

SEAWALL REPAIRS AT 28 & 28A CHILDE ST, BELONGIL

RE: DEVELOPMENT APPLICATION CP17-004

RESPONSES TO QUESTIONS BY NSW COASTAL PANEL DATED 26/4/17 Ref DOC17/237550

TECHNICAL RESPONSES

CP; “the Coastal Panel notes the ICM proposed design is a different structure to those works exhibited in the WRL report.”

ICM acknowledge that there are some differences between the Manfred St seawall and the seawall to be repaired at 28 & 28A Childe Street. Any significant differences have been taken into consideration in the views and responses of ICM to queries.

ICM engineers have extensive expertise and experience with the design, construction, monitoring, condition surveys and repair of seawalls. In particular, ICM has experience with both the Manfred Street wall and the walls at 28 & 28A Childe Street:

- With respect to the nearby Manfred Street structure constructed by BSC, ICM has
 - monitored and assessed the performance of the interim sand bag wall constructed by BSC in about 2001
 - reviewed the 2013 WRL design report for a rock seawall to replace the sandbag wall,
 - reviewed the 2014 LGES construction drawings,
 - prepared tie-in design details for the adjacent walls,
 - supervised and certified the construction in 2015, and
 - monitored the performance in the June 2016 erosion event.
- With respect to the seawall at 28 & 28A Childe St, ICM has:
 - monitored the performance of the wall in storm events since 1999
 - assessed the structural condition in 2016
 - prepared repair drawings in 2016/17

The existing structure at 28 & 28A Child Street is part of the rock seawall wall designed and constructed in about 1976 to protect the private properties to SE of Manfred Street between Manfred Street and the rock wall at the Old Jetty site from intermittent storm erosion events.

The engineering design drawings (Attachment A) for the repairs have been provided previously. The wall will be reprofiled to the original profile and addition rocks in the size range of 0.5t to 2.5t added to the wall. The initial repairs will involve the section of wall within the Council road reserve as shown on drawings 002 to 005, inclusive.

The 2015 BSC rock sea wall constructed to protect Manfred Street and the adjacent private wall to the NW connects into the 1976 wall. There is now a continuous rock seawall from the northern flank of the northern most private property on Belongil spit to the rock protection at the Old Jetty Site (State lands). With the natural indurated sandstone outcrops at the southern end of the Old Jetty site and southward from Border Street with the BSC sandbag walls at Border Street and Don Street, there is now effectively a continuous protection structure (natural and artificial) between the SLSC

SEAWALL REPAIRS AT 28 & 28A CHILDE ST, BELONGIL

to the south of Jonson Street and the northern most private property on Belongil Spit. This continuous wall was also referenced in WRL (2013).

The Belongil walls have generally been constructed with primary armour rocks with a standard primary armour grading of 1.5-5t with an alignment that is landward of normal high water. The continuous wall acts as a terminal seawall that not only protects public and private beachfront properties and infrastructure during major erosion events but also provides environmental benefits as it mitigates the risk of a breakthrough of Belongil Spit that, if allowed to occur, would have large adverse impacts on Belongil Creek and the Belongil wetlands.

The existing structure has proven to be adequate over the life to date of about 40 years. The works are repair using existing rocks and similar rock sizes to make up the minor deficit. As a check, during the repair design, ICM recalculated the theoretical design rock sizes on the wall using Van der Meer formulae as per CIRCA (2007) with the up to date design data from WRL 2013 modified slightly for this site and a design life of about 30 years with maintenance as required; estimated at 10 yearly intervals). The future conditions will depend on the coastal management plan and mitigation of impacts caused by the Jonson Street structures. Repair, using similar size rock to existing, is a practical approach for an existing structure that has proven to be adequate in service. The adopted design conditions based on the extensive theoretical calculations by WRL (2013) at the structure for the design check were:

Adopted Design Conditions at Structure			
Design Event		50	year ARI
Design interval between maintenance		10	year
Wave height at structure	H_s	2.50	m
	$H_{2\%}$	3.50	m
Critical wave period	T_α	13.0	sec

The design check indicates the following theoretical rock sizes:

Adopted Boulder Weight & Grade (t)			
		Primary	Secondary
M_{15}		1.62	0.16
Adopted M_{50}		3.00	0.30
M_{85}		4.37	0.44

This compares well with the typical rock sizes in the existing structure and other structures along Belongil. Seawall design is not exact but seawalls are flexible structures that can accommodate some damage. There are always uncertainties in the various inputs and, as a design check, it has been previously noted that these armour sizes are similar to the Manfred St wall rock design sizes (WRL 2013).

SEAWALL REPAIRS AT 28 & 28A CHILDE ST, BELONGIL

CP; "The Coastal Panel also notes the proposed works represents a substantial increase over and above what is currently in-situ, as evidenced by the intent to import rock to site to give effect to the proposed design.

The proposed repair works ARE NOT A SUBSTANTIAL INCREASE. The repairs aim to restore the wall back to its original profile (estimated at 40-50m³/m) and the top up volume of about 4m³/m is only about 9%. The initial repairs will be about ½ this volume and %.

CP; "The Panel requires an assessment on the impact that the proposed works will have on and from the physical coastal processes and hazards. It is noted that this information still remains outstanding."

We have provided assessment that there will be NO incremental impacts of the repair works. This also was the finding of WRL in 2013 in their assessment of the downdrift impacts of the Manfred St wall and we have referenced WRL 2013.

Signed



Leslie Angus Jackson

CPEng (National Engineers Register, Institution of Engineers Australia), RPEQ 2876

3/5/17

ATTACHMENT A

TECHNICAL DRAWINGS



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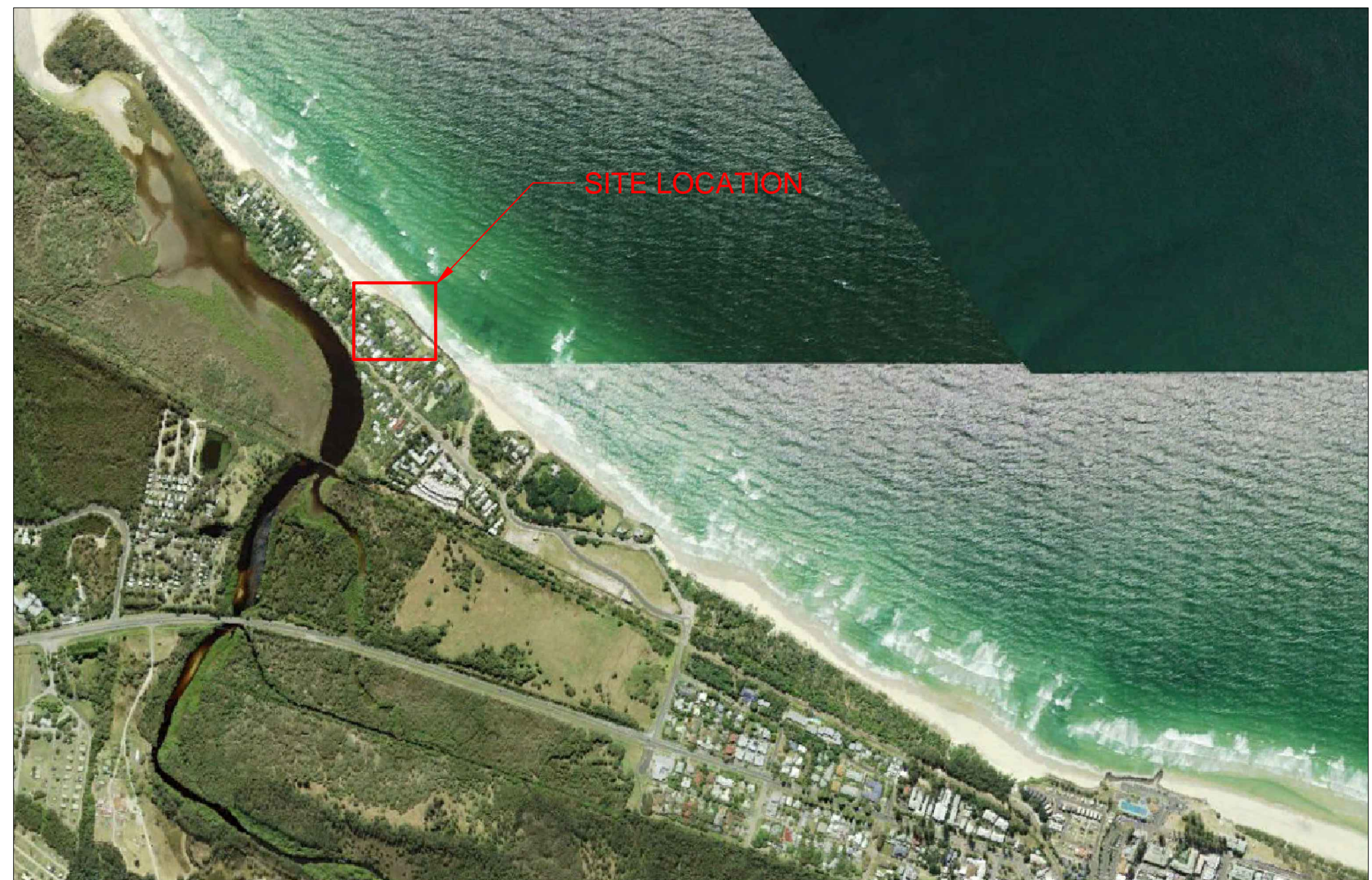
Belongil Seawall Repairs

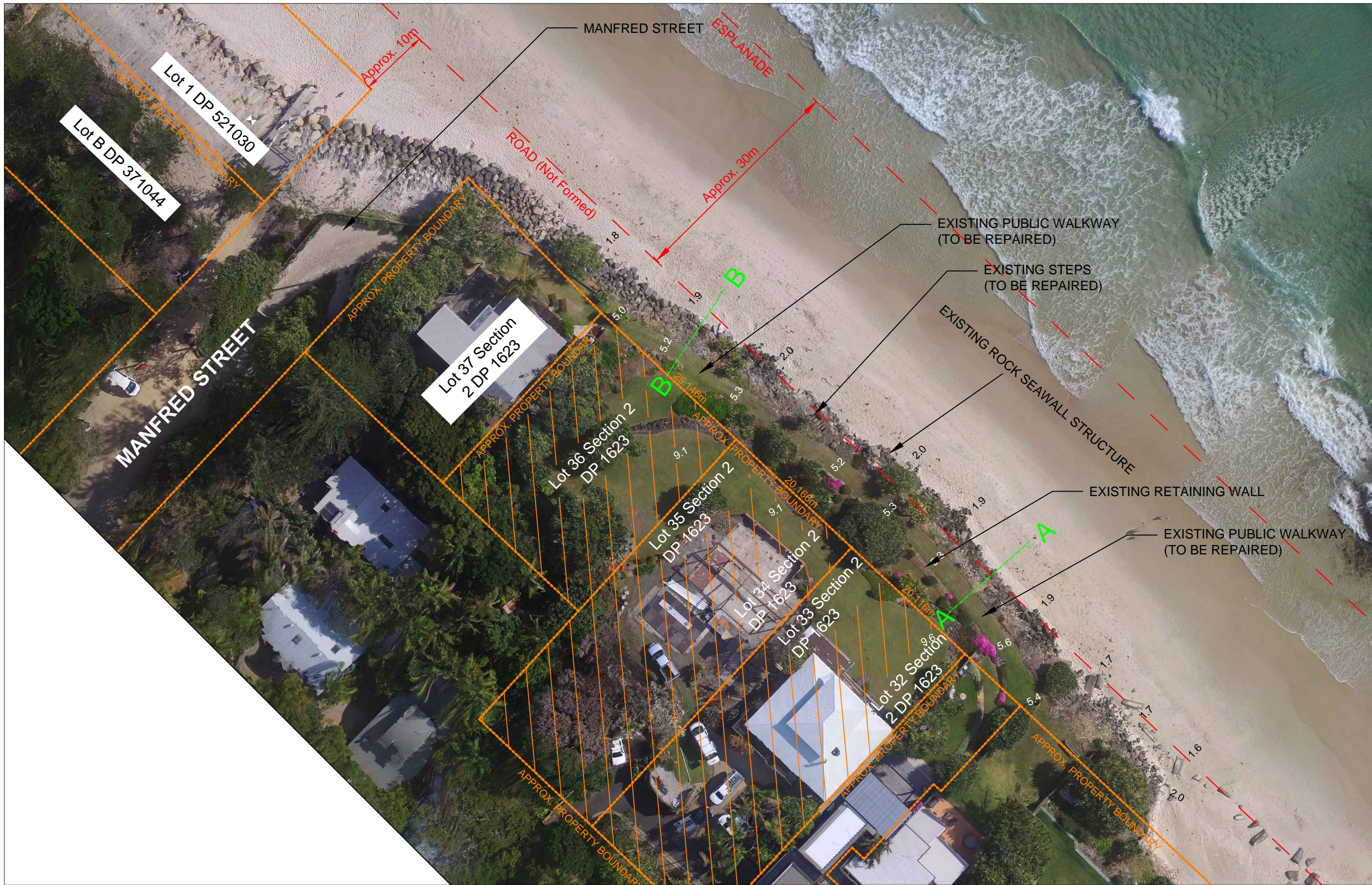
28, 28A CHILDE STREET AND 8 THE ESPLANADE
(Lots 32, 33, 34, 35 and 36 in Section 2 of DP1623)

DRAWING REGISTER

21.04.2017

BSR - CS3 - 001 B COVER PAGE
BSR - CS3 - 002 B PLAN VIEW (PRESENT)
BSR - CS3 - 003 B X-SECTION A (PRESENT)
BSR - CS3 - 004 B REPAIR WORKS A
BSR - CS3 - 005 B X-SECTION B(PRESENT)
BSR - CS3 - 006 B REPAIR WORKS B
BSR - CS3 - 007 B CONSTRUCTION PLAN
BSR - CS3 - 008 B CONSTRUCTION NOTES
BSR - CS3 - 009 CANTY SURVEY 2016
BSR - CS3 - 010 TRAFFIC CONTROL PLAN





SITE PLAN

LOCALITY PLAN

NOTES

1. Survey Plan 28/10/16 - See Drawing 008

LEGEND

- Approximate Property Boundary
X-Section
Stair Access

VERTICAL DATUM: AHD HORIZONTAL DATUM: -

REVISION REGISTER

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B	19/04/17	Expanded to include Manfred St	SK	AJ	AJ
A	23/02/17	Updated Drawing	SK	AJ	AJ
REV NO.	DATE	DESCRIPTION	BY	ENG.	APP.



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PROJECT NAME
BELONGIL SEAWALL REPAIRS

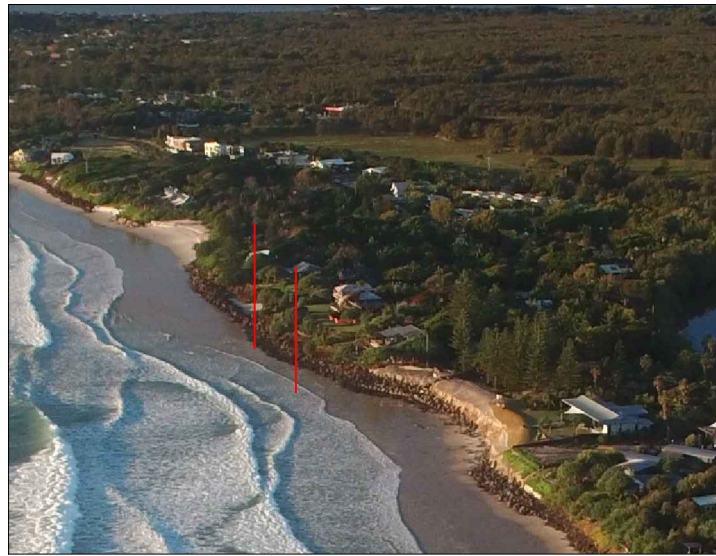
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PLAN VIEW (PRESENT)

DRAWING No. BSR - CS3 - 002 REVISION: B

DRAWN: SK CHECKED: AJ APPROVED: AJ

RPEQ 2876

SIZE: A3 SCALE: A3 DATE: 21 Apr, 2017



AERIAL PHOTO JUNE 2016 (Source: WRL)



PHOTO (ICM 13/10/16)

LOCALITY PLAN

- NOTES
1. Grey shaded area shows estimated location of rocks based on wall slump and volume displacement

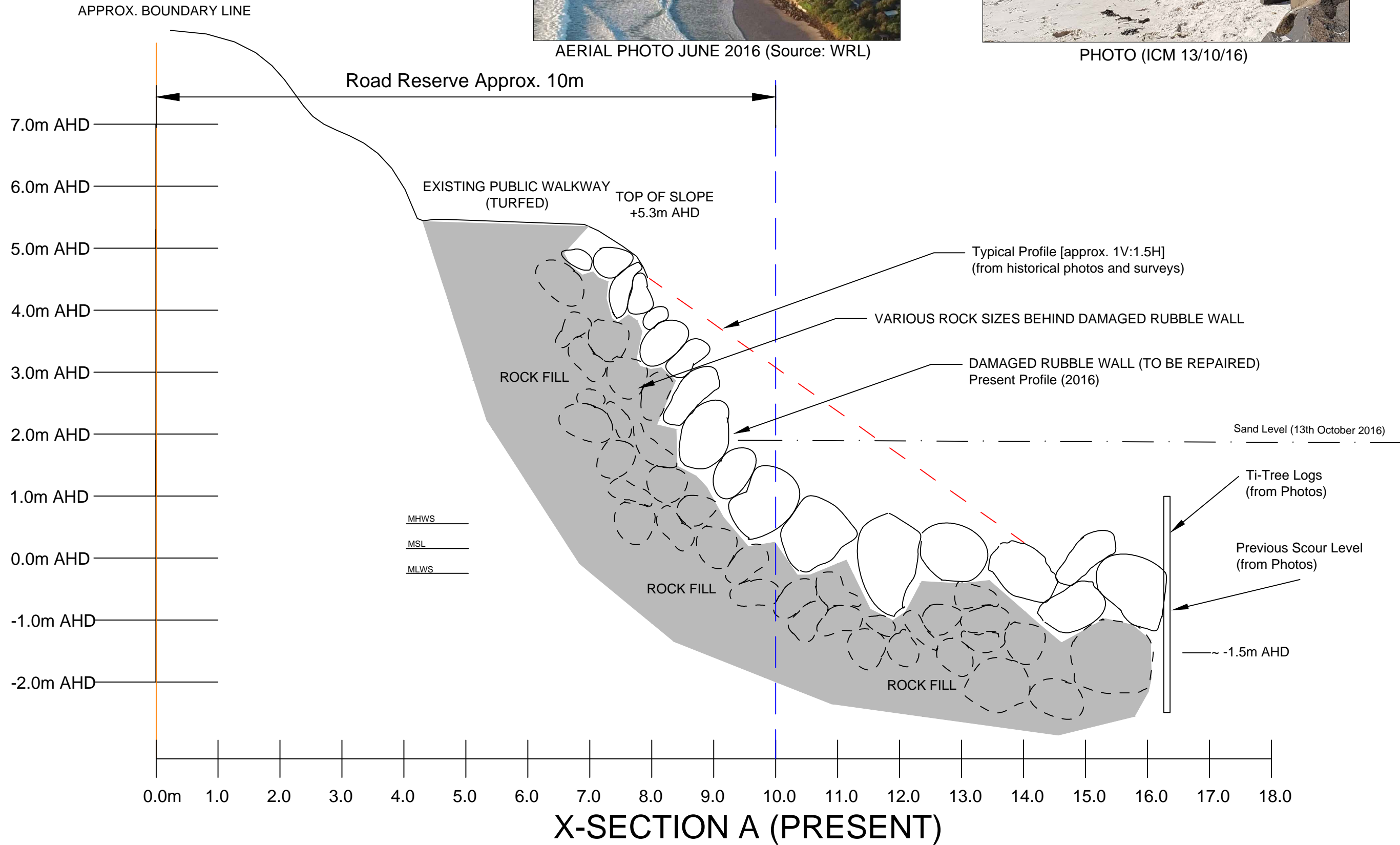
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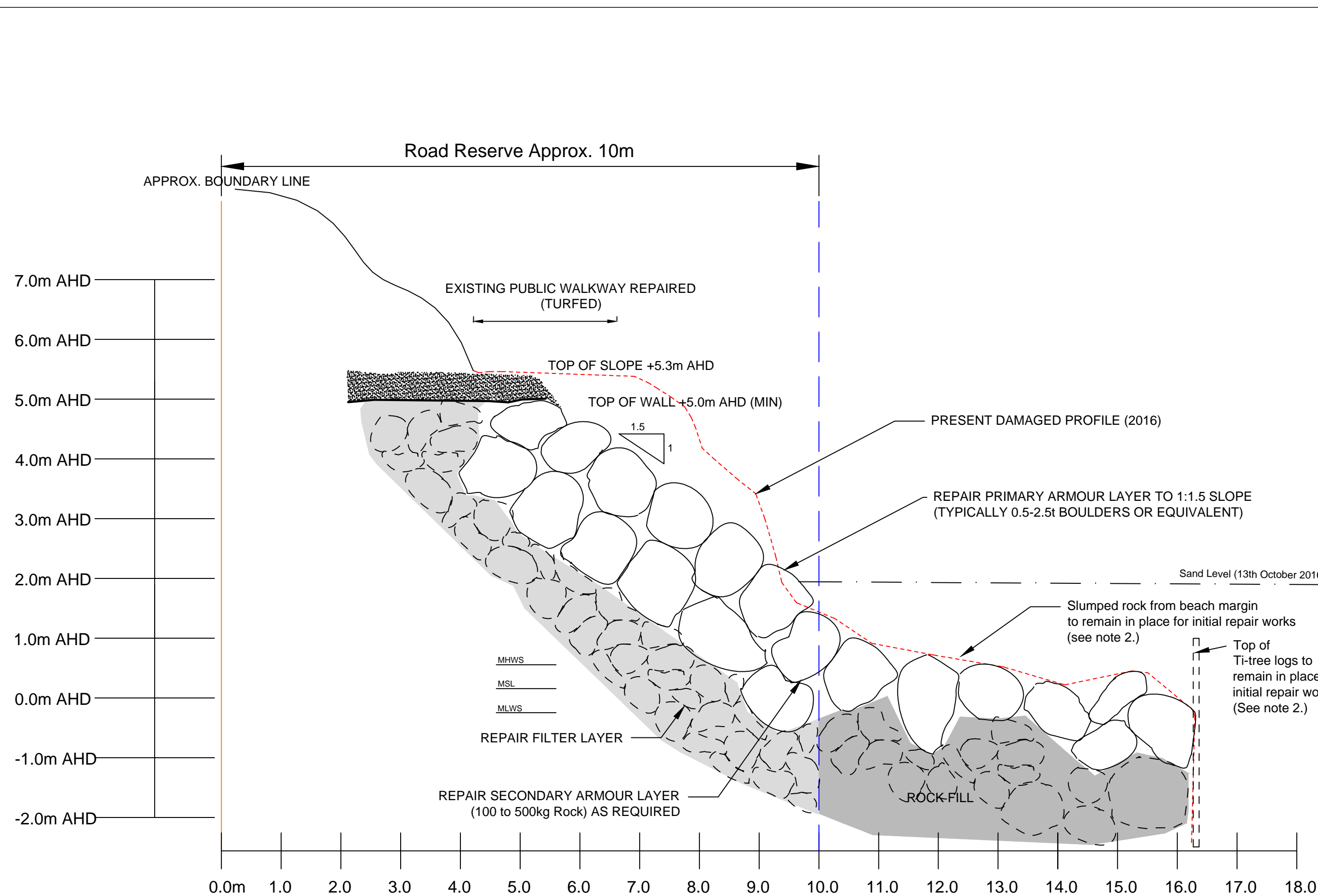
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A	23/02/17	Added Boundary Line	SK	AJ	AJ
REV. NO.	DATE	DESCRIPTION	BY	ENG.	APP.



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PROJECT NAME	
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DRAWING TITLE	
X-SECTION A (PRESENT)	
DRAWING No.	
BSR - CS3 - 003	
REVISION:	
B	
DRAWN : SK	CHECKED : AJ
APPROVED : AJ	
RPEQ 2876	
SIZE: A3	DATE: 21 Apr, 2017





TYPICAL REPAIR PROFILE A

LOCALITY PLAN

NOTES

- Repairs to be in accordance with Supreme Court of NSW Consent Orders 2010/426976 Dated 12/08/16
- Council consent to be obtained for works within Road Reserve. No works to be undertaken seaward of the road reserve without approval from NSW State Government.
- Vegetation to be maintained as far as possible.

LEGEND

--- Present Profile (2016)

VERTICAL DATUM: AHD HORIZONTAL DATUM: -

REVISION REGISTER

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A	23/02/17	Amended Annotations	SK	AJ	AJ
REV NO.	DATE	DESCRIPTION	BY	ENG.	APP.



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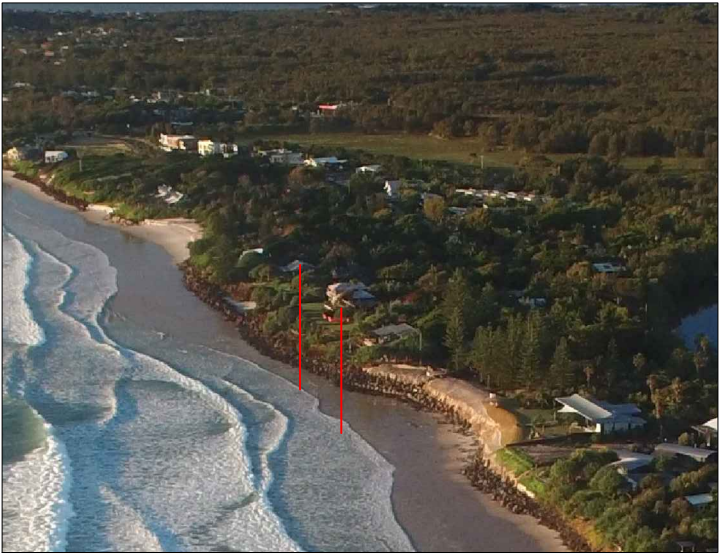
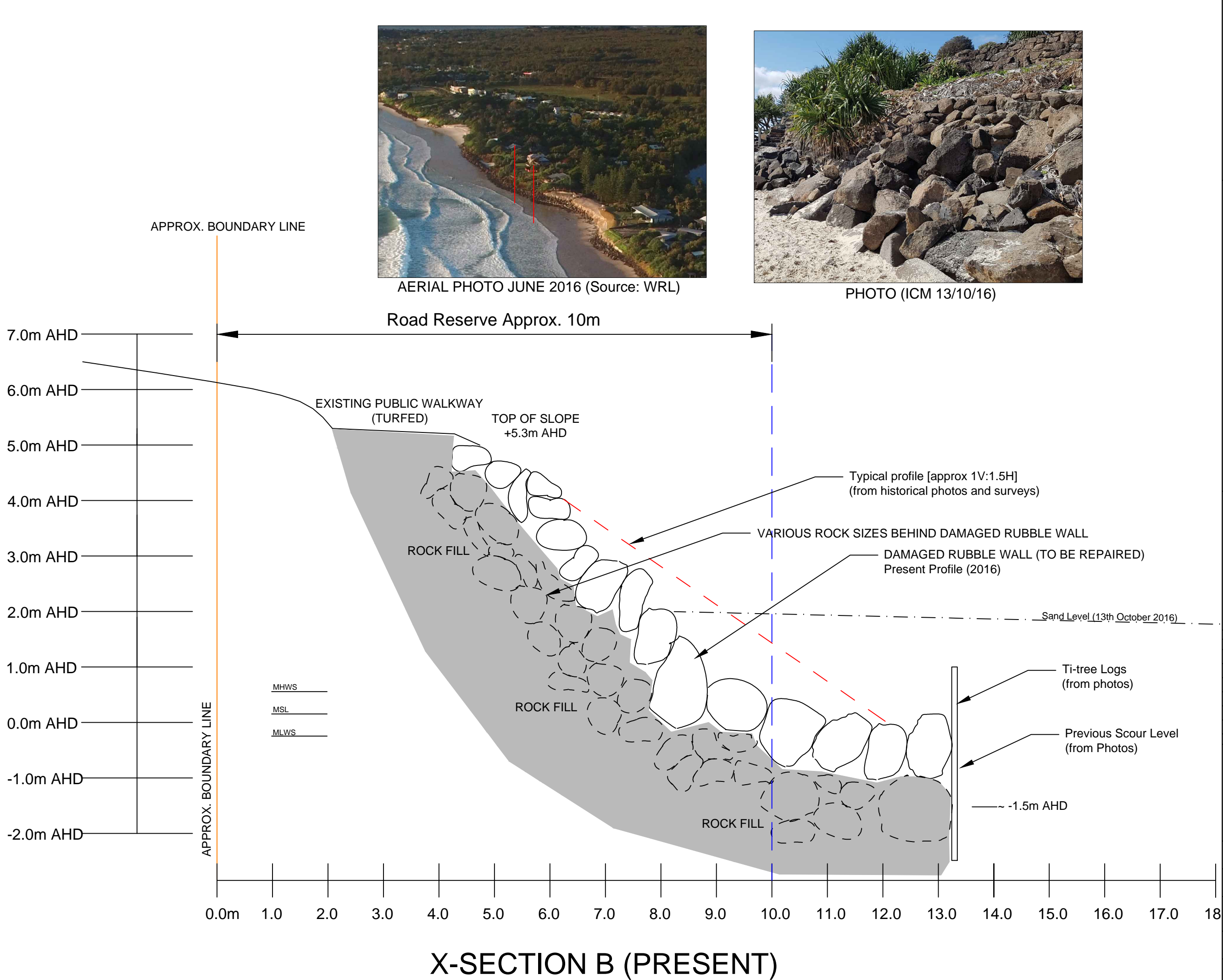
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DRAWING TITLE
REPAIR WORKS A

DRAWING No.	REVISION:
BSR - CS3 - 004	B

DRAWN : SK	CHECKED : AJ	APPROVED : AJ
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SIZE: A3	SCALE: A3	DATE: 21 Apr, 2017
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AERIAL PHOTO JUNE 2016 (Source: WRL)



PHOTO (ICM 13/10/16)

LOCALITY PLAN

NOTES

1. Grey shaded area shows estimated location of rocks based on wall slump and volume displacement

LEGEND

VERTICAL DATUM:	AHD	HORIZONTAL DATUM:	-
REVISION REGISTER			
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A	23/02/17	Added Boundary Line	SK AJ AJ
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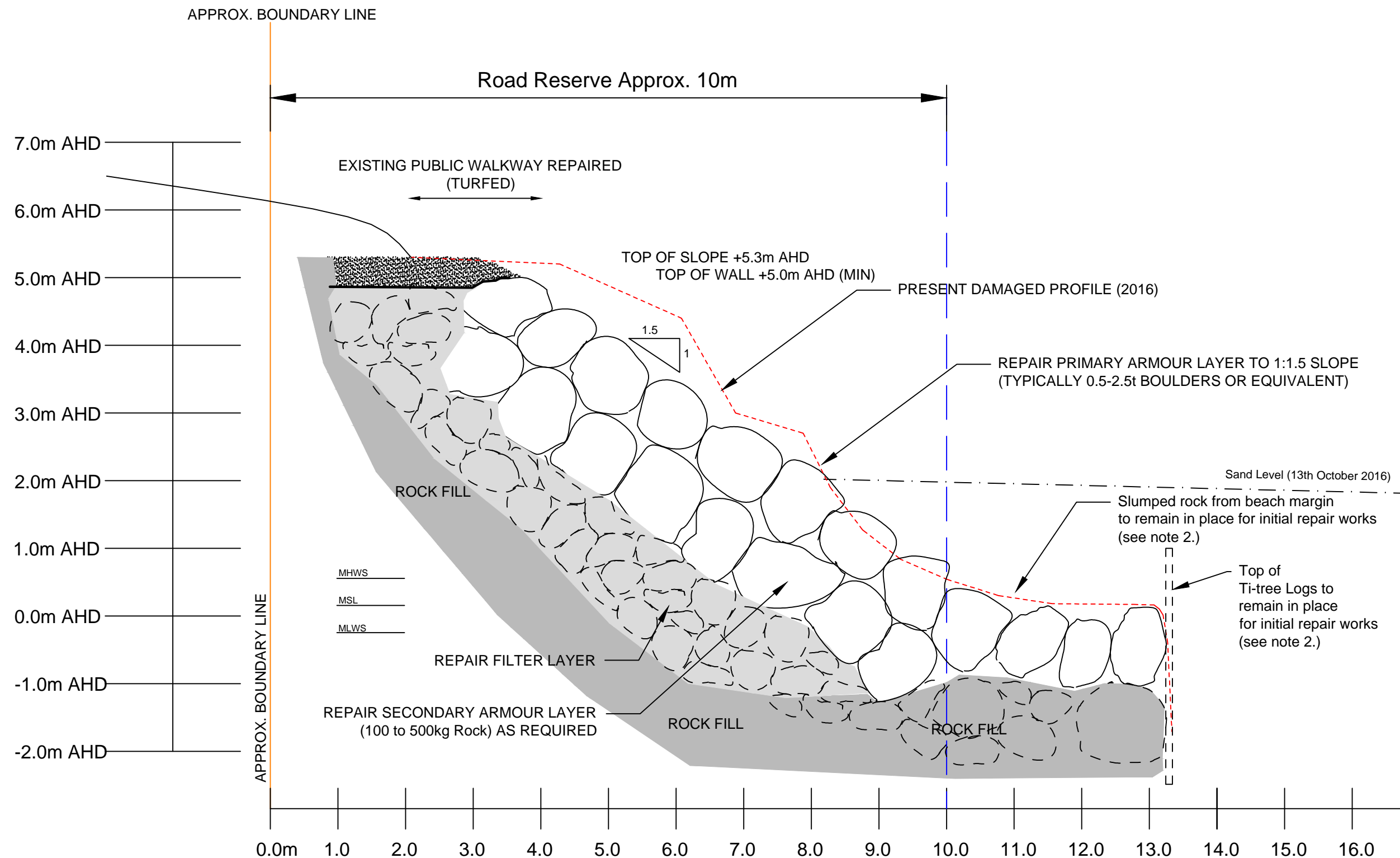
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PROJECT NAME
BELONGIL SEAWALL REPAIRS

DRAWING TITLE
X-SECTION B (PRESENT)

DRAWING No.		REVISION:
BSR - CS3 - 005		B
DRAWN : SK	CHECKED : AJ	APPROVED : AJ
RPEQ 2876		
SIZE: A3	SCALE: A3	DATE: 21 Apr, 2017



TYPICAL REPAIR PROFILE B

LOCALITY PLAN

- NOTES
- Repairs to be in accordance with Supreme Court of NSW Consent Orders 2010/426976 Dated 12/08/16
 - Council consent to be obtained for works within Road Reserve. No works to be undertaken seaward of the road reserve without approval from NSW State Government.
 - Vegetation to be maintained as far as possible.

LEGEND

- - - Present Profile (2016)

VERTICAL DATUM: AHD		HORIZONTAL DATUM: -			
REVISION REGISTER					
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A	23/02/17	Added Boundary Line	SK	AJ	AJ
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PROJECT NAME BELONGIL SEAWALL REPAIRS	
DRAWING TITLE REPAIR WORKS B	
DRAWING No. BSR - CS3 - 006	REVISION: B
DRAWN : SK	CHECKED : AJ
APPROVED : AJ	
RPEQ 2876	
SIZE: A3	DATE: 21 Apr, 2017



LOCALITY PLAN

NOTES

- Construction access to be from Manfred Street, or approved alternate.
 - Refer to traffic control plan; drawing BSR-CS3-010
 - Construction access to be adequately fenced
 - Safe pedestrian access along Manfred Street and to existing beach access to be provided.
- Smooth transition (tie in) of crest and toe to adjacent walls (Typical)
- Vegetation to be maintained as far as possible.

LEGEND

- Safety Fence
- Approximate Property Boundary
- Construction Vehicle Access
- Safe Pedestrian Access

VERTICAL DATUM: AHD HORIZONTAL DATUM: -

REVISION REGISTER

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B	20/04/17	Expanded to include Manfred Street	SK	AJ	AJ
A	23/02/17	Updated Annotations	SK	AJ	AJ
REV NO.	DATE	DESCRIPTION	BY	ENG.	APP.



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PROJECT NAME
BELONGIL SEAWALL REPAIRS

DRAWING TITLE
CONSTRUCTION PLAN

DRAWING No.
BSR - CS3 - 007

REVISION:
B

DRAWN : SK CHECKED : AJ APPROVED : AJ

RPEQ 2876

SIZE: A3 SCALE: A3 DATE: 21 Apr, 2017

CONSTRUCTION PLAN

REPAIR DESIGN

To determine the extent of repair works:

- An inspection of the walls covered under the consent orders was carried out by ICM engineers on 13/10/16 to ascertain the present condition.
- Historical photos and surveys held by ICM were reviewed to ascertain the previous condition.

REPAIR CONSTRUCTION METHOD STATEMENT

Works to repair the seawall structures are to be carried out as anticipated by the recent Supreme Court of NSW consent orders made 12/8/16. The proposed method of carrying out the works is as follows:

- Pre-Construction
 - All approvals and notifications to be in place.
 - Safety fencing and signage is to erected as per drawing 007 to restrict public access to the work and access areas.
 - Temporary construction access from either the sealed section of Manfred Street over the existing rock wall or, alternatively, the sealed section of Don Street along the southern boundary of 1 Don Street over the existing SFGC wall (covered with 1200gsm non-woven geotextile) onto the beach.
- Construction (5 days per week, 7am to 6pm. Estimated repair time 2 week)
 - Access onto the fenced works area for equipment and materials will be by temporary construction track.
 - The works shall be carried out in 10 -15m sections starting from the NW end.
 - Loose rocks above about -1m AHD that have been displaced from the wall face onto the beach to seaward of the wall will be restacked to the original stable slope of 1V:1.5H with the repaired crest at +5m AHD with a 20-30t hydraulic excavator.
 - The crest and toe of the works shall be tapered smoothly into the adjacent crest and toe without interference with the existing structures.
 - The existing access to the beach shall be repaired and safe access provided at each end of the works to provide public access along the top of the wall.
 - The wall is to be progressively surveyed and final “as constructed” drawings prepared.
- Post-Construction
 - The beach is to be groomed and left in a clean condition free from rock or rubble.
 - The access track is to be restored to the original condition.
 - The safety fencing is to be removed.
- Repair Costs
 - Preliminary Estimate = \$165,000

MITIGATION OF IMPACTS

The works have been designed to avoid adverse impacts. Section 55M of the Coastal Protection Act requires that:

- (a) *the works will not over the life of the works:*
- (i) *unreasonably limit or be likely to unreasonably limit public access to or the use of a beach* or headland, or
 - (ii) *pose or be likely to pose a threat to public safety, and*
- (b) *satisfactory arrangements have been made (by conditions imposed on the consent) for the following for the life of the works:*
- (i) *the restoration of a beach, or land adjacent to the beach, if any increased erosion of the beach* or adjacent land is caused by the presence of the works,
 - (ii) *the maintenance of the works.*

With reference to the above conditions:

- Re (a) (i);
- The proposed works are to make safe existing works by restacking of the wall to restore a stable slope without loose rocks that could be easily dislodged during erosion events.
 - The proposed works will make public access safer by moving dislodged rock from the base of the existing wall and replacing these on the repaired slope.
 - The completed repair works will improve public access along the beach.

- Re(a) (ii);
- The proposed repair works will improve public safety by restacking loose rock. Thus, the repair works will not “pose a threat to public safety”.

- Re (b) (i);
- The proposed repair works will restore a stable slope. Large loose rocks at the toe will be moved landward onto the steeper mid and upper slope of the wall. The footprint of the repaired wall will be smaller and will not extend as far seaward. The repaired wall face will also be less reflective during erosion events. As a result, any impacts on the beach and adjacent land will be the same, or less, than at present. Thus, the repairs will not cause “any increased erosion of the beach or adjacent land”.

Re (b) (ii);


The proposed repair works can and should be maintained by the landowners after each erosion event that impacts the wall.

LOCALITY PLAN

NOTES

LEGEND

VERTICAL DATUM: AHD		HORIZONTAL DATUM: -			
REVISION REGISTER					
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A	15/03/17	Ameneded Construction Notes	SK	AJ	AJ
REV NO.	DATE	DESCRIPTION	BY	ENG.	APP.



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PROJECT NAME

BELONGIL SEAWALL REPAIRS

DRAWING TITLE

CONSTRUCTION NOTES

DRAWING No.

BSR - CS3 - 008

REVISION:

B

DRAWN : SK

CHECKED : AJ

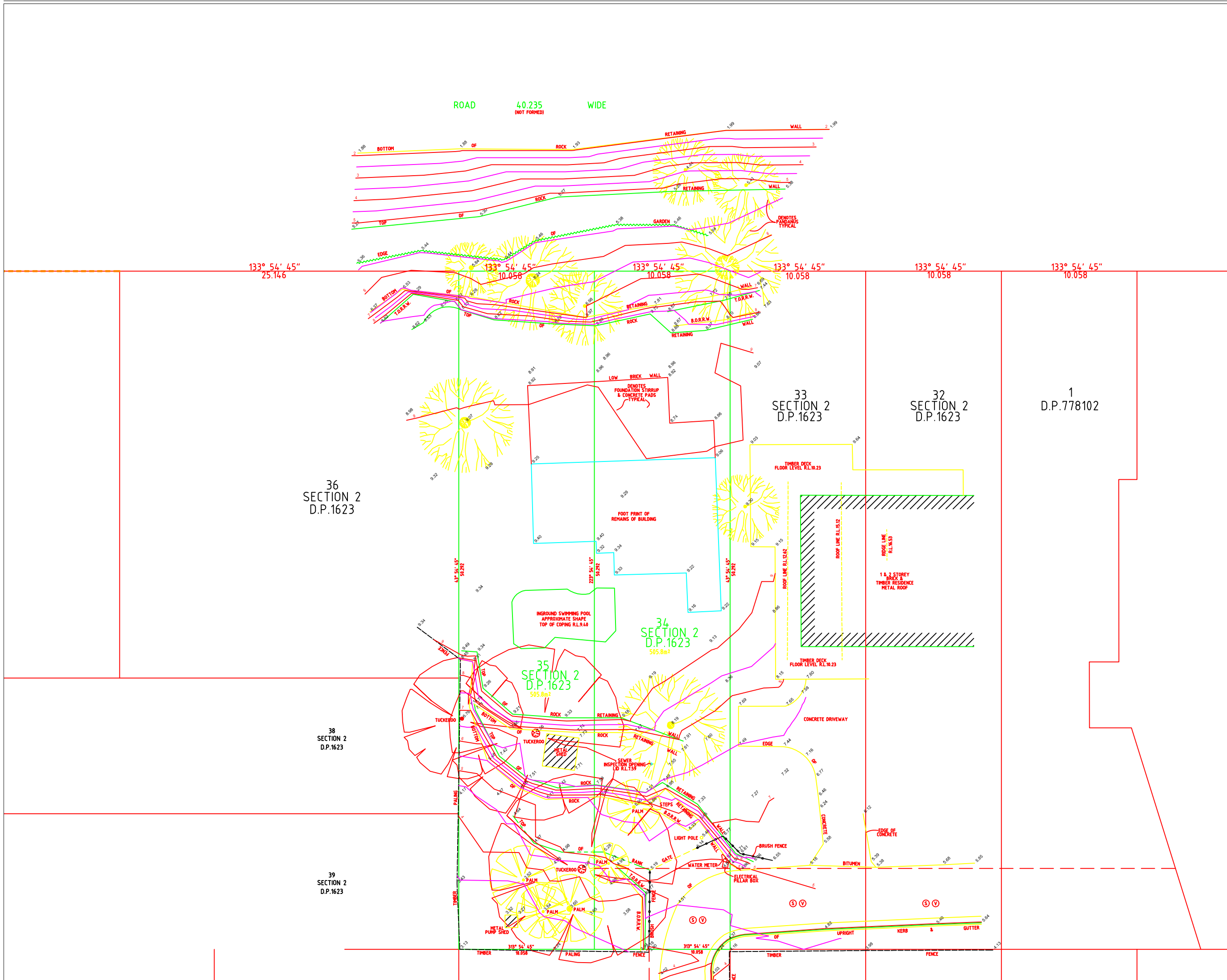
APPROVED : AJ

RPEQ 2876

SIZE: A3

SCALE : A3

DATE : 21 Apr, 2017



LOCALITY PLAN

NOTES

1. 2016 Canty Survey Details
Plan of Detail Survey Lots 34 & 35, Section 2
DP1623, Childe Street, Byron Bay, Shire of Byron,
Parish of Byron, County Rous
Canty's Surveyors ABN 49 093 101 305
Datum - AHD
Survey Date - 28th October 2016
Reference - 0210/2
Drawn By - Cameron Barnett
Checked By - Scott Thompson

LEGEND

VERTICAL DATUM: AHD
HORIZONTAL DATUM: -

REVISION REGISTER

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PROJECT NAME

BELONGIL SEAWALL REPAIRS

DRAWING TITLE

CANTY SURVEY 2016

DRAWING No.

BSR - CS3 - 009

REVISION:

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DRAWN: SK

CHECKED: AJ

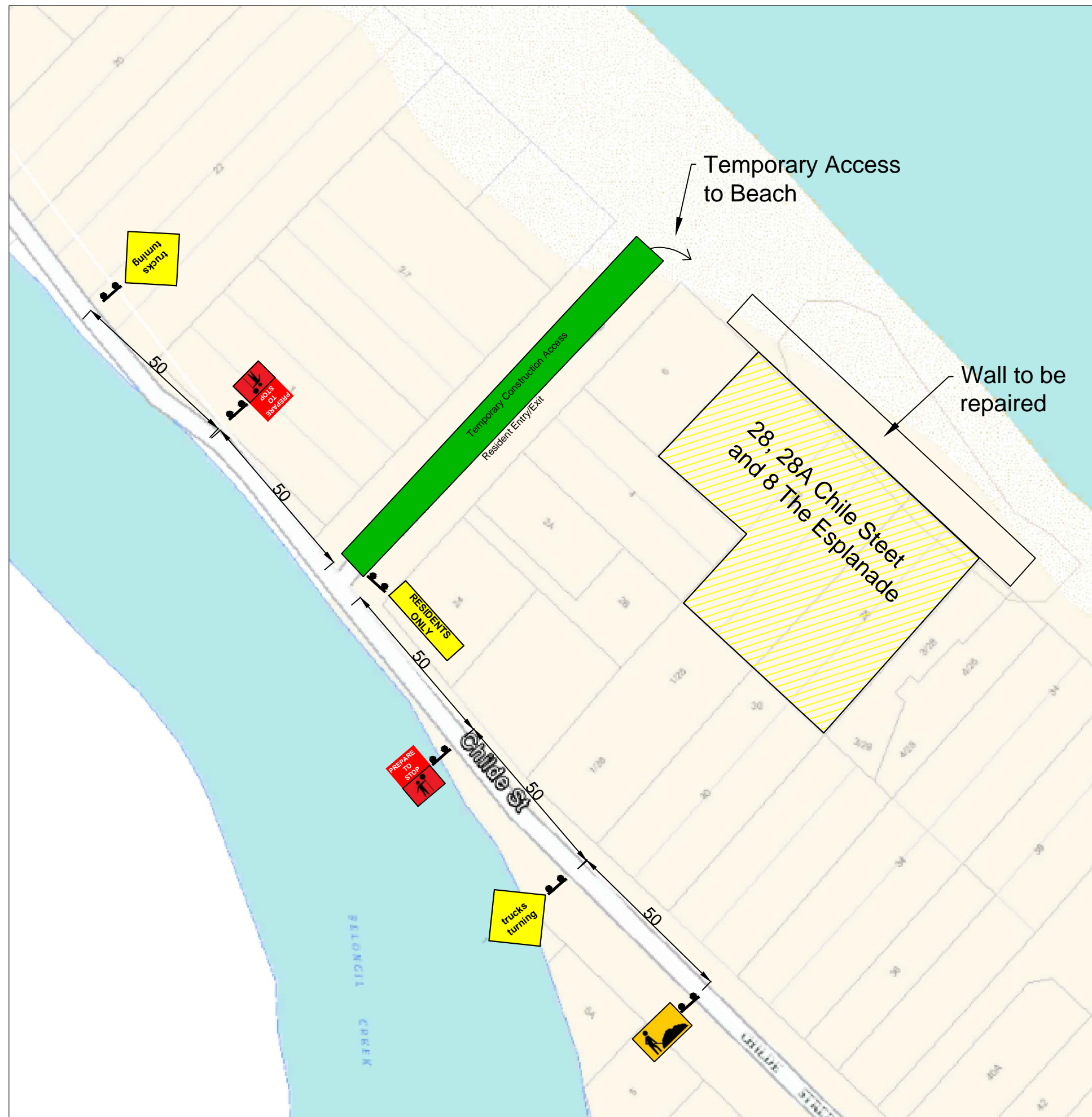
APPROVED: AJ

SIZE: A3

SCALE: A3


DATE: 21 Apr, 2017

RPEQ 2876



NOTES

1. Work hours; 7am - 6pm Monday to Friday excepting public holidays
2. Construction Time; Approx 10 working days.
3. Truck volumes; It is estimated that 60 trucks @ 12t/truck over the 10 days will be required.
4. Traffic Control and Signage; All traffic control and signage is to comply with Roads & Maritime Services Guide to Traffic Control at Worksites Manual. All signage is to be removed when works are not in progress and are to be removed immediately following the completion of works.
 - Sign distances may be shortened to 25m so not to be obscured by vegetation if necessary.
 - Traffic controller to hold North bound traffic for truck to reverse into sight
 - Contractor to provide a spotter for vehicles and pedestrians in Manfred St.
5. Road Hazards; Trucking operations to be implemented in a safe manner so as to not cause a hazard for motorists or pedestrians.
6. Covering of Loads; All loads are to be covered with taut heavy duty purpose fitted tarpaulins to ensure no loss of load or dust.
7. Mud; Contractor to ensure that the wheels, tracks and body surfaces of all vehicles and plant leaving the site are free of mud and that mud is not carried on to adjacent paved streets or other areas.

VERTICAL DATUM: -		HORIZONTAL DATUM: -	
REVISION REGISTER			
REV. NO.	DATE	DESCRIPTION	BY ENG. APP.
 <div style="display: inline-block; vertical-align: middle; margin-left: 10px;"> International Coastal Management </div>			
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PROJECT NAME 28, 28A CHILDE STREET AND 8 THE ESPLANADE			
DRAWING TITLE TRAFFIC CONTROL PLAN			
DRAWING No. BSR - CS3 - 010			REVISION: -
DRAWN : SK	CHECKED : AJ	APPROVED : AJ	
		RPEQ 2876	
SIZE: A3	SCALE: A3	DATE: 21 Apr, 2017	