural improvements aside from sea walls and general canal infrastructure that includes bridge underpasses and wire mesh fencing to sections. Areas adjacent to some lots have been lightly developed with paving, cabanas and outdoor living areas, all of which has been undertaken in an ad hoc manner.

The photos below provide a general overview of the state of the improvements evident.

6 MARKET OVERVIEW

In respect to this valuation we have been requested to value portions of an englobo site that sits adjacent to residential subdivisions sites within the southern Sydney suburb of Sylvania Waters. The respective proposed portions have varying sizes, shapes and water frontage and are proposed to be offered for sale to adjoining owners in order to facilitate these properties having water front access to the Sylvania Waters Estate.

At present the lands to the north of this portion of the Estate facing the canals almost universally have direct water frontage. This portion of the estate, and another section to the north west have set backs from the water front with the residual land area owned by Sylvania Waters Limited (The Company). Therefore, there exists an opportunity for The Company to divulge these areas to adjoining owners to mutually enhance the existing site values of these subdivided lands, and secondly to move the onus of maintenance and liability away from The Company.

It is acknowledged that whilst the acquisition of these small site areas would enhance the overall value and marketability of the existing residential sites, there is no pressure or requirement for owners to acquire these proposed sites. As such there value as isolated parcels of land are of considerably lower than that which would apply to sites where there is a greater level of market interest.

This section of the canal estate is also somewhat hampered by the aspect afforded and the level of access to and from the main canal system. The respective allotments either side of the water body have views across the water to neighbouring residential sites, with the water way access afforded through a road underpass that is only suitable for small craft, unlike sites along the main canal.

The level of residential sales activity in Sylvania Waters has averaged around 42 dwellings per annum over the past decade but has receded to around 30 per annum over the past 2-years. Agents report that this has more to do with the availability of supply of property to the market, rather than a lack of purchasers. This has not affected the median sales price with an annual growth rate recorded of approximately 14% in the year to September 2018 to an amount of $2,627,500. There has however been a slight decline of 2.3% since May 2018 when the median house price reached $2,705,000. With a finite number of properties in the area any decline in house prices across the board is likely to less severe in this area than most.

7 VALUATION CONSIDERATIONS

7.1 Highest and Best Use

Highest and best use is defined by the Australian Property Institute as:

"The use of an asset that maximises its potential and that is physically possible, legally permissible and financially feasible."

Within the Town Planning Scheme, the property is designated as part "RE2 – Private Recreation" and part "W2- Recreational Waterways". The adjacent land to the canals and seabed is all zoned "R2 – Low Density Residential"

In this instance we consider the highest and best use of the property is for residential usage.

7.2 Valuation Process

The appropriate Method of Valuation is considered the Direct Comparison Approach with sales evidence.

In adopting this approach, we have analysed sales of residential property offering similar characteristics and then assessed the sales on a proportional basis estimating the respective value of the land and improvements separately.

We have applied the 'Before and After" approach whereby we have assessed the land value of the respective sites 'as is' and then the value 'after' the apportionment of the extra land. This has been adopted as the areas of land of the various lots vary considerably in size and represent additions to the base area of the sites of between 3% and 61% and averages approximately 21%. Therefore, there is no uniform rate that can be applied across the entire estate.

7.3 Recent Sales History of the Subject

Of all the sites that are subject to this report there have been no recent sales transactions.

7.4 Sales Evidence

The following sales have been used as a guide in assessing the market value of the subject property.

All of the properties have been transacted over the past 9 months and are within the Sylvania Waters Estate and comprise of waterfront allotments.

Sale 1

Property Address:	60 Roper Crescent, Sylvania Waters
Sale Price:	$2,707,000
Sale Date:	30 June 2018
Zoning:	R2 Low Density Residential
Land Area:	683m²
Building Area:	200m²
Analysed Value/m² Building Area:	$2,000

Comment: The subject property comprises of a waterfront allotment located on the deep-water section of the canals approximately 400 metres to the west of the subject lands. The improvements comprised of a 1980's built single level dwelling that is of rendered brick and tile construction and accommodates 3-bedrooms, 3-bathrooms and a double garage. The rear yard contains an inground pool and a jetty.
Overall the property is in a superior locality with access to the deep-water part of the state afforded for larger boats. Also, a superior aspect is afforded to the property than that which would be applicable to sites in the general vicinity of the subject portion of the estate.
We have estimated the internal floor area to be 200m² and have applied a building value rate of $2,000/m² or a total of $400,000. In addition to this we have allowed for other improvements (pool, landscaping, jetty) of $150,000 to estimate the total value of the improvements at $550,000. This provides a net land value of $2,157,000 or $3,158/m². This compares to a Valuer Generals land assessment as at 1 July 2017 of $1,800,000 or a 20% premium.

Sale 2

Property Address:	52 Roper Crescent, Sylvania Waters
Sale Price:	$2,780,000
Sale Date:	27 February 2018
Zoning:	R2 Low Density Residential
Land Area:	721m²
Building Area:	200m²
Analysed Value/m² Building Area:	$2,000

Comment: The subject property comprises of a waterfront allotment located on the deep-water section of the canals approximately 400 metres to the west of the subject lands. The improvements comprised of a 1980's built single level dwelling that is of rendered brick and tile construction and accommodates 3-bedrooms, 3-bathrooms and a double garage. The rear yard contains an inground pool and a jetty.
Overall the property is in a superior locality with access to the deep-water part of the state afforded for larger boats. Also, a superior aspect is afforded to the property than that which would be applicable to sites in the general vicinity of the subject portion of the estate.
We have estimated the internal floor area to be 200m² and have applied a building value rate of $2,000/m² or a total of $400,000. In addition to this we have allowed for other improvements (pool, landscaping, jetty) of $150,000 to estimate the total value of the improvements at $550,000. This provides a net land value of $2,230,000 or $3,141/m². This compares to a Valuer Generals land assessment as at 1 July 2017 of $1,880,000 or a 19% premium.

Sale 3

Property Address:	45 Hawkesbury Esplanade, Sylvania Waters
Sale Price:	$2,550,000
Sale Date:	30 July 2018
Zoning:	R2 Low Density Residential
Land Area:	689m²
Building Area:	230m²
Analysed Value/m² Building Area:	$1,500

Comment: The subject property comprises of a waterfront allotment located on the deep-water section of the canals approximately 300 metres to the north of the subject lands. The improvements comprise of a 1970's built split-level dwelling that is of brick and tile construction and accommodates 3-bedrooms, 3-bathrooms and a double garage. The rear yard contains an inground pool and a small jetty.
Overall the property is in a superior locality with access to the deep-water part of the estate afforded for larger boats. Also, a superior aspect is afforded to the property than that which would be applicable to sites in the general vicinity of the subject portion of the estate, although this site looks onto Barcoo Island and has a restricted outlook.
We have estimated the internal floor area to be 230m² and have applied a building value rate of $1,500/m² or a total of $345,000. In addition to this we have allowed for other improvements (pool, landscaping, jetty) of $100,000 to estimate the total value of the improvements at $445,000. This provides a net land value of $2,105,000 or $3,044/m². This compares to a Valuer Generals land assessment as at 1 July 2017 of $1,800,000 or a 17% premium.

Sale 4

Property Address:	43 Hawkesbury Esplanade, Sylvania Waters
Sale Price:	$3,225,000
Sale Date:	25 July 2018
Zoning:	R2 Low Density Residential
Land Area:	689m²
Building Area:	330m²
Analysed Value/m² Building Area:	$2,250

Comment: The subject property comprises of a waterfront allotment located on the deep-water section of the canals approximately 300 metres to the north of the subject lands. The improvements comprise of a 1980's built 2-level dwelling that is of brick and tile construction and accommodates 4-bedrooms, 3-bathrooms and a double garage. The rear yard contains an inground pool and a large jetty.
Overall the property is in a superior locality with access to the deep-water part of the estate afforded for larger boats. Also, a superior aspect is afforded to the property than that which would be applicable to sites in the general vicinity of the subject portion of the estate, although this site looks onto Barcoo Island and has a restricted outlook.
We have estimated the internal floor area to be 300m² and have applied a building value rate of $2,250/m² or a total of $825,000. In addition to this we have allowed for other improvements (pool, landscaping, jetty) of $150,000 to estimate the total value of the improvements at $975,000. This provides a net land value of $2,250,000 or $3,266/m². This compares to a Valuer Generals land assessment as at 1 July 2017 of $1,800,000 or a 25% premium.

Sale 5

Property Address:	24 Clarence Crescent, Sylvania Waters
Sale Price:	$2,800,000
Sale Date:	24 January 2018
Zoning:	R2 Low Density Residential
Land Area:	664m²
Building Area:	380m²
Analysed Value/m² Building Area:	$1,500

Comment: The subject property comprises of a waterfront allotment located on the deep-water section of the canals approximately 800 metres to the north-west of the subject lands. The improvements comprised of a 1970's built double level dwelling that is of brick and tile construction and accommodates 5-bedrooms, 3-bathrooms and a double garage. The rear yard contains an inground pool and a jetty.
Overall the property is in a superior locality with access to the deep-water part of the state afforded for larger boats. It is located on a section of the canal behind Captain Cook Island and has restricted views to the main waterway. However, it is considered a superior aspect than is afforded to the property that are located in the general vicinity of the subject portion of the estate.
We have estimated the internal floor area to be 380m² and have applied a building value rate of $1,500/m² or a total of $570,000. In addition to this we have allowed for other improvements (pool, landscaping, jetty) of $100,000 to estimate the total value of the improvements at $670,000. This provides a net land value of $2,130,000 or $3,091/m². This compares to a Valuer Generals land assessment as at 1 July 2017 of $1,800,000 or a 18% premium.

7.5 Summary of Evidence

The sales analysed are of recent transactions of water front allotments. In our analysis of these we have made a subjective allowance for the value of the improvements based on a depreciated replacement rate utilising the available market data, sales summaries and the view of sales agents.

The sales evidence summary table provided below analyses the sales on the basis of a rate per square metre of improved site area, then deducts the estimated value of the underlying improvements to obtain a raw land value.

Sale No	Property	Sale Price	Sale Date	Site Area m²	$/m² site area	Adj Rate $/m²
1	60 Roper Cres, Sylvania Waters	$2,707,000	30-Jun-18	683	$3,963	$3,158
2	60 Roper Cres, Sylvania Waters	$2,780,000	27-Feb-18	721	$3,856	$3,141
3	45 Hawkesbury Esp, Sylvania Waters	$2,550,000	30-Jul-18	689	$3,701	$3,044
4	43 3Hawkesbury Esp, Sylvania Waters	$3,255,000	25-Jul-18	689	$4,724	$3,266
5	24 Clarence Cres, Sylvania Waters	$2,800,000	24-Jan-18	664	$4,217	$3,091

7.6 Conclusions and Application of Evidence

The evidence tabled above provides before land values of between $3,044 and $3,266/m² which represents a reasonably consistent variance of approximately 7% (average rate of $3,164/m²), which reflects factors such as the size of the lots, their views and extent of water frontage.

Given the nature and location of the land content of the surveyed area we are of the opinion that given its restrictive access to this section of canal a weighting of 60% of the overall value rate would apply, which is equivalent to a site value rate of approximately $1,900/m².

We have then weighted this in respect to the proposed portions to reflect the relative size of the existing allotment and the extent of potential canal frontage to obtain a site value range of between $1,450/m² (20% below average) to $2,203/m² (15% above average). Overall this provides the following estimate of base site values.

Address	Site Area m²	Site Base Value	Rate/m²
229 Belgrave Esp.	581.70	$1,280,000	$2,200
15 Wollondilly Place	784.10	$1,330,000	$1,696
17 Wollondilly Place	657.60	$1,250,000	$1,901
19 Wollondilly Place	607.00	$1,155,000	$1,903
21 Wollondilly Place	569.10	$1,225,000	$2,153
23 Wollondilly Place	682.90	$1,300,000	$1,904
227 Belgrave Esp.	562.80	$1,240,000	$2,203
33 Bellinger Place	638.60	$1,150,000	$1,801
31 Bellinger Place	556.40	$1,195,000	$2,148
29 Bellinger Place	562.80	$1,210,000	$2,150
27 Bellinger Place	752.50	$1,450,000	$1,927
25 Bellinger Place	910.50	$1,320,000	$1,450

7.7 Valuation Calculations

Based on our analysis we have prepared calculations on a Direct Comparison basis adopting "Before and After" values, thereby arriving at a value of the ascribed adjacent lots. We have weighted the values to reflect the size of the parent sites and the extent of water frontage with our initial estimate being as tabled above.

Address	Lot No.	Shore Length (m)
229 Belgrave Esp.	495	33.81
15 Wollondilly Place	489	5.82
17 Wollondilly Place	488	29.5
19 Wollondilly Place	487	23.64
21 Wollondilly Place	486	20.35
23 Wollondilly Place	485	28.48
227 Belgrave Esp.	532	29.26
33 Bellinger Place	522	10.968
31 Bellinger Place	521	26.64
29 Bellinger Place	520	25.22
27 Bellinger Place	519	34.34
25 Bellinger Place	518	6.77

As stated the relative values reflect the location of the Lot in the subdivision and the breadth of the frontage that the site possesses to the water front reservation area, and subsequently would gain. In our estimations we have made note of the following.

- The majority of lots will benefit in some way by the addition of extra waterfront land, but this is not a uniform appreciation across the board.
- The property at 15 Wollondilly Place will gain a 5-metre frontage but the addition of this extra land to the site is of a less beneficial nature than that afforded to other lots.
- Similarly, the property at 25 Bellinger Place gains a total of area 43m² with 6.77 metres of canal frontage. It is an irregular shaped allotment with an awkward aspect and the addition of the extra land does make as significant an impact as it does with other sites, hence a lower rating has been applied.
- The property at 227 Belgrave Esplanade would potentially gain the most site area (389m²) with the canal frontage being 29.26 metres. Whilst this is a significant impact the weighting adopted of 50% less than a market rate reflects the size of the extra land compared to the base site area (69% increase).

Based on our findings we have applied a value rate to the sites that has been discounted to reflect the size and water frontage of a factor of between 10% and 50% of the adopted base value rates to attain the following estimates of end values.

Address	Incresed Site Area m²	After Value	Value added	After Rate/m²
229 Belgrave Esp.	717.70	$1,370,000	$90,000	$1,909
15 Wollondilly Place	806.10	$1,350,000	$20,000	$1,675
17 Wollondilly Place	775.60	$1,450,000	$200,000	$1,870
19 Wollondilly Place	722.00	$1,350,000	$195,000	$1,870
21 Wollondilly Place	652.10	$1,375,000	$150,000	$2,109
23 Wollondilly Place	775.90	$1,450,000	$150,000	$1,869
227 Belgrave Esp.	951.80	$1,670,000	$430,000	$1,755
33 Bellinger Place	708.60	$1,230,000	$80,000	$1,736
31 Bellinger Place	751.40	$1,530,000	$335,000	$2,036
29 Bellinger Place	743.80	$1,520,000	$310,000	$2,044
27 Bellinger Place	968.50	$1,820,000	$370,000	$1,879
25 Bellinger Place	953.50	$1,350,000	$30,000	$1,416

7.8 Added Value Conclusion

Having deducted the before value from the after value we have derived values that reflect the interest of the portion of land adjacent to the parent sites.

Address	Site Area m²	Before Value	Rate/m²	Incresed Site Area m²	After Value	Value added	After Rate/m²
229 Belgrave Esp.	581.70	$1,280,000	$2,200	717.70	$1,370,000	$90,000	$1,909
15 Wollondilly Place	784.10	$1,330,000	$1,696	806.10	$1,350,000	$20,000	$1,675
17 Wollondilly Place	657.60	$1,250,000	$1,901	775.60	$1,450,000	$200,000	$1,870
19 Wollondilly Place	607.00	$1,155,000	$1,903	722.00	$1,350,000	$195,000	$1,870
21 Wollondilly Place	569.10	$1,225,000	$2,153	652.10	$1,375,000	$150,000	$2,109
23 Wollondilly Place	682.90	$1,300,000	$1,904	775.90	$1,450,000	$150,000	$1,869
227 Belgrave Esp.	562.80	$1,240,000	$2,203	951.80	$1,670,000	$430,000	$1,755
33 Bellinger Place	638.60	$1,150,000	$1,801	708.60	$1,230,000	$80,000	$1,736
31 Bellinger Place	556.40	$1,195,000	$2,148	751.40	$1,530,000	$335,000	$2,036
29 Bellinger Place	562.80	$1,210,000	$2,150	743.80	$1,520,000	$310,000	$2,044
27 Bellinger Place	752.50	$1,450,000	$1,927	968.50	$1,820,000	$370,000	$1,879
25 Bellinger Place	910.50	$1,320,000	$1,450	953.50	$1,350,000	$30,000	$1,416

7.9 Goods and Services Tax (GST)

It is anticipated that GST would be added to the sale price of the property when sold, if the vendor is required to remit GST to the Australian Tax Office following a sale. Our valuation is made exclusive of GST components.

8 VALUATION

Subject to the stipulations and conditions contained within the body of this report, it is our opinion that the Market Value of the proposed lots on a vacant possession basis, as at 17 September 2018 is:

ADDRESS	LOT	DP	VALUE
229 Belgrave Esp.	495	233447	$90,000
15 Wollondilly Place	489	233447	$20,000
17 Wollondilly Place	488	233447	$200,000
19 Wollondilly Place	487	233447	$195,000
21 Wollondilly Place	486	233447	$150,000
23 Wollondilly Place	485	233447	$150,000
227 Belgrave Esp.	532	236367	$430,000
33 Bellinger Place	522	236367	$80,000
31 Bellinger Place	521	236367	$335,000
29 Bellinger Place	520	236367	$310,000
27 Bellinger Place	519	236367	$370,000
25 Bellinger Place	518	236367	$30,000

VALUER

ANTHONY E. MARTIN AAPI MRICS
Certified Practising Valuer
Branch Manager
TAYLOR BYRNE

The counter signatory verifies that this report is genuine and endorsed by Taylor Byrne.
The opinion of value expressed in this report has been arrived at by the prime signatory alone.

LETTER OF INSTRUCTION

Letter of Engagement [Insert Address]

TAYLOR BYRNE

Acceptance of the above and is acknowledged:

Signature

ROLF NIEDERMANN, DIRECTOR

Name and Position [please print]

ROLF.J@TIPAZA.COM.AU

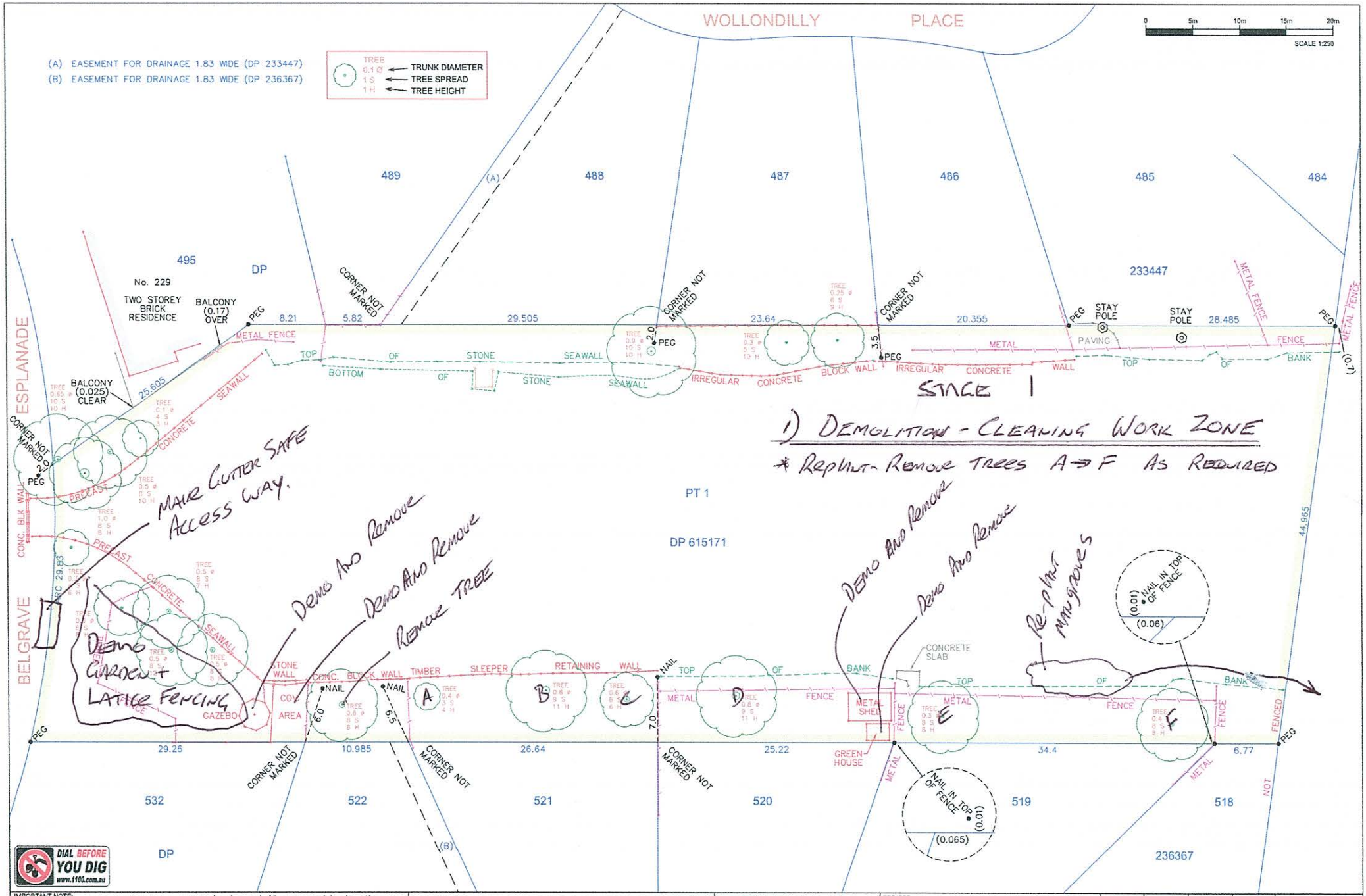
Email Address [please print]

0413702704

Contact Phone Number (please print)

7.9.18

Date (please print)



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IMPORTANT NOTE:
This plan is prepared for SYLVANIA WATERWAYS LIMITED from a combination of field survey and existing records for the purpose of designing new constructions on the land and should not be used for any other purpose.

A services search of the area surveyed above has not been undertaken. Visible services shown hereon have been located where possible by field survey. Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services.
This note is an integral part of this plan.

REVISION	DATE	DESCRIPTION	CCADS REF	APPROVED
00	05-02-14	ORIGINAL ISSUE	116706AD	PH

Cardno Hard&Forester
Shaping the Future
23-25 Frederick Street PO Box 175 Rockdale NSW 2216
t: (02) 8597 3700
f: (02) 9599 2146

PROJECT:
PLAN OF BOUNDARY MARKING OF PART LOT 1 IN DP 615171 & DETAIL OF ADJOINING LANDS

CLIENT: SYLVANIA WATERWAYS LIMITED

SURVEYED	DRAWN	CHECKED	PASSED
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SCALE 1:250		SHT 1 OF 1 SHTS	
DRAWING NUMBER		REV	
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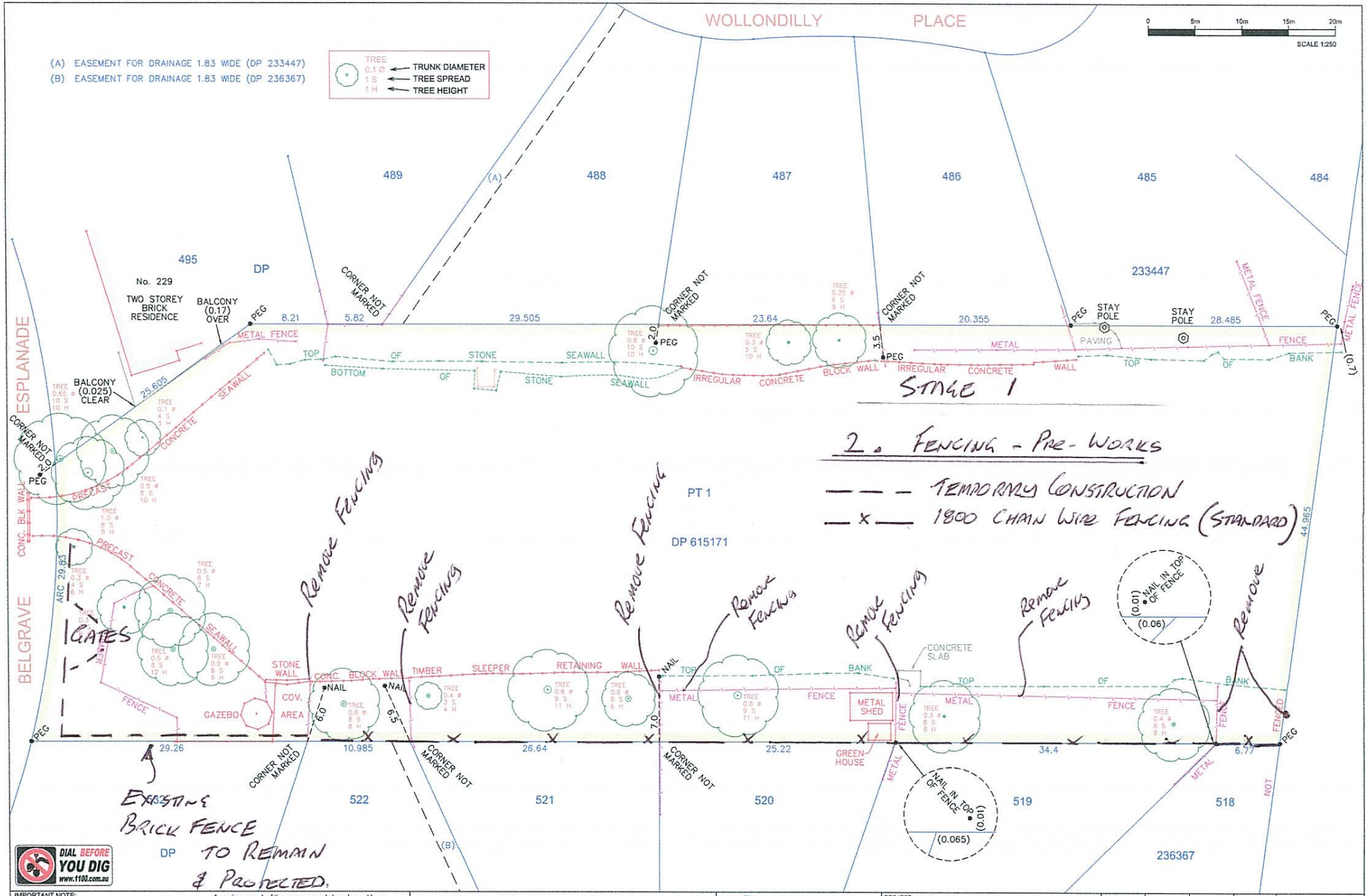

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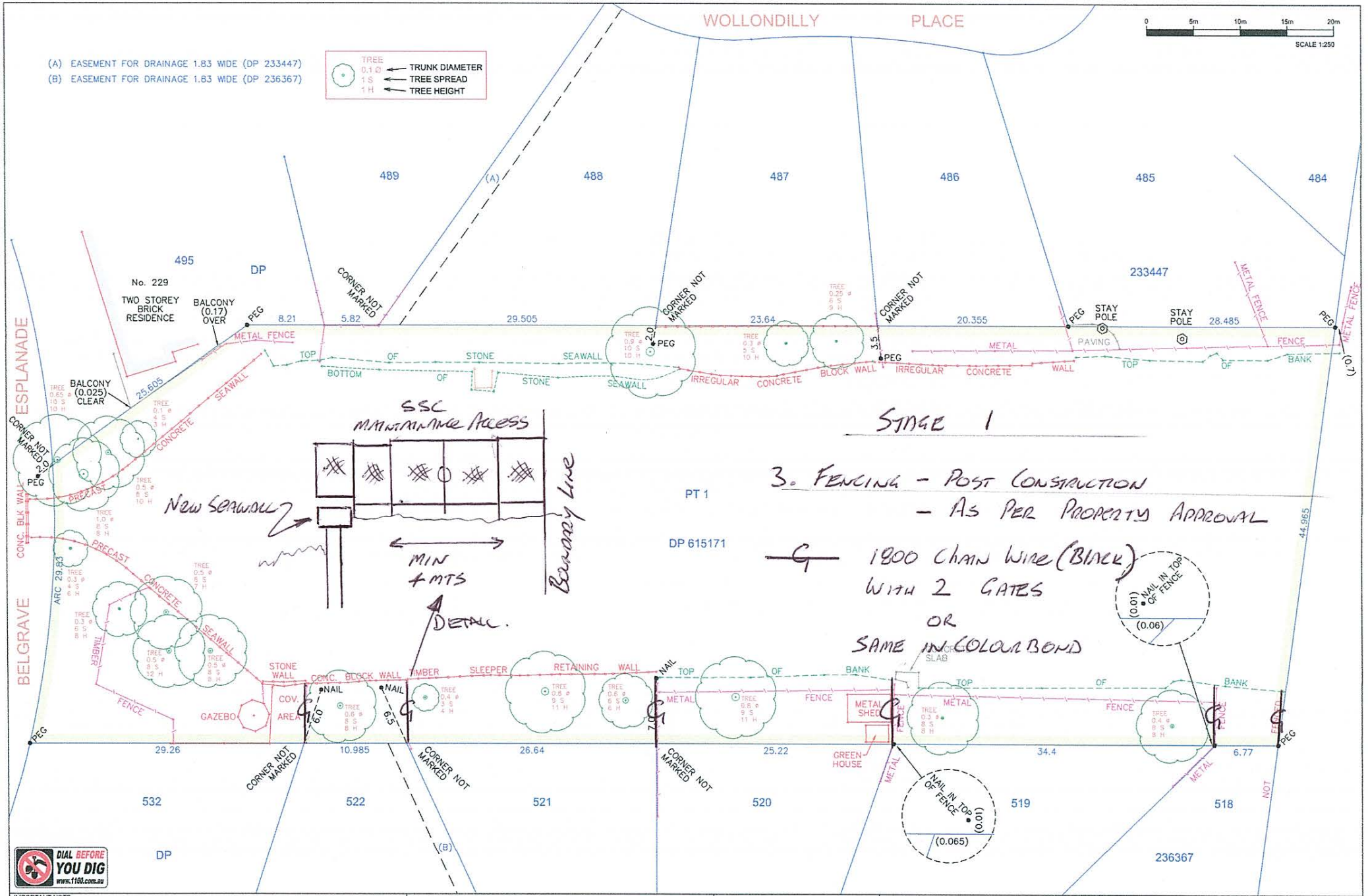
REVISION	DATE	DESCRIPTION	CCAD5 REF	APPROVED
00	05-02-14	ORIGINAL ISSUE	116706AD	PH

Cardno Hard & Forester
Shaping the Future
23-25 Frederick Street PO Box 175 Rockdale NSW 2216 t: (02) 9567 2700 f: (02) 9599 2446 e: survey@hardforester.com.au w: www.hardforester.com.au

PROJECT: PLAN OF BOUNDARY MARKING OF PART LOT 1 IN DP 615171 & DETAIL OF ADJOINING LANDS
CLIENT: SYLVANIA WATERWAYS LIMITED

SURVEYED	DRAWN	CHECKED	PASSED
JPM	JT		
SCALE 1:250		SHT 1 OF 1 SHTS	
DRAWING NUMBER		REV	
116706500		00	A2



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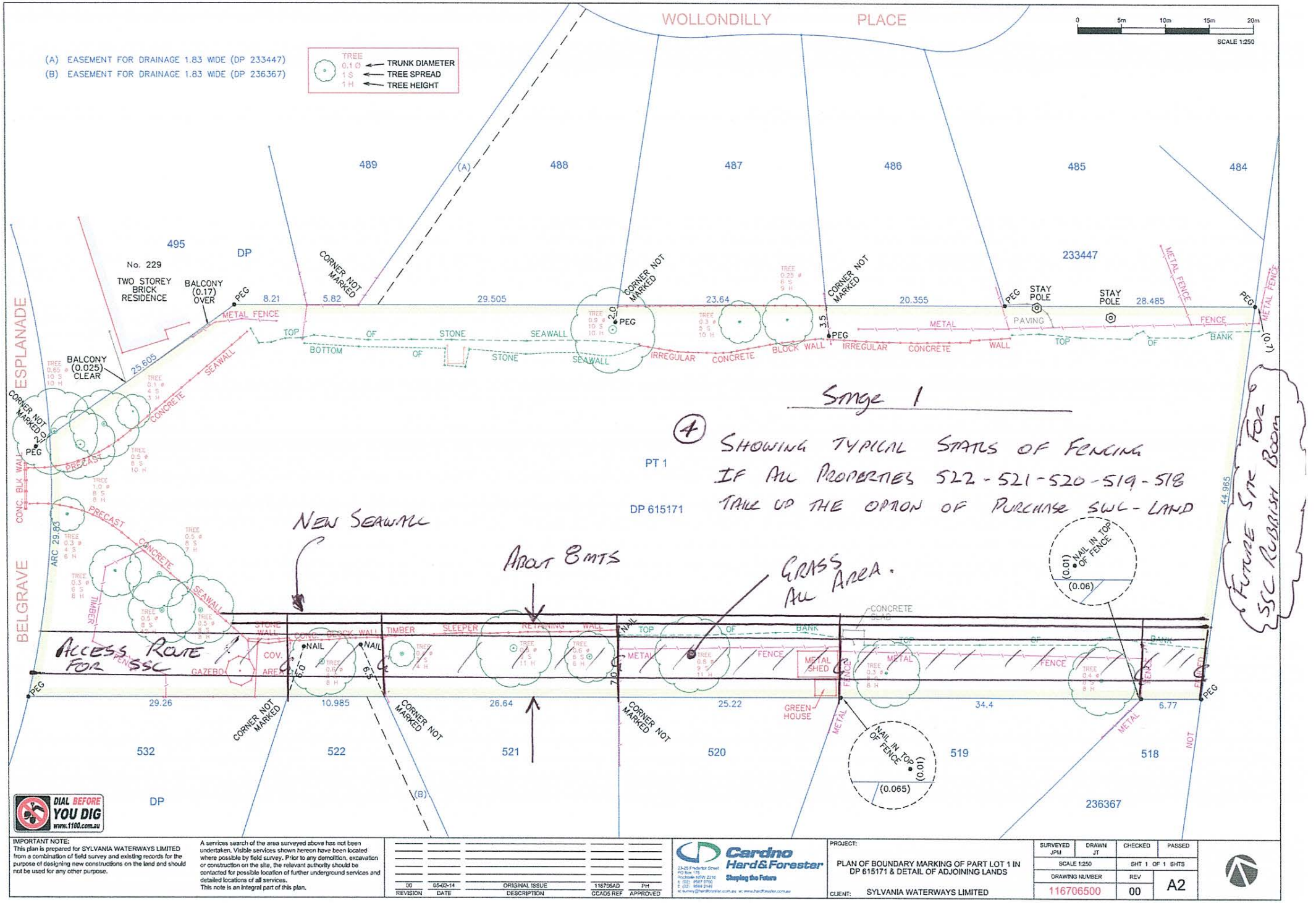
PROJECT:
PLAN OF BOUNDARY MARKING OF PART LOT 1 IN DP 615171 & DETAIL OF ADJOINING LANDS

CLIENT: SYLVANIA WATERWAYS LIMITED

SURVEYED	DRAWN	CHECKED	PASSED
JPM	JT		
SCALE 1:250		SHT 1 OF 1 SHTS	
DRAWING NUMBER		REV	
116706500		00	A2



DIAL BEFORE YOU DIG www.1100.com.au

IMPORTANT NOTE:
This plan is prepared for SYLVANIA WATERWAYS LIMITED from a combination of field survey and existing records for the purpose of designing new constructions on the land and should not be used for any other purpose.

A services search of the area surveyed above has not been undertaken. Visible services shown hereon have been located where possible by field survey. Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services.
This note is an integral part of this plan.

REVISION	DATE	DESCRIPTION	CCADS REF	APPROVED
00	05-02-14	ORIGINAL ISSUE	116706AD	PH

Cardno Hard&Forester
Shaping the Future
23-25 Frederick Street, PO Box 175, Rockdale NSW 2216
t: (02) 9567 9700 f: (02) 9599 2149
w: www.hardforester.com.au

PROJECT:
PLAN OF BOUNDARY MARKING OF PART LOT 1 IN DP 615171 & DETAIL OF ADJOINING LANDS

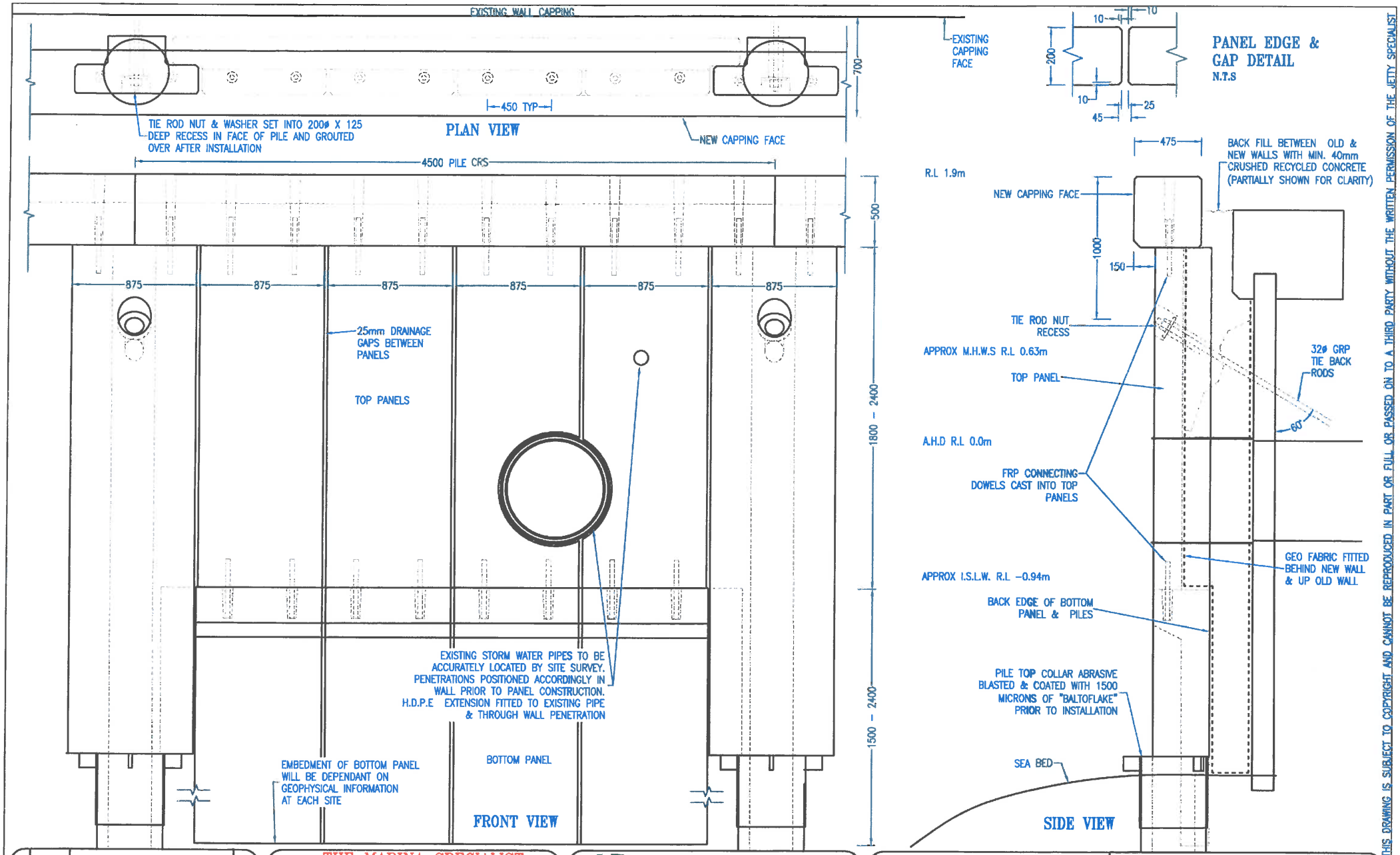
CLIENT: SYLVANIA WATERWAYS LIMITED

SURVEYED	DRAWN	CHECKED	PASSED
JPM	JT		
SCALE 1:250		SHT 1 OF 1 SHTS	
DRAWING NUMBER		REV	
116706500		00	A2

APPENDIX

B

PREVIOUS SEAWALL DESIGNS



REV	DATE	AMENDMENT	REQD
D	3/11/15	TIE ROD ANGLE CHANGED	JSP
C	10/9/15	DETAILS ALTERED	JSP
B	31/8/15	BOTTOM PANEL ALTERED, DETAILS ADDED	JSP

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Email: cardno@cardno.com.au

CHECKED: R.P.E.Q. 1667 DATE: 4.11.15

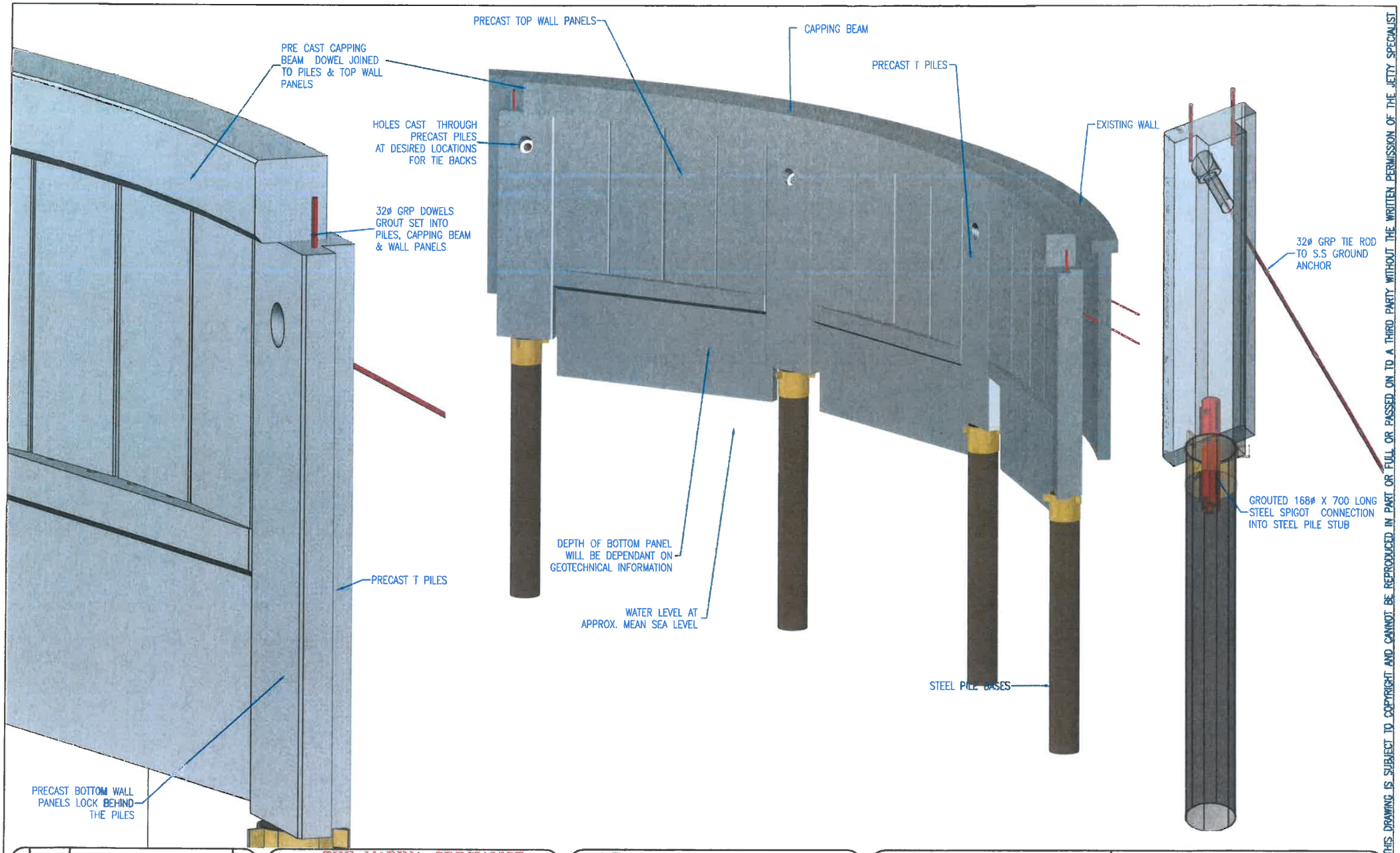
CLIENT:

PROJECT: PROPOSED REMEDIAL WORKS FOR SYLVANIA WATERS

TITLE: WALL PANEL & PILE PROFILES DESIGN No 40

SCALE:	DATE:	DRAWING NO:
1:25	19/8/15	JSP-CP-4068

DRAWN	CHECKED	DIMENSIONS	ISSUE	
M.A		MILLIMETRES	D	A3



REV	DATE	AMENDMENT	REQD
D	3/11/15	DESIGN DETAILS ALTERED	JSP
C	10/9/15	PILE SPIGOT LENGTHENED TO 750mm	JSP
B	31/8/15	BOTTOM PANEL ALTERED	JSP

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CHECKED: R.P.E.Q. 1667 DATE: 4.11.15

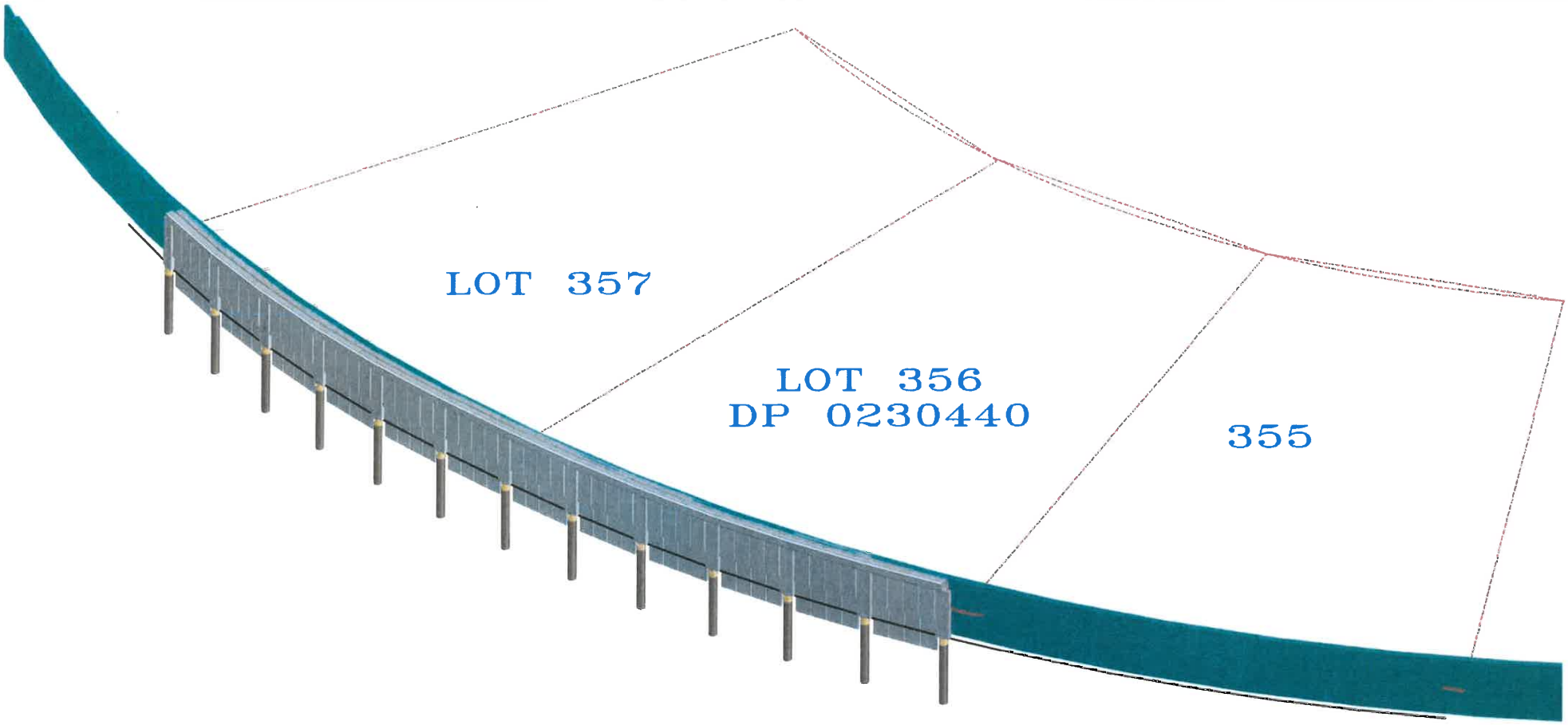
CLIENT:

PROJECT: PROPOSED REMEDIAL WORKS FOR SYLVANIA WATERS

TITLE: CONCEPT MODEL No 4
DESIGN No 40

SCALE:	DATE:	DRAWING NO:
N.T.S	20/8/15	JSP-CP-40610

DRAWN	CHECKED	DIMENSIONS	ISSUE	
M.A		MILLIMETRES	D	A3



REV	DATE	AMENDMENT	REQD

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CHECKED:	R.P.E.Q.	DATE:
	1607	4.11.15

CLIENT:

PROJECT: PROPOSED REMEDIAL WORKS FOR SYLVANIA WATERS

TITLE: FULL WALL TO LOTS 355, 356 & 357 FINAL DESIGN No 40

SCALE:		DATE:	DRAWING NO:
NTS		21/8/15	JSP-CP-40614
DRAWN: M.A	CHECKED:	DIMENSIONS: MILLIMETRES	ISSUE: A	A3

PILING NOTES

1. ALL PILING TO BE IN ACCORDANCE WITH THE DETAILS AS SET OUT IN THE SITE SPECIFIC DOCUMENTATION.
2. ALL PILE BASES ARE TO BE 457ø X 9.1 GRADE 450, CHS STEEL WITH COATED 9.1mm REINFORCING COLLAR FULLY WELDED TO TOP OF PILE.
3. PILES ARE TO BE INSTALL TO A MINIMUM OF 2.5m INTO BED ROCK.
4. TOP OF PILES ARE TO BE FINISHED ACCURATELY AT REQUIRED SITE SPECIFIC R.L.

PRECAST CONCRETE PANEL NOTES

1. ALL WORKMANSHIP AND MATERIALS SHALL CONFORM WITH CURRENT EDITIONS OF AS3600 AND AS3850 EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS AND SPECIFICATIONS.
2. ALL PRECAST PANELS ARE TO BE 175 & 200mm THICK, N50 CONCRETE U.N.O.
4. PRIOR TO LIFTING OF ANY PRECAST CONCRETE ELEMENT THE PRECAST CONCRETE MANUFACTURER'S ENGINEER SHALL VERIFY THAT EACH PRECAST CONCRETE ELEMENT HAS BEEN CONSTRUCTED IN ACCORDANCE WITH THE DESIGN FOR ERECTION AND THAT THE CONCRETE HAS REACHED THE REQUIRED STRENGTH FOR LIFTING.

CONCRETE

1. ALL MATERIALS AND WORKMANSHIP SHALL CONFORM WITH CURRENT EDITIONS OF AS 1379, AS 3600 AND AS3610.
2. CONCRETE STRENGTH GRADE FOR PARTICULAR ELEMENTS SHALL BE AS NOTED ON THE DRAWINGS.
3. SIZE OF ELEMENTS IS EXCLUSIVE OF APPLIED FINISHES. BEAMS DEPTHS INCLUDE SLAB THICKNESS AND ARE THE FIRST DIMENSION SPECIFIED, FOLLOWED BY WIDTH. UNLESS NOTED OTHERWISE ALL FORMED EDGES AND CORNERS OF CONCRETE MEMBERS SHALL HAVE 20mm CHAMFERS.
4. ALL REINFORCEMENT SHALL BE TO AS/NZS 4671 AND REINFORCEMENT GRADE IS DESIGNATED AS FOLLOWS:-
   R: PLAIN ROUND BAR, GRADE 250
   N: DEFORMED BAR, GRADE 500
   SL/RL: WIRE REINFORCING FABRIC GRADE 500
5. REINFORCEMENT SHALL BE BENT COLD IN ACCORDANCE WITH AS3600 EXCEPT WHERE APPROVED BY THE STRUCTURAL ENGINEER. NO REBENDING SHALL BE PERMITTED. CONCRETE COVER AND LAPS TO REINFORCEMENT SHALL BE AS NOTED ON THE DRAWINGS.
6. SLABS AND BEAMS SHALL BEAR ONLY ON LOAD BEARING ELEMENTS SHOWN ON THE PLANS.
7. CONCRETE ELEMENTS HAVE BEEN DESIGNED AS PER AS5100.5 FOR A DESIGN LIFE OF 100 YEARS.

GLASS FIBRE REINFORCED POLYMER (GFRP) BAR NOTES

1. FIX GFRP BARS AS SHOWN ON DRAWINGS.
2. ALL GFRP BARS SHALL BE V,ROD SUPPLIED AND INSTALLED IN ACCORDANCE WITH V.ROD PRODUCT GUIDE SPECIFICATION DATED JULY 2010.

NOMINAL BAR DIAMETER (mm)
- ø10
- ø12
- ø25
- ø32

CONSTRUCTION SEQUENCE

1. INSTALL PILES TO REQUIRED R.L AND CLEAN OUT TOP 1m OF PILES.
2. INSTALL TEMPORARY TOP PILE, ALIGN TO CORRECT POSITION AND SECURE TO EXISTING CAPPING.
3. USING TEMPORARY PILE TO ALIGN HOLE CORE DRILL THROUGH EXISTING WALL PANEL.
4. REMOVE TEMPORARY PILE TOP AND REPEAT PROCEDURE FOR ALL PILES.
5. INSTALL NEW COMPOSITE PILE TOP AND GROUT PILE INTO POSITION. AS PER NOTES IN CONSTRUCTION PLAN.
6. INSTALL GEOTEXTILE FABRIC TO EXISTING CONCRETE WALL PANELS AND INSTALL BOTTOM CONCRETE PANELS.
7. INSERT REQUIRED QUANTITY OF GROUT INTO BOTTOM PANEL HOLES AND INSTALL TOP PANELS.
8. INSTALL CAPPING BEAM AND GROUT TOP HOLES.
9. BACKFILL REMAINING VOID WITH 40mm CRUSHED CONCRETE AND TRIM ANY EXCESS GEOTEXTILE FABRIC.
10. INSTALL GROUND ANCHOR WITH 32ø GRP TIE BACK RODS & PROOF LOAD.

REV	DATE	AMENDMENT	REQD
B	3/11/15	NOTES AMENDED	JSP

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CHECKED: R.P.E.Q. 1667 DATE: 4.11.15

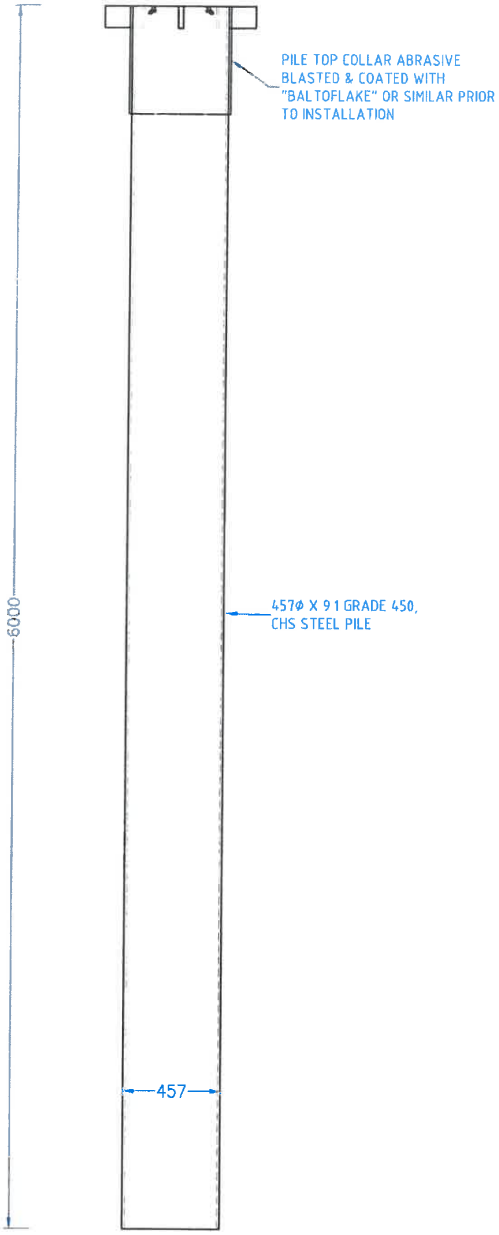
CLIENT:

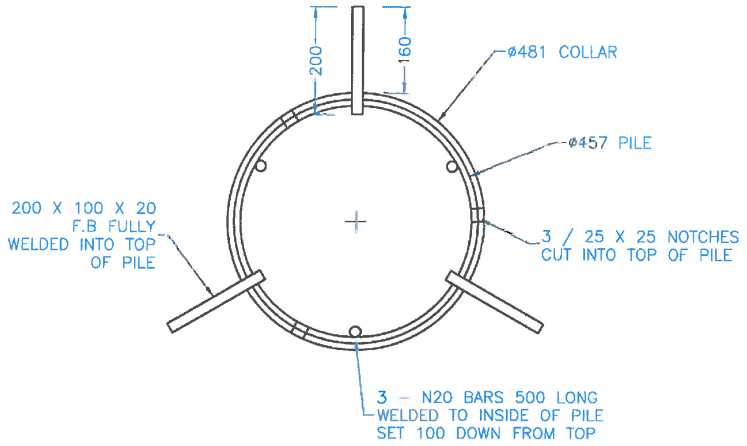
PROJECT: PROPOSED REMEDIAL WORKS FOR SYLVANIA WATERS

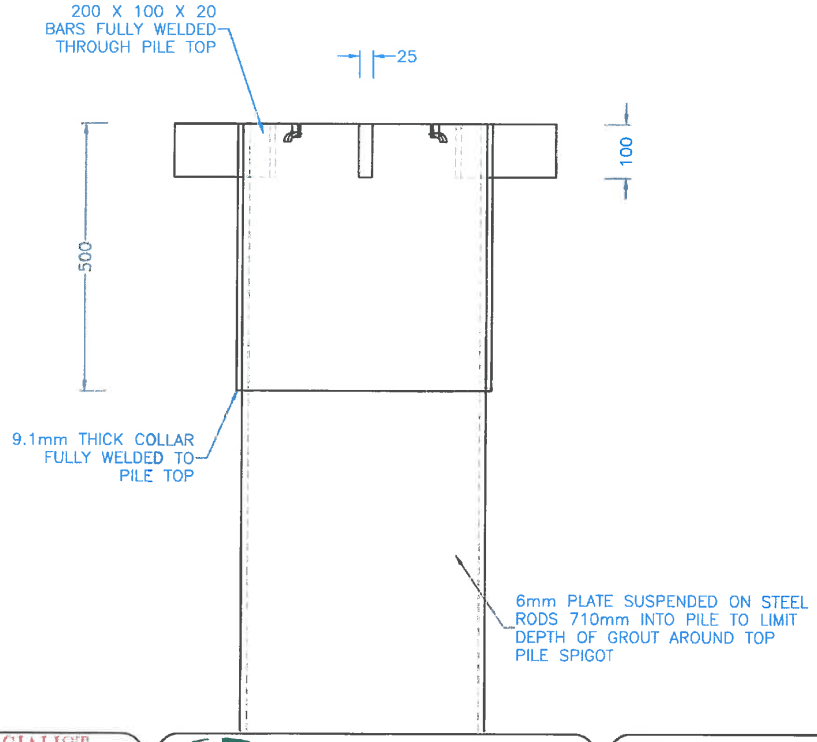
TITLE: CONSTRUCTION NOTES

SCALE:	DATE:	DRAWING NO:
NTS	31/8/15	JSP-CP-40616

DRAWN	CHECKED	DIMENSIONS	ISSUE	
M.A		MILLIMETRES	B	A3







REV	DATE	AMENDMENT	REQD
B	3/11/15	TOP COLLAR COATING NOTE CHANGED	JSP

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CHECKED: R.P.E.Q. 1667 DATE: 4-11-15

CLIENT:

PROJECT: PROPOSED REMEDIAL WORKS FOR SYLVANIA WATERS

TITLE: STEEL PILE CONSTRUCTION DETAILS

SCALE:	DATE:	DRAWING NO:
AS SHOWN	25/9/15	JSP-CP-40617

DRAWN	CHECKED	DIMENSIONS	ISSUE	
M.A		MILLIMETRES	B	A3

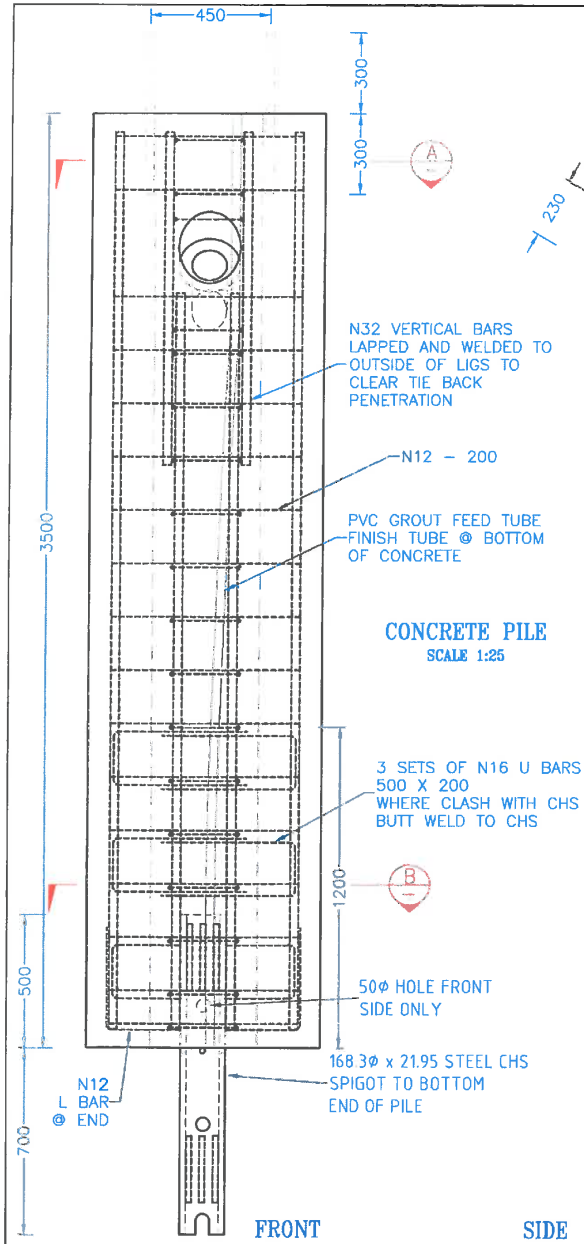
CONCRETE NOTES:

ALL CONCRETE TO BE 50MPa WITH QCL SEASURE CEMENT (OR EQUIVALENT) TO MANUFACTURERS SPECIFICATIONS
70mm COVER TO REINFORCING ON ALL EXPOSED SURFACES.
25mm COVER TO REINFORCING TO ANY SURFACES TO BE GROUT FILLED.

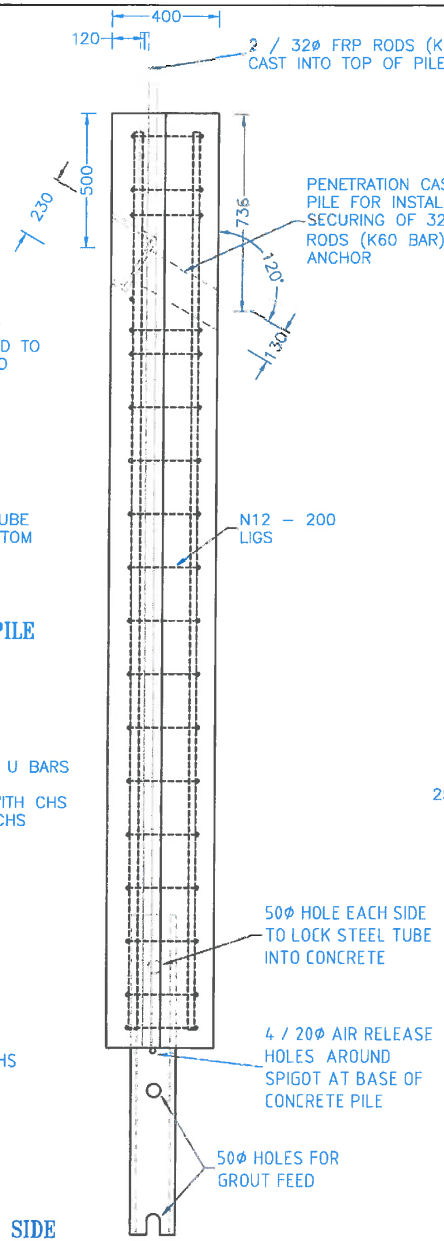
ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH RELEVANT AUSTRALIAN STANDARDS.

GROUTING NOTES FOR CONCRETE PILE:

AFTER PLACEMENT OF THE CONCRETE PILE ON THE STEEL PILE, INSERT GROUT INJECTION TUBE DOWN GROUT FEED TUBE UNTIL IT REACHES BELOW THE BOTTOM OF THE SPIGOT IN THE CHS PILE. THIS WILL RETAIN AN AIR RELEASE IN THE GROUT FEED TUBE. USE HAND PUMP TO INJECT PARCHEM COMBEXTRA UW GROUT OR APPROVED EQUIVALENT. KEEP FILLING, SLOWLY LIFTING INJECTION TUBE BUT RETAINING TREMIE PUMPING UNTIL GROUT HAS RISEN 500mm UP GROUT FEED TUBE INTO CONCRETE PILE. DIP TO CONFIRM HEIGHT. NOTE THAT THIS IS APPROXIMATELY THE LEVEL OF EQUILIBRIUM WITH OUTSIDE WATER PRESSURE. ONCE INITIAL SET IS COMPLETE FILL REMAINING GROUT FEED TUBE TO TOP OF CONCRETE PILE.



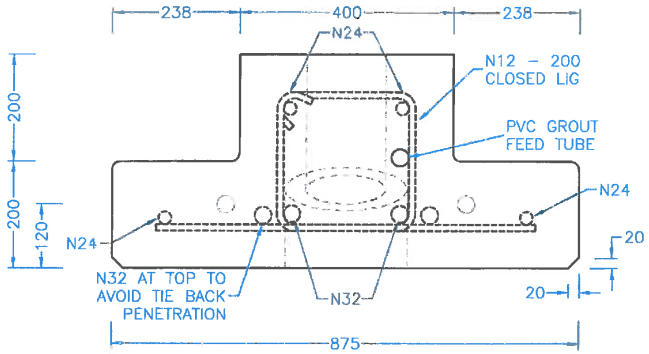
FRONT ELEVATION



SIDE ELEVATION

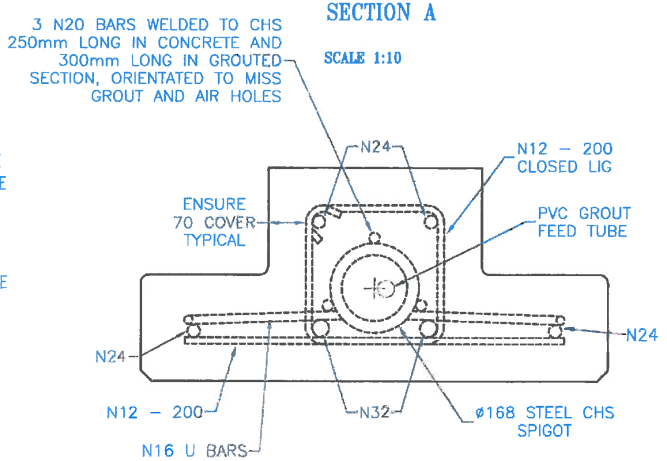
CONCRETE PILE

SCALE 1:25



SECTION A

SCALE 1:10



SECTION B

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REV	DATE	AMENDMENT	REQD
	3/11/15	PENETRATION & TIE ROD NOTE ADDED	JSP

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CHECKED:	R.P.E.Q.	DATE:
	1667	4.11.15

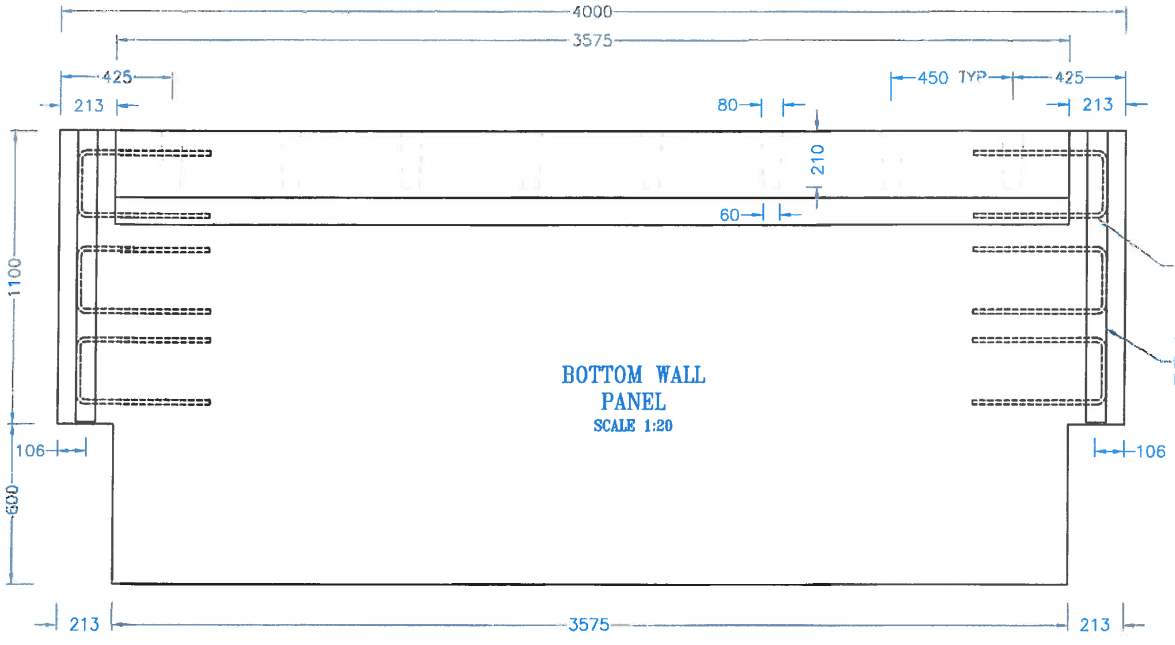
CLIENT:

PROJECT: PROPOSED REMEDIAL WORKS FOR SYLVANIA WATERS

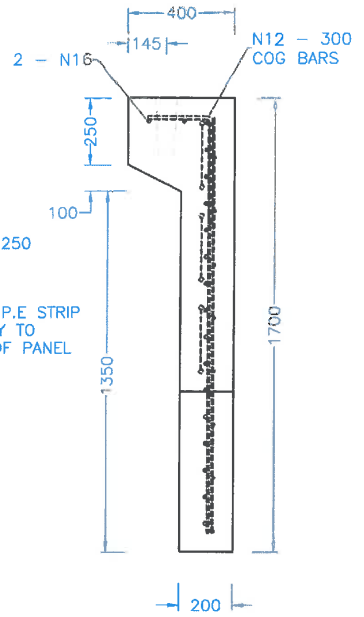
TITLE: CONCRETE PILE CONSTRUCTION DETAILS

SCALE:	DATE:	DRAWING NO:
AS SHOWN	25/9/15	JSP-CP-40618

DRAWN	CHECKED	DIMENSIONS	ISSUE	
M.A		MILLIMETRES	B	A3



FRONT ELEVATION



SIDE ELEVATION

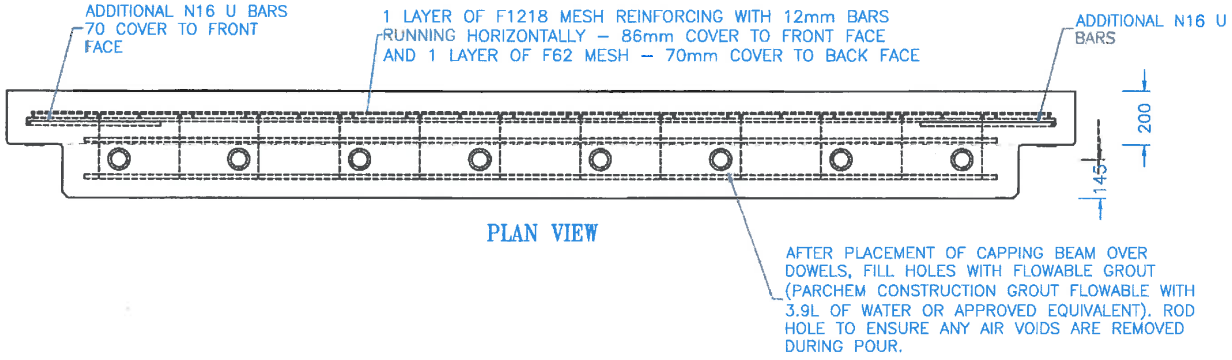
NOTE:
ALL CONCRETE TO BE 50MPa WITH QCL SEASURE CEMENT (OR EQUIVALENT) TO MANUFACTURERS SPECIFICATIONS.

70mm COVER TO REINFORCING ON ALL EXPOSED SURFACES.

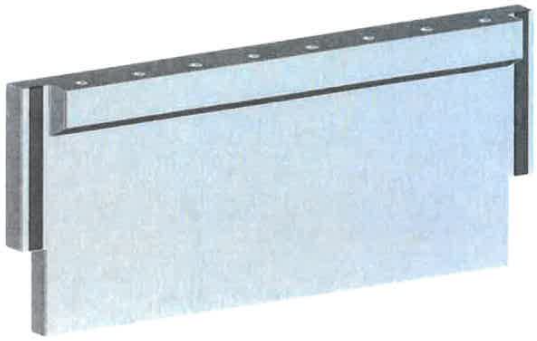
25mm COVER TO REINFORCING TO ANY SURFACES TO BE GROUT FILLED.

ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH RELEVANT AUSTRALIAN STANDARDS.

ANY WALLS TO BE INSTALLED IN HIGH CURVE AREAS WILL REQUIRE H.D.P.E BEARING STRIPS TO BE DESIGNED TO SUIT.



PLAN VIEW



PICTORIAL VIEW
NOT TO SCALE

REV	DATE	AMENDMENT	REQD

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CHECKED:	R.P.E.Q.	DATE:
	1667	4.11.15

CLIENT:

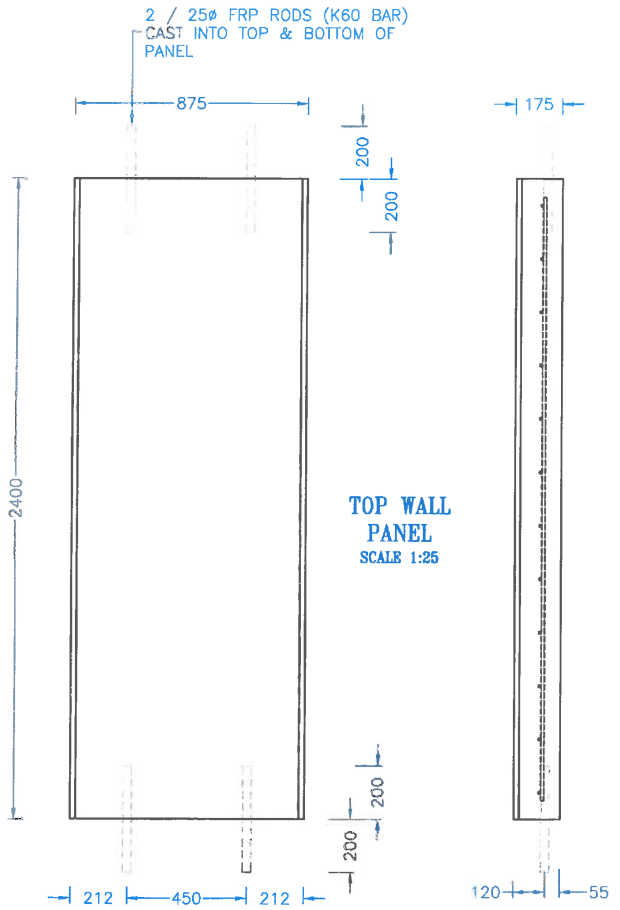
PROJECT: PROPOSED REMEDIAL WORKS FOR SYLVANIA WATERS

TITLE: BOTTOM WALL PANEL CONSTRUCTION DETAILS

SCALE:	DATE:	DRAWING NO:
AS SHOWN	25/9/15	JSP-CP-40619

DRAWN	CHECKED	DIMENSIONS	ISSUE	
M.A		MILLIMETRES	A	A3

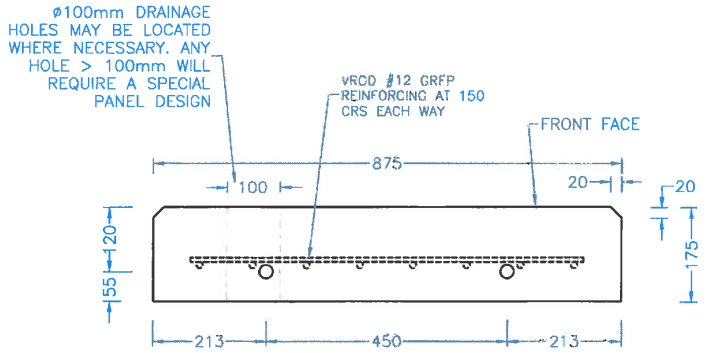
NOTE:
ALL CONCRETE TO BE 50MPa WITH QCL SEASURE CEMENT (OR EQUIVALENT) TO MANUFACTURERS SPECIFICATIONS.
40mm COVER TO REINFORCING ON ALL EXPOSED SURFACES.
25mm COVER TO REINFORCING TO ANY SURFACES TO BE GROUT FILLED.
ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH RELEVANT AUSTRALIAN STANDARDS.



TOP WALL PANEL
SCALE 1:25

FRONT ELEVATION

SIDE ELEVATION



PLAN VIEW
SCALE 1:10

PICTORIAL VIEW
NOT TO SCALE

REV	DATE	AMENDMENT	REQD

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CHECKED:	R.P.E.Q.	DATE:
	1667	4.11.15

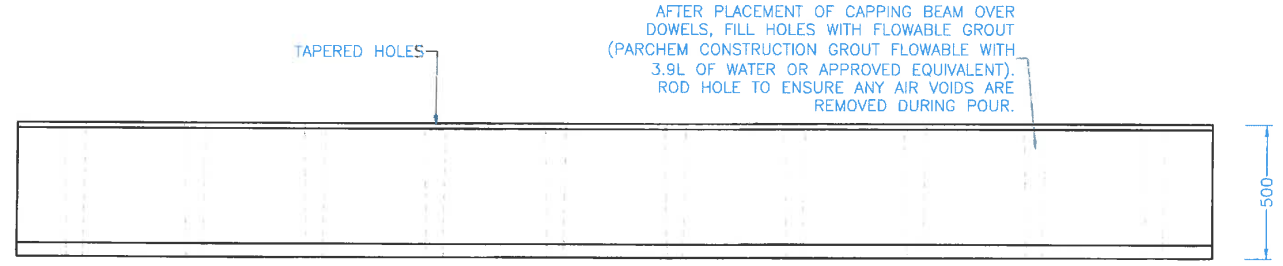
CLIENT:

PROJECT: PROPOSED REMEDIAL WORKS FOR SYLVANIA WATERS

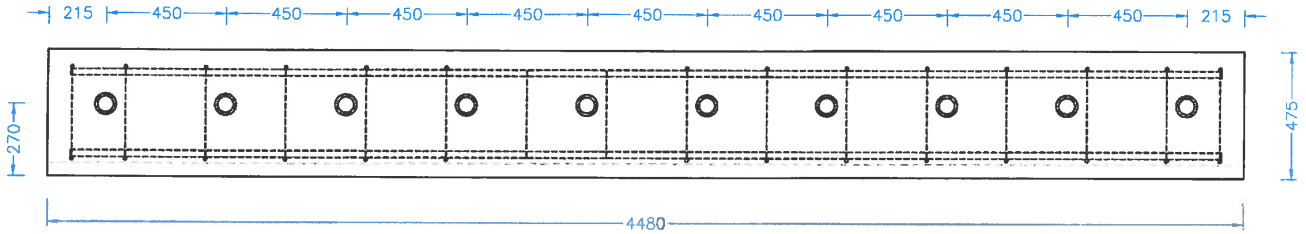
TITLE: TOP WALL PANEL CONSTRUCTION DETAILS

SCALE:	DATE:	DRAWING NO:
AS SHOWN	25/9/15	JSP-CP-40620

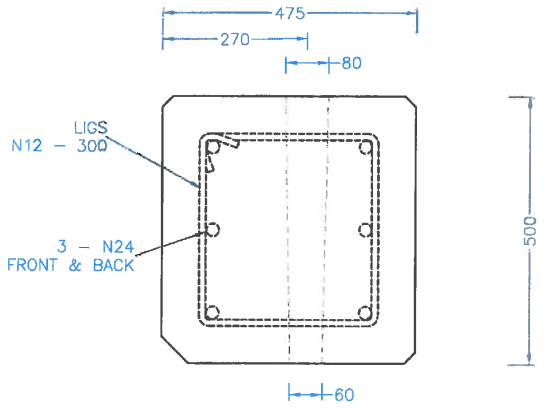
DRAWN	CHECKED	DIMENSIONS	ISSUE	
M.A		MILLIMETRES	B	A3



FRONT ELEVATION



PLAN VIEW



SIDE ELEVATION

NOTE:
ALL CONCRETE TO BE 50MPa WITH QCL SEASURE CEMENT (OR EQUIVALENT) TO MANUFACTURERS SPECIFICATIONS.
70mm COVER TO REINFORCING ON ALL EXPOSED SURFACES.
25mm COVER TO REINFORCING TO ANY SURFACES TO BE GROUT FILLED.
ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH RELEVANT AUSTRALIAN STANDARDS.
CAPPING BEAMS TO BE CONSTRUCTED WITH LONGITUDINAL CURVE TO SUIT APPROXIMATE RADIUS OF WATERFRONT BOUNDARY AT SPECIFIC PROJECT SITE.

REV	DATE	AMENDMENT	REQD

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CHECKED:	R.P.E.Q.	DATE:
	1667	4.11.15

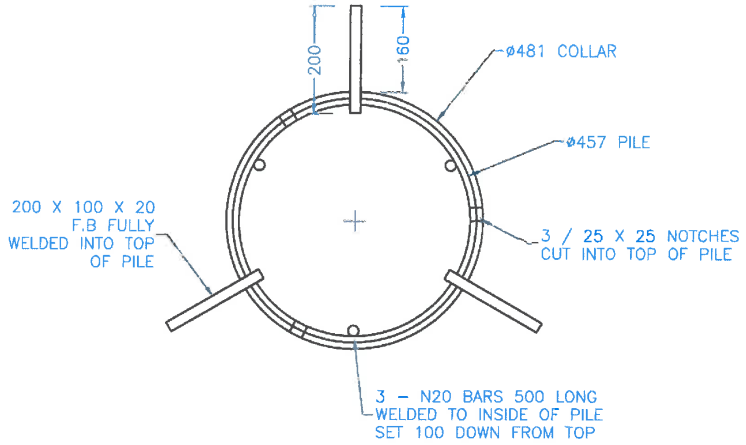
CLIENT:

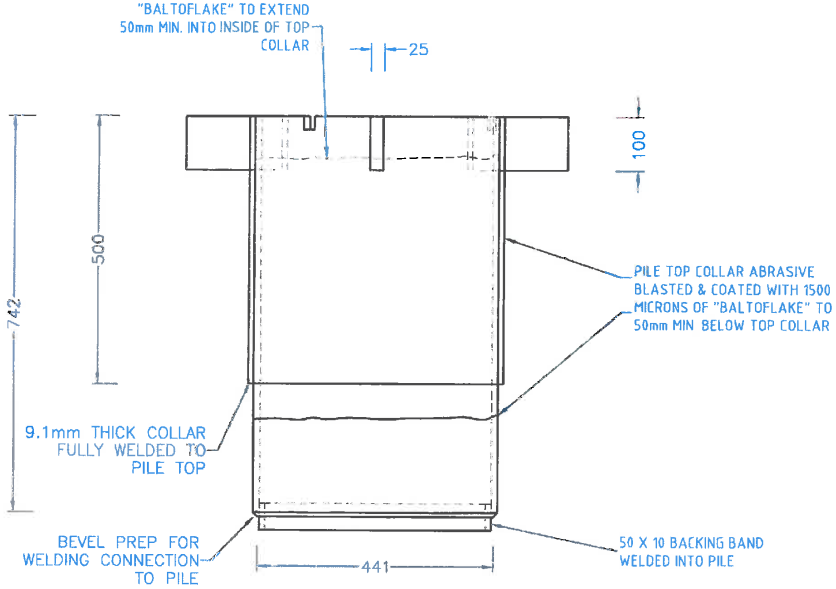
PROJECT: PROPOSED REMEDIAL WORKS FOR SYLVANIA WATERS

TITLE: CAPPING BEAM CONSTRUCTION DETAILS

SCALE:	DATE:	DRAWING NO:
AS SHOWN	25/9/15	JSP-CP-40621

DRAWN	CHECKED	DIMENSIONS	ISSUE	
M.A		MILLIMETRES	A	A3





REV	DATE	AMENDMENT	REQD

THE MARINA SPECIALIST
TRADING AS THE JETTY SPECIALIST
ACN 010633119
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Fax (07) 3369 9722
Email: cardno@cardno.com.au

CHECKED:	R.P.E.Q.	DATE:
	1667	9-11-15

CLIENT:

PROJECT: PROPOSED REMEDIAL WORKS FOR SYLVANIA WATERS

TITLE: STEEL PILE COLLAR CONSTRUCTION DETAILS

SCALE:	DATE:	DRAWING NO:
1:10	8/10/15	JSP-CP-40625

DRAWN	CHECKED	DIMENSIONS	ISSUE	
M.A		MILLIMETRES	A	A3

SYLVANIA WATERS SEAWALL
FOR
APEES MARLAN

LOCAL LOCATION MAP
NOT TO SCALE

LOCATION / PROJECT DATA

SECT TWP RNG
STATE:
COUNTY:
CITY:
LEGAL DESCRIPTION:
ALTERNATE KEY #:
SITE ADDRESS:

UTILITY OWNERS

WATER -
SEWER -
ELECTRICAL -
PHONE -

CLIENT INFORMATION

MAILING ADDRESS: Sylvania Waters
NSW 2224
Australia

PLAN STATUS

- PRELIMINARY PLANS
- FOR BIDDING ONLY
- APPROVAL / PERMITTING
- CHECK PRINT
- CONSTRUCTION PRINT
- RECORD DRAWING

Prepared by:
Crystal Engineering International
E.B. # 8572
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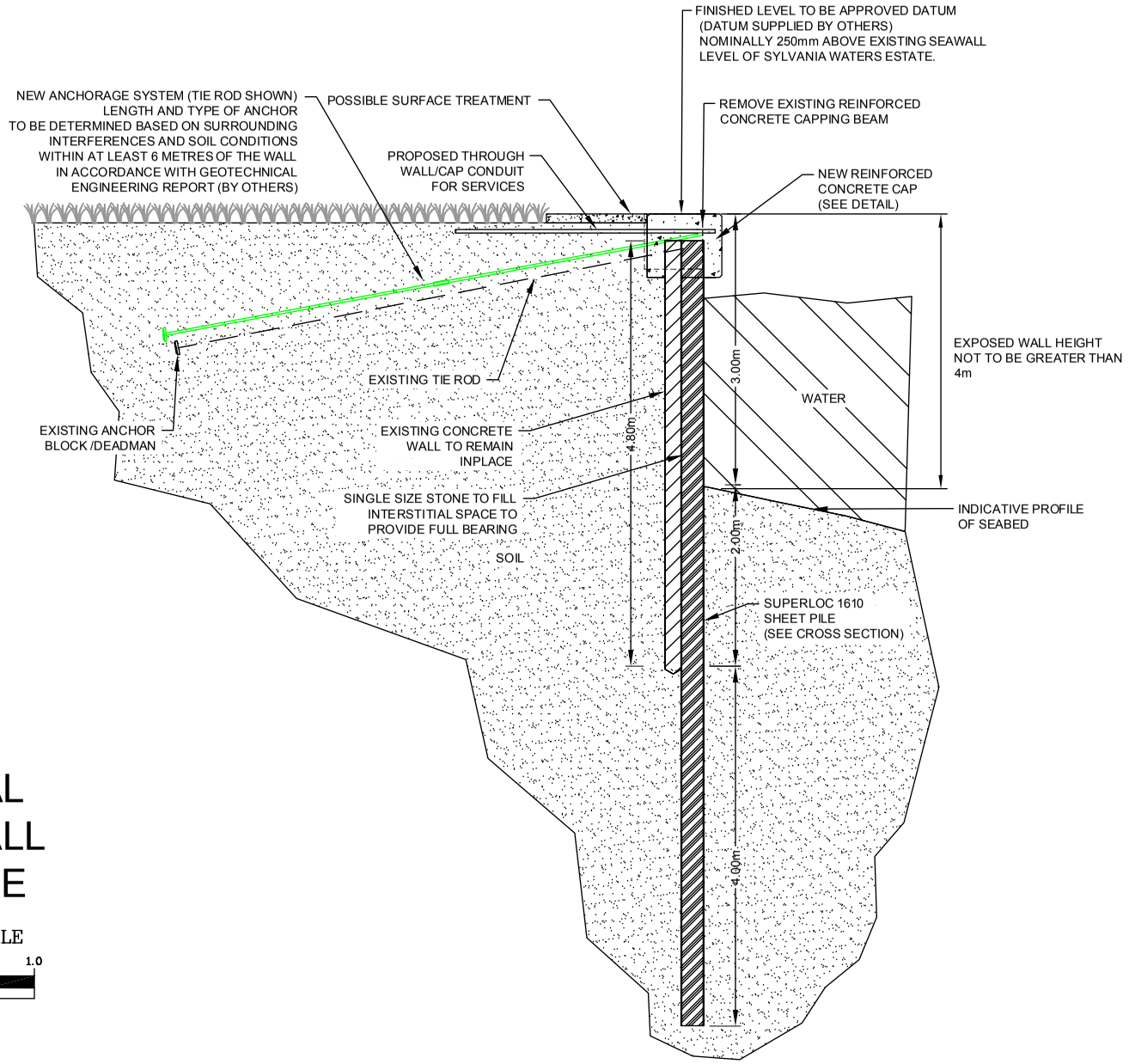
Crystal River, Florida 34428
Phone: 352.795.6777
Fax: 352.795.7758

SYLVANIA WATERS SEAWALL
1010021



TYPICAL SEAWALL PROFILE

GRAPHIC SCALE

1.0 0 0.5 1.0

(IN METERS)

Wayne O. Walker, P.E.
53507
Crystal Engineering International
E.B.#8672

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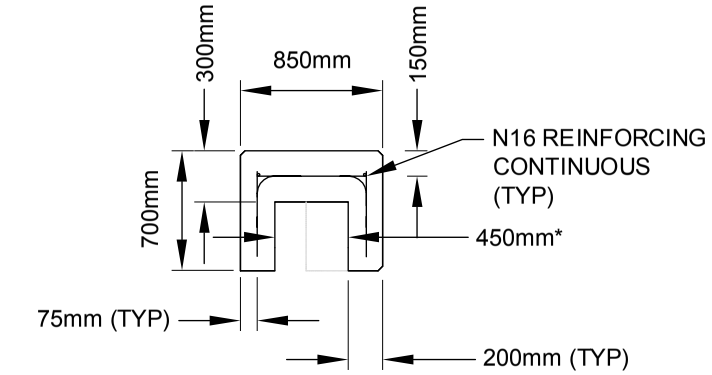
Crystal Engineering International

REV	DATE	COMMENT
A	26/11/10	ISSUED AS "SEE REPLACED WITH AS "SEE SHEET PILE

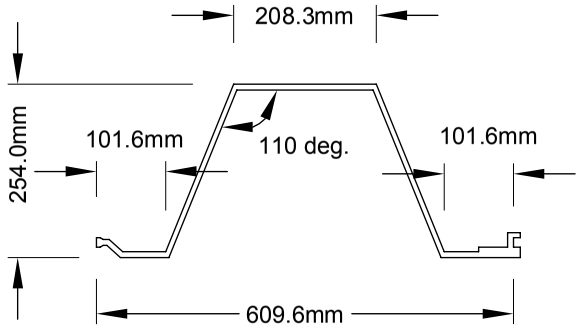
TYPICAL SEAWALL PROFILE

SYLVANIA WATERS CONCEPT PLAN
FOR
APEES MARLAN
SYDNEY, AUSTRALIA

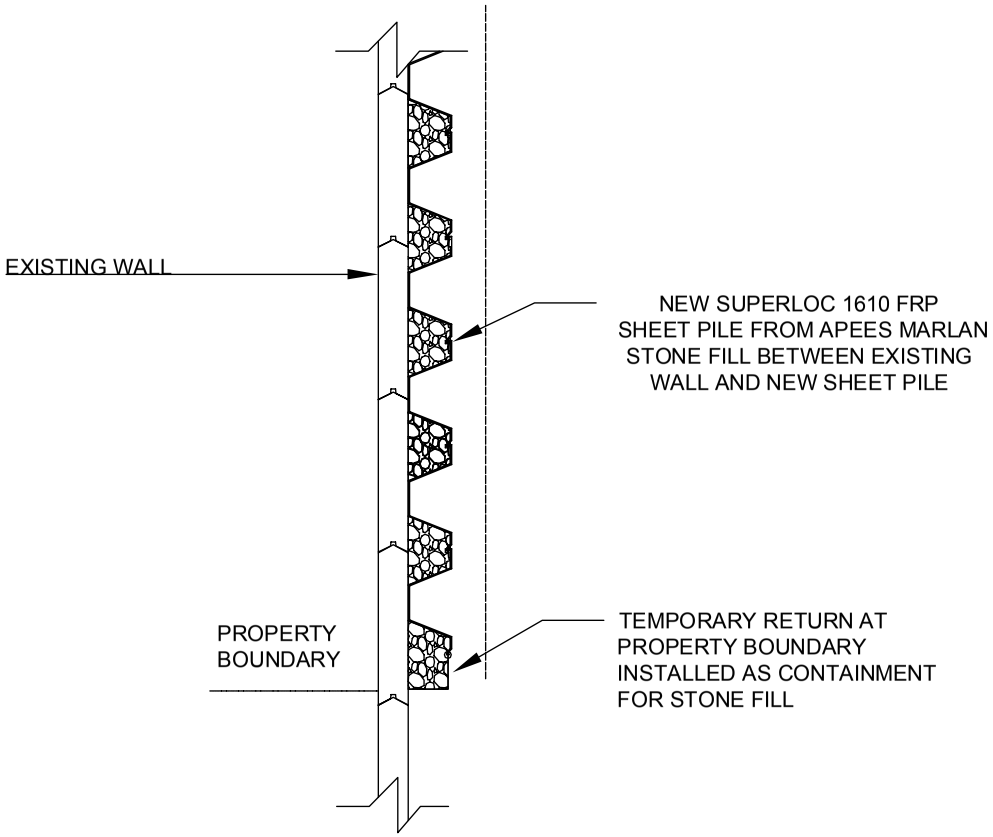
SCALE:	N.T.S.
DRAWN BY:	MFW
DESIGNED BY:	WOW
CHECKED BY:	WOW
START DATE:	OCT 2010
PROJECT NUMBE	1009021
SHEET NUMBER:	1



NOTES:
* ESTIMATED WIDTH.
ACTUAL = THICKNESS OF
THE EXISTING WALL PLUS
SHEET PILE (200mm).
1. N16 STIRRUPS SPACING
VARIES W/ N16 STRAIGHTS
EACH CORNER AND END
2. CONCRETE TO BE
SPECIFIED FOR MARINE USE



SUPERLOC 1610 FRP
SHEET PILE FROM
APEES MARLAN
CROSS SECTION
NTS



STONE FILL DETAIL /
WALL CROSS SECTION
NTS

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REV	DATE	COMMENT
A	2/8/11	ADDED SL 1610 REPLACED WITH SL 1610 SHEET PILE

DETAILS

SYLVANIA WATERS CONCEPT PLAN
FOR
APEES MARLAN
SYDNEY, AUSTRALIA

SCALE:	N.T.S.
DRAWN BY:	MFW
DESIGNED BY:	WOW
CHECKED BY:	WOW
START DATE:	OCT 2010
PROJECT NUMBE	1009021
SHEET NUMBER:	2

NOTES:

General

1. This set of drawings are submitted for the purpose of a concept design for the 365 residential seaside properties of Sylvania Waters Estate (Sydney, NSW Australia) replacement of the existing concrete panel seawall with APEES Marlan FRP seawall to obtain a Complying Development Certificate.
2. These drawings, each individual drawing of the set and all details and notes o n each drawing of the set are the property of APEES Marlan and cannot be copied in full or part, issued, forwarded or in any way distributed to other persons, organisations, institutions, companies, associations, partnerships or the like without the express written approval of APEES Marlan and the Engineer.
3. This set of drawings, or any individual drawing of the set or any detail on a drawing of the set cannot be used for construction.
4. This set of drawings, or any individual drawing of the set or any detail on a drawing of the set cannot be used for any other purpose.

Concept Design

Geotechnical Information

5. These drawings are based on the information provided by Douglas Partners Geotechnical Engineers, *Report on Desk Study Review Proposed Seawalls Sylvania Waters Project 72180 dated issued 20 December 2010 revision 0*.
6. Generalised Soil Profile:
   - Filling - Highly variable, dredged sands, shells and some clay, in loose to dense and very dense states.
   - Estuarine Deposits - A loose and soft sand/clay deposits becoming stiff and very stiff sandy clay with depth, in places. Liquefaction during installation by vibration of new wall may be encountered.
   - Sandstone / Bedrock - anticipated between 5m to over 25m deep and comprises very low and low sandstone grading to medium strength or greater with depth
7. Earth Pressure Coefficients for filling profile
   - Active Lateral 0.35
   - Passive 2.50
8. The dredged filling contains Acid Sulphate Soils.
9. Ground water can be expected to be encountered between depths of 1.5m to 2.5m and are typically close to the tide level and may be tidally influenced.

Sheet Pile System

10. Sheet piles are to be APEES Marlan SuperLoc 1610 fibre reinforced polymer (FRP) sheet piles.
11. Capping beam is reinforced concrete integrating anchorage points for tie rods or other anchorage system.
12. Detailed Engineering Design of tie rods, or other anchorage system will be required in each individual case.
13. Stone fill used between existing wall and new FRP system to obtain full bearing may allow for migration of a small amount of fines from behind existing walls that are damaged. Should this occur subsidence behind the wall will require minor maintenance until the wall system stabilizes.
14. Wall design expected with current known parameters to be accomplished with FRP sheets that do not exceed 12 meters in length.

Detailed Design

15. Detailed design drawings by APEES Marlan are required for each individual property. The following identifies the minimum requirements.
16. Geotechncial site investigations and reporting by APEES Marlan are required for each individual property.
17. Topographical and (where necessary) Bathymetric site surveys by APEES Marlan are required for each individual property.
18. For each individual property, based on site investigations and survey, the detailed design will determine length of wall, depth of sheeting, number of anchors, types of anchors, length of anchors, end condition of sheet pile wall to property boundary, end condition of capping beam to property boundary, site specific considerations and construction methodology.
19. The finished level of every property seawall is to be the same, the level will be based on a Datum to be supplied by others. The alignment of the new seawalls will follow that of the existing.
20. Detailed design drawings will provide construction information.

Construction

21. A basic, not necessarily comprehensive, construction method is laid out below. Each individual property will need to be assessed and a construction method developed to suit each individual property.
    - Clear the work area of all surface finishes, boundary walls, fences, fixtures, seaside pontoons and the like.
    - Install temporary supports to the existing concrete seawall panels.
    - Remove existing anchorages and capping beams to property.
    - Install anchors to existing capping beams at the newly created ends.
    - Capture any fallen or remove any loose existing concrete seawall panelling. Remove all sections of panelling which may interfere with driving of FRP sheet piling.
    - Drive FRP sheet piling to finished level outboard but as close as possible to existing concrete seawall panels or otherwise to that alignment.
    - Install anchorage system.
    - Form, reinforce and pour concrete to new capping beam.
    - Secure anchorage.
    - Clear site of construction materials.
    - Reinstate surfacing, walls, fixtures, furniture and seaside elements.

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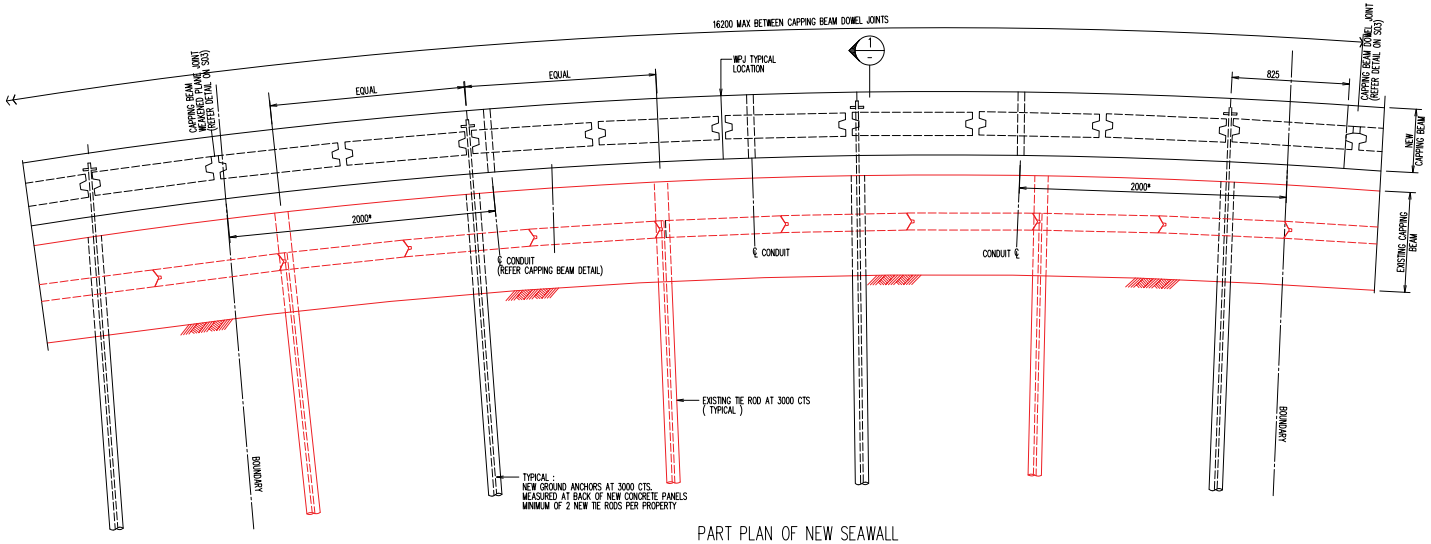
Crystal Engineering International

REV	DATE	COMMENT
A	28/11/11	ISSUED AS "ISSUED FOR REPLACED WITH AS "AFD SHEET PILE

NOTES

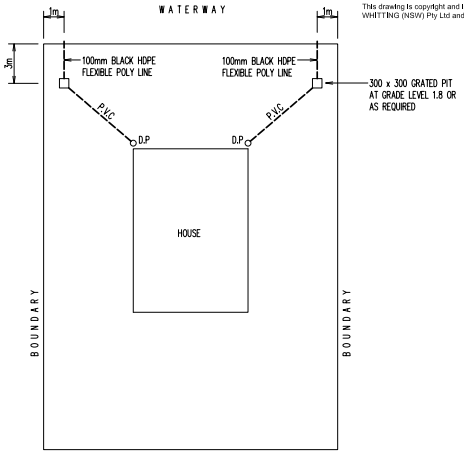
SYLVANIA WATERS CONCEPT PLAN
FOR
APEES MARLAN
SYDNEY, AUSTRALIA

SCALE:	N.T.S.
DRAWN BY:	MFW
DESIGNED BY:	WOW
CHECKED BY:	WOW
START DATE:	OCT 2010
PROJECT NUMBE	1009021
SHEET NUMBER:	3



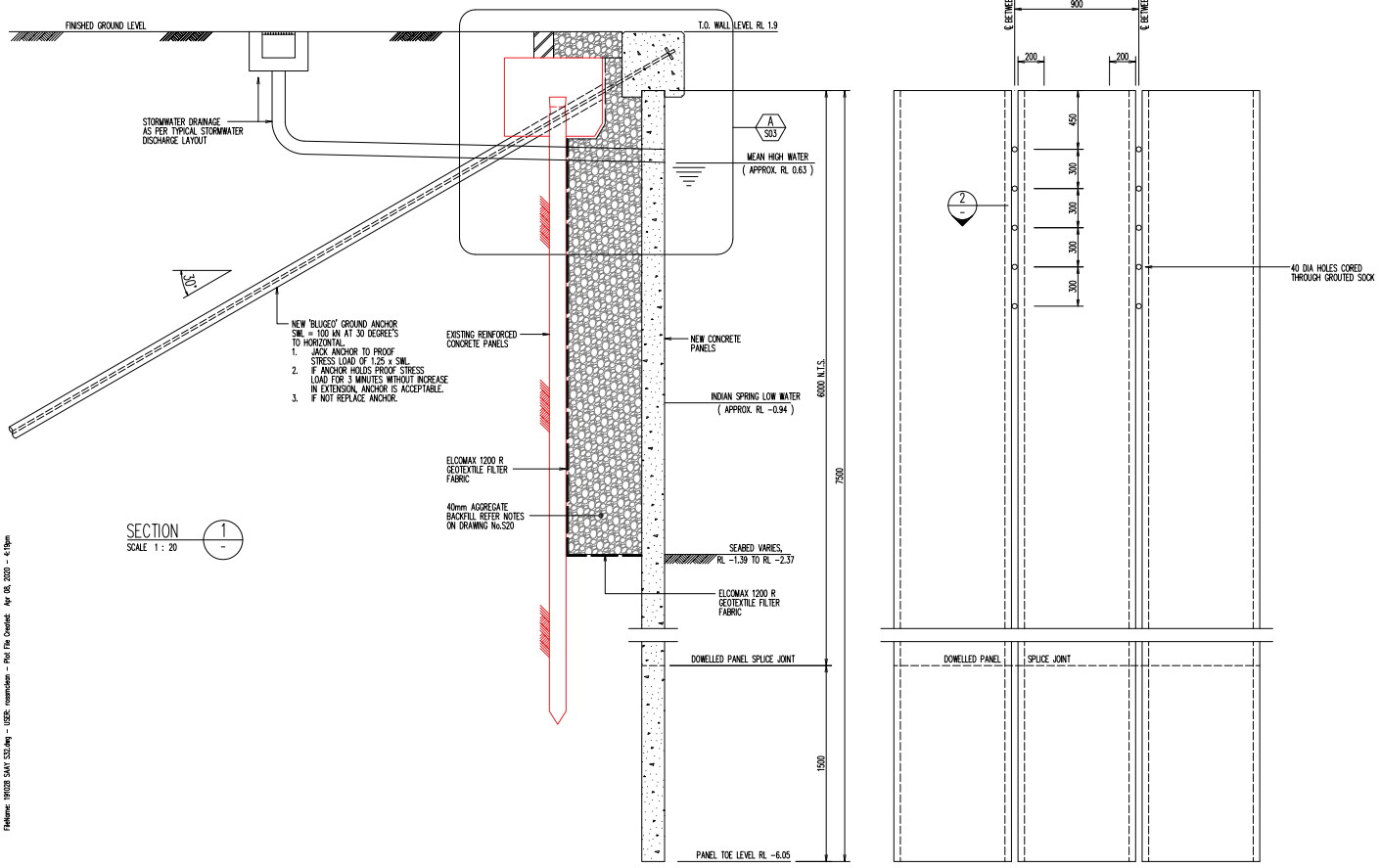
PART PLAN OF NEW SEAWALL

SCALE 1 : 20
EXISTING SEAWALL SHOWN IN RED
* DENOTES APPROXIMATE LOCATION OF SERVICE CONDUITS CONFIRM LOCATIONS WITH SYLVANIA WATERWAYS LTD PRIOR TO CONSTRUCTION.



TYPICAL STORMWATER DISCHARGE LAYOUT

NOT TO SCALE

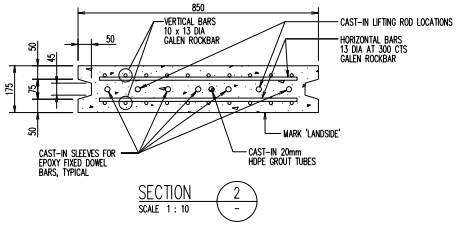


SECTION 1

SCALE 1 : 20

TYPICAL ELEVATION OF CONCRETE PANELS

SCALE 1 : 20



SECTION 2

SCALE 1 : 10

Rev	Description	Eng	Draft	Date
P1	PRELIMINARY	S.S	RMcL	08.04.20

Project

SEAWALL UPGRADE SYLVANIA WATERS (7.5m PANELS)

Sheet Subject

NEW SEAWALL (OPTION 2) - PLAN, SECTION & DETAILS SHEET 1

Client

SYLVANIA WATERWAYS LTD

Engineer

TTW Structural Civil Traffic Façade

612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

Scale : A1	Drawn	Authorised
1:20, 10	R McL	S.S

Job No	Drawing No	Revision
191028 SAAY	S32	P1

Plot File Created: Apr 08, 2020 - 4:19pm

PRELIMINARY

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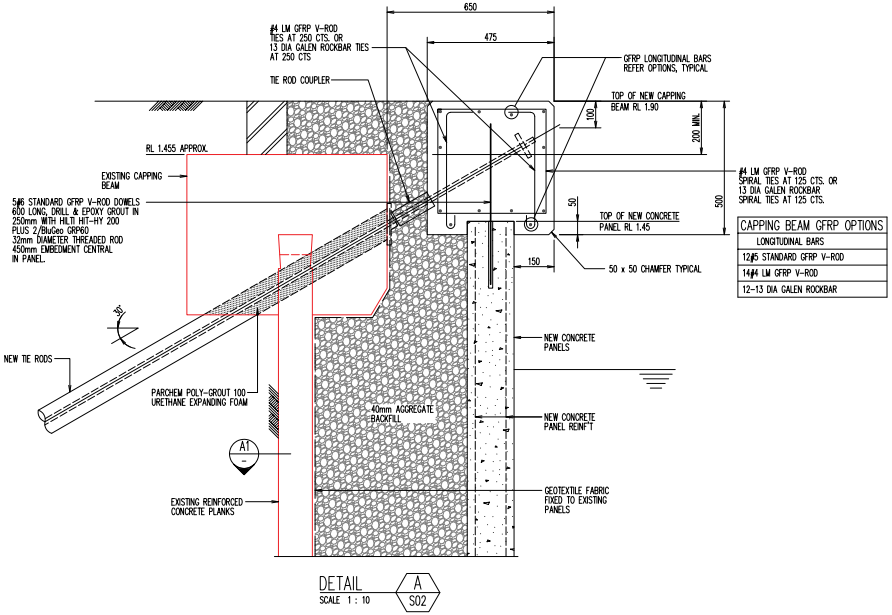
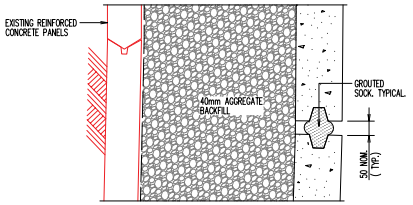


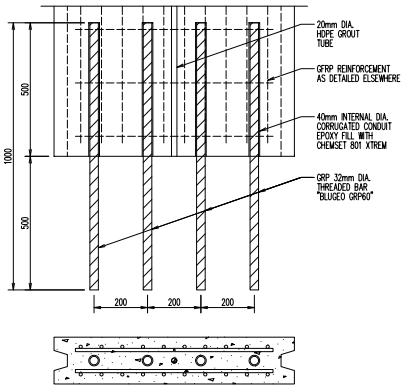
CAPPING BEAM GFRP OPTIONS
LONGITUDINAL BARS
12#5 STANDARD GFRP V-ROD
14#4 LM GFRP V-ROD
12-13 DIA GALEN ROCKBAR

DETAIL A S02
SCALE 1 : 10

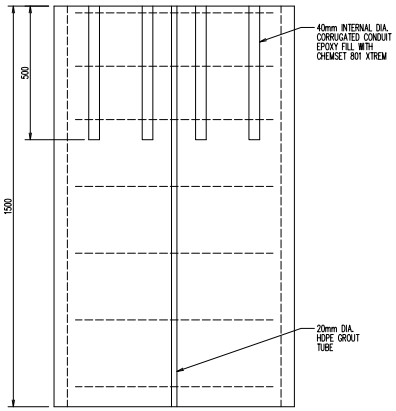
NOTE :
CAPPING BEAM FORMWORK TO BE WATERTIGHT TO PREVENT LOSS OF SLURRY DURING CONCRETE PLACEMENT



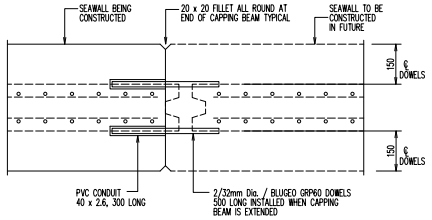
SECTION A1
SCALE 1 : 10



CROSS SECTION

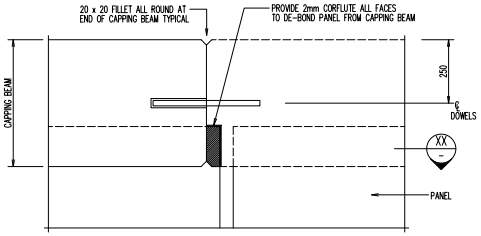


PRECAST PANEL EXTENSION DOWELLED PANEL SPLICE JOINT DETAIL



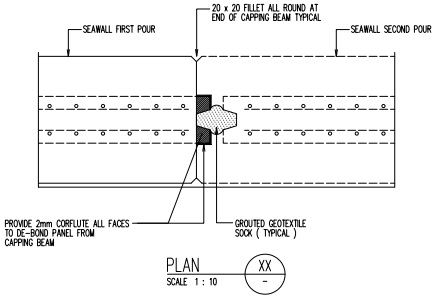
CAPPING BEAM DOWEL JOINT - PLAN

SCALE 1:10
(REINFORCEMENT NOT SHOWN FOR CLARITY)

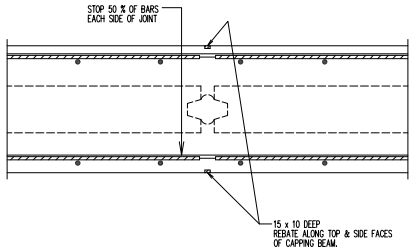


CAPPING BEAM DOWEL JOINT - ELEVATION

SCALE 1:10
(REINFORCEMENT NOT SHOWN FOR CLARITY)



PLAN XX
SCALE 1 : 10



W.P.J. - WEAKENED PLANE JOINT PLAN

1. PROVIDE A WPJ MIDWAY BETWEEN DOWEL JOINTS TYPICAL.
2. WPJ TO BE LOCATED AT 1/3 POINTS BETWEEN ANCHORS ON A WALL PANEL JOINT.

PRELIMINARY

Rev	Description	Eng	Draft	Date
P1	PRELIMINARY	S.S	RMcL	08.04.20

Project
SEAWALL UPGRADE
SYLVANIA WATERS
(7.5m PANELS)

Sheet Subject
NEW SEAWALL (OPTION 2) - DETAILS SHEET 2

Client
SYLVANIA WATERWAYS LTD

Engineer
TTW Structural Civil Traffic Façade
612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

Scale : A1	Drawn	Authorised
1:10	R McL	S S

Job No	Drawing No	Revision
191028 SAAY	S33	P1

Plot File Created: Apr 08, 2020 - 4:19pm

A1 0 1 2 3 4 5 6 7 8 9 10

TTW Structural Civil Traffic Façade

Document Issue Transmittal

Project: Sylvania Waters
1 Barcoo Island

Page: 1 of 1

Date: 8/04/2020

Job No.: 191028 SAAY

Issue No.: 3

Reason for Issue: Co-ordination

Sent Via:

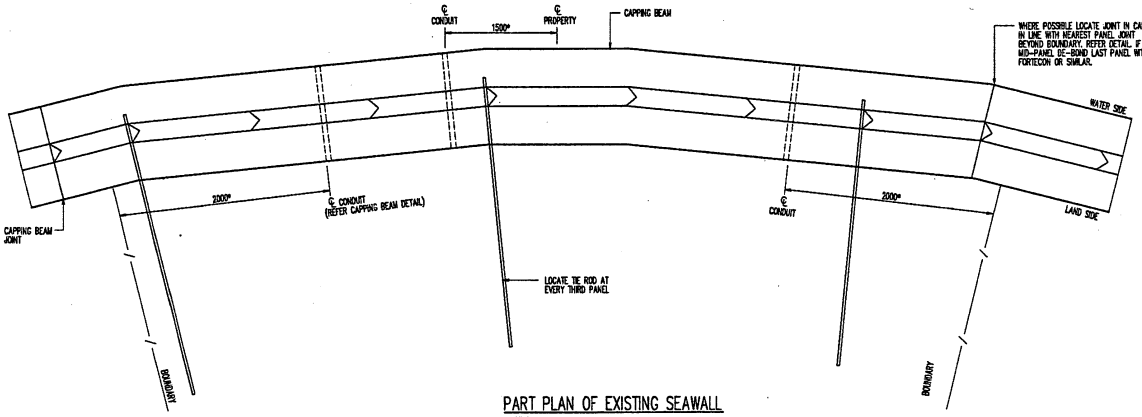
Distribution	Attention

Total number of drawings: 2

Drawing No.	Title	Issue
S32	NEW SEAWALL (OPTION 2) - PLAN, SECTION & DETAILS SHEET 1	P1
S33	NEW SEAWALL (OPTION 2) - DETAILS SHEET 2	P1

SENT BY: SCHUETZE S

Taylor Thomson Whitting (NSW) Pty Ltd (ACN 113 578 377)
as trustee for the Taylor Thomson Whitting NSW Trust
(ABN 59 514 956 558) | Consulting Engineers
Level 3, 48 Chandos Street St Leonards NSW 2065

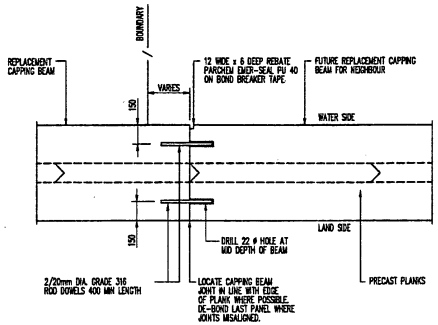


PART PLAN OF EXISTING SEAWALL

SCALE 1:20

*DENOTES APPROXIMATE LOCATION OF SERVICE CONDUITS CONFIRM LOCATIONS WITH SWL PRIOR TO CONSTRUCTION.

NOTE: ALL CAST–INS & MASONRY ANCHORS CONNECTED TO CAPPING BEAM OR PANELS TO BE STAINLESS STEEL.



CAPPING BEAM JOINT DETAIL – PLAN VIEW

SCALE 1:20

PROVIDE REBATE AND SEALANT ON TOP AND WATER FACES OF CAPPING BEAM JOINT.

NOTE: ALL REINFORCEMENT TO BE HOT DIP GALVANIZED.

CONCRETE NOTES

EXPOSURE CLASSIFICATION : C

CONCRETE

1. Place concrete of the following characteristic compressive strength f'c as defined in AS 1379.

	AS 1379 f'c MPa at 28 days	Specified Slump	Nominal Agg. Size
ALL U.N.O.	S(50) *	80	20

CONCRETE TO COMPLY WITH CHEMICAL CONTENT PROVISIONS OF AS5100

2. Use Type "SL" cement, unless otherwise specified.
3. All concrete shall be subject to project assessment and testing to AS 1379.
4. Consolidate by mechanical vibration. Cure all concrete surfaces as directed in the Specification.
5. For all fills in slab, drip grooves, reglets, chamfers etc. refer to Architects drawings and specifications.
6. Unless shown on the drawings, the location of all construction joints shall be submitted to Engineer for review.
7. No holes or chases shall be made in the slab without the approval of the Engineer.
8. Conduits and pipes are to be fixed to the underside of the top reinforcement layer.
9. Slurry used to lubricate concrete pump lines is not to be used in any structural members.

FORMWORK

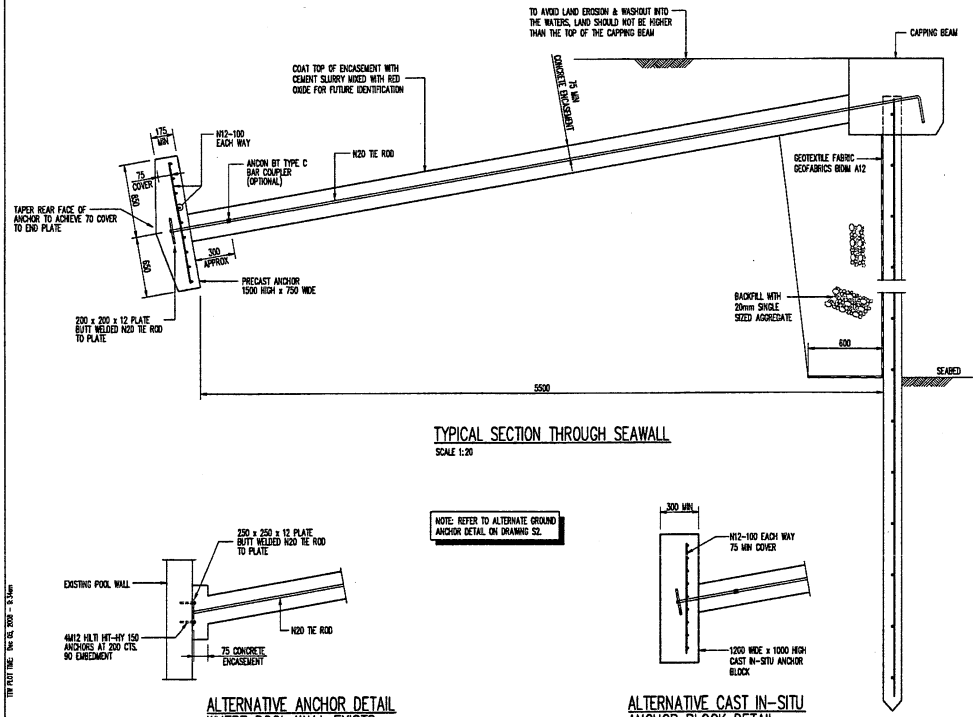
1. The design, certification, construction and performance of the formwork, falsework and backpropping shall be the responsibility of the contractor. Proposed method of installation and removal of formwork is to be submitted to the superintendent for comment prior to work being carried out.

REINFORCEMENT NOTES

1. Fix reinforcement as shown on drawings. The type and grade is indicated by a symbol as shown below. On the drawings this is followed by a numeral which indicates the size in millimetres of the reinforcement.

N. Hot rolled ribbed bar	grade D500N
R. Plain round bar	grade R250N
SL. Square mesh	grade 500L
RL. Rectangular mesh	grade 500L

2. Provide plastic bar supports or spacers to give concrete cover to all reinforcement as noted on drawings.
3. Cover to reinforcement ends to be 45 mm u.n.o.
4. Maintain cover to all pipes,conduits,reglets,drip grooves etc
5. Laps in reinforcement shall be made only where shown on the drawings unless otherwise approved. Lap lengths shall be 40 bar dia. unless noted otherwise.
6. All cogs to be standard cogs unless noted otherwise.



TYPICAL SECTION THROUGH SEAWALL

SCALE 1:20

NOTE: REFER TO ALTERNATE GROUND ANCHOR DETAIL ON DRAWING S2.

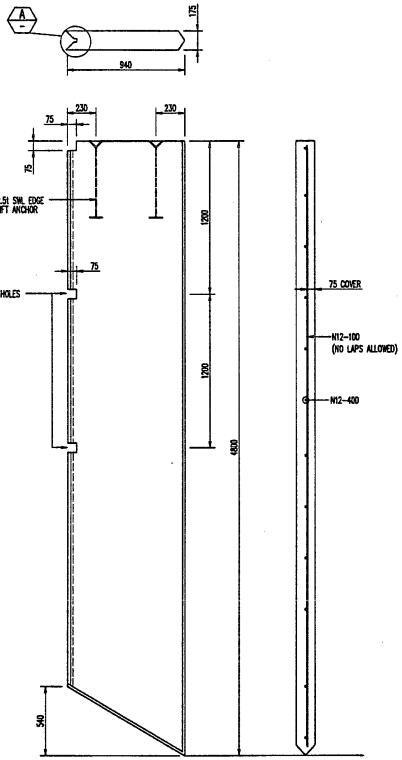
ALTERNATIVE ANCHOR DETAIL WHERE POOL WALL EXISTS

SCALE 1:20

ALTERNATIVE CAST IN–SITU ANCHOR BLOCK DETAIL

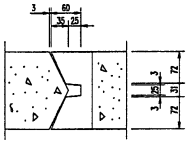
SCALE 1:20

REFER TO TYPICAL SECTION THROUGH SEAWALL FOR ALL OTHER DETAILS



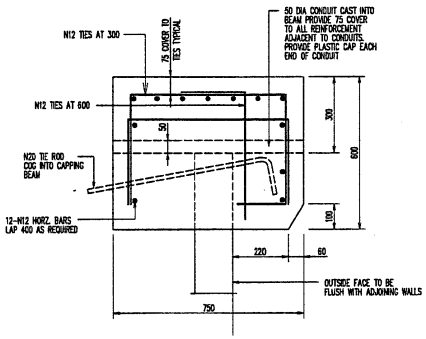
REPLACEMENT PLANK DETAIL

SCALE 1:20



DETAIL A

SCALE 1:5



REPLACEMENT CAPPING BEAM DETAIL

SCALE 1:10

No	AMENDMENT	ENG	DRAFT	DATE
B	ISSUED FOR CONSTRUCTION	DC	ML	05.12.08
A	ISSUED FOR REVIEW	DC	ML	17.10.08

PROJECT
SYLVANIA WATERS SEAWALL

SHEET SUBJECT
SYLVANIA WATERS SEAWALL RECTIFICATION DETAILS SHEET 1

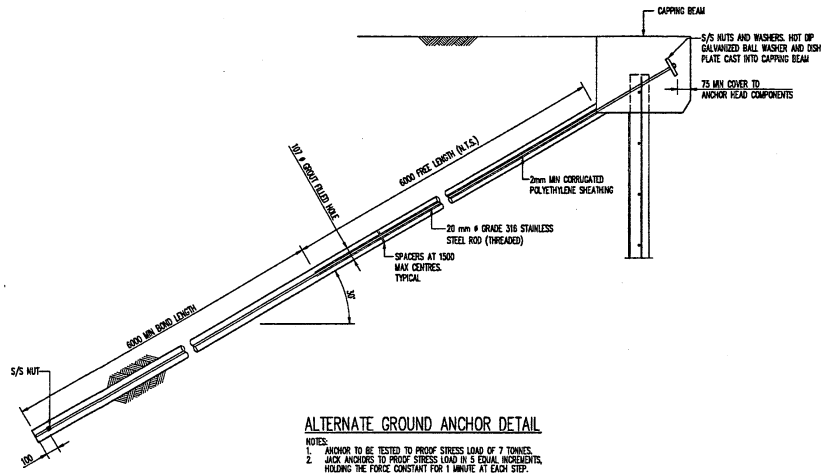
SYLVANIA WATERS LTD

TAYLOR THOMSON WHITTING
PTY. LTD. Incorporated in N.S.W. A.C.N. 001 282 711
CONSULTING, STRUCTURAL & CIVIL ENGINEERS
48 CHANDOS STREET ST.LEONARDS NSW 2065
PHONE 9439 7288 FAX 9439 3146 EMAIL postmaster@tte.net.au

SCALE	JOB No	
AS SHOWN	081002	
AUTHORISED D Conlan	DRG No S1	REV B

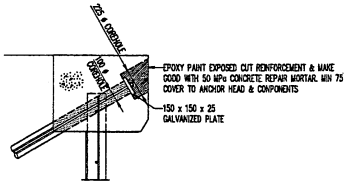
TTW PLOT TIME: Dec 05, 2008 - 8:24am

A1 0 1 2 3 4 5 6 7 8 9 10



ALTERNATE GROUND ANCHOR DETAIL

NOTES:
1. ANCHOR TO BE TESTED TO PROOF STRESS LOAD OF 7 TONNES.
2. JACK ANCHORS TO PROOF STRESS LOAD IN 5 EQUAL INCREMENTS, HOLDING THE FORCE CONSTANT FOR 1 MINUTE AT EACH STEP.
3. AT THE PROOF STRESS LOAD HOLD THE FORCE FOR 10 MINUTES AND RECORD THE ACTUAL EXTENSIONS.
4. IF EXTENSION CONTINUES, HOLD TEST FORCE CONSTANT UNTIL EXTENSION CEASES OR ANCHOR FAILS.
5. REPLACE FAILED ANCHORS AND RETEST REPLACEMENT ANCHORS.



GROUND ANCHOR REPLACEMENT IN EXISTING CAPPING BEAM DETAIL

GROUND ANCHORS NOTES

1. The design, supply, installation and tensioning of ground anchors shall be carried out in compliance with the relevant Australian Standards.
   Anchorage lengths and curing times shall be determined by the contractor and shall remain the contractor's responsibility.
2. Anchor holes should be thoroughly cleaned and the bond grout should be allowed to cure before proof stressing.
3. Grouting shall conform to the requirements of AS 3500 and The Concrete Institute "Recommended Practice For Grouting 1982". The grout mix shall have a water/cement ratio of no greater than 0.45 by weight
4. For proof stressing loads refer to the Specification.
5. Records of all anchor extensions and test loadings are to be submitted to TTW for review.
6. All anchors shall be located so as to avoid all services and pits etc.The contractor is to determine the location of all services etc prior to installation of anchors.
7. Any variation in location or inclination of anchors shall be submitted to TTW for approval.

No	AMENDMENT	ENG	DRAFT	DATE
B	ISSUED FOR CONSTRUCTION	DC	ML	05.12.08
A	ISSUED FOR REVIEW	DC	ML	17.10.08

PROJECT
SYLVANIA WATERS SEAWALL

SHEET SUBJECT
SYLVANIA WATERS SEAWALL
RECTIFICATION DETAILS SHEET 2

SYLVANIA WATERS LTD

TAYLOR THOMSON WHITTING
PTY. LTD. Incorporated in N.S.W. A.C.N. 001 252 711
CONSULTING, STRUCTURAL & CIVIL ENGINEERS
48 CHANDOS STREET STLEONARDS NSW 2065
PHONE 9439 7288 FAX 9439 3140 EMAIL postmaster@ttw.net.au

SCALE	JOB No	
AS SHOWN	081002	
AUTHORISED	DRG No	REV
D Canlan	S2	B

PILE DESIGN SOLUTIONS

J STEEL Australasia

SEAWALL REPLACEMENT
30-34 ROPER CRESCENT
SYLVANIA WATERS, NSW 2224

GENERAL NOTES

G1. FOR THESE DRAWINGS AND NOTES "PDS" DENOTES "PILE DESIGN SOLUTIONS PTY LTD"

G2. THE "WORKS" DENOTES ALL ITEMS DESIGNED BY PDS AS SHOWN ON THE DRAWINGS.

G3. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE EXISTING SERVICES DRAWINGS, SERVICES DIVERSION DRAWINGS, SURVEYS AND DBYD (DIAL BEFORE YOU DIG) DRAWINGS.

G4. UNLESS OTHERWISE NOTED, ALL LEVELS ARE GIVEN IN METRES AND ALL DIMENSIONS ARE IN MILLIMETERS. REDUCED LEVELS (RL'S) ARE REFERENCED TO AUSTRALIAN HEIGHT DATUM.

G5. INDICATIVE LOCATION OF SHEET PILE WALL SHOWN ONLY. NO DIMENSIONS ARE TO BE OBTAINED BY SCALING FROM DRAWINGS.

G6. ALL MATERIALS, WORKMANSHIP AND TOLERANCES SHALL BE IN ACCORDANCE WITH AUSTRALIAN STANDARDS AND CODES OF PRACTICE EXCEPT WHERE VARIED BY THE DRAWINGS. THE APPLICABLE STANDARDS SHALL BE THE REFERENCED STANDARDS CURRENT AT DATE OF DRAWING ISSUE. THE DESIGN HAS BEEN CARRIED OUT BASED ON THE WORKS BEING CARRIED OUT BY A COMPETENT EXPERIENCED CONTRACTOR WITH ADEQUATE SUPERVISION.

G7. THE CONTRACTOR SHALL ENSURE ALL WORKS ARE CARRIED OUT IN A MANNER THAT WILL NOT CAUSE ANY DAMAGE TO ADJACENT PROPERTIES, SERVICES, ROADS AND/OR UTILITIES.

G8. A DILAPIDATION SURVEY OF ADJACENT PROPERTIES AND STRUCTURES IS REQUIRED IMMEDIATELY PRIOR TO THE COMMENCEMENT OF THE WORKS. COMPARISON DILAPIDATION SURVEY IS REQUIRED TO BE UNDERTAKEN AT THE COMPLETION OF THE WORKS.

G9. ALL SITE RECORDS RELATED TO THE WORKS SHALL BE SUBMITTED TO PDS ON A WEEKLY BASIS FOR REVIEW.

G10. THE CONTRACTOR SHALL ENSURE A SERVICES SEARCH HAS BEEN CARRIED OUT, AND THAT ALL EXISTING STRUCTURES, SERVICES (INCLUDING REDUNDANT SERVICES) AND UTILITIES ARE LOCATED PRIOR TO COMMENCEMENT OF WORKS. THE ACCURACY OF THIS INFORMATION SHOULD BE VERIFIED AS NECESSARY BEFORE WORK COMMENCES ON SITE.

G11. CONTRACTOR TO REVIEW LOCATIONS OF SERVICES AND UTILITIES AND TO IMPLEMENT PROTECTION AND AVOIDANCE METHODS TO ENSURE NO DAMAGE OCCURS IN THE PROCESS OF CARRYING OUT THE WORKS.

G12. ANY DISCREPANCIES OR NON-COMPLIANCE WITH THE DRAWINGS SHALL BE REFERRED TO PDS FOR CLARIFICATION.

G13. PDS REQUIRES 48 HOURS NOTICE OF ANY INSPECTION REQUIRED.

G14. PDS HAS RELIED ON THE ACCURACY OF THE GEOTECHNICAL INVESTIGATION BY JK GEOTECHNICS PTY LTD REF 25828L DATED 20 JULY 2012 FOR DETERMINING SUBSURFACE CONDITIONS.

G15. PDS SHALL BE NOTIFIED IMMEDIATELY IF SUBSURFACE GROUND CONDITIONS ENCOUNTERED ON SITE DIFFER FROM THE GEOTECHNICAL INVESTIGATION AND AS SHOWN ON THE DRAWINGS AND/OR FOR ANY REASON THE REQUIRED DESIGN DEPTH CANNOT BE ACHIEVED.

G16. UNDER NO CIRCUMSTANCES SHALL ANY OF THE WORKS BE DAMAGED BY ANY PLANT/MACHINERY OR DURING WORKS BY OTHER TRADES. IN THE EVENT THAT DAMAGE DOES OCCUR, PDS SHALL BE NOTIFIED IMMEDIATELY.

G17. WHERE SPECIFIC ITEMS OR DESIGN ALTERNATIVES ARE REQUIRED BY BUILDER OR CONTRACTOR, THE CONTRACTOR WILL ENSURE NO WORKS COMMENCE UNTIL THE ITEMS HAVE BEEN ADDRESSED.

G18. THE STRUCTURAL INTEGRITY OF THE EXISTING SEAWALL AND CAPPING BEAM TO BE VERIFIED BY A STRUCTURAL ENGINEER PRIOR TO COMMENCEMENT OF WORKS ON SITE. IF REQUIRED, STABILISATION MEASURES TO BE IMPLEMENTED AND CERTIFIED PRIOR TO COMMENCEMENT OF THE WORKS.

G19. NO CORE HOLES OR PENETRATIONS THROUGH THE CAPPING BEAM ARE PERMITTED WITHOUT THE PRIOR APPROVAL OF PDS.

G20. DESIGN LIFE FOR SEAWALL 50 YEARS.

G21. WRITTEN APPROVAL FROM PDS IS REQUIRED FOR ANY PROPOSED ALTERNATIVE DETAILS.

G22. AT THE COMPLETION OF THE WORKS, THE CONTRACTOR SHALL PROVIDE A CERTIFICATE STATING THAT ALL WORKS HAVE BEEN COMPLETED IN ACCORDANCE WITH PDS DRAWINGS AND THE RELEVANT AUSTRALIAN STANDARDS.

RETAINING WALL NOTES

SW1. EXCAVATION LEVELS SHALL BE STRICTLY IN ACCORDANCE WITH THOSE SHOWN ON THE PDS DRAWINGS. WRITTEN APPROVAL MUST BE OBTAINED FROM PDS PRIOR TO ANY DETAILED EXCAVATION NOT SHOWN ON THESE DRAWINGS.

SW2. THE RETAINING WALL DESIGN IS BASED ON THE CURRENT GROUND AND SEABED LEVELS. FUTURE BACKFILLING MUST NOT EXCEED THE LEVEL SHOWN

SW3. MONITORING OF THE SEABED LEVELS AT THE FACE OF THE SEAWALL SHALL BE CARRIED OUT AT 2 YEAR INTERVALS. MAXIMUM ALLOWABLE DEPTH BELOW TOP OF CAPPING BEAM TO SEABED IS 4000mm. PILE DESIGN SOLUTIONS TO BE NOTIFIED IMMEDIATELY IF THIS DEPTH EXCEEDS 4000mm.

SW4. STABILITY OF ALL TEMPORARY BATTERS IS THE CONTRACTORS RESPONSIBILITY.

SW5. ESTIMATED SHORING WALL DEFLECTIONS ARE UP TO 35mm. PDS HAVE MADE NO ASSESSMENT OF THE EFFECT OF ESTIMATED DEFLECTIONS ON ADJACENT STRUCTURES AND/OR SERVICES. IF THESE DEFLECTIONS AND THE ASSOCIATED RISK OF DAMAGE TO ADJACENT STRUCTURES AND/OR SERVICES IS NOT ACCEPTABLE, PLEASE NOTIFY PDS FOR THE SEAWALL TO BE REDESIGNED PRIOR TO THE COMMENCEMENT OF WORKS.

SW6. A 5 KPA SURCHARGE HAS BEEN ALLOWED FOR IN THE SEAWALL DESIGN. THESE SURCHARGES MUST NOT BE EXCEEDED AT ANY TIME. WRITTEN APPROVAL FROM PDS IS REQUIRED IF GENERAL SURCHARGES ARE REQUIRED TO BE EXCEEDED FOR TEMPORARY CONSTRUCTION REQUIREMENTS, SUCH AS MOBILE CRANES, BOOM PUMPS, MATERIALS STORAGE ETC.

SW7. SHEETPILE PROFILE IS FIBRE-REINFORCED POLYMER (FRP) UC-95 AS SUPPLIED BY J STEEL AUSTRALASIA. UC-95 FRP COMPOSITE SHEET PILE IS EQUIVALENT TO THE GG-95 SHEET PILE, THE FORMER NAME OF THE SAME PRODUCT.

PILING NOTES

P1. PILES TO BE INSTALLED IN ACCORDANCE WITH THE PROCEDURES AND REQUIREMENTS OUTLINED IN AS2159-2009 "PILING - DESIGN AND INSTALLATION".

P2. PILE RECORDS TO BE IN ACCORDANCE WITH AS2159-2009. THESE RECORDS SHALL BE SUBMITTED TO PDS ON A REGULAR BASIS FOR REVIEW.

P3. THE CONTRACTOR'S CHOICE OF PILING METHOD AND EQUIPMENT SHALL ENSURE THE PILE AND SURROUNDING MATERIAL IS MAINTAINED IN A STABLE CONDITION THROUGHOUT THE CONSTRUCTION PROCESS, AND THE PILES CAN BE INSTALLED IN ACCORDANCE WITH ALL ASPECTS OF THE DESIGN.

P4. WHERE REQUIRED, THE PILES INSTALLATION PROCESS SHALL BE MONITORED BY AN APPROPRIATELY EXPERIENCED ENGINEER TO VERIFY THE DESIGN ASSUMPTIONS, INCLUDING LEVELS AND PARAMETERS.

CONCRETE NOTES

C1. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH AS3600-2009 EXCEPT WHERE VARIED BY THESE DRAWINGS.

C2. ALL CEMENT SHALL BE TYPE SL. SHRINKAGE LIMITED CEMENT IN ACCORDANCE WITH AS3972. SULPHATE RESISTANT CONCRETE TO BE USED AT ALL TIMES.

C3. ALL CONCRETE TO BE MINIMUM F'C = 50 MPa MARINE GRADE, 80mm SLUMP AND 20mm AGGREGATE SIZE.

C4. MINIMUM COVER TO REINFORCEMENT - 65mm

C5. PLASTIC BAR CHAIRS SHALL BE USED

C6. EXPOSURE CLASSIFICATION - C2

C7. QUALITY OF SURFACE FINISH TBA

REINFORCEMENT

R1. MINIMUM LAP LENGTHS FOR SPLICING BARS SHALL BE MAINTAINED AT ALL TIMES AS LISTED BELOW;

N12 - 600mm

N16 - 900mm

N20 - 1200mm

N24 - 1500mm

R2. N BARS DENOTES DEFORMED BAR NORMAL DUCTILITY GRADE 500MPa

R3. LAPS TO BE STAGGERED WITH NO MORE THAN 50% OF LONGITUDINAL BARS LAPPED AT A SINGLE CROSS-SECTION.

R4. ALL REINFORCEMENT BARS AND TIES SHOWN ON THESE DRAWINGS SHALL BE HOT DIP GALVANISED IN ACCORDANCE WITH AS/NZS 4680

PERMANENT ANCHORS

PA1. DESIGN OF PERMANENT ANCHORS AND ALL COMPONENTS BY ANCHORING CONTRACTOR. DETAILED DESIGN TO BE SUBMITTED TO PILE DESIGN SOLUTIONS FOR REVIEW AND APPROVAL PRIOR TO COMMENCEMENT OF ANCHORING WORKS.

PA2. DESIGN LIFE OF PERMANENT ANCHORS = 50 YEARS.

PDS DRAWINGS

THE FOLLOWING DRAWINGS ARE INCLUDED IN THE FULL SET OF DRAWINGS ISSUED BY PDS

SH100	GENERAL NOTES
SH101	GENERAL ARRANGEMENT PLAN
SH102	SEAWALL GENERAL SECTION 1
SH103	DETAILS - SHEET 1 OF 2
SH104	DETAILS - SHEET 2 OF 2

CONSTRUCTION STAGES

THE DESIGN OF THE SEAWALL HAS CONSIDERED THE FOLLOWING CONSTRUCTION SEQUENCE. NO AMENDMENT TO SEQUENCE WITHOUT PRIOR APPROVAL FROM PILE DESIGN SOLUTIONS.

1. STRUCTURAL ENGINEER TO CERTIFY THE STABILITY OF EXISTING SEAWALL AND ALL EXISTING COMPONENTS AND TO DETERMINE THE CAPABILITY TO REMAIN STABLE FOR THE PROPOSED CONSTRUCTION METHODOLOGY
2. CARRY OUT PREPARATION WORKS FOR STORMWATER PIPE
3. AFFIX GEOFABRIC TO EXISTING SEAWALL BELOW THE CAPPING LEVEL
4. INSTALL SHEETPILES TO THE REQUIRED DEPTH/FOUNDING MATERIAL
5. INSTALL BOLTS TO SECURE SHEETPILES TO EXISTING CAPPING BEAM
6. CORE THROUGH SHEETPILE AND EXISTING SEAWALL AT PERMANENT ANCHOR LOCATIONS
7. INSTALL PERMANENT ANCHORS
8. AFFIX PERMANENT ANCHORS TO EXISTING SEAWALL CAPPING BEAM WITH SACRIFICIAL PLATE, NUT AND TAPERED WASHER.
9. BACKFILL BETWEEN EXISTING SEAWALL AND SHEETPILES. BACKFILL TO 100mm BELOW PIPE INVERT LEVEL AT LOCATION OF STORMWATER PIPE PENETRATION
10. CUT PENETRATION FOR STORMWATER PIPE AND DETAIL BACKFILL TO MATCH PROFILE OF NEW PIPE.
11. AFFIX PVC PIPE TO EXTEND STORMWATER PIPE THROUGH SHEETPILE WALL
12. COMPLETE BACKFILLING AT THIS LOCATION
13. FORM, PLACE REO AND POUR CAPPING BEAM
14. REMOVE FORMWORK AND TEMPORARY BOLTS WHEN CAPPING BEAM HAS ACHIEVED THE MINIMUM DESIGN STRENGTH

REV	DATE	DESCRIPTION	DESIGNED	APPROVED
P1	07/11/12	80% DESIGN COMPLETE	SA	SH
P2	28/02/13	PRELIMINARY - ISSUED FOR TENDER	SA	SH
P3	1/05/13	PRELIMINARY - ISSUED FOR TENDER	SA	SH

NOTES:

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PROJECT:
SEAWALL REPLACEMENT
30-34 ROPER CRESCENT,
SYLVANIA WATERS

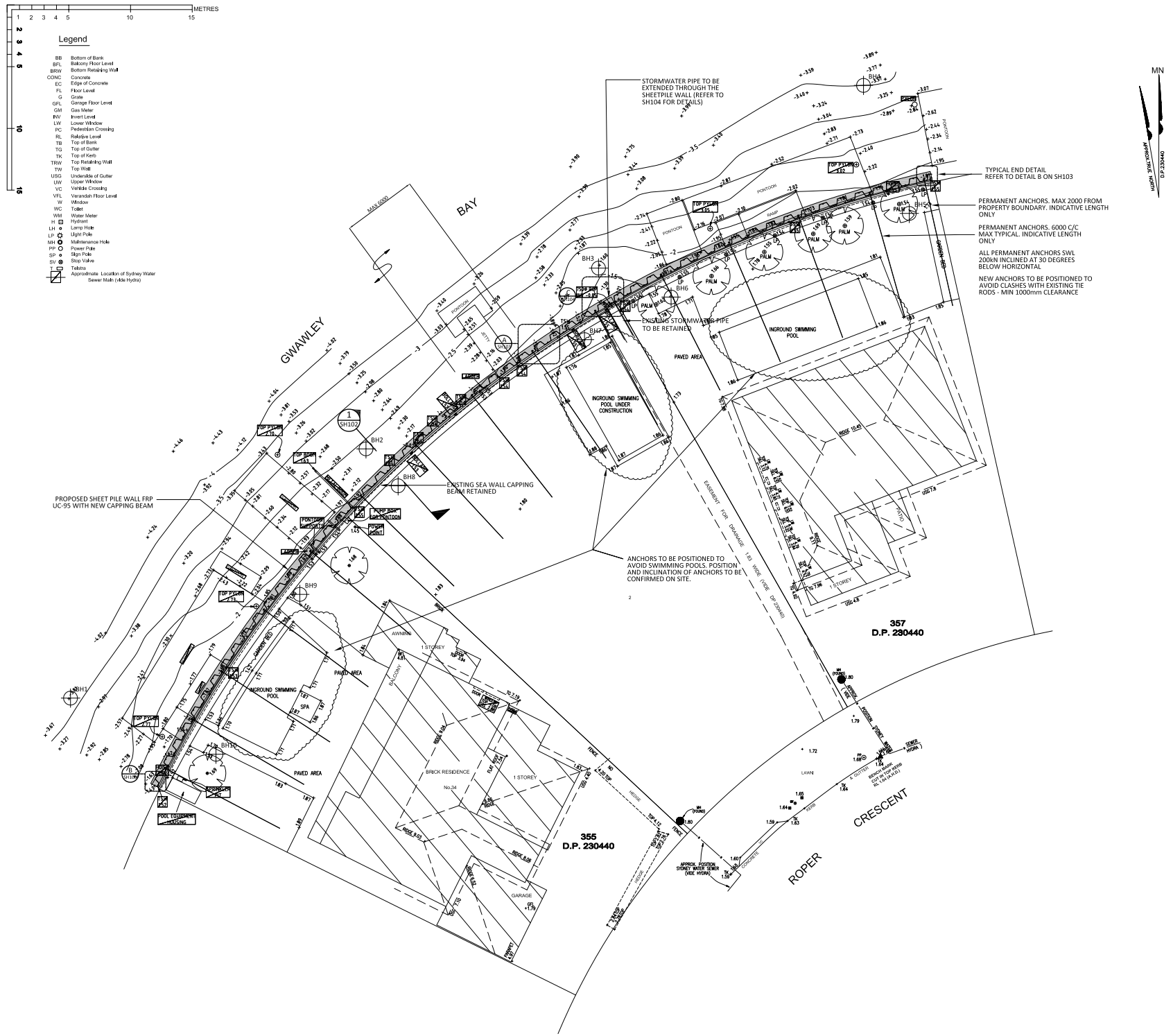
PROJECT No: 106-012

DRAWING: GENERAL NOTES

DRAWING No: SH100

REVISION: P3

SCALE: NTS



REV	DATE	DESCRIPTION	DESIGNED	APPROVED
P1	07/11/12	80% DESIGN COMPLETE	SA	SH
P2	28/02/13	PRELIMINARY - ISSUED FOR TENDER	SA	SH
P3	1/05/13	PRELIMINARY - ISSUED FOR TENDER	SA	SH

NOTES:

REFER TO SH100 FOR GENERAL NOTES

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PROJECT:

SEAWALL REPLACEMENT
30-34 ROPER CRESCENT,
SYLVANIA WATERS

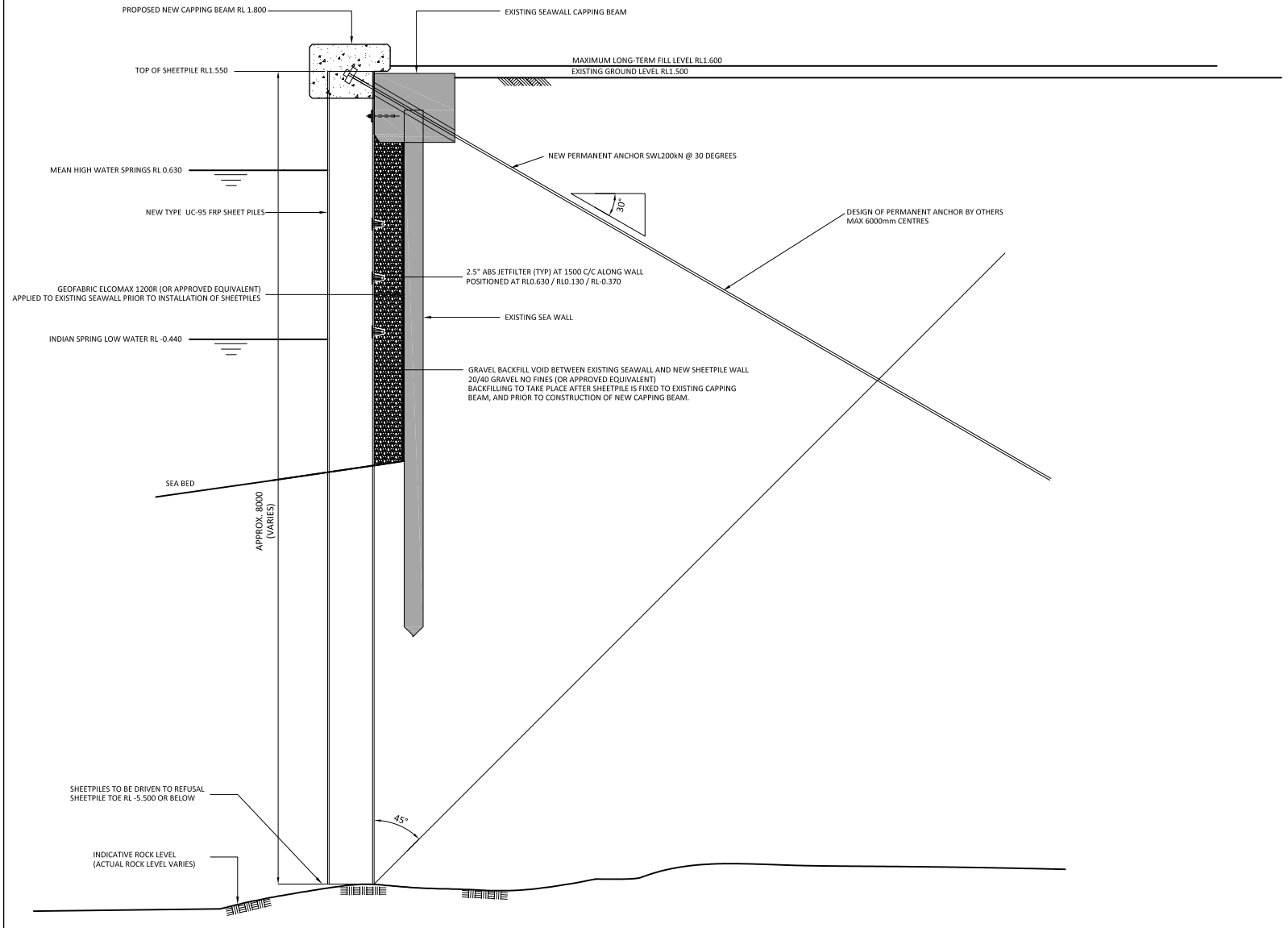
PROJECT No: 106-012

DRAWING: GENERAL ARRANGEMENT PLAN

DRAWING No: SH101

REVISION: P3

SCALE: 1:150 @ A1



SECTION 1
1:20 @ A1 SH101

REV	DATE	DESCRIPTION	DESIGNED	APPROVED
P1	07/11/12	80% DESIGN COMPLETE	SA	SH
P2	28/02/13	PRELIMINARY - ISSUED FOR TENDER	SA	SH
P3	1/05/13	PRELIMINARY - ISSUED FOR TENDER	SA	SH

NOTES:

REFER TO SH100 FOR GENERAL NOTES

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PROJECT:
SEAWALL REPLACEMENT
30-34 ROPER CRESCENT,
SYLVANIA WATERS

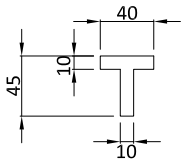
PROJECT No
106-012

DRAWING
SEAWALL GENERAL SECTION 1

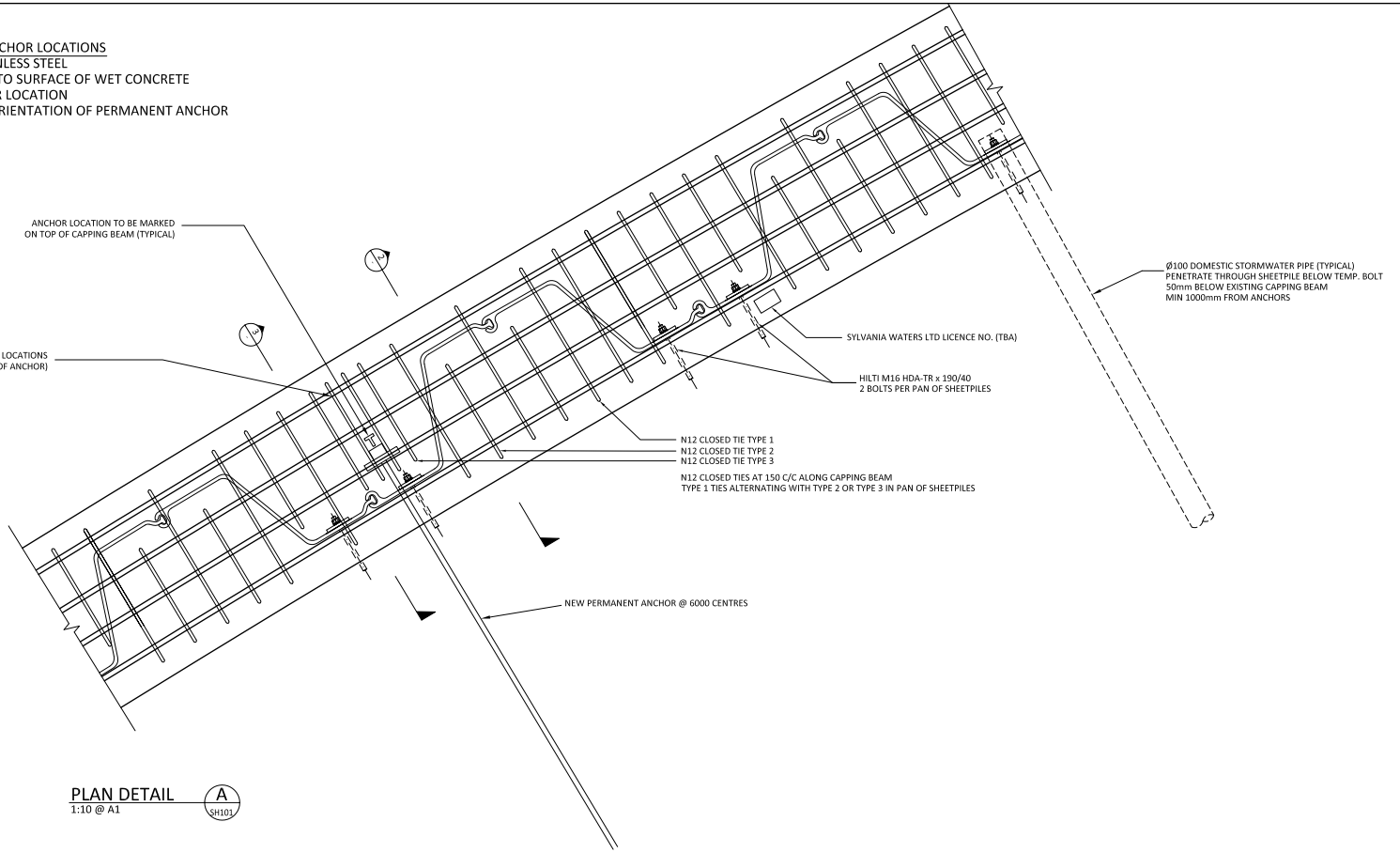
DRAWING No
SH102

REVISION
P3

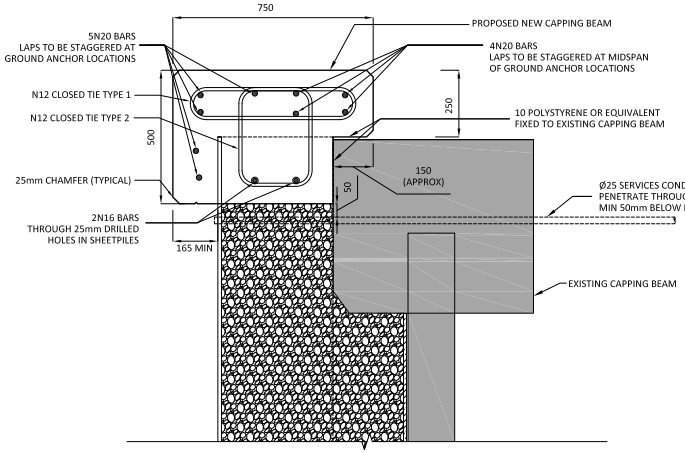
SCALE
1:20 @ A1



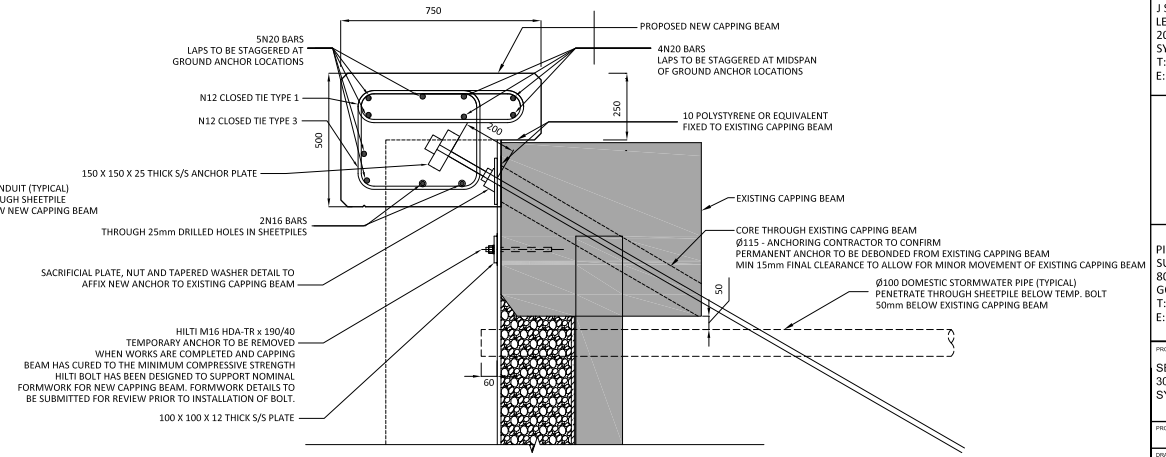
T - MARK FOR ANCHOR LOCATIONS
5mm THICK STAINLESS STEEL
TO BE PLACED INTO SURFACE OF WET CONCRETE
AT EACH ANCHOR LOCATION
ALIGNED WITH ORIENTATION OF PERMANENT ANCHOR



PLAN DETAIL A
1:10 @ A1
SH101



SECTION 2
1:10 @ A1
SH101



SECTION 3
1:10 @ A1
SH101

REV	DATE	DESCRIPTION	DESIGNED	APPROVED
P1	07/11/12	80% DESIGN COMPLETE	SA	SH
P2	28/02/13	PRELIMINARY - ISSUED FOR TENDER	SA	SH
P3	1/05/13	PRELIMINARY - ISSUED FOR TENDER	SA	SH

NOTES:
REFER TO SH100 FOR GENERAL NOTES

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PROJECT:
SEAWALL REPLACEMENT
30-34 ROPER CRESCENT,
SYLVANIA WATERS

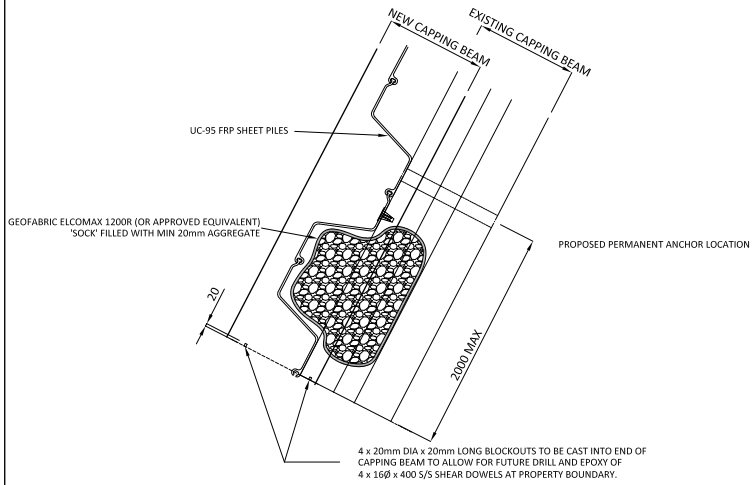
PROJECT NO.
106-012

DRAWING
DETAILS SHEET 1 OF 2

DRAWING NO.
SH103

REVISION
P3

SCALE
1:10 @ A1



PLAN DETAIL B
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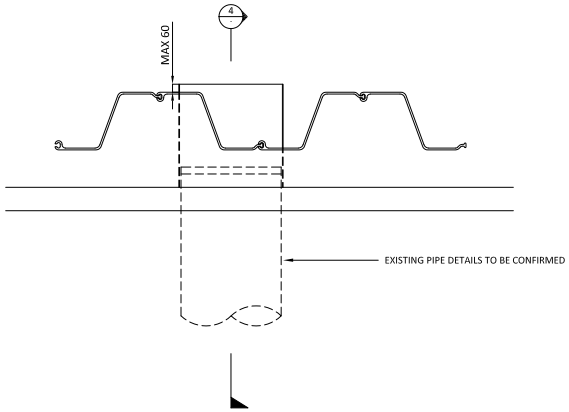
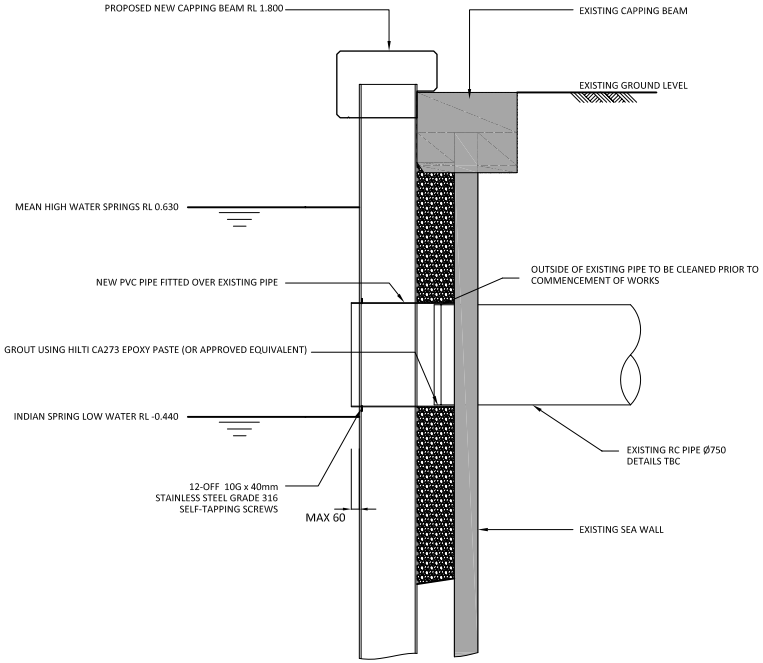
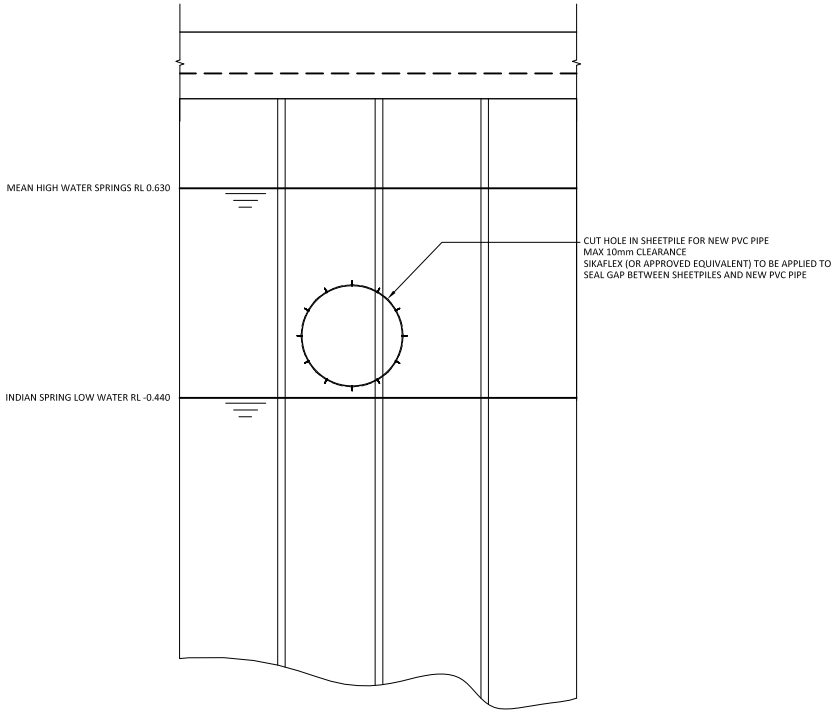
SH101



PLAN DETAIL C
1:20 @ A1
SH101



SECTION 4
1:20 @ A1



SEAWALL ELEVATION AT PIPE LOCATION
1:20 @ A1
VIEWED FROM WATER SIDE OF SEAWALL

REV	DATE	DESCRIPTION	DESIGNED	APPROVED
P1	28/02/13	PRELIMINARY - ISSUED FOR TENDER	SA	SH
P2	1/05/13	PRELIMINARY - ISSUED FOR TENDER	SA	SH

NOTES:

REFER TO SH100 FOR GENERAL NOTES

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PROJECT:
SEAWALL REPLACEMENT
30-34 ROPER CRESCENT,
SYLVANIA WATERS

PROJECT NO: 106-012

DRAWING: DETAILS SHEET 2 OF 2

DRAWING NO: SH104

REVISION: P2

SCALE: 1:20 @ A1

TRANSMITTAL AND DRAWING REGISTER

TO:	Sylvania Waters Limited													
ADDRESS:														
PROJECT:	106-012_30-34 Roper Crescent, Sylvania Waters NSW2224													
ATTN:	Garry Lynton													
TRANSMITTAL NO:	**T02**	**TRANSMITTAL DATES**												
DRAWING TITLE	**NO.**	**28/02/13**	**1/05/13**											
GENERAL NOTES	SH100	P2	P3											
GENERAL ARRANGEMENT PLAN	SH101	P2	P3											
SEAWALL GENERAL SECTION 1	SH102	P2	P3											
DETAILS SHEET 1 OF 2	SH103	P2	P3											
DETAILS SHEET 2 OF 2	SH104	P1	P2											

ALL DRAWINGS ISSUED AS PDF VIA EMAIL

SEAWALL RECTIFICATION
SYLVANIA WATERS

GENERAL NOTES

1. These drawings are for structural purposes only and are to be read in conjunction with other contract documentation and the requirements of the relevant authorities.
2. Do not obtain dimensions by scaling the structural elements.
3. Should any ambiguity, error, omission, discrepancy, inconsistency or other fault exist or seem to exist in the contract documents, immediately notify in writing to the Superintendent.
4. Maintain the structure in a stable condition during construction. Temporary bracing/shoring shall be provided by the contractor to keep the structure and excavations stable at all times, ensuring that no part of the documented structure becomes overstressed.
5. All workmanship and materials shall be in accordance with the requirements of current SAA codes and the bylaws, ordinances or other requirements of the relevant building authorities.
6. All proprietary items are to be installed and fixed in accordance with the manufacturers specifications and instructions.
7. All work is to be carried out in accordance with all Workcover requirements and occupational health and safety act regulations
8. In these drawings and notes, the following abbreviations are used :
   - RL – Reduced Level
   - U.N.O. – Unless Noted Otherwise
   - N.S.O.P. – Not Shown On Plan
   - N.S.O.E. – Not Shown On Elevation
   - L.V. – Bar Lengths Vary
   - N.T.S. – Not To Scale
   - E.W. – Each Way
   - E.F. – Each Face
   - N.F. – Near Face
   - F.F. – Far Face
10. The Contractor shall ensure all works are carried out in a manner that will not cause any damage to adjacent properties, services, roads and/or utilities.
12. The Contractor shall ensure that a services search utilising Dial Before You Dig plus an electronic survey has been carried out, and that all existing structures, services (including redundant services) and utilities are located prior to commencement of works. The accuracy of this information should be verified as necessary before work commences on site.
13. For extent of new sea wall to be installed in front of existing capping beam, locally excavate behind the capping beam to locate all existing tie rods. If any existing tie rods clash with proposed new tie rods locations, refer to TTW for advice.
14. A 5 kPa surcharge has been allowed for in the seawall design. These surcharges must not be exceeded at any time. Written approval from SSC is required if general surcharges are required to be exceeded for temporary construction requirements, such as mobile cranes, boom pumps, materials storage etc.
15. The contractor is to ensure that vibration caused during the installation of the new sea wall does not cause damage to nearby structures or utility services.

CONSTRUCTION SEQUENCE

1. Fix geotextile to face of existing concrete panels.
2. Locate all existing tie rods for extent of new sea wall.
3. Install new concrete panels & brace to existing capping beam.
4. Grout base of panels and between panels.
5. Core 200 dia max holes through existing capping beam at new tie rod locations.
6. Form and cast new capping beam.
7. Backfill void with "40mm Cobble Aggregate" by Concrush or approved equivalent.
8. Install new tie rods.

CONCRETE NOTES

EXPOSURE CLASSIFICATION : Tidal Zone : C2

CONCRETE

Place concrete of the following characteristic compressive strength f'c as defined in AS 1379.

Location	AS 1379 f'c MPa at 28 days	Specified Slump	Nominal Agg. Size
All (U.N.O.)	S50	80	20

1. Use Type 'D' cement, unless otherwise specified.
2. All concrete shall be subject to project assessment and testing to AS 1379.
3. Consolidate by mechanical vibration. Cure all concrete surfaces as directed in the Specification.
4. Unless shown on the drawings, the location of all construction joints shall be submitted to Engineer for review.
5. Conduits and pipes are to be fixed to the underside of the top reinforcement layer.
6. Slurry used to lubricate concrete pump lines is not to be used in any structural members.

FORMWORK

1. All formwork to capping beams and splints to be watertight to prevent loss of slurry.
2. The design, certification, construction and performance of the formwork, falsework and backpropping shall be the responsibility of the contractor. Proposed method of installation and removal of formwork is to be submitted to the superintendent for comment prior to work being carried out.

GLASS FIBRE REINFORCED POLYMER (GFRP) BAR NOTES

1. Fix GFRP bars as shown on drawings. All GFRP bars shall be V.ROD supplied and installed in accordance with V.ROD Product Guide Specification dated July 2010.

	Nominal bar diameter (mm)
# 2	6.350
# 3	9.525
# 4	12.700

2. Provide bar supports or spacers to give 40mm concrete cover to all GFRP bars unless otherwise noted on drawings.
3. All cogs to be standard cogs unless otherwise noted.
4. Laps in GFRP bars shall be made only where shown on the drawings unless otherwise approved. Lap lengths shall be 40 bar diameters.

Rev	Description	Eng	Draft	Date
P1	FOR REVIEW	D.C.	P.S.H	20.08.15

Project

BELGRAVE ESPLANADE
SEAWALL UPGRADE
SYLVANIA WATERS

Sheet Subject

CONSTRUCTION NOTES

Client

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Scale : A1	Drawn	Authorised
N / A	P.S.H	D Cowlan

Job No	Drawing No	Revision
141223	S20	P1

FileName: S20.dwg - USER: paulh - Plot File Created: Aug 21, 2015 - 9:21am

PRELIMINARY

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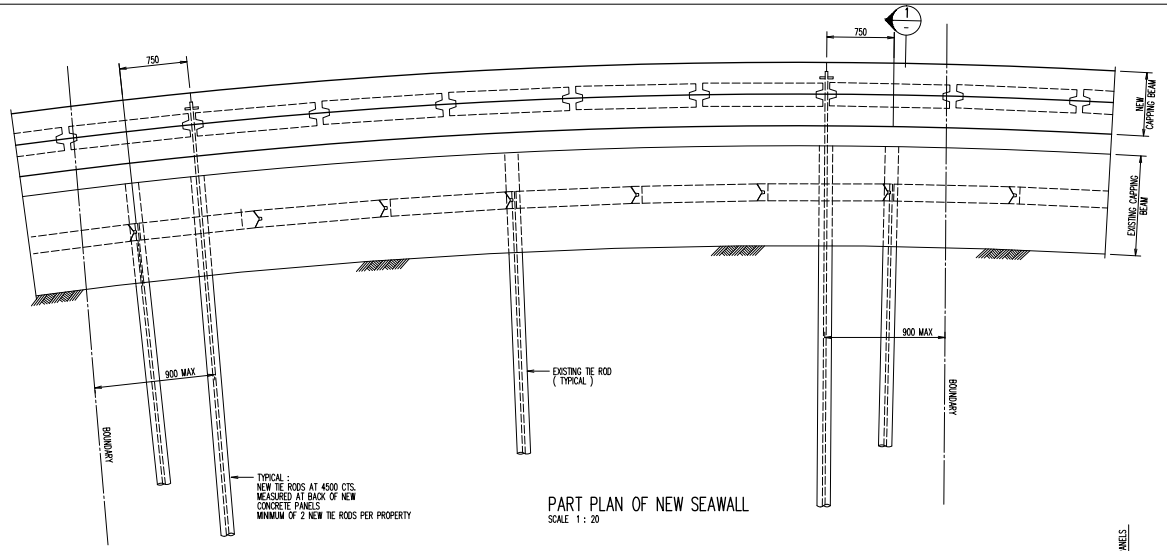
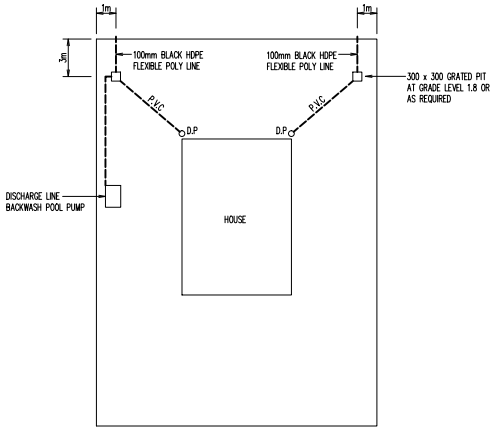
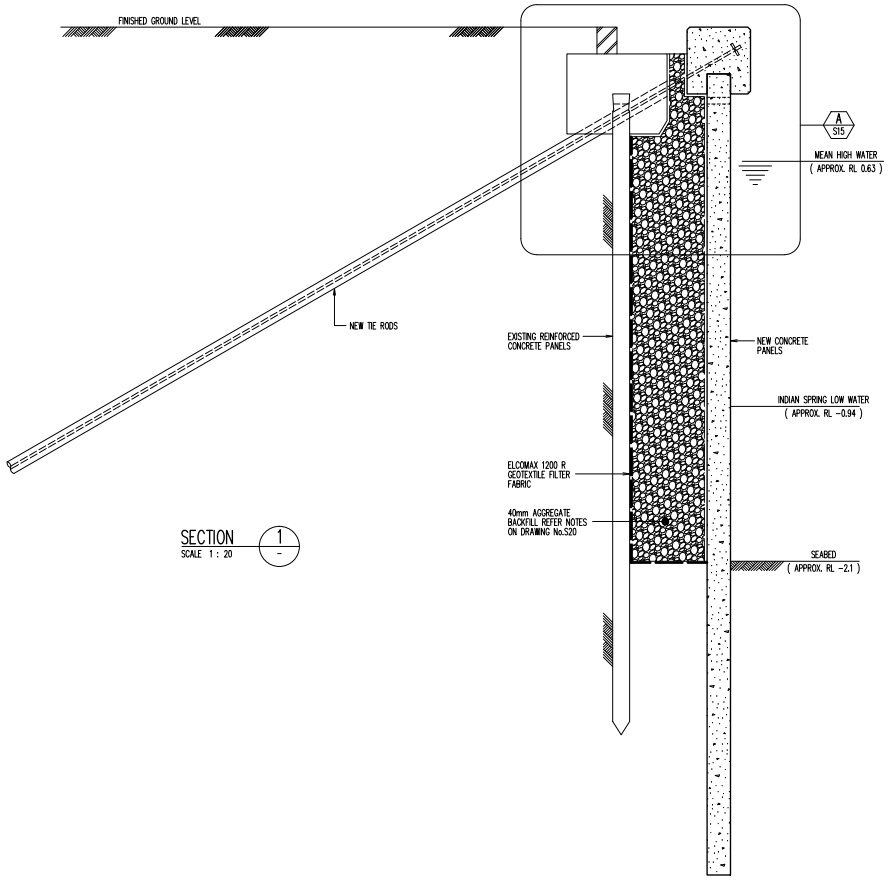
THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING No.ST01



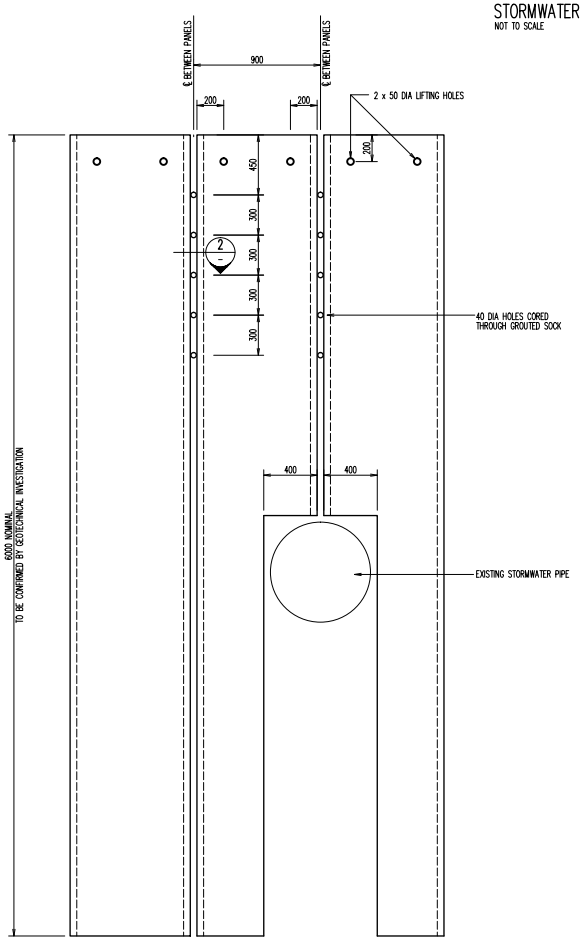
PART PLAN OF NEW SEAWALL
SCALE 1 : 20



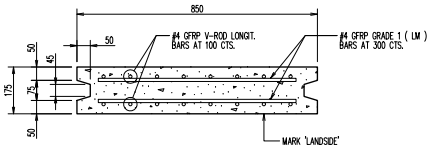
STORMWATER DISCHARGE LAYOUT
NOT TO SCALE



SECTION 1
SCALE 1 : 20



TYPICAL ELEVATION OF CONCRETE PANELS
SCALE 1 : 20



SECTION 2
SCALE 1 : 10

Rev	Description	Eng	Draft	Date
P1	FOR REVIEW	D.C.	P.S.H	21.07.15

Project

BELGRAVE ESPLANADE SEAWALL UPGRADE SYLVANIA WATERS

Sheet Subject

NEW SEAWALL (OPTION 2) - PLAN, SECTION & DETAILS SHEET 1

Client: Sutherland Shire COUNCIL

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Scale : A1	Drawn	Authorised
1 : 20, 10	P.S.H	D Conlan

Job No	Drawing No	Revision
141223	S21	P1

FileName: S21.dwg - USER: paulh - Plot File Created: Aug 21, 2015 - 9:21am

PRELIMINARY

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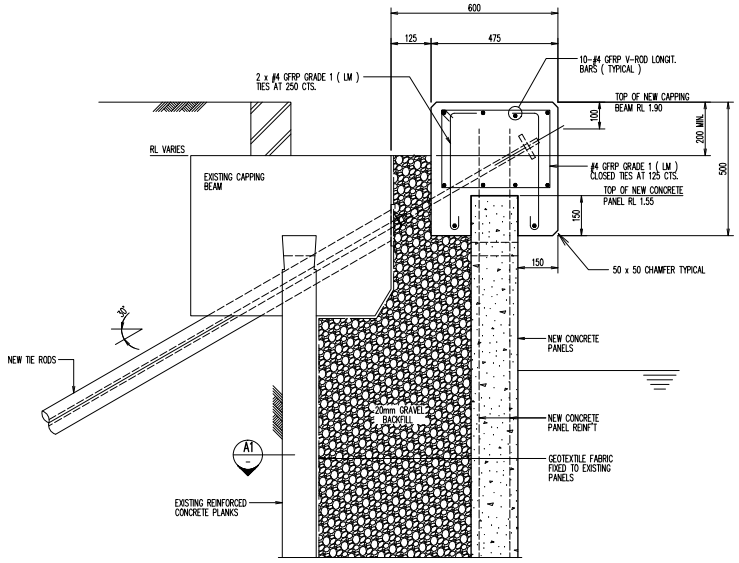
THIS DRAWING TO BE PRINTED IN COLOUR

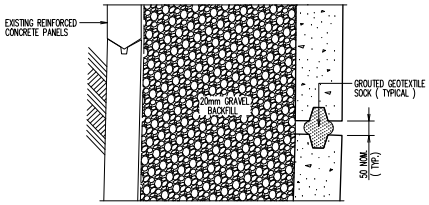
THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING No.ST01



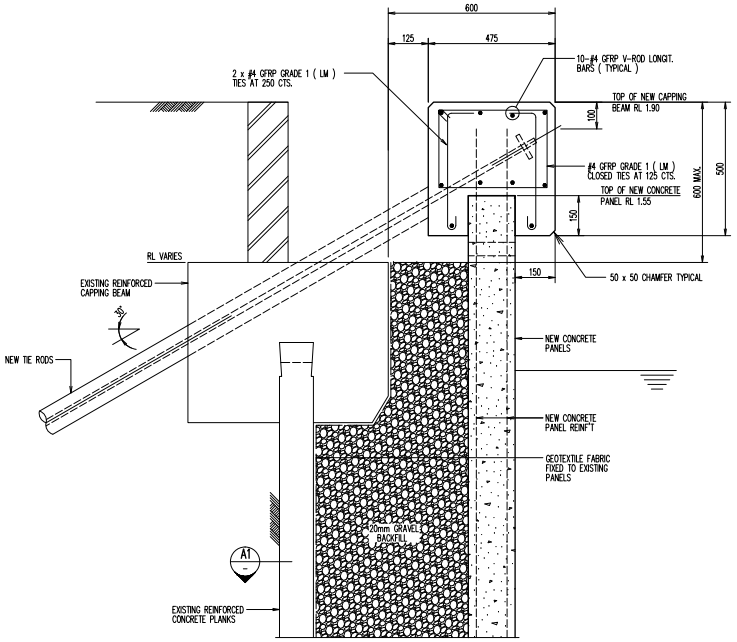
DETAIL A / S14
SCALE 1 : 10

HIGH EXISTING CAPPING BEAM

NOTE :
CAPPING BEAM FORMWORK TO BE WATERTIGHT TO PREVENT LOSS OF SLURRY DURING CONCRETE PLACEMENT



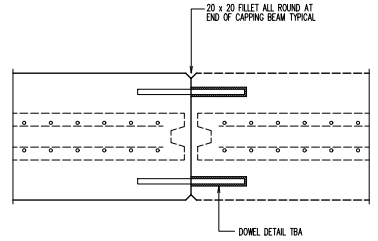
SECTION A1
SCALE 1 : 10



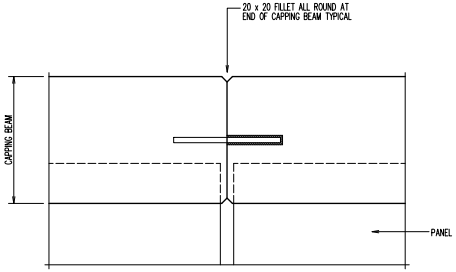
DETAIL A / S14
SCALE 1 : 10

LOW EXISTING CAPPING BEAM

NOTE :
CAPPING BEAM FORMWORK TO BE WATERTIGHT TO PREVENT LOSS OF SLURRY DURING CONCRETE PLACEMENT



CAPPING BEAM END DETAIL
SCALE 1:10



CAPPING BEAM ELEVATION
SCALE 1:10

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PRELIMINARY

Rev	Description	Eng	Draft	Date
P1	FOR REVIEW	D.C.	P.S.H	21.08.15

Project

BELGRAVE ESPLANADE SEAWALL UPGRADE SYLVANIA WATERS

Sheet Subject

NEW SEAWALL (OPTION 2) - DETAILS SHEET 2

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Scale : A1	Drawn	Authorised
1 : 10	P.S.H	D Conlan

Job No	Drawing No	Revision
141223	S22	P1

FileName: S22.dwg - USER: paulh - Plot File Created: Aug 21, 2015 - 9:20am

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TaylorThomsonWhitting

Document Issue Transmittal

Date: 21/08/2015
Job No.: 141223
Issue No.: 9

Project: Seawalls, Sylvania Waters

Reason for Issue: Review

Sent Via: Email

Distribution	Attention
Barry Stubbs Landscapes	**Barry Stubbs**
Sylvania Waterways	**Gary Lynton**
Taylor Thomson Whitting	**Bruce Duff**

Drawing No.	Title	Issue
S20	CONSTRUCTION NOTES	P1
S21	NEW SEA WALL (OPTION 2) PLAN, SECTIONS & DETAILS SHEET 1	P1
S22	NEW SEA WALL (OPTION 2) DETAILS SHEET 1	P1

SENT BY: HAIGH P

About Cardno

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

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