

SOUTHERN REGIONAL PLANNING PANEL – ADDENDUM REPORT

RPP No.	PPSSTH-103
DA Number	DA-2021/1071
Local Government Area	Southern Regional Panel - Wollongong
Proposed Development	Cliff stabilisation coastal protection works
Street Address	1 Craig Street, Thirroul
Applicant/Owner	Jarrold Etherington
Lodgement date	21 September 2021
Recommendation	Approval
Number of Submissions	None
Regional Development Criteria (Schedule 7 of the SEPP (State and Regional Development) 2011	Coastal Protection Works
List of All Relevant s 4.15(1)(a) Matters	<p><u>s4.15 (1)(a)(i) Any environmental planning instruments:</u></p> <p><i>Acts</i></p> <ul style="list-style-type: none"> Coastal Management Act 2016 No. 20 The Coastal Management Amendment Act 2021 <p><i>State Environmental Planning Policies (SEPPs)</i></p> <ul style="list-style-type: none"> State Environmental Planning Policy No. 55 – Remediation of Land State Environmental Planning Policy (Infrastructure) 2007 State Environmental Planning Policy (State and Regional Development) 2011 State Environmental Planning Policy – (Resilience and Hazards) 2021 <p><i>Local Environmental Planning Policies</i></p> <ul style="list-style-type: none"> Wollongong Local Environmental Plan 2009 <p><i>Other policies:</i></p> <ul style="list-style-type: none"> Wollongong Coastal Zone Management Plan Wollongong City-Wide Development Contributions Plan 2021 Wollongong Community Participation Plan 2019 <p><u>s4.15(1)(a)(ii) Any proposed instrument that is or has been the subject of public consultation under the Act and that has been notified to the consent authority:</u></p> <p>N/A</p> <p><u>s4.15(1)(a)(iii) Any development control plan:</u></p> <ul style="list-style-type: none"> Wollongong Development Control Plan 2009 <p><u>s4.15(1)(a)(iii)(a) any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4</u></p> <p>N/A</p> <p><u>s4.15(1)(a)(iv) the regulations: e.g., Regs 92, 93, 94, 105</u></p> <p>N/A</p>

List all documents submitted with this report for the panel's consideration	Attachments Attachment 1 Deferral Attachment 2 Applicant's response
Clause 4.6 request	N/A
Summary of key submissions	N/A
Report prepared by	Sharyn Grant & John Wood - City Wide Development
Addendum Report Date	15 March 2022

1. ADDENDUM REPORT PURPOSE

This report should be read in conjunction with the Council Assessing Officer's report as considered electronically by the Southern Regional Planning Panel on the 23 February 2022. The Panel decided to defer the matter on 8 March 2022 to enable additional information to be submitted to address issues of concern. A copy of the Panel's decision is provided at Attachment 1.

2. Assessment Report and Recommendation Cover Sheet

Executive Summary

Reason for consideration by Southern Regional Planning Panel

The Southern Sydney Regional Planning Panel is the determining authority for the development pursuant to Part 4 of the SEPP Regional Development 2011 and Schedule 7.

8A Certain coastal protection works

(1) The following development on land within the coastal zone that is directly adjacent to, or is under the waters of, the open ocean, the entrance to an estuary or the entrance to a coastal lake that is open to the ocean—

(a) development for the purpose of coastal protection works carried out by a person other than a public authority, other than coastal protection works identified in the relevant certified coastal management program.

The proposed development is for coastal protection works to be undertaken on private land. Whilst Council does have a certified coastal zone management plan, the identified actions within the plan for this locality are for a seawall.

Proposal

The application proposes to undertake cliff stabilisation works to prevent further erosion, particularly from wave action.

Permissibility

The site is zoned E4 Environmental Living pursuant to Wollongong Local Environmental Plan (LEP) 2009. The proposed development, *Coastal Protection Works*, is not permissible under the WLEP2009, however is permitted with consent under the State Environmental Planning Policy (SEPP) Coastal Management 2018.

Consultation

The proposal was originally notified in accordance with Council's Community Participation Plan 2019 and received no submissions.

Council's Geotechnical, Development Engineering, Heritage and Environment sections have reviewed the proposed works with conditionally satisfactory referral advice received subject to conditions.

The Natural Resource Access Regulator and NSW Fisheries have both advised no objections to the proposal with no required additional referral agency permits or conditions to be imposed.

3. APPLICANT'S RESPONSE TO THE SRPP DEFERRAL

The applicant has provided additional information in response to the concerns raised by the Panel. A copy including updated plans and documents is provided at Attachment 2.

3.1 COUNCIL'S ASSESSING OFFICER'S COMMENTS

3.1.1 Matters Raised by the Panel:

The Panel sought further information and clarification around the following issues, prior to being able to make final determination namely:

- Potential for “end” effects arising from the proposed works
- Potential for enhanced wave reflection arising from the proposed works
- Ability of the proposed works to withstand the wave forces that occur at this location
- The “design life” of the proposed works, which is relevant to formulating conditions to be imposed on the consent for the life of the works (for example a time-limited consent, and/or maintenance requirements for the life of the works) in accordance with Section 27 of the *Coastal Management Act 2016*.

The Panel requested the followings specific matters be addressed:

- An illustration in plan view of the location and extent of all proposed works. Ideally, this could be overlain on the detailed survey plan provided in the Council Assessment Report. This illustration should clearly identify the extent of shotcrete to be placed, particularly over existing cliff and boulders on the foreshore.

Comment - provided in documents provided at Attachment 2.

- An illustration in elevation view of the extent of all proposed works along the eastern (seaward) boundary of the site. Ideally, this would be as a photo montage clearly showing all stabilisation elements to be placed on the existing cliff and rock face, the extent of the shotcreting and any other concrete elements along width of the eastern boundary; and any works at or around the existing stormwater outlet at the north-eastern corner of the Lot.

Comment - provided in documents and elevation plan provided at Attachment 2, page 5.

- A clear description of:
 - The design life of the works
 - The potential for “end” effects from the proposed works/structures that may result in enhanced erosion to adjacent land. In particular, the Lot immediately adjacent to the north appears to be composed of more erodible materials, and there is currently evidence of previous landslips in the form of soil, rocks and other debris in this location.
 - The potential for enhanced wave reflection from the works, for example, where the shotcreting may reduce the roughness and “blockiness” of the existing cliff and rock profile in this location.
 - The wave forces that the proposed works may be subject to over its design life, and any mitigation measures proposed, for example, limits to design life, maintenance, and/or monitoring provisions.
 - Any other potential changes to coastal processes and hazards arising from the works.

Comment – provided at Attachment 2, including report from JK Geotechnics, pages 7 to 23.

The Panel also seeks the original report referenced in the SoEE:

- Horton Coastal Engineering, 2020, *Information on Proposed Cliff Stabilisation Works at 1 Craig Street Thirroul for Pre-Lodgement Meeting*, Doc Ref: IrJ0134-1 Craig St Thirroul PLM-v3.docx

Comment – provided in Attachment 2, pages 24 to 31.

3.1.2 Overall Comment:

As a result of the additional information Council suggest Condition 1 of the Draft Conditions be updated to include the reference to the additional information from BMT dated 10 March 2022. See draft condition amendment below.

Original Draft Condition 1

Approved plans and documents

The development shall be implemented substantially in accordance with the details and specifications set out on Drawing No. P.R.12668 dated 29 April 2021 prepared by Dennis Smith Surveys and the report dated 29 June 2020 by JK Geotechnics and Statement of Environmental Effects Ref. R.A11273.001.02 Rev.2 dated 1 September 2021 by BMT Commercial Australia Pty Ltd and any details on the application form, and with any supporting information received, except as amended by the conditions specified and imposed hereunder.

Amended Draft Condition 1

Approved plans and documents

The development shall be implemented substantially in accordance with the details and specifications set out on Drawing No. P.R.12668 dated 29 April 2021 prepared by Dennis Smith Surveys and the report dated 29 June 2020 by JK Geotechnics and Statement of Environmental Effects Ref. R.A11273.001.02 Rev.2 dated 1 September 2021 and the subsequent Additional Assessment information Ref. L.A11273.002 SPP dated 10 March 2022 by BMT Commercial Australia Pty Ltd and any details on the application form, and with any supporting information received, except as amended by the conditions specified and imposed hereunder.

It is the Council's Assessing Officer's view that the applicant appears to have satisfactorily addressed the matters listed by the Panel.

4 CONCLUSION

At the Electronic meeting of 23 February 2022, the Panel deferred determination of the matter to allow the applicant an opportunity to address matters of concern and submit additional information. In response the applicant has submitted additional information which has been reviewed and is considered satisfactory.

The Department of Planning and Environment recently amended and consolidated the existing forty-five (45) state environmental planning policies into eleven (11) new policies in order to simplify the planning system. The consolidated SEPPs commenced on 5 March 2022 with the exception of the Housing SEPP which commenced on 26 November 2021 and the Design and Place SEPP which is still in a draft form.

The proposed development is subject to the following Environmental Planning Instruments:

– State Environmental Planning Policy (Resilience and Hazards), 2022

The provisions of this policy has been considered as part of this assessment and the proposal satisfies the requirements.

5 RECOMMENDATION

DA-2021/1071 be approved subject to the condition listed in the original assessment report to the Panel and any amendments to conditions recommended above in Section 3.1.2.

ATTACHMENTS

- 1 SRPP deferral from electronic meeting 23 February 2022.
- 2 Response from applicant and additional information submission.



BMT (OFFICIAL)

Our ref: L.A11273.002.SPP IR Request.docx

10 March 2022

Wollongong City Council
Locked Bag 8821
Wollongong DC NSW 2500

Attention: Sharyn Grant

Dear Sharyn,

RE: PPSSTH-103 (DA-2021/1071) PROPOSED CLIFF STABILISATION COASTAL PROTECTION WORKS AT 1 CRAIG ST THIRROUL

This letter responds to information requested by Wollongong City Council (WCC) on behalf of the Southern Regional Planning Panel (the Panel) regarding ***PPSSTH-103 (DA-2021/1071) Proposed cliff stabilisation coastal protection works at 1 Craig St Thirroul***. This letter sets out responses against each of the items raised by the Panel, as set out in email from Sharyn Grant dated 27 February 2022.

This letter is accompanied by updated plan and elevation views of the works, as requested by the panel. Note that these plans provide more detail of the works but no actual change to the works applied for is proposed as part of this response. These plans are not detailed but show the extent of works. More detailed plans are not possible at present due to the need for the works to reflect actual conditions at the time (see further below).

If you have any queries regarding this response, please do not hesitate to contact me at Jeremy.Visser@bmtglobal.com or 07 3831 6744.

Yours Sincerely,

BMT

A handwritten signature in blue ink, appearing to read 'Jeremy Visser', is positioned above the printed name.

Jeremy Visser
Senior Environmental Consultant

1 Additional Assessment Information

It is understood that the Panel requires further information on the following aspects of the works:

- The design life of the works.
- The potential for 'end' effects from the proposed works/structures that may result in enhanced erosion to adjacent land. In particular, the Lot immediately adjacent to the north appears to be composed of more erodible materials, and there is currently evidence of previous landslips in the form of soil, rocks and other debris in this location.
- The potential for enhanced wave reflection from the works, for example, where the shotcreting may reduce the roughness and 'blockiness' of the existing cliff and rock profile in this location.
- The wave forces that the proposed works may be subject to over its design life, and any mitigation measures proposed, for example, limits to design life, maintenance, and/or monitoring provisions.
- Any other potential changes to coastal processes and hazards arising from the works.

For ease of reference, the geotechnical design specifications for the stabilisation works have been re-attached as part of this response. This provides detail on the specific methodology proposed for the works, including the expected extent of rock-bolting and shotcreting. Note that a significant component of the scope is as follows (s2.1):

*2. Complete a detailed geotechnical inspection to confirm the scope and extent of stabilisation measures. **At this stage the extent of repairs to the existing shotcrete will be confirmed as well as identifying the extent of underpinning of cliff face undercuts, any blocks that require stabilisation and the extent of infilling of open joints.***

*3. Provide reinforced shotcrete supported by rock bolts (3m and 4m long) installed at about 1.0m lateral spacing and 1.5m vertical spacing staggered **over the full height and length of the damaged shotcrete face.***

Importantly, this methodology relies on a geotechnical consultant to confirm the full extent of works required. Subsequent to this, rock bolts and shotcreting would be applied across the full extent of areas requiring stabilisation. Therefore, the actual full extent of works will depend on the conditions of the cliffs at the time of works.

Despite this, an indicative extent has been provided in the plan view of the works developed in parallel with this response. Note that this extends through to the area where the cliff slumping transitions to a more stable area, as shown in the photo below taken from Horton (2020). This area is set back approximately 4 m from the northern property boundary of 1 Craig Street.



Figure 1.1 Area of concrete face requiring shotcreting and rock bolts (Horton, 2020)

The design life of rock bolting and shotcrete works depends on the environmental forces that the structures will be exposed to and the geotechnical characteristics of the cliff at the time of works. At a minimum, the rock bolts will have a design life of 25 years although there is precedence for such works having a design life of 50+ years. Note that some maintenance may be required on the associated shotcrete across this time.

As can be seen from Figure 1.1, much of the shoreline of the property is already a highly reflective environment. While shotcreting works will lead to an increased 'smoothing' of this area compared to present, this is not anticipated to materially change the wave climate for the area. Importantly, as the area already has a high level of wave reflection, the shotcreting will not represent a fundamental change in shoreline type which may otherwise lead to more significant changes in wave activity. Additionally, the shotcreting works are not proposed to cover the entire cliff face and foreshore, and therefore will preserve some of the existing 'complexity' of the environment that assists in slowing wave movement. This can also be seen in review of the works undertaken at the adjoining (southern) Council road reserve where shotcreting and rock-bolting have also been undertaken, without major changes in wave climate.

Without a material change in wave reflection, the works are not anticipated to cause a major change to coastal hazards in the area. The main driver for cliff instability is preferential erosion within the siltstone band of the cliff face, following exposure of sand levels. Sand exposure itself is driven primarily as a result of storm erosion, rather than ongoing (wave-driven) longshore processes). Any change in wave reflection at the cliffs, therefore, is not expected to drive sand scour and subsequent cliff instability of adjoining areas. Note also that as the 'end' of the works will be set back several metres from the

property boundary and adjacent to a natural 'return' in the rock platform, any scour effects that do occur are not expected to move beyond the property boundary.

Note also that in determining coastal hazard zones for the Wollongong Coastal Zone Management Plan (CZMP),¹ geotechnical hazards were considered in conjunction with coastal processes. This included determination of a wave run-up effect based on 'representative cliffs in the study region [and] calculated using empirical formulae for wave run up on rough impermeable surfaces' (s3.2.3). The proposed 'shotcreted' cliff face would be consistent with the assumed 'rough impermeable surface' used for the CZMP assessment therefore. Adopting this approach, at present, both areas are considered to be at low risk of shoreline erosion under the CZMP. This indicates that, as long as the property retains a 'rough impermeable surface', the effects of works within the coastal environment should not materially change the risk levels of the adjoining property.

The CZMP also acknowledges the geotechnical risk that exists across most of the Thirroul coastline and does not materially distinguish between the proponent site and adjoining lands. The key risk to these areas, therefore, remains a geotechnical risk, as exacerbated and/or influenced by coastal processes. This likely accounts for the debris and slippage already identified for the adjoining property. Note also that the CZMP acknowledges the need for geotechnical hazard management for each of the properties in the area of Thirroul cliffs in which the proponent site is located. While the proposed works are not specifically identified in the CZMP, they are consistent with the intent for coastal protection in this area.

¹ https://www.wollongong.nsw.gov.au/_data/assets/pdf_file/0029/36569/Coastal-Zone-Management-Plan-Management-Study.pdf

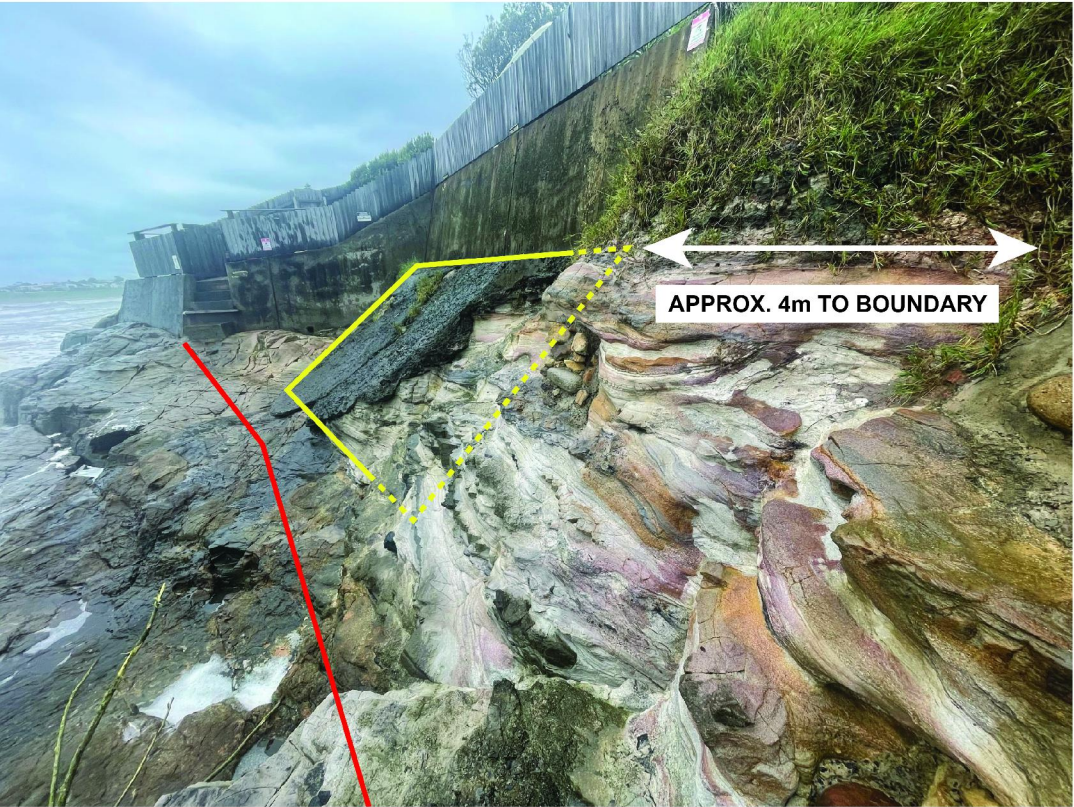
SHOTCRETE RETAINING WALL CONCEPT PLAN



PLAN VIEW



VIEW LOOKING NORTH



VIEW LOOKING SOUTH

- LEGEND
- SHOTCRETING
 - WORK EXTENT
 - CADASTRAL BOUNDARIES

AERIAL IMAGE 9 FEBRUARY 2022 BY NEARMAP.COM

Title:
**Shotcrete Retaining Wall Concept Plan
1 Craig St, Thirroul**

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

NOT TO SCALE

Filepath: I:\A11273_I_GML_ThirroulCliffStabilisation_JV\QGIS\A11273_002_220309_ConceptPlans.qgz

Figure:
A11273-002

Rev:
A



2 Attachments



SPECIFICATION

FOR FORESHORE CLIFF FACE STABILISATION MEASURES

AT
1 CRAIG STREET, THIRROUL, NSW

Date: 29 June 2020

Ref: 31735R spec

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Specification prepared by:

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For and on behalf of

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DOCUMENT REVISION RECORD

Report Reference	Report Status	Report Date
31735R spec	Final	29/6/20

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ATTACHMENTS

Table A: Pricing Schedule

Figure 1: Rock Bolt Detail

Figure 2: Typical Detail: Rock Bolt Supporting Shotcrete

Figure 3: Shotcrete Reinforcing and Strip Drain Detail

Figure 4: Typical Detail: Underpin Support to Undercut at Base of Cliff Face

1 INTRODUCTION

This specification presents the extent and location of recommended stabilisation measures (referred to as the works) as outlined in our report (Ref: 31735Rlet) dated 18 December 2018. The extent of the works is an approximately 20m length of foreshore cliff face on the seaward side of the property at No. 1 Craig Street; see Plate 1.



Plate 1: Approximate Extent Of The Works

At this stage it is assumed that the stabilisation measures will include:

- Underpinning of the current undercut areas at the base of the outcrop face. Locally there may be a need for rock bolts to secure individual blocks although we consider this to be unlikely.
- Infill open joints along the outcrop crest area with concrete or grout to prevent wave overtopping, rainfall, surface run-off and stormwater discharge from entering the joint planes and possibly imparting additional destabilising hydrostatic pressures on individual blocks.
- Repair the steeply sloping concrete face with shotcrete and rock bolts.

The purpose of the stabilisation measures is to protect the current foreshore outcrop face and thereby the property landward of the outcrop face within the site (No. 1 Craig Street).

2 SCOPE OF WORKS AND SEQUENCING

2.1 Scope Of Works

The scope of the stabilisation measures covered by this specification are summarised on the attached Figures 1 to 4 and Table A, and will be as follows:

1. Remove loose debris, damaged shotcrete and fractured rock from the section of cliff face covered by The Works.
2. Complete a detailed geotechnical inspection to confirm the scope and extent of stabilisation measures. At this stage the extent of repairs to the existing shotcrete will be confirmed as well as identifying the extent of underpinning of cliff face undercuts, any blocks that require stabilisation and the extent of infilling of open joints.
3. Provide reinforced shotcrete supported by rock bolts (3m and 4m long) installed at about 1.0m lateral spacing and 1.5m vertical spacing staggered over the full height and length of the damaged shotcrete face.
4. Construct cliff face underpins.
5. Install individual rock bolts to support unstable blocks (where required) and infill open joints in the cliff face crest.

The Works are expected to be completed from the beach and rock platform with due regard for tidal levels.

The Contractor must allow for appropriate traffic/pedestrian control using an accredited RMS traffic control company and in accordance with Council requirements, such as submission of a traffic control plan to Council for approval, permit to work on the beach etc.

2.2 Sequencing Of The Works

The above works will require pedestrian and traffic control measures which will need to be provided to the satisfaction of Council. Once the pedestrian and traffic control measures are in place, the sequence of works will be as follows:

1. A site inception meeting must be held at the commencement of the works attended by the stabilisation contractor and the Geotechnical Consultant. The purpose of the inception meeting is to outline and confirm the scope of works and determine the stabilisation contractors work methods.
2. Clear loose debris, damaged shotcrete and fractured rock from the cliff face.
3. Provide reinforced shotcrete supported by rock bolts, cliff face undercuts, rock bolts to support individual blocks (where required) and infill open joint planes in the cliff face crest.
4. Stabilisation measures must be installed in accordance with the Specification. Periodic site inspections must be undertaken by the Geotechnical Consultant during the course of the works. This is a HOLD point and the final shotcrete faces must not to be applied until approval is given by the Geotechnical Consultant.

The final works must be inspected by the Geotechnical Consultant and stabilisation contractor. This is a HOLD point. Plant and equipment can be de-commissioned and pedestrian/traffic control measures removed, once the Geotechnical Consultant has confirmed that the works have been satisfactorily completed.

At least 24 hours notice must be given by the stabilisation contractor when a geotechnical inspection is required.

3 STABILISATION CONTRACTORS ROLE

The stabilisation contractor must supply all materials, plant and labour for treatment of the potential geotechnical hazards as indicated in this specification and on the drawings herein to the entire satisfaction of the Geotechnical Consultant.

The works must be carefully planned and scheduled to avoid breaks for holidays during construction and should preferably be undertaken during dry weather.

The stabilisation contractor must provide a Safe Work Method Statement (SWMS) and construction program with their Tender. The SWMS and construction program will need to be approved by the Geotechnical Consultant.

The stabilisation contractor must have a skilled and competent foreman on site continuously for all of the required works. The stabilisation contractor foreman must be available daily for joint site inspections and/or site meetings related to the works. If any major issues arise, then the project manager representing the stabilisation contractor must be available for any relevant meetings at short notice.

The stabilisation contractor is required to have current public liability and contractors all risk insurance policy appropriate for The Works and to the satisfaction of The Owner. Copies of these policies must be forwarded and approved by The Owner before the commencement of any site work.

All other statutory insurance policies, including workers compensation cover, must be held by the stabilisation contractor.

The stabilisation contractor must allow for determination of the location of any buried services affecting the proposed works. If any buried services do affect the work then the installation angle of rock bolts may need to be adjusted so as to avoid the buried services. The adjusted rock bolt installation angle must be agreed by the Geotechnical Consultant, Council and the owner of the utility, if appropriate.

Every care must be taken during the work to protect any existing structures and services from damage. Any damage which, in the opinion of The Owner or the Geotechnical Consultant has been caused as a result of incorrect workmanship or inadequate precautions by the stabilisation contractor must be repaired or replaced at the stabilisation contractor's expense.

Stripping of vegetation, clearance of loose debris, installation of rock bolts, reinforced shotcrete etc must be completed in a manner which will prevent uncontrolled down slope movement of any materials. The stabilisation contractor must maintain site safety for site personnel and users of the road below.

4 POLLUTION AND ENVIRONMENTAL MANAGEMENT

The stabilisation contractor must plan and carry out the works to avoid erosion, contamination, or sedimentation within the site and its immediate environs. Appropriate control measures must be defined in the stabilisation contractor's tender and be implemented and maintained by the stabilisation contractor for the stabilisation works period. The control measures must also include clean-up and emergency measures.

The works must be completed in accordance with the appropriate Council environmental policies and/or guidelines and in accordance with existing legislation.

5 DRILLING ROCK BOLT HOLES, WATER TESTING AND CLEANING HOLES

- (a) Holes are to be drilled using rotary (i.e. non-percussive) techniques at spacings and/or locations nominated in the appropriate Figures, Plates and/or as directed on site.
- (b) Required hole lengths are as shown in Table A and/or as directed on site. Drill holes must be over-drilled by an additional 500 millimetres (mm) such that incomplete cleaning does not affect the bond length of the rock bolts.
- (c) The minimum acceptable hole diameter for installation of 25mm diameter size rock bolts must be 60mm.
- (d) Holes must be drilled at not less than 15° below the horizontal and in accordance with the details provided in Table A, on the appropriate Figures and/or as directed on site.
- (e) Each of the holes must be water tested to ensure that the water loss is not greater than 0.5 litres per minute. If water loss is found to be in excess of this criterion, the hole must be initially grouted and then redrilled and retested until a satisfactory test result is obtained. Supervision of the grouting and retesting procedure by the Geotechnical Consultant must be carried out to assess the need for grouting and redrilling. All holes with an unsatisfactory water loss are to be identified to the representative within 24 hours of the initial water test.
- (f) Prior to installation, all holes must be flush cleaned by clean water passing through a hose or delivery pipe inserted to the base of the hole. The hole must be pronounced clean once clear or almost clear water is being returned out of the hole opening. This procedure must be supervised by the Geotechnical Consultant or the Council representative to ensure it is being carried out correctly.
- (g) On completion of drilling and flushing, all holes must be plugged or otherwise protected to prevent entry of foreign matter.
- (h) The stabilisation contractor must record for each hole the date drilled, length drilled, orientation of hole, time of water test, water test result, details of grouting and redrilling, if required. The details are to be provided to the Geotechnical Consultant prior to installation of the rock bolt.

6 ROCK BOLTS

- (a) Rock bolts are to consist of DSI “THREADBAR” Double Corrosion Protection (DCP) rock bolts (or similar). Unless otherwise specified, bolts must be locked off against a 200mm square anchor plate with a head assembly provided in accordance with the supplier’s specifications (see Figure 1).
- (b) Total in hole length of rock bolts must be as shown in Table A and/or as directed on site. However, it is possible that subsurface conditions encountered during drilling of the rock bolt holes may differ from those expected and therefore some allowance must be made for adjustments in bolt lengths (that is, they may need to be longer).
- (c) Care must be taken to prevent damage, kinking or bending of bolts. Any bolts sustaining damage must not be used.
- (d) Bolts must be kept free from oil, grease, mud or any other deleterious substances. The steel must not be visibly pitted or rusted.

7 INSTALLATION AND GROUTING

- (a) Spacers or spiders must be provided along the length of the rock bolts to maintain them centrally within the drill hole.
- (b) Grout mix to surround the rock bolt is to have a target water/cement ratio of 0.45. A target laboratory test criterion would be an average grout strength of 25MPa at seven days. (No single test to be less than 20MPa). A minimum sampling and test ratio must be one set of three test specimens per three mix batches. All grout testing must be completed by a NATA registered laboratory and the cost of testing must be paid by the stabilisation contractor. Confirmatory test results need to be provided to the Geotechnical Consultant.
- (c) Grout must be pumped to the base of the hole through hoses or grout tubes until the consistency of the grout mix escaping at the hole openings is the same as that being pumped in. Once this is the case, the grout tube must be withdrawn slowly such that the rate of grout exiting the hole is virtually maintained. Only when the tube is completely removed from the hole should the pumping mechanism be switched off.
- (d) If the grout level drops below the drill hole opening whilst still wet, it must be topped up until loss of grout is negligible. If the grout level cannot be maintained, then the rock bolt must be withdrawn and the hole treated as per Item 5 (e).
- (e) Once grout is dry or almost dry, a thick, non-shrink topping grout must be packed into the hole until the grout completely covers the rock bolt up to the drill hole opening. The grout must be finished flush with the surrounding rock face.
- (f) Unless otherwise specified, bolts must be locked off as per Item 6 (a).
- (g) Where mortar pads are required, the mortar must be non-shrink and of a strength at least equal to the grout. The mortar pad must be formed to the required size and the bearing plate seated to provide uniform bearing.
- (h) The end plates must be fitted and nuts nipped tight no sooner than four days after grouting.

8 MESH AND SHOTCRETING

- (a) One layer of hot dipped galvanised reinforcing, SL61 mesh must be used at locations nominated on the appropriate Figures, Plates and/or as directed on site by the Geotechnical Consultant. Four additional N12 bars (1.0m long) to be installed at each of the rock bolt head assembly-reinforcement interfaces; 2 vertical and 2 horizontal; see Figure 3.
- (b) The mesh must be held to the rock face by DSI “THREADBAR” DCP rock bolts (or similar) at horizontal and vertical spacings as indicate on Figure 2, or as directed on site by the Geotechnical Consultant. Typically, 1.0m lateral and 1.5m vertical spacings are anticipated although actual spacings must be confirmed by the Geotechnical Consultant and some additional rock bolts or irregular spacings may be required.
- (c) Chairs must be provided to maintain a clear gap of 50mm between the rock face and the mesh.
- (d) The mesh must be kept free from oil, grease, mud or any other deleterious substances. The steel must not be visibly pitted or rusted.
- (e) The shotcrete must have a thickness of at least 160mm, providing minimum covers of 50mm to the front of the rock bolt, and 65mm to the rear of the reinforcing mesh.
- (f) All shotcrete must be in accordance with “Recommended Practice Sprayed Concrete” prepared by the Concrete Institute of Australia.
- (g) All shotcrete must have a characteristic strength ($F'c$) of 50MPa.
- (h) Shotcrete may be stencilled and stained with an appropriate colour to provide a ‘sandstone’ like surface colour, if required by The Owner.

9 UNDERPINS

- (a) N12-200 hot dipped galvanised reinforcing mesh must be used as indicated on Figure 4 and/or as directed on site.
- (b) The underpins must be founded on sandstone bedrock as indicated on Figure 4 and/or as directed on site. The bedrock foundation must be confirmed by the Geotechnical Consultant.
- (c) Formwork must be provided and a minimum 200mm cover to the outer face of the underpin reinforcement.
- (d) The mesh and shotcrete must also be installed in compliance with Items 8 (d) and 8 (f) to (h).

10 DRAINAGE

- (a) Geotextile enclosed drainage strips or other drainage medium approved by the Geotechnical Consultant must be placed against the rock face at the rear of the shotcrete as nominated in Figure 2.
- (b) The strip drains must be discharged in a controlled manner beyond the toe of the shotcrete face.

11 LOAD TESTING OF ROCK BOLTS

- (a) Load testing of rock bolts to 1.3 times the working load [100kN] will be required as directed by the Geotechnical Consultant prior to shotcrete placement. The stabilisation contractor must allow for at least 20% of rock bolts to be tested at locations to be determined by the Geotechnical Consultant.

The load testing must be witnessed by the Geotechnical Consultant. Any rock bolts failing the test must be replaced at the stabilisation contractor's expense.

12 SITE CLEAN UP

- (a) All vegetation and material removed from the site must be taken off site to an authorised landfill.

13 RECORDS TO BE SUPPLIED BY THE CONTRACTOR

The stabilisation contractor must supply the following records to the Geotechnical Consultant prior to the commencement of the works:

1. Calibration charts for the jack and gauges to be used for the rock bolt load testing.

Following the installation of the rock bolts, the stabilisation contractor must supply the following records to the Geotechnical Consultants:

1. Details of each rock bolt as outlined in Item 5 (h);
2. Results of the water test, grouting and redrilling (if required) for each rock bolt hole as outlined in Section 5;
3. Grout strength tests; and
4. The results of load testing of rock bolts must be supplied to the Geotechnical Consultant within 24 hours of completing the tests. If the rock bolt fails during testing then the Geotechnical Consultant will immediately advise on the new rock bolt location. A new rock bolt installed in a separate drill hole will be required with all the information outlined in Sections 1, 2 and 3, above provided. The replacement rock bolt must also be load tested in the presence of the Geotechnical Consultant.

14 AUSTRALIAN STANDARDS

Wherever Australian Standards exist with regard to the materials and workmanship referred to in this specification then they must be deemed to apply.

15 REFERENCE TABLE, DRAWINGS AND PLATES

The following table, drawings and photographic plates are attached and form part of this specification.

TABLE A:	Pricing Schedule
Figure 1:	Rock Bolt Detail
Figure 2:	Typical Detail: Rock Bolt Supporting Reinforced Shotcrete
Figure 3:	Shotcrete Reinforcing and Strip Drain Detail
Figure 4:	Typical Detail: Underpin Support to Undercut at Base of Cliff Face

16 GENERAL COMMENTS

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



TABLE A
PRICING SCHEDULE

	PRELIMINARIES			
ITEM	PROVISIONAL QUANTITY	UNIT	RATE	TOTAL
Establishment/De-establishment (includes all plant, equipment & personnel)	1	LS		
Provision of Environmental Controls	1	LS		
Provision of Pedestrian/Traffic Control	1	LS		
Provision of Work As Executed Details	1	LS		
Sub Total				

Proposed Stabilisation Measures (No. 1 Craig Street)	Expected Volume	Number of Rock Bolts	Expected Length of Rock Bolts	UNIT	RATE	TOTAL
Remove loose rock and damaged shotcrete from the cliff face.	1m ³	-	-	m ³		
Provide reinforced shotcrete to cover approximately 5m long section of cliff face and damaged shotcrete. Supported by two rows of rock bolts installed at about 1m lateral and 1.5m vertical spacing; and positioned to have staggered centres.	2.5m ³ (based on 0.2m thick shotcrete)	3 3	4m (upper row) 3m (lower row)	ea ea m ³		
Provide continuous underpins to support cliff face undercuts; approximately 20m long, max. 1m high and 1.3m depth.	25m ³			m ³		
Infill open joints in the cliff face crest with concrete.	0.5m ³			m ³		
Contingency for additional rock bolts to support potentially unstable blocks.		6	5m	ea		
Sub Total						



Pricing Schedule Summary		
General items	Sub Total	
Proposed Stabilisation Measures	Sub Total	
Contingency for additional 25mm diameter rock bolts	Sub Total	
	10% GST	
	FINAL TOTAL	

NOTES

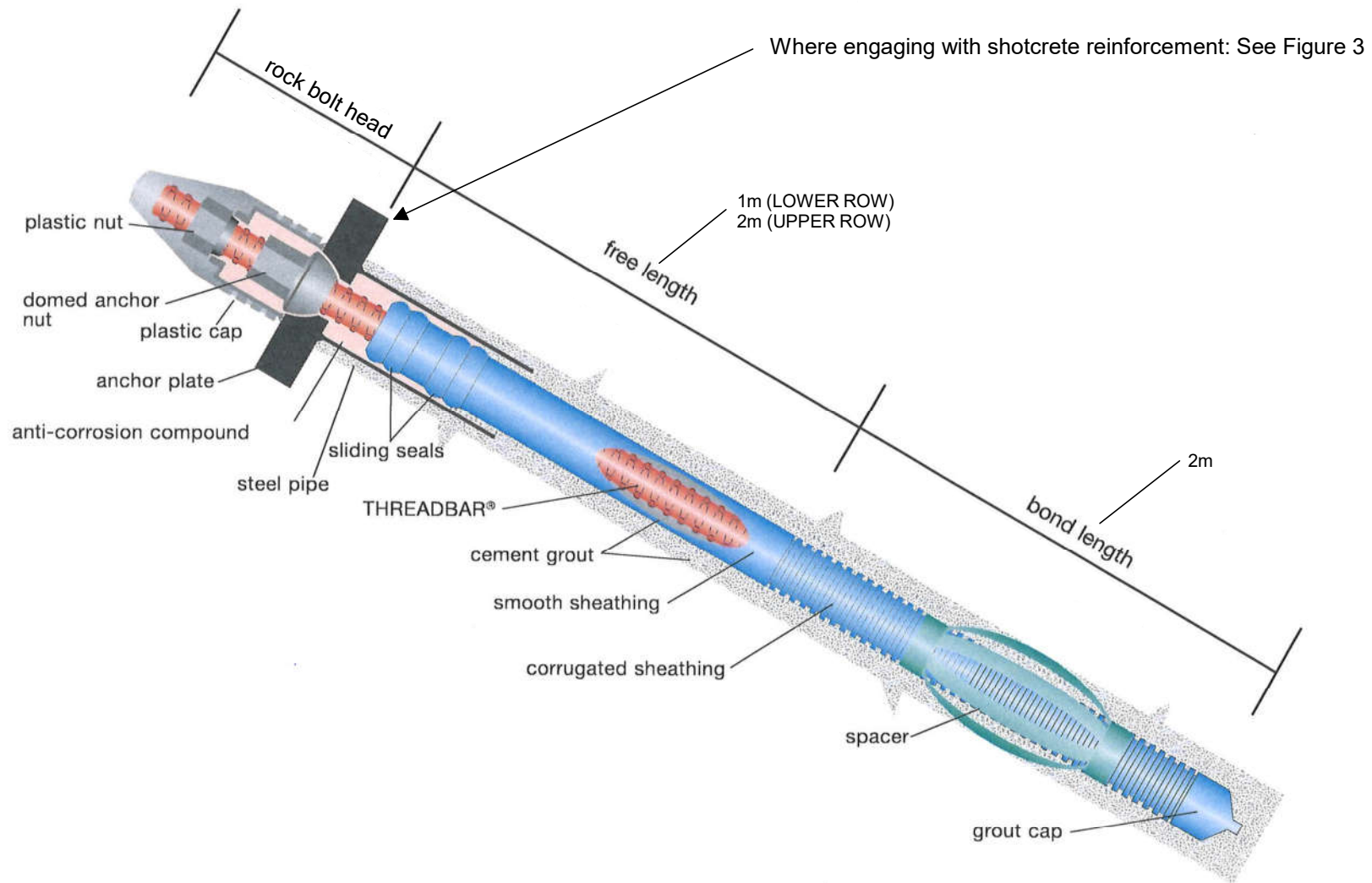
Rate for removing debris, tree stumps/root balls, blocks etc from rock face based on material placed and densely packed in skip bins before removal from site.

Rate for additional works in Council reserve to be based on being completed whilst on site for The Works at

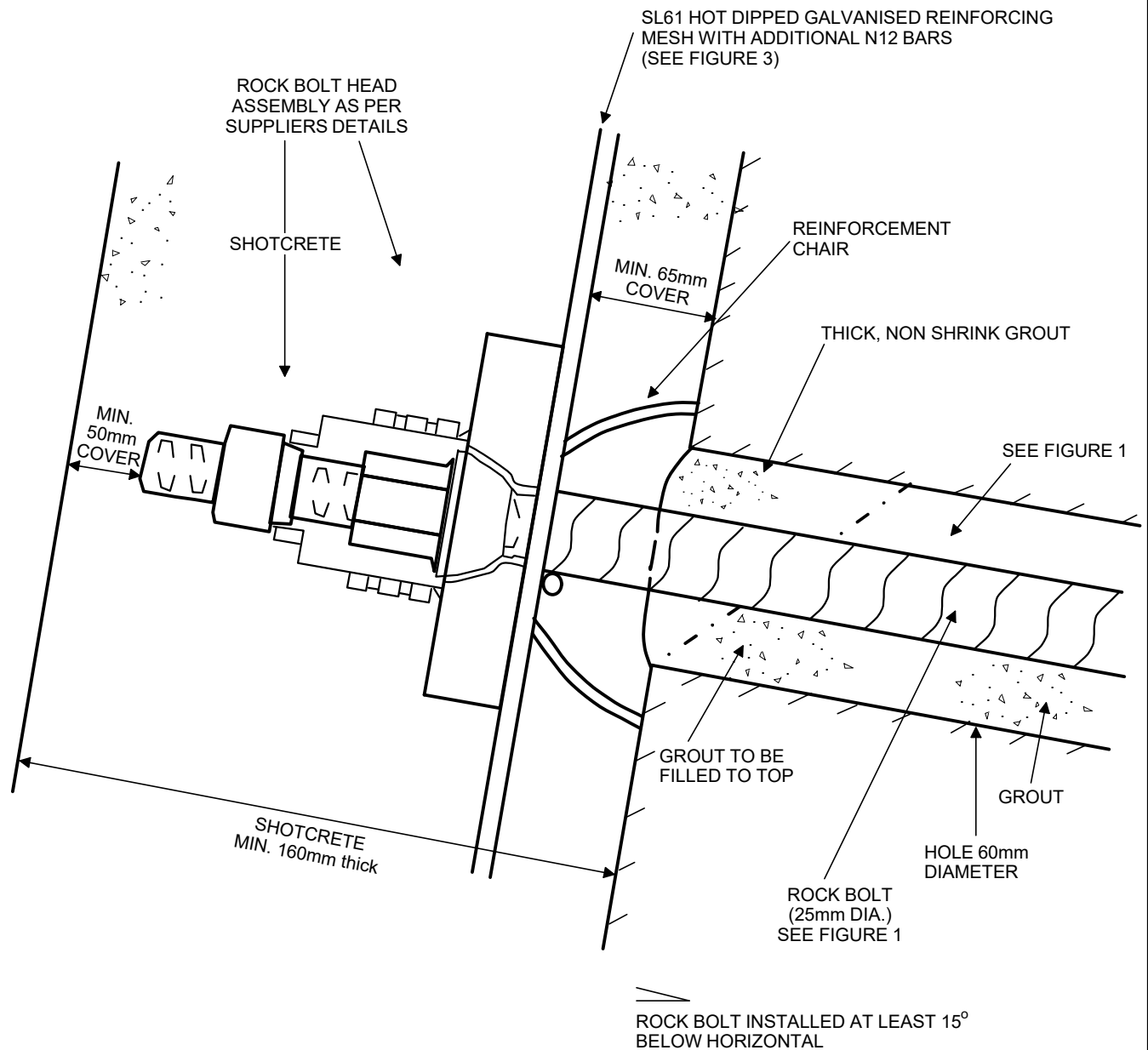
Work As Executed details to include photographs of rock bolts and strip drains prior to placement of shotcrete to clearly indicate location and number of rock bolts. Photographs to be labelled accordingly.

All item rates deemed to include for all requirements of the specification.

Unit rates will be used as basis for costing variations where not covered by the contingency quantities outlined in the table.



ROCK BOLT DETAIL
THREADBAR® with Double Corrosion Protection (DCP)
 (Details courtesy of DSI)



TYPICAL ROCK BOLT HEAD DETAIL: ROCK BOLT SUPPORTING REINFORCED SHOTCRETE

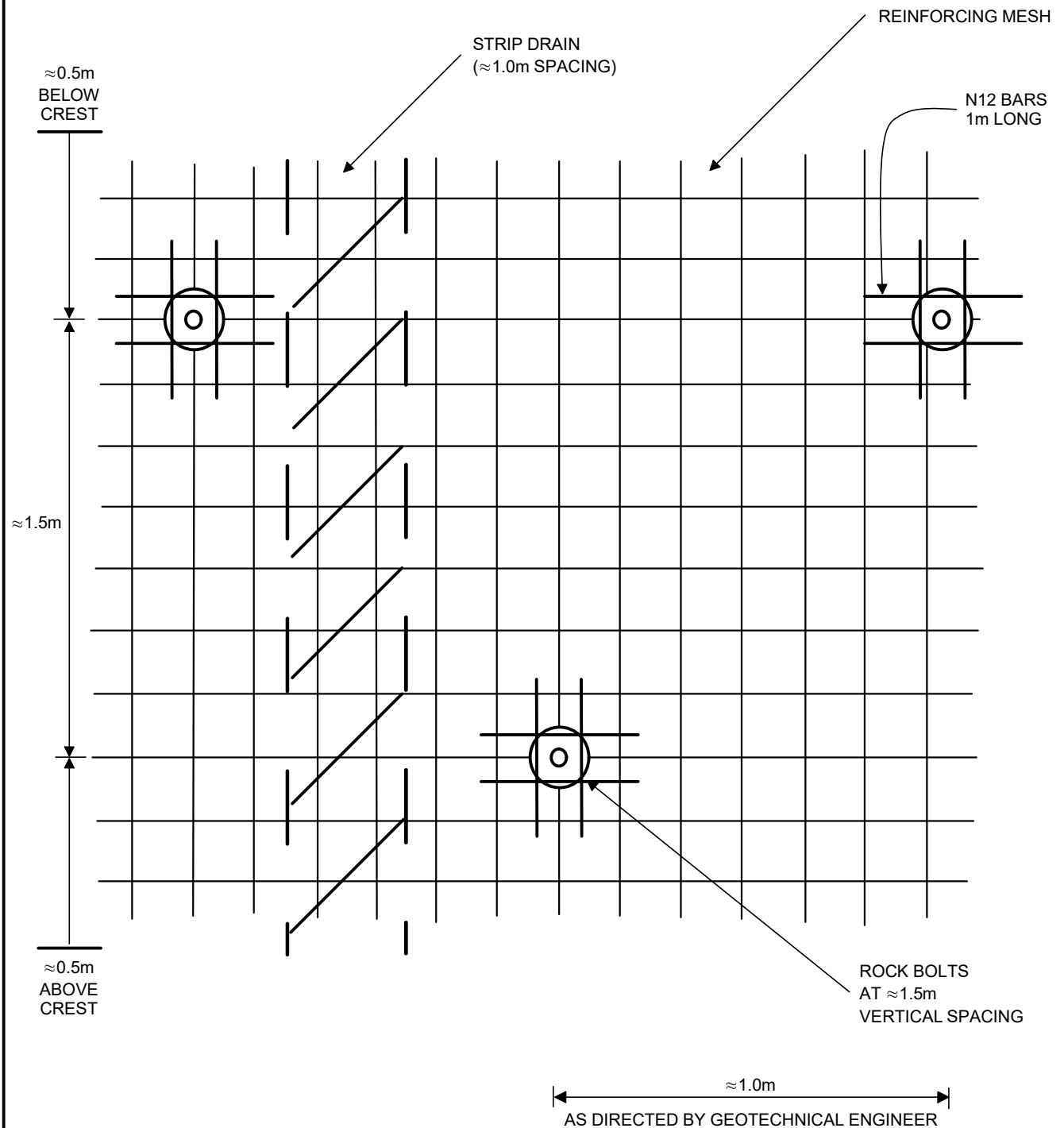
NOT TO SCALE

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Figure No. 2





SHOTCRETE REINFORCING AND STRIP DRAIN DETAIL

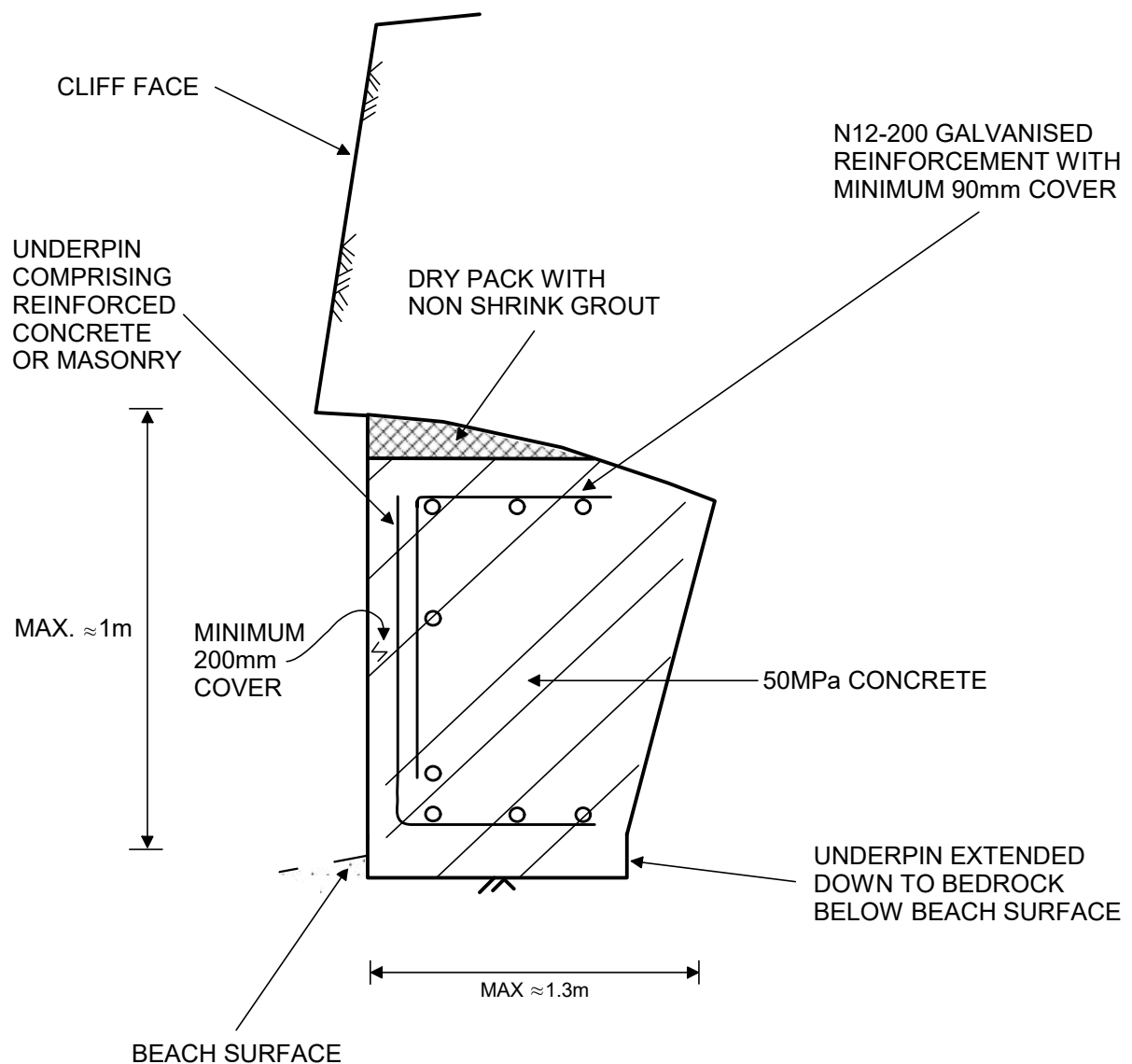
NOT TO SCALE

JKGeotechnics

Report No. 31735R spec

Figure No. 3





NOTES:

- 1) MAXIMUM WIDTH OF UNDERPIN 1.5m
- 2) DO NOT EXTEND HORIZONTAL REINFORCEMENT THROUGH VERTICAL JOINTS AND STOP 90mm FROM EDGE.

TYPICAL DETAIL:
UNDERPIN SUPPORT TO UNDERCUT
AT BASE OF CLIFF FACE

NOT TO SCALE

JKGeotechnics

Report No. 31735R

Figure No. 4



Wollongong City Council
(sent by email only to council@wollongong.nsw.gov.au)

19 October 2020

Information on Proposed Cliff Stabilisation Works at 1 Craig Street Thirroul for Pre-Lodgement Meeting

1. INTRODUCTION AND BACKGROUND

Cliff stabilisation works are proposed along the seaward frontage of 1 Craig Street Thirroul. The document herein has been prepared to outline the need for the proposed works (Section 2), describe the proposed works (Section 3), and to list the responses required from Council (Section 4), as part of an application for a Pre-Lodgement Meeting with Council.

2. NEED FOR WORKS

Aerial photographs of the property, with an approximate boundary depicted in red from NSW Government cadastral data, are provided in Figure 1 (January 2010), Figure 2 (March 2020) and Figure 3 (June 2020).

It is evident in Figure 2 that there was a significant recession of the cliffline from January 2010 to March 2020 at various locations, namely:

- Location A, over a length of 7m over the southern portion of the property and another 5m to the south, with recession of up to about 5m;
- Location B, with recession of up to about 3m¹; and
- Location C, with recession of about 3m (on average) over a length of about 40m to the north of the property.

It is evident in Figure 3 that there was a significant recession of the cliffline due to detachment of blocks from the cliff from March 2020 to June 2020 at two locations south of the property, namely:

- Location D, with recession of up to about 1m; and
- Location E, with recession of up to about 2m.

The works are proposed to reduce the potential for ongoing cliff recession at the subject property, which is both a public safety issue (as the public uses the subject property for access along the top of cliff, with the property not fenced off to the seaward property boundary), and to reduce the risk of property damage at the subject property. It is considered that works on public land to the south of the subject property are also required to maintain this beach access location for public use, and to reduce the risk to public safety.

¹ The recession over the northern portion of Location B is uncertain due to wave action at the time of the 18 March 2020 photograph.



Figure 1: Aerial photograph of 1 Craig Street Thirroul on 12 January 2010, with seaward edge of cliffline delineated in blue



Figure 2: Aerial photograph of 1 Craig Street Thirroul on 18 March 2020, with seaward edge of cliffline delineated in green (12 January 2010 cliffline in blue)



Figure 3: Aerial photograph of 1 Craig Street Thirroul on 26 June 2020, with seaward edge of cliffline delineated in yellow (12 January 2010 cliffline in blue, and 18 March 2020 cliffline in green)

3. DESCRIPTION OF PROPOSED WORKS

The cliff recession mechanism at and adjacent to the subject property appears to be as follows:

- preferential erosion of a thinly bedded siltstone band located about 1.5m below the top of the sandstone cliff, when sand levels are sufficiently low to expose this band;
- this preferential erosion leads to undercutting, eg JK Geotechnics observed a 0.3m to 0.8m high basal undercut extending landward by up to 1.3m on 17 September 2018; and
- this eventually leads to detachment of sandstone blocks above the undercuts, along sub-vertical joint planes.

This mechanism has led to detachment of blocks both at the subject property and at the adjacent Council land at DH Lawrence Reserve to the east of Tasman Parade. The block detachment on the Council land has led to the closure of the stairway at this location by Council.

As per the specification prepared by JK Geotechnics in Attachment 1, the following works are proposed:

- underpinning of undercut areas at the base of the outcrop face with reinforced concrete 'blocks', possibly supplemented with some rock bolting to secure individual blocks (see photograph of existing undercutting in Figure 4);
- infilling of open joints along the outcrop crest area with concrete or grout to prevent wave overtopping, rainfall, surface run-off and stormwater discharges from entering the joint planes and possibly imparting additional destabilising hydrostatic pressures on individual blocks (see photograph of existing exposed joints in Figure 5); and
- repairing an existing steeply sloping concrete face with shotcrete and rock bolts (see photograph of this existing face in Figure 6).



Figure 4: Examples of undercut areas (at arrows) at cliff at subject property (photograph taken 2 January 2018)



Figure 5: Examples of sub-vertical joints (extending between arrows) on cliff at subject property (photograph taken 26 August 2020)



Figure 6: Existing concrete face proposed to be repaired with shotcrete and rock bolts (photograph taken 2 January 2018)

Preventing further detachment of blocks is a public safety benefit (as members of the public access the property), and also reduces the risk of damage to the subject property from undermining and additional landward propagation of wave action. These works would not have significant environmental impacts if appropriate construction environmental controls are applied.

4. RESPONSES REQUIRED FROM COUNCIL

It is considered that the works should be classified as “environmental protection works” as per *Wollongong Local Environmental Plan 2009*. As defined therein:

“environmental protection works means works associated with the rehabilitation of land towards its natural state or any work to protect land from environmental degradation, and includes bush regeneration works, wetland protection works, erosion protection works, dune restoration works and the like, but does not include coastal protection works”.

It is considered that the works are associated with retaining the natural state of the cliff face and preventing its further degradation, and are essentially “erosion protection works”. The subject property is zoned as E4, and “environmental protection works” are permissible in this zone.

The works are not considered to be “coastal protection works”, which would apply if the location was a sandy beach area rather than being subject solely to geotechnical hazards. None of the definitions of “coastal protection works” in the *Coastal Management Act 2016* apply at the subject property, namely:

- no beach nourishment activities or works are proposed; and
- the works do not comprise seawalls, revetments or groynes, but rather underpinning and joint filling at the tidal interface.

Furthermore, the works cannot cause increased erosion of the beach or adjacent land, and nor do they require funding for restoration and maintenance, making the *Coastal Management Act 2016* not applicable to the proposed works.

It is requested that Council geotechnical engineer, Peter Tobin, is present at the Pre-Lodgement Meeting, as he is aware of the site issues and has discussed them with Peter Horton of Horton Coastal Engineering and Paul Roberts of JK Geotechnics previously.

Hence, the specific responses required from Council are as follows:

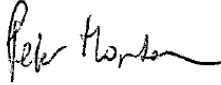
1. Will Council accept that the works are “environmental protection works”?
2. Can Peter Tobin be present at the Pre-Lodgement Meeting?
3. Does Council have any specific concerns with the proposal?
4. What documentation will Council require for the DA?
5. Given the similar issues at the adjacent Council land, would the owner’s contractor be permitted to do similar works there, or, if not, would Council implement these works to preserve the limited available remaining area for public beach access at DH Lawrence Reserve?

5. SALUTATION

If you have any further queries, please do not hesitate to contact Peter Horton via email at peter@hortoncoastal.com.au or via mobile on 0407 012 538.

Yours faithfully

HORTON COASTAL ENGINEERING PTY LTD



Peter Horton

Director and Principal Coastal Engineer

This report has been prepared by Horton Coastal Engineering Pty Ltd on behalf of and for the exclusive use of David and Natalie Burroughs (the client), and is subject to and issued in accordance with an agreement between the client and Horton Coastal Engineering Pty Ltd. Horton Coastal Engineering Pty Ltd accepts no liability or responsibility whatsoever for the report in respect of any use of or reliance upon it by any third party. Copying this report without the permission of the client or Horton Coastal Engineering Pty Ltd is not permitted.

Refer to Attachment 1, *Specification for Foreshore Cliff Face Stabilisation Measures at 1 Craig Street, Thirroul, NSW*, prepared by JK Geotechnics



DATE OF DEFERRAL	Tuesday, 8 March 2022
PANEL MEMBERS	Chris Wilson (Acting Chair), Angus Gordon, Greg Britton and Michael Mantei
APOLOGIES	David Brown
DECLARATIONS OF INTEREST	None

Papers circulated electronically on 15 February 2022.

MATTER DEFERRED

PPSSTH-103 – Wollongong – DA-2021/1071 at 1 Craig Street, Thirroul – Cliff stabilisation coastal protection works (as described in Schedule 1).

REASONS FOR DEFERRAL

The panel unanimously agreed to defer the determination of the matter until further information and clarification of the following issues is provided:

- Potential for “end” effects arising from the proposed works
- Potential for enhanced wave reflection arising from the proposed works
- Ability of the proposed works to withstand the wave forces that occur at this location
- The “design life” of the proposed works, which is relevant to formulating conditions to be imposed on the consent for the life of the works (for example a time-limited consent, and/or maintenance requirements for the life of the works) in accordance with Section 27 of the *Coastal Management Act 2016*.

The Panel has requested the following matters be addressed to allow for finalisation of their determination:

- An illustration in plan view of the location and extent of all proposed works. Ideally, this could be overlain on the detailed survey plan provided in the Council Assessment Report. This illustration should clearly identify the extent of shotcrete to be placed, particularly over existing cliff and boulders on the foreshore.
- An illustration in elevation view of the extent of all proposed works along the eastern (seaward) boundary of the site. Ideally, this would be as a photo montage clearly showing all stabilisation elements to be placed on the existing cliff and rock face, the extent of the shotcreting and any other concrete elements along width of the eastern boundary; and any works at or around the existing stormwater outlet at the north-eastern corner of the Lot.
- A clear description of:
 - The design life of the works
 - The potential for “end” effects from the proposed works/structures that may result in enhanced erosion to adjacent land. In particular, the Lot immediately adjacent to the north appears to be composed of more erodible materials, and there is currently evidence of previous landslips in the form of soil, rocks and other debris in this location.
 - The potential for enhanced wave reflection from the works, for example, where the shotcreting may reduce the roughness and “blockiness” of the existing cliff and rock profile in this location.
 - The wave forces that the proposed works may be subject to over its design life, and any mitigation measures proposed, for example, limits to design life, maintenance, and/or monitoring provisions.
 - Any other potential changes to coastal processes and hazards arising from the works.





The Panel also seeks the original report referenced in the SoEE:

- Horton Coastal Engineering, 2020, *Information on Proposed Cliff Stabilisation Works at 1 Craig Street Thirroul for Pre-Lodgement Meeting*, Doc Ref: IrJ0134-1 Craig St Thirroul PLM-v3.docx

The Panel seeks the above information from the applicant to be provided to Council by **5pm Friday 18th March 2022**, in order to expedite a determination on this matter.

The Panel expects Council to update or provide an addendum to their assessment report to incorporate the further information and respond to the matters raised above within **1 week** of receipt of the material from the applicant.

If the revised information is not provided and included into the Assessment report by **5pm Friday 25th March 2022**, the Panel may move to determine the DA based on the information currently at hand. When this information has been received, the panel will determine the matter electronically.

PANEL MEMBERS	
 Chris Wilson (Chair)	 Angus Gordon
 Greg Britton	 Michael Mantei

SCHEDULE 1		
1	PANEL REF – LGA – DA NO.	PPSSTH-103 – Wollongong – DA-2021/1071
2	PROPOSED DEVELOPMENT	Cliff stabilisation coastal protection works
3	STREET ADDRESS	1 Craig Street, Thirroul
4	APPLICANT/OWNER	Jarrold Etherington
5	TYPE OF REGIONAL DEVELOPMENT	Certain Coastal Protection Works
6	RELEVANT MANDATORY CONSIDERATIONS	<ul style="list-style-type: none"> Environmental planning instruments: <ul style="list-style-type: none"> State Environmental Planning Policy No. 55 – Remediation of Land State Environmental Planning Policy (Infrastructure) 2007 State Environmental Planning Policy (State and Regional Development) 2011 State Environmental Planning Policy – (Costal Management) 2018 Wollongong Local Environmental Plan 2009 Wollongong City-Wide Development Contributions Plan 2021 Wollongong Community Participation Plan 2019 Draft environmental planning instruments: Nil Development control plans: <ul style="list-style-type: none"> Wollongong Development Control Plan 2009 Planning agreements: Nil Provisions of the Environmental Planning and Assessment Regulation 2000: Nil Coastal zone management plan: <ul style="list-style-type: none"> Coastal Management Act 2016 No. 20 The Coastal Management Amendment Act 2021 Wollongong Coastal Zone Management Plan 2017 The likely impacts of the development, including environmental impacts on the natural and built environment and social and economic impacts in the locality The suitability of the site for the development Any submissions made in accordance with the Environmental Planning and Assessment Act 1979 or regulations The public interest, including the principles of ecologically sustainable development
7	MATERIAL CONSIDERED BY THE PANEL	<ul style="list-style-type: none"> Council Assessment Report: 1 February 2022, which included direct reference to the SoEE (BMT, 2021) and associated technical reports (JK Geotechnics, 2021), and site survey plan (2021) Written submissions during public exhibition: Nil
8	MEETINGS, BRIEFINGS AND SITE INSPECTIONS BY THE PANEL	<ul style="list-style-type: none"> Site inspection: 22 February 2022 <ul style="list-style-type: none"> Panel members: Chris Wilson (Acting Chair), Angus Gordon, Greg Britton, Michael Mantei Council assessment staff: Sharyn Grant and John Woods Final briefing to discuss council's recommendation: 22 February 2022 <ul style="list-style-type: none"> Panel members: Chris Wilson (Acting Chair), Angus Gordon, Greg Britton, Michael Mantei Council assessment staff: Sharyn Grant and John Woods
9	COUNCIL RECOMMENDATION	Approval
10	DRAFT CONDITIONS	Attached to the Council Assessment Report